

# Trouble-free pumping in tunnel construction



# Smooth tunneling while water problems solved

We provide a full range of reliable, trouble-free pumps for cost-effective tunneling. Our products cover the various pumping needs at a tunnel application.

Where there are tunnels, there is water and its management is a key consideration in any major tunnel construction project. Engineering teams may have to extract significant volumes of water from the construction site to stabilize the ground or prevent flooding of the work area.

Tunnel boring machines and drilling equipment require a reliable supply of cooling water, which must be recovered, extracted and treated after use. In addition, personnel working on site need access to safe, clean water for drinking and sanitation.

## Applications for dewatering in tunneling

- 1 Tunnel shaft and shaft dewatering
- 2 TBM (Tunnel Boring Machine) dewatering
- 3 Dig and blast dewatering
- 4 Cooling water circulation / general water supply / fire water supply
- 5 Water cleaning and treatment
- 6 Sewage from sanitary facilities





# A complete solution for the tunneling application

At Sulzer we understand the challenges and demands of dewatering on a tunnelling project. Our tunnelling Center of Excellence based in Isernhagen, Germany have worked on many tunnel projects over the recent years, providing much valued expertise and problem-solving skills.

Each tunnel is unique and therefore the configuration of pumps and the pump station network are also different. Experts in our Center of Excellence can design the best solution for your specific project, with pumps selected from the wide range of Sulzer products to best meet your unique demands and at the optimal operating cost, either through rental or purchase. Because of our wide experience in this field we know what will work well and we also know what can cause an issue during operation, helping you avoid costly mistakes.

Of course, selection and design are only part of the story, operating reliably on site is also critical to a successful project. Sulzer provides onsite support via its comprehensive network of service centers, or on larger projects we can deploy a dedicated onsite support facility. These onsite facilities come in the form of fully equipped shipping container, providing diagnostic services, spare pumps, spare parts and repair workstations, ensuring your dewatering system operates continuously throughout the project.

You are the tunnelling experts, so why not partner with the dewatering experts.

## Center of Excellence

- Dewatering system design
  - Pump selection
  - Control panel design
  - Electrical design
- Operating cost calculations
- Technical support
- Delivery logistics
- Maintenance
  - Training and qualification packages
  - Coordination of local service centers



# Our comprehensive product portfolio

Product type				
		2 & 3	2 & 3	1
		Standard dewatering	Lifting from settlement tanks	Shaft dewatering
Submersible drainage pumps	J XJ	✓	✓	✓
Submersible drainage center-line pumps	JC XJC	✓	✓	✓
Submersible sludge pumps	JS XJS	✓	✓	✓
Submersible sewage pumps	XFP	✓	✓	
Heavy-duty metal and rubber lined slurry pumps	EMW-M EMW-R		✓	✓
Axially split pumps	SMD			✓
End suction pumps	SNS AHLSTAR A, APP/T			
Ring section pumps	VMS			
	MBN MC			✓
Progressing cavity pumps	PC			
Agitators and submersible mixers	XRW		✓	✓
	SSF		✓	✓
Compressors	HST™ HSR			
Lifting stations	Piranhamat			

Application							
4	4	2	4	4	5	4	6
Ground water table management	General water supply	TBM	Cooling water circulation	Fire water supply	Water cleaning and treatment	Chemicals	Sewage sanitary
		✓			✓		
✓					✓		
					✓		
		✓					
	✓	✓	✓	✓		✓	
	✓	✓	✓	✓		✓	
	✓	✓	✓	✓			
		✓					
					✓		
					✓		
		✓					
							✓

# Product overview

## Submersible dewatering pumps

### Submersible drainage pump J and XJ (application 1, 2, 3, 5)

#### Features and benefits

- Easy and fail-safe starting with optional AquaTronic
- Impeller in white cast iron and diffusers coated in oil-resistant nitrile rubber, provide high abrasion resistance
- Double outer casing and good heat convection enable the pump to operate continuously at low levels – or even run dry without damaging the motor
- External inspection ports for the oil and motor chambers enable quick and easy evaluation of the shaft seal during service
- Conversion between high-volume and high head hydraulics is managed with only a few parts, ensuring the right performance for the application

#### Key characteristics

Capacities	up to 330 l/s / 5'440 USgpm
Heads	up to 90 m / 331 ft.
Motor power	up to 56 kW / 94 hp



### Submersible drainage center-line pump JC and XJC (application 1, 2, 3, 4, 5)

#### Features and benefits

- Easy and fail-safe starting with optional AquaTronic
- An impeller and wear ring in white cast iron, as well as diffusers coated in oil-resistant nitrile rubber, provide high abrasion resistance
- Double outer casing and good heat convection enable the pump to operate continuously at low levels – or even run dry without damaging the motor
- Due to the modular design, the same parts can be used for different pumps, which lowers the overall service costs
- The high-efficiency motor and new hydraulics combine with low-friction bearings to reduce power losses
- Conversion between high-volume and high-head hydraulics is managed with only a few parts, ensuring the right performance for the application
- A slim design allows the pumps to fit in boreholes or other applications with limited installation space

#### Key characteristics

Capacities	up to 54 l/s / 865 USgpm
Heads	up to 76 m / 308 ft.
Motor power	up to 11.8 kW / 18 hp



### Submersible sludge pump JS and XJS (application 1, 2, 3)

#### Features and benefits

- Easy and fail-safe starting with optional AquaTronic
- A free-flow vortex impeller and pump volute make the pump ideal for pumping water mixed with solids up to 48x60 mm
- Both the impeller and volute are made from heavy-duty ductile iron for maximum durability
- The top cover and motor housing are made of lightweight aluminum, which creates a pump that is very easy to handle and install
- The high-efficiency motor and hydraulics combine with low-friction bearings to reduce power losses

#### Key characteristics

Capacities	up to 31 l/s / 475 USgpm
Heads	up to 36 m / 131 ft.
Motor power	up to 11.8 kW / 18 hp



## > Submersible pumps

### Submersible sewage pumps type ABS XFP (application 2, 3, 5)

#### Features and benefits

- Premium Efficiency IE3 motor in accordance with IEC 60034-30
- Excellent rag handling
- Specially designed impellers for reliable delivery of wastewater containing solids and fibrous material
- Hazardous locations: Approval for ATEX (Ex II 2G Ex h db IIB T4 Gb), FM and CSA available
- Quick and easy installation, safe operation, easy maintenance and service

#### Key characteristics

Capacities	up to 2'400 l/s (50 Hz) / 2'500 l/s / 39'600 USgpm (60 Hz)
Heads	up to 80 m (50 Hz) / 95 m / 310 ft. (60 Hz)
Temperatures	up to 40°C / 104°F
Motor power	up to 550 kW (50 Hz) / up to 620 kW / 830 hp (60 Hz)



## > Slurry pumps

### EMW-M heavy-duty metal slurry pump (application 1, 2, 3)

#### Features and benefits

- Extra high durability
- Minimized total cost of ownership
- Low energy consumption due to high efficiency
- Easy and quick installation and maintenance
- Low spare cost due to high standardization

#### Key characteristics

Capacities	up to 4'000 m <sup>3</sup> /h / 17'600 USgpm
Heads	up to 95 m / 312 ft.
Pressures	up to 16 bar / 232 psi
Temperatures	up to 110°C / 230°F



### EMW-R heavy-duty rubber lined slurry pump (application 1, 2, 3)

#### Features and benefits

- Extra high durability
- Minimized total cost of ownership
- Low energy consumption due to high efficiency
- Easy and quick installation and maintenance
- Low spare cost due to high standardization

#### Key characteristics

Capacities	up to 1'450 m <sup>3</sup> /h / 6'385 USgpm
Heads	up to 55 m / 180 ft.
Pressures	up to 14 bar / 203 psi
Temperatures	up to 110°C / 230°F





## ➤ Axially-split pumps

### SMD axially-split, double suction pump (application 1, 2, 4)

#### Features and benefits

- Optimum hydraulic fit with high efficiency maintained over a wider flow range
- Exceptionally low Net Positive Suction Head Required (NPSHR) value not only at the best efficiency point but also on overload
- Maintenance-friendly features; excellent interchangeability of parts
- Horizontal and vertical constructions

#### Key characteristics

Capacities	up to 24'000 m <sup>3</sup> /h / 106'000 USgpm
Heads	up to 260 m / 850 ft.
Pressures	up to 34 bar / 490 psi
Temperatures	up to 140°C / 280°F



## ➤ Single stage, end suction/overhung pumps

### SNS range (application 2, 4)

#### Features and benefits

- Designed to meet the design requirements of EN 5199 international standard
- Exceeding EU's (European Union) requirements for energy-related products (ErP)
- Highest efficiency across the whole pump range, exceeding the benchmark efficiency index MEI 0.7 (minimum efficiency index)
- New, state-of-the-art hydraulics ensure optimum capacity with low net positive suction head required (NPSHr)
- Low energy consumption, high standardization, easy installation and unique construction also equate to lower maintenance and operating costs

#### Key characteristics

Capacities	up to 1'400 m <sup>3</sup> /h / 6'000 USgpm
Heads	up to 160 m / 525 ft.
Pressures	up to 16 bar / 230 psi,
Temperatures	up to 120°C / 250°F



### AHLSTAR A, APP/T (application 2, 4)

#### Features and benefits

- AHLSTAR pumps save energy, sealing water and the environment
- Designed to meet the EN ISO 5199 standard, these pumps also comply to EN 22858 (ISO 2858) standard
- The modular interchangeability of parts and components enables low spare parts inventory
- The pump range offers the lowest total cost shaft seal concept, with dynamic seal, mechanical seals and packing
- Every AHLSTAR is designed for fast and easy installation, maintenance and service

#### Key characteristics

Capacities	up to 11'000 m <sup>3</sup> /h / 48'400 USgpm
Heads	up to 160 m / 525 ft.
Pressures	up to 16 / 25 bar, 230 / 360 psi, depending on material and size
Temperatures	up to 180°C / 356°F





## ➤ Radially-split, multistage, ring section pumps

### VMS vertical multistage pump (application 2, 4)

#### Features and benefits

- Unique hydraulic design gives an efficiency of up to 80%
- Low NPSHr for vibration-free operation and extended life span
- Durable solution with high quality materials
- Suitable for drinking water with ACS, WRAS and NSF certification

#### Key characteristics

Capacities	up to 162 m <sup>3</sup> /h / 850 USgpm
Heads	up to 400 m / 1'350 ft.
Pressures	up to 40 bar / 580 psi
Temperatures	from -20°C to 140°C / -4°F to 284°F



### MBN medium pressure stage casing pump (application 1)

#### Features and benefits

- Simple construction to minimize dimensions and reduce investment and maintenance costs
- High quality investment cast impellers and diffusers for better efficiency
- Fast and easy impeller mounting
- Bearing unit can be serviced without disassembling the pumps
- Wide range of materials including duplex stainless-steel grades

#### Key characteristics

Capacities	up to 700 m <sup>3</sup> /h / 3'080 USgpm
Heads	up to 900 m / 2'950 ft.
Pressures	up to 100 bar / 1'450 psi
Temperatures	up to 180°C / 355°F



### MC high pressure stage casing pump (application 1)

#### Features and benefits

- Modular hydraulics for high efficiency in a wide range of operating conditions
- Large branch sizes for optimized inlet flow, low noise level and higher allowable forces and moments
- Unaffected by rapid temperature variations
- Easy access for cleaning to the seal cooling chambers
- Stiff shaft design for critical speeds above the maximum operating speed
- Low pressure version with dedicated large sizes for condensate extraction service

#### Key characteristics

Capacities	up to 1'700 m <sup>3</sup> /h / 8'500 USgpm
Heads	up to 1'750 m / 5'500 ft.
Pressures	up to 180 bar / 2'610 psi
Temperatures	up to 180°C / 355°F



## > Progressing cavity pumps

### PC transfer pump (application 2)

#### Features and benefits

- Designed to deliver constant capacity with viscous fluids and shear thinning non-Newtonian fluids
- Selected drives and gearboxes with many low speed options are available to reduce pump wear
- Compact for space saving, can be installed vertically or horizontally and run in either direction
- Competitively-priced process pump with integral direct drive and gearbox, baseplate optional

#### Key characteristics

Capacities	up to 440 m <sup>3</sup> /h / 1'900 USgpm
Pressures	up to 24 bar / 350 psi
Temperatures	-10 up to 100°C / 14 up to 212°F



## > Agitators and submersible mixers

### Submersible mixer type ABS XRW (application 1, 2, 3, 5)

#### Features and benefits

- Lowest energy consumption
- Easy upgrade of existing installations supported by a wide range of brackets and adapters
- Operational flexibility with variable speed to match the real mixing task and to manage changes throughout the year
- The robust design and the Premium Efficiency motor give superior reliability and long operating life

#### Key characteristics

Capacities	up to 1.79 m <sup>3</sup> /s / 28'300 USgpm
Diameters	up to 900 mm / 35 in.
Temperatures	up to 40°C / 104°F



### SALOMIX™ SSF side-mounted agitator (application 1, 2, 3, 5)

#### Features and benefits

- High efficiency results in energy savings and improved agitation
- Cast propeller blades with adjustable blade angle give accurate power and pumping control
- Conical body shape supports the propeller and ensures vibration free operation
- Unique solutions
- Wide hydraulic coverage enabling the use in all mixing applications

#### Key characteristics

Stock concentration	up to 6%
Propeller diameters	800 – 1'300 mm / 32 – 52 in
Power	7.5 – 55 kW / 10 – 75 hp



## > Compressors and aeration

### HST™ turbocompressor (application 2)

#### Features and benefits

- High efficiency guaranteeing optimal life-cycle costs
- Low noise: no need for additional soundproofing
- Wear-free, requiring minimal maintenance
- Simple design with integrated components
- Accurate flow measurement
- Vibration-free, ensuring less stress for pipe work
- Fully certified
- Operates alongside all types of conventional blowers

#### Key characteristics

Flow	up to 16,000 Nm <sup>3</sup> /jh / 10'200 SCFM
Pressure rise	up to 125 kPa / 18 psi
Motor power	75 to 400 kW / 100 to 500 hp



### HSR turbocompressor (application 2)

#### Features and benefits

- 100% oil-free, environmentally friendly and safe
- Premium efficiency, low life cycle costs
- Wear-free, low maintenance costs
- Real-time monitoring secures the trouble-free operation
- Vibration-free, low machine noise
- Advanced liquid cooling system enables energy recovery

#### Key characteristics

Flow	up to 56 m <sup>3</sup> /min / 2'000 CFM
Pressure rise	2 to 9 bar (g) / 43 to 139 psig
Motor power	60 to 300 kW / 80 to 400 hp



## > Lifting stations

### Lifting station type ABS Piranhamat (application 6)

#### Features and benefits

- Ready for installation; robust, compact tank for buildings
- Easily transported and installed
- Fitted with Piranha submersible grinder pumps for problem-free pumping of sewage containing toilet waste

#### Key characteristics

Capacities	up to 9.8 m <sup>3</sup> /h / 43 USgpm
Heads	up to 30 m / 110 ft.
Temperatures	40°C up to 60°C (max. 5 minutes) / 104°F up to 140°F (max. 5 minutes)
Motor power	0.40–1.7 kW / 0.9–2.4 hp





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