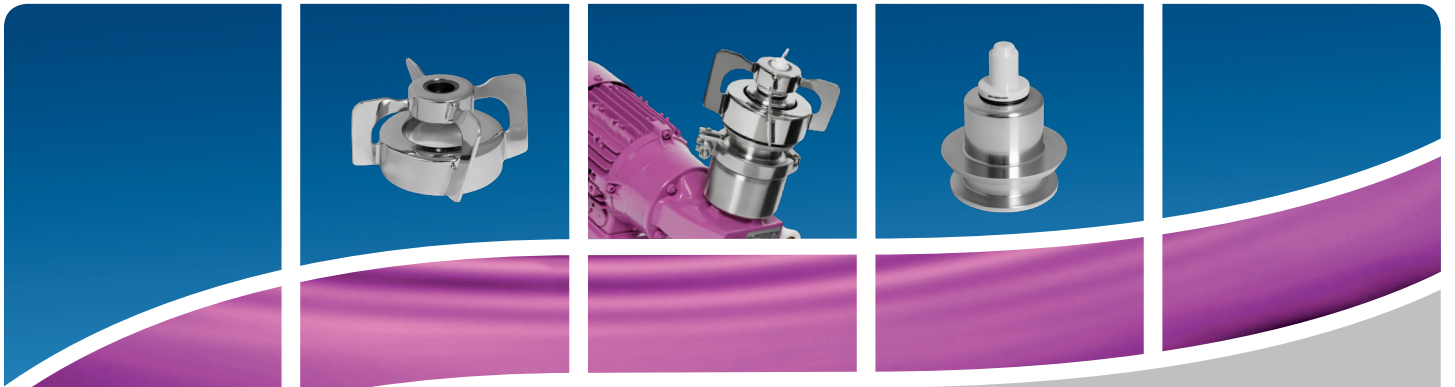


Mixer Technology



“The Perfect Mixture of
Safety and Efficiency”

VPureMix®

Magnetic mixing technology

The VPureMix® magnetic mixers were specially designed for applications with the most stringent demands in terms of safety and sterility. A magnetic coupling eliminates the risks of conventional shaft penetration, such as leakage and contamination, and thus guarantees the highest level of product safety. The optional magnetic field sensor also contributes to increasing process reliability, since the speed and direction of rotation can be continuously monitored, recorded and adjusted.

Product safety through magnetic coupling

A magnetic coupling between the drive unit and the mixing head eliminates the need for shaft bushings and mechanical seals. The integrity of the tank is thus fully preserved and ensures a sterile process.

Customized gear motors

The VPureMix® is available with gear motors that have international certifications or declarations of conformity, such as CE; CCC; EAC; ISI; UA; UL and CSA, as well as explosion-proof ATEX and CCC Ex motors, gear motors with special painting, smooth motors, motors with forced cooling fans and incremental encoders etc.

Adaptable design

The VPureMix® is available in two axis lengths to allow work in insulated tanks.

VPureMix®

Special alloys for corrosive applications

If increased corrosion resistance of the stainless steel components in contact with the product is required, the VPureMix® is also available in the special alloys 1.4539 (904L), 2.4602 (Alloy 22) and 1.4529 (6Mo) in addition to the standard material 1.4435 (AISI 316L).

Smart bracket

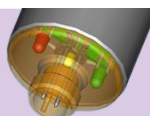
The VPureMix® drive unit can be rotated by 360°. This enables customer-specific design and use in every production facility.

Smooth surfaces

No protruding bolts or screws on the transmission or the tank fixtures. The resulting smooth surfaces are easy to clean.

Process reliability through sensors

The speed and direction of rotation of the mixing head can be permanently recorded and monitored in real time using the optional magnetic field sensor. Three LEDs on the converter unit's sensor indicate the status of the sensor directly on site.



“For demanding & high quality Processes”

VPureMix® magnetic mixers are the first choice in processes with the highest standards of sterility and product safety.

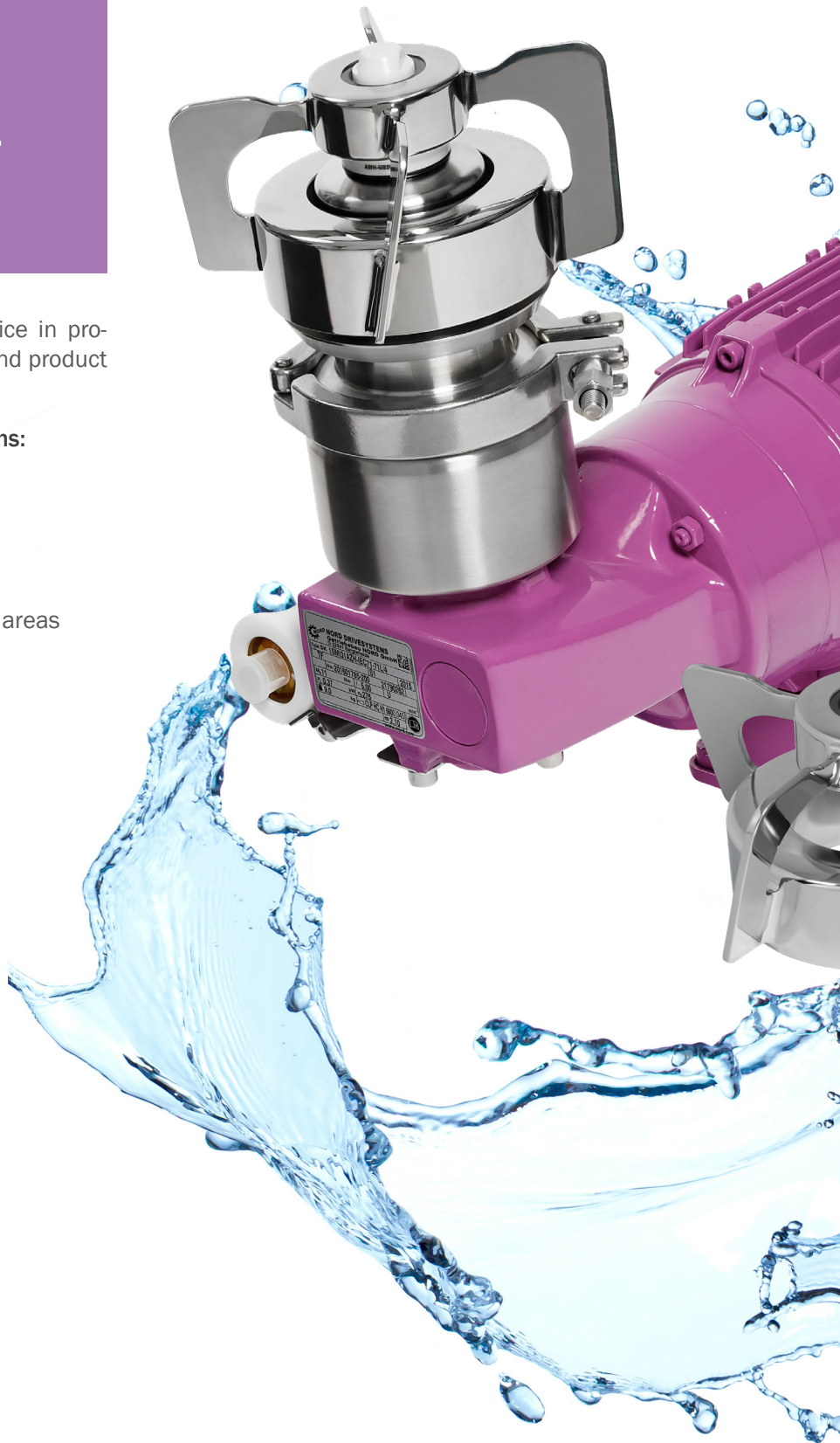
Pharmaceutical & biotechnological applications:

- API production
- Vaccine production
- Reserve and media production
- Plasma fractionation
- Bio-reactors for bacteria and cell cultures
- Process tanks in upstream and downstream areas
- Storage tanks
- And much more.



Food & beverage applications

- Dairy products
- Breweries
- Soft drink and fruit juice production
- And much more.



VPureMix®

"Mixing head design and high-performance ceramic bearings make the difference"

The mixing head design is the result of CFD analyses and impresses with its open design, which enables optimal product flow and makes cleaning processes simple. The mixing head is mounted on high-performance ceramic made of zirconium dioxide (ZrO₂) and silicon carbide (SSiC), which eliminates vibrations, and also ensures extremely low shear forces and smooth dry running.

Studies were able to confirm the temporary dry-running capability of the high-performance ceramic bearing over several hours of operation at adjusted speeds. The reason for this is the robustness and wear resistance of the high-performance ceramics. These properties also guarantee particle-free processes. A particle test in accordance with USP<788> PARTICULATE MATTER IN INJECTIONS, which was carried out via an independent research institute, could not detect any particle abrasion between the two bearing components.

Furthermore, zirconium dioxide and silicon carbide convince with their biocompatibility, which was certified according to USP Plastic Class VI test and cytotoxicity test according to ISO 10993-5.

This means:

- Gentle & efficient product mixing, even of the smallest volumes
- Risk-free & complete tank emptying even when the mixing process is running
- Minimal product residue
- Optimum in-place cleanability (CIP) & in-place sterilizability (SIP) save valuable resources such as water and cleaning agent and reduces plant downtimes

“Easy, residue-free Cleaning”

Riboflavin test - proof of the easy cleaning of the VPureMix® with a TANKO® S30 spray head

A VPureMix® LS500 along with a TANKO® S30 were installed in a 350 L tank to verify its easy cleaning capability. Before the 45-second cleaning step with 20 liters of tap water (20°C, 0.8 bar) using TANKO® S30, VPureMix® and TANKO® were sprayed with riboflavin solution (Fig. 1).

The test focused on components that are commonly considered difficult to clean, such as the inside of the mixing head with female bearing, male bearing with O-ring, the tank plate and downpipe of the TANKO® (Fig. 1,2). During the test, the VPureMix® LS500 ran at a speed of 50 rpm to achieve complete wetting.

Cleaning the VPureMix® LS500 with TANKO® S30 delivered excellent cleaning results on critical surfaces (see Fig. 1 and 2). VPureMix® magnetic mixers are easy to clean - without dismantling or opening the tank.

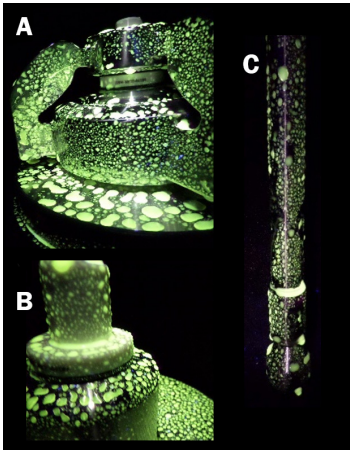


Fig. 1: Riboflavin fluorescence on critical areas of the VPureMix® VPureMix® LS500 (A;B) and TANKO® S30 (C).

A: Attached mixing head; B: Male bearing with O-ring, screwed onto tank plate;

C: Downpipe

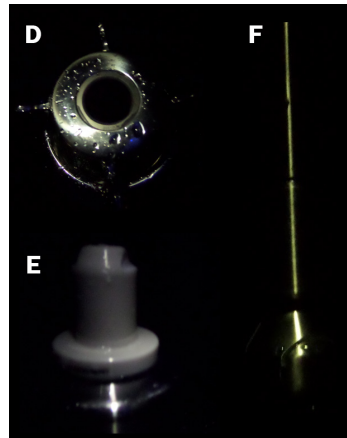


Fig. 2: Fluorescence image after cleaning the critical areas of the VPureMix® LS500 (D;E) and TANKO S30 (F).

D: Mixing head; E: Male bearing with O-ring, screwed onto tank plate;

F: Downpipe



“Perfect Mixing Result!”

By generating an axial flow towards the mixing head of the VPureMix® and radial flow towards the vessel wall, effective and optimum mixing of low to medium viscosity fluids with a dynamic viscosity of 1 to 800 mPa*s can be achieved. This also provides the best possible compensation for differences in temperature, concentration, density and pH. The low-shear mixing head gently and efficiently mixes shear-sensitive media from the pharmaceutical, biotech and food industries without damaging them.

It can be used for small or laboratory processes with a working volume of 3 liters up to large-scale processes with a working volume of 31,000 liters, depending on the viscosity.



Mixing Process

"Corrosion resistance due to special alloys"

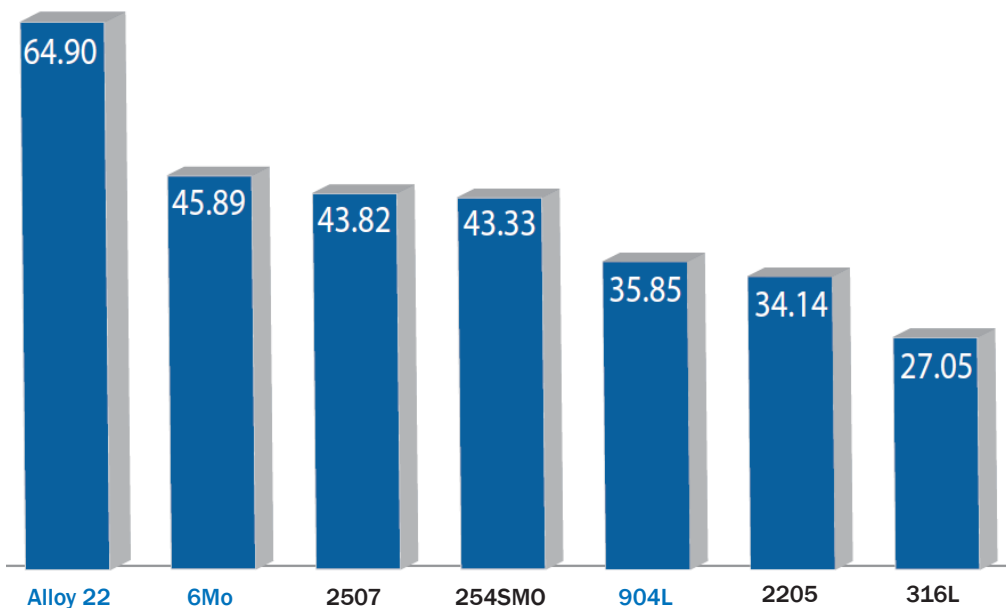
Stainless steel special alloys for the product-wetted components of the VPureMix® magnetic mixer.

Stainless steel components in the materials 1.4404 and 1.4435 (316L) are often the first choice when it comes to use in pharmaceutical, biotechnological and food processes. High concentrations and temperatures, as well as long contact times of corrosive chemicals, such as chlorides, sulfuric acid and organic acids, in these processes can reduce the corrosion resistance of components and significantly shorten service life. Shorter maintenance cycles, more frequent downtimes and recurring investment costs are the result.

Stainless steel special alloys can offer exceptional corrosion resistance to most aggressive and corrosive process media. Process reliability, especially in hygienic and high-purity stirring processes in the pharmaceutical, biotech and food industries, can be significantly increased by the right choice of materials. The investment often pays off quickly.

AWH offers VPureMix® magnetic mixers in three of the special stainless steel alloys most in demand on the market:

- 1.4529 / 6Mo / UNS N08367
- 1.4539 / 904L / UNS N08904
- 2.4602 / Alloy 22 / UNS N06022



PREN - Index (Pitting Resistance Equivalent Number)

as a measure of the corrosion resistance of stainless steels.

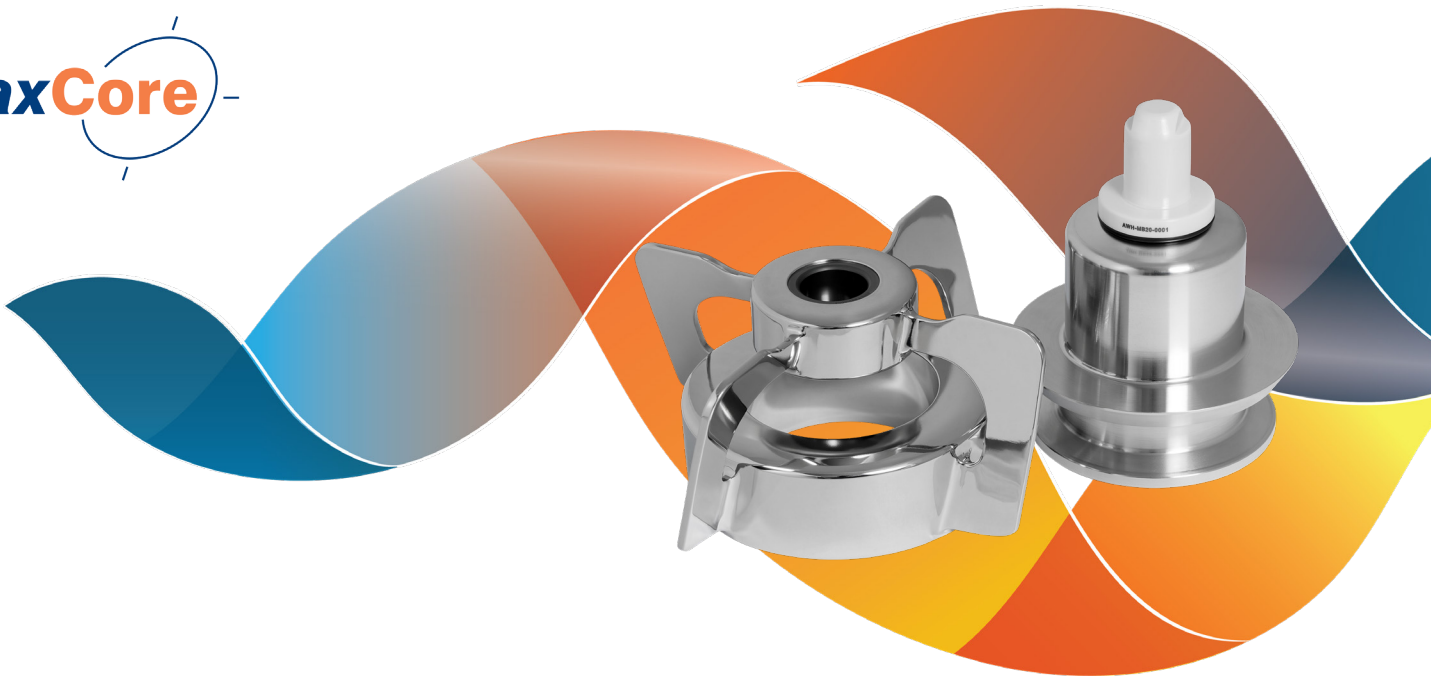
The higher the PREN number, the more corrosion resistant the stainless steel ($PREN = Cr + 3.3 Mo + 16N$).

Special Alloy

"Special Alloy - a plus in process reliability"

Alloy Chemical Composition

Typ	UNS	Grade	similar EN-(European) Grade	C (max)	N	Cr	Ni	Mo	Cu	Typical trade names
Austenitic	S31603	316L	1.4404	0.03	0.1	16.0-18.0	10.0-14.0	2.0-3.0	-	
Duplex	S32205	2205	1.4462	0.03	0.14-0.20	22.0-23.0	4.5-6.5	2.5-3.5	-	
Superaustenitic	N08904	904L	1.4539	0.02	-	19.0-23.0	23.9-28.0	4.0-5.0	1.0-2.0	MaxCore 904L URANUS B6
Superduplex	S32750	2507	1.4410	0.03	0.24-0.32	24.0-26.0	6.0-8.0	3.0-5.0	0.5	
Superaustenitic	S31254	SM0254	1.4547	0.02	0.18-0.22	19.5-20.5	17.5-18.5	6.0-6.5	0.5-1.0	
Superaustenitic	N08367	6Mo	1.4529	0.03	0.18-0.25	20.0-22.0	23.5-25.5	6.0-7.0	0.75	MaxCore 6Mo Ultra6XN® AL-6XN®
Superaustenitic	N08926	6Mo	1.4529	0.02	0.15-0.25	19.0-21.0	24.0-26.0	6.0-7.0	0.5-1.5	Ultra6XN® AL-6XN®
Nickel Base	N10276	Alloy C276	2.4819	0.01	-	16	57	16	0.5	Hastelloy C276®
Nickel Base	N06022	Alloy 22	2.4602	0.01	-	22	56	13	0.5	MaxCore Alloy22 Hastelloy C22®



Special Alloy

Model Overview

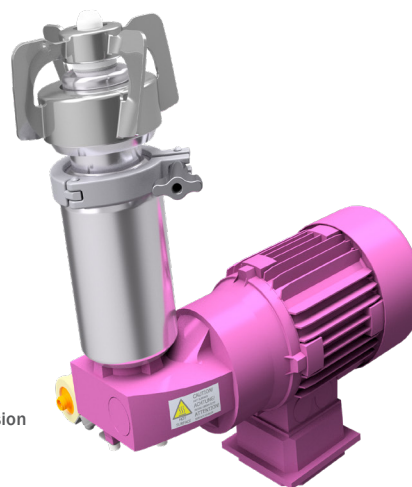
Model	VPureMix® LS30	VPureMix® LS50	VPureMix® LS100	VPureMix® LS250
Mixing Volume* [L]	3 - 35	35 - 70	70 - 200	150 - 350
Voltage [V]	230/400			
Nominal Frequency [Hz]	50			
Speed at Nominal Frequency of 50 Hz [/min]	280			
Rotational Speed Range**/** [rpm]	50 - 490	50 - 490	50 - 490	50 - 490
Motor Power [kW]	0,12	0,12	0,12	0,25
Motor Transmission Ratio	5,0	5,0	5,0	5,0
Diameter Mixing Head [mm]	82	96	120	132
Standard Material product-touched [Mixing Head + Tank Plate]				
Special Alloys product-touched [Mixing Head + Tank Plate]				
Axis Extension 75 mm				
Magnetic Field Sensor				
ATEX Version	Available			
ATEX + CCC Ex**** Version				
Hygienic Version - Smooth Gear Motors				

* Mixing volume at dynamic viscosity of 1 mPa*s and density of 1000 kg/m³

** Execution of rotational speed operation in mentioned rotational speed range with frequency inverter. Frequency range approx. 9 to 90 Hz.

*** Shown rotational speed ranges are valid for VPureMix Magnetic Coupled Mixers Standard. Speed ranges may differ for VPureMix magnetic mixers for the Ex area.

**** CCC Ex certification of electrical components gear motor and magnetic field sensor.

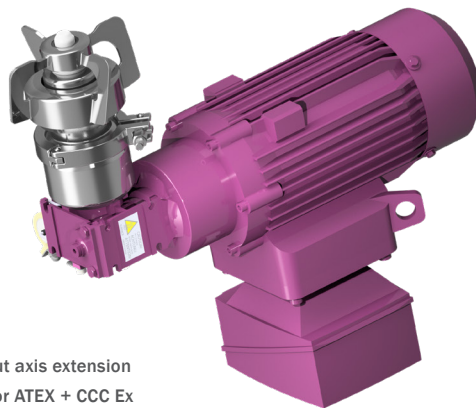


VPureMix® LS500 with axis extension
and magnetic field sensor

Model Overview

VPureMix® LS500	VPureMix® LS1000	VPureMix® LS2000	VPureMix® LS5000	VPureMix® LS10000	VPureMix® LS20000	VPureMix® LS30000
200 - 700	700 - 1100	1100 - 2300	2300 - 6000	6000 - 13000	13000 - 22000	22000 - 31000
230/400						
50						
			285	290	195	175
50 - 490	50 - 490	50 - 490	50 - 490	50 - 450	35 - 350	50 - 300
0,37	0,55	0,75	1,5	2,2	2,2	4,0
5,00	5,00	5,00	5,00	5,0	7,5	8,19
142	160	184	190	225	273	330
1.4435 (316L)						
Available in: 1.4539 (904L); 1.4529 (6Mo); 2.4602 (Alloy 22)						
Available as option for all sizes.						
Available as option for all sizes.						
Available						
Available						
Available on request.						

Note: Additional options, such as VPureMix® magnetic mixers with geared motors with external fans and incremental encoders for speeds below 50 rpm or more corrosion-resistant finishes are available on request.

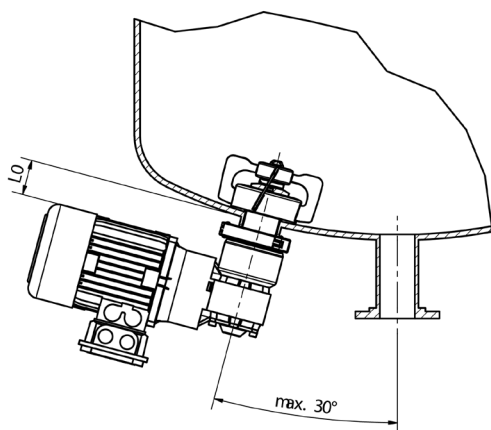


VPureMix® LS500 without axis extension and magnetic field sensor ATEX + CCC Ex

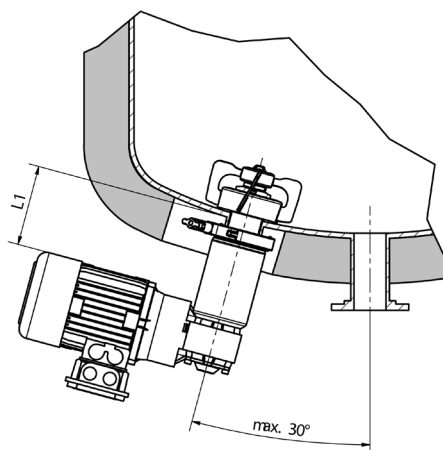
VPureMix[®] Equipment Options

VPureMix[®] axis extension

The entire VPureMix[®] product portfolio is optionally available with an axis-extended drive unit of 75 mm for insulated tank bottoms.



VPureMix[®] model without axis extension (L0)



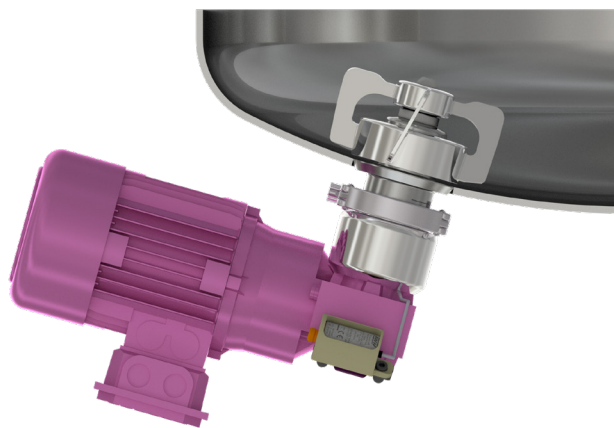
VPureMix[®] model with axis extension (L1)

Note: The VPureMix[®] magnetic mixers installed off-center on the tank bottom. The maximum installation angle is 30° to the vertical axis in dished bottom tanks and 30° to the horizontal axis in tapered tank bottoms.

VPureMix[®] magnetic field sensor

The entire VPureMix[®] model range can optionally be equipped with a magnetic field sensor for speed and direction of rotation monitoring.

The contactless detection of the speed and direction of rotation of a mixing head through the tank wall can make a significant contribution to increasing process reliability, as production-related downtimes or malfunctions are detected and displayed in good time.



VPureMix® ATEX

In addition to the standard VPureMix® magnetic mixers, AWH also offers VPureMix® ATEX magnetic mixers.

Using an ATEX-compliant magnetic field sensor and type-tested geared motor makes it possible to install VPureMix® ATEX magnetic mixers inside tanks with potentially explosive atmosphere according to Directive 2014/34/EU.

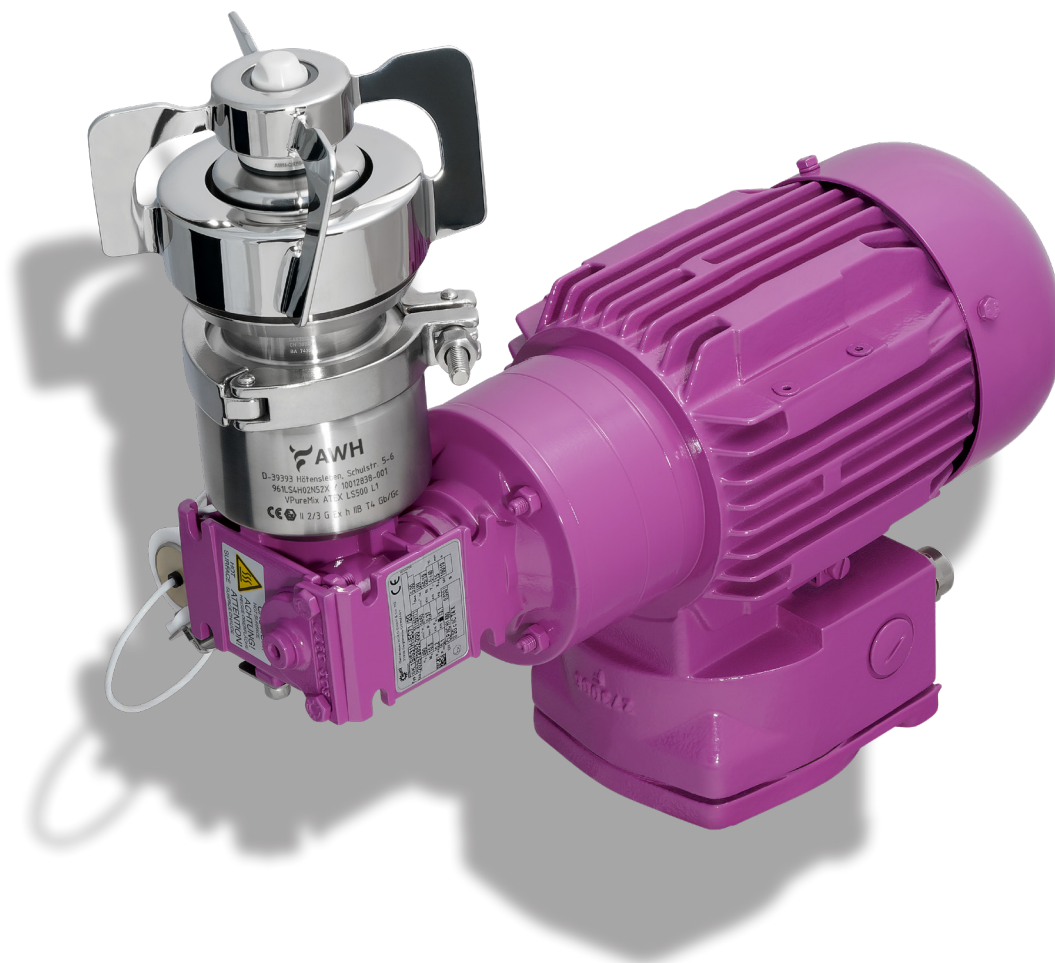
The following options are available here:

- VPureMix ATEX magnetic mixers with equipment category 2/3G for use in zone 1 inside the vessel and zone 2 outside the vessel:

CE Ex II 2/3G Ex h IIB T4 Gb/Gc

- VPureMix ATEX magnetic mixers without magnetic field sensor with equipment category 2G for use in zone 1 inside and outside the vessel:

CE Ex II 2G Ex h IIB T4 Gb



VPureMix® ATEX

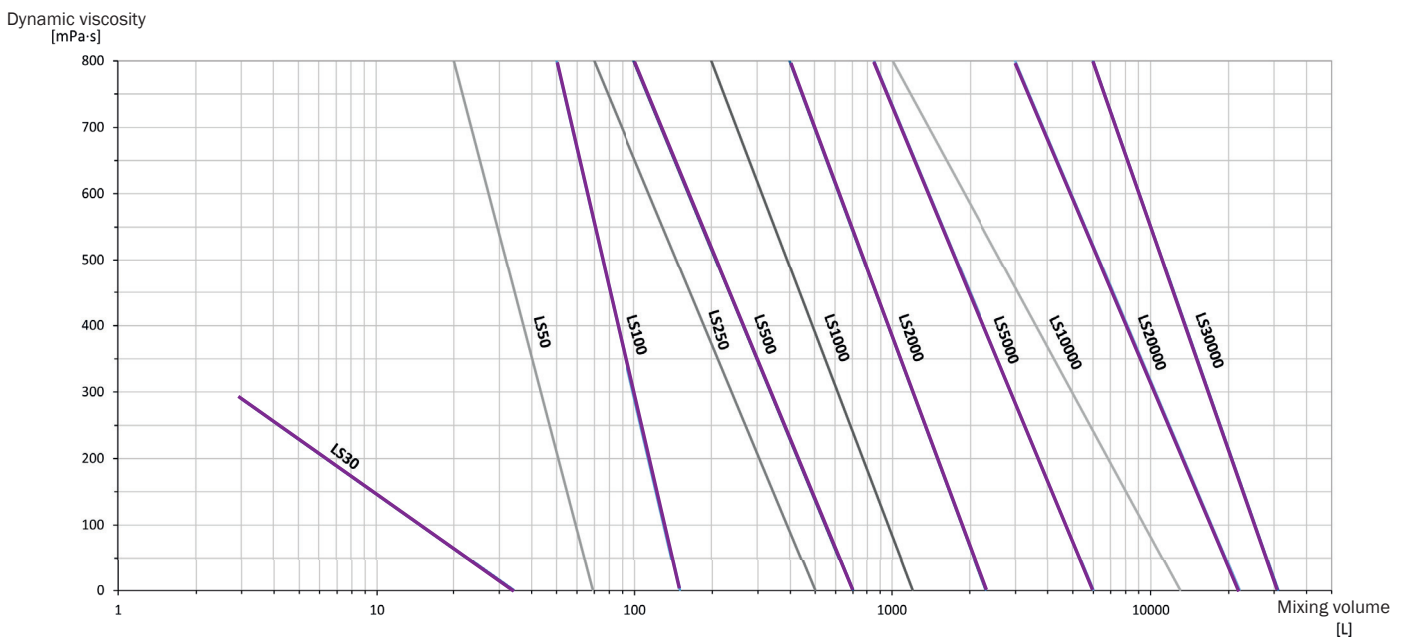
Selection Guide

Depending on the mixing volume of 3 to 31,000 liters, the VPureMix® series guarantees optimum mixing of low and medium viscous media with a dynamic viscosity of 1 to 800 mPa s.

To ensure an optimum mixing process, we recommend a ratio of 1:1 to 2:1 between fill level and tank diameter.



Selection Guide



Note: The selection guide provides data that are used only for rough orientation. You will receive binding data with a written request.

Note on the H/D ratio:

The vessel geometry, especially the vessel inner diameter and the resulting filling level, influences the vortex formation in the mixing medium.

In some mixing processes, such as dissolving processes of powders or hydrophobic solids, the vortex formation is essential. In foaming or gas-sensitive processes, on the other hand, vortex formation should be avoided.

Therefore, pay attention to the correct filling height to inner diameter ratio (H/D) for your process:

H/D < 1: No vortex formation, yet good mixing.

H/D > 1 < 2: Vortex formation, optimum mixing

H/D > 2: No vortex formation, formation of dead zones, poor mixing

Technical Parameters

Mixing head with female bearing:

Mixing head:	Shape: Impeller Number of mixing blades: 4 Material: 1.4435 (AISI 316L), delta ferrite content $\leq 1\%$ Optional special alloys: 1.4539 (904L/ UNS N08904); 1.4529 (6Mo/ UNS N08367); 2.4602 (Alloy 22/ UNS N 06022) Surface 1.4435; 1.4539; 1.4529 polished and electro-polished $Ra \leq 0.38 \mu\text{m}$ Surface 2.4602: polished $Ra \leq 0.38 \mu\text{m}$
Female bearing:	Material: Silicon carbide SSiC Surface: $Ra \leq 0.5 \mu\text{m}$

Male bearing with O-ring:

Male bearing:	Material: Zirconium dioxide ZrO_2 (Mg-PSZ), base 1.4435 Surface: $Ra \leq 0.5 \mu\text{m}$ Working temperature: $0^\circ\text{C}/32^\circ\text{F}$ to $150^\circ\text{C}/302^\circ\text{F}$
O-ring:	EPDM (standard); FKM, FFKM, VMQ (optional available)

Tank plate:

Material:	1.4435 (AISI 316L) delta ferrite content $\leq 1\%$
Optional special alloys:	1.4539 (904L/ UNS N08904); 1.4529 (6Mo/ UNS N08367); 2.4602 (Alloy 22/ UNS N 06022)
Surface:	$Ra \leq 0,4 \mu\text{m}$



Exploded-view of VPureMix® LS 500

Certificates for components in contact with the product:

- Inspection certificate according to DIN EN 10204-3.1 and restamping certificate
- Male bearing and female bearing: Biocompatibility according to USP Class VI
- O-Ring-Elastomere: FDA, USP Class VI, 3-A Sanitary Standard
- Measurement protocols for delta ferrite content
- Measurement protocols for surface roughness

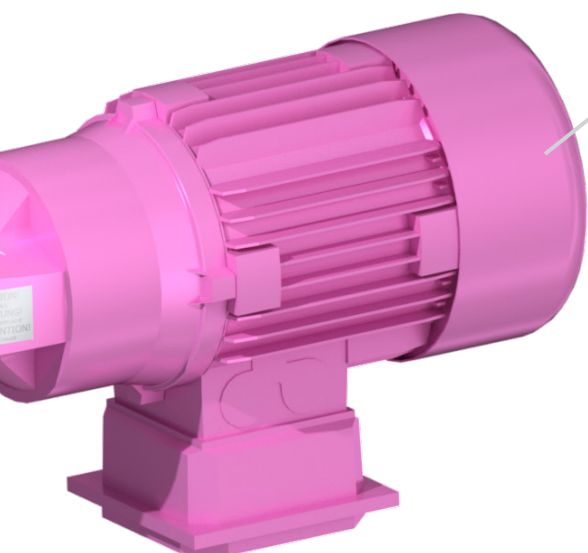
VPureMix® and VPureMix® ATEX / ATEX + CCC Ex drive units:

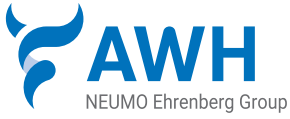
Drive unit with gear motor for frequency converter operation:

- Available variants:
 - Drive unit with standard gear motor IE3
 - Drive unit with universal motor Premium/ CUS
 - Drive unit with ATEX gear motor
 - Drive unit with ATEX + CCC Ex gear motor
 - Drive unit with surface-finished, hygienic and corrosion resistant gear motors
 - Further variants on request

Area of application:

- Viscosity range: 1 to 800 cP
- pH range: 1 to 14
- VPureMix ATEX (all versions) for use in zone 1 inside the vessel and zone 2 outside the vessel: CE EX II 2/3G Ex h IIB T4 Gb/Gc
- VPureMix ATEX without magnetic field sensor for use in zone 1 inside and outside the vessel: CE EX II 2G Ex h IIB T4 Gb





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