Submersible Pump

The Ruhrpumpen Types PVT, TRT, and LKT are vertical submersible pumps for installation in a steel tube or a concrete well.

PUMP TYPES

A standardized submersible motor is combined with different pump casings and impellers to build the different pump types.

LKT with three-channel impeller for small flow and low heads, e.g. activated sludge, mixed water.

TRT with semi-axial impeller for medium flow and high heads, e.g. clean and pre-cleaned fluids.

PVT with axial propeller for high flow and low heads, e.g. activated sludge, mixed water, river water.

INSTALLATION

The pump is placed via an O-Ring and without any fixing devices on a machined, conical supporting and centring ring. By its own weight the pump is emplaced self-centring and resistant against tilting and distortion.

The installation has to be performed in a way, that the intake of the pump is submerged to a certain depth. The necessary minimum submergence is shown in the pump curve as Hü.

ACCESSORY

- PES-lifting rope for pump and cable with rubber elements to bind together cable and lifting rope.
- Monitoring system Thycon VR-T for evaluation of all sensors.

Characteristics

1. Stable lifting handle where the lifting device is fixed on. A lifting rope consisting of PES-Slings, SS-Schackles and a SS-Screw Schackle is available as option. Special rubber parts are used as joints between cable and lifting slings and enable the slings to take the weight of the cable.

2. The cable type used for power and control cable is SSHÖU-I, a heavy rubber-sheathed cable suitable for high mechanical stresses and thus a guarantee for long life.

3. Strain relief for the cable inlet.

4. Water tight, replaceable cable inlet. Optional available in a special design with soldered cable cores and additionally sealed lengthwise by casting resin.

5. Water tight encapsulated terminal housing with humidity probe.

6. Temperature probes in the windings (3 x PTC).

7. Dry running three-phase induction motor with squirrel cage rotor acc. to DIN VDE 0530, DIN EN 60034-1 and IEC 34-11, enclosure IP 68, insulation class F (155°C max. stator temperature). Optional explosion proof (ATEX II 2 G EEx de II, BT4).

8. Temperature monitoring of the lower bearings via PT100. From motor size 420 lower and upper bearings are equipped with a PT100.

9. Humidity probe in the oil chamber for early indication of inspection based on the water to oil ratio.

10. Collection chamber with a float switch located underneath the lower bearings.

11. Shaft sealing by two mechanical seals in tandem arrangement. Pump side SiC/ SiC, motor side SiC/SiC or SiC/Carbon graphite.

12. The large oil reservoir for lubrication of the mechanical seals and a large air cushion above it ensure intensive cooling of mechanical seals and bearings.

13. Axial casing with double curvature guide vanes transforms kinetic energy into pressure.

Submersible Propeller Pump PVT

The Ruhrpumpen Type PVT is a vertical submersible pump with propeller for installation in a steel tube or concrete well suitable to pump clean, raw, river and rain water as well as pre-cleaned waste water and activated sludge.

**BROAD APPLICATION RANGE**

- Water Lifting Stations
- Water Works
- Irrigation
- Sewage Engineering
- Power Stations
- Sugar Industry
- Dock Equipment (Ship building)

**PERFORMANCE DATA**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>400 to 15,000 m³/h</th>
<th>1,761 to 66,043 gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>1.5 to 13 m</td>
<td>5 to 43 ft</td>
</tr>
<tr>
<td>Speed</td>
<td>up to 1,480 min⁻¹</td>
<td>up to 1,750 rpm</td>
</tr>
<tr>
<td>Tube diameter</td>
<td>600 to 1,600 mm</td>
<td>24 to 63 in</td>
</tr>
<tr>
<td>Motor power</td>
<td>up to 355 kW</td>
<td>up to 476 hp</td>
</tr>
</tbody>
</table>

Note: For pump operations outside this range, please contact a Ruhrpumpen Representative.

**Characteristics**

1. One-piece casing connected directly to the submersible motor with integrated inlet bell-mouth for evenly accelerated feed of the medium towards the impeller.
2. Propeller head with inserted, adjustable blades made of chromium steel. The blade angle suitable for the respective duty point is firmly adjusted in the shop. Subsequent alteration of the blade angle for a different duty point is possible at standstill and after dismantling.
3. Optional the pump can be equipped with a wear ring made of chromium steel or bronze, which is inserted into the inlet bellmouth in the area of the impeller and protects it against wear.
4. For pressure stage 1 (up to -6 m head) back-bent blades with fibre repellent design are deployed.
5. The fibre repellent design comes with diagonal cleaning grooves in the impeller area of the inlet bellmouth which enable cutting and removal of fibrous matters and therefore provide them from building up in the gap between impeller and casing.

**PUMP SIZE IDENTIFIER**

Type
Hydrodynamic Parameter
Nominal Impeller Diameter

**Selection Chart PVT**

Various Poles

FLOW

TOTAL HEAD

m³/h

m³/h

m³/h
Submersible Semi-axial Pump TRT

The Ruhrpumpen Type TRT is a vertical submersible pump with semi-axial impeller for installation in a steel tube or concrete well suitable to pump clean and pre-cleaned fluids.

BROAD APPLICATION RANGE

- Water Works
- Irrigation and Drainage
- Power Stations
- Cooling Water Circuits

PERFORMANCE DATA

<table>
<thead>
<tr>
<th>Capacity</th>
<th>800 to 5,500 m³/h</th>
<th>3,522 to 24,216 gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>8 to 50 m</td>
<td>26 to 164 ft</td>
</tr>
<tr>
<td>Speed</td>
<td>up to 1,480 min⁻¹</td>
<td>up to 1,750 rpm</td>
</tr>
<tr>
<td>Tube diameter</td>
<td>700 to 1,000 mm</td>
<td>27 to 39 in</td>
</tr>
<tr>
<td>Motor power</td>
<td>up to 410 kW</td>
<td>up to 550 hp</td>
</tr>
</tbody>
</table>

Note: For pump operations outside this range, please contact a Ruhrpumpen Representative.

Characteristics

1. Pump part directly connected to the submersible motor consisting of casing with guide vanes, impeller and inlet bellmouth.

2. Inserted wear plate in the area of back shroud blades of the impeller.

3. The single entry, closed, semi-axial impeller with 4 up to 6 blades is equipped with back shroud blades for axial thrust compensation and protection against intrusion of particles into the area of the shaft seal.

4. Effective protection against erosion by replaceable casing wear ring at the suction side and anti-rotation ribs in the gap in front of the impeller.

5. Flanged inlet bellmouth for evenly accelerated feed of the medium towards the impeller.

PUMP SIZE IDENTIFIER

- Type: TRT
- Hydrodynamic Parameter: 8 / 530
- Nominal Impeller Diameter:
Submersible Three-channel Pump LKT

The Ruhrpumpen Type LKT is a vertical submersible pump with three-channel impeller for installation in a steel tube or concrete well suitable to pump activated sludge as well as mixed, rain and raw water with upstream screen.

**BROAD APPLICATION RANGE**

- Disposal of Waste Water
- Raw Water with Upstream Screen
- Activated Sludge
- Mixed Water

**PERFORMANCE DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Capacity (m³/h)</th>
<th>Flow (gpm)</th>
<th>Head (m)</th>
<th>Flow (ft)</th>
<th>Speed (min⁻¹)</th>
<th>Flow (rpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>200 to 2,800</td>
<td>800 to 12,328</td>
<td>2 to 14</td>
<td>7 to 46</td>
<td>up to 990</td>
<td>up to 1,180</td>
</tr>
<tr>
<td>Head</td>
<td>m³/h</td>
<td>gpm</td>
<td>m</td>
<td>ft</td>
<td>min⁻¹</td>
<td>rpm</td>
</tr>
<tr>
<td>Speed</td>
<td>up to 145</td>
<td>up to 194</td>
<td>m</td>
<td>ft</td>
<td>kN/m</td>
<td>hp</td>
</tr>
<tr>
<td>Tube diameter</td>
<td>500 to 800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor power</td>
<td>up to 145</td>
<td>up to 194</td>
<td>m</td>
<td>ft</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: For pump operations outside this range, please contact a Ruhrpumpen Representative.

**Characteristics**

1. Pump part directly connected to the submersible motor consisting of casing with guide vanes, impeller and inlet bellmouth.
2. The pump casing is utilised as wear plate in the area of back shroud blades of the impeller.
3. The single entry, closed impeller is a three-channel type with large passage areas and specially designed to enable careful treatment of the pumped medium. It is equipped with back shroud blades for axial thrust compensation and protection against intrusion of particles into the area of the shaft seal.
4. Front shroud blades reduce the backflow of medium to the suction side, where impeller and wear ring form the radial sealing clearance.
5. Replaceable wear ring.
6. Flanged inlet bellmouth for evenly accelerated feed of the medium towards the impeller.

**PUMP SIZE IDENTIFIER**

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LKT 4 / 325
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- Type
- Hydrodynamic Parameter
- Nominal Impeller Diameter
Submersible Sewage Pump STT

The Ruhrpumpen Type STT is a vertical submersible pump with non-clogging and non-stringing two-channel impeller in pot design for stationary dry or wet well installation suitable for pumping sewage with coarse solid matter and fibrous content without upstream screen.

PUMP CASING

The radial split volute casing directly flanged to the submersible motor is specially designed for pumping sewage and equipped with large flow areas and large clearances between impeller and the rounded volute cutwater.

The suction side is equipped with a replaceable wear ring and anti-rotation ribs in the gap in front of the impeller, which ensures effective prevention of erosion.

SHAFT SEALING

The shaft is sealed up by two maintenance free mechanical seals in tandem arrangement. On the pump side both faces are made of wear resistant silicon carbide, on the motor side either silicon carbide or carbon graphite against silicon carbide is used. The mechanical seals are running in an oil reservoir, which provides lubrication and cooling for the faces. The water to oil ratio is monitored by a probe to be able to generate an early maintenance indication.

IMPELLER

The single entry, closed impeller is a two-channel type in pot design with large passage areas, impeller vanes without distinct entrance edges and an impeller hub which is arranged outside the flow path. Together, with the special shape of the impeller channels this ensures non-clogging and non-stringing operation.

On the suction side impeller and wear ring form the radial sealing clearance.

INSTALLATION

Standard installation is in a wet well with autocoupling system. The pump is lowered via a stable double tube guide into the sump and automatically couples to a pedestal fixed on the sump bottom regardless whether the sump is flooded or not. Sealing of the connection is ensured via an O-Ring affixed and locked to the discharge flange. The minimum water level in the pump sump is determined by the necessary submergence $H_u$ of the pump which can be seen from the pump curve.

VARIANTS

- Vertical dry installation, on pedestal flanged to the suction nozzle with a transition bend for evenly accelerated feed to the impeller.
- Vertical dry installation via pump feet on stripe bedrock, discharge nozzle tangential.
- Horizontal dry installation via pump feet on baseplate, discharge nozzle tangential.
- Motor with cooling jacket for dry or partly immersed installation.

ACCESSORY

- PES - lifting rope for pump and cable with rubber elements to bind together cable and lifting rope.
- Monitoring system Thycon VR-T for evaluation of all sensors.

Characteristics

1. Stable lifting handle where the lifting device is fixed on.
2. NSSHOU-J power and control cable with strain relief device.
3. Water tight, replaceable cable inlet. Optional available in a special design with soldered cable cores and additionally sealed lengthwise by casting resin.
4. Water tight encapsulated terminal housing with humidity probe. In case of water ingress the aggregate is stopped.
5. Temperature probes in the windings (3 x PTC).
6. Dry running three-phase induction motor with squirrel cage rotor acc. to DIN VDE 0530, DIN EN 60034-1 and IEC 34-11, enclosure IP 68, insulation class F (155°C max. stator temperature). Optional explosion proof (ATEX II 2 G Ex de II, BT4).

7. For dry installation or operation at low water level available with optional cooling jacket.

8. Temperature monitoring of the lower bearings via PT100. From motor size 420 lower and upper bearings are equipped with a PT100.

9. Humidity probe in the oil chamber for early indication of inspection based on the water to oil ratio.

10. Collection chamber with a float switch located underneath the lower bearings. Disregard of the oil chamber inspection signal and further leakage will result in a shutdown of the machine before water can ingress into the motor through the bearings.

11. The pump is lowered via a stable double tube guide into the sump and automatically couples to a pedestal fixed on the sump bottom. Sealing of the connection is ensured via an O-Ring affixed and locked to the discharge flange.

12. Shaft sealing by two mechanical seals in tandem arrangement. Pump side SiC/SiC, motor side SiC/SiC or SiC/Carbon graphite.

13. The large oil reservoir for lubrication of the mechanical seals and a large air cushion above it ensure intensive cooling of mechanical seals and bearings.

14. Two-channel impeller with large free passages.

15. Volute casing designed for pumping of sewage with radial discharge nozzle.

**Description**

**BROAD APPLICATION RANGE**
- Disposal of Waste Water
- Municipal Raw Water
- Activated Sludge
- Mixed Water

**PERFORMANCE DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>400 to 4,000 m³/h</td>
</tr>
<tr>
<td>Head</td>
<td>3.5 to 35 m</td>
</tr>
<tr>
<td>Speed</td>
<td>up to 990 min⁻¹</td>
</tr>
<tr>
<td>Tube diameter</td>
<td>300 to 500 mm</td>
</tr>
<tr>
<td>Motor power</td>
<td>up to 315 kW</td>
</tr>
</tbody>
</table>

Note: For pump operations outside this range, please contact a Ruhrpumpen Representative.
RUHRPUMPEN PLANTS

- GERMANY, Witten
- USA, Tulsa & Orland
- MEXICO, Monterrey
- EGYPT, Cairo
- INDIA, Chennai
- BRAZIL, Rio de Janeiro
- ARGENTINA, Buenos Aires

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