# Alfa Laval SX UltraPure

## Rotary lobe pumps

### Introduction

The Alfa Laval SX UltraPure Rotary Lobe Pump is designed with optimized pump head geometry and multi-lobe rotors to ensure low-shear operation with minimum pulsation. This makes the SX UltraPure the best choice for maintaining the integrity of delicate products in high-purity applications.

The pump is designed according to the most stringent hygienic design standards and with verified, effective Cleaning-in-Place (CIP) and Sterilization-in-Place (SIP).

### Applications

The SX UltraPure Rotary Lobe Pump is designed for gentle transportation of process fluids in high-purity applications across the biotechnology, pharmaceutical, and home and personal care industries.

The SX UltraPure is available with 14 different pump head displacements based on seven different gearbox modules to handle flow rates up to 30380 gallon/h and differential pressures up to 218 psi (15 bar).

### Benefits

- Low pulsation and very gentle pumping, making the pump ideal for sensitive products.
- Minimized shearing to protect end-product quality.
- Low maintenance, increased process uptime.
- Low contamination risk due to full material traceability and USP Class VI elastomers that reduce the risk of process contamination from extractables.
- Smooth qualification, validation and process control: material traceability, and pump supplied with the Alfa Laval Q-doc package in line with Good Documentation Practices.

### Standard design

All media contacting steel components, like the rotor case, front cover, rotors and rotor nuts, are in W. 1.4404 (AISI 316L). The stainless steel gearbox provides maximum shaft rigidity and easy oil seal replacement. The gearbox design is universal, which enables the flexibility of mounting pumps with the inlet and outlet ports in either a vertical or horizontal plane by changing the foot and its position.

The standard Alfa Laval SX UltraPure has four-lobe rotors rated to 302°F, facilitating use with CIP and SIP processes.

Fully front-loading and fully interchangeable single, single flushed and double mechanical shaft seals are available. All media contacting elastomers are controlled compression joints, the latest technology where static and dynamic elastomer seals are used to prevent leakage of pumped media to the atmosphere.

The Alfa Laval SX UltraPure can be supplied either as a bare shaft pump or mounted on a base plate complete with coupling, guard, gear motor and shroud for easy, plug-and-play installation.

### Working principle

A gear train in the pump gearbox drives the rotors and provides accurate synchronization of the multi-lobe rotors. The movement of the counter-rotating rotors creates a partial vacuum that allows atmospheric pressure or other external pressures to force fluid into the pump chamber. As the rotors

revolve, an expanding cavity forms, filling with fluid. As the blades disengage, each dwell forms a cavity. As the rotor blades engage, the cavity diminishes and fluid is displaced into the outlet port.

## Certificates

Authorized to carry the 3A symbol

## TECHNICAL DATA

| Standard specification | |
|---|---|
| Product wetted steel parts: | W. 1.4404 (316L) with material traceability 3.1 according to EN 10204 |
| Inside surface finish: | Mech Ra ≤ 32 |
| Gearbox: | Stainless steel |
| Base plate: | Stainless steel |
| Coupling guard: | Stainless steel |
| Rotor: | Four-lobe |
| Product wetted elastomers: | EPDM - USP Class VI, 121°C. Chapter 88, and Chapter 87 |
| Other elastomers: | FPM |
| Shaft seal: | Single mechanical (R00) |
| Rotary seal face: | Silicon Carbide |
| Stationary seal face: | Silicon Carbide |

| Shaft seals | |
|---|---|
| Single, single flush and double mechanical available. All options are fully front loading and interchangeable. | |
| Max. flush pressure, single flush: | Max. 7.25 psi |
| Max. flush pressure, double mechanical: | Max. 1 bar over product pressure |
| Water consumption, flushed or double mechanical: | 0.13 gallon/min |
| Flush connections: | BSPT or NPT |

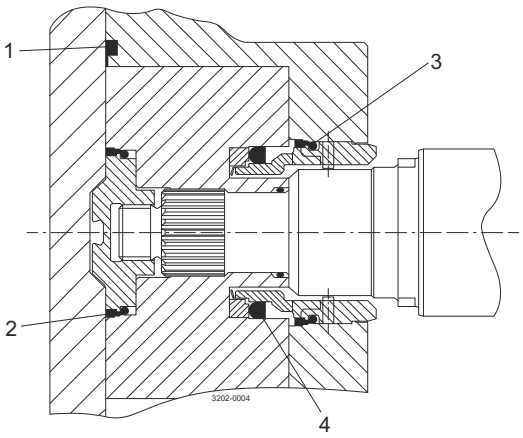
| Temperature | |
|---|---|
| Max. process and CIP temperature: | 302ºF |

| Motor |
|---|
| Gear motor, 4 poles, to IEC metric standard, 50/60 Hz, suitable for frequency conversion, IP55, insulation class F. |

| Warranty |
|---|
| Extended 3-years warranty on SX UltraPure pumps. The warranty covers all non wear parts on the condition that genuine Alfa Laval Spare Parts are used. |

## Media contacting elastomers

All media contacting elastomers are controlled compression joints, the latest technology where static and dynamic elastomer seals are used to prevent pumped media leaking to atmosphere.




1. Front cover compression joint.
2. Spline sealing cup seal.
3. Cup seal.
4. Squad ring.

## Flows/Pressures/Connections

| SX Model | Displacement | | | Inlet and Outlet Connection Size | | Differential Pressure [1] | | Maximum Speed |
|---|---|---|---|---|---|---|---|---|
| | Litre/rev | Imp gall/100 rev | US gall/100 rev | mm | in | bar | psi | rev/min |
| SX UltraPure 1NDL | 0.05 | 1.11 | 1.32 | 25 | 1 | 12 | 175 | 1200 |
| SX UltraPure 1WLD | 0.07 | 1.54 | 1.85 | 40 | 1.5 | 7 | 100 | 1200 |
| SX UltraPure 2NDL | 0.128 | 2.82 | 3.38 | 40 | 1.5 | 15 | 215 | 1000 |
| SX UltraPure 2WLD | 0.181 | 3.98 | 4.78 | 50 | 2 | 7 | 100 | 1000 |
| SX UltraPure 3NDL | 0.266 | 5.85 | 7.03 | 50 | 2 | 15 | 215 | 1000 |
| SX UltraPure 3WLD | 0.35 | 7.70 | 9.25 | 65 | 2.5 | 7 | 100 | 1000 |
| SX UltraPure 4NDL | 0.46 | 10.12 | 12.15 | 50 | 2 | 15 | 215 | 1000 |
| SX UltraPure 4WLD | 0.63 | 13.86 | 16.65 | 65 | 2.5 | 10 | 145 | 1000 |
| SX UltraPure 5NDL | 0.82 | 18.04 | 21.67 | 65 | 2.5 | 15 | 215 | 600 |
| SX UltraPure 5WLD | 1.15 | 25.30 | 30.38 | 80 | 3 | 10 | 145 | 600 |
| SX UltraPure 6NDL | 1.40 | 30.80 | 36.99 | 80 | 3 | 15 | 215 | 500 |
| SX UltraPure 6WLD | 1.90 | 41.80 | 50.20 | 100 | 4 | 10 | 145 | 500 |
| SX UltraPure 7NDL | 2.50 | 55.00 | 66.05 | 100 | 4 | 15 | 215 | 500 |
| SX UltraPure 7WLD | 3.80 | 83.60 | 100.40 | 150 | 6 | 10 | 145 | 500 |

[1] These pressure ratings may vary for pumps with certain threaded connections.

## Weight

| Model | Bare Shaft Pump lbs. | |
|---|---|---|
| | Horizontal porting | Vertical porting |
| SX UltraPure 1NLD | 37 | 39 |
| SX UltraPure 1WLD | 39 | 41 |
| SX UltraPure 2NLD | 75 | 77 |
| SX UltraPure 2WLD | 77 | 79 |
| SX UltraPure 3NLD | 130 | 134 |
| SX UltraPure 3WLD | 134 | 138 |
| SX UltraPure 4NLD | 247 | 254 |
| SX UltraPure 4WLD | 260 | 267 |
| SX UltraPure 5NLD | 342 | 342 |
| SX UltraPure 5WLD | 364 | 364 |
| SX UltraPure 6NLD | 613 | 613 |
| SX UltraPure 6WLD | 639 | 639 |
| SX UltraPure 7NLD | - | 750 |
| SX UltraPure 7WLD | - | 798 |

## Shaft Seal Options

- Single or single flush/quench (steam barrier for aseptic application) R00 type mechanical seals.
- Double R00 type mechanical seal for flush.

All sealing options are fully front loading and fully interchangeable without the need for additional housings or pump component changes. Specialised seal setting of the mechanical seal is not required as the seal is dimensionally set on assembly. This feature further enhances fast and efficient on-site seal interchangeability.

## Materials for Mechanical Seals

As standard the SX UltraPure is supplied with EHEDG compliant Silicon Carbide/Silicon Carbide seal faces avoiding any risk of potential extractable contamination.

## Standard Specification Options

- Screwed male inlet and outlet ports to DIN11851, SMS, RJT, Triclamp for ASME, DIN 32676 Clamp, DIN 11864-1 (Union) Form A, DIN 11864-2 (Flange) Form A or DIN 11864-3 (Clamp) Form A.
- Heating/Cooling Jacket for Rotorcase Cover.
- Product wetted surface finish electropolished to Ra 15 µin.
- Passivated surface.
- Surface finish measurement with certificate.
- Hydrostatic testing with certificate.
- ATEX compliance.

- Complete pump unit comprising: Pump + stainless steel baseplate + coupling with guard + Geared electric motor suitable for (or supplied with) frequency speed control or manual variable speed drive (advise motor enclosure and electrical supply).
- Low delta ferrite material for product wetted components.
- High alloy materials for product wetted components i.e. AL6XN or Titanium.

## Q-doc

**Standard documentation package:**

- Declaration of compliance with Regulation (EC) No.: 1935/2004.
- Declaration of compliance to EN 10204 type 3.1 (MTR).
- Declaration of compliance to the U.S. Food & Drug Administration CFR 21 (non-metallic parts).
- Declaration of compliance to the U.S. Pharmacopeia (Elastomers and polymers).
- TSE (Transmissible Spongiform Encephalopathy) / ADI (Animal Derivative Ingredient) declaration.
- Declaration of surface finish compliance.
- Declaration of passivation and electro polishing (if specified).
- 3.1 certification in accordance to EN10204.
- Pump performance test certificate.

**Optional documentation:**

- Hydrostatic test certificate.
- Surface measurement report.

## Pump Sizing

In order to correctly size a rotary lobe pump some essential information is required. Provision of this information listed below enables our Technical Support personnel to obtain the optimum pump selection.

Product/Fluid Data:

- Fluid to be pumped.
- Viscosity.
- SG/Density.
- Pumping temperature, minimum, normal and maximum.
- Cleaning in Place temperature(s), minimum, normal and maximum.

Performance Data:

- Flow rate, minimum, normal and maximum.
- Discharge head/pressure (closest to pump outlet).
- Suction condition.

## Bareshaft Pump Dimensions

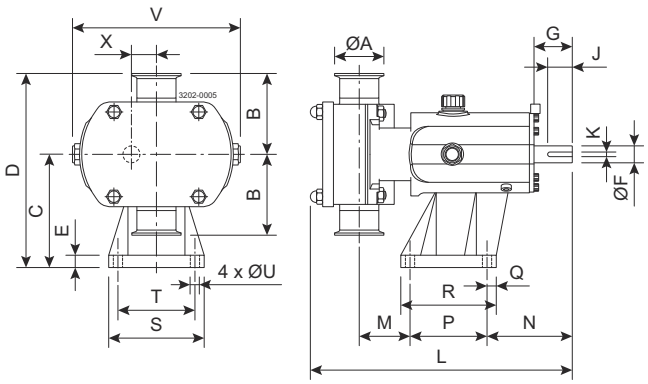



**Figure 1. Vertically ported**

**All dimensions in inches, except where noted**

| PUMP | A | B | C | D | E | F | G | J | K | L | M | N | P | Q | R | S | T | U | V | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SX UltraPure 1NLD | 1.00 | 3.74 | 4.45 | 8.19 | 0.63 | 0.63 | 1.57 | 1.18 | 0.20 | 10.87 | 2.13 | 3.94 | 3.15 | 0.87 | 4.49 | 4.09 | 3.15 | 0.39 | 7.05 | 0.93 |
| SX UltraPure 1WLD | 1.50 | 3.74 | 4.45 | 8.19 | 0.63 | 0.63 | 1.57 | 1.18 | 0.20 | 11.38 | 2.36 | 3.94 | 3.15 | 0.87 | 4.49 | 4.09 | 3.15 | 0.39 | 7.05 | 0.93 |
| SX UltraPure 2NLD | 1.50 | 4.13 | 5.79 | 9.92 | 0.63 | 0.87 | 1.97 | 1.26 | 0.24 | 12.76 | 2.32 | 4.37 | 3.94 | 0.47 | 4.88 | 4.88 | 3.94 | 0.47 | 8.62 | 1.28 |
| SX UltraPure 2WLD | 2.00 | 4.13 | 5.79 | 9.92 | 0.63 | 0.87 | 1.97 | 1.26 | 0.24 | 13.39 | 2.60 | 4.37 | 3.94 | 0.47 | 4.88 | 4.88 | 3.94 | 0.47 | 8.62 | 1.28 |

| PUMP | A | B | C | D | E | F | G | J | K | L | M | N | P | Q | R | S | T | U | V | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SX UltraPure 3NLD | 2.00 | 4.92 | 6.89 | 11.81 | 0.87 | 1.10 | 2.36 | 1.57 | 0.31 | 16.97 | 2.83 | 5.59 | 6.10 | 0.59 | 7.28 | 6.10 | 4.92 | 0.55 | 9.96 | 1.48 |
| SX UltraPure 3WLD | 2.50 | 4.92 | 6.89 | 11.81 | 0.87 | 1.10 | 2.36 | 1.57 | 0.31 | 17.60 | 3.03 | 5.59 | 6.10 | 0.59 | 7.28 | 6.10 | 4.92 | 0.55 | 9.96 | 1.48 |
| SX UltraPure 4NLD | 2.00 | 5.91 | 8.39 | 14.29 | 0.98 | 1.50 | 3.15 | 2.48 | 0.39 | 20.24 | 2.95 | 6.85 | 7.87 | 0.67 | 9.21 | 7.24 | 5.91 | 0.55 | 12.09 | 1.95 |
| SX UltraPure 4WLD | 2.50 | 5.91 | 8.39 | 14.29 | 0.98 | 1.50 | 3.15 | 2.48 | 0.39 | 20.98 | 3.19 | 6.85 | 7.87 | 0.67 | 9.21 | 7.24 | 5.91 | 0.55 | 12.09 | 1.95 |
| SX UltraPure 5NLD | 2.50 | 6.89 | 10.12 | 17.01 | 1.18 | 1.77 | 4.33 | 2.76 | 0.55 | 23.58 | 2.40 | 10.39 | 7.87 | 0.79 | 9.45 | 8.66 | 7.09 | 0.55 | 13.58 | 2.36 |
| SX UltraPure 5WLD | 3.00 | 6.86 | 10.12 | 17.01 | 1.18 | 1.77 | 4.33 | 2.76 | 0.55 | 24.65 | 3.19 | 10.39 | 7.87 | 0.79 | 9.45 | 8.66 | 7.09 | 0.55 | 13.58 | 2.36 |
| SX UltraPure 6NLD | 3.00 | 7.48 | 11.61 | 19.09 | 1.18 | 1.89 | 4.33 | 2.76 | 0.55 | 27.05 | 3.03 | 10.51 | 10.24 | 0.79 | 11.81 | 9.84 | 8.27 | 0.55 | 15.75 | 2.76 |
| SX UltraPure 6WLD | 4.00 | 7.48 | 11.61 | 19.09 | 1.18 | 1.89 | 4.33 | 2.76 | 0.55 | 28.15 | 3.50 | 10.51 | 10.24 | 0.79 | 11.81 | 9.84 | 8.27 | 0.55 | 15.75 | 2.76 |
| SX UltraPure 7NLD | 4.00 | 8.07 | 14.37 | 22.44 | 1.18 | 2.36 | 4.33 | 3.54 | 0.71 | 30.04 | 3.70 | 11.34 | 11.02 | 0.98 | 12.99 | 11.42 | 9.45 | 0.71 | 18.70 | 3.21 |
| SX UltraPure 7WLD | 6.00 | 8.07 | 14.37 | 22.44 | 1.18 | 2.36 | 4.33 | 3.54 | 0.71 | 32.17 | 4.76 | 11.34 | 11.02 | 0.98 | 12.99 | 11.42 | 9.45 | 0.71 | 18.70 | 3.21 |

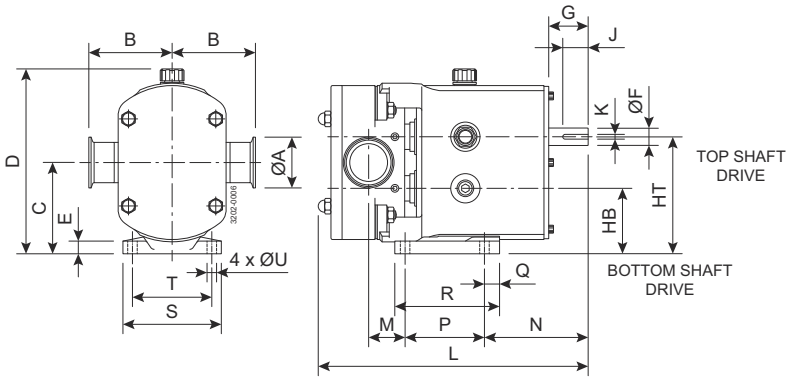



**Figure 2. Horizontally ported**

### All dimensions in inches, except where noted

| PUMP | A | B | C | D | E | F | G | HB | HT | J | K | L | M | N | P | Q | R | S | T | U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SX UltraPure 1NLD | 1.00 | 3.74 | 3.54 | 7.40 | 0.39 | 0.63 | 1.57 | 2.62 | 4.47 | 1.18 | 0.20 | 10.87 | 1.46 | 4.61 | 3.15 | 0.98 | 4.53 | 3.94 | 3.15 | 0.39 |
| SX UltraPure 1WLD | 1.50 | 3.74 | 3.54 | 7.40 | 0.39 | 0.63 | 1.57 | 2.62 | 4.47 | 1.18 | 0.20 | 11.38 | 1.69 | 4.61 | 3.15 | 0.98 | 4.53 | 3.94 | 3.15 | 0.39 |
| SX UltraPure 2NLD | 1.50 | 4.13 | 4.53 | 9.17 | 0.63 | 0.87 | 1.97 | 3.25 | 5.81 | 1.26 | 0.24 | 12.76 | 1.54 | 5.16 | 3.94 | 0.75 | 5.20 | 4.88 | 3.94 | 0.47 |
| SX UltraPure 2WLD | 2.00 | 4.13 | 4.53 | 9.17 | 0.63 | 0.87 | 1.97 | 3.25 | 5.81 | 1.26 | 0.24 | 13.39 | 1.81 | 5.16 | 3.94 | 0.75 | 5.20 | 4.88 | 3.94 | 0.47 |
| SX UltraPure 3NLD | 2.00 | 4.92 | 5.43 | 10.75 | 0.71 | 1.1 | 2.36 | 3.96 | 6.91 | 1.57 | 0.31 | 16.97 | 2.72 | 6.89 | 4.92 | 1.18 | 7.13 | 6.06 | 4.92 | 0.55 |
| SX UltraPure 3WLD | 2.50 | 4.92 | 5.43 | 10.75 | 0.71 | 1.1 | 2.36 | 3.96 | 6.91 | 1.57 | 0.31 | 17.60 | 2.91 | 6.89 | 4.92 | 1.18 | 7.13 | 6.06 | 4.92 | 0.55 |
| SX UltraPure 4NLD | 2.00 | 5.91 | 6.42 | 12.80 | 0.79 | 1.5 | 3.15 | 4.47 | 8.37 | 2.48 | 0.39 | 20.24 | 2.95 | 8.86 | 5.91 | 1.38 | 7.95 | 7.24 | 5.91 | 0.55 |
| SX UltraPure 4WLD | 2.50 | 5.91 | 6.42 | 12.80 | 0.79 | 1.5 | 3.15 | 4.47 | 8.37 | 2.48 | 0.39 | 20.98 | 3.19 | 8.86 | 5.91 | 1.38 | 7.95 | 7.24 | 5.91 | 0.55 |
| SX UltraPure 5NLD | 2.50 | 6.89 | 7.68 | 14.80 | 0.79 | 1.77 | 4.33 | 5.31 | 10.04 | 2.76 | 0.55 | 23.58 | 1.81 | 10.98 | 7.09 | 1.38 | 10.83 | 8.27 | 7.09 | 0.55 |
| SX UltraPure 5WLD | 3.00 | 6.89 | 7.68 | 14.80 | 0.79 | 1.77 | 4.33 | 5.31 | 10.04 | 2.76 | 0.55 | 24.65 | 2.60 | 10.98 | 7.09 | 1.38 | 10.83 | 8.27 | 7.09 | 0.55 |
| SX UltraPure 6NLD | 3.00 | 7.48 | 8.86 | 16.89 | 0.79 | 1.89 | 4.33 | 6.10 | 11.61 | 2.76 | 0.55 | 27.05 | 3.07 | 10.47 | 10.2 | 1.57 | 14.57 | 8.66 | 7.48 | 0.55 |
| SX UltraPure 6WLD | 4.00 | 7.48 | 8.86 | 16.89 | 0.79 | 1.89 | 4.33 | 6.10 | 11.61 | 2.76 | 0.55 | 28.15 | 3.54 | 10.47 | 10.2 | 1.57 | 14.57 | 8.66 | 7.48 | 0.55 |







**How to contact Alfa Laval**

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com