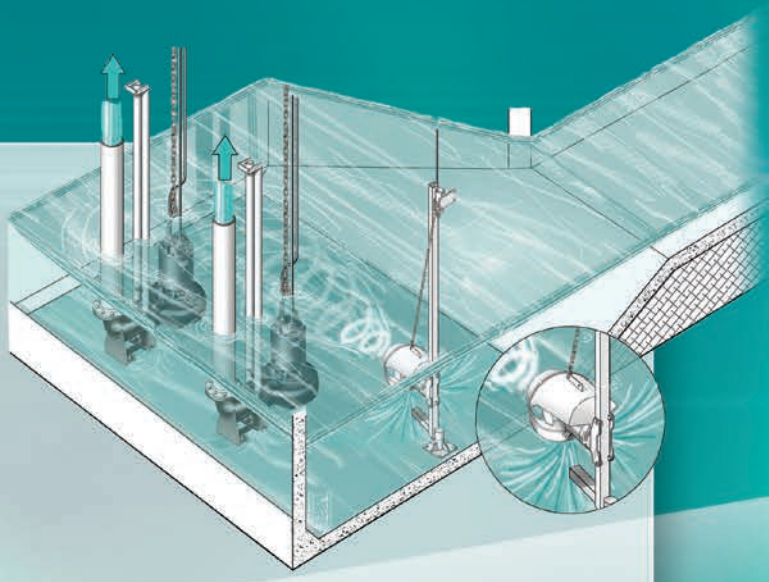
ShinMaywa

Submersible Mixer Series

High speed submersible mixer | Medium speed submersible mixer | Low speed submersible mixer

Save energy with powerful mixing. Meet wide-ranging needs with various lineups



High Speed Submersible Mixer
SM Series

0.25 - 15 kW

- Mixing in a pump well, sludge storage tank or equalization tank
- Crushing scum

For details, refer to pages 4–15p

SM/SME

With Tungsten Carbide Spraying Propeller
SM-W/SME-W Series

0.9 - 7.5kW

SM-W/SME-W

For details, refer to pages 16·17p

Aeration Mixer
SM-R Series

0.75, 1.5kW

SME-R

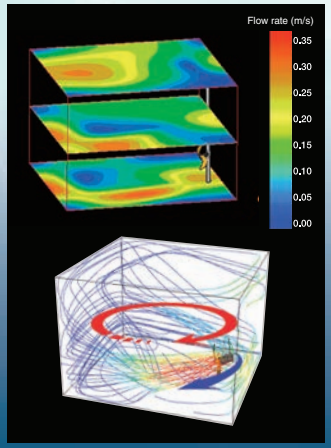
For details, refer to pages 18·19p

Medium Speed Submersible Mixer
SMM Series

For details, refer to pages 20·21p

0.75 - 2.2kW

- Mixing of denitrification tank, reaction tank, reaction tank
- Mixing the carriers in wastewater treatment



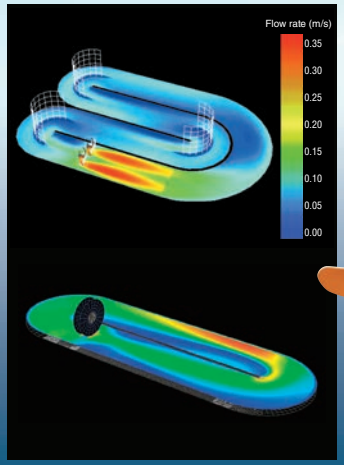
SMM

Low Speed Submersible Mixer
SML Series

For details, refer to pages 22–25p

1.5 - 3.7 kW

- Oxidation ditch
- Water flow generation

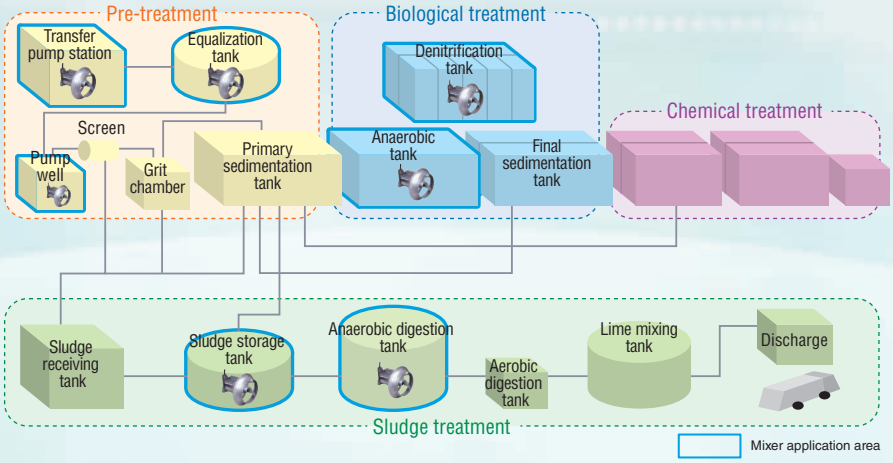


SML

ShinMaywa's submersible mixers can be installed anywhere.

With various lineups, we will address requirements for agitation, mixture and water flow generation in water-related facilities in all fields, including industry, water quality and the environment.
Each and every one of our products incorporates advanced technologies perfected by ShinMaywa through the development of our water treatment-related equipment.

Example of Submersible Mixer Application at Wastewater Treatment Plant



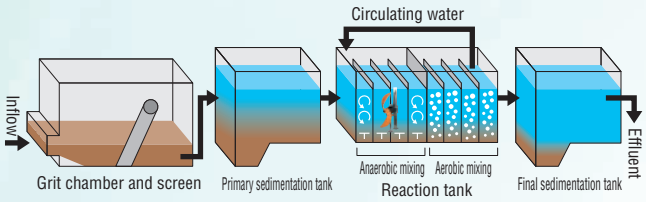
Purpose

Preventing the sedimentation of activated sludge
Uniform mixing
Reducing scum formation

Points of use

Sludge storage tank
Pump station for wastewater collection system
Pump well
pH regulating tank
Reaction tank
(Denitrification tank,
Anaerobic tank)

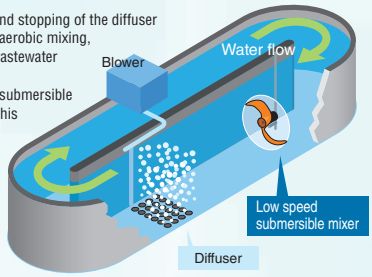
Advanced Wastewater Treatment Method



Conventionally, purification is performed by mixing activated sludge while supplying oxygen. However, the conventional method has the disadvantage of insufficient removal of nitrogen and phosphorus. To overcome this disadvantage, anaerobic mixing, in which no oxygen is supplied, and aerobic mixing, in which oxygen is supplied, combine to maximize the capability of various bacteria, as an advanced wastewater treatment method.

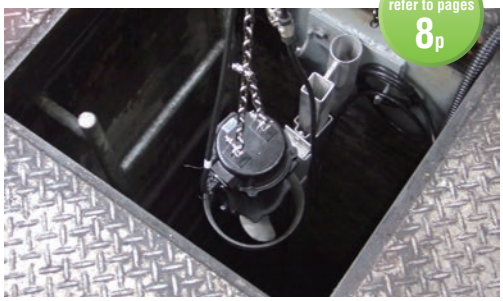
OD (Oxidation Ditch) Method

The oxidation ditch method performs aeration while circulating activated sludge in a circulating channel.
The repeated starting and stopping of the diffuser enables anaerobic and aerobic mixing, just like an advanced wastewater treatment method.
ShinMaywa low speed submersible mixer can be used for this system.



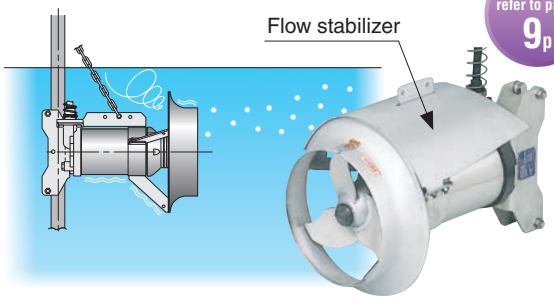
Installation with the mixer oriented downward

For details, refer to pages 8p



Flow stabilizer for a low water level (optional)

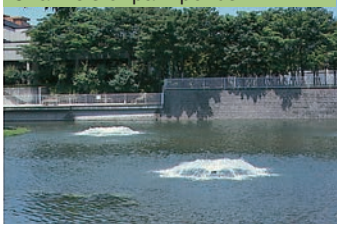
For details, refer to pages 9p



Generating a water flow

For details, refer to pages 26p

Channels or park ponds



Helps improve water quality.

Channel and/or shallow rivers

Dams

Helps prevent freezing at dam intakes.

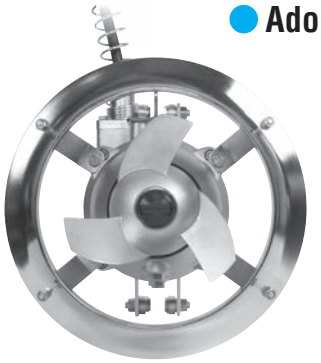
For various examples of submersible mixers, refer to pages 26 and 27.

ShinMaywa submersible mixers are robust. We focus on the smallest details.

SME series

Newly developed propeller and motor realize to reduce power consumption

High efficiency propeller

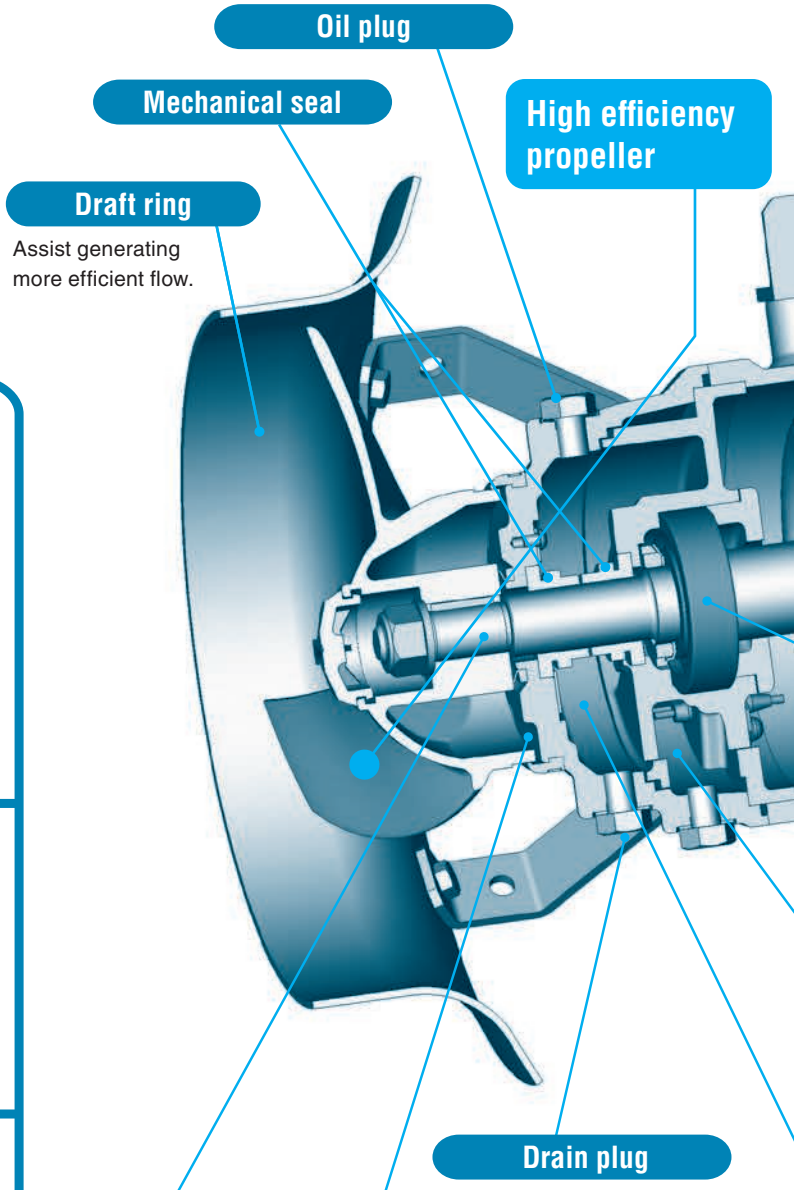


Adopt 3-D wing propeller

- Up to 40% reduction in power consumption compared with conventional models.
- Optimum design of propeller using CAE/CFD.
- Achieving the high performance airfoil.
- Improving wear resistance.
- Large thrust propeller for clear water can be used for wastewater.

High efficiency motor

Optimum design of winding specifications and silicon steel sheet realize energy saving



SM/SME series

0.9kW - 7.5kW (50Hz)
1.1kW - 7.5kW (60Hz)

Features

Improved reliability

- To prevent cable entanglement, **support coil** and **cable fixture** are equipped.
- Adopt the **cable** with fiber reinforcement, core wire seal shut the water penetrating into the motor.
- Equipped with a **leakage water chamber** as standard, it protect the bearing and motor from leaked water and oil.
- Employing a large **shaft** with shorter overhang prevents shaft deflection and mechanical seal reliability is greatly improved.

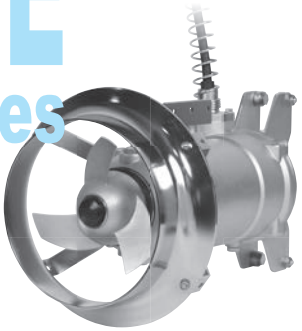
Superb durability

- Employs **double mechanical seal** with silicon carbide (SiC) seal faces that is proven for submersible pumps.
- Employed **large size bearing** for load side, and **anti-creep bearing** for rear side.
- **Propeller** has special hardening treatment to improve wear resistance.

Efficient mixing by simple adjustment

- As position and angle (left / right and up / down) can be easily adjusted to the most efficient location, efficient mixing can be realized in accordance with shape, size and depth of tank, liquid characters and mixing purpose.

SM/SME series



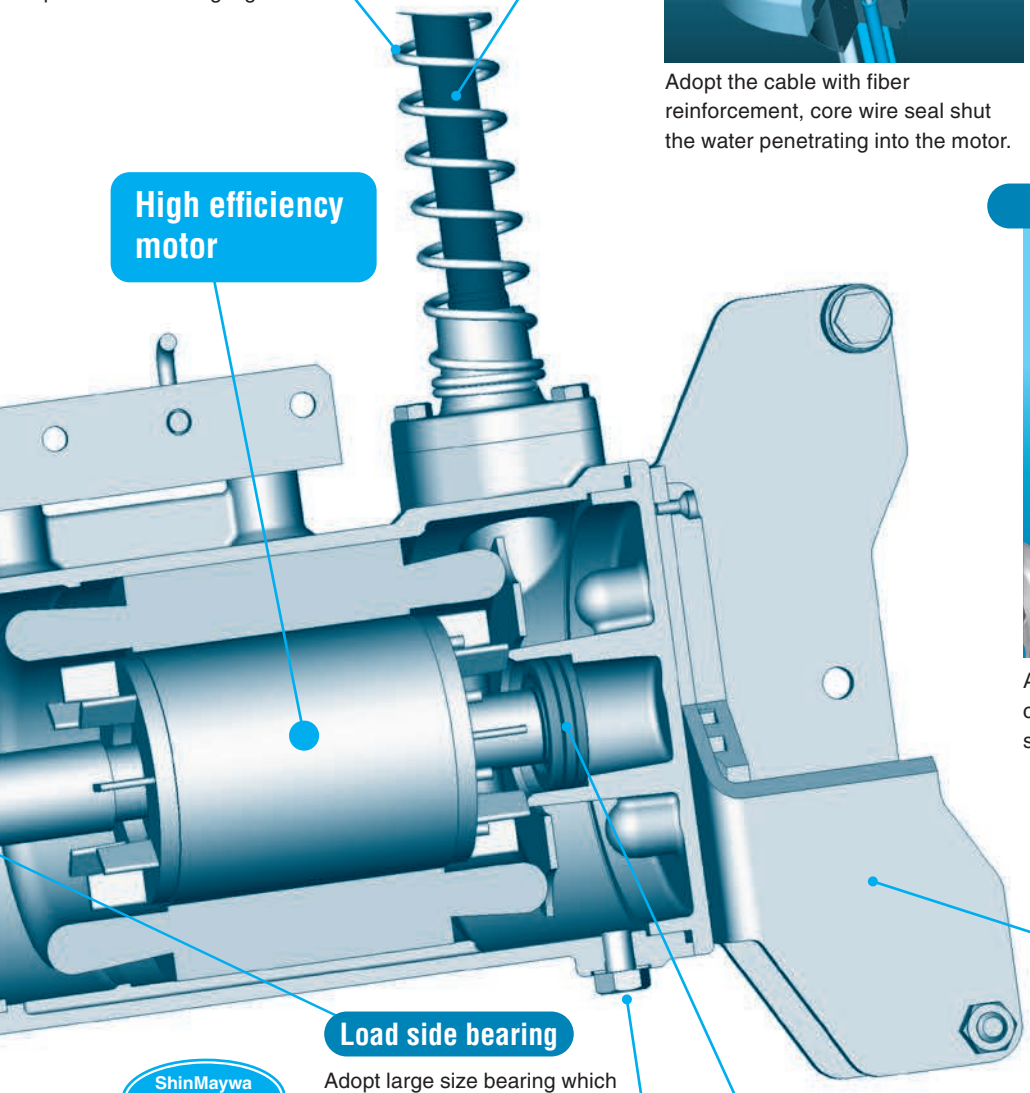
Cable (with core wire seal)

Adopt the cable with fiber reinforcement, core wire seal shut the water penetrating into the motor.

Support coil

To fix cable vertically and prevent cable tangling.

High efficiency motor



Cable fixture

Allows you to adjust the cable length and fix the cable in the upper part of a tank to prevent sagging.

Slide

Suitable for square pipe of installation equipment and no limitation of installation depth.

Load side bearing

ShinMaywa maintenance point

Adopt large size bearing which has durability under harsh environment such as sludge, etc.

Anti-load side bearing

Adopt the anti-creep bearing.

Leakage water chamber

Leakage detector can be equipped (option). Possible to inspect through inspection plug for leakage water chamber.

Drain plug for motor chamber

ShinMaywa maintenance point

Oil chamber

Providing an oil plug on the upper surface and a drain plug on the lower surface, oil change can be taken without changing the posture of the mixer.

Applicable Condition

Liquid type	Various types of wastewater and sludge
Specific gravity	1.1 or less
Viscosity	1.000mPa's or less
Temperature	0°C - 40°C
Chlorine ion	1,000mgl or less
Sludge concentration	5% or less
Water depth	10m or less
pH	6-9

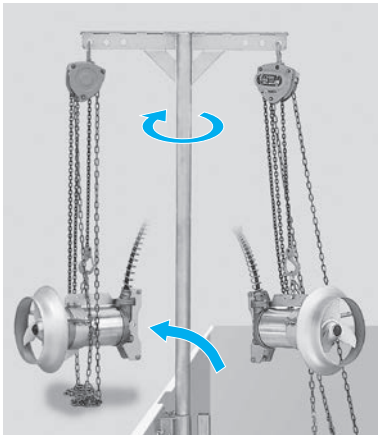
- Applicable liquid specific gravity and viscosity vary per product model.
- Some liquid type may be supported a range exceeding the above scope. Please contact us

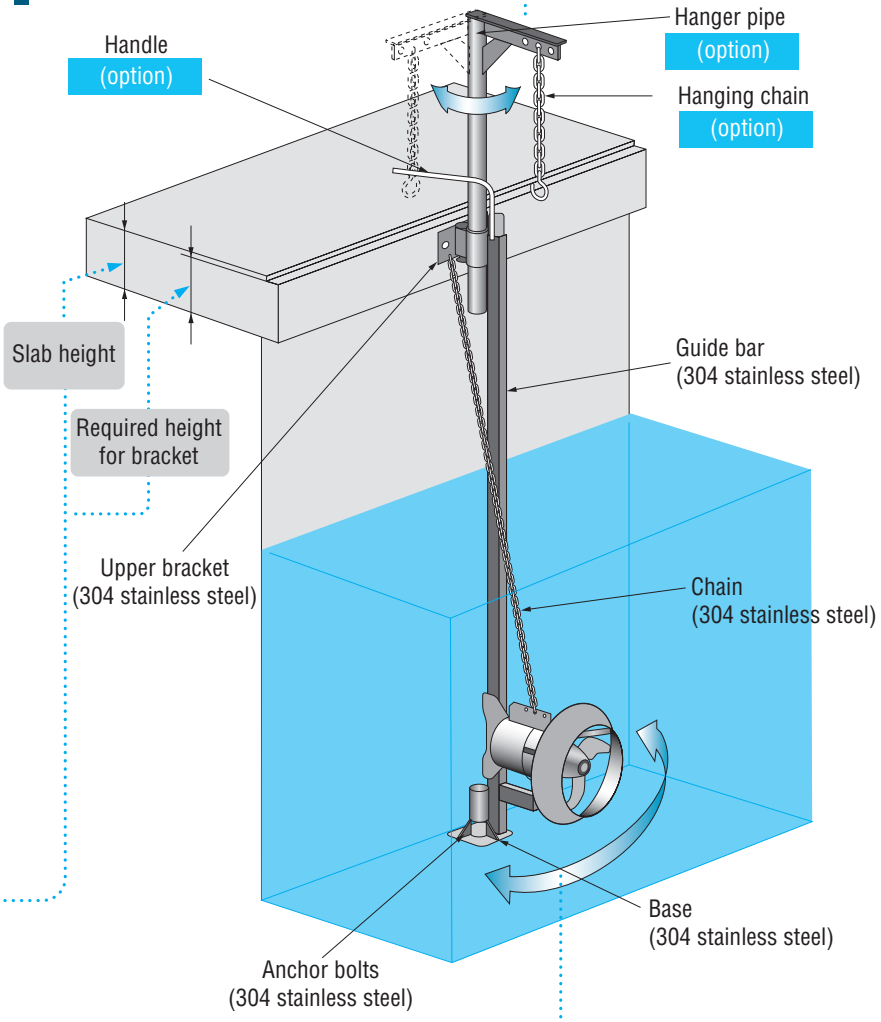
Installation Equipment (for SM15 - 75)

Simple adjustment for effective mixing.

Easy Pull-out of Mixer from the Tank

- Using hanger pipe (option), lifted mixer can easily rotate to floor side and make easy inspection and adjustment.





Required Slab Height

Guide bar	Required height for bracket	Slab height (reference)
□50 pipe	150mm	200mm
□100 pipe	200mm	250mm

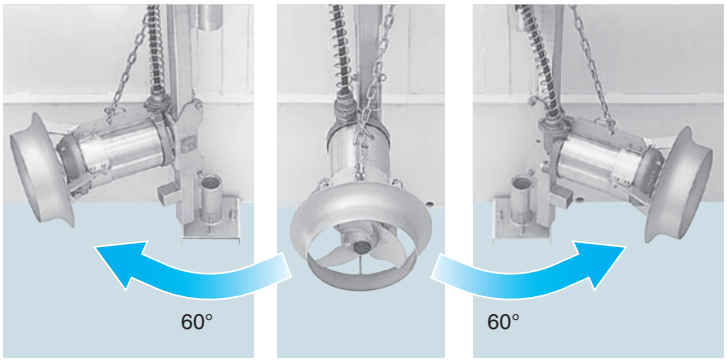
Left / Right Angle Adjustment

- Mixing direction in horizontal can be adjusted within + / - 60° with 20° pitch.

1. Remove the pin.

2. Determine angle using the handle.

3. Insert the pin.



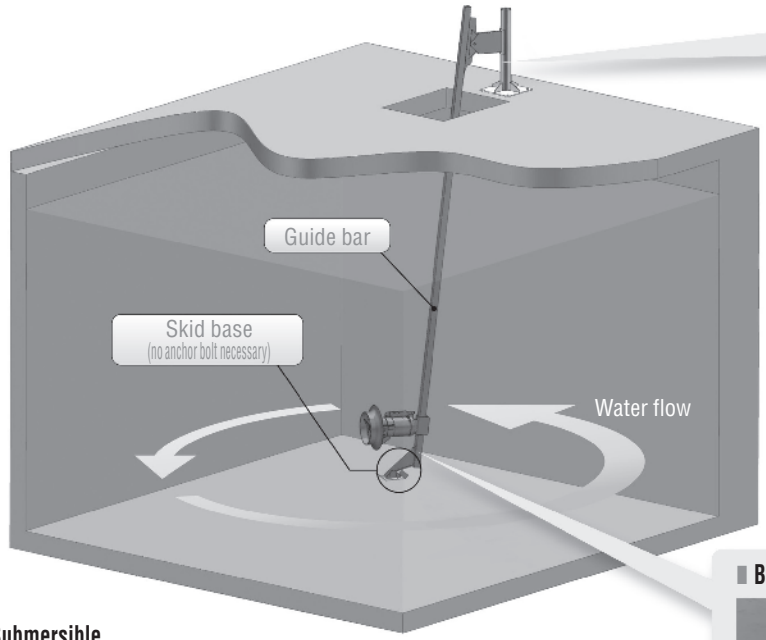
When Water cannot be Drained from an Existing Tank

Equipped with an installation equipment requiring no water drainage Output: 1.5 - 2.8 kW — SME-D Series

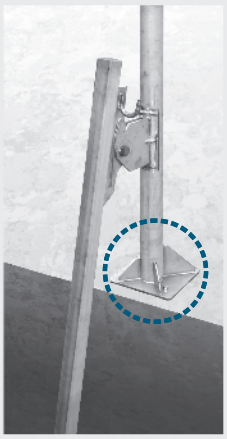
A submersible mixer that saves energy by powerful mixing can be installed without shutting down the wastewater treatment facility.

Features

- Adopts a delta receiving structure in which a slanting guide bar is exposed to thrust from a submersible mixer.
- A skid base that can be inclined to any angle absorbs the inclination of the tank bottom (1 / 50 or less).
- The maximum possible depth of the water tank is 6m.

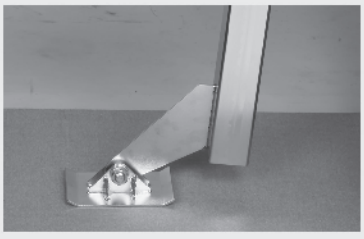


Opening



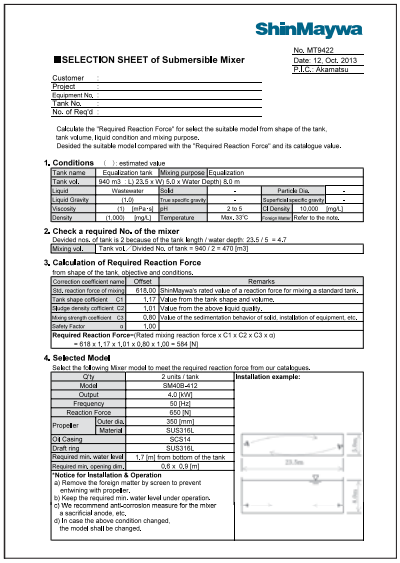
Fixed at the upper part of the tank.

Bottom surface of a tank (Photo for reference)



A skid base is used to stabilize at the tank bottom.

- **SELECTION SHEET of Submersible Mixer** (Example)



ShinMaywa

■SELECTION SHEET of Submersible Mixer

No. MT9422
Date: 12. Oct. 2013
P.I.C. Akamatsu

Customer :
Project :
Equipment No. :
Tank No. :
No. of Req'd :

Calculate the "Required Reaction Force" for select the suitable model from shape of the tank, tank volume, liquid condition and mixing purpose.
Desided the suitable model compared with the "Required Reaction Force" and its catalogue value.

1. Conditions ( ): estimated value

Tank name	Equalization tank	Mixing purpose	Equalization		
Tank vol.	940 m3 (L) 23,5 x W) 5,0 x Water Depth) 8,0 m				
Liquid	Wastewater	Solid	-	Particle Dia.	-
Liquid Gravity	(1,0)	Tnie specific gravity	-	Superficial specific gravity	-
Viscosity	(1) (mPa·s)	pH	2 to 5	Oil Density	10,000 (mg/L)
Density	(1,000) (mg/L)	Temperature	Max. 33°C	Foreign matter	Refer to the note.

2. Check a required No. of the mixer
Devided nos. of tank is 2 because of the tank length / water depth: 23,5 / 5 = 4,7
Mixing vol. | Tank vol. / Divided No. of tank = 940 / 2 = 470 [m3]

3. Calculation of Required Reaction Force
from shape of the tank, objective and conditions.

Correction coefficient name	Offset	Remarks
Std. reaction force of mixing	618,00	ShinMaywa's rated value of a reaction force for mixing a standard tank.
Tank shape coffisient C1	1,17	Value from the tank shape and volume.
Sludge density coffisient C2	1,01	Value from the above liquid quality.
Mixing strength coefficient C3	0,80	Value of the sedimentation behavior of solid, installation of equipment, etc.
Safety Factor α	1,00	

Required Reaction Force=(Rated mixing reaction force x C1 x C2 x C3 x α)
= 618 x 1,17 x 1,01 x 0,80 x 1,00 = 584 [N]

4. Selected Model
Select the following Mixer model to meet the required reaction force from our catalogues.

Qty		2 units / tank
Model		SM40B-412
Output		4,0 [kW]
Frequency		60 [Hz]
Reaction Force		650 [N]
Propeller	Outer dia.	350 [mm]
	Material	SUS316L
Oil Casing		SCS14
Draft ring		SUS316L
Required min. water level		1,7 [m] from bottom of the tank.
Required min. opening dim.		0,6 x 0,9 [m]

Installation example:

***Notice for Installation & Operation**
a) Remove the foreign matter by screen to prevent entwining with propeller.
b) Keep the required min. water level under operation.
c) We recommend anti-corrosion measure for the mixer a sacrificial anode, etc.
d) In case the above condition changed, the model shall be changed.

Standard Specifications

Model	Rated output (kW)	No. of poles	Propeller code 50Hz	Propeller code 60Hz	Flow (m³ / min)	Thrust (N)	Weight (Kg)
SME15JAD SME15JBD	1.5	6	2513	2523	7.4	300	52
			2512	2522	6.5	230	
			2511	2521	5.6	175	
SME15AD SME15BD			✳3012	✳3022	10.5	430	54
			3011	3021	9.8	380	
SME28AD SME28BD	2.8	8	3513	3523	15.0	650	75
			3512	3522	14.0	570	
			3511	3521	13.0	490	

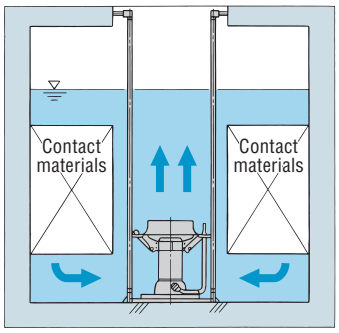
Note) Propeller code marked with ✳ cannot be used in the liquid that contains a large amount of foreign objects or has a large specific gravity (1.03 or higher).

Special Installation Methods

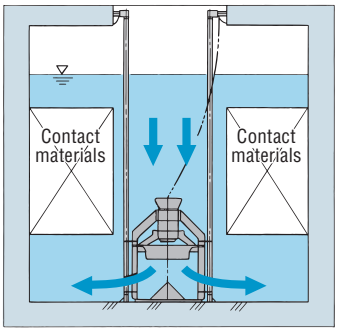
Special Installation Examples of a Mixer Facing Upwards or Downwards

A special mount and two guide pipes allow a mixer to be installed facing upwards or downwards. The mixer thus installed can be used to circulate and mix sewage water in a contact aeration tank filled with contact materials or an anaerobic filter bed tank in a small-sized community sewage treatment facility.

Example of a mixer facing upwards



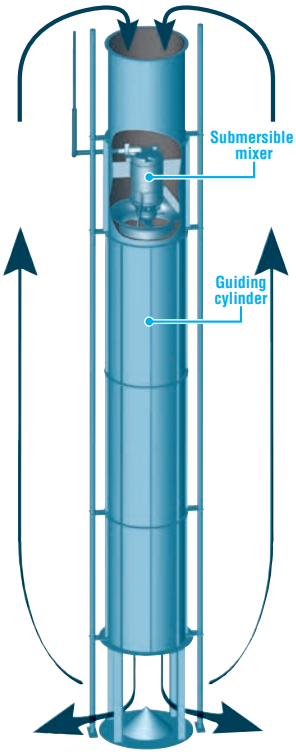
Example of a mixer facing downwards



Facing Downwards (with a Guiding Cylinder)

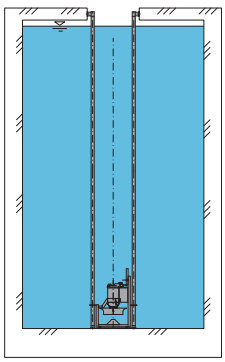
Installation of a submersible mixer near the bottom of a deep tank with the mixer facing downwards may result in the generation of scum on the liquid surface, depending on the quality of the liquid.
If the generation of scum is expected, a submersible mixer can be installed near the liquid surface along with a guiding cylinder. This ensures efficient mixing and prevents the generation of scum at the same time.

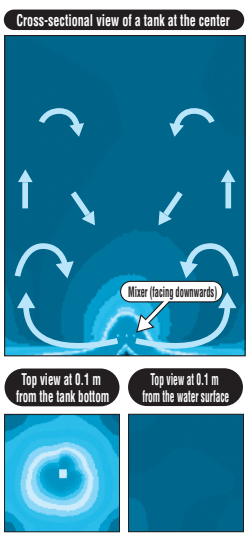
Installation image



Water flow image

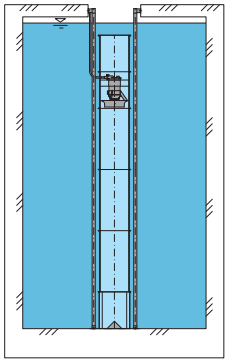
Without a guiding cylinder

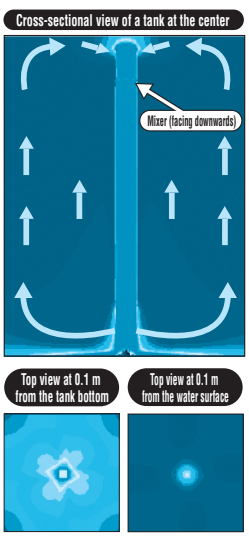




A lower flow rate near the water surface is likely to result in the accumulation of scum.

With a guiding cylinder

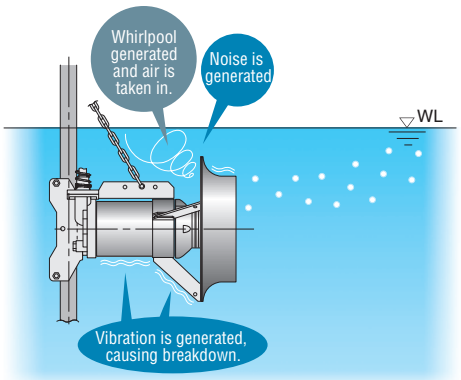




The suction flow generated near the water surface (at the center) can suck out generated scum efficiently.

Flow Stabilizer for Low Water Level (Option)

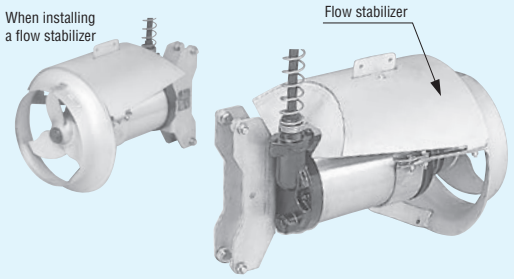
Problems at Low Water Level



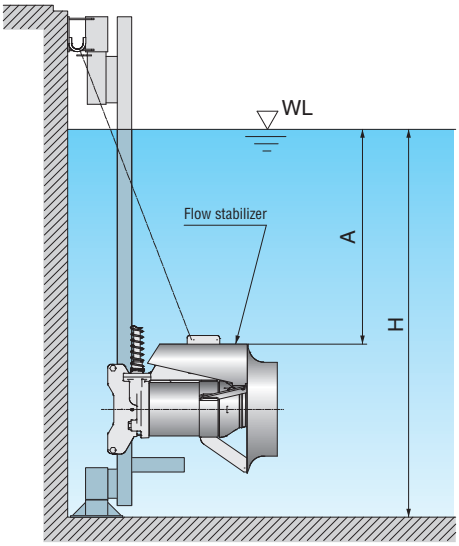
When submersible mixer operates at the lower water level, for example in a shallow equalization tank, anaerobic mixing is disabled as mixer takes air due to whirlpool generates on the water surface. This may cause breakdown of mixer. Therefore, in case of low water level operation, by installing flow stabilizer to mixer, operable water level can be lowered.

Effect of a Flow Stabilizer

A flow stabilizer precludes sucking of swirl generated at low water levels. Installation of a flow stabilizer allows operation of the mixer with a lower water level than usual.



Operational Min. Water Level



Model	Flow stabilizer	H (mm)	A (mm)
SM250	Without	1,100	700
	With	500	100
SM400	Without	1,100	700
	With	500	100
SM750 / SME750	Without	1,100	700
	With	500	100
SME15JA • JB	Without	1,100	700
	With	500	100
SME15A • B	Without	1,300	700
	With	900	300
SME22JA • JB	Without	1,100	700
	With	500	100
SME28A • B	Without	1,500	900
	With	900	300
SME40A • B	Without	1,700	1,100
	With	1,000	400
SM50A • B	Without	1,700	800
	With	1,200	300
SM75A • B	Without	1,900	1,000
	With	1,200	300

Actual Measurement of Thrust at the Factory

Thrust Measurement System

ShinMaywa has a thrust measurement system specific for submersible mixers installed at our Ono factory.

High quality can be achieved by accurately measuring the thrust during submersible operation.

Standard Specifications

50Hz Specifications

Model	Rated output (kW)	No.of poles	Rated current (A)	Simultaneous rotation speed (min^{-1})	Propeller code	Propeller dia. (mm)	Power for mixing clear water (kW)	Flow (m^3 / min)	Thrust (N)	Weight (kg)
SM250	0.25	4	2.3	1,500	—	150	0.21	1.8	53	20
SM400	0.4	4	2.8	1,500	—	180	0.33	2.7	80	23
SM750	0.75	4	4.4	1,500	—	180	0.55	3.5	140	25
SME750	0.75	4	4.1	1,500	—	180	(0.66)*1	3.5	140	28
SME15JA・JB	1.5	6	9.3	1,000	2513	254	1.4	7.4	300	52
					2512		1.0	6.5	230	
					2511		0.8	5.6	175	
SME15A・B					∗3012	300	1.6	10.5	430	54
					3011		1.4	9.8	380	
SME22JA・JB	2.2	4	10.4	1,500	2212	220	1.8	6.4	300	52
					2211		1.1	5.1	190	
SME28A・B	2.8	8	15.8	750	3513	350	2.1	15.0	650	75
					3512		1.9	14.0	570	
					3511		1.6	13.0	490	
SME40A・B	4		23.4		3515		3.2	17.0	850	93
					3514		2.6	16.0	750	
					3513		2.2	15.0	650	
SM50A・B	5	10	25.8	600	∗512	525	5.5	35.5	1,620	145
					513		4.9	34.2	1,500	
					514		4.4	30.6	1,200	
					515		3.4	26.5	900	
SM75A・B	7.5		39.6		∗510		8.2	43.0	2,370	160
					511		7.4	40.0	2,050	
					512		6.4	35.5	1,620	
SM110A	8.8	4	38	311	503	780	7.2	63.4	2,600	330
SM150A	13.5	4	59	352	502	780	10.4	71.5	3,300	330
	15		64	367	501		11.8	74.7	3,600	

*1: Value in ( ) shows consumption power for mixing clear water.

*2: Propeller code marked with ∗ cannot be used in the liquid that contains a large amount of foreign objects or has a large specific gravity (1.03 or higher).

•For mixers with motor rated output not specified in these tables, please contact us.

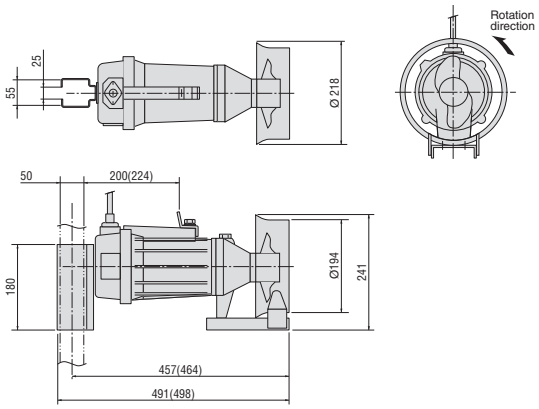
60Hz Specifications

Model	Rated output (kW)	No.of poles	Rated current (A)	Simultaneous rotation speed (min^{-1})	Propeller code	Propeller dia. (mm)	Power for mixing clear water (kW)	Flow (m^3 / min)	Thrust (N)	Weight (kg)
SM250	0.25	4	2.0	1,800	—	136	0.22	1.5	44	20
SM400	0.4	4	2.5	1,800	—	150	0.32	2.0	60	23
SM750	0.75	4	4.2	1,800	—	180	0.6	3.4	125	25
SME750	0.75	4	3.6	1,800	—	180	(0.7)*1	3.4	125	28
SME15JA・JB	1.5	6	7.6	1,200	2523	254	1.3	7.4	300	52
					2522		1.0	6.5	230	
					2521		0.7	5.6	175	
SME15A・B					∗3022	300	1.7	10.5	430	54
					3021		1.5	9.8	380	
SME22JA・JB	2.2	4	9.3	1,800	2221	220	1.8	5.8	250	52
SME28A・B	2.8	8	14.5	900	3523	350	2.3	15.0	650	75
					3522		2.0	14.0	570	
					3521		1.7	13.0	490	
SME40A・B	4		20.9		3525		3.0	17.0	850	93
					3524		2.6	16.0	750	
					3523		2.3	15.0	650	
SM50A・B	5	12	29.9	600	∗512	525	5.5	35.5	1,620	145
					513		4.9	34.2	1,500	
					514		4.4	30.6	1,200	
					515		3.4	26.5	900	
SM75A・B	7.5		44.6		∗510		8.2	43.0	2,370	160
					511		7.3	40.0	2,050	
					512		6.4	35.5	1,620	
SM110A	10.5	4	43	328	602	780	8.4	66.4	2,850	330
SM150A	15	4	62	373	601	780	12.4	75.7	3,700	330

*1: Value in ( ) shows consumption power for mixing clear water.
*2: Propeller code marked with ∗ cannot be used in the liquid that contains a large amount of foreign objects or has a large specific gravity (1.03 or higher).
•For mixers with motor rated output not specified in these tables, please contact us.

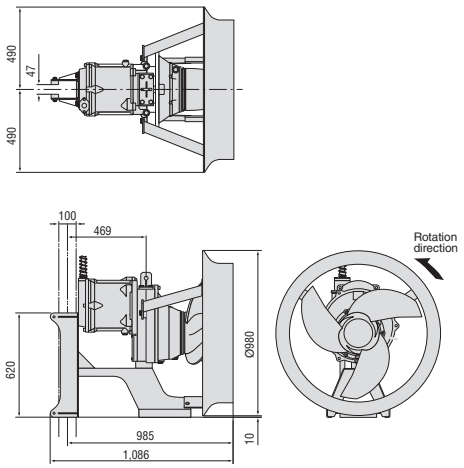
Dimensions (Unit : mm)

SM250·SM400·SM750·SME750

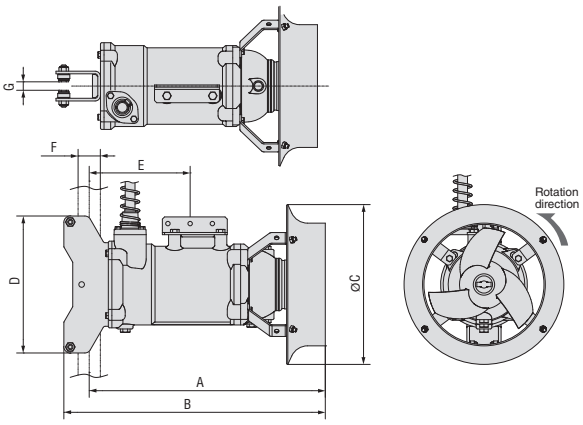


( ) : SME750

SM110A·SM150A

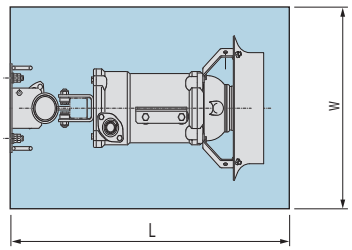


SME15JA·SME15A·SME22JA·SME28A·SME40A·SM50A·SM75A
SME15JB·SME15B·SME22JB·SME28B·SME40B·SM50B·SM75B



Model	Dimensions						
	A	B	C	D	E	F	G
SME15JA·JB	531	588	360	308	234	50	19
SME15A·B	557	614	440		247		
SME22JA·JB	531	588	360		234		
SME28A·B	641	698	510		278		
SME40A·B	701	758			308		
SM50	746	836	705	280	328	100	43
SM75	798	888			350		

Opening Slot Dimensions



Model	W	L
SM250,SM400,SM750,SME750	400	700
SME15JA·JB,SME22JA·JB	500	800
SME15A·B	600	
SME28A·B		900
SME40A·B		1,000
SME50A·B,SME75A·B	800	1,200
SM110A,SM150A	1,100	1,400

Cable Specifications

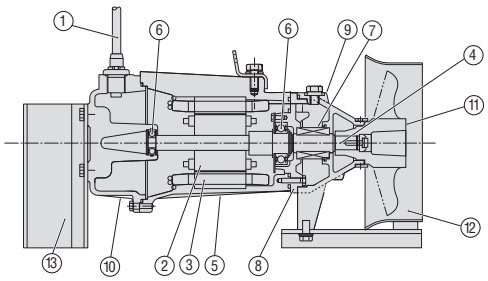
Model	Type	Section area (mm²)	No. of cores	Application	Length (m)	Outer diameter (mm)
SM250 SM400 SM750 SME750	PVC insulated PVC sheathed cable	1.25	4	Power	10	Ø11.5
SME15JA·JB SME15A·B SME22JA·JB	EPR insulated CPC sheathed cable with fabric reinforcement	1.25 1.25 (1.25)	4 2 (2)	Power Thermal (Leakage detector)	10	Ø15 (Ø17)
SME28A·B		2.0 2.0 (2.0)				Ø16 (Ø18)
SME40A·B		3.5 2.0 (2.0)				Ø18 (Ø20)

Model	Type	Section area (mm²)	No. of cores	Application	Length (m)	Outer diameter (mm)
SM50A·B	EPR insulated CPC sheathed cable with fabric reinforcement	5.5 2.0 (2.0)	4 2 (2)	Power Thermal (Leakage detector)	10	Ø20 (Ø22)
SM75A·B		8.0 2.0 (2.0)				Ø22 (Ø24.5)
SM110A SM150A		14 2.0 (2.0)				Ø29

( ) shows the optional specification with [leakage detector].

Standard Specifications

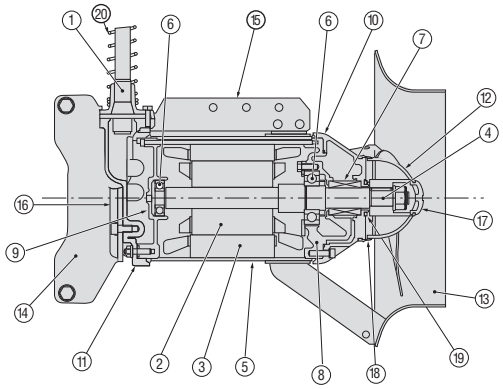
SM250・SM400・SM750・SME750



■ Material

No.	Name	Material	No.	Name	Material
1	Cable	PVC insulated PVC sheathed cable	8	Mechanical seal bracket	Gray iron casting (FC200)
2	Rotor	–	9	Oil housing	Gray iron casting (FC200)
3	Stator	–	10	Motor cover	Gray iron casting (FC200)
4	Shaft	420J2 stainless steel	11	Propeller	Spheroidal graphite iron casting (FCD500)
5	Stator housing	Gray iron casting (FC200)	12	Draft ring	304 stainless steel
6	Bearing	–	13	Sliding bracket	304 stainless steel
7	Mechanical seal	–			

SM50A・SM75A (Cast iron specification)
SM50B・SM75B (Stainless steel specification)

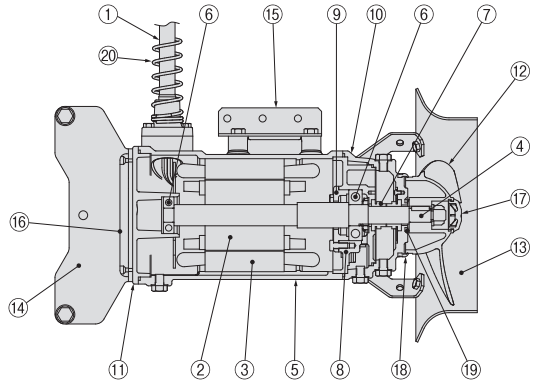


■ Material

No.	Name	Material	No.	Name	Material
1	Cable	EPR insulated PCP sheathed cable with fabric reinforcement	11	Motor cover	Gray iron casting (FC200) <316 stainless steel casting>*
2	Rotor	–	12	Propeller	316L stainless steel
3	Stator	–	13	Draft ring	304L stainless steel
4	Shaft	316 stainless steel (wet portion only)	14	Sliding bracket	304 stainless steel
5	Stator housing	316L stainless steel	15	Hanger plate	304 stainless steel
6	Bearing	–	16	Sliding plate	Polyethylene (PE)
7	Mechanical seal	–	17	Propeller cap	Chloroprene rubber (CR)
8	Mechanical seal bracket	Gray iron casting (FC200)	18	Shield ring	Acrylonitrile butadiene rubber (NBR)
9	Bearing bracket	Gray iron casting (FC200)	19	Oil seal	Acrylonitrile butadiene rubber (NBR)
10	Oil housing	Gray iron casting (FC200) <316 stainless steel casting>*	20	Support coil	304 stainless steel

*The material within the bracket < >is for stainless steel specification models.

SME15JA・SME15A・SME22JA・SME28A・SME40A (Cast iron specification)
SME15JB・SME15B・SME22JB・SME28B・SME40B (Stainless steel specification)

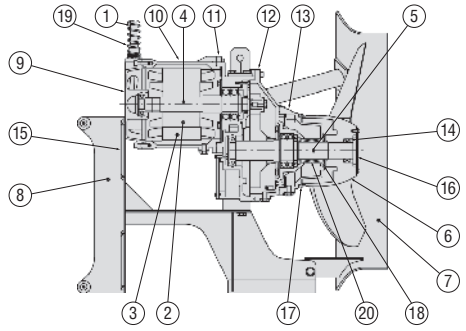


■ Material

No.	Name	Material	No.	Name	Material
1	Cable	EPR insulated PCP sheathed cable with fabric reinforcement	11	Motor cover	Gray iron casting (FC250) <316 stainless steel casting>*
2	Rotor	–	12	Propeller	316 stainless steel casting
3	Stator	–	13	Draft ring	304 stainless steel
4	Shaft	316 stainless steel(wet portion only)	14	Sliding bracket	304 stainless steel
5	Stator housing	Gray iron casting (FC250) <316 stainless steel casting>*	15	Hanger plate	304 stainless steel
6	Bearing	–	16	Sliding plate	Polyethylene (PE)
7	Mechanical seal	–	17	Propeller cap	Chloroprene rubber (CR)
8	Bearing bracket	Gray iron casting (FC250)	18	Shield ring	Acrylonitrile butadiene rubber (NBR)
9	Bearing retainer	Gray iron casting (FC250)	19	Oil seal	Acrylonitrile butadiene rubber (NBR)
10	Oil housing	Gray iron casting (FC250) <316 stainless steel casting>*	20	Support coil	304 stainless steel

*The material within the bracket < >is for stainless steel specification models.

SM110A・SM150A



■ Material

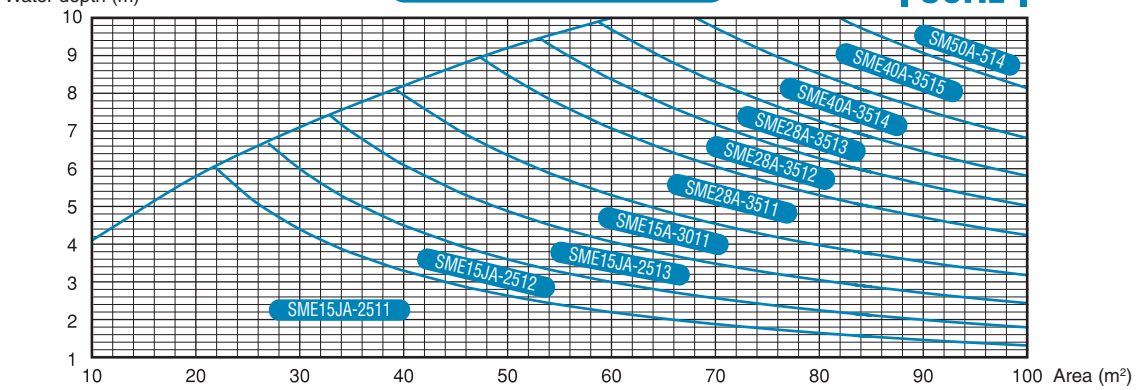
No.	Name	Material	No.	Name	Material
1	Cable	EPR insulated PCP sheathed cable with fabric reinforcement	11	Gear housing	Gray iron casting (FC200)
2	Rotor	–	12	Mechanical seal bracket	Gray iron casting (FC200)
3	Stator	–	13	Oil housing	Gray iron casting (FC200)
4	Motor shaft	Carbon steel	14	Locking element	–
5	Propeller shaft	316 stainless steel	15	Sliding plate	Polyethylene (PE)
6	Propeller	316 stainless steel casting	16	Propeller cap	316 stainless steel casting
7	Draft ring	304L stainless steel	17	Shield ring	Chloroprene rubber (CR)
8	Sliding bracket	304 stainless steel	18	Oil seal	Acrylonitrile butadiene rubber (NBR)
9	Motor cover	Gray iron casting (FC200)	19	Support coil	304 stainless steel
10	Stator housing	Gray iron casting (FC200)	20	Mechanical seal	–

*The material within the bracket < >is for stainless steel specification models.

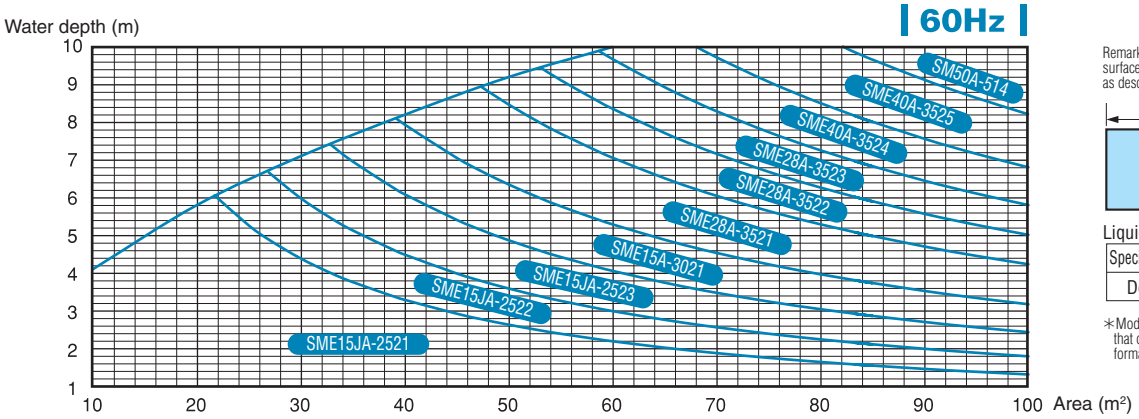
Simple Selection Chart

For Pump Well

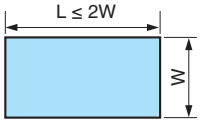
50Hz



60Hz



Remarks) Length/Width ratio of plain surface of tank shall be less than 2:1 as described below.



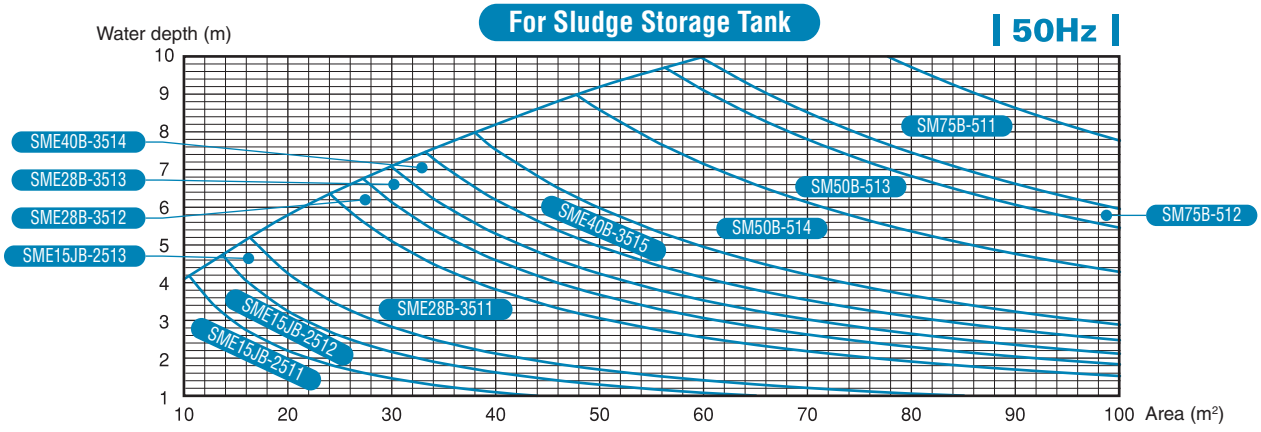
Liquid condition

Specific gravity	1.01
Density	0.1%

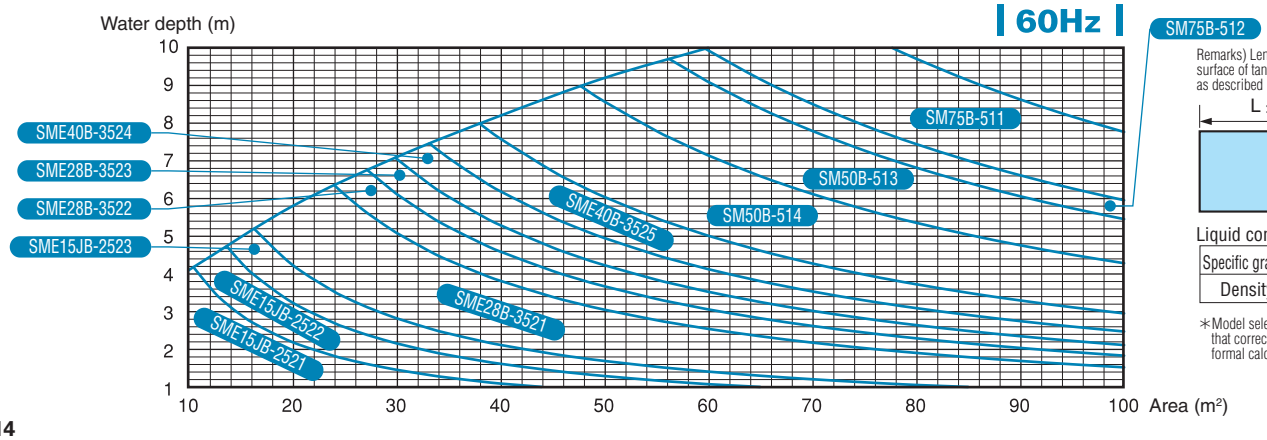
∗Model selection is just for reference so that correct model shall be determined by formal calculation chart.

For Sludge Storage Tank

50Hz

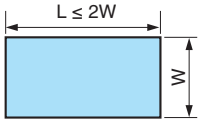


60Hz



SM75B-512

Remarks) Length/Width ratio of plain surface of tank shall be less than 2:1 as described below.



Liquid condition

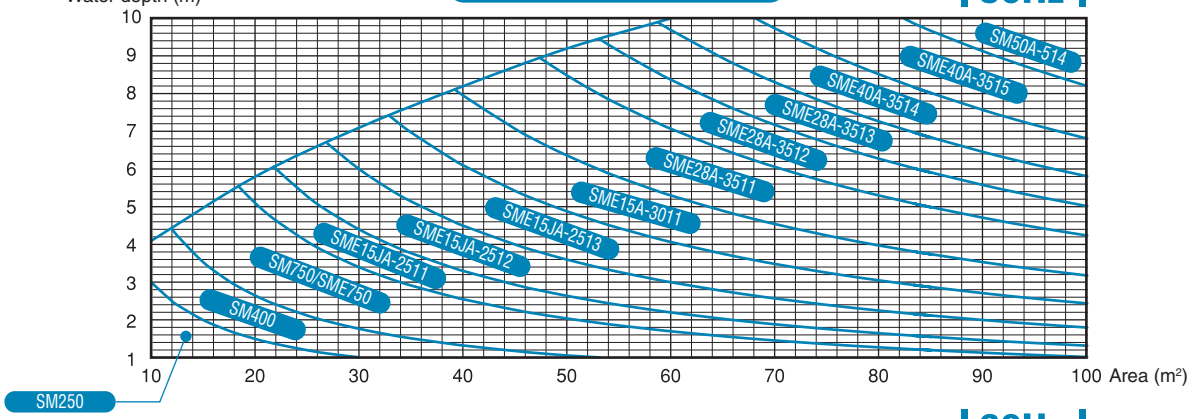
Specific gravity	1.05
Density	Less than 2%

∗Model selection is just for reference so that correct model shall be determined by formal calculation chart.

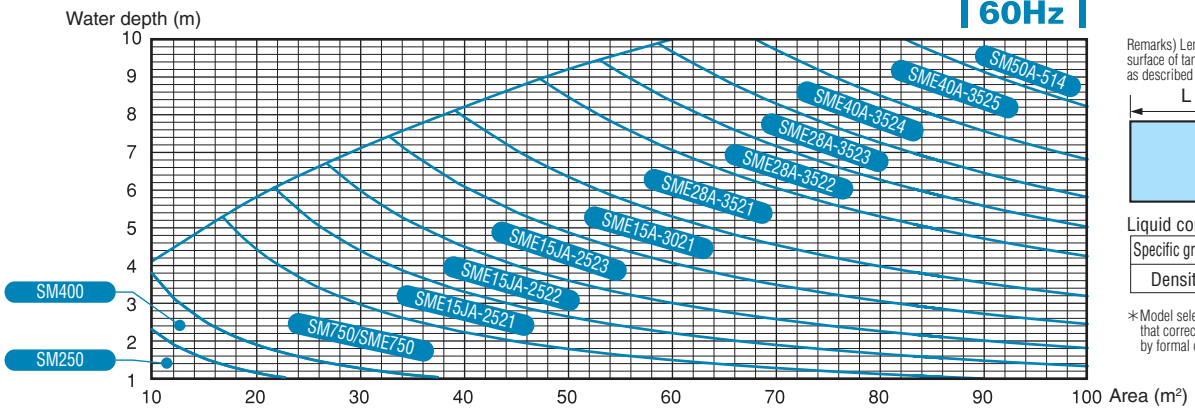
∗ For the SM-W, SME-W, SM-F and SME-R, please contact us separately.

For Equalization Tank

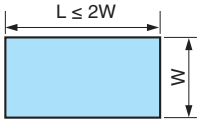
50Hz



60Hz



Remarks) Length/Width ratio of plain surface of tank shall be less than 2:1 as described below.



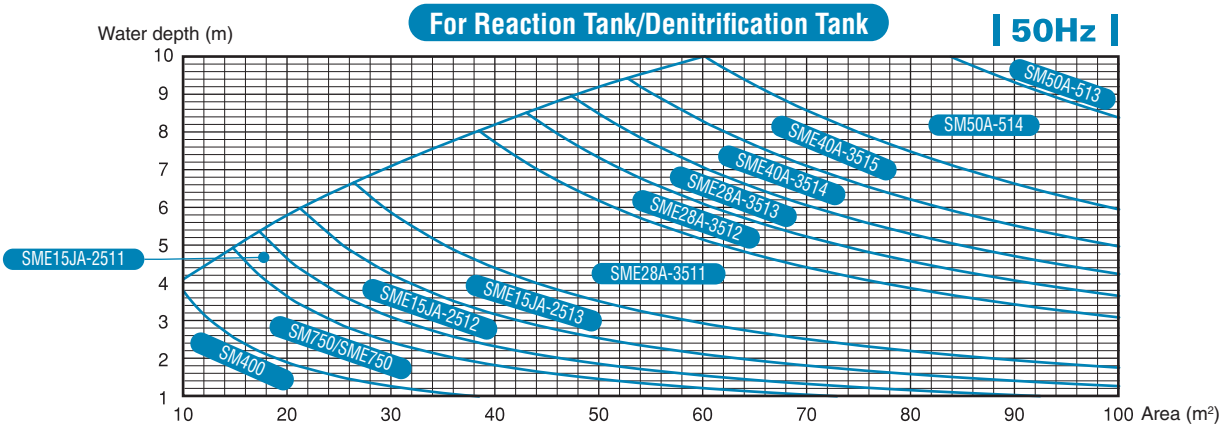
Liquid condition

Specific gravity	1.01
Density	0.1%

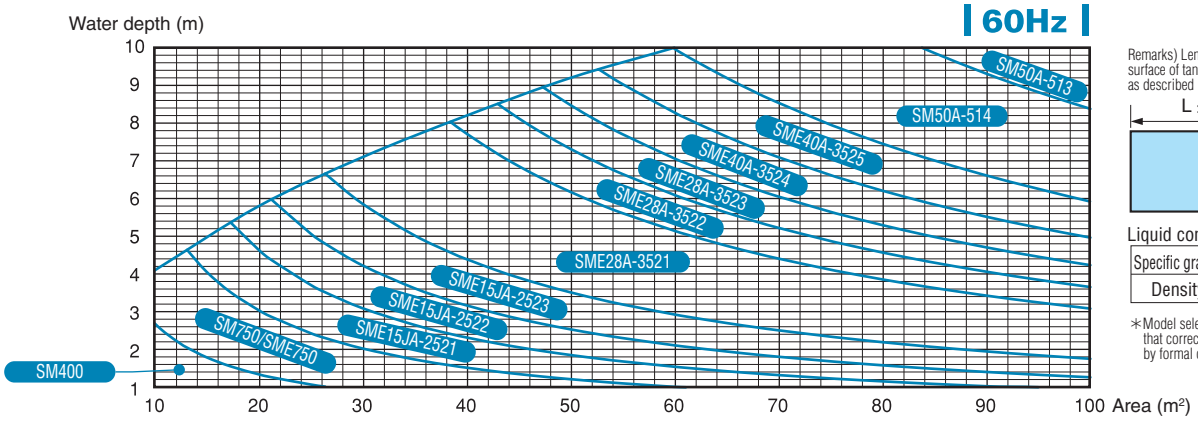
∗Model selection is just for reference so that correct model shall be determined by formal calculation chart.

For Reaction Tank/Denitrification Tank

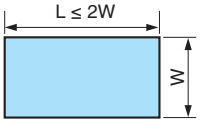
50Hz



60Hz



Remarks) Length/Width ratio of plain surface of tank shall be less than 2:1 as described below.

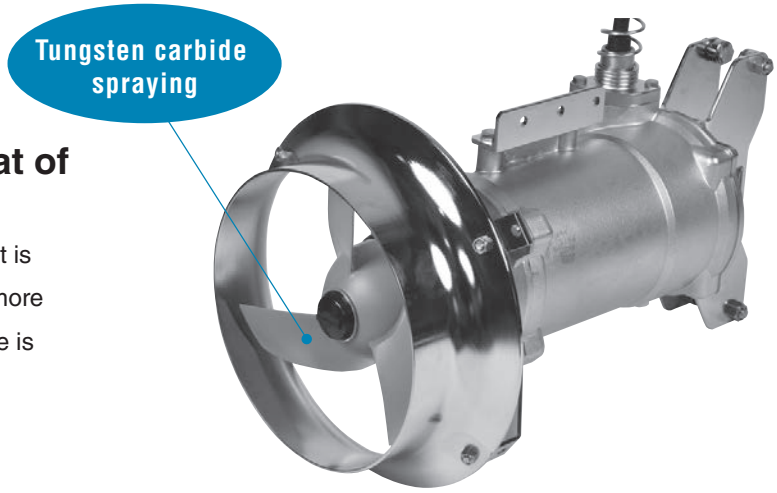


Liquid condition

Specific gravity	1.05
Density	0.5%

∗Model selection is just for reference so that correct model shall be determined by formal calculation chart.

Coating the 316 stainless steel casting propeller by spraying the tungsten carbide. While having excellent corrosion resistance of stainless steel, it greatly enhances abrasion resistance.



Propeller wear is less than half that of stainless steel casting.

"Tungsten carbide spraying" of the propeller's vane part is adopted. The Vickers hardness of tungsten carbide is more than 5 times that of stainless steel, and wear resistance is greatly improved.

Applications

Livestock manure treatment
Uniform agitation of livestock manure

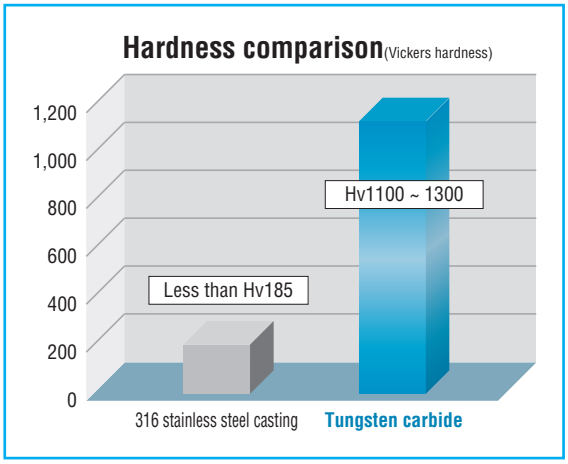
＊For use in other applications (such as factory drainage), please contact us.

Comparison of propeller wear
Operation with No. 5 silica sand 8% mixture

		
Model	SM	SME-W
Accumulated operation time	46 hours	90 hours
Propeller diameter change(mm)	254 → 200	254 → 254
Propeller weight change	-9%	-5%
Change of the thrust	-23%	-15%
Material of propeller	316 stainless steel	316 stainless steel casting with tungsten carbide splaying

• What is tungsten carbide?

Tungsten carbide has a Vickers hardness of at least 5 times that of stainless steel and is a stable material. It resists corrosion and exhibits stable characteristics even under harsh environments.



Standard Specifications

50Hz Specifications

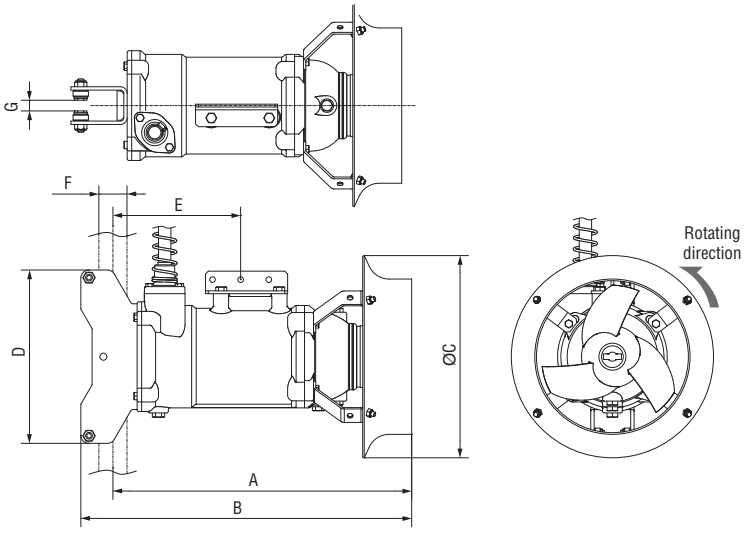
Model	Rated output (kW)	No. of poles	Rated voltage (V)	Rated current (A)	Propeller code	Propeller dia. (mm)	Power consumption at clear water mixing(kW)	Flow (m^3 / min)	Thrust (N)	Weight (kg)
SME15JAW·JBW	0.9	6	3-phase 200	7.8	W2511	254	0.8	5.6	175	52
	1.5			9.3	W2513		1.4	7.4	300	
SME22JAW·JBW	2.2	4		10.4	W2212	220	1.8	6.4	300	52
SME28AW·BW	2.8	8		15.8	W3511	350	1.6	13.0	490	75
SME40AW·BW	4.0	8		23.4	W3513		2.2	15.0	650	93
SM50AW·BW	5.0	10		25.8	W5212	525	3.8	30.6	1,200	145
SM75AW·BW	7.5	10		39.6	W5214		5.2	35.5	1,620	160

60 Hz Specifications

Model	Rated output (kW)	No. of poles	Rated voltage (V)	Rated current (A)	Propeller code	Propeller dia. (mm)	Power consumption at clear water mixing(kW)	Flow (m^3 / min)	Thrust (N)	Weight (kg)
SME15JAW·JBW	1.1	6	3-phase 200	6.3	W2521	254	0.7	5.6	175	52
	1.5			7.6	W2523		1.3	7.4	300	
SME22JAW·JBW	2.2	4		9.3	W2221	220	1.8	5.8	250	52
SME28AW·BW	2.8	8		14.5	W3521	350	1.7	13.0	490	75
SME40AW·BW	4.0	8		20.9	W3523		2.3	15.0	650	93
SM50AW·BW	5.0	12		29.9	W5222	525	3.8	30.6	1,200	145
SM75AW·BW	7.5	12		44.6	W5224		5.2	35.5	1,620	160

Dimensions

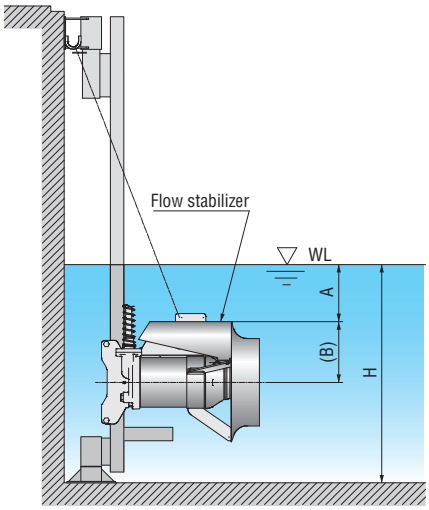
(Unit: mm)



Model	Dimensions						
	A	B	C	D	E	F	G
SME15JAW·JBW	531	588	360	308	234	50	19
SME22JAW·JBW							
SME28AW·BW	641	698	510		278		
SME40AW·BW	701	758			308		
SM50AW·BW	746	836	705	280	328	100	43
SM75AW·BW	798	888			350		

Operation Min. Level

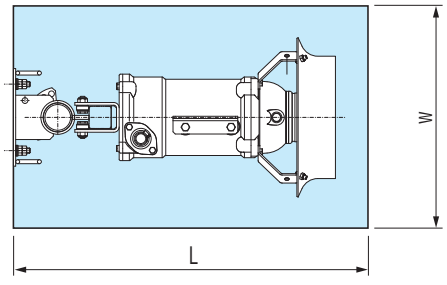
(Unit: mm)



Model	Flow stabilizer	H	A	B
SME15JAW·JBW	Without	1,100	700	180
	With	500	100	185
SM22JAW·JBW	Without	1,100	700	180
	With	500	100	185
SME28AW·BW	Without	1,500	900	220
	With	900	300	226
SME40AW·BW	Without	1,700	1,100	255
	With	1,000	400	261
SM50AW·BW	Without	1,700	800	353
	With	1,200	300	361
SM75AW·BW	Without	1,900	1,000	353
	With	1,200	300	361

Open Slot Dimensions

(Unit: mm)



Model	W	L
SME15JAW·JBW	500	800
SME22JAW·JBW		
SME28AW·BW	600	900
SME40AW·BW		1,000
SM50AW·BW	800	1,200
SM75AW·BW		

Aeration Mixer

SME-R Series

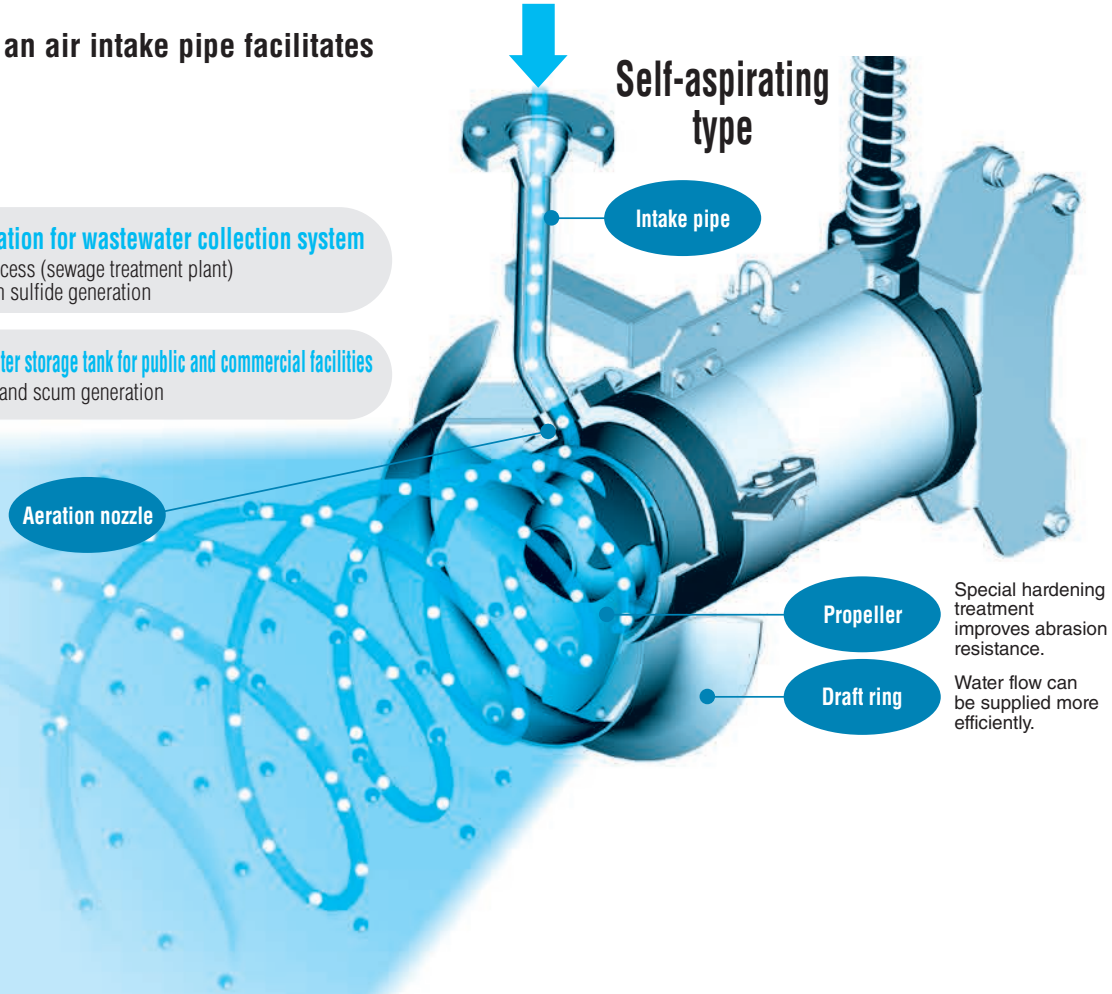
Suppresses odor generation at a low water level

The installation of an air intake pipe facilitates the air supply.

Applications

Mixing of the pump station for wastewater collection system
Load reduction in post-process (sewage treatment plant) and prevention of hydrogen sulfide generation

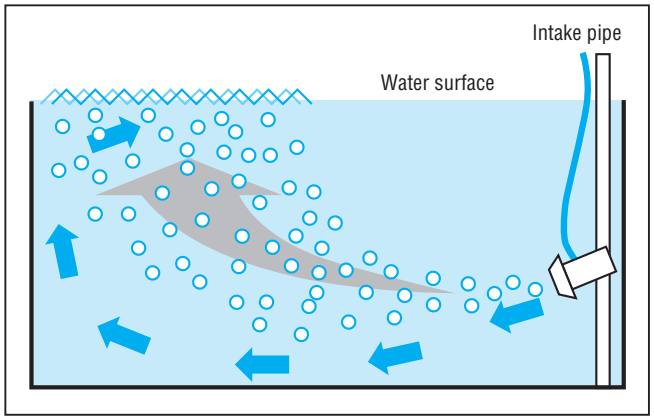
Mixing of temporary wastewater storage tank for public and commercial facilities
Preventing sludge deposit and scum generation



Features

- No blower is required as self-aspirating type
- Supplying oxygen simultaneously with mixing
  Submersible mixer is used as a base for supplying oxygen and simultaneously mixing.
- Anaerobic mixing is also available
  Throttling or stopping air also enables anaerobic mixing.
- Prevent clogging
  Use of sweepback blade propeller prevents foreign object clogging.

Conceptual Chart

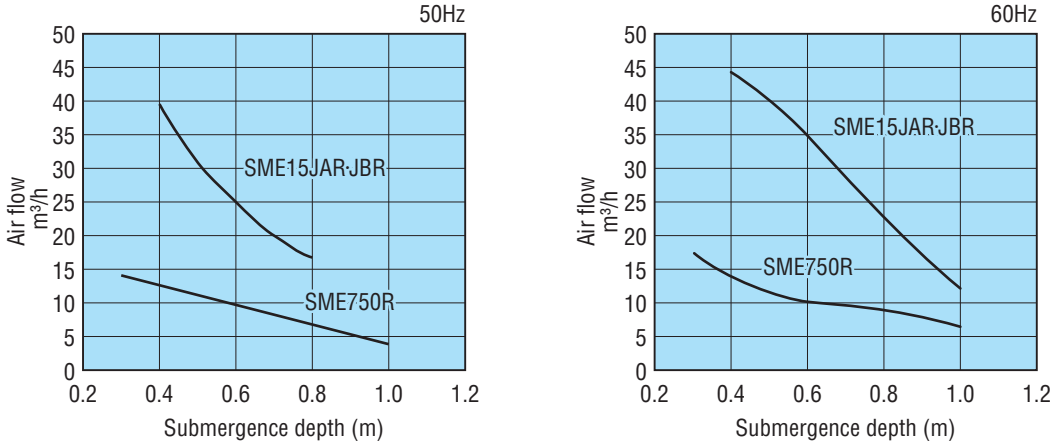


Standard Specifications

Model	Rated output (kW)	Frequency (Hz)	Rated current (A)	Synchronous rotation speed (min^{-1})	Propeller code	Air flow (Standard submergence depth*) (m^3 / h)	Min. / Max. submergence depth* for aspiration	Max. tank dimensions (W x L)	Weight (kg)
SME750R	0.75	50	4.4	1,500	—	13.8(0.3m)	0.1m / 1.0m	6m×6m ($36m^2$)	30
		60		1,800		17.4(0.3m)			
SME15JAR • JBR	1.5	50	9.3	1,000	130	39.5(0.4m)	0.1m / 0.8m	7m×7m ($49m^2$)	55
		60	8.0	1,200	131	44.3(0.4m)	0.1m / 1.0m		

∗ Submergence depth: Distance between water surface and top of draft ring of the mixer.

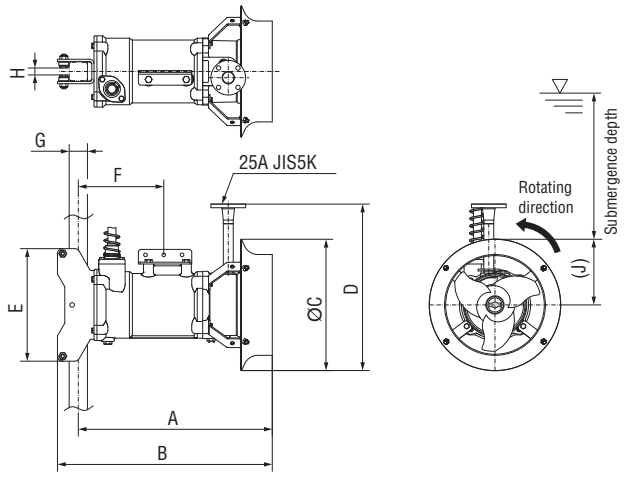
Performance Curve



∗ Air flow is the value obtained by multiplying the flow area in the intake pipe by the representative flow velocity.

Dimensions

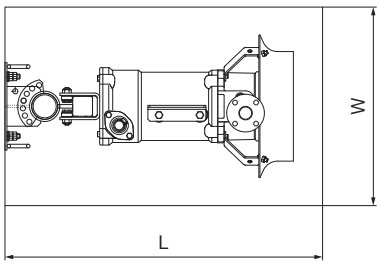
(Unit: mm)



Model	Dimensions								
	A	B	C	D	E	F	G	H	J
SME750R	464	498	241	349	180	224	50	25	109
SME15JAR • JBR	531	588	360	456	380	234		19	180

Open Slot Dimensions

(Unit: mm)



Model	L	W
SME750R	700	400
SME15JAR • JBR	800	500

Medium Speed Submersible Mixer

SMM Series

Energy consumption can be reduced to 1 / 2 to 1 / 3 from SM series high speed submersible mixer, when using in the reaction tank.

Features

Energy saving
Mixing of the reaction tank is realized with a slight power density of 2 to 4 W / m^3.
Energy consumption can be reduced to 1 / 2 to 1 / 3 compared to SM series high speed submersible mixers.

High maintainability
The maintenance cycle is twice as long as the SM series high speed submersible mixer. In addition, it can be easily pulled up with the portable hanger pipe, reducing maintenance costs.

Smooth mixing of biological flocs
A smooth propeller shape and low blade tip speed provide gentle mixing for biological flocs and so on.

Installation on the tank wall side
Unlike other mechanical mixing systems, there is no need for structures (installation structures or inspection walkways) at the center of the tank, so the installation to the existing tank can be reduced the construction period and cost.

Applications

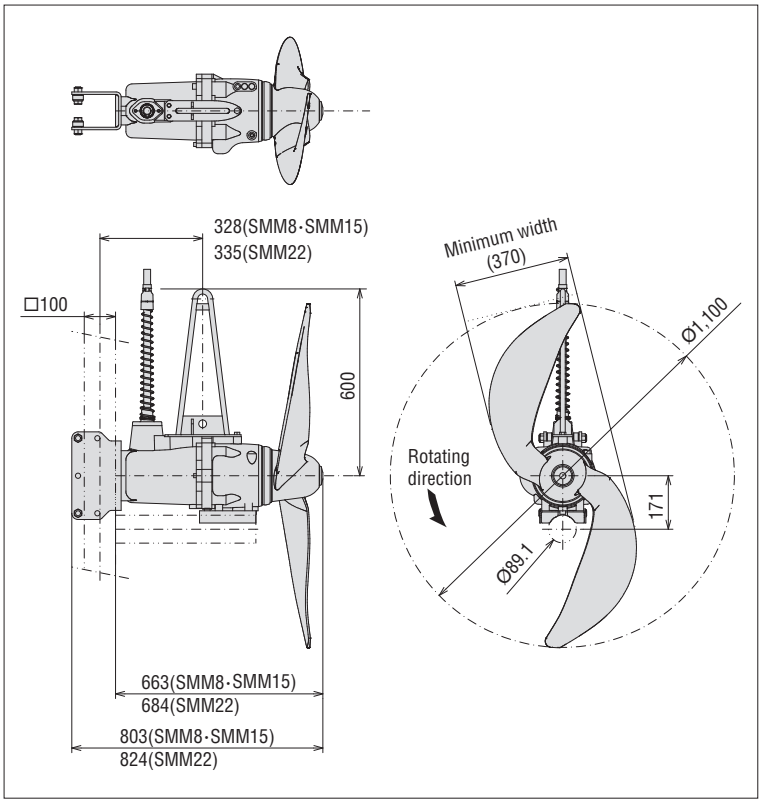
Energy save mixing in denitrification tank and reaction tank.

Standard Specifications

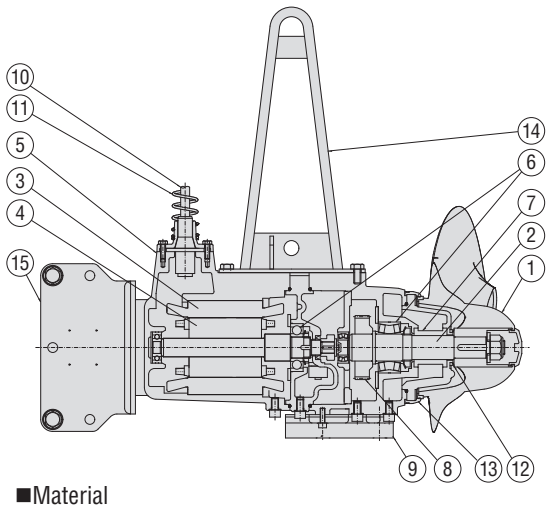
Model	Rated output (kW)	No. of poles	Rated current (A)		Simultaneous rotation speed (min^{-1})	Propeller code	Propeller diameter (mm)	Minimum width (mm)	Power for mixing clear water (kW)	Flow (mm)	Thrust (N)	Weight (kg)
			50Hz	60Hz								
SMM8	0.75	8	5.8	5.2	109	723	1,100	Approx. 370	0.7	109	600	Approx. 100
SMM15	1.5	6	7.8	7.4	137	722			1.4	137	1,000	
SMM22	2.2	4	9.9	9.4	156	721			2	156	1,300	

Dimensions

(Unit: mm)

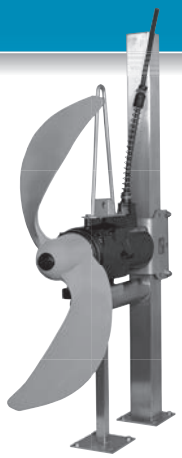


Sectional View



■Material

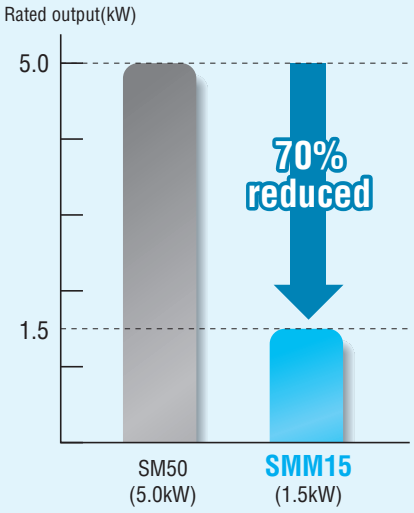
No.	Name	Material	No.	Name	Material
1	Propeller	Glass fiber reinforced plastic (GRP)	9	Buffer material	Ethylene propylene diene rubber (EPDM)
2	Shaft	316 stainless steel	10	Cable	EPR insulated PCP sheathed cable with fabric reinforcement
3	Stator	—	11	Support coil	304 stainless steel
4	Rotor	—	12	Oil seal	Acrylonitrile butadiene rubber (NBR)
5	Stator housing	Gray iron casting (FC200)	13	Shield ring	Chloroprene rubber (CR)
6	Bearing	—	14	Hanger bracket	304 stainless steel
7	Mechanical seal	—	15	Sliding bracket	304 stainless steel
8	Gear	Chromium molybdenum steel			



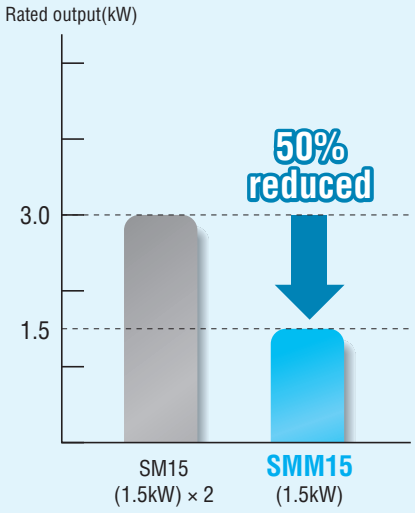
Energy save mixing

(Compare in the 11m x 6m x 6m (water height) reaction tank)

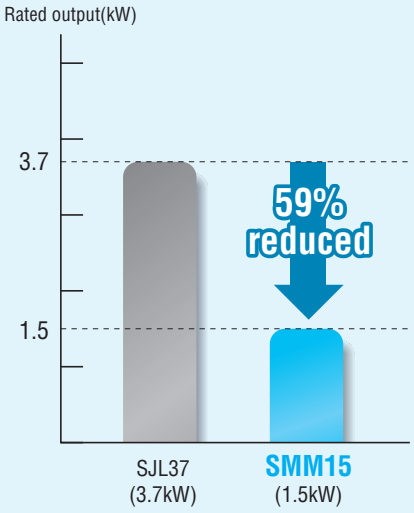
• Compare with same number of SM series high speed submersible mixer



• Compare with same power SM series high speed submersible mixers



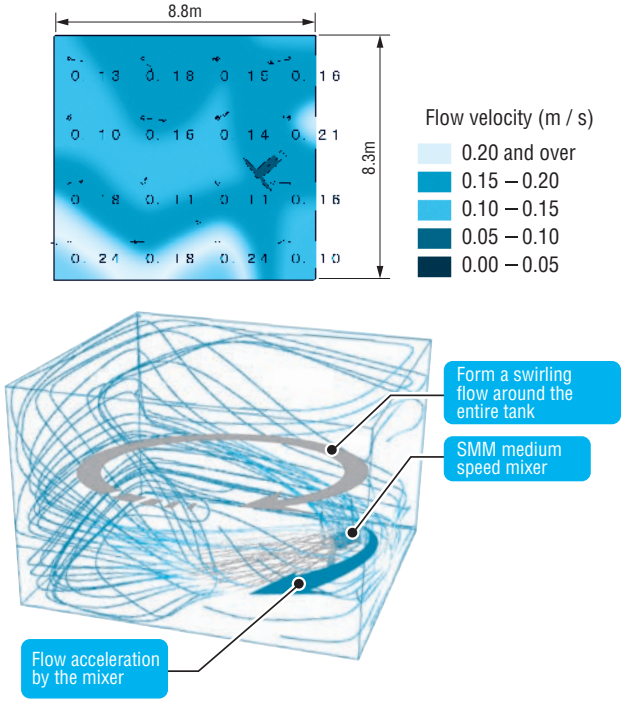
• Compare with same number of SJL series submersible aerator



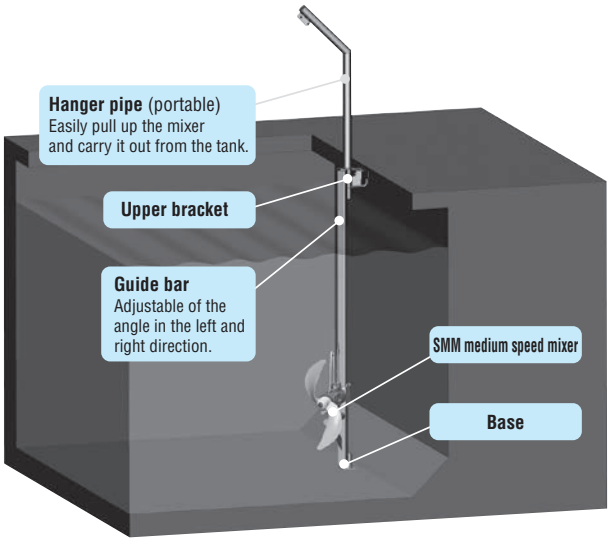
Flow velocity measurement at the bottom of reaction tank

(Tank capacity: 430m³ Power consumption: 630W)

• Bottom velocity of 0.1 m / s achieved with a power density of 1.5 W / m³

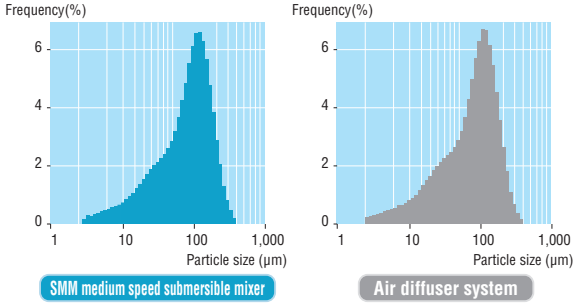


The strong water flow of the medium speed mixer gradually accelerates the sewage in the tank to create a swirling flow, achieving agitation of the reaction tank with a small power density.



Distribution of biological floc particle size in reaction tank

• The particle size distribution of the biological floc is equal to air diffuser system



Low Speed Submersible Mixer

SML Series

Generate a huge water flow using minimal energy.

Features

Strong water flow

Using CFD / CAE analysis, adopt the high-performance propeller that enables both mixing performance and strength. In addition, a structure with a sweepback angle will prevent foreign matters from tangling and provide superb durability.

Safety design

Leakage water chamber is standard on all models to prevent water penetration to the motor. In addition, a leakage detector (optional) prevents insulation deterioration due to leakage water. In addition, adopt the cable with fiber reinforcement, core wire seal shut the water penetrating into the motor.

High maintainability

Under a hanging up condition, oil change for mechanical seal and reduction gear parts, and inspection of the immersion to the leakage water chamber are possible.

Superb reliability

Employs double mechanical seal with silicon carbide (SiC) seal faces that is proven for submersible pumps. Secured the reliability that can withstand the long-time continuous operation required for the submersible mixer. In addition, the propeller shaft is made of corrosion resistant 316 stainless steel. It exhibits reliability in a wide range of environments.

Long service life

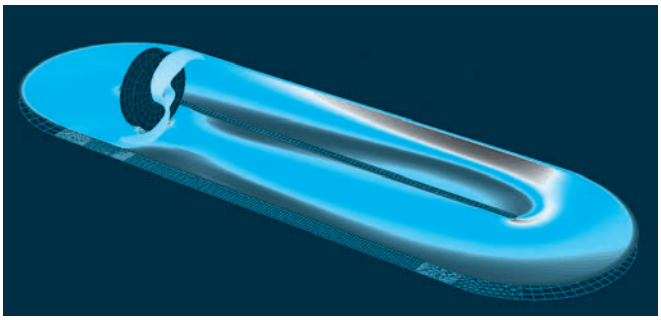
Adopt the multi-pole motor with slow rotating speed reduces the load on the reduction gear, which realizes long service life.

Wider scope of application

The high-temperature resistant motor, which reduces temperature rise, is employed to endure liquid temperature up to 40˚C.
Liquid contact part is fully made of stainless steel for applications in wider environment such as seawater.

Applications

- Generating circulating water flow for Oxidation Ditch (OD) tank
- Generation or circulation of water flow for dam and lake / bog



Computational fluid dynamics of oxidation-ditch tank

Specifications of Handling Liquid

Kind of liquid	Various types of wastewater
Specific gravity	1.03 or less
Viscosity	1,000mPa • s or less
Temperature	0°C - 40°C
Chlorine iron	1,000mg / ℓ or less
Sludge concentration	5% or less
Water depth	10m or less
pH	6 - 9

• Applicable ranges of specific gravity and viscosity differ depending on the model.
• Depending on the liquid type, it is possible to cope with those beyond the above range, please contact us.

Cable Specifications

Model	Type	Section Area (mm^2)	No. of cores	Application	Length (m)	Outer dia. (mm)
SML15 SML22	EPR insulated PCP sheathed cable with fiber reinforcement	2.0 2.0 2.0	4 2 2	Power Control Spare	10	Ø18
SML37		3.5 2.0 2.0	4 2 2	Power Control Spare	10	Ø20

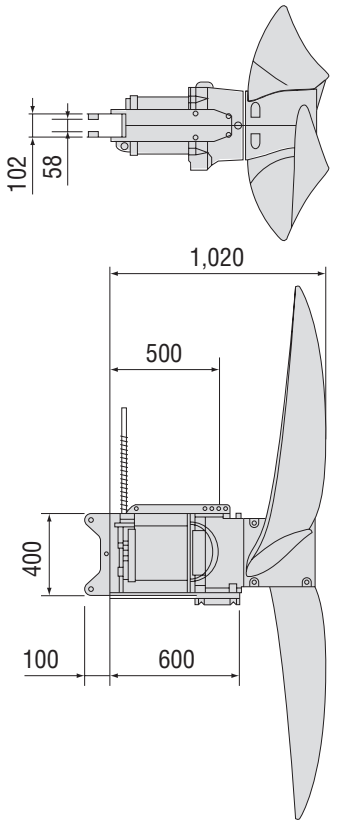
Standard Specifications

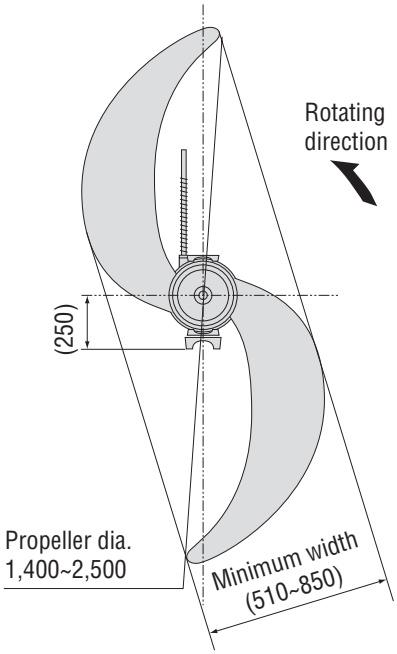
Model	Rated output (kW)	No..of poles		Rated current (A)		Synchronous rotation speed (min^{-1})	Propeller code	Propeller dia. (mm)	Minimum wodth (mm)	Power for mixing clear water (kW)	Flow (m^3 / min)	Thrust (N)	Weight (kg)
		50Hz	60Hz	50Hz	60Hz								
SML15	1.5	10	12	8.8	9.7	39	∗1020	1,400	510	1.5	70	900	225
						38	1021			1.3	68	850	
						36	1022			1.2	66	800	
						35	1023			1.1	63	700	
						33	1120	1,600	555	1.4	85	1,000	
						32	1121			1.2	82	900	
						31	1122			1.1	79	800	
						31	∗1220	1,800	605	1.5	103	1,200	
						30	1221			1.3	99	1,100	
						28	1222			1.1	95	1,000	
						27	1223			1	91	900	
						27	∗1320	2,200	750	1.4	143	1,500	
						27	1321			1.4	140	1,400	
						25	1322			1.2	134	1,300	
						27	∗1420	2,500	850	1.5	180	1,800	
						25	1421			1.4	174	1,700	
SML22	2.2	10	12	13.5	14.7	45	∗2020	1,400	510	2.2	80	1,200	225
						43	2021			2	77	1,100	
						42	2022			1.8	75	1,050	
						40	2023			1.6	73	1,000	
						39	2024			1.5	70	900	
						39	∗2120	1,600	555	2.2	99	1,400	
						38	2121			2	96	1,300	
						36	2122			1.8	93	1,200	
						35	2123			1.6	90	1,100	
						35	∗2220	1,800	605	2.2	117	1,500	
						33	2221			1.9	111	1,400	
						32	2222			1.7	107	1,300	
						31	2223			1.5	103	1,200	
						32	∗2320	2,200	750	2.1	168	2,100	
						31	2321			1.9	162	1,900	
						30	2322			1.8	156	1,800	
						28	2323			1.6	149	1,600	
						28	2324			1.6	143	1,500	
						31	∗2420	2,500	850	2.1	201	2,300	
						30	2421			1.9	195	2,100	
						28	2422			1.7	189	2,000	
						28	2423			1.7	183	1,900	
						28	2424			1.7	180	1,800	
SML37	3.7	10	12	21.2	25.5	50	3020	1,400	510	3.2	91	1,600	235
						49	3021			3	89	1,500	
						47	3022			2.6	86	1,400	
						46	3023			2.3	82	1,300	
						45	3024			2.2	80	1,200	
						46	∗3120	1,600	555	3.5	116	1,900	
						45	3121			3.2	114	1,800	
						43	3122			2.9	109	1,700	
						41	3123			2.5	104	1,600	
						40	3124			2.3	102	1,500	
						38	3125			2	97	1,400	
						41	∗3220	1,800	605	3.5	137	2,100	
						40	3221			3.2	133	2,000	
						38	3222			2.8	128	1,800	
						37	3223			2.5	122	1,700	
						36	3224			2.4	120	1,600	
						34	3225			2	113	1,500	
						40	∗3320	2,200	750	3.6	210	3,200	
						38	3321			3.2	201	3,000	
						37	3322			2.9	192	2,700	
						36	3323			2.8	190	2,600	
						34	3324			2.4	179	2,300	
						38	∗3420	2,500	850	3.5	237	3,200	
						37	3421			3.2	229	3,000	
						36	3422			3.1	226	2,900	
						34	3423			2.7	216	2,700	

- Propeller code marked with ∗ cannot be used in the liquid that contains a large amount of foreign objects or has a large specific gravity (1.03 or higher).
- The flow is a calculated value and may change depending on the tank shape.

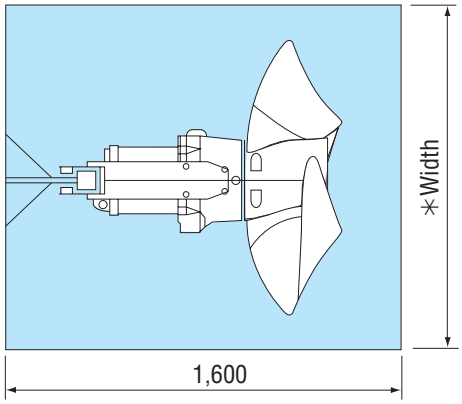
Dimensions

(Unit: mm)





■Open Slot Dimensions

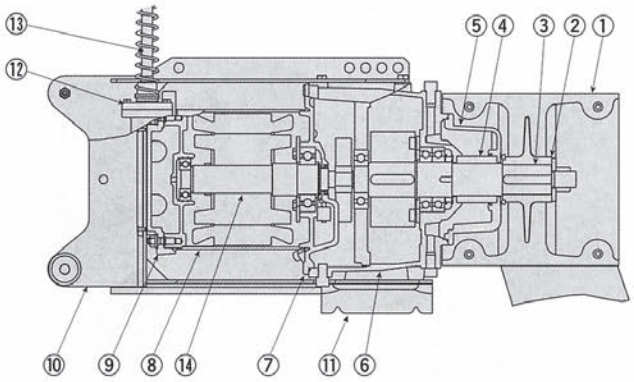


∗Width Dimensions

Propeller dia. (mm)	Minimum width (mm)	Recommended width (mm)
1,400	900	1,800
1,600	950	2,000
1,800	1,000	2,200
2,200	1,100	2,600
2,500	1,200	2,900

∗ At the minimum width, the propeller must be positioned vertically during installation and removal. As far as possible, examine your plan under the recommended width.

Sectional View



■Material

No.	Name	Material	No.	Name	Material
1	Propeller	Glass fiber reinforced plastic (GRP)	8	Stator housing	316 stainless steel
2	Propeller boss	316 stainless steel casting	9	Motor cover	Gray iron casting (FC200)
3	Propeller shaft	316 stainless steel	10	Guide	316 stainless steel
4	Mechanical seal	—	11	Buffer material	Ethylene propylene diene rubber (EPDM)
5	Mechanical seal bracket	Gray iron casting (FC200)	12	Cable entry	Gray iron casting (FC200)
6	Oil housing	Gray iron casting (FC200)	13	Cable	EPR insulated PCP sheathed cable with fabric reinforcement
7	Bearing housing	Gray iron casting (FC200)	14	Motor shaft	Carbon steel

Propeller Selection Table (propeller code)

Thrust (N)	Propeller outer diameter (m)				
	1.4	1.6	1.8	2.2	2.5
700	1023				
800	1022	1122			
850	1021				
900	∗1020 / 2024	1021	1223		
1,000	2023	1120	1222		
1,100	2021	2123	1221		
1,200	∗2020 / 3024	2121	∗1220 / 2223		
1,300	3023	2122	2222	1322	
1,400	3022	∗2120 / 3125	2221	1321	
1,500	3021	3124	∗2220 / 3225	∗1320 / 2324	
1,600	3020	3123	3224	2323	
1,700		3122	3223		1421
1,800		3121	3222	2322	∗1420 / 2424
1,900		∗3120		2321	2423
2,000			3221		2422
2,100			∗3220	∗2320	2421
2,300				3224	∗2420
2,600				3323	
2,700				3322	3423
2,900					3422
3,000				3321	3421
3,200				∗3320	∗3420

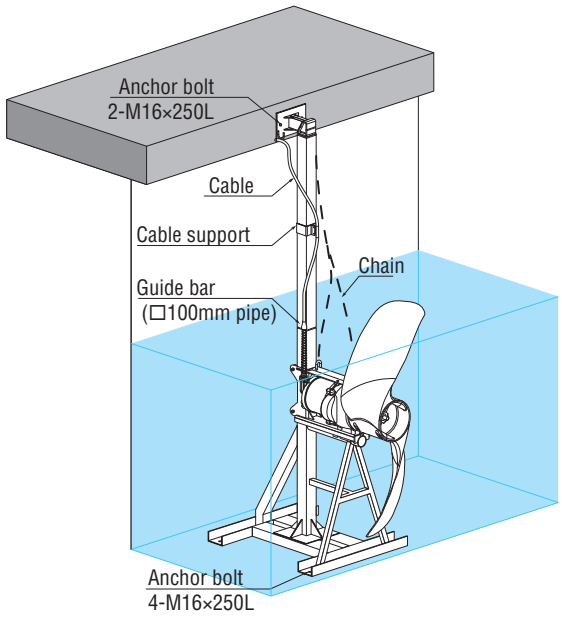
The numbers in the table, such as 1023 and 1022, indicate a propeller code.

SML15
SML15(clear water) / 22
SML22
SML22(clear water) / 37
SML37
SML37(clear water)

- To select the size of submersible mixer, calculate necessary thrust for your application and select the size which has greater thrust than calculated one. The required thrust varies depending on the shape and size of tank, and the water quality in each application, so there must have some know-how (experience and expertise) to make correct calculation of required thrust. Please contact to ShinMaywa for correct size selection.

Propeller code marked with ∗ cannot be used in the liquid that contains a large amount of foreign object or large specific gravity (1.03 or higher).

Installation Example



Various Cases

No Draft Ring

In order to improve the mixing effect of a submersible mixer, a draft ring is provided on the outer perimeter of a propeller. However, when used in a liquid with abundant foreign objects, including screen residues, overload due to trapping of foreign objects or entanglement to draft ring mounting stay may impair the mixing efficiency. In such an environment, a submersible mixer without a draft ring is useful.

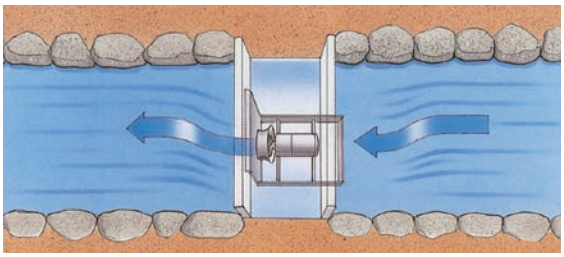
∗ This is not applicable to some specific propeller codes as removal of a draft ring increases shaft power. For details, please contact us.

Anti-corrosion Treatment

During treatment of garbage landfill leachate, corrosion problems may occur, even with a device made of 100% stainless steel. In such cases, the application of an anti-crevice corrosion sealant and mounting of a sacrificial anode (Zinc board) further increase corrosion resistance. In this example, epoxy resin is applied to an external surface to reduce the consumption of the sacrificial anode.

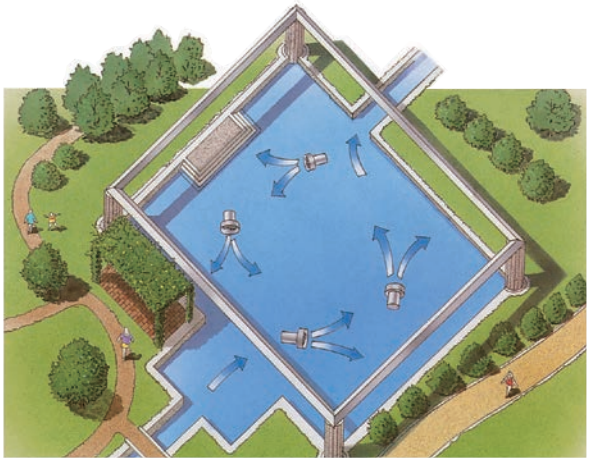
Channels and Shallow Rivers

In order to improve water quality in a channel or shallow river, creating a water flow in a certain direction using submersible mixers is effective. At a point where water is likely to stagnate, an appropriate number of submersible mixers are installed in the relevant positions to create an adequate water flow, thereby preventing water corrosion by the mixing effect.



Shallow Pond in a Park

To improve the water quality of small and very shallow water areas, like ornamental ponds in a park, a compact submersible mixer that can be installed at a water depth of 50 cm or more is effective. These mixers are installed at certain internal positions and in the same orientation to generate a water flow. By creating a state equivalent to that of a river with constant water flow, water corrosion and odor generation can be prevented, enhancing the park for users and nearby residents.



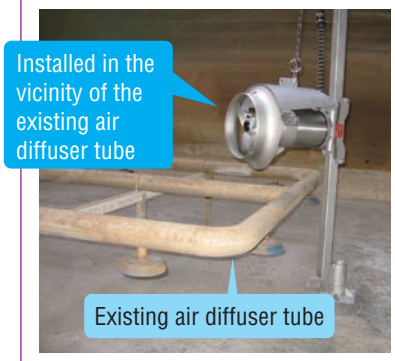
Supply Record 1 Energy savings achieved by replacing from the blower

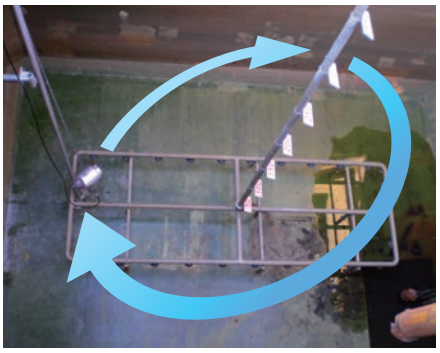
Customer's problem

The water level in the equalization tank was raised due to the increased amount of drainage water, which sometimes resulted in blower overload. At the same time, pH adjustment was also performed in this tank, but the adjustment occasionally failed, which precluded the stable operation of the treatment facility.

Proposal from ShinMaywa

We recommended to use submersible mixers instead of diffuser system, because its driving power is unaffected by changes in the water level and it can significantly reduce the output.





Before replacing	
Product in use	Blower
Rated output	15.0kW
Number of units	1

▼

Replacing to	
Product to use	Submersible mixer
Rated output	1.5kW
Number of units	2

Total output 15.0kW→3.0kW Cost reduction!

Effect

Various problems have been solved and energy savings have been achieved at the same time.

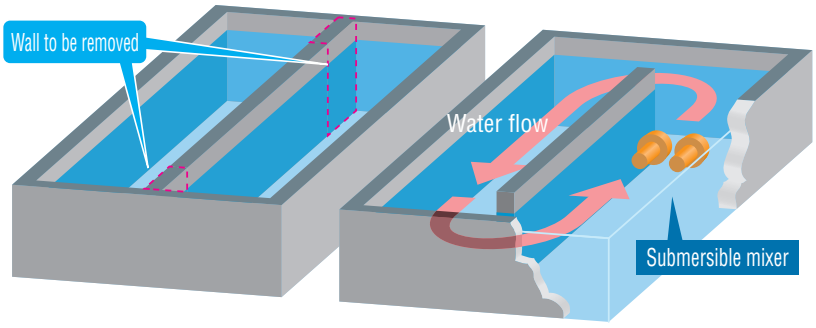
Supply Record 2 Uniform mixing in a tank achieved with creative thinking

Customer's problem

Mixing by air alone resulted in uneven water quality due to the elongated shape of the sewage water tank. This unevenness resulted in instability in the quantity of chemical agent added in the next process, which adversely affected treatment quality.

Proposal from ShinMaywa

We recommended that part of the wall between the two adjacent tanks be removed to change the shape of the water tank into that a looped style, and the installation of submersible mixers to create a large circulating flow.



■Mixers to be used

Model	SM15JA
Rated output	1.5 kW
Number of units	2
Purpose	Uniform mixing in the tank

Effect

This has almost eliminated changes in the quantity of chemical agent added in the next process, thereby stabilizing the water quality. Furthermore, this reduces the quantity of the chemical agent required.

DIAGONAL FLOW PUMP / AXIAL FLOW PUMP

SD / SA

It can be set up at minimal space within a short period with very little installation restriction.
It is also a very economical pumping station as water is suctioned from the lower part of the discharge pipe and up through it for draining.

FLOAT PUMP

FP

A floating scum pump to collect suspended solids on water surface.

SUBMERSIBLE EJECTOR

J / JA

Aeration with low initial and running costs can be realized.
"J"-type is applicable for 1 - 6 m depth and from 20m3 - 300m3 preliminary aeration tank.

SUBMERSIBLE AERATOR

SJ

Both mixing and aeration are available.
SJ type has a high oxygen transfer efficiency and easy maintenance due to direct drive motor system.
Strong downward flow provides efficient mixing.

AIR BLOWER

ARH-S / SE
ARH-SP

Helical rotor type air blower realized reducing noise dramatically.

LIGHTWEIGHT SUBMERSIBLE PUMP (Engineering Plastic Type)

CR / CRS / CRC

The"NORUS"series that is made of engineering
plastic and stainless steel is the submersible pumps
that feature durability, lightweight and excellent corrosion resistance.

PUMP-RELATED PRODUCTS

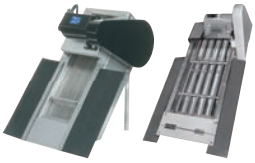
LC
Level regulator

MS
Mini switch

FV
Oval float

SCREEN

BS･VS
Automatic bar screen



SB / S
Wedge wire screen

Specifications and dimensions are subject to change without notice.

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ShinMaywa ONO PLANT
ISO 9001(No.956445)/ISO 14001(No.771888)

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