

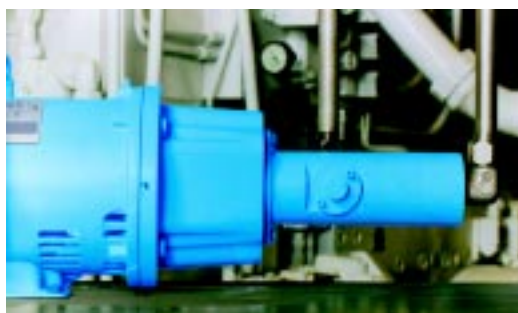


# Rotary and Centrifugal Pumps

*The reliable pump people*



ALLHEAT® series pump in heat transfer fluid service - Germany



3G series pump in compressor lube service - Buffalo, NY, USA



CIG series pumps in hydraulic service - Detroit, Michigan, USA



8L and 12D series pumps in crude oil service - Alberta, Canada

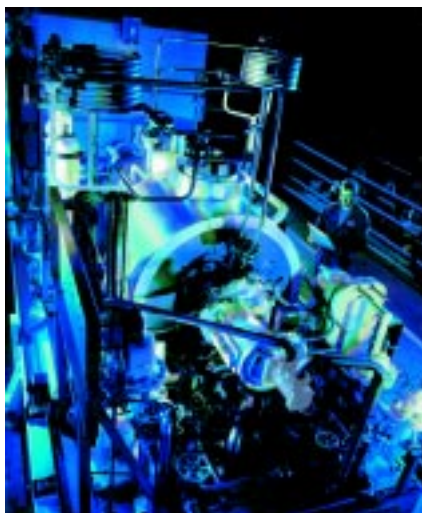


6D series pumps in crude oil service - Pacific Rim

## Imo Rotary & Centrifugal Pumps Quick Selection Guide

PUMP SERIES	PROCESS/TRANSFER	FUEL	LUBE	SEAL	FLUID POWER	HIGH-PRESSURE MACHINE TOOL COOLANT	CORROSIVE/WATER	HOT WATER	PUMP TYPE	APPROXIMATE FLOW RANGE		MAXIMUM DISCHARGE PRESSURE	
										(USGPM)	(L/MIN)	(PSIG)	(BAR-G)
3E	•	•	•	•	•	•	•	•	Three Screw	1-100	4-379	150	10
UCF	•	•	•	•	•	•	•	•		120-800	454-3028	175	12
3G	•	•	•	•	•	•	•	•		1-200	7-757	250	17
3R	•	•	•	•	•	•	•	•	Three Screw	150-1100	568-4164	300	21
3D	•	•	•	•	•	•	•	•		5-400	19-1514	500	34
324A	•	•	•	•	•	•	•	•		50-900	189-3407	500	34
SN	•	•	•	•	•	•	•	•		300-1000	1136-3785	500	34
323F	•	•	•	•	•	•	•	•		400-3500	1514-13240	500	20
T324	•	•	•	•	•	•	•	•		300-800	1136-3028	700	48
TRITEC	•	•	•	•	•	•	•	•	Crescent Internal Gear	10-280	38-1060	1160	80
EMTEC	•	•	•	•	•	•	•	•		4-260	15-984	1300	90
110H	•	•	•	•	•	•	•	•		2-7	8-26	1500	103
6D	•	•	•	•	•	•	•	•		5-400	19-1514	1500	103
4T	•	•	•	•	•	•	•	•		15-175	57-662	1500	103
8L	•	•	•	•	•	•	•	•		250-950	946-3596	1500	103
210H	•	•	•	•	•	•	•	•		7-16	26-61	2000	138
4UV	•	•	•	•	•	•	•	•		15-175	57-662	5000	345
12D	•	•	•	•	•	•	•	•		5-400	19-1514	2200	152
6T	•	•	•	•	•	•	•	•		15-175	57-662	2500	172
6UV	•	•	•	•	•	•	•	•		15-175	57-662	3000	207
12L	•	•	•	•	•	•	•	•		15-100	57-379	5000	345
► CIG-2	•	•	•	•	•	•	•	•	Centrifugal	1-6	4-23	5000	345
► CIG-3	•	•	•	•	•	•	•	•		4-14	15-53	5000	345
► CIG-4	•	•	•	•	•	•	•	•		8-28	30-106	5000	345
► CIG-5	•	•	•	•	•	•	•	•		17-56	64-212	5000	345
► CIG-6	•	•	•	•	•	•	•	•		35-113	132-428	5000	345
► CIG-8	•	•	•	•	•	•	•	•		73-122	276-462	5000	345
NSS	•	•	•	•	•	•	•	•	Centrifugal	APPROXIMATE FLOW RANGE		DISCHARGE HEAD	
▲ ALLHEAT	•	•	•	•	•	•	•	•		(USGPM)	(M3/H)	(FEET)	(METERS)
	•	•	•	•	•	•	•	•		to 2600	to 600	300	90
	•	•	•	•	•	•	•	•		to 2900	to 660	475	145

- Higher flows available by combining two or three pumps on a single drive shaft. Multistage pumps available for handling a broad range of fluid viscosities.
- ▲ For pumping thermal oil at temperatures to 662°F (350°C) or hot water at temperatures up to 405°F (207°C).



3E series centrifugal pump in lubrication service - North Sea



Vertical, Magnetic Drive 3D-250 pump on chemical service - Freeport, Texas, USA



## Design Philosophy

The lmo 3-Screw pump is a positive displacement rotary design consisting of a rotor housing which envelopes the drive screw or power rotor, and the sealing screws, or idler rotors. The power rotor is driven and the idler rotors turn due to the action of the fluid being pumped.

The intermeshing of the threads of the 3-screw pump rotors and the close fit of the surrounding housing creates a moving labyrinth seal, which captures fluid and transports it axially. The captured fluid is called a fluid closure (see Figure A). Depending on the length of the screw set and the surrounding housing, there may be a number of fluid closures continually moving axially from the suction side of the pump to the discharge side. The moving fluid closure concept provides the 3-screw pump with its positive displacement capability. The pumping element does not pre-compress the fluid, but merely transports the fluid from the suction port to the discharge port of the pump in a smooth and continuous manner.

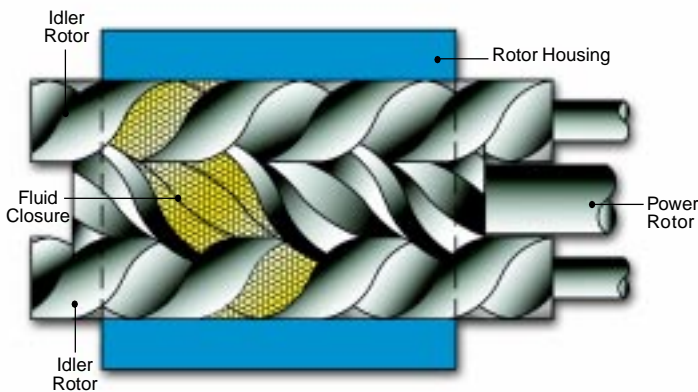


Figure A

Three screw pumps are the largest class of multiple screw pumps in service today. They are commonly used for:

- Machinery Lubrication
- Hydraulic Elevators
- Fuel Oil Transport and Burner Service
- Powering Hydraulic Machinery
- Refinery Processes for High Temperature Products such as asphalt, vacuum tower bottoms and residual fuel oils
- Crude Oil Pipeline Service as well as gathering, boosting and loading of barges and ships.
- They are common in engine rooms on most of the world's commercial marine vessels and many combat ships.

Designs are available in sealless configurations such as magnetic drives and canned motor arrangements. The magnetic drive screw pump is used extensively for pumping isocyanate, a component of urethane, as well as other difficult environmentally unfriendly fluids.



lmo 3-screw pumps are also used for water injection services (TRITEC Series), as well as high pressure machine tool coolants (EMTEC Series).

Symmetrical pressure loading on the power rotor eliminates the need for bearings to absorb radial forces. The idler rotors generate a hydrodynamic (see Figure B) film while rotating in the surrounding housing bore which provides the radial support similar to journal bearings.

In most designs, axial loads on the power rotors and idler rotors, created by differential pressure, are hydrostatically balanced, increasing pump life dramatically.

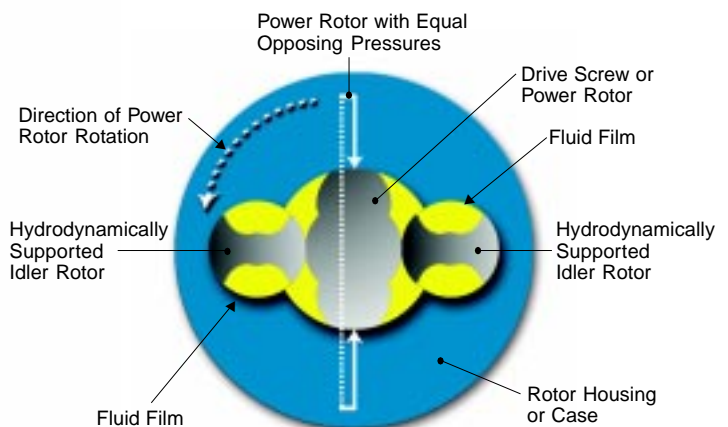


Figure B

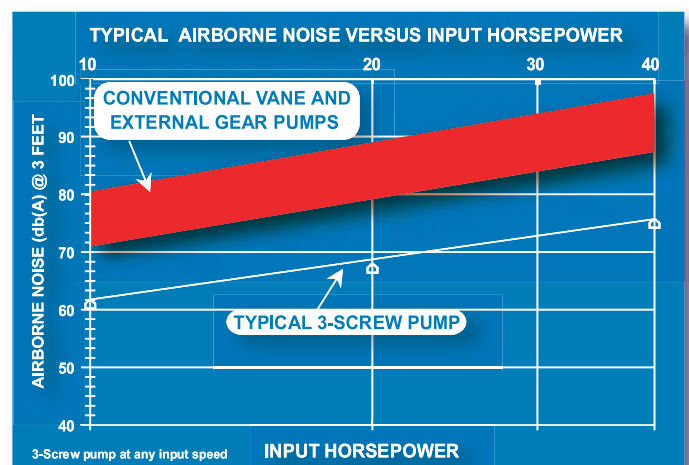


Figure C

## Pump Features

- **Low Pressure Ripple**

A screw pump typically provides pressure pulsations less than 1% RMS at operating pressure. This is significantly lower than many other pump types such as the vane or external gear.

- **Long Life**

A screw pump typically provides 10 times the life of other pump designs under a wide variety of operating environments and fluids. Idler rotors are torque compensated so they do not transmit any torque to the power rotor. This ability to achieve long life in a variety of operating environments can be directly attributable to the lack of Hertzian compression stresses during the meshing phase of the screws.

- **Low Contamination Sensitivity**

Typically 3-screw pumps exhibit excellent resistance to flow degradation caused by contamination when compared to other pump designs such as vane or external gear, even when running twice the speed.

- **Low Noise**

The rotor profile used in the screw pump provides a continuous smooth output flow, reducing pressure pulsations to a negligible amount, which in turn, lowers airborne, fluid-borne and structure-borne noise as shown in Figure C.

- **Excellent Suction Lift**

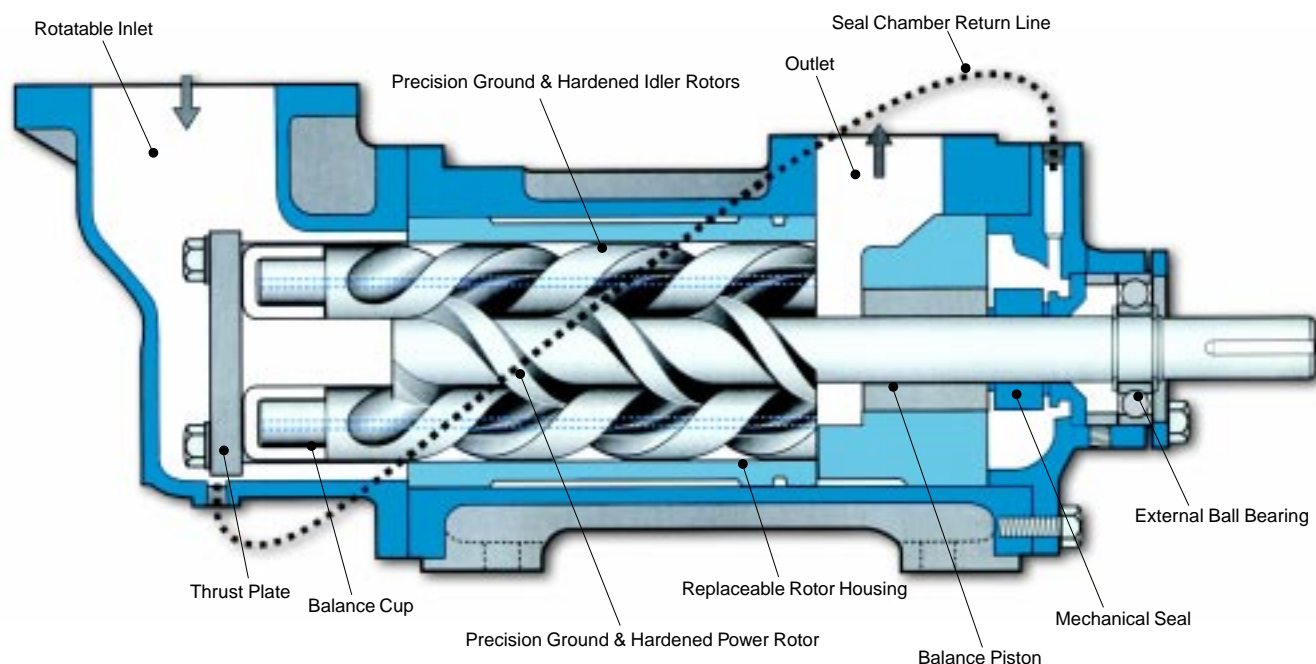
The small peripheral diameters of the rotors and the low axial velocity of the fluid provide excellent suction lift performance compared to other pump designs providing similar output flows. This gives the 3-screw pump an inherent advantage in negative suction pressure applications allowing the pumping of higher viscosity fluids at much higher speeds than vane or external gear style pumps.

- **Low Horsepower Consumption**

The small peripheral diameters of the rotors and low fluid axial velocities reduce fluid shearing within the pump and therein reduce horsepower consumption while operating on high viscosity fluids.

- **Excellent Scavenge Performance**

The geometry of the rotors utilized in our 3-screw product provides inherent advantages in scavenge applications. The centrifugal action of the screw profile forces fluid to the outside diameter of the screws. This centrifugal action of the screws, combined with the positive displacement feature provides superior hydrodynamics in environment where high levels of entrained and soluble air are encountered.



3D Series Pump (Typical)

## Design Philosophy

The success of the CIG series pump lies in the fundamental design principle of using hydrodynamic lift to separate all moving contact areas. This internal gear design does not use any axial or radial compensation, virtually eliminating contamination potentially caused by axially loaded side plates or radial thrust shoe designs. The only loaded parts are the sleeve bearings of the drive shaft and the housing surrounding the outer ring gear, which also acts as a sleeve bearing.

The "hydrodynamic lift", or fluid film support, is created through the friction of the fluid media. This is formed between the shaft bushing and the shaft and also between the ring-gear outside diameter and gear housing inside diameter. This hydrodynamic lift prevents metal-to-metal contact between the stationary and rotating components, therefore there is no metal contact or wear. The ring gear and shaft float on a film of the fluid being pumped.

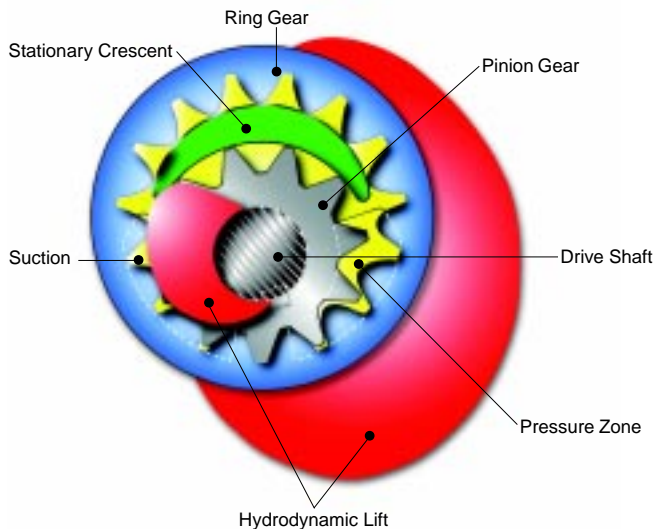


Figure A

For the sake of completeness, it should be mentioned that the gear teeth do touch each other along a given line. At this point, metal-to-metal contact cannot be avoided. This problem, however, is solved with a special patented gear tooth profile, which greatly reduces the Hertzian compression stresses (gear tooth contact loads) on the gear flanks compared to an Involute profile. Also, the relative velocities in the area of the largest forces on the gear teeth are kept small in the relationship to the strength of the material.

CIG pumps are commonly used for lubrication, scavenge, high-pressure fuel and hydraulic applications in mobile or stationary environments. The product is capable of handling a broad range of fluids with low or high viscosities at flow rates from 1 to 115 GPM (3.8 to 435 liters/minute) in a single pump. Multiple pumps can be provided on a single drive shaft to save space.

## Pump Features

- **Low Pressure Ripple**

Typically less than 1% peak to peak at maximum pressure performance.

- **Long Life**

This can be directly attributed to the patented gear tooth profile and its low Hertzian compression stresses during the meshing phase of the gears, along with the incorporation of the hydrodynamic principle.



- **Low Contamination Sensitivity**

Typically, CIG pumps exhibit excellent resistance to flow degradation when compared to many other pump designs. Durable materials, along with design simplicity, provide outstanding durability.

- **Low Noise**

Typically less than 68 db(A) for most applications. The patented gear tooth profile used in the CIG product reduces trapped fluid and backlash in the gears reducing pressure pulsations, which in turn lowers airborne noise.

- **Wide Speed Range**

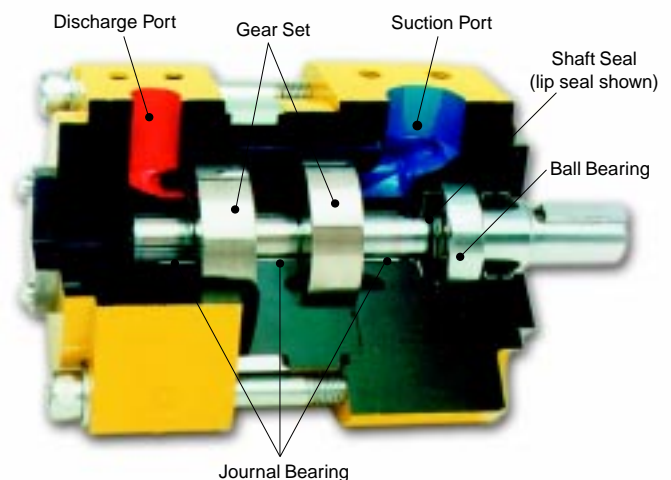
The CIG pump can operate at high speed without a suction boost, with excellent suction lift characteristics.

- **Modular Design**

Available in single pumps, double pumps or triple pump configurations where each pump shares a common drive shaft requiring only one driver and saving space.

- **Wide Application Range**

Able to handle fluids with viscosities as low as 0.2 cSt and is applied at pressures up to 5000 PSI (345 BAR).



High-Pressure CIG Pump



## Design Philosophy

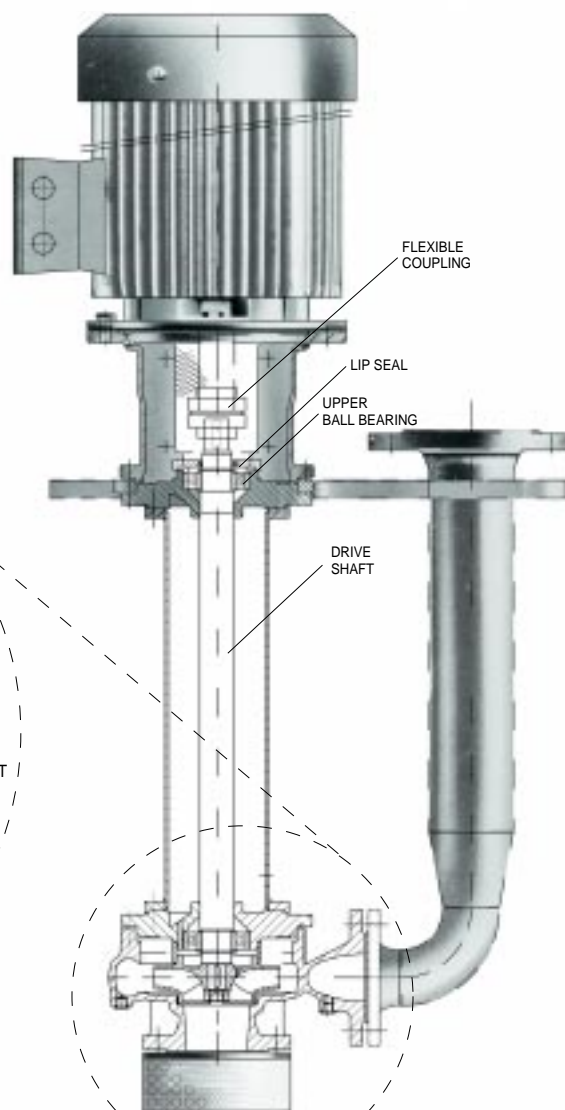
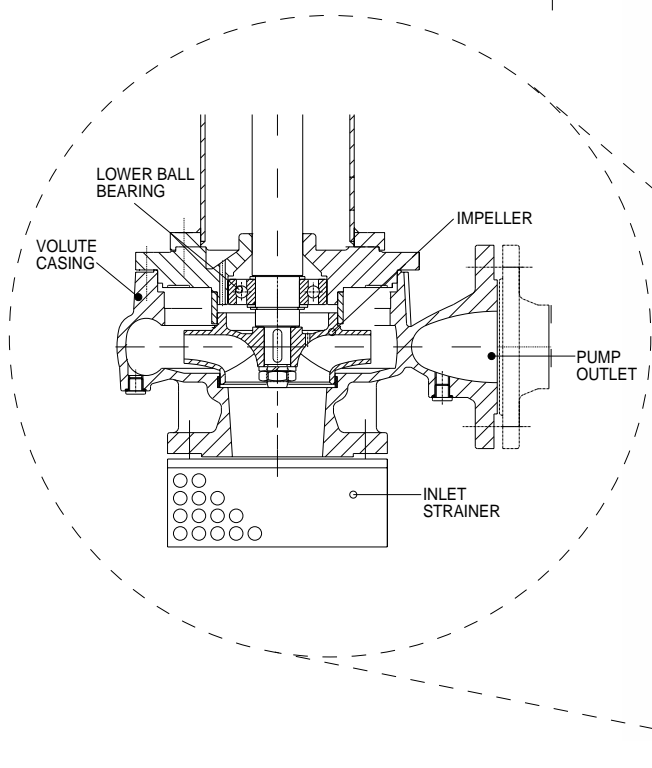
The NSS series of centrifugal pumps is intended for vertical, tank mounted lubrication services where medium to large flow rates are required at relatively low discharge pressures.

Packages are designed to suit customer specific tank depth. Piping can be sized and oriented to suit system requirements. Typically, pumps have no shaft seal, are extremely simple and use modern impeller designs for optimum performance.

Although standard designs are available, NSS pump assemblies can be designed and made to order. Size and shape of the tank mounting plate can be specified as square, rectangular, round, etc. The discharge connection can face in any direction including a return downward and back through the mounting plate. Piping size and outlet flange type, size and facing can all be specified to suit customer requirements. An optional discharge check valve can also be supplied.



Main and standby NSS pumps on lubrication service



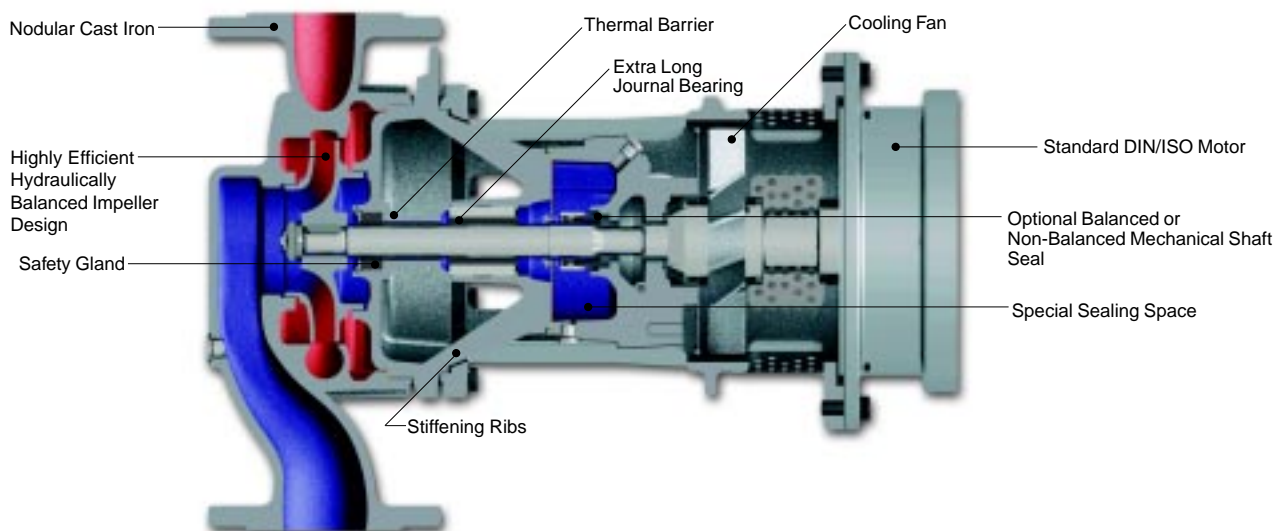
NSS Series Tank Mounted Lube Oil Pump

The ALLHEAT® series centrifugal pump was designed specifically for the safe pumping of hot fluid medias. This versatile and universally applied pump series offers the best technical solution at an excellent price for pumping mineral and synthetic thermal oils at temperatures up to 660°F (350°C) or hot water up to 405°F (207°C). The main features this product brings to the marketplace include:

- Low Viscosity Capability
- Excellent Price/Performance Ratio
- Robust mechanical design, which minimizes axial thrust, with long life rolling bearings.
- No additional cooling required for seal chamber or bearings
- High efficiency
- Balanced or unbalanced, maintenance free standard mechanical seals
- Long life and low maintenance
- Constant velocity coupling for special applications
- Available in foot mount pump-to-motor (NTWH/CTWH) or integrated pump to motor designs (NIWH/CIWH)
- Integrated pump-motor design available (NIWH/CIWH), includes an integrated seal chamber cooling fan (external to pump)



The ALLHEAT® concept is also available in a space saving block and in-line design. The drive motor is flange mounted directly to the pump. The ALLHEAT® in-line pump can also be simply installed into the piping system without the need for any separate support.



Space Saving Centrifugal Hot Oil Pump Design  
Horizontal or Vertical Installation (with Motor Facing Upwards)

Series	Performance Data—Process Model		Performance Data – Block and In-Line Model	
	NTWH	CTWH	NIWH	CIWH
<b>Maximum Output</b>	up to 2906 GPM (660 m3/h)	475.7 ft. (145 m)	up to 969 GPM (220 m3/h)	up to 462 GPM (105 m3/h)
<b>Maximum Head</b>	328 ft. (100 m)	475.7 ft. (145 m)	302 ft. (92 m)	190 ft. (58 m)
<b>Allowable Housing Pressure</b>	232 PSIG (16 bar)	232/363 PSIG (16/25 bar)	232 PSIG (16 bar)	232/363 PSIG (16/25 bar)
<b>Material</b>	EN-GJS-400-15 (GGG-40)	EN-GJS-400-18LT (GGG-40.3)	EN-GJS-400-15 (GGG-40)	EN-GJS-400-18LT (GGG-40.3)
<b>Temperature of Fluid Media</b>			<b>Temperature of Fluid Media</b>	
<b>Thermal Oil</b>	662°F (350°C)	662°F (350°C)	662°F (350°C)	662°F (350°C)
<b>Hot Water</b>	361°F (183°C)	361/405°F (183/207°C)	361°F (183°C)	361/405°F (183/207°C)

Imo Pump is proud to be a member of the Colfax Pump Group associated with Allweiler Pump of Radolfzell, Germany, Houttuin Pump of Utrecht, The Netherlands, Warren Pump of Warren, Massachusetts, USA, providing World-Class fluid handling equipment and services to a global market.

Imo Pump means in a word, Performance. Imo Pump's "Performance Over Time" provides the best overall value by providing low maintenance or lengthy service intervals and efficient product operation or low energy costs, which results in the lowest "Total Cost of Ownership".

All of Imo Pump's products are designed to be of "Heavy Duty - Industrial Grade" construction and certain models are designed specifically for "Severe Duty" services such as Marine, Power Generation or Process Applications.

Imo Pump is fully qualified to respond on all of the imposed quality and design standards provided, such as Military Standards, ABS, ANSI, ASME, SAE, ISO-9000, CE, UL, CSA, NEMA and ISO, among others.

Imo Pump maintains a fully qualified staff of experienced Application Engineers, Technical Sales Engineers, Product Engineers, Service Engineers and Draftsmen capable of handling the most demanding applications.

We are responding to our customer needs with efficient, reliable products capable of handling a wide range of fluids over a long service life.

*Our QuickServe Department processes internet and credit card orders. Most repair kits can be shipped same or next business day delivery saving valuable down time. Visit out our E-Commerce site on the web or call our customer service department to place your order today!*

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**Quality Management System**



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