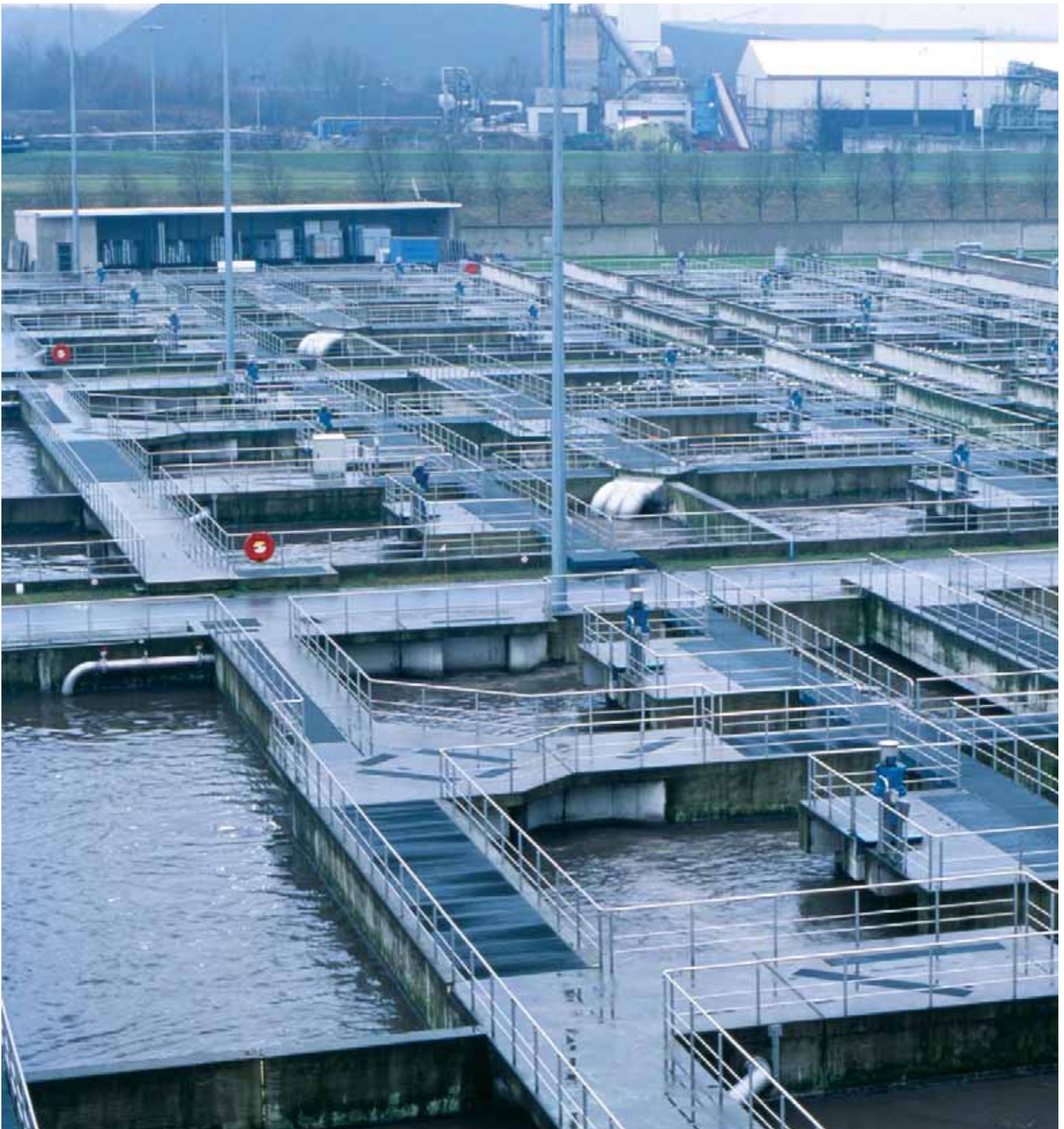


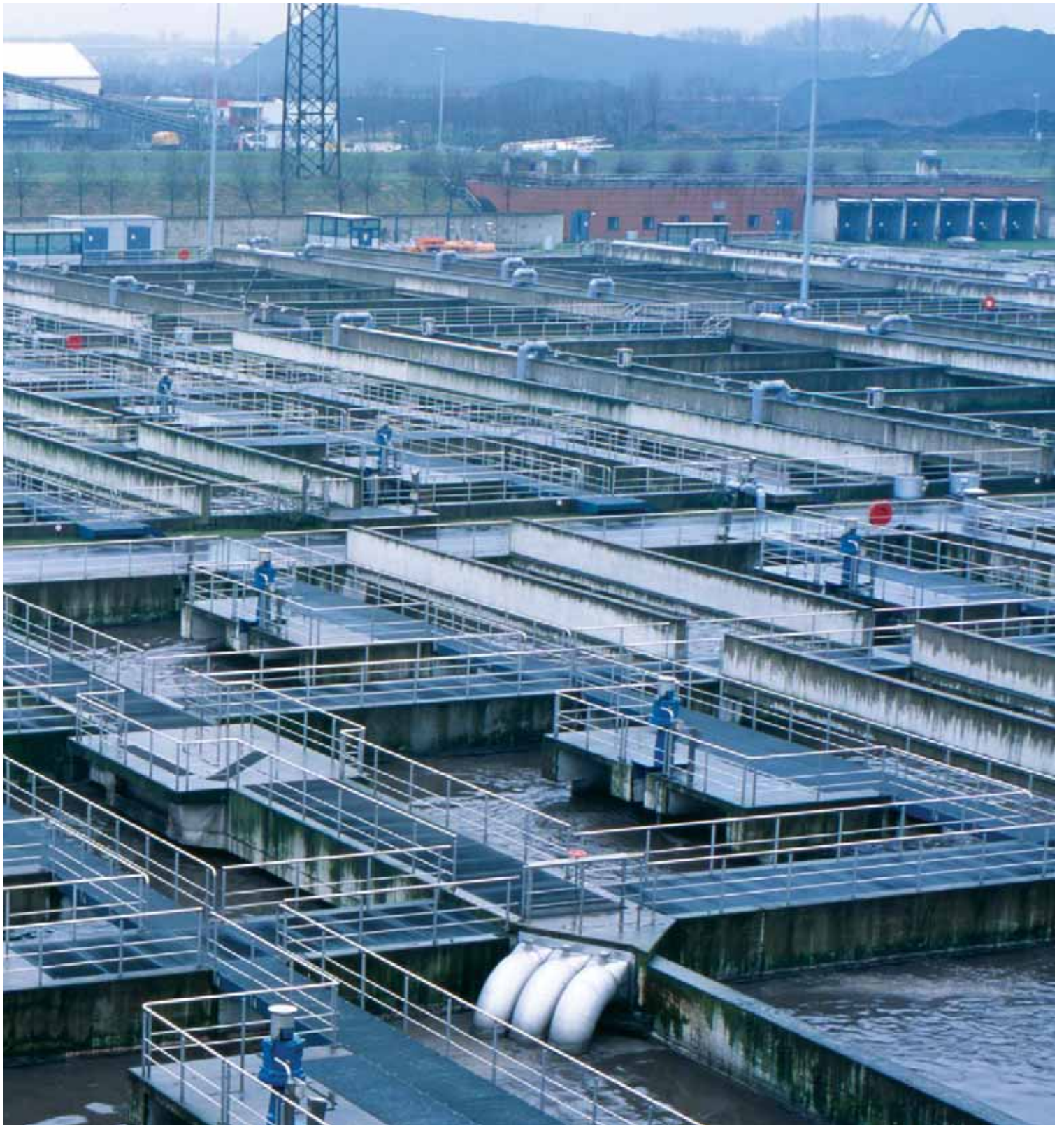
## Submersible mixers

*Product overview.*





Pumpen Intelligenz.



An ideal range of long-life, economical submersible mixers capable of handling even problematic fluids, intelligent accessories and above all, constructive, active collaboration from planning through to installation and beyond: those are without a doubt the most important reasons why the operators of sewage treatment plants in Erfurt, Bottrop, Jena, Leuna and

Eisenach decided to work with WILO on important projects in recent years. On top of that there is another reason, one which is becoming ever more important today: energy efficiency and cost effectiveness. Here too, WILO's system solutions are winners. Whether for new construction, special installation, or refurbishment during ongoing operations, we apply all our

expertise and years of experience to developing carefully tailored solutions. And after installation, our professional after-sales service is available at any time for maintenance and support services.



# Complete solutions

## Technology and service from WILO.

### The basic solution

The objective of any mixing process – regardless of the particular application – is to mix fluids optimally without problems. To ensure deposit-free operation in sewage treatment plants, for example. That requires technologies which can reliably perform this task.

The efficiency of a mixer is also vital, however: it must be able to operate in an energy-efficient way, with precisely predictable consumption of resources. When it comes to costs, more than simply the initial capital outlay must be considered. Other factors such as installation and start-up costs, power and operating costs, maintenance and repair costs, breakdown costs and disposal costs are always taken into account when deciding on a mixer. WILO is the right contact partner when looking for economic solutions at a cost-effective price/performance ratio. Submersible mixers from WILO combine fully developed technology with cost effectiveness: we provide full system solutions.

Since many mixer applications require permanent operation, the energy costs have a considerable influence on the overall costs. An energy-optimised mixer configuration helps to save costs during operation. A higher initial investment when selecting a device can pay for itself in no time.

#### Example calculation:

Tank volume	Specific power density		Difference	Energy savings
	Selection by minimum capital outlay	Optimised selection by operating costs		
2950 m <sup>3</sup>	3.63 W/m <sup>3</sup>	1.7 W/m <sup>3</sup>	1.93 W/m <sup>3</sup>	~ 5700 W
Energy savings			5,700 W	
Yearly operating time			8,760 h	
Energy costs per kWh			0.15 euro	
Number of tanks			1	
<b>Total energy cost savings per year</b>			<b>7,480 euros</b>	

Simply by using high-efficiency mixers, savings of 7,480 euros can be achieved each year for each tank.

### Advice, configuration, planning

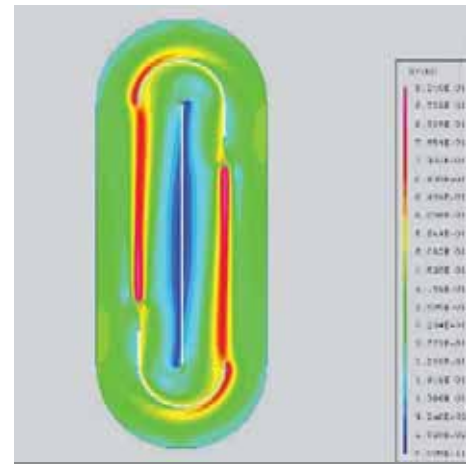
The following parameters are determined for you in advance:

- The optimum mixer configuration for your specific process.
- The most economical solution in terms of capital outlay and operating costs.
- The hydraulically most favourable point for the flow pulse by means of a combination of computer-aided design, simulation of flow profiles and practical tests in a test environment.

In the consultation and planning stages, WILO customers benefit from our technical expertise and our many years of experience. For installation, after-sales service and maintenance, an experienced plant engineering and construction team is at the ready, guaranteeing fast installation, repair and support services.

You have a basic choice between three types of WILO mixers, for different applications:

- Fast mixers with direct drive
- Medium-fast mixers with single reduction gearing
- Slow mixers with double reduction gearing



- CFD simulation in circulation tank
- For optimum mixer configuration, the different flow fields in the tank are calculated



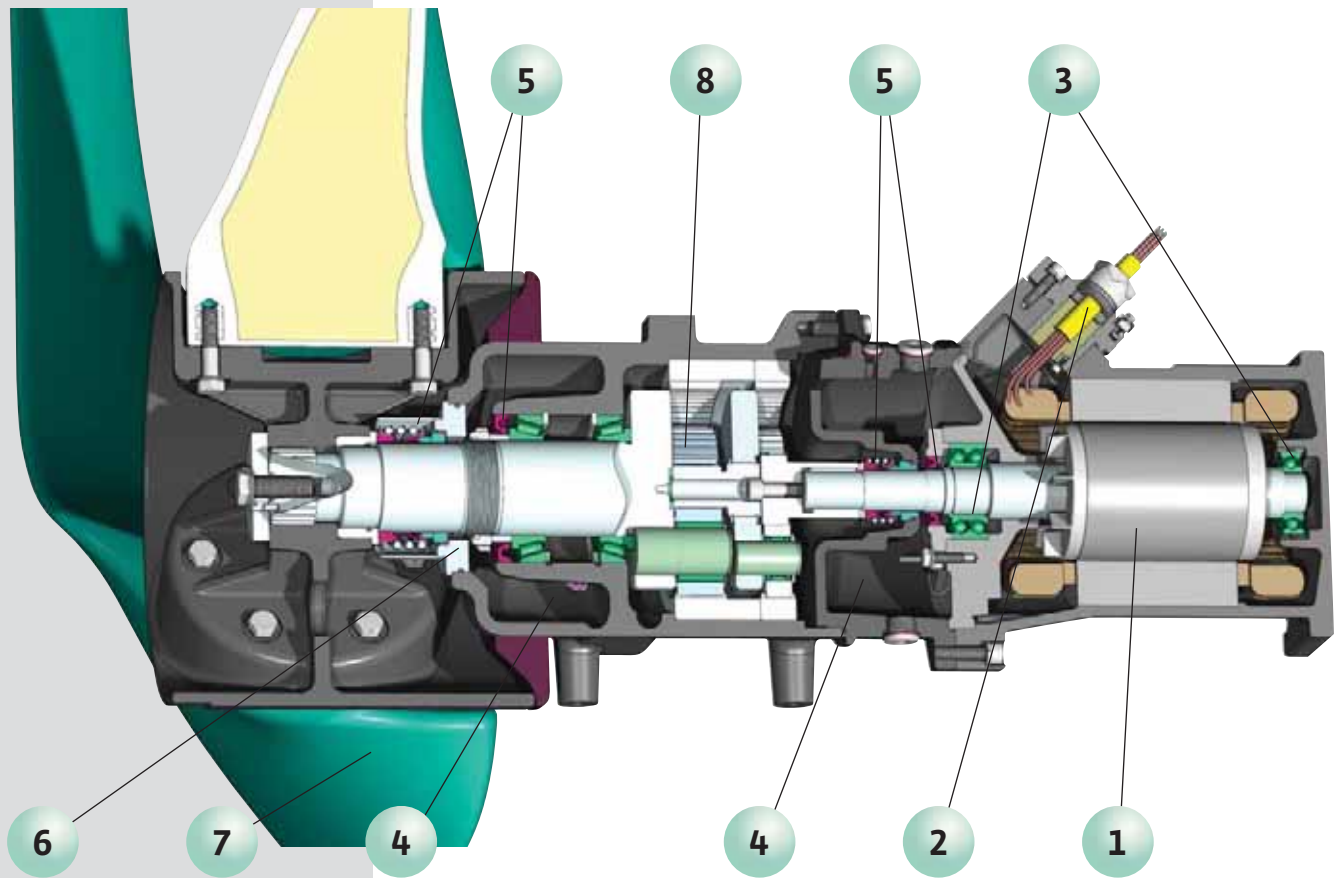
- Using our Mixer Select configuration software, the right mixers for any tank shape and size can be determined quickly and easily.



- Whether for acceptance, instruction, maintenance or repair: the Wilo Service team has local representatives all over Germany.

## Fully developed technology

### The components.



- 1 Motor** – Water pressure-tight Wilo submersible motor with standard connection, thus allowing easy and efficient adjustment of motor power class.
- 2 Cable entry** – Longitudinally watertight encapsulated cable lead-in with strain relief.
- 3 Motor bearings** – Large-size angular and grooved ball bearings ensure long service life.
- 4 Prechamber/sealing chamber** – Large-volume sealing chamber to absorb the leak rate of the mechanical shaft seal. Upon request also with sealing chamber control.
- 5 Sealing** – On fluid side and motor side, by means of a silicon carbide mechanical shaft seal and rotary shaft seals.
- 6 Sealing sleeve** – Made of stainless steel, guarantees long-term corrosion-protected fit of the mechanical seal.
- 7 Propeller** – Two- or three-blade propeller; entwining-free due to backward curve of incoming flow edge. Propeller blades are permanently fixed, which guarantees the best possible hydraulic efficiency.
- 8 Gearing** – Efficient single or double reduction planetary gear with angular and grooved ball bearings or tapered roller bearings. Different transmission ratios permit optimum mixing results. Gear shaft is made from highly corrosion-resistant material 1.4462.

## Technical construction

### Modular component system.

In WILO submersible mixers, the submersible motor, gears and propeller form a compact unit. This mode of construction means that the submersible mixers can be adapted precisely to provide the performance required. The shape of the individual tanks and the required mixing tasks in

a particular wastewater treatment system will require a certain number of submersible mixers to be installed. The modular system employed by WILO makes it possible to combine motors, gears and propellers so as to provide a wide range of submersible mixers and flow characteristics.







# WILO Miniprop and Uniprop

## Fast submersible mixers.

Our fast submersible mixers Miniprop and Uniprop offer maximum flow rates in the smallest possible space. Their compact dimensions make them suitable for narrow installation openings, such as in pumping shafts, or as retrofitted installations in buildings. And thanks to their low propeller diameter, they can be mounted on the basin or tank floor, allowing operation even when the water level is low. For special applications in pumping shafts, the submersible mixer can be installed on the wall or ceiling via a flexible pipe bracket.

### The features: choose your own

The extensive range of standard features includes temperature sensors and a one-chamber system. Depending on the field of application, Miniprop and Uniprop submersible mixers can be supplied with either PU (polyurethane) or stainless steel propellers. If desired, the mixers can be fitted with an internal or external sealing chamber control. For use in abrasive and/or corrosive fluids, our highly effective Ceram C0 coating is recommended. Optionally, fast WILO submersible mixers can also be supplied with explosion protection to ATEX T4 or FM. With these options, WILO Miniprop or Uniprop submersible mixers can be configured precisely for each individual field of application.



Ceram C0 is WILO's high-efficiency two-component coating (polymer + ceramic). Units with Ceram C0 are characterised by less surface roughness, which increases their efficiency. Not only that: Ceram C0 coatings extend the service life of the units and reduce the amount of maintenance required.

### WILO Miniprop submersible mixers

These are suitable above all for cleaning rain spillway basins, for use in pumping stations to stir up deposits, for destroying surface scum layers and for homogenising tank contents in wastewater treatment systems and in small reaction vessels.

### WILO Uniprop submersible mixers

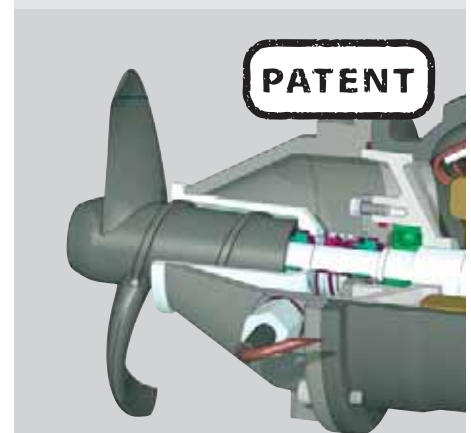
A special feature of this series is the guide carriage for aligning the unit vertically. Uniprop can also be installed with fixed or flexible lowering devices. WILO Uniprop submersible mixers are suited to a highly diverse range of applications in sewage treatment, industry, agriculture and water supply. Pumping fluids such as sludge with varying dry matter content and viscosities or in activated-sludge tanks or with varying water levels? No problem for WILO Uniprop submersible mixers.



- Mixer with PU propeller
- The ideal blade profile of this robust plastic propeller guarantees high efficiency in operation.



- Mixer with steel propeller
- This sturdy propeller is suited to tanks with undefined fluids such as rain spillway basins or pump sumps.



- Helical hub
- Thanks to its special design, this hub is self-cleaning. It can be combined with either PU or stainless steel propellers.



# Wilo Uniprop

## Modules for purpose-oriented utilisation.

WILO Uniprop submersible mixers are modular in design, so exactly the right submersible mixer can be put together for every application. That increases efficiency, extends the service life of the mixer and reduces energy costs. Tangibly.

### Uniprop: the smart module system

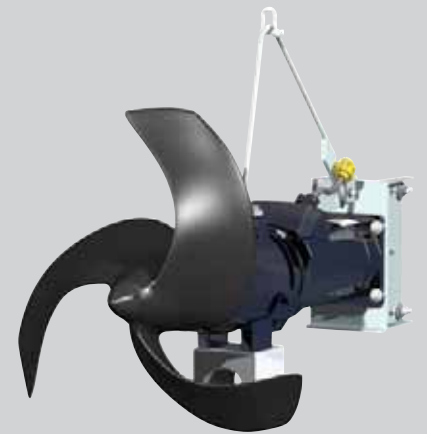
Because WILO Uniprop propeller diameters and speeds can be adapted with the modular system, these submersible mixers produce ideal mixing results. With the use of 4-, 6- or 8-pole submersible motors and various transmission ratios, the propeller speeds can be varied between 90 and 600 rpm. Optimised adaptation is worthwhile as it minimises propeller wear. The mixers can be installed on flexible lowering devices or fixed stands, making for trouble-free utilisation in a wide variety of tank and basin shapes. The lowering device offers the further advantage of allowing the mixer to be operated at different horizontal angles and – with auxiliary hoisting gear – at different heights. On the other hand, when mounted on a stand the submersible mixer can be installed anywhere in the tank or basin. If that stand is mounted on a concrete slab, it can even be installed in a tank after the tank has been filled.

### The features: reliability comes as standard

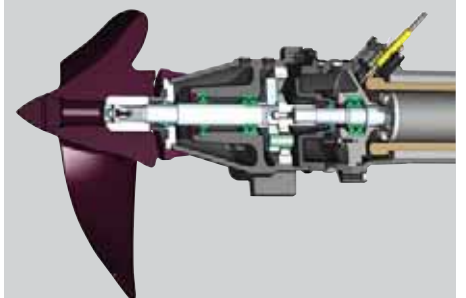
The standard features of our Uniprop submersible mixers include temperature sensors and a three-chamber system. The gear shaft consists of saltwater-resistant stainless steel 1.4462. A protective sleeve and the propeller's shape can be relied on to prevent entangling. The mechanical shaft seal is corrosion-protected by a stainless steel liner. Options include PU or stainless steel propeller, external sealing chamber control, a Ceram C0 coating for use in aggressive fluids or explosion protection to ATEX T4 or FM. A special feature of the WILO Uniprop series is the guide carriage which allows the submersible mixers to be aligned vertically.



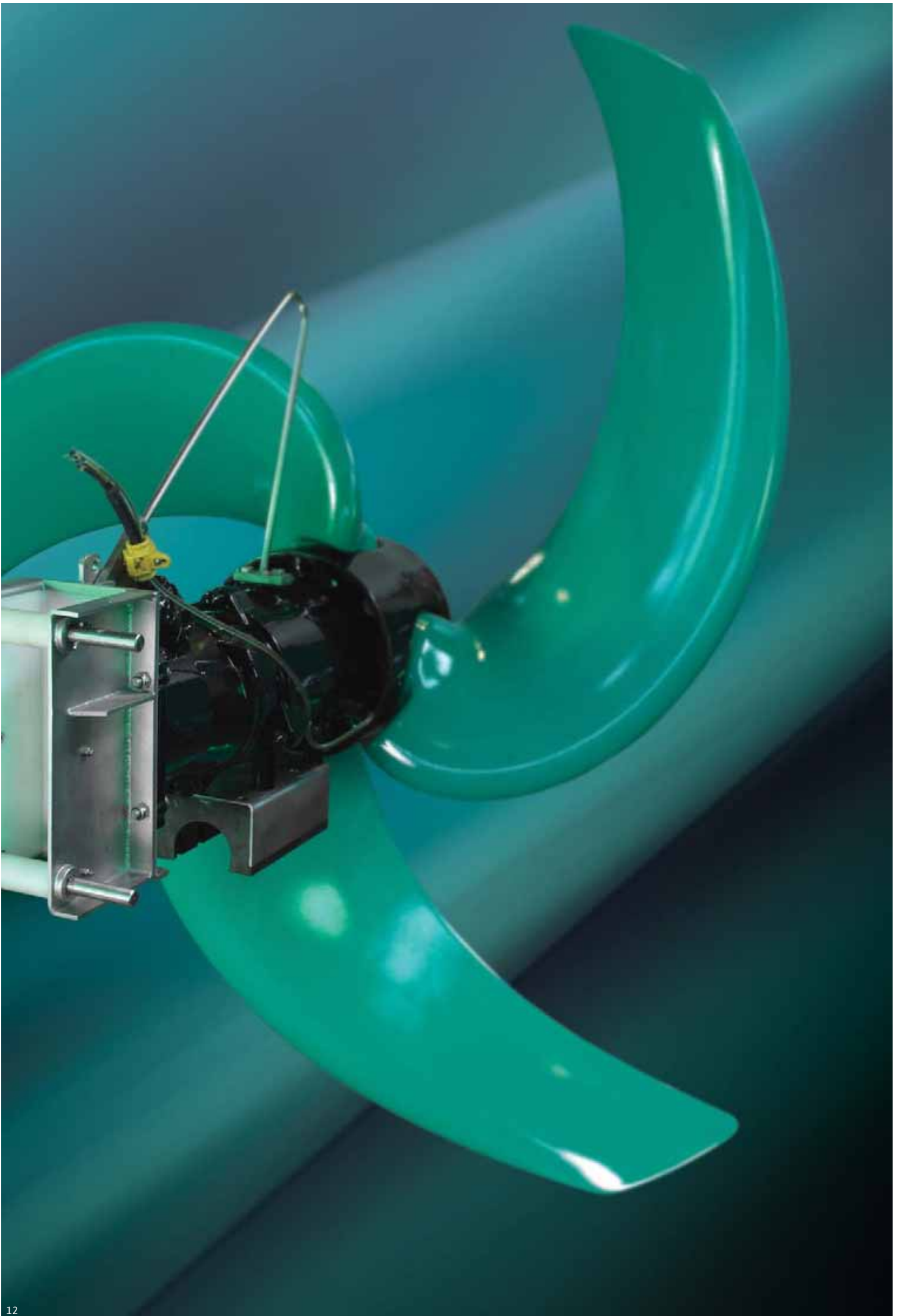
- Standard mixer with PU propeller
- A mixer with a wide range of application. Shown here with sliding carriage for sludge applications.



- Mixer with wear-resistant Ceram coating
- The highly effective two-component coating provides durable resistance even to alkaline or acidic fluids.



- Planetary gear – cross-section
- The WILO difference: the gear unit is equipped with a special prechamber to collect leak water.



# Wilo Maxiprop and Megaprop

## Slow submersible mixers.

WILO offers slow submersible mixers in two different designs:

- Maxiprop with 2-blade propeller
- Megaprop with 3-blade propeller

Here the load on the blades is less for the same thrust, ensuring smooth running even under unfavourable inflow conditions.

"Slow runners" are ideal for generating a directional flow in wastewater treatment systems and for suspending solids. In activated-sludge, BPR and denitrification tanks, they prevent the deposition of activated sludge. The result is a diverse range of possible applications in sewage treatment, industry, agriculture and water supply.

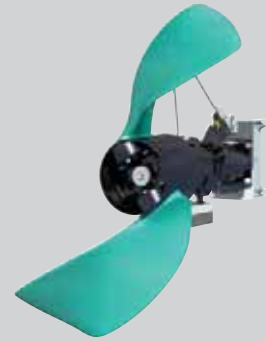
Like the medium-fast Uniprop submersible mixers, WILO Maxiprop and WILO Megaprop can likewise be used in modular combinations and can be adapted precisely to suit individual applications. Since the WILO Megaprop distributes the load across three propeller blades, mixers from this series are useful wherever smooth running is crucial. The propeller blades are made using GRP (glass reinforced plastic) and can be replaced individually.

### The Maxiprop/Megaprop "modular system"

WILO Maxiprop and WILO Megaprop are available with propeller diameters from 1,500 mm to 2,400 mm. Depending on the submersible motor (4-, 6- and 8-speed motors are available) and the transmission of the planetary gear, propeller speeds of 17–60 rpm are possible. Just as with the other WILO submersible motor series, the slow runners can also be fitted on request with explosion protection (ATEX T4 or FM), external sealing chamber monitoring and with a Ceram C0 coating for use in abrasive or corrosive fluids.

### Installation: as unique as your plant

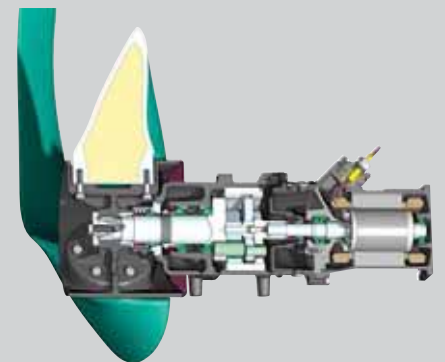
The individual modules are not the only way to make sure that the Megaprop and Maxiprop submersible mixers meet your exact requirements. WILO will also produce a precise installation plan tailored to your specific application scenario. According to the shape of the tank or basin, the mixers are installed on fixed stands, either free-standing or with an upper attachment point, where walkways are fitted.



- Maxiprop mixer
- Shown here with small propeller diameter for use with low water levels or small basin volumes.



- Megaprop mixer
- The propellers of the WILO Maxiprop and Megaprop mixers are energy-optimised in every size – for maximum efficiency.



- Double reduction planetary gear – cross-section
- Especially robust due to highly corrosion-resistant, saltwater-proof output shaft. Standard feature.



# Wilo accessories

## Everything for intelligent installation.

WILO has a broad range of accessories to accompany the submersible mixers. These include a wide selection of sturdy, technically advanced lowering devices, auxiliary hoisting gear and other installation equipment. WILO manufactures all accessory parts in house, which is why our expert sales representatives can offer you tailored system solutions. Planning data, engineering datasheets and accessory specifications in conventional file formats are available upon request.

### Lowering devices

Ideal results are only possible if a mixer can actually be mounted in the ideal installation location. That's why freely positionable lowering devices are a prerequisite for an energy-optimised mixer configuration. WILO's product range consequently includes flexible systems for wall mounting as well as stands for positioning mixers anywhere in the tank. Fully developed technology and robust materials guarantee high stability and durability.

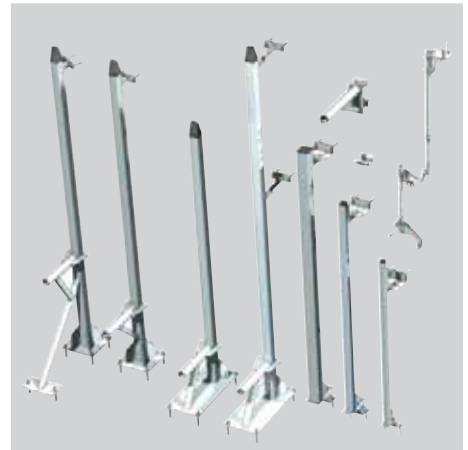
### Auxiliary hoisting gear

With WILO's auxiliary hoisting gear, tested by German testing agency LGA, it's an easy matter to install our submersible mixers securely or to raise them out of the tank for maintenance. WILO can provide auxiliary hoisting gear with a working radius of up to 3.2 m and bearing capacity of up to 500 kg. To ensure simple and safe implementation, some models can be disassembled into compact separate parts. Furthermore, most types give you a choice of material between galvanised steel, A2 steel (1.4301) and A4 steel (1.4571), as well as between a 2-gear aluminium winch and a stainless steel hand winch.

### Other accessories

The WILO programme includes an extensive range of practical accessories such as:

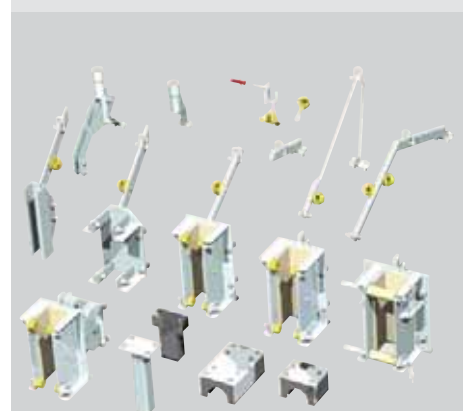
- An additional polyamide rope stay for the control and supply cables. It relieves strain on the cables supplying the mixer.
- A separate rope holder (winding mechanism) for the use of auxiliary hoisting gear at different installation locations.
- A catch hook or automatic catch device for raising and lowering submersible mixers, so that the rope does not have to remain in the fluid all the time.



- Lowering devices
- Whether for swivelling or as a stationary stand, the WILO range supplies you with lowering devices for every field of application.



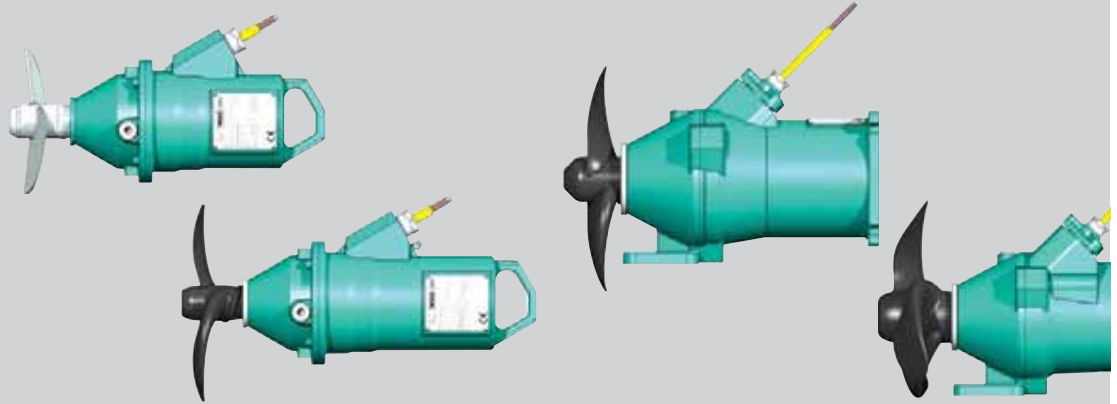
- Auxiliary hoisting gear
- Different working radiuses, LGA tested, with working radius and bearing capacity precisely designed for WILO submersible mixers.



- WILO provides all kinds of accessories – from guide pipes to frames and sliding carriages, or rubber buffers – for trouble-free adaptation to any application.

# Product programme 400 V/50 HZ

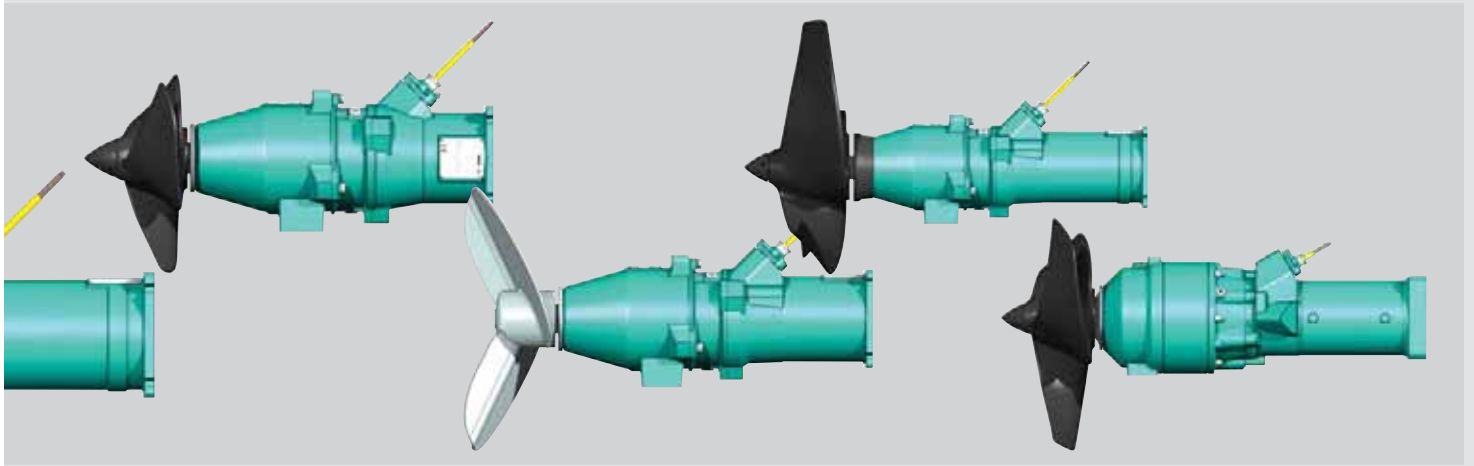
The right solution for every task.



Type		TR 14.145-4/6	TR 16.145-4/6	TR 21.145-4/6	TR 21.145-4/11	TR 28.145-4/11		TR 22.95-6/8	TR 22.145-4/8 V	TR 22.145-4/8	TR 22.145-4/12		TR 36.74-8/8	TR 36.95-6/8	TR 36.145-4/12	TR 36.145-4/16		TR 40.74-8/16	TR 40.74-8/24	TR 40.95-6/24		TR 50-2...6/8
Propeller, 2-blade		●	●	●	●	●		-	-	-	-		●	●	●	●		-	-	-		●
Propeller, 3-blade		-	-	-	-	-		●	●	●	●		●	●	●	●		●	●	●		●
Polyurethane		●	●	●	●	●		-	-	-	-		●	●	●	●		●	●	●		●
Steel ( <sup>1</sup> cast iron)		-	-	-	-	-		● <sup>1</sup>	● <sup>1</sup>	● <sup>1</sup>	● <sup>1</sup>		-	-	-	-		-	-	-		●
Stainless steel		-	-	●	●	-		●	●	●	●		●	●	●	●		-	-	-		●
D <sub>rated</sub>	mm	140	160	210 220	210 220	280		220	220	220	220		360 250	360 250	360 250	360 250		400	400	400		500 229 306
n <sub>rated</sub>	min	1450	1450	1450	1450	1450		950	1450	1450	1450		740	950	1450	1450		740	740	950		
No. of poles		4	4	4	4	4		6	4	4	4		8	6	4	4		8	8	6		6
P <sub>rated</sub>	kW	0.5	0.5	0.5	1.3	1.3		1.8	2.5	3.5	4.5		1.1	1.8	4.5	6.5		2.8	5.1	6		1.8
P <sub>max</sub>	kW	0.7	0.7	0.7	1.7	1.7		2.5	3.5	4.5	5.8		1.7	2.5	5.8	8.2		4	7.7	7.7		2.5
I <sub>rated</sub>	A	1.4	1.4	1.4	3.3	3.3		4.5	5.9	7.9	9.4		3.2	4.5	9.4	13.5		7.4	14.3	13.6		4.5
Explosion protection		●	●	●	●	●		●	●	●	●		●	●	●	●		●	●	●		●
Weight	kg	20	20	20	26	26		70	70	70	78		61	61	69	85		84	93	93		110
Fields of application																						
Activated-sludge tank		-	-	-	-	-		x	x	x	x		x	x	x	x		x	x	x		x
Pump sump		xx	xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx		x	x	x		x
Liquid manure tank		-	-	-	-	-		x	x	x	x		x	x	x	x		x	x	x		xx
Rain spillway basin		x	x	x	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx		x
Sludge tank		-	-	-	-	-		x	x	x	x		x	x	x	x		x	x	x		xx

● = yes   x = suitable   xx = very suitable   Technical details subject to change.

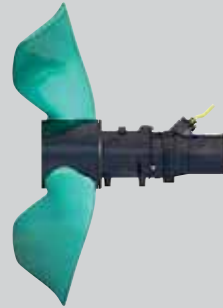
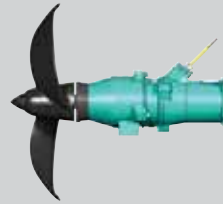




TR 50-2...4/8 V	TR 50-2...6/16	TR 50-2...4/12	TR 50-2...4/8	TR 50-2...4/16	TR 50-2...4/24	TR 50-2...2/22		TR 60-2...6/8	TR 60-2...4/8 V	TR 60-2...4/8	TR 60-2...4/12	TR 60-2...4/16	TR 60-2...4/24	TR 60-2...2/22		TR 75-2...6/16	TR 75-2...6/24	TR 75-2...4/16	TR 75-2...4/24		TR 80-1...6/27	TR 80-1...6/32	TR 80-1...4/22	TR 80-1...4/27	TR 80-1...4/30
●	●	●	●	●	●	-		●	●	●	●	●	●	-		-	-	-	-		-	-	-	-	-
●	●	●	●	●	-	●		●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	●
●	●	●	●	●	-	●		●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	●
●	●	●	●	●	●	-		●	●	●	●	●	●	-		-	-	-	-		-	-	-	-	-
500 251 371	500 250	500 299 372	500 309 473	500 344 479	500 379 475	500 528 619		600 195 288	600 221 308	600 234 337	600 345 389	600 260 447	600 300 480	600 497 544		750 156 176	750 194 216	750 193 217	750 197 266		785 243	785 258 272	785 269	785 239 272	785 240 301
4	6	4	4	4	4	2		6	4	4	4	4	4	2		6	6	4	4		6	6	4	4	4
2.5	3.7	4.5	3.5	6.5	10	10.5		1.8	2.5	3.5	4.5	6.5	10	10.5		3.7	6	6.5	10		11.5	12.5	12.5	16	18.5
3.5	5.2	5.8	4.5	8.2	12.2	12.3		2.5	3.5	4.5	6	8.1	12.2	12.3		5.2	7.7	8.2	12.2		14.1	14.9	15.3	18.9	22
5.9	9.1	9.4	7.9	13.5	21	20.5		4.5	5.9	7.9	9.4	13.5	21	20.5		9.1	13.6	13.5	21		24.5	26	26	32	36.5
●	●	●	●	●	●	●		●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	●
110	121	118	110	129	138	129		112	112	112	120	131	140	130		127	135	127	135		298	303	284	298	303
x	x	x	x	x	x	x		x	x	x	x	x	x	x		x	x	x	x		x	x	x	x	x
x	x	x	x	x	x	x		x	x	x	x	x	x	x		-	-	-	-		-	-	-	-	-
xx	xx	xx	xx	xx	xx	xx		xx	xx	xx	xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx	xx
x	x	x	x	x	x	x		-	-	-	-	-	-	-		-	-	-	-		-	-	-	-	-
xx	xx	xx	xx	xx	xx	xx		xx	xx	xx	xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx	xx

# Product programme 400 V/50 HZ

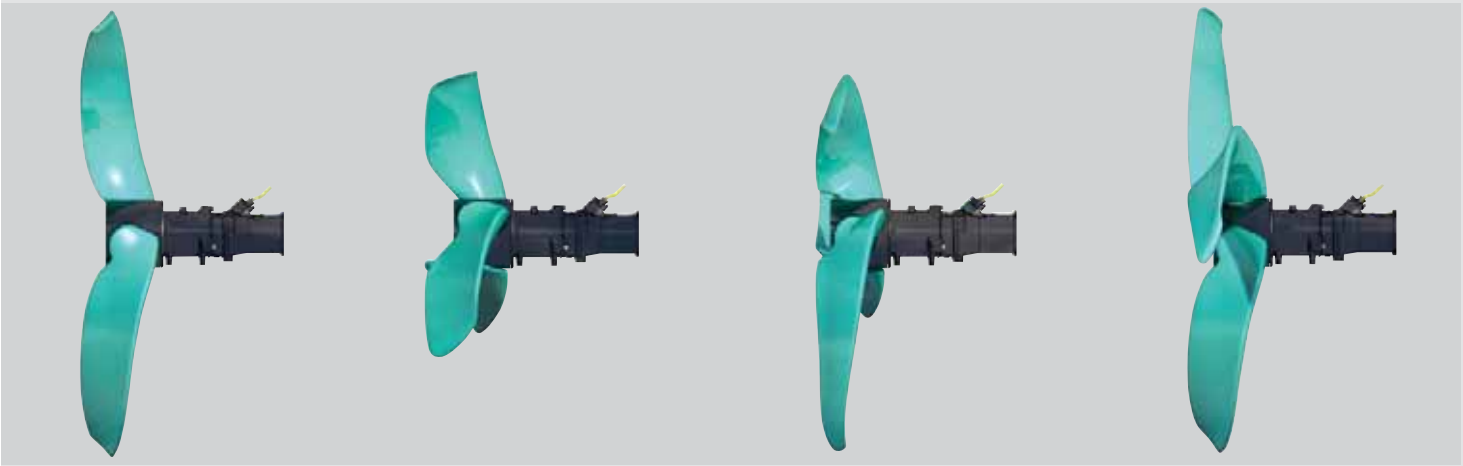
The right solution for every task.



Type		TR 90-2...-8/8	TR 90-2...-6/8	TR 90-2...-4/8V	TR 90-2...-4/8	TR 90-2...-4/12		TR 215...-6/8	TR 215...-4/8V	TR 215...-4/8	TR 215...-4/12		TR 221...-8/8	TR 221...-6/8	TR 221...-4/8V	TR 221...-4/8	TR 221...-4/12
Propeller 2-blade		●	●	●	●	●		●	●	●	●		●	●	●	●	●
Propeller 3-blade		-	-	-	-	-		-	-	-	-		-	-	-	-	-
* GRP		●	●	●	●	●		●	●	●	●		●	●	●	●	●
* Steel		-	-	-	-	-		-	-	-	-		-	-	-	-	-
* Stainless steel		-	-	-	-	-		-	-	-	-		-	-	-	-	-
* D	mm	900	900	900	900	900		1500	1500	1500	1500		2100	2100	2100	2100	2100
* n <sub>rated</sub>	min <sup>-1</sup>	<u>98</u> 126	<u>129</u> 166	192	<u>193</u> 215	<u>219</u> 251		<u>17</u> 24	<u>26</u> 40	<u>40</u> 44	<u>53</u> 57		<u>25</u> 32	<u>33</u> 39	<u>41</u> 45	<u>46</u> 53	<u>57</u> 59
No. of poles		8	6	4	4	4		6	4	4	4		8	6	4	4	4
P <sub>rated</sub>	kW	1.1	1.8	2.5	3.5	4.5		1.8	2.5	3.5	4.5		1.1	1.8	2.5	3.5	4.5
P <sub>max</sub>	kW	1.7	2.5	3.5	4.5	5.8		2.5	3.5	4.5	5.8		1.7	2.5	3.5	4.5	5.8
I <sub>rated</sub>	A	3.2	4.5	5.9	7.9	9.4		4.5	5.9	7.9	9.4		3.2	4.5	5.9	7.9	9.4
Explosion protection		●	●	●	●	●		●	●	●	●		●	●	●	●	●
Weight	kg	107	107	107	107	117		172	172	172	182		178	178	178	178	188
Fields of application																	
Nitrification		xx	xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx	xx
Denitrification		xx	xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx	xx
Phosphate removal		xx	xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx	xx
Bioreactors		xx	xx	xx	xx	xx		xx	xx	xx	xx		xx	xx	xx	xx	xx
Cooling basins		x	x	x	x	x		x	x	x	x		x	x	x	x	x
Fish farms		x	x	x	x	x		x	x	x	x		x	x	x	x	x

● = yes x = suitable xx = very suitable

Technical details subject to change.



TR 225...-8/8					TR 315-6/8					TR 321...-8/8					TR 325...-8/8				
TR 225...-8/8	TR 225...-6/8	TR 225...-4/8V	TR 225...-4/8	TR 225...-4/12	TR 315-6/8	TR 315-4/8V	TR 315-4/8	TR 315-4/12	TR 321...-8/8	TR 321...-6/8	TR 321...-4/8V	TR 321...-4/8	TR 321...-4/12	TR 325...-8/8	TR 325...-6/8	TR 325...-4/8V	TR 325...-4/8	TR 325...-4/12	
●	●	●	●	●	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	-	-	-	-	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2400	2400	2400	2400	2400	1500	1500	1500	1500	2100	2100	2100	2100	2100	2400	2400	2400	2400	2400	
$\frac{13}{16}$	$\frac{17}{23}$	$\frac{25}{30}$	$\frac{31}{34}$	$\frac{35}{38}$	$\frac{17}{24}$	$\frac{26}{38}$	40	44	$\frac{23}{31}$	$\frac{33}{35}$	$\frac{36}{39}$	$\frac{41}{45}$	$\frac{49}{52}$	$\frac{13}{16}$	$\frac{17}{24}$	25	28	$\frac{29}{32}$	
8	6	4	4	4	6	4	4	4	8	6	4	4	4	8	6	4	4	4	
1.1	1.8	2.5	3.5	4.5	1.8	2.5	3.5	4.5	1.1	1.8	2.5	3.5	4.5	1.1	1.8	2.5	3.5	4.5	
1.7	2.5	3.5	4.5	5.8	2.5	3.5	4.5	5.8	1.7	2.5	3.5	4.5	5.8	1.7	2.5	3.5	4.5	5.8	
3.2	4.5	5.9	7.9	9.4	4.5	5.9	7.9	9.4	3.2	4.5	5.9	7.9	9.4	3.2	4.5	5.9	7.9	9.4	
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
180	180	180	180	190	190	190	190	200	199	199	199	199	209	202	202	202	202	212	
xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	
xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	
xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	
xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	



Pumpen Intelligenz.

WILO AG  
Nortkirchenstraße 100  
44263 Dortmund  
Germany  
T +49 231 4102-0  
F +49 231 4102-7363  
www.wilo.com

## Wilo – International (Subsidiaries)

### Austria

WILO Handelsges. m.b.H.  
1230 Wien  
T +43 5 07507-0  
F +43 5 07507-42  
office@wilo.at

### Azerbaijan

WILO Caspian LLC  
1014 Baku  
T +994 12 4992386  
F +994 12 4992879  
info@wilo.az

### Belarus

WILO Bel OOO  
220035 Minsk  
T +375 17 2503393  
F +375 17 2503383  
wilobel@wilo.by

### Belgium

WILO SA/NV  
1083 Ganshoren  
T +32 2 4823333  
F +32 2 4823330  
info@wilo.be

### Bulgaria

WILO Bulgaria Ltd.  
1125 Sofia  
T +359 2 9701970  
F +359 2 9701979  
info@wilo.bg

### Canada

WILO Canada Inc.  
Calgary, Alberta T2A5L4  
T/F +1 403 2769456  
bill.lowe@wilo-na.com

### China

WILO SALMSON (Beijing)  
Pumps System Ltd.  
101300 Beijing  
T +86 10 80493900  
F +86 10 80493788  
wilobj@wilo.com.cn

### Croatia

WILO Hrvatska d.o.o.  
10090 Zagreb  
T +38 51 3430914  
F +38 51 3430930  
wilo-hrvatska@wilo.hr

### Czech Republic

WILO Praha s.r.o.  
25101 Cestlice  
T +420 234 098 711  
F +420 234 098 710  
info@wilo.cz

### Denmark

WILO Danmark A/S  
2690 Karlslunde  
T +45 70 253312  
F +45 70 253316  
wilo@wilo.dk

### Estonia

WILO Eestli OÜ  
12618 Tallinn  
T +372 6509780  
F +372 6509781  
info@wilo.ee

### Finland

WILO Finland OY  
02330 Espoo  
T +358 207401540  
F +358 207401549  
wilo@wilo.fi

### France

WILO S.A.S.  
78310 Coignières  
T +33 1 30050930  
F +33 1 34614959  
info@wilo.fr

### Great Britain

WILO (U.K.) Ltd.  
DE14 2WJ Burton-  
Upon-Trent  
T +44 1283 523000  
F +44 1283 523099  
sales@wilo.co.uk

### Greece

WILO Hellas AG  
14569 Anixi (Attika)  
T +302 10 6248300  
F +302 10 6248360  
wilo.info@wilo.gr

### Hungary

WILO Magyarország Kft  
2045 Törökbálint  
(Budapest)  
T +36 23 889500  
F +36 23 889599  
wilo@wilo.hu

### Ireland

WILO Engineering Ltd.  
Limerick  
T +353 61 227566  
F +353 61 229017  
sales@wilo.ie

### Italy

WILO Italia s.r.l.  
20068 Peschiera  
Borromeo (Milano)  
T +39 25538351  
F +39 255303374  
wilo.italia@wilo.it

### Kazakhstan

WILO Central Asia  
050002 Almaty  
T +7 3272 785961  
F +7 3272 785960  
in.pak@wilo.kz

### Korea

WILO Pumps Ltd.  
621-807 Gimhae  
Gyeongnam  
T +82 55 3405809  
F +82 55 3405885  
wilo@wilo.co.kr

### Latvia

WILO Baltic SIA  
1019 Riga  
T +371 7 145229  
F +371 7 145566  
mail@wilo.lv

### Lebanon

WILO SALMSON  
Lebanon  
12022030 El Metn  
T +961 4 722280  
F +961 4 722285  
wsl@cyberia.net.lb

### Lithuania

WILO Lietuva UAB  
03202 Vilnius  
T/F +370 2 236495  
mail@wilo.lt

### Montenegro

WILO Beograd d.o.o.  
11000 Beograd  
T +381 11 2850410  
F +381 11 2851278  
office@wilo.co.yu

### The Netherlands

WILO Nederland b.v.  
1948 RC Beverwijk  
T +31 251 220844  
F +31 251 225168  
info@wilo.nl

### Norway

WILO Norge AS  
0901 Oslo  
T +47 22 804570  
F +47 22 804590  
wilo@wilo.no

### Poland

WILO Polska Sp. z o.o.  
05-090 Raszyn  
T +48 22 7026161  
F +48 22 7026100  
wilo@wilo.pl

### Moldova

2012 Chisinau  
T/F +373 2 223501  
sergiu.zagorean@wilo.md

### Portugal

Bombas Wilo-Salmson  
Portugal Lda.  
4050-040 Porto  
T +351 22 2076900  
F +351 22 2001469  
bombas@wilo-salmson.pt

### Romania

WILO Romania s.r.l.  
041833 Bucharest  
T +40 21 4600612  
F +40 21 4600743  
wilo@wilo.ro

### Russia

WILO Rus ooo  
123592 Moscow  
T +7 495 7810690  
F +7 495 7810691  
wilo@orc.ru

### Serbia

WILO Beograd d.o.o.  
11000 Beograd  
T +381 11 2850410  
F +381 11 2851278  
office@wilo.co.yu

### Slovakia

WILO Slovakia s.r.o.  
82008 Bratislava 28  
T +421 2 45520122  
F +421 2 45246471  
wilo@wilo.sk

### Slovenia

WILO Adriatic d.o.o.  
1000 Ljubljana  
T +386 1 5838130  
F +386 1 5838138  
wilo.adriatic@wilo.si

### Spain

WILO Ibérica S.A.  
28806 Alcalá de Henares  
(Madrid)  
T +34 91 8797100  
F +34 91 8797101  
wilo.iberica@wilo.es

### Sweden

WILO Sverige AB  
35246 Växjö  
T +46 470 727600  
F +46 470 727644  
wilo@wilo.se

### Switzerland

EMB Pumpen AG  
4310 Rheinfelden  
T +41 61 8368020  
F +41 61 8368021  
info@emb-pumpen.ch

### Turkey

WILO Pompa Sistemleri  
San. ve Tic. A.Ş.  
34857 Istanbul  
T +90 216 6610203  
F +90 216 6610212  
wilo@wilo.com.tr

### Ukraine

WILO Ukraina t.o.w.  
01033 Kiev  
T +38 044 2011870  
F +38 044 2011877  
wilo@wilo.ua

### USA

WILO-EMU LLC  
Thomasville, Georgia  
31758-7810  
T +1 229 584 0098  
F +1 229 584 0234  
terry.rouse@wilo-emu.com

### USA

WILO USA LLC  
Calgary, Alberta T2A5L4  
T/F +1 403 2769456  
bill.lowe@wilo-na.com

## Wilo – International (Representation offices)

### Bosnia and Herzegovina

71000 Sarajevo  
T +387 33 714510  
F +387 33 714511  
zeljko.cvjetkovic@wilo.ba

### Georgia

0177 Tbilisi  
T/F +995 32317813  
info@wilo.ge

### Macedonia

1000 Skopje  
T/F +389 2122058  
valerij.vojneski@wilo.com.mk

### Tajikistan

Dushanbe  
T +992 93 5554541

### Uzbekistan

100046 Taschkent  
T/F +998 71 1206774  
info@wilo.uz

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