Mixing solutions

Flow boosters
type ABS SB

Main industries and applications

The flow booster type ABS SB is a good choice for gently circulating and mixing fluids in sewage treatment plants and industrial areas. It is suitable for all low-speed wastewater mixing and circulating applications, including:

- Equalization of sewage
- Biological process (aerobic, anoxic and anaerobic)
- Selector (contact zone)
- Hazardous locations: Certification for ATEX (Ex II 2G Ex h db IIB T4 Gb) available as an option

Proven design for sustainable operation

The motors in the flow booster SB series are asynchronous electrical motors with a power range from 1.4 to 4.6 kW. This proven technology has been a successful part of our flow boosters for more than two decades.

Operating at low speed, the highly efficient propellers reduce the energy costs significantly compared with conventional high speed mixers. The short mixing times are achievable due to the extensive mixing capacity of the SB series.

The connection to the vibration-absorbing concrete pedestal is made with an innovative coupling system, allowing the unit to be raised and lowered for inspection even in filled tanks, giving high reliability. The smart coupling design always keeps the flow booster SB in the correct position, even in turbulent environments and allows visual inspection during operation.

The 2-blade mono-cast propellers are packed separately for safe transportation and easy mounting at site. No additional adjustment is needed for setting up the SB before start up.

Features and benefits

1 Water pressure-tight encapsulated three-phase motor
- Maximum protection and performance stability (protection type IP 68, stator insulation class F (155°C)
- Dynamically balanced motor shaft and rotor reduce vibrations and extend the life of the motor
- Economical and reliable design

2 Helical gearbox, 2/3-stage
- Allows numerous ratios via fatigue-strength helical gears
- Calculated lifetime of more than 100’000 hours for the oil-lubricated bearings
- Compact and lightweight drives

3 Mono-cast propeller (except SB 900/ 1200 series)
- For effective mixing and vibration-free operation
- Reduces strain on the drive unit through extreme smoothness and vibration damping – the result of highly elastic design and geometry
- Produces high thrust and high flow capacity in an axial direction with performance-optimized 2- and 3-blade designs
- Self-cleans effectively due to optimized blade profile and special curved propeller edge
- Reducing the risk of accumulation of fibrous material, the dynamical balanced rotating assembly will always run smoothly extending the bearing lifetime

4 Patented concrete pedestal with heavy-duty, fully lockable coupling device
- Eliminates turbulences with its streamlined shape and thus improves propeller efficiency
- Suppresses all damaging vibration through its mass and material characteristics
- Resists corrosion and provides a robust, reliable connection to the tank floor
- Allows raising and lowering of the unit for inspection – even in filled tanks

5 TCS (Thermo Control System) with bimetallic contacts as thermal sensors
- Provides a warning or switches off the motor automatically before the permissible temperature limit is exceeded, whether due to high-temperature medium or another problem source

6 DI system with sensors in the junction box and motor
- Provides a warning before water is able to enter the motor or unit

7 Solids deflection ring
- Protects the mechanical seal from damage due to the ingress of solids or fibrous matter

Fully-lockable coupling system

The coupling system is a major technical innovation in the development of easy disconnection systems. Liquid flow, regardless of being laminar or turbulent, causes vibrations which effects submersible mixers especially with large propellers. In addition to impulse forces and any intrinsic vibrations of the units themselves, these forces must be absorbed by the coupling device so that quick disconnection systems can function in a secure and reliable manner.

A vibration-free attachment is a major requirement for reliable running and long operating life of the mixers and installation system. Amply designed three-dimensional support of the coupling element ensure its reliable seating.

Vibration-absorbing concrete pedestal

The concrete pedestal establishes the necessary vibration absorbing connection between machine and built structures. This invention has an abundance of advantages that make the flow booster a comprehensive solution:

- The flow favoring drop shape avoids turbulence and therefore improves the efficiency of the propeller.
- The mass and the material characteristics suppress all damaging vibrations.
- Corrosion resistance and a fluent connection with the tank floor ensure the highest level of security and long operation life.

Specifications

Materials

Part	Material
Motor housing	EN-GJS-400-18 / ASTM A 536, 60-40-18
Motor shaft / propeller shaft	1.0060, ASTM, AISI A276 Gr.65 / 1.7225 fully encapsulated (42CrMo4)
Propeller	Reinforced solid polyurethane (SB 1200 composite, fiberglass, resin) (SB 900 1.4571 – AISI 316)
Coupling bracket	1.4408 / ASTM / AISI CF – 8M

Operating data

	50 Hz	60 Hz
Propeller diameter	900 to 2’500 mm	900 to 2’500 mm 35 to 98 in.
Motor power	up to 4.5 kW	up to 4.6 kW up to 6.2 hp
Motor efficiency	up to 81%	up to 81.6%
Mixing flow	up to 4.3 m^3/s	up to 4.2 m^3/s up to 66’600 Usgpm

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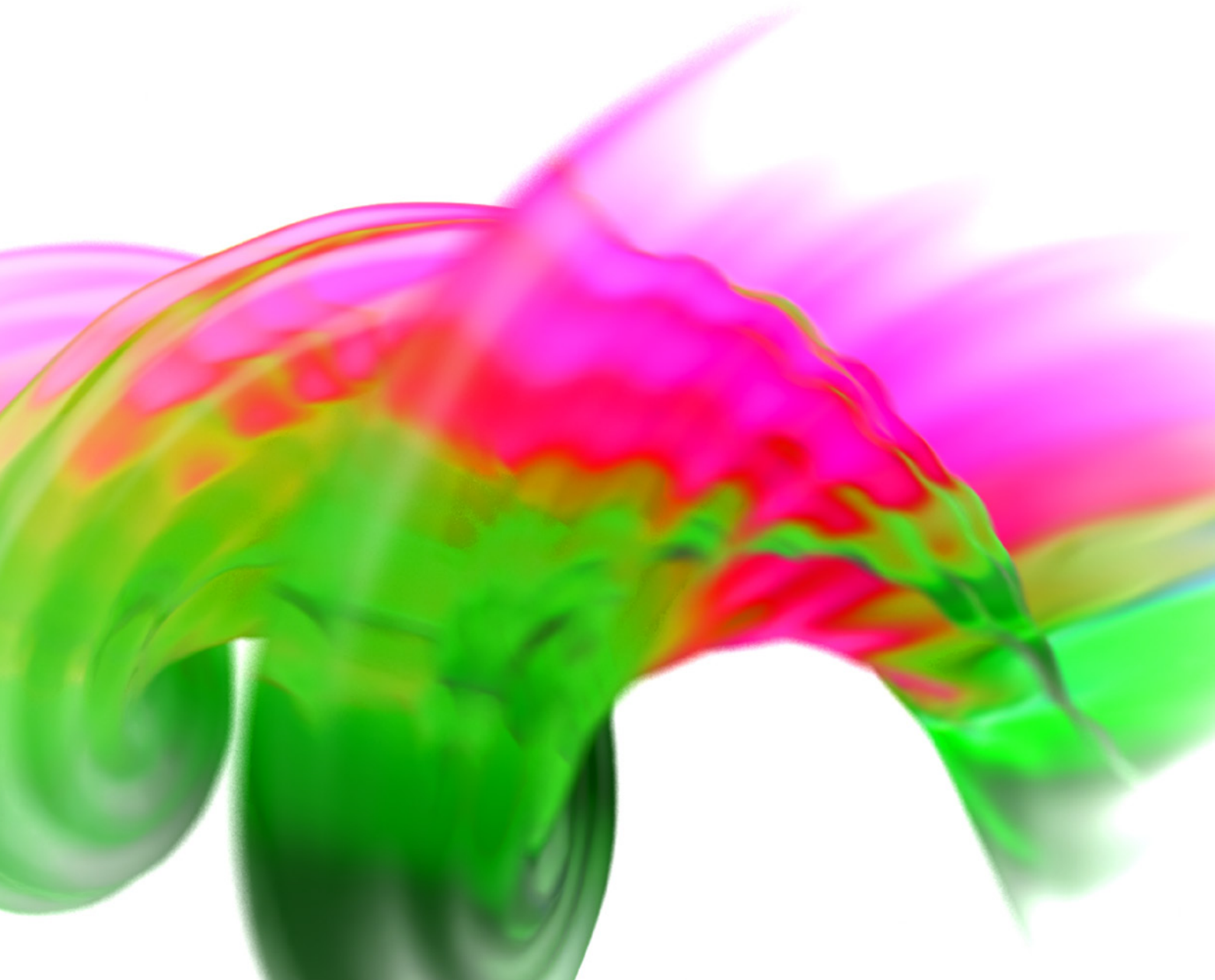
The Sulzer Flow division keeps your processes flowing. Wherever fluids are treated, pumped, or mixed, we deliver highly innovative and reliable solutions for the most demanding applications.

The Flow division specializes in pumping solutions specifically engineered for the processes of our customers. We provide pumps, agitators, compressors, grinders, screens and filters developed through intensive research and development in fluid dynamics and advanced materials. We are a market leader in pumping solutions for water, oil and gas, power, chemicals and most industrial segments.



Mixing solutions

Submersible mixers
type ABS RW 200 - RW 650

Main industries and applications

A compact and versatile mixer with a wide range of applications, including use in aggressive and abrasive liquids.

Mixing and stirring applications in sewage treatment plants and industrial areas such as:
- Equalization of sewage
- Biological processes (aerobic, anoxic and anaerobic)
- Selector (contact zone)

Applicable for homogenization highly concentrated sludge and slurries such as:
- Primary, secondary and digested sludge in storage and buffer tanks
- Lime and mineral slurries

Mixing applications in pump sumps as prevention of deposits and floating crusts (RW 200/280)

Hazardous locations
- Certification for ATEX (Ex II 2G Ex h db IIB T4 Gb), FM and CSA available as an option

Key customer benefits

Economical
- The RW mixer range includes several submersible mixers with integral motors ranging from 1.3 to 13 kW (1.7 – 17.5 hp)
- Sulzer offers efficient multiple and gear-driven mixers either standard or explosion-proof motor enclosures
- Reduced energy costs
- Short mixing times

Reliable
- Compact, water pressure-tight design
- Minimal risk of motor overloading

Easy to replace existing installations
Our wide range of brackets and adapters make them suitable for existing guide rails and lifting devices without modification to meet customer needs.

Features and benefits
RW 400 and RW 650

1 Efficient three-phase motor
- Water pressure-tight encapsulated
- Protection type IP 68, stator insulation class F (155°C)
- Motor shaft and rotor dynamically balanced
- Economical and reliable design
- Continuous running 24/7

2 Pre-loaded upper bearing
- Prevents spinning through the design of the outer ring
- Eliminates backlash
- Ensures longer bearing life

3 DI-system
- Seal monitoring and indication that an inspection is due

4 Solids deflection ring
- Protects the mechanical seal from damage due to the ingress of solids or fibrous matter

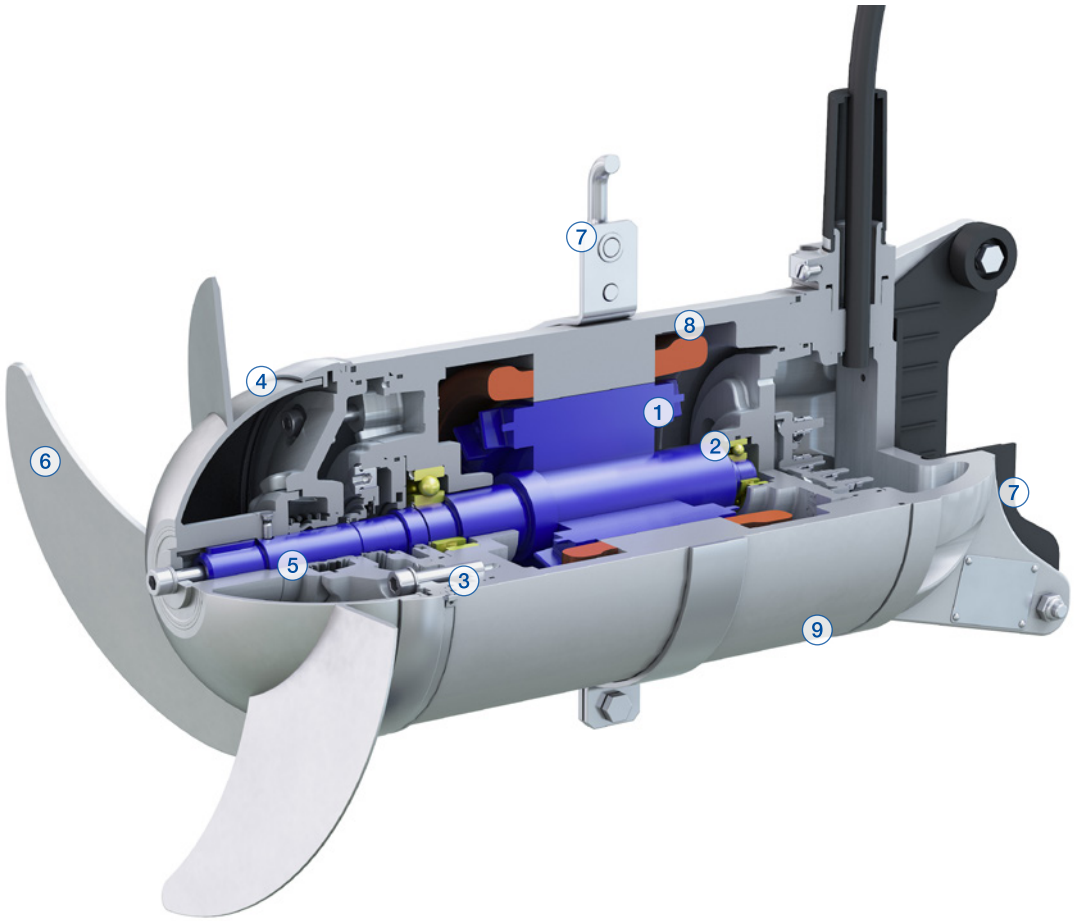
5 Enhanced mechanical seal protection
- Keeps the mechanical seal clog-free
- Greatly extends the life of the seal

6 Hydraulic-optimized, 2- or 3-blade axial flow propeller design
- Achieves high thrust and therefore a high flow capacity
- Strong rotating flow in axial direction
- Ensures high mixing performance
- Reduces maintenance through self-cleaning

7 Abrasion-resistant, galvanically insulated mast bracket
- Reduces the risk of electrochemical corrosion

8 TCS (Thermo Control System)
- Provides a warning or switches off the motor automatically before the permissible temperature limit is exceeded, whether due to high-temperature medium or another problem source

9 Corrosion resistant execution
- Suitable for industrial applications and nitrification tanks in wastewater treatment plants



Features and benefits
RW 480

1 Efficient three-phase motor
- Water pressure-tight encapsulated
- Protection type IP 68, stator insulation class F (155°C)
- Motor shaft and rotor dynamically balanced
- Economical and reliable design

2 Helical one stage robust gearbox
- Allows numerous ratios via fatigue-strength helical gears
- Calculated lifetime of more than 100’000 hours for the oil-lubricated bearings
- Compact and lightweight drives

3 Large, long-lasting bearings
- Offer true reliability with a calculated lifetime of more than 100’000 operating hours
- Need no maintenance – lubricated for life

4 DI-system
- Seal monitoring and indication that an inspection is due

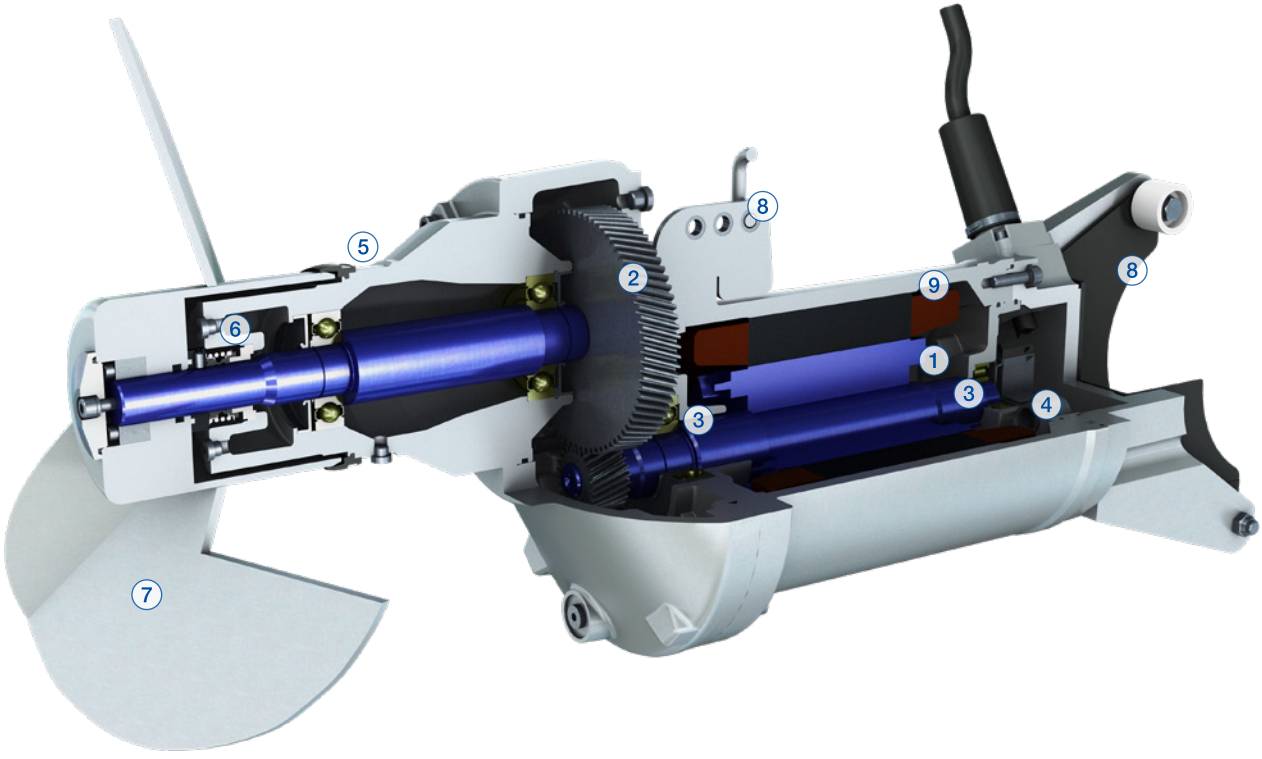
5 Solids deflection ring
- Protects the mechanical seal from damage due to the ingress of solids or fibrous matter

6 Enhanced mechanical seal protection
- Keeps the mechanical seal clog-free
- Greatly extends the life of the seal

7 Special 2-blade mixed-flow propeller design
- Strong rotating turbulent flow in radial and axial direction
- Highly efficient for homogenization of concentrated sludge and slurries
- Ensures high mixing performance
- Reduces maintenance through self-cleaning

8 Abrasion-resistant, galvanically insulated mast bracket
- Reduces the risk of electrochemical corrosion

9 TCS (Thermo Control System)
- Provides a warning or switches off the motor automatically before the permissible temperature limit is exceeded, whether due to high-temperature medium or another problem source



Features and benefits
RW 200 and RW 280

Prevention of deposits and floating crusts in pump sumps, it keeps the sump clean, it limits the accumulation of solids and consequently the pumps blockages. Intermittent duty when used in combination with the pumps, to reduce the power consumption.

Efficient three-phase motor
- Water pressure-tight encapsulated
- Protection type IP 68, stator insulation class F (155°C)
- Motor shaft and rotor dynamically balanced
- Economical and reliable design

DI-system
- Seal monitoring and indication that an inspection is due

Solids deflection ring
- Protects the mechanical seal from damage due to the ingress of solids or fibrous matter

Hydraulic-optimized, 2-blade axial flow propeller design running at high speed (4 poles)
- Strong rotating turbulent flow in axial direction
- Highly efficient for homogenization of raw sewage and floating crusts
- Ensures high mixing performance
- Reduces maintenance through self-cleaning

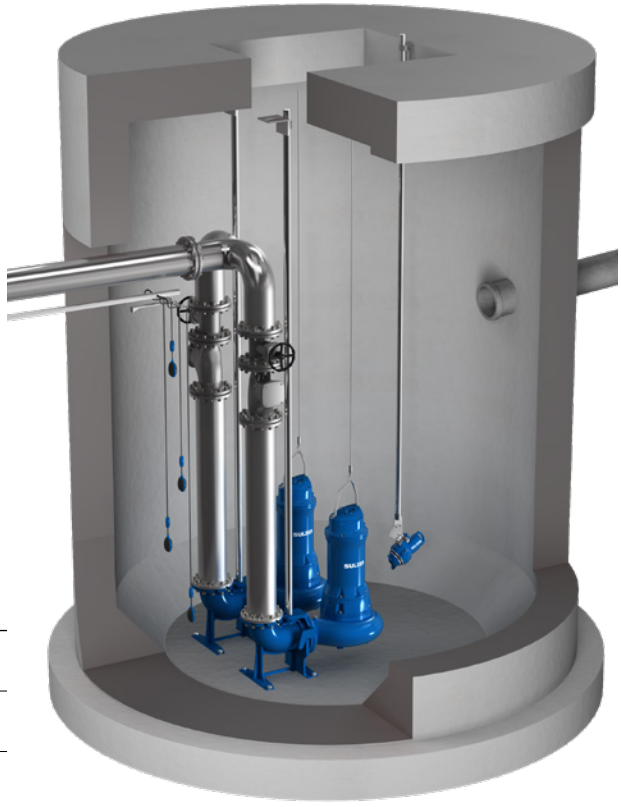
TCS (Thermo Control System)
- Provides a warning or switches off the motor automatically before the permissible temperature limit is exceeded, whether due to high-temperature medium or another problem source

Versatile mounting bracket for hanging installation
- It allows to adjust both vertical and horizontal orientation of the mixer to remove the sediments from the dead zones of the wet sump
- The hanging installation allows retrofitting the mixer in critical pumping stations even when they are in operation. The installation footprint is minimal

RW 200 / RW 280 pump stations

The RW 200 / RW 280 mixers are mainly used for mixing applications in pump sumps. The function of the mixers is to thoroughly mix up the contents of the sump before the pumps themselves start up, so that after completion of the pumping only a small amount of deposit remains. Silting up of the pump sump is therefore effectively avoided.

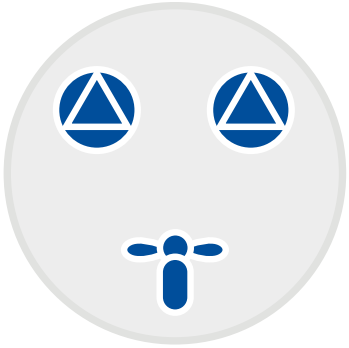
In general the operation of the mixers in the pump sump is controlled as follows: The mixer is operated by a level control unit which switches it on shortly before the pumps themselves are switched on. In general a timer allows 30 to 45 seconds mixing before starting the pumps. An additional level control unit switches off the mixer while propeller coverage of 30 to 40 cm remains.



Specific power density

Municipal raw sewage	25 - 40 W/m^3
Sewage containing lots of solid materials	50 - 80 W/m^3
Sewage containing lots of sandy materials	100 - 200 W/m^3

Maximum sump size when using only RW 200 / RW 280



Round tanks
Max. diameter:
RW 200 = 3.5 m
RW 280 = 5.0 m

Rectangular tanks
Max. size:
RW 200 = 3 x 5 m
RW 280 = 4 x 6 m

Specifications

Materials

Mixer parts RW 400 – RW 650	EC (cast iron)	CR (stainless steel)
Motor housing	EN-GJL-250, painted	1.4404 (AISI 316L)
Motor shaft / propeller shaft	1.4021 (AISI 420)	1.4404 (AISI 316L)
Propeller	1.4571 (AISI 316Ti)	1.4571 (AISI 316Ti)
Fasteners	1.4401 (AISI 316)	1.4401 (AISI 316)

Mixer parts RW 200 and RW 280	EC (cast iron)
Motor housing	EN-GJL-250, painted
Motor shaft / propeller shaft	1.4021 (AISI 420)
Propeller	EN-GJL-250, painted
Fasteners	1.4401 (AISI 316)

Mixer parts RW 480	EC (cast iron)
Motor housing	EN-GJL-250, painted
Motor shaft / propeller shaft	1.4021 (AISI 420) / 1.4418 (AISI S165M)
Propeller	1.4571 (AISI 316Ti)
Fasteners	1.4401 (AISI 316)

Operating data

	50 Hz	60 Hz	
Propeller diameter	185 - 650 mm	185 - 650 mm	7.3 - 25.6 in.
Motor power	up to 11 kW	up to 13 kW	up to 17.5 hp
Motor efficiency	up to 87%	up to 88%	up to 88%
Mixing flow	up to 0.83 m^3/s	up to 0.92 m^3/s	up to 14’600 USgpm

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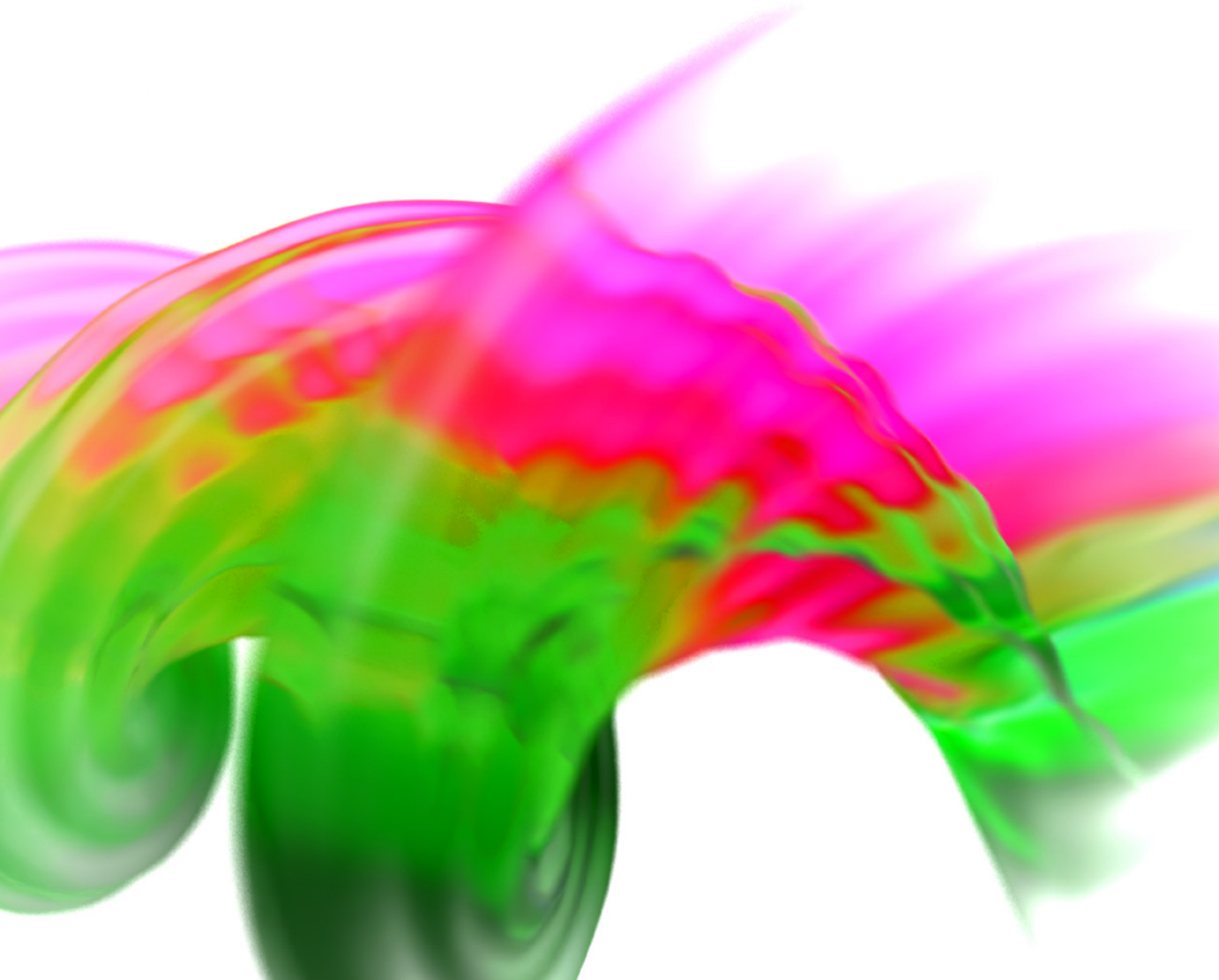


OKI aerator mixer

Main industries and applications

The submersible OKI 1000 and 2000 aerator mixers are heavy-duty devices suitable for applications in the continuous and/or intermittent aeration of both municipal and industrial wastewater. It can withstand many harsh types of wastewater with no performance degradation and will tackle intermittent process problems.

The OKI aerator mixer range has been designed to meet the process requirements in versatile municipal and industrial applications:

- Activated sludge basins and sequencing batch reactor (SBR), membrane bio reactors (MBR), and moving bed biofilm reactor (MBBR), providing aeration and mixing in a single unit for degrading the biomass
- Mixing and equalization basins, providing uniform wastewater loading to downstream processes and eliminating odors
- Sludge storage and stabilization, providing odor control as well as oxidation of sludge
- Flotation of oil and grease
- Additional aeration
- Plants with chemical and petrochemical effluents
- Heavily-loaded plants
- Deep basins

Oil and gas | **Hydrocarbon processing** | **Power generation** | **Pulp, paper and board** | **General industry** | **Chemical process industry** | **Water and wastewater**

Key customer benefits

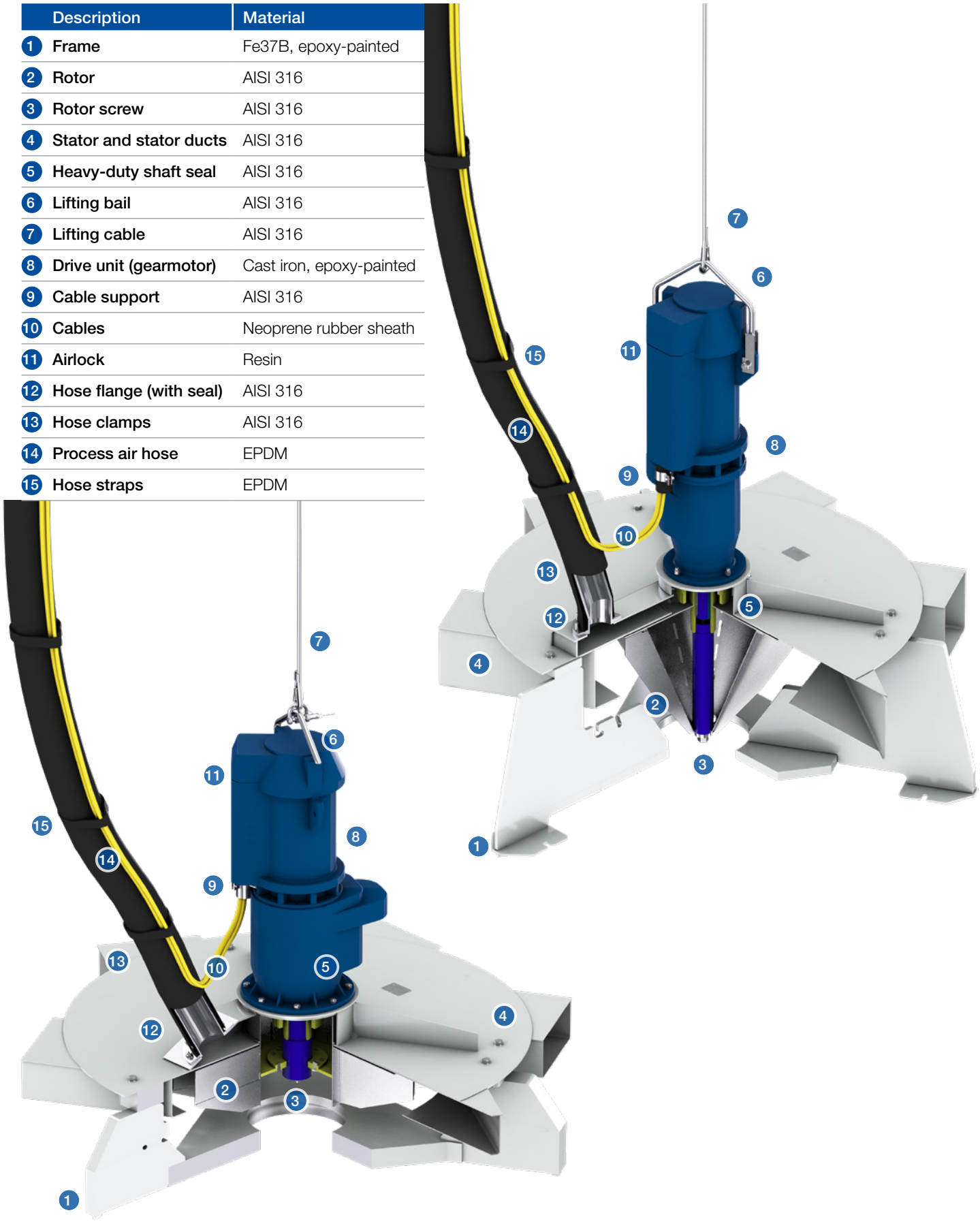
The OKI aerator mixer range has been designed using our long experience and in-depth knowledge of how to maximize value for our customers.

Key benefits include:

- High process efficiency and high standard oxygen transfer rate (SOTR)
- Adjustable oxygen transfer
- Superb pumping capacity
- Designed for non-clogging operation
- Good corrosion resistance
- Lifetime sustainable high-aeration efficiency
- Especially suited for heavy-duty continuous and intermittent processes
- Easy and quick installation without emptying the tank
- Liftable and selfstanding, making it easy to change the plant configuration— no need to empty the tank
- Low maintenance need (maintenance interval three years)
- Suitable for all usual tank depths, especially deep tanks which no longer require air cooling
- Complete delivery including suitable air hose, lifting cable and electrical cables making installation safe and easy
- Can run as an aerator and/or mixer according to process requirements

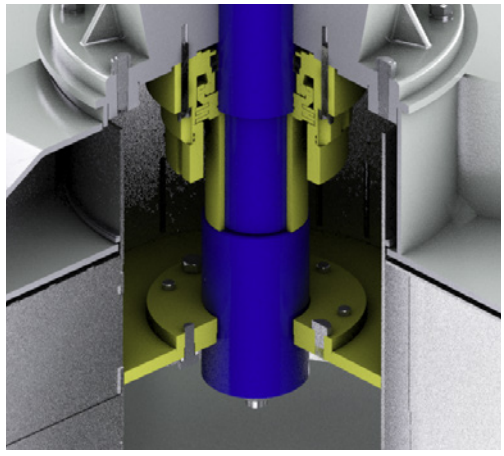
Components and materials

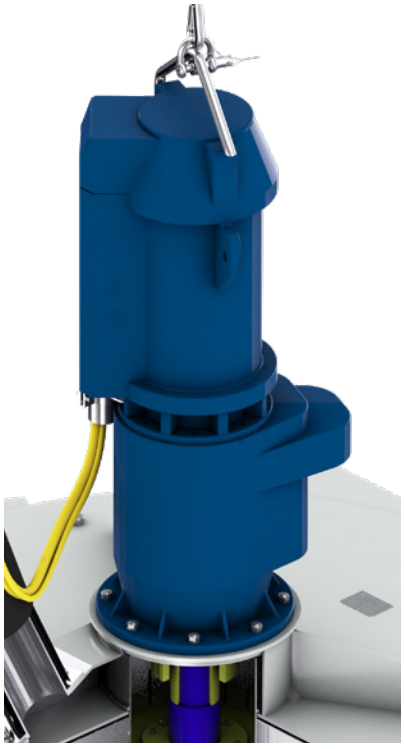
	Description	Material
1	Frame	Fe37B, epoxy-painted
2	Rotor	AISI 316
3	Rotor screw	AISI 316
4	Stator and stator ducts	AISI 316
5	Heavy-duty shaft seal	AISI 316
6	Lifting bail	AISI 316
7	Lifting cable	AISI 316
8	Drive unit (gearmotor)	Cast iron, epoxy-painted
9	Cable support	AISI 316
10	Cables	Neoprene rubber sheath
11	Airlock	Resin
12	Hose flange (with seal)	AISI 316
13	Hose clamps	AISI 316
14	Process air hose	EPDM
15	Hose straps	EPDM



Shaft seal

- Specially designed for OKI aerator mixer
- Heavy-duty mechanical labyrinth seal
- Superior reliability based on fourfold protection (four sealing barriers)





Submersible gearmotor

- Power range 5-37 kW / 7-49 hp
- Water-cooled
- Protection class IP68
- Motors are equipped with thermal switches
- Available for 50 and 60 Hz

Two-speed motors available for OKI 1070 and OKI 1090 series:
- aeration at high speed
- mixing without air at low speed

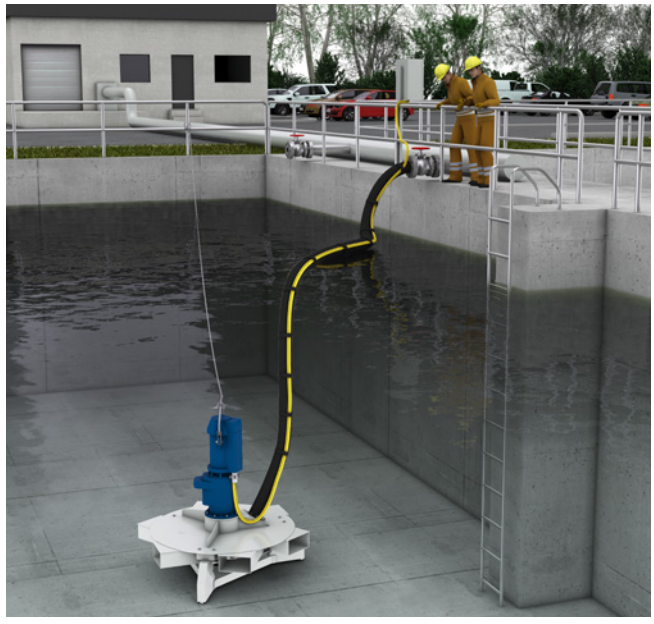
Gearbox

- Two or three stage helical heavy-duty gearbox
- Oil-lubricated
- Low maintenance need

Installation

OKI is delivered complete including suitable process air hose as well as lifting and electrical cables, making installation safe and easy. As such, OKI aerator mixer is a complete unit ready for quick and easy installation and connection without emptying the tank.

OKI aerator mixer is connected to a plant air manifold by an air distribution hose (process air hose).



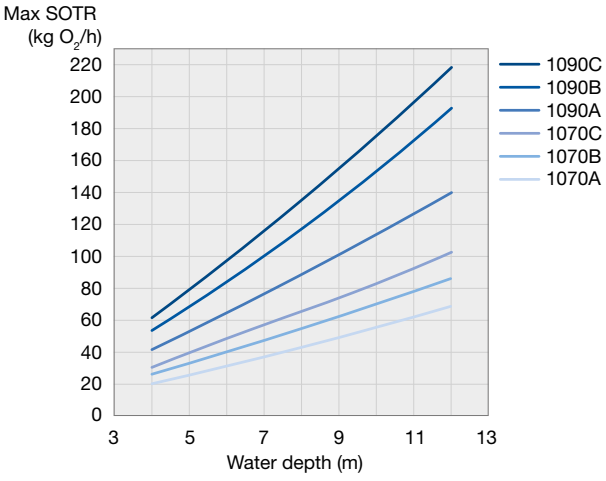
Operating data

	50 Hz	60 Hz
Power range	5-37 kW	7-49 hp
Air flow	up to 60 m^3/min	up to 2'100 ft^3/min
SOTR	up to 410 kg O_2/h	up to 900 lb O_2/h
Operation depth	up to 12 m	up to 40 ft.
Air temperature without additional cooling	up to 120°C	up to 248°F

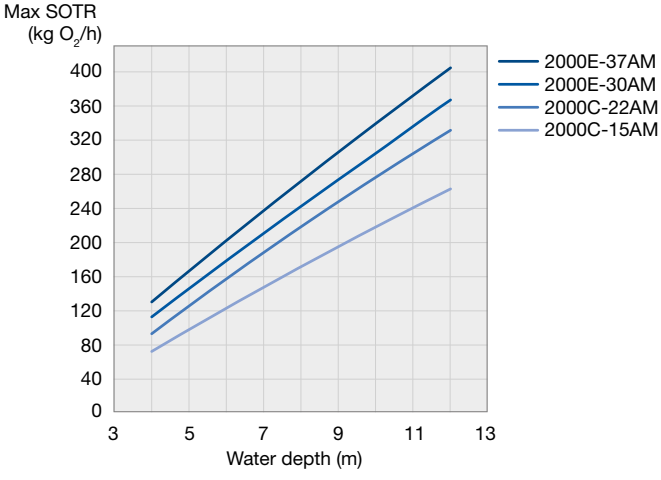
For more than 12 m / 40 ft. operation depth, please contact your local sales representative.

Performance ranges

OKI1000



OKI2000



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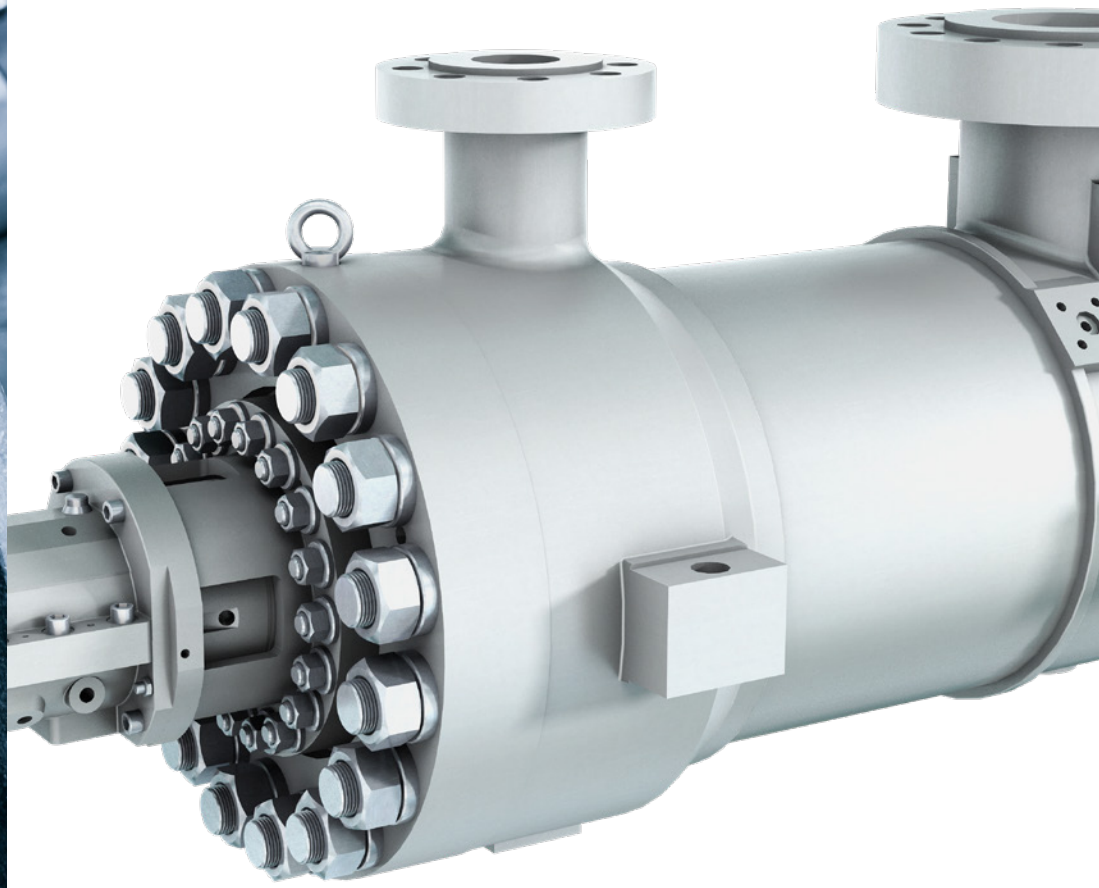
Pumps and pumping systems

API 610 type BB5

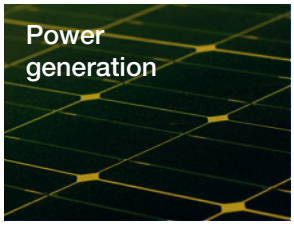
GSG diffuser style barrel pump

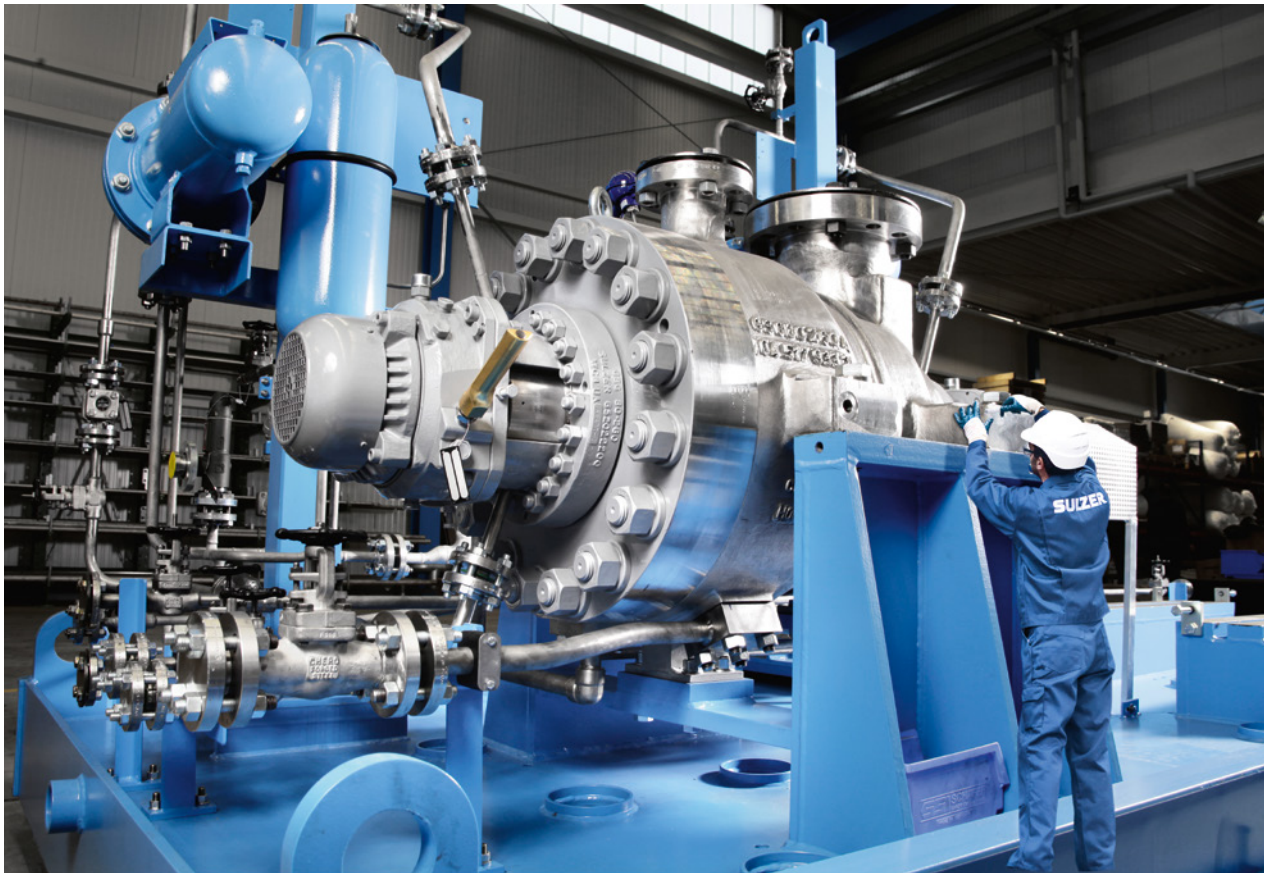


Main industries and applications

The GSG is a BB5 type pump built to the latest edition of API 610.Thousands of Sulzer GSG pumps are installed around the world in:

- Refineries
- Petrochemical plants
- Gas processing plants
- Hydraulic Power Recovery Turbine (HPRT)
- Water injection services
- Crude oil, refined product and LPG pipeline services
- Industrial power plants





Features and benefits
GSG inline

High head per stage balanced radial loads
- Diffuser design allows replacement/upgrade of individual stage pieces vs. entire inner volute

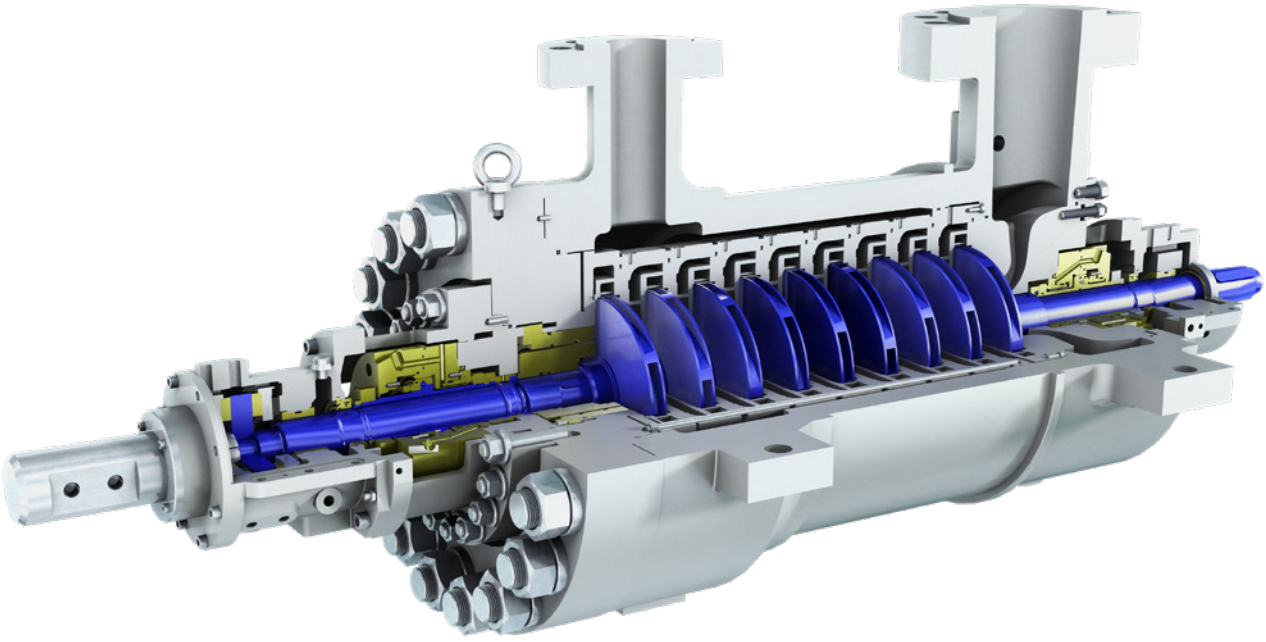
Compact inline design
- Available in low, medium and high-pressure configurations
- Short bearing span and minimized foundation footprint

Cartridge design on all but smallest sizes
- Allows bundle to be removed without major disassembly which saves time

Dynamically balanced rotor
- For smooth and reliable operation

Multiple bearing types
- Ball radial and 7300 series ball thrust bearings are standard
- Pressure lubricated sleeve/pivot shoe bearings are optional
- Bearing isolators are standard

Suction region of pump rated for discharge pressure
- API 610 12th edition ready



Features and benefits

GSG low flow

Low flow, high head design
- 10-35 m^3/h, up to 1’800 m head
- Barske type impeller and precision machined diffuser ensure correct performance

API 610 compliant BB5 pump
- Full API 610 11th & 12th edition design

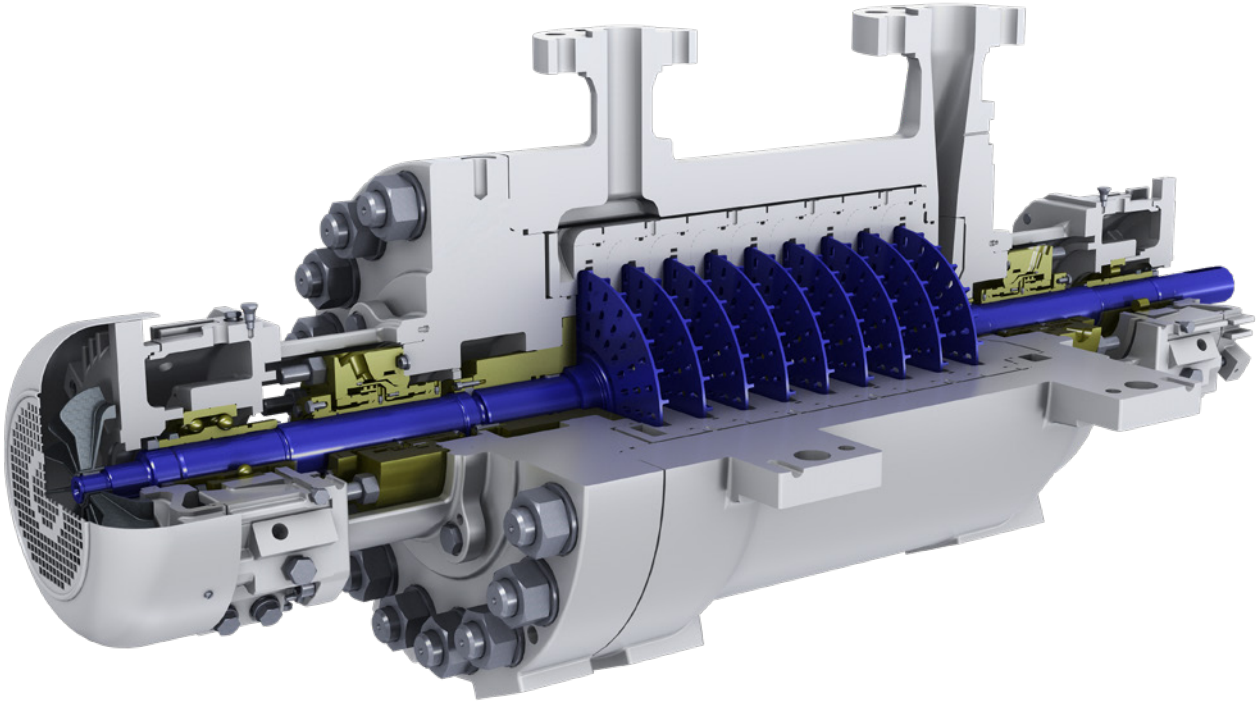
Reduced maintenance compared to high speed OH6 design
- No gearbox required, pump operates at 2-pole, 50 Hz (3’000 rpm) or 60 Hz (3’600 rpm) motor speed

Suction performance
- Standard is <11’000 Nss suction impeller avoiding high values associated with OH6 design
- Optional inducer option to meet clients site limitations

Suction regions of pump rated for discharge pressure
- API 610 12th edition ready

Individually retained impellers
- Impellers axially retained in both directions as standard

Shared GSG pump components to minimize spare parts holding
- Reduces manufacturing and spare part inventory



Features and benefits

GSG back to back

Back-to-back rotor design for high head applications

- Provides enhanced rotor support and balanced axial loads even in worn condition

High pressure casing

- Cast or forged barrel case, optional side-side, side-top nozzles on forged barrel

Barrel closure

- Patented Twistlock cover for fast cartridge changeout on offshore water injection services
- Bolted cover design available for hazardous services

Multiple bearing types

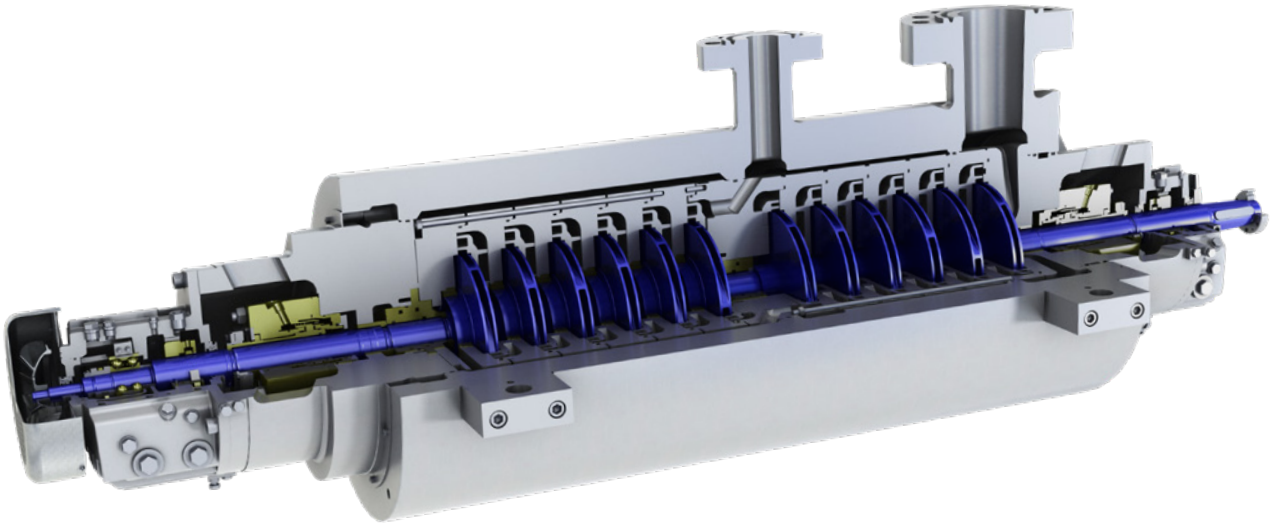
- Various bearing configurations including; rolling element, sleeve/ball and sleeve/pivot shoe

Swirl brake

- Sulzer proprietary swirl brake technology used ensures stable rotodynamic even on light gravity liquids

Full cartridge design

- Allows bundle to be removed without major disassembly which saves time



Specifications

Material options

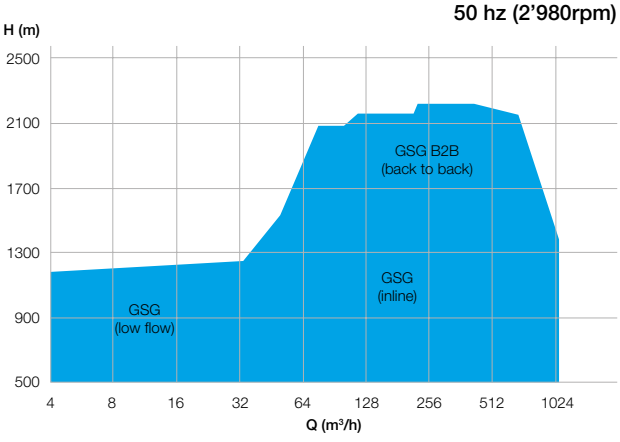
- API 610 S-6, S-8, C-6, A-8, D-1, D-2
- Low temperature materials and sour service materials for compliance with NACE
- Non-metallic wear parts (PEEK and Graphalloy™) allowing operation with, low product gravity, low viscosity or low lubricity
- Other materials and special alloys available on request

Operating data

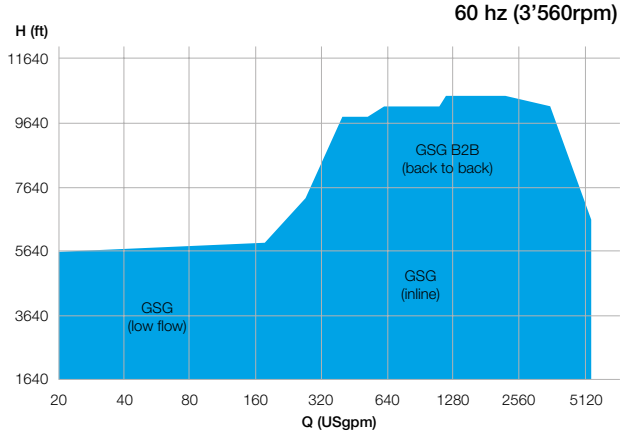
	Metric units	US units
Pump size	40 to 200 mm	1.5 to 8 in.
Capacities	up to 900 m^3/h	up to 4’600 USgpm
Heads	up to 2’600 m	up to 10’000 ft.
Pressures	up to 300 bar	up to 4’500 psi
Temperatures	-50 to 425°C	-45 to 800°F
Higher performance available in Sulzer engineered API 610 type BB5 products, CP and HPcp (up to 1’000 bar)		

Performance range

50 hz (2’980rpm)



60 hz (3’560rpm)



We keep your processes flowing

Wherever fluids are treated, pumped, or mixed, we deliver highly innovative and reliable solutions for the most demanding applications.

Our offer

The Flow division specializes in pumping solutions specifically engineered for the processes of our customers. We provide pumps, agitators, compressors, grinders, screens and filters developed through intensive research and development in fluid dynamics and advanced materials. We are a market leader in pumping solutions for water, oil and gas, power, chemicals and most industrial segments.

Pumps

As one of the world's leading pump manufacturers, Sulzer provides a wide range of products for engineered, configured, and standard pumping solutions as well as essential auxiliary equipment. We are renowned for our state-of-the-art products, performance reliability and efficient solutions.

Agitators and dynamic mixers

Sulzer mixing and agitation technology offers a wide range of products for industrial applications. Side-mounted horizontal and top-mounted vertical agitators, dynamic chemical mixers, and tower and tank flow management products guarantee effective mixing and agitating processes.

Compressors and aeration

Sulzer's state of the art offering for municipal and industrial wastewater treatment includes turbocompressors, aeration systems and mechanical aerators. Our application and process know-how combined with our unique product portfolio give us the means to provide customers with reliable and efficient solutions.

Submersible mixers

Sulzer's energy efficient submersible mixers are suitable for a wide range of applications in industry and municipal treatment plants. They provide the right solution to match mixing tasks for agitating, blending, mixing, dissolving and suspension of solids in industry and municipal treatment plants.

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