Lakeside Screw Pumps

Proven design backed by years of reliable operation.

- Wastewater Plant Lift Stations
- Return Activated Sludge
- Storm Water Pumping
- Land Drainage
- Industrial Applications

Lakeside Screw Pumps

Lakeside Screw Pumps are an efficient means of lifting large quantities of water or wastewater at low heads. For municipal wastewater treatment plants, screw pumps offer a variety of applications ranging from return activated sludge to stormwater pumping.

Lakeside Screw Pumps are widely accepted by engineers because of their proven design and trouble-free operation. Lakeside began manufacturing screw pumps in 1969 and since then has installed more than 1,200 screw pumps. Lakeside offers both open and enclosed screw pumps for additional flexibility.

Open Screw Pumps

Lakeside's screw pumps, which are patterned after the Archimedean screw, consist of a tube with spiral flights set in an inclined trough. The entire assembly consists of the spiral screw, an upper bearing, a lower bearing and a drive arrangement. Each of these elements is simple and basic in design. Open screw pumps are normally placed into a concrete, semicir-cular "open" trough. The trough may be constructed at an angle of inclination of 22° to a maximum of 40°.

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Enclosed Screw Pumps

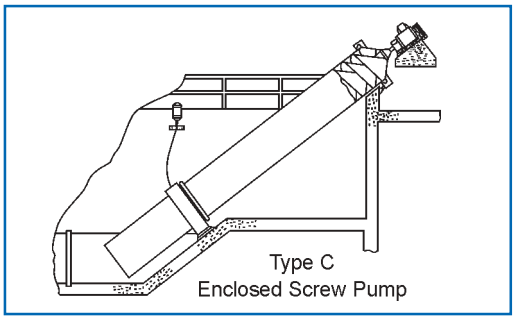
Enclosed screw pumps utilize the same operating principles as open pumps, but are enclosed in a tube rather than in an open trough. Two types of enclosed pumps are available using either rotating or station-ary outer tubes. Pumps available include styles that will operate at a maximum angle of 45° producing the shortest horizontal space requirement for a given lift.

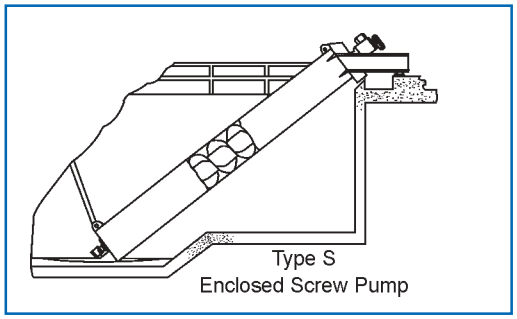
Type C

The Type C screw has two convoluted flights that are welded to the rotating outer tube and the lower hearing is mounted above water level. This design may be built at inclinations of 38° or 45°.

Type S

The Type S is an open screw operating in an outer stationary tube. The top of the stationary tube may be fixed or mounted on a pivot joint to allow raising the lower end. The pivot design may also be used to vary flow rate.





Screw Pump Advantages

Lakeside screw pumps offer many advantages over other types of pumps. Specifically, screw pumps provide greater *freedom from clogging* and high operating efficiencies over a greater range than other pumps. In addition, they offer variable pumping capacity while operating at a *constant speed.*

• *High Efficiency Pumping Lowers Cost of Electric Power.*

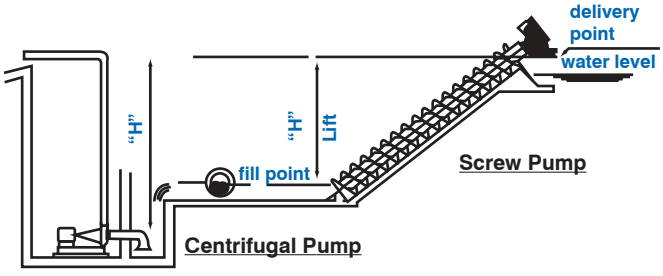
Screw pumps provide efficient pumping over a wide range and *operate economically* down to 30 percent of maximum design capacity. The high efficiency pumping results in *lower electrical costs* over the entire life of the equipment.

• *Only Minimal Maintenance and Upkeep Required.*

Slow operating speeds reduce friction that damages parts and causes heat generation. Only periodic maintenance is needed for oil changes and greasing.

• *Screw Pump Installation Eliminates Need for Wet Well, Reduces Head.*

Screw pumps do not require a wet well, pump house or piping. The screw pump can fit into a channel that is only slightly lower than influent line. This means there is no need for a large wet well to avoid on and off pump operation. By eliminating wet wells, *the total pump head is reduced* which in turn lessens total power requirements.

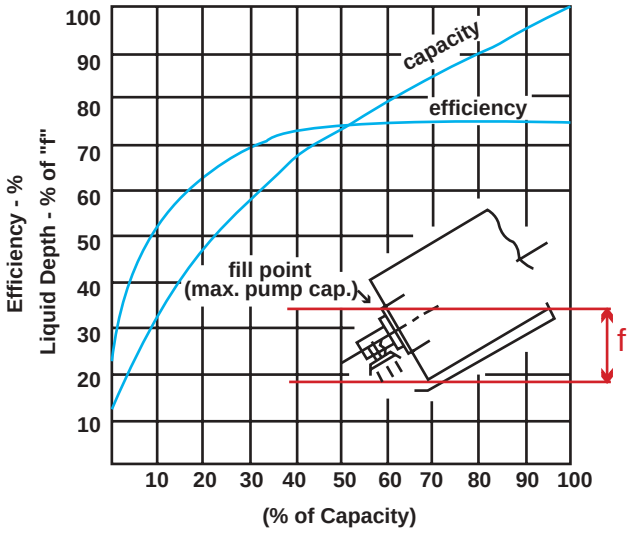


• *Screw Pumps Handle Large Objects So Pumps Won't Clog.*

Screw pumps require *no prescreening* and pass any debris as large as the gap between screw flights. The screw pump will not clog because it rejects large objects.

• *Variable Capacity Reduces Initial Costs.*

The pump's built-in variable capacity automatically adjusts the pumping rate and power consumption to the depth of liquid in the inlet chamber while operating at a constant speed. The variable capacity saves money on initial cost by *eliminating* the need for elaborate variable speed electrical controls.



Typical open screw pump performance

Proven Design, Simple Operation

Bearings

Bearing construction is critical to the life of any screw pump. Lakeside engineers have designed and developed the best screw pump hearings available.

Upper Bearing Assembly

The upper bearing assembly is the same for both open and enclosed screw pumps. The assembly consists of a split housing fitted with dual bearings and seals. One bearing, designed specifically for thrust loads, carries the thrust from the pump: The other bearing carries radial loads. The upper shaft is held into the bearing housing by a unique split collar and locking halter design. The split outer housing allows easy internal inspection and access to the bearings. The complete bearing assembly is fully self-aligning in any plane.

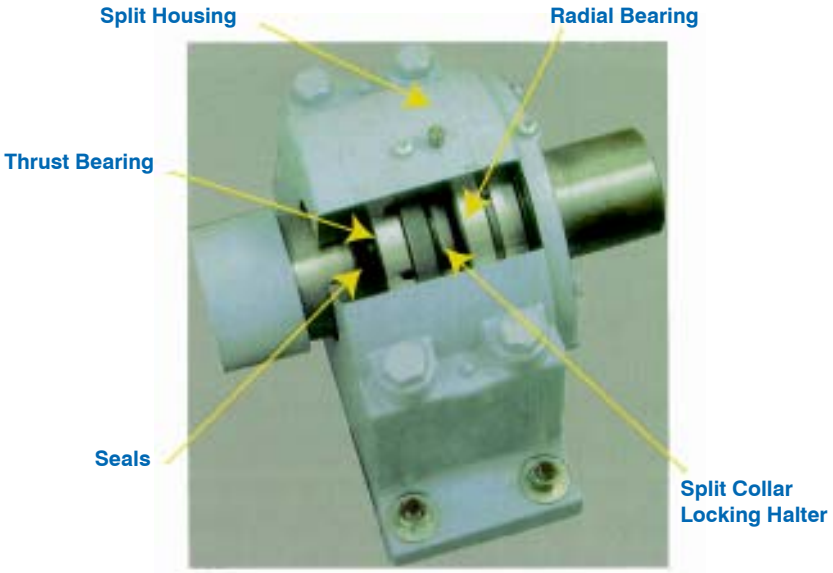


Figure A - The upper bearing features a split housing that allows access to the bearings.

Lower Bearing Assembly

There are two types of lower bearings. The first type (*Figure B*) is used on both open screw pumps and Type S enclosed screw pumps. This assembly is specifically designed to compensate for installation misalignment, operate under water and achieve long life without constant attention. This sleeve bearing is automatically and continuously greased when the pump operates. The bearing compensates for expansion and contraction of the pump due to temperature fluctuations and automatically maintains bearing alignment as the pump deflection changes due to varying loads. The bearings rocker-type base assures uniform distribution of radial load the full length of the bushing. The bushing rotates with the shaft so that wear distributes over tile entire outer circumference. Finally, the design allows for visual inspection of the lubrication system and recovers spent grease to prevent environmental contamination.

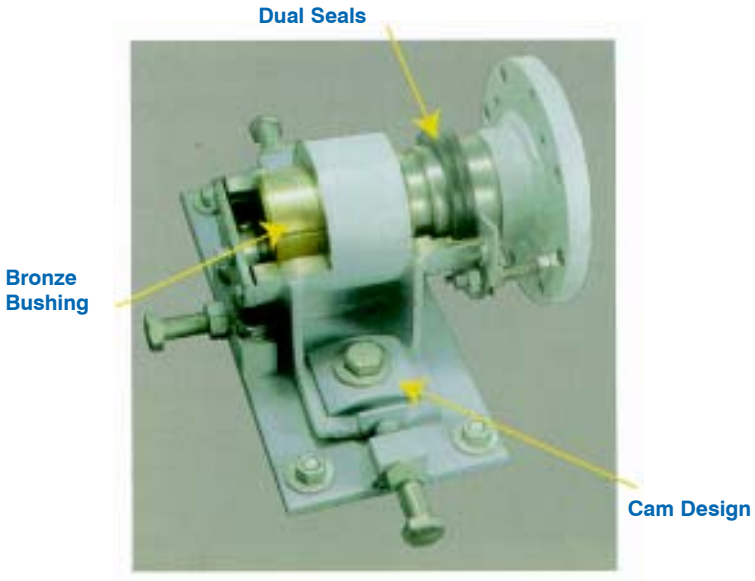


Figure B - Lower bearing assembly for open screw pumps and Type S enclosed screw pumps

The second type of lower bearing (*Figure C*) is used on Type C enclosed screw pumps. This bearing consists of rollers that support a forged, hardened ring that is mounted on the outer rotating tube. To provide for expansion, contraction and variation in deflection, the rollers are mounted in a cradle which is supported on a self-aligning thrust bearing. This arrangement carries the radial load and provides positive tracking of the rollers at all times.

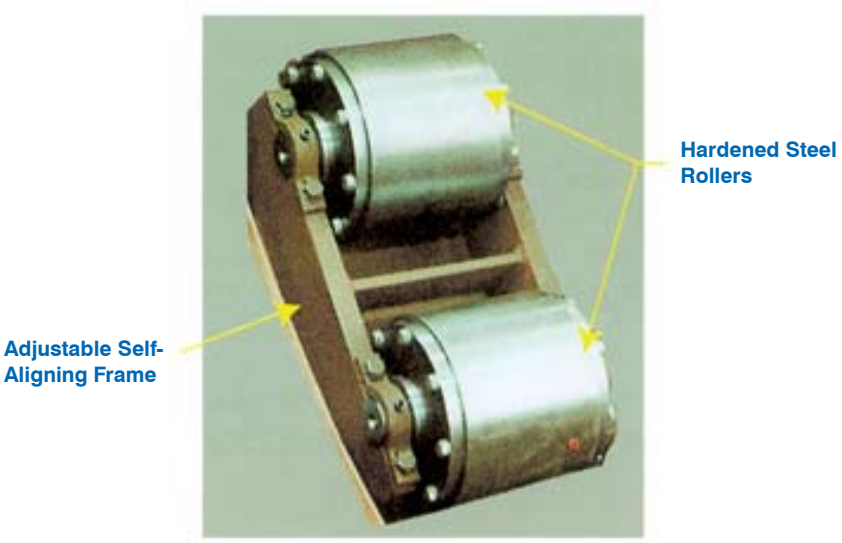


Figure C - Lower bearing assembly for Type C enclosed screw pumps.

Drive

The V-belt drives connect the motor to the speed reducer. The V-belts act as a shock absorber in the drive system to protect the speed reducer from possible shock loads and provide for easy speed changes in the field. Back stops are standard on each speed reducer to prevent high speed reverse rotation if the pump is shut down while fully loaded. The constant speed drive eliminates the need for complex variable speed electrical controls.

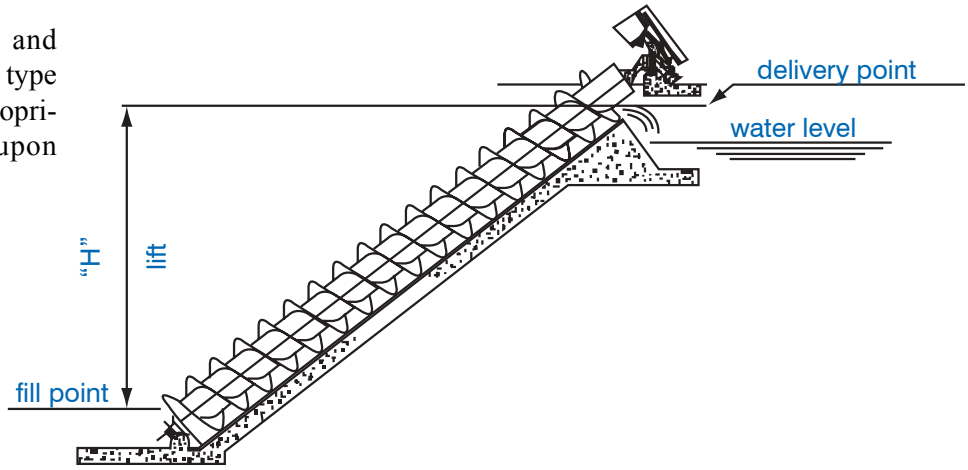
To meet the requirements of any project. Lakeside provides shaft-mounted, concentric and parallel shaft drive arrangements.

Lakeside's V-belts act as a shock absorber in the drive system.

Designing A Screw Pump To Fit Your Needs

Screw Pump Selection

Because of the many styles and individual advantages of each type of screw pump, the most appropriate selection is dependent upon specific application factors. Lakeside engineers are ready and available to discuss advantages, pros and cons of open or enclosed screw pumps, as well as make definite recommendations to best suit your specific requirements.



Capacity of a Screw Pump

The capacity of a screw pump varies with these engineering factors:

- Diameter of the screw
- Speed of the screw
- Number of flights mounted on the torque tube
- Angle of inclination of the screw
- Level of liquid in the influent chamber
- Ratio of the diameter of the torque tube to outside diameter of the screw flights
- Clearance between screw flights and trough

By making adjustments in these performance factors, pump capacity can increase. However, if substantial capacity increases are required, it may be more cost-effective to use multiple screws.

To design a screw pump of the proper size, the following information is needed:

- the maximum flow to be pumped in gpm
- the max mum lift required in feet

To achieve the best efficiency, other engineering factors to be considered are:

- inclination of the screw
- screw speed

Screw Speed

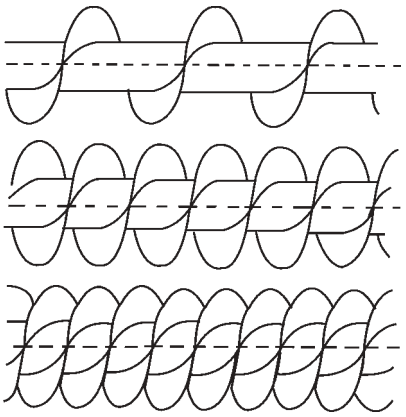
Maximum speed is calculated as the highest rev/min at which liquid will not overflow into the next lower chamber. If the screw speed is increased beyond its maximum, lower efficiency and wasted energy will result. Loss of efficiency will also result if the screw speed is reduced by more than 30 percent of the calculated maximum.

Inclination of the Screw

Lakeside designs open screw pumps with standard inclinations of 30° and 38°. Lakeside can modify the angle of inclination to between 22° and 40° when necessary to achieve a specific combination of capacity and lift.

Increasing the angle of inclination lowers the capacity of the screw approximately 3 percent for each degree of increase. A screw at 30° therefore, will have a greater maximum capacity than one inclined at 38°. Conversely, increasing the angle of inclination increases the maximum lift available. A screw at 38° will have greater available lift than one inclined at 30°.

Selection of a screw pump requires determining an angle of inclination that satisfies both lift and capacity of the specific application. However, certain design adjustments can be made that allow the pump to obtain the same output volume at steeper angles. For example, increasing the number of flights or the speed of the screw (within limitations).



One Flight

Two Flights

Three Flights

Number of Flights

Screw pumps are available in single, double or triple helix designs. Output capacity increases about 25 percent for each helix added. For example. the capacity of a two flight screw would be approximately 125 percent of the same screw with one flight. The three flight screw provides the most capacity in the least space.

Enclosed screw pumps are capable of operating at 45° inclinations.

Motor Horsepower

Screw pump power requirements are based on capacity and lift with consideration to efficiencies of the motor and gear reducer.

Pump capacity varies directly with the pump speed in the upper end of the operating range. Lift is the vertical distance from the filling point to the delivery point. Good design practice dictates selecting the motor so that the pump requirements do not exceed 90 percent of the motor nameplate HP.

Screw Pump Applications

Wastewater Plant Lift Stations

Because screw pumps are non-clogging, they offer high reliability and handle most objects in raw sewage influent.

Return Activated Sludge

The spiral lift is a gentle lift that reduces breakup of activated sludge floc.

Storm Water Pumping

Screw pumps are ideally suited for widely ranging storm flows because of the large capacity. They can take discharge from storm drains or act as standby units to bypass storm flows.

Land Drainage

Screw pumps are particularly useful for pumping large volumes of water over levees.

Industrial

Screw pumps can also be used for pumping where low shear requirements are important.

Screw pumps are non-clogging so they can handle most objects in raw wastewater influent.

The screw pumps gentle spiral lift reduces break up of floc when handling return activated sludge.

Safety

As with all rotating equipment, every precaution should be taken to prevent people, vehicles, etc., from entering the pumping area. A few precautions include covering the pit with sturdy grating, erecting handrails or barriers between the trough and the service stairs and arranging the control equipment so that the screw cannot start accidentally.

Sturdy grating or covers and handrails are suggested safety precautions.

LAKESIDE
Water Purification Since 1928

Lakeside Equipment Corporation

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