High efficiency 
permanent magnet-synchronous-propeller pump
po-upl-s300.1
Performance data and characteristic curve

Graph 1: Head vs. Flow Rate
- H [m]
- Q [m³/h]
- Curves for 60 Hz, 55 Hz, 50 Hz, 45 Hz, 40 Hz, 35 Hz

Graph 2: Efficiency vs. Flow Rate
- \( \text{ETA}_{\text{ges}} \) [%]
- Q [m³/h]
- Curves for 60 Hz, 55 Hz, 50 Hz, 45 Hz, 40 Hz, 35 Hz

Graph 3: Power vs. Flow Rate
- P1 [kW]
- Q [m³/h]
- Curves for 60 Hz, 55 Hz, 50 Hz, 45 Hz, 40 Hz, 35 Hz
### Propeller pump

#### po-upl-s

<table>
<thead>
<tr>
<th>H [mWs]</th>
<th>P1 [kW]</th>
<th>eta* [%]</th>
<th>Q [m³/h]</th>
<th>60 Hz</th>
<th>55 Hz</th>
<th>50 Hz</th>
<th>45 Hz</th>
<th>40 Hz</th>
<th>35 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>34,8</td>
<td>55,8</td>
<td>0,0</td>
<td>0</td>
<td>100</td>
<td>92</td>
<td>0</td>
<td>75</td>
<td>67</td>
<td>58</td>
</tr>
<tr>
<td>33,2</td>
<td>53,0</td>
<td>17,3</td>
<td>200</td>
<td>300</td>
<td>183</td>
<td>23,0</td>
<td>150</td>
<td>133</td>
<td>117</td>
</tr>
<tr>
<td>31,3</td>
<td>53,7</td>
<td>31,5</td>
<td>300</td>
<td>400</td>
<td>275</td>
<td>21,8</td>
<td>225</td>
<td>200</td>
<td>175</td>
</tr>
<tr>
<td>29,4</td>
<td>56,0</td>
<td>43,0</td>
<td>400</td>
<td>500</td>
<td>367</td>
<td>20,4</td>
<td>300</td>
<td>267</td>
<td>233</td>
</tr>
<tr>
<td>27,3</td>
<td>58,5</td>
<td>51,5</td>
<td>500</td>
<td>550</td>
<td>458</td>
<td>19,0</td>
<td>375</td>
<td>333</td>
<td>300</td>
</tr>
<tr>
<td>25,2</td>
<td>60,4</td>
<td>57,6</td>
<td>600</td>
<td>642</td>
<td>550</td>
<td>17,5</td>
<td>450</td>
<td>400</td>
<td>367</td>
</tr>
<tr>
<td>23,1</td>
<td>61,0</td>
<td>62,2</td>
<td>700</td>
<td>733</td>
<td>642</td>
<td>16,0</td>
<td>533</td>
<td>467</td>
<td>425</td>
</tr>
<tr>
<td>21,0</td>
<td>60,4</td>
<td>66,3</td>
<td>800</td>
<td>825</td>
<td>733</td>
<td>14,6</td>
<td>600</td>
<td>567</td>
<td>500</td>
</tr>
<tr>
<td>18,7</td>
<td>60,4</td>
<td>70,1</td>
<td>900</td>
<td>917</td>
<td>825</td>
<td>11,3</td>
<td>667</td>
<td>617</td>
<td>560</td>
</tr>
<tr>
<td>16,3</td>
<td>60,4</td>
<td>73,2</td>
<td>1000</td>
<td>1008</td>
<td>917</td>
<td>9,4</td>
<td>750</td>
<td>702</td>
<td>642</td>
</tr>
<tr>
<td>13,6</td>
<td>60,4</td>
<td>73,5</td>
<td>1100</td>
<td>1054</td>
<td>958</td>
<td>7,0</td>
<td>825</td>
<td>733</td>
<td>675</td>
</tr>
<tr>
<td>10,1</td>
<td>60,4</td>
<td>67,0</td>
<td>1150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8,0</td>
<td>60,4</td>
<td>59,4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*overall efficiency of pump and motor*
High efficiency permanent magnet-synchronous-propeller pump

Design

The **oddesse** permanent magnet-synchronous-propeller pump is a single stage centrifugal pump with a surface treated open semi-axial impeller. The pump is driven by a rewindable three-phased permanent magnet-synchronous motor. The motor is designed as a wet-running motor with a watertight insulated winding, whereby the rotor is equipped with permanent magnets.

The radial bearings are lubricated by the motor filling. The filling is a mixture of glycol and water. It is biodegradable and secures the frost protection up to -15 °C. If necessary, it can be replaced by pure drinking water or by a more highly frost protection mixture.

Axial forces arising from the pump and motor are absorbed by a rotational direction-independent axial bearing with individual tilting pads.

Motors are encapsulated by a high quality mechanical seal. The pressure compensation between motor and its environment is granted by a reliable balance system. The motors are completed with water pressure-tight cables. They are earthed inside. The motors comply with the VDE-directives and the EC safety requirements for machinery.

The propeller pump is suitable for permanent or switched operation.

The **oddesse** permanent magnet-synchronous-propeller pump is characterized by a very high level of overall efficiency. The characteristic curve of the pump is recognized in accordance with DIN EN ISO 9906 class 2.

- Degree of protection: IP68 (EN60034-5)
- Cable version: multicore rubber jacket round cable, optional shielded round cable and cable suitable for drinking water
- Cable length: 10 m, other lengths on request
- Temperature control: PT100 / PTC optional
- Materials: GG25 or bronze

Operating data

For the operation of the motor it is necessary to use a suitable frequency converter programmed with special software. Additionally it is advisable to use a sine-wave filter or dU/dt-filter. The max. useable frequency of 120 Hz should be considered in the system design.

Additional parameters are:

- Acceleration time to minimum frequency ≤ 3 s
- Stopping time to zero frequency ≤ 3 s
- Switching frequency max. 20/h, switching pause ≥ 1 min
- Nominal speed 900 ... 1800 1/min (30 ... 60 Hz)
- Ambient temperature max. 50 °C
- Tolerances: DIN VDE 0530 / IEC 34
- Voltage tolerances ±10 % System (power)-supply
- Frequency tolerances -5 ... +10 % System (power)-supply
- Max. rate of the increase in voltage dU/dt ≤ 500 V/µs
- Max. voltage peaks to ground ≤ 1000 V
Applications

Propeller pumps are suitable for delivering of clean or slightly dirty water with a maximum sand content of 50 mg/l and water temperatures $< 50 \, ^\circ C$.

- irrigation and draining of agriculture areas
- regulation of water levels (land reclamation pumps and dyke draining pumps)
- circulating pumps in purification plant
- enhancement of oxygen in waters for breeding of fish
- dewatering of caves and security shafts
- watering and draining of sluices and floating docks
- trimming of ships and ferries

Kinds of installations

- vertical, hanging at the pipe
- horizontal, with automatic coupling device
- horizontal, as in-line pump
- angular, in a duct
### Material of construction

<table>
<thead>
<tr>
<th>Components</th>
<th>Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft</td>
<td>GG25</td>
</tr>
<tr>
<td>Impeller</td>
<td>Bronze</td>
</tr>
<tr>
<td>Casing</td>
<td>GG25</td>
</tr>
<tr>
<td>Radial bearing</td>
<td>Bronze</td>
</tr>
<tr>
<td>Axial bearing</td>
<td>GG25</td>
</tr>
<tr>
<td>Screws, nuts, bolts</td>
<td>Stainless steel / 1.4301</td>
</tr>
<tr>
<td>GLRD mechanical seal</td>
<td>SiC / SiC</td>
</tr>
</tbody>
</table>

#### Main dimensions

- **Weight**: 590 kg (without cable)
- **Connection suction branch**: C250 DIN2532
- **Connection outlet branch**: C300 DIN2532
Propeller pump

Design

1. Suction casing
2. Impeller
3. Mechanical seal
4. Diffuser
5. Water lubricated bearings
6. Rewindable stator with a watertight insulated winding
7. Permanent magnet rotor
8. Reliable pressure balance system
9. Outlet branch
10. Thrust bearing with self-adjusting tilting pads
11. Motor cable
System components

po-upl-s300.1 • Grid 500 V • 50/60 Hz • 3 ~

<table>
<thead>
<tr>
<th>Pn</th>
<th>Frequency converter</th>
<th>dU/dt - filter</th>
<th>Sine-wave filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>kW</td>
<td>HP</td>
<td>REFU</td>
<td>REDU</td>
</tr>
<tr>
<td>4</td>
<td>5.5</td>
<td>21 087</td>
<td>54 087</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54 100</td>
<td>00 180</td>
</tr>
</tbody>
</table>

The dimensioning of the system components is related to the rated data of the motor at a rated frequency of 60 Hz. For higher frequencies please consult with the oddesse service.

Electrical Connection

![Electrical Connection Diagram]
Sine-wave filter

Design

Sine-wave filters can be connected between inverter output and submersible motor. The pulse-width modulated (PWM) inverter output voltage is converted into a sinus voltage. Especially with long motor cables sinusoidal filters should be used to reduce parasitic capacities of the motor cable. It helps to reduce noise levels. Not only emissions on the motor cables are significantly attenuated, but also the voltage peaks, which are caused by the inverter switching frequency. The purpose of a sine-wave filter is to prevent damage to the motors' winding insulation. By using a sine-wave filter additional losses and motor noises are reduced. The use of shielded cables may be dispensed with in certain cases.

Electrical data

- Voltage: 3 x 500 V
- Frequency: 60 Hz
- Max. cable length: 500 m (depending on power range)
- Overload: 1,6 x In (1 min); every 10 min
- Clock frequency: ≥ 3,6 kHz
- Operating temperature: 40 °C; without power reduction
- Operating altitude: 1000 m, without power reduction

Dimensions

<table>
<thead>
<tr>
<th>Type</th>
<th>In</th>
<th>Dimensions</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>A [mm]</td>
<td>B</td>
<td>H [mm]</td>
<td>T [mm]</td>
</tr>
<tr>
<td>REFS00...</td>
<td>110</td>
<td>360</td>
<td>388</td>
</tr>
<tr>
<td>REFS54...</td>
<td>106</td>
<td>855</td>
<td>690</td>
</tr>
</tbody>
</table>
Examples of installations in fishfarms

Two pumps in series

Inline installation

Vertical installation

Inline installation
Example of Nordic Clean Pump well design by using oddesse po-upl-s 300.1 pumps and quick lock.

Maximum flowrate 4.200 m³/h at 10 meter delivery head
Worldwide distributor:

**Nordic Clean Pumps AS**
Asalvikvegen 40
5523 Haugesund, Norway
Phone: +47 928 19 295
Epost: post@nordiccleanpumps.no
www.nordiccleanpumps.no

**oddesse**
Pumpen- und Motorenfabrik GmbH
Am Pappelwald 12
39387 Oschersleben (Bode), Germany
Phone: +49 3949 932-0
Fax: +49 3949 932-463
info@oddesse.de
www.oddesse.de