L4 SCREW PUMP SERIES
Screw Pumps & Systems
PUMP TECHNOLOGY

With experience and passion

Leistritz is the first address when it comes to the application of screw pumps. After all, the company, with its headquarters in Nuremberg, is one of the pioneers in the field of screw pumps: more than 90 years ago, it was Paul Leistritz, who used the twin screw pump for the first time to pump lube oil for steam turbine bearings. What started out small in 1924 is now a globally active company with more than 300 employees, which has the widest product range in the field of screw pumps. Leistritz Pump Technology has branches in all important markets, such as the USA, China, Singapore, Dubai, India and Italy. Leistritz customers benefit from valuable know-how in various industries and applications.

»Leistritz is the only producer in the world to offer the complete range of screw pumps.«

PUMP FACTS

The intelligent design of the Leistritz screw pumps offers enormous advantages over other pump technologies, like:

↗ low-pulsation pumping of the fluid
↗ extremely low vibration and noise
↗ high flow rates
↗ pumping a wide range of viscosities
↗ low-wear operation
↗ long service life

L4 SCREW PUMP
Superior technology & intelligent design

Low pressure on seals → long service life
Low-pulsation pumping of the fluid
Compact design → minimum shaft deflection
Grinded and hardened profile → high quality
L4 PUMPS
TECHNICAL FEATURES

PUMP CASING
- Welded design with materials from carbon steel to stainless steel and up to duplex steel
- Casted design with materials from grey cast iron to nodular cast iron and up to cast steel
- Economic and slim design for reduced weight
- ANSI & DIN flanges possible
- Various flange sizes and positions
- Drain and vent connections

SPINDLES
- Single bar stock for maximum stiffness
- Case-hardened steel (1.7139), nitrided for max. hardness
- Tungsten carbide or stellite coating available for high wear resistance
- Side by side arrangement for excellent lubrication capabilities of spindle, bearings and seals
- Smooth running with reduced bearing load

TIMING GEARS
- External double helical gear for efficient power transmission
- Oil lubricated by internal or external circulation
- Oil cooling if required
- Smooth running

MECHANICAL SEAL
- Seal design acc. to API 682
- Installation in suction area
- Unbalanced or balanced design
- Single acting mechanical seal
- Double acting mechanical seal with seal supply system acc. to API

BEARINGS
- Self-aligning roller bearings on DE and NDE side
- Oil lubricated bearings (and gear) as an API 676 demand for better lubrication of the shaft seals
- External lube oil cooler and systems for special applications possible

INSTALLATION / DRIVE
Delivery of complete skids incl.:
- Common baseplate
- Electric motors, hydraulic motors or combustion engines
- Flexible spacer type couplings
- Variable speed drive
- Instrumentation
L4 Pumps are self-priming screw pumps with two screws in double volute and hydraulically balanced design. The drive torque is transmitted from the double helix drive screw to the likewise double helix idler screw via herringbone gears. The screws rotate closely meshing but without contact in the spindle bore of the interchangeable pump casing insert. As a result of the special profile geometry sealed cavities are formed which transport the pump liquid continuously with low shear and without turbulences from both suction chambers axially to the discharge chamber.

For optimum strength and low shaft deflection both drive screw and idler screw are manufactured from single piece bar stock.

### Design and Operation

#### L4 Pumps

<table>
<thead>
<tr>
<th>Pump type</th>
<th>Options design code</th>
<th>Seal</th>
</tr>
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<tbody>
<tr>
<td>No. of spindles</td>
<td>Pressure ranges</td>
<td>Design</td>
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<tr>
<td>L4NG/L4MG/L4HG</td>
<td>Modular pump: pages 8-13</td>
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<tr>
<td>L4NC</td>
<td>Compact design pump: pages 14-15</td>
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<td>L4NO</td>
<td>Cargo pump: page 16</td>
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<tr>
<td>L4NT</td>
<td>Submerged pump: page 17</td>
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### Discharge Pressure and Flow Rate

<table>
<thead>
<tr>
<th>Pump type</th>
<th>Pressure ranges</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of spindles</td>
<td>Medium pressure: M</td>
<td></td>
</tr>
<tr>
<td>L4N</td>
<td>Low pressure: N</td>
<td></td>
</tr>
<tr>
<td>L4NG/L4MG/L4HG</td>
<td>Modular pump: pages 8-13</td>
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<td>L4NT</td>
<td>Submerged pump: page 17</td>
<td></td>
</tr>
</tbody>
</table>

### Flow rate

- **m³/h**: 25, 50, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1,000, 1,500, 2,000, 2,500, 3,000, 3,500, 4,000, 4,500, 5,000, 5,500, 6,000, 6,500, 7,000, 7,500, 8,000, 8,500, 9,000, 9,500, 10,000, 10,500, 11,000, 11,500, 12,000, 12,500, 13,000, 13,500, 14,000, 14,500, 15,000, 15,500, 16,000, 16,500, 17,000, 17,500, 18,000, 18,500, 19,000, 19,500, 20,000
- **l/min**: 416, 1,666, 3,333, 5,000, 6,666, 8,333, 10,000, 11,666, 13,333, 15,000, 16,666, 25,000, 33,333, 50,000, 66,666, 83,333
- **GPM**: 110, 440, 880, 1,320, 1,761, 2,200, 2,641, 3,082, 3,522, 3,962, 4,400, 6,604, 8,800, 13,200, 17,500, 22,000

#### Overview L4 pumps

<table>
<thead>
<tr>
<th>Pump type</th>
<th>Options design code</th>
<th>Seal</th>
</tr>
</thead>
</table>

#### Pump type

- **L4N**
- **L4NG/L4MG/L4HG**
- **L4NC**
- **L4NO**
- **L4NT**
**L4NG, L4MG, L4HG MODULAR PUMP**

**GENERAL USE**

Leistritz Screw Pumps L4NG/MG/HG are self-priming rotary positive displacement pumps for pressure ranges of 16 bar (232 psi), 40 bar (580 psi) and 150 bar (2175 psi) suitable for the transport of lubricating and non-lubricating, low and high viscous liquids with abrasive particles.

**USER ADVANTAGES**

↗ Maximum allowable rotor deflection limited to 50% of radial clearance between rotor housing and rotor → highest process safety

↗ Interchangeable liner → easy maintenance, low costs

↗ Special rotor design available → Minimized pulsation

↗ Optimized NPSHR

↗ Low axial flow velocity → excellent priming

↗ Suitable for dry running → maximized process safety

**MODULAR SYSTEM**

The components of the low, medium and high pressure pumps are produced as a modular system. Pump casings, bearing covers, bearings, mechanical seals, mechanical seal installation parts and the timing gears are interchangeable among pumps of different sizes.

For installations with different pump sizes and designs the modular system for the Leistritz L4 series twin screw pumps permits simple and economical keeping of a spare parts inventory.

The modular system covers both liquid and multiphase pumps of the Leistritz L4 series.

**LEISTRITZ PUMP TECHNOLOGY**

**PERFORMANCE CHARACTERISTICS**

**L4NG - OPERATING CONDITIONS**

| Flow rate max. | 5,000 m³/h |
| Differential pressure max. | 16 bar |
| Viscosity max. | 150,000 cSt |
| Temperature max. | 350°C |

**Flow Rate vs. Pump Size**

- 5000 m³/h (22000 GPM)
- 450 m³/h (17600 GPM)
- 400 m³/h (8800 GPM)
- 300 m³/h (13200 GPM)
- 200 m³/h (8800 GPM)
- 100 m³/h (4400 GPM)

**Differential Pressure vs. Flow Rate**

- 10 bar (145 psi)
- 20 bar (290 psi)
- 30 bar (435 psi)
- 40 bar (580 psi)
- 50 bar (760 psi)

**L4MG - OPERATING CONDITIONS**

| Flow rate max. | 1,900 m³/h |
| Differential pressure max. | 40 bar |
| Viscosity max. | 150,000 cSt |
| Temperature max. | 350°C |

**Flow Rate vs. Pump Size**

- 3900 m³/h (17160 GPM)
- 2600 m³/h (9280 GPM)
- 1600 m³/h (5280 GPM)
- 800 m³/h (2760 GPM)
- 400 m³/h (1760 GPM)

**Differential Pressure vs. Flow Rate**

- 10 bar (145 psi)
- 20 bar (290 psi)
- 30 bar (435 psi)
- 40 bar (580 psi)
- 50 bar (760 psi)

**L4HG - OPERATING CONDITIONS**

| Flow rate max. | 2,000 m³/h |
| Differential pressure max. | 150 bar |
| Viscosity max. | 150,000 cSt |
| Temperature max. | 350°C |

**Flow Rate vs. Pump Size**

- 5000 m³/h (22000 GPM)
- 450 m³/h (17600 GPM)
- 400 m³/h (8800 GPM)
- 300 m³/h (13200 GPM)
- 200 m³/h (8800 GPM)
- 100 m³/h (4400 GPM)

**Differential Pressure vs. Flow Rate**

- 10 bar (145 psi)
- 20 bar (290 psi)
- 30 bar (435 psi)
- 40 bar (580 psi)
- 50 bar (760 psi)
## TECHNICAL INSTALLATIONS

### OIL & GAS INDUSTRY
- **Used as:** Pipeline booster pumps
- **Pumped liquid:** Crude oil
- **Flow rate:** $Q = 180 \text{ m}^3/\text{h} \ [793 \text{ GPM}]$
- **Differential pressure:** $\Delta P = 60 \text{ bar} \ [870 \text{ psi}]

### TANKSTORAGE
- **Used in:** Tank storage in Singapore
- **Pumped liquid:** Various black and white products
- **Flow rate:** $Q = 2,000 \text{ m}^3/\text{h} \ [8,806 \text{ GPM}]$
- **Differential pressure:** $\Delta P = 11 \text{ bar} \ [160 \text{ psi}]

### CHEMICAL INDUSTRY
- **Used in:** Chemical plant in the Netherlands
- **Pumped liquid:** Polymer
- **Flow rate:** $Q = 876 \text{ m}^3/\text{h} \ [3,857 \text{ GPM}]$
- **Differential pressure:** $\Delta P = 48 \text{ bar} \ [696 \text{ psi}]

### POWER PLANT
- **Used in:** Fuel oil power plants
- **Pumped liquid:** Heavy fuel oil
- **Flow rate:** $Q = 876 \text{ m}^3/\text{h} \ [3,857 \text{ GPM}]$
- **Differential pressure:** $\Delta P = 48 \text{ bar} \ [696 \text{ psi}]

### APPLICATIONS
- **Oil & Gas**
  - pipeline pumps · pipeline start-up pumps · produced water pumps · pumps for chemical injection · pumps for upstream slop and drain systems.
- **Tank Storage**
  - loading/unloading pumps · circulation pumps · transfer pumps · stripping pumps · cargo pumps · tank cleaning pumps
- **Chemical and Petrochemical Industry**
  - circulation pumps · transfer pumps · stripping pumps · export pumps
- **Power Generation and Fuel Oil Systems**
  - unloading pumps · transfer pumps
**MULTIPHASE PUMP SYSTEMS**

**DESIGN AND OPERATION**

Leistritz multiphase pumps are rotary positive displacement pumps based on twin screw pump technology and built in accordance with the requirements of API 676. This makes twin screw multiphase pumps particularly suitable for the handling of non-lubricating products with high gas fractions, contaminations and crude oils with low gravity.

Leistritz twin screw multiphase pumps are designed to handle untreated well flow with gas fractions (GVF) between 0 and 100%. In order to maintain a dynamic seal between the screw packages and the pump casing at high GVF rates a small liquid flow must be provided at all times. An external liquid management system for continuous liquid injection guarantees uninterrupted operation with high GVF content and gas slugs and ensures dissipation of the compression heat. The size of the external liquid management system can be adapted to the actual operating conditions.

**BENEFITS OF MULTIPHASE TECHNOLOGY**

- The entire well flow is handled with one machine
- Low inlet pressures allow extended well life and increased production
- High pressure capability to boost the well flow to remote processing facilities
- Reduction of artificial lift requirements due to low permissible inlet pressure
- Decrease of the production time
- Low shear, non-emulsifying pumping
- Gas handling capability (GVF) up to 100%
- Elimination of flaring
- Low capital investment costs and quick payback due to production increase
- Low operational and maintenance cost
- Ideal for installation on offshore platforms due to small footprint and low weight

**LEISTRITZ SYSTEM SUPPLY**

- Leistritz multiphase pump
- Single or double acting mechanical seals
- Customized liquid management system
- Skid type baseplate
- Electric motors / combustion engines / gas or diesel engines
- Flexible all metal coupling with non-sparking coupling guard
- On-skid instrumentation
- On-skid piping with manually or actuator operated block valves, suction filter, check and pressure relief valve
- Lube and seal oil systems
- Variable speed drives
- PLC, low and medium voltage switch gears, MCC, UPS
- Remote control systems
- Container for installation of the multiphase pump skids and the control equipment

**TECHNICAL INSTALLATIONS**

**OFFSHORE ON A WELLHEAD PLATFORM IN THE GULF OF MEXICO**

- Used as: Multiphase pump
- Gas volume fraction: GVF = 97.2% [3,870 GPM]
- Flow rate: Q = 879 m³/h
- Differential pressure: ΔP = 17.25 bar [250 psi]

**CONTAINERIZED LEISTRITZ MULTIPHASE PUMP IN A PERMAFROST AREA IN KAZAKHSTAN**

- Used as: Multiphase pump
- Gas volume fraction: GVF = 86.6%
- Flow rate: Q = 175 m³/h [770 GPM]
- Differential pressure: ΔP = 38 bar [551 psi]

**LEISTRITZ MULTIPHASE PUMP INSTALLATION ON AN OIL FIELD IN CENTRAL AFRICA**

- Used as: Multiphase pump
- Gas volume fraction: GVF = 56%
- Flow rate: Q = 395-1,000 m³/h [1,739-4,402 GPM]
- Differential pressure: ΔP = 7.3-56.2 bar [105-915 psi]

**LEISTRITZ MULTIPHASE PUMP WITH INSULATION ON A CALIFORNIAN OIL FIELD**

- Used as: Multiphase pump
- Gas volume fraction: GVF = 97%
- Flow rate: Q = 966 m³/h [4,253 GPM]
- Differential pressure: ΔP = 14.8 bar [214 psi]
**L4NC COMPACT DESIGN PUMP**

**GENERAL USE**
The new compact screw pump design for the oil & gas industry!
With focus on tank farm applications such as transfer, stripping, loading and unloading pumps. Developed for low capital expenditure (CAPEX) combined with highest efficiency and reliability for optimized operational expenditure (OPEX)

**USER ADVANTAGES**
- **Pump casing:** Economic and slim design for reduced weight
- **Spindles:** Single bar stock for maximum stiffness
- **Timing gears:** External double helical gear for efficient power transmission
- **Mechanical seal:** Single acting seals
- **Bearings:** Self-aligning roller bearings on DE and NDE side

**L4NC - OPERATING CONDITIONS AND PERFORMANCE CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Flow rate max.</th>
<th>5,000 m³/h</th>
<th>22,000 GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differential pressure max.</td>
<td>20 bar</td>
<td>290 psi</td>
</tr>
<tr>
<td>Viscosity max.</td>
<td>10,000 cSt</td>
<td></td>
</tr>
<tr>
<td>Temperature max.</td>
<td>100 °C 212 °F</td>
<td></td>
</tr>
<tr>
<td>Casing design pressure</td>
<td>25 bar 362 psi</td>
<td></td>
</tr>
</tbody>
</table>

**APPLICATIONS**

- **Oil & Gas**
  - pipeline pump · pipeline start-up pump · produced water pump · chemical injection pump

- **Tank Storage**
  - loading/unloading pump · circulation pump · transfer pump · stripping pump · cargo pump · tank cleaning pump

- **Chemical and Petrochemical Industry**
  - transfer pump
**L4NO CARGO PUMP**

**GENERAL USE**

The Leistritz screw pump series L4NO is a self-priming positive displacement pump for a pressure range up to max. 16 bar, suitable for transporting abrasive and non-abrasive, lubricating and non-lubricating fluids.

**APPLICATIONS**

- Power Generation
  - transfer pump · supply pump · waste oil pump
- Shipbuilding
  - cargo pump · unloading pump · transfer pump
- Chemical and Petrochemical Industry
  - transfer pump

**POWER PLANT (COMBINED CYCLE)**

Used as:

- Unloading pump
- Pumped liquid: Light fuel oil
- Flow rate:
  - Q = 156 m³/h [686 GPM]
- Differential pressure:
  - ΔP = 5 bar [72 PSI]

**OPERATING CONDITIONS AND PERFORMANCE CHARACTERISTICS**

- Flow rate max. 1,250 m³/h [5,509 GPM]
- Differential pressure max. 16 bar
- Viscosity max. 15,000 mm²/s
- Temperature max. 180 °C [356 °F]

**L4NT SUBMERGED PUMP**

**GENERAL USE**

Leistritz screw pumps of the series L4NT are submerged rotary positive displacement pumps for pumping corrosive liquids, or liquids with solid content, liquids containing gases and liquids of high and low viscosity.

**APPLICATIONS**

- Oil and Gas Industry
  - closed and open drain pump · transfer pump · slop pump
- Shipbuilding
  - unloading pump
- Chemical and Petrochemical Industry
  - transfer pump · circulation pump

**OIL & GAS INDUSTRY**

Used as:

- Slops & drains pump
- Pumped liquid:
  - Mixtures of water, hydrocarbons and solids
- Flow rate:
  - Q = 145 m³/h [638 GPM]
- Differential pressure:
  - ΔP = 3 bar [43 PSI]

**L4NT - OPERATING CONDITIONS AND PERFORMANCE CHARACTERISTICS**

- Flow rate max. 500 m³/h [2,200 GPM]
- Differential pressure max. 16 bar
- Viscosity max. 100,000 cSt
- Temperature max. 150 °C [302 °F]
- Installation depth max. 10 m [32.8 ft]
Rising demands on pump manufacturers regarding wear protection, service life or flow rate require the use of state-of-the-art machine technology and process chains that are ideally coordinated with one another. These are the prerequisites to facilitate the high-quality manufacturing of pump components.

To accomplish this high standard, we produce the screws and housings, i.e. the core elements of the Leistritz pumps, ourselves in Germany - under the aspect of the ultimate precision and with a high level of production knowledge vertical integration.

This is particularly due to the symbiosis of the various products of the Leistritz Group in the form of superior materials know-how and in-house metal processing technologies, such as whirling. In addition to our numerous machines, it is particularly our team that convinces our customers with its well-founded expertise and extensive manufacturing know-how.

Leistritz pumps are manufactured with expertise and passion. »

This list offers a general overview of the standard pump range by Leistritz. Various options and systems are individually configured according to customer requirements and tested on our test bench (drive power up to 4 MW) in Nuremberg.