

Pump design impacts both the initial purchase price and ongoing maintenance costs

## Crude oil pumping with only one seal

**P**etrochemical companies continuously increase their output of feedstock and finished products all over the globe to satisfy the vast growing demand for fuel, bitumen and other petrochemical products.

The growth of production requires higher storage capabilities including large and reliable positive displacement pumps.

Energy demand, HSE regulations and above all the reduction of operating costs are the focus of today's terminal operators.

### Unique design

Leistritz Pumpen GmbH has designed two screw pump series to help terminals meet these aims. These two series are designed according to DIN or API standards.

Twin and five-spindle screw pumps in series L2NG and L5NG belong to the group of self-priming rotary positive displacement pumps.

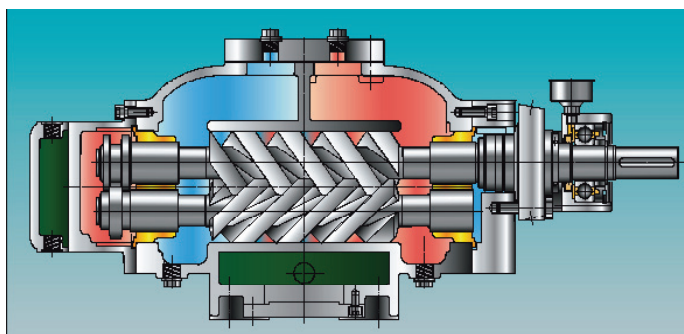
They are designed for a pressure range up to 16bar (232psi) and suitable for transport of light abrasive and corrosive, high or low viscous storage fluids with poor or good lubricity.

The pumping capacities start at a few litres per minute and go up as high as 1,700m<sup>3</sup>/h, while viscosities from 1 up to 100,000 Centistokes and pumping temperatures up to 280°C can be achieved.

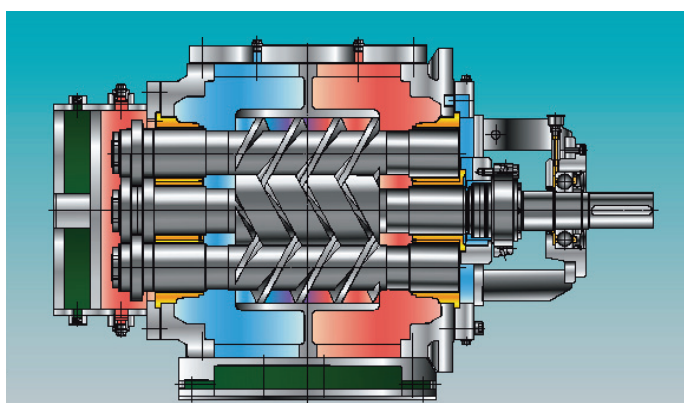
Besides loading or unloading duties, these pumps can also be used as circulating, blending and stripping pumps.

Both designs have only one seal to the atmosphere. The drive spindle rotates and is hermetically sealed with the idler spindles in the bores drilled into the pump casing, which encloses the spindle set with small clearances.

The idler spindles are driven by the drive spindle through hydraulic force. The special epicycloidal profile of the spindles guarantees the perfect closure of the pumping



Cross Sectional Drawing Leistritz L2NG



Cross sectional drawing Leistritz L5NG

chambers, so that the liquid is moved continuously and almost pulsation-free in axial direction from the suction area to the pump discharge port. This pumping process guarantees a highly efficient operation at reduced power consumption, which results not only in lower initial equipment costs, but also into reduced operational costs.

The rotors of all Leistritz pumps are manufactured out of a single piece of bar stock. It guarantees limited shaft deflection and lowest possible bearing loads at highest process safety.

Surface hardening up to 64 HRC complete the robustness of the screws against wear.

The L2 Pump Series has a double helix drive and triple helix idler spindle, while all rotors of the L5 Pump Series have a double helix profile, so are already balanced by design.

Spindle pitches are kept reasonable low to reduce the axial flow velocity in the pumps, resulting in an excellent priming capability.

Drive and idler spindles are

mounted in interchangeable radial bearing bushes on both sides of the pump. The spindles are contactless to the casing bore due to a defined clearance, which avoids metal to metal contact between the casing and the screws.

The special arrangement of different pressure compartments in the pump, which are shown blue coloured (suction pressure) and red coloured (discharge pressure) is unique to Leistritz.

It guarantees a hydraulically balanced pumping process, since the axial force on the spindles is compensated as a result of the produced discharge pressure.

The radial bearing points simultaneously form choke points between the inlet and delivery compartments and therefore are always subject to differential pressure of the pumped fluid. This guarantees excellent lubrication of the bearing bushes and ensures adequate transfer of frictional heat.

Due to the axially-balanced

spindles, the ball bearing on the drive side of the pumps is exposed to almost no axial load. It is grease lubricated for operational lifetime. Optional, oil lubricated bearings can be supplied upon request.

Last but not least these pumps are also capable to run dry for a longer period of time, since the pump flanges are located above the idler spindle/s, which keeps enough liquid for sufficient lubrication of the unloaded spindle profile and bearing bushes.

### CAPEX and OPEX benefits

Beside standard component seals, mechanical cartridge seals, which are fully in accordance with API 682, can be installed in both Pump Series, L2 and L5. Double volute twin screw pumps, however, need usually more expensive and specially engineered seal designs due to their restrictions in space.

Above all, the need for only one mechanical shaft seal and the corresponding lower initial costs gives the designers and the terminal operators more reason to choose higher quality seals and/or most reliable seal solutions. These could be wear resistant tungsten carbide seal faces or even double acting sealing solutions with seal oil systems in accordance with the API plans 53A, 53B or 54.

### Simple maintenance

The design itself, with a reduced number of parts compared to a double volute twin screw pump, ensures an extremely short downtime for service.

The design does not require any gear boxes, timing gears, liners or clamping devices.

No additional adjustment of timing gears or special alignment of covers are necessary. Easy and fast dismantling and re-assembly even by an untrained person increases the operational terminal availability and keeps the lifecycle costs as low as possible. ●