AHLSTAR™ Process Pumps

The Heart of Your Process
Sulzer Pumps

Sulzer Pumps is a leading global supplier of reliable products and innovative pumping solutions for end users. Our active research and development, detailed process and application knowledge together with a comprehensive understanding of market demands keeps us consistently at the leading edge of technical development. Our global network of modern manufacturing and packaging facilities together with sales offices, service centers and representatives located close to major markets provide fast responses to customer needs.

Sulzer Pumps has a long history of providing innovative pumping solutions to business partners in the following industries:

- Oil and Gas
- Hydrocarbon Processing
- Pulp and Paper
- Power Generation
- General Industry
- Chemical Process Industry
- Water and Wastewater

A Reputation for Excellence

Sulzer Pumps has earned its reputation for providing advanced pumping solutions that meet the critical demands of our customers and business partners. Attention to detail and an insistence on quality are paramount to all phases of our operations.

Through having our own foundries, we are able to ensure optimum pump material selection for each particular application. Our 14 manufacturing plants are strategically located throughout the world, and our production processes are ISO 9002, ISO 14001 and OHSAS 18001 certified. Each and every pump is rigorously tested before shipment, and regardless of where in the world our pumps are made, the commitment to quality is unrelenting.
Lifetime Service Solutions for the AHLSTAR™ Pump

High pumping performance comes as a result of the availability, reliability and quality of the correct pump. Genuine spare parts and proper maintenance ensure the high performance of AHLSTAR™ process pumps in complex production operations.

We support our customers with an extensive range of pumping services, from spare parts to remote monitoring. Additionally we offer various types of service agreements in which spare parts and service solutions can be combined.

PumpsOnline
Customers can benefit from our new eBusiness solution, Pumps Online. This enables instant online access to product documentation, electronic ordering of spare parts and installed pump base at the mill.

Spare Parts Solutions
We offer an exchange unit service and newly developed service kits for all AHLSTAR™ process pumps. This enables fast and easy servicing and reduces downtime.

Service Solutions
To maintain and improve the high performance of AHLSTAR™ process pumps, customers can select from a wide range of available service solutions. All service work is carried out by qualified, experienced technicians using state-of-the-art equipment.
A double volute casing in larger AHLSTAR™ pumps reduces radial forces and shaft deflection.

The self-venting, top centerline casing prevents air lock in the top of the casing.

The sideplate is adjusted externally to maintain a constant impeller clearance and continuous high efficiency.

ROTOKEY impeller mounting provides strong, reliable power transmission. It is self-locking and reverse rotation safe. ROTOKEY facilitates the installation and removal of the impeller. It is not sensitive to axial loads created during pump operation.

**A-Hydraulics**

Designed for pumping clean, abrasive or corrosive liquids especially stocks of various kinds.

**N-Hydraulics**

Non-clogging process pumps are the right solutions when the liquid contains large or long particles.

**W-Hydraulics**

Wear-resistant pumps guarantee reliable pumping when the liquid is very corrosive and/or abrasive.

A wide selection of shaft seals is available to meet the needs of each specific application. Dynamic seals and ready fitted mechanical seals suit all requirements.
Expanded AHLSTAR™ Process Pumps – Features and Benefits

**Bearing Unit**
Simplified heavy-duty bearing unit design ensures reliability.

**Grease Lubrication**
Temperature of pumped liquid max. 120°C

**Oil Lubrication**
Temperature of pumped liquid max. 180°C (EPP 210°C)

Heavy-duty shaft. Deflection at stuffing box less than 0.05 mm. High strength duplex stainless steel is standard shaft material.

Non-contacting bearing protection for the combined advantages of labyrinth ring, deflector and lipseal. Lipseal protects in standstill position.

Strong and rigid bearing support foot improves mounting stability and maintains solid support.

**Self-Priming S**
Self-priming pumps with an internal vacuum pump are designed for self-priming purposes and to pump gas-containing liquids.

**Others**
AHLSTAR™ hydraulics are also utilized in NVP non-clogging vertical process pumps and NKP/WKP non-clogging cantilever pumps.

**EPP hot liquid pumps** for industrial processes where the system pressure is high and pressure or temperature strokes occur.

**Air-Separating R**
Air-separating pumps with an external vacuum pump are particularly applicable for pumping gas-containing liquids.

**Jackscrews** for simple disassembly.
The AHLSTAR™ product line offers a wide range of hydraulic sizes to guarantee minimum power consumption. Pump hydraulics, casings and impellers are designed to optimize fluid handling capabilities. Stocks are pumped like water. Particles in sludges do not accumulate in the pump, or slurries are effectively channeled so as not to cause wear.

AHLSTAR™ Interchangeability of Main Parts

<table>
<thead>
<tr>
<th>Pump type</th>
<th>Volute casing</th>
<th>Impeller</th>
<th>Casing cover</th>
<th>Adapter</th>
<th>Bearing unit</th>
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<tbody>
<tr>
<td>APP</td>
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<tr>
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<td>WRP</td>
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<tr>
<td>WSP</td>
<td></td>
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</table>

Common parts shown in the columns.

Hydraulic Design

The back vanes of the impeller keep the area between the impeller and the casing cover clean, and reduce the axial load on the bearings. Balance holes in the impeller are used to stabilize the pressure in the seal chamber. The balance holes can be plugged to optimize the shaft seal environment, should the application demand it.

The impeller hub design ensures a smooth flow and helps to avoid spinning and plugging. The reverse sides of same size impellers on the APP, NPP and WPP pumps are of equal dimensions. It is possible, therefore, to use the same casing covers for all impellers. This reduces the number of spare parts required.

All AHLSTAR™ pumps have the same basic design using the same components.

- 246 pumps
- 80 casing covers
- 6 common bearing units
- 6 common shaft seal sizes
- common sealing water equipment
- common coupling and coupling guard
- common baseplates

P metric dimensioning
P basic horizontal pump, S self-priming and R air-separating construction
A, N, W and E indicate the basic hydraulics
An Impeller Tailored to Each Liquid

**Closed Impeller**
is used for pumping clean liquids or liquids containing some impurities.

For pump types:
- APP
- EPP

**Open Impeller**
is designed for liquids containing solid particles, abrasive liquids or stock up to 8% consistency.

For pump types:
- APP
- ARP
- ASP
- EPP

**Special Open Impeller**
is suitable for liquids containing larger solid particles and long fibers, abrasive liquids or stock up to 8% consistency.

For pump types:
- APP
- ARP
- ASP

**Low Pulse Impeller**
is designed and manufactured to minimize pressure pulsations.

For pump type:
- APP

**Non-Clogging Closed Impeller**
is used for sludges or slurries containing large solid particles.

For pump types:
- NPP
- NRP
- NSP

**Vortex Impeller**
is suitable for liquids containing large or long solid particles or abrasive liquids.

For pump types:
- NPP
- NRP
- NSP
- WPP
- WRP
- WSP

**Wear-Resistant Closed Impeller**
is used for pumping both erosive and corrosive liquids or slurries containing solid particles.

For pump types:
- WPP
- WRP
- WSP

**Wear-Resistant Open Impeller**
is suitable for liquids with larger solid particles and long fibers, abrasive liquids or stock up to 8% consistency.

For pump types:
- WPP
- WRP
- WSP
Gas Handling Systems

**AHLSTAR™ Gas Removal Pumps for Various Applications**

The patented AHLSTAR™ self-priming gas removal pumps are designed to pump liquids containing gas, and for use where the inlet pipe is empty. These are situations where conventional centrifugal pumps fail.

With standard centrifugal pumps, gas bubbles which are formed in the impeller eye impair pumping. With the AHLSTAR™ pump, these gas bubbles are removed by an internal or external vacuum pump, or through sufficient inlet pressure. By removing the gas bubbles from the impeller, the operation of the pump system is stabilized and efficiency is greatly increased.

**The Effect of Gas Content in Conventional Centrifugal Pumps**

- Almost all impeller types can operate with a gas content of below 4%. However, the capacity and head will be reduced.
- At a gas content level of above 4%, the duty point remains approximately 10...100% from BEP (Best Efficiency Point). Pumping is unstable since the duty point varies heavily and excessive over-dimensioning of the pump becomes necessary.

**The Effect of Weakly Bound Gas Content in the AHLSTAR™ Gas Removal Pump**

- Pump operation is stable.
- For weakly bound gases, the absolute maximum value is 40%.
- For strongly bound gases it is up to 70%.

Conventional pump has unstable operation with a gas content of 0...4%

AHLSTAR™ gas removal pump has stable operation with a gas content of 0...40%
** Shaft Sealing **

** Dynamic Seal **
The Dynamic Seal is specially designed for fibrous liquids such as paper stock and other difficult liquids. The Dynamic Seal requires no external sealing water. It is essentially maintenance-free and offers outstanding reliability.

** Mechanical Seals **
Various mechanical seal configurations are available. For difficult applications “ready-fitted” seals are especially recommended. For extremely corrosive applications, a ready-fitted seal can be selected with the same exact construction material as the pump casing itself.

** Gland Packings **
A gland packing with external flushing prevents the pumped liquid from precipitating into the sealing housing. The flushing liquid is mixed with the pumped liquid. Alternatively the external flushing has an outlet connection.

** Additional Options for the Dynamic Seal **
The well-proven and highly successful Dynamic Seal can be modified to have additional properties. With these properties we are able to expand its operational limits. The pump can operate under a light vacuum or even over liquid boiling point.
To ensure maximum reliability against corrosion we offer material selection options from our own steel foundries.

- All parts in contact with the pumped liquid can be produced from the same construction material as the pump casing. Materials available for this option are 41, 4L, 4T, 4G, 43, 4U and 4J.

### Corrosion Resistant Thinking

To ensure maximum reliability against corrosion we offer material selection options from our own steel foundries.

- All stainless steel structures for extremely corrosive situations. All parts including the adapter and bearing unit are made of stainless steel.
- Additionally, stainless steel can be selected for the bearing unit auxiliary equipment to give longer operating life in corrosive environments.

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**Materials**

<table>
<thead>
<tr>
<th>Standard material combinations</th>
<th>Nominal chemical composition %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stainless steel design</strong></td>
<td>C max.</td>
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<td>Duplex SS</td>
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<td>AVESTA 654 SMO(^1)</td>
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<td>A494CW-6M</td>
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<td><strong>Cast iron design</strong></td>
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<td>Chromium iron (^2)</td>
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<tr>
<td>A532 IIIA</td>
<td>5B</td>
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</table>

**Material alternatives for other parts**

- **Gasket material**
  - Klinger SIL C-4430: Used in temperature range -40...+160°C and pH 2-12
  - PTFE/Glass: Used in temperature range -190...+240°C and pH 0-14

- **O-ring material**
  - EPDM: Used in temperature range -50...+150°C
  - FKM: Used in temperature range -20...+210°C

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\(^1\) AVESTA 654SMO is a trademark owned by Outokumpu Stainless which has granted Sulzer Pumps licence to produce this material.

\(^2\) For W construction (5B/4E).
Main Dimensions

AHLSTAR™ Series

up to size 44-200
Design  EN ISO 5199:2002
Flange drilling  Several flange drilling options
according to valid standards

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<th>B2</th>
<th>H1</th>
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<td>120</td>
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</table>

1) Max. dimension for the largest IEC motor required in standard operation.
2) With the largest steel baseplate and coupling but without motor.

AHLSTAR™ is available with both metric and US standard dimensions with compatible fasteners and fittings.

NOTE: Dimensions not to be used for construction.
Various options are available for painting the pump.

Grinding of the pump interior and special cleaning offered for specific applications where surface quality or cleanliness is essential.

Back pull-out design facilitates fast and easy access when servicing the pump.

Flexible coupling with spacer for quick service.

Safety coupling guard is designed according to stringent safety regulations.

RIGBASE baseplates are of steel or concrete with 3-point fastening. Distortion-free and easy to install. EPP centerline mounted.

Removable adjusting screws permit fast and simple alignment of the coupling.

Riser blocks allow the installation of the next frame size of motor.

**Foundation Screws**

- **Grouted**
- **Welded**
- A smaller pump and motor can be installed with adjustable support feet
Steel Baseplate
A steel baseplate for pump and motor grouted at site. A short baseplate is also available.

Concrete Baseplate
The concrete baseplate can be mounted on rubber sheeting, various mounting beams, vibration dampers, etc.

Belt Drive
Belt drive construction is also available.

Sealing Water Equipment

The concept for sealing water equipment meets all the requirements demanded by the pumped liquid or the shaft seal. All general pumping solutions can be covered by just four different options. Special materials to take into account corrosive environments ensure reliable operation in extreme circumstances.
Wide Hydraulic Coverage

A-Performance
Head up to 160 m
Temperature max. 180°C
Capacity up to 2000 l/s
Operating frequency 50 or 60 Hz
Pressure up to 1.6 MPa, depending on material and size

E-Performance
Head up to 140 m
Temperature max. 210°C
Capacity up to 1700 l/s
Operating frequency 50 or 60 Hz
Pressure up to 2.5 MPa
**N-Performance**
- Head up to 90 m
- Temperature max. 180°C
- Capacity up to 550 l/s
- Operating frequency 50 or 60 Hz
- Pressure up to 1.6 MPa, depending on material and size

![N-Performance Image]

**W-Performance**
- Head up to 110 m
- Temperature max. 180°C
- Capacity up to 2000 l/s
- Operating frequency 50 or 60 Hz
- Pressure up to 1.6 MPa, depending on material and size

![W-Performance Image]