

SERIES
TRN/BER
PLS with Aeration Kit

SUBMERSIBLE AERATORS



Submersible Self-aspirating Aerators

Tsurumi's submersible aerators are used at wastewater treatment facilities to aerate and agitate industrial wastewater, livestock wastewater and other water that needs treating. More specifically, they provide the primary aeration in reactor tanks and aeration tanks at the heart of the water treatment process, and aeration and agitation in flow regulating tanks. These aerators produce tiny bubbles in the wastewater by furiously mixing in air they draw from above the wastewater's surface, and discharge the aerated wastewater to the outside. The mixed flow of air and water contains a high amount of dissolved oxygen and makes aeration and agitation very efficient.

Tsurumi offers two kinds of aerators in three series. The TRN-series features Tsurumi's baseline submersible aerators that produce a high amount of dissolved oxygen and enable efficient aeration and agitation, while the BER-series and the PLS-series with aeration kit are submersible jet aerators that generate a powerful unidirectional flow. All three series are built to draw air themselves while submerged in wastewater, so they can aerate and agitate wastewater without requiring a blower, which greatly reduces both installation space and noise.



TRN



BER



PLS with Aeration Kit

The TRN-series is built to draw air on its own by generating negative pressure behind a special semi-open impeller with the flow the impeller creates. The air drawn from above the wastewater's surface is furiously mixed in with the wastewater under the mechanical force of the impeller and guide vanes, to form tiny bubbles. The aerated flow is equally discharged in all directions and the synergistic effect of the airlift and convection that this mechanism causes produces a high amount of dissolved oxygen and enables efficient aeration and agitation.

The BER and PLS (with aeration kit) series combine a submersible pump and venturi-jet based diffuser. They draw in air from above the wastewater by generating negative pressure around the nozzle with the flow from the pump. The air is mixed into the wastewater by this jet injector mechanism and sprayed underwater by the diffuser, to aerate and agitate the wastewater at the same time. In the process, tiny bubbles form inside the diffuser and increase the amount of dissolved oxygen in the wastewater. The powerful unidirectional jet that results can efficiently agitate long narrow tanks, as well as wider areas when multiple units are used.

Despite their simple structures, Tsurumi submersible aerators are packed with original technologies that have been tested and proven over many years of R&D and market use, such as an anti-wicking cable, dual inside mechanical seals with silicon carbide faces and Oil Lifter. Moreover, they are designed and built for the degree of reliability and durability required for 24 hour-a-day continuous operation. Plus, when it is time for maintenance, it suffices to raise just the pump from the tank; the tank does not need to be drained as is the case of a plate/tube diffuser, so these aerators are economically beneficial in terms of running costs.



TRN: Submersible aerators that generate tiny bubbles to produce a high amount of dissolved oxygen and enable efficient aeration and agitation

BER: Submersible jet aerators optimized for pre-aeration and prevention of bacterial spoilage

PLS with Aeration Kit: Lightweight, compact resin-made submersible jet aerators for shallow water application

Selection Table

		Submersible Aerators	Submersible Jet Aerators	
		TRN	BER	PLS with Aeration Kit
Air-inlet Bore	mm	32 - 150	25 - 50	25
Motor Output	kW	0.75 - 40	0.75 - 5.5	0.15 - 0.75
Pole		2 • 4	2 • 4	2
Impeller	m	Special Semi-open	Channel	Vortex
Max. Water Depth		3.5 - 6.0 (Capable of deeper water tank in combination with a blower)	3.5 - 6.0	1.2
No. of Outlets		6 • 8 (Multiple Directions)	1 (One Direction)	
Guide Rail Fitting System			●	
Features		<ul style="list-style-type: none">• Built with a special semi-open impeller to draw in air on its own. Can aerate and agitate wastewater without requiring a blower. (Not capable of anaerobic agitation.)• Discharges mixed flow of air and water radially in multiple directions and generates a powerful agitational force from the synergetic action of the airlift and convective flow.• Obtains a high level of dissolved oxygen by furiously mixing air and water with the impeller and guide vanes to form tiny bubbles.• Capable of deep-water aeration in combination with a general-purpose blower. Does not require a high-pressure blower.	<ul style="list-style-type: none">• Simple structure consisting of a submersible pump and venturi-jet based diffuser. Can aerate and agitate wastewater without requiring a blower. (Capable of anaerobic agitation.)• Powerfully ejects a mixed flow of air and water in one direction.• Obtains a high level of dissolved oxygen because tiny bubbles slowly rise as the air and water mix.• The pump can be easily lowered and hoisted using guide rail fitting system, so maintenance and inspection can be performed without entering the sump.	<ul style="list-style-type: none">• Simple structure consisting of a submersible pump and aeration kit. Can aerate and agitate wastewater without requiring a blower. (Capable of anaerobic agitation.)• Powerfully ejects a mixed flow of air and water in one direction.• Made of special resin and stainless steel, thus tough against corrosion.• Lightweight and compact, thus easy to install and maintain.• Uses fish-friendly liquid paraffin as lubricating oil, so it can be safely used for fish farms and water features.• Can be used in water as shallow as 310 mm.
Applications		<ul style="list-style-type: none">• Aeration, pre-aeration and mixing at wastewater treatment plant• Oxygen supply at aquariums and fish farms (Requires lubricant change to liquid paraffin.)	<ul style="list-style-type: none">• Pre-aeration and mixing at wastewater treatment plant• Oxygen supply at aquariums and fish farms (Requires lubricant change to liquid paraffin.)	<ul style="list-style-type: none">• Pre-aeration and mixing at septic tank/Johkasou• Oxygen supply at water features and fish pond
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Guide Rail Fitting System (BER-series only)

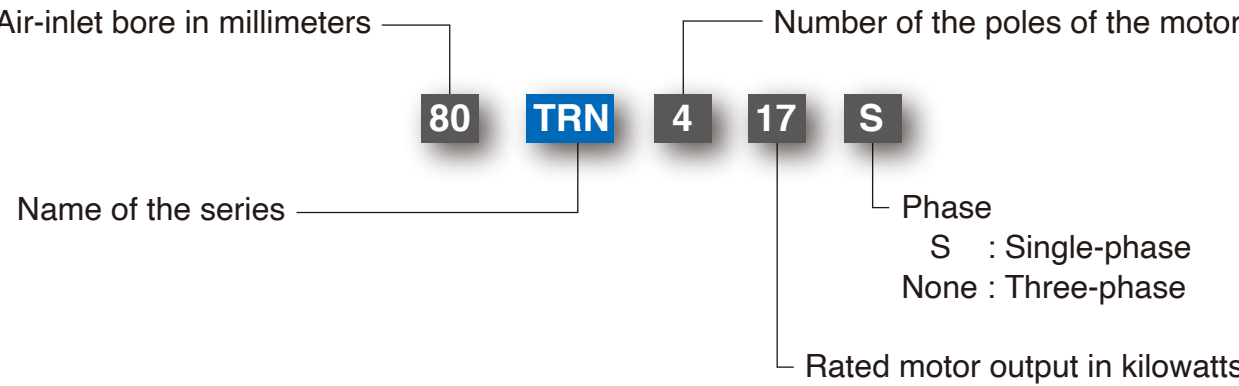
The guide rail fitting system connects the pump to and from the piping easily just by lowering and hoisting the pump, allowing easy maintenance and inspection without the need to enter the sump.

- Accessories
- Silencer & Valve Set
 - Lifting Chain 5m (with Shackles)
 - Guide Support
 - Guide Hook
 - Suction Casing
 - Threaded Oval Flange
 - Diffuser

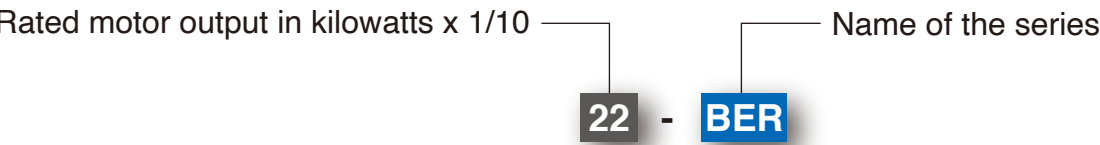


Model Number Designation

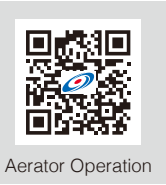
TRN / PLS (with Aeration Kit) series



BER series



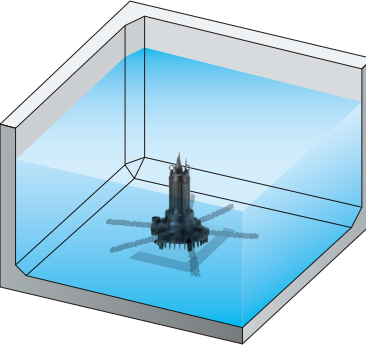
Mixed flow of air-water profile during operation



► Submersible Aerators: TRN series

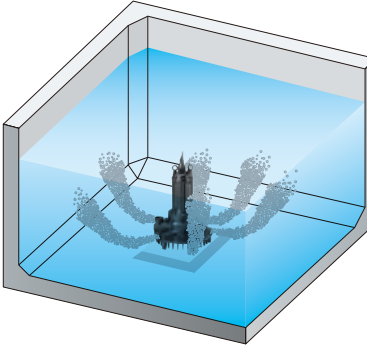
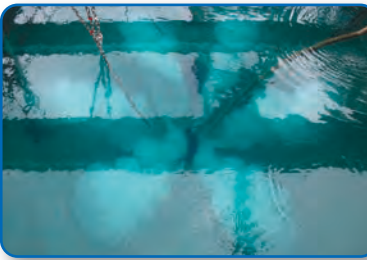
Start of operation

Mixed flow of air-water is discharged in multiple directions.



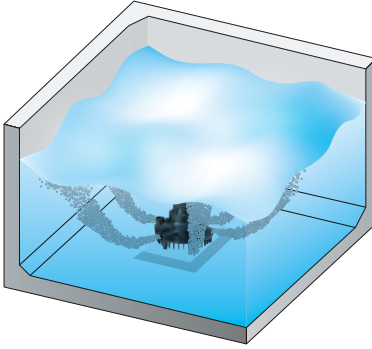
Rising by airlift

Tiny bubbles produce a high amount of dissolved oxygen.



Agitation by convection

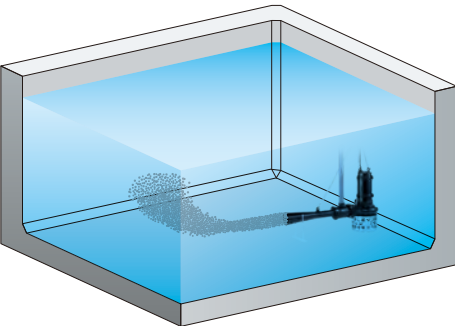
The rising bubbles enable efficient aeration and agitation.



► Submersible Jet Aerators: BER / PLS (with Aeration Kit) series

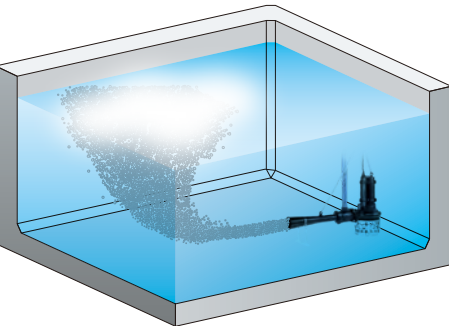
Rising by airlift

Mixed flow of air-water is jetted in one direction. Tiny bubbles produce a high amount of dissolved oxygen.



Agitation by convection

The rising bubbles enable efficient aeration and agitation.

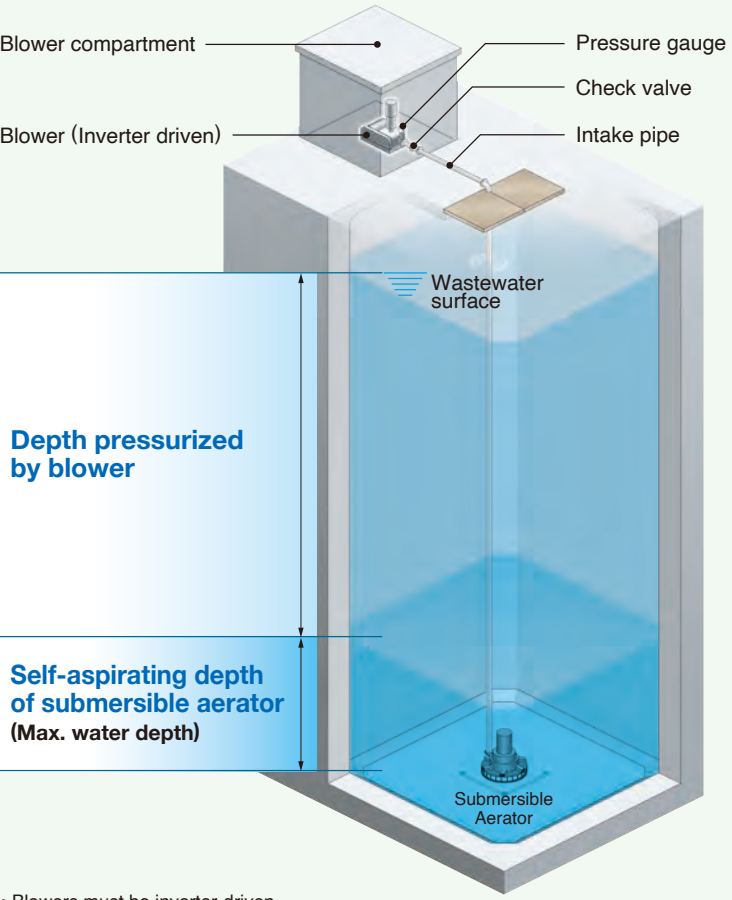


Special Offer for TRN series

How to aerate in tank deeper than max. water depth

► In combination with a blower
(Example of installation in a 10 m-deep tank)

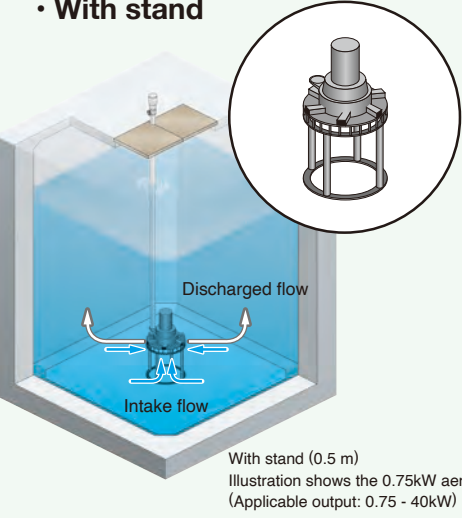
Applicable for deep tank aeration below max. water depth. Because it draws air on its own, the aerator works with a general-purpose blower instead of a high-pressure blower.



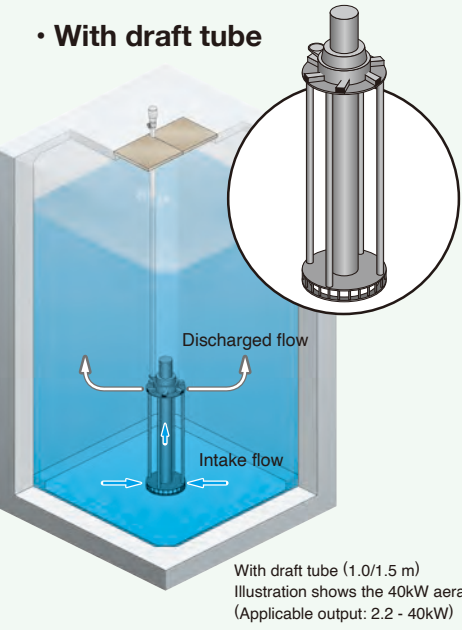
- Blowers must be inverter-driven.
- Provide 1 blower for each submersible aerator.

► Optional specifications

• With stand

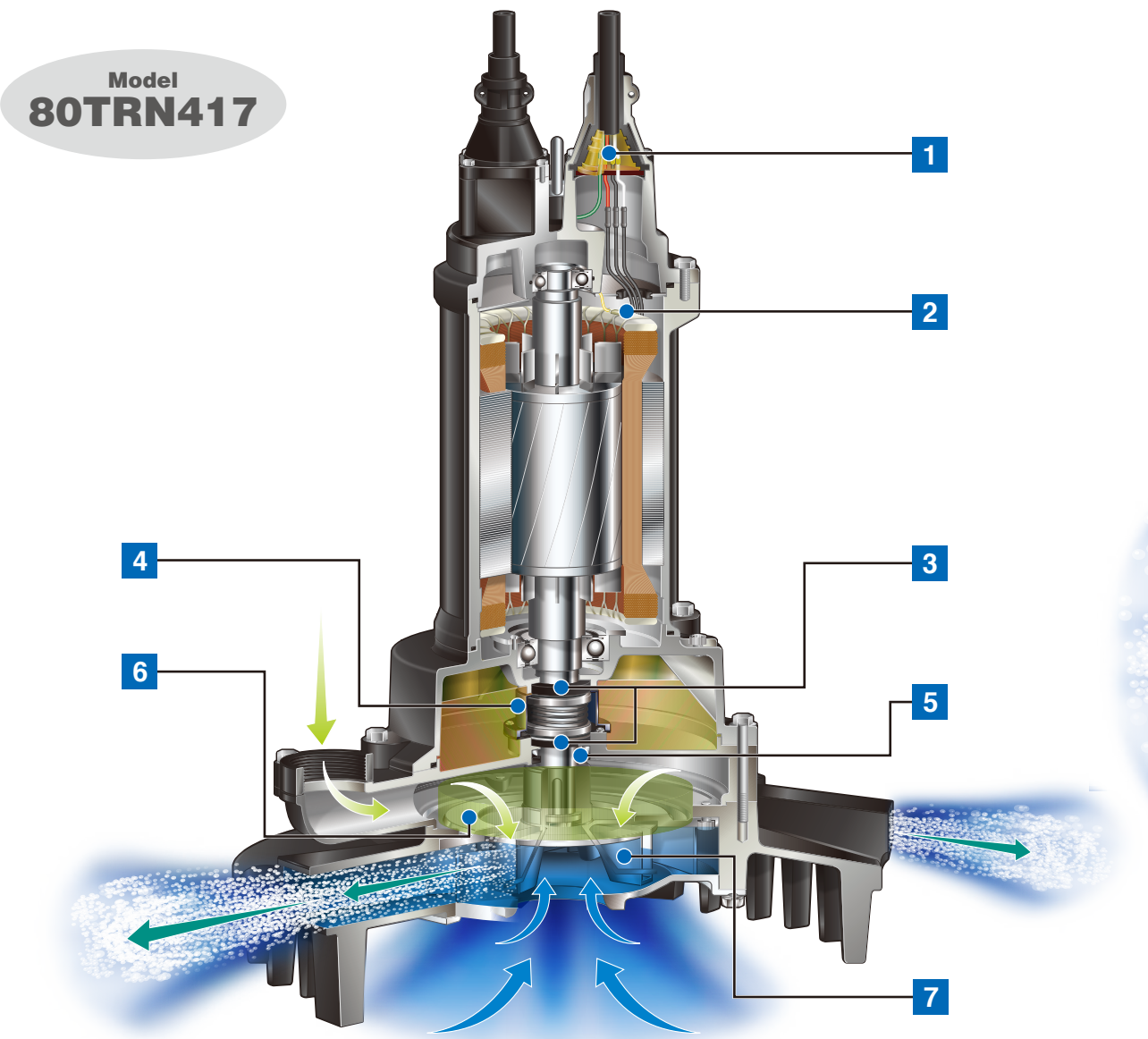


• With draft tube



Submersible Self-aspirating Aerators: TRN series

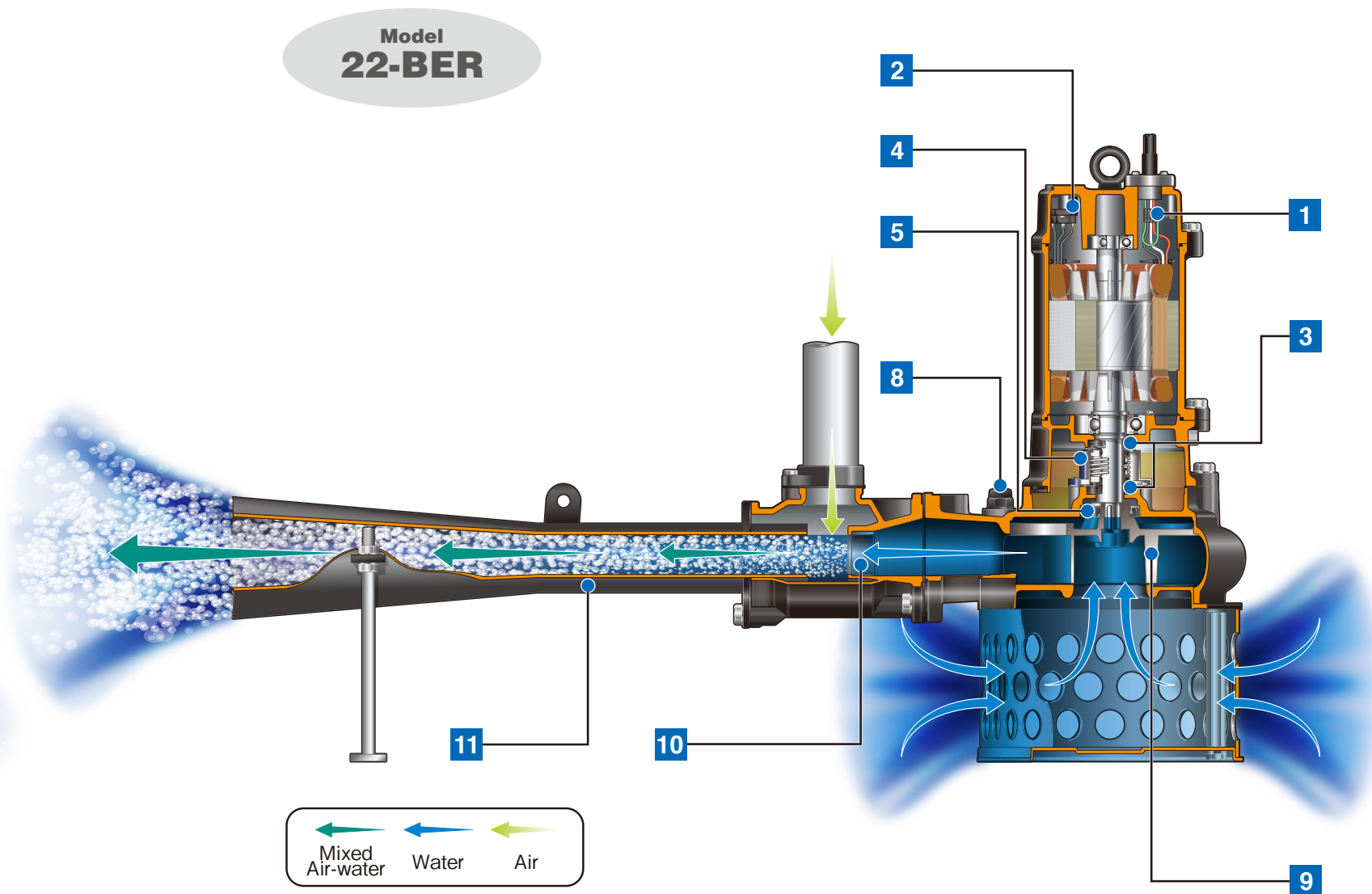
The aspirated air, mixed with water viciously by mechanical forces inside the impeller and guide vane, transforms into tiny bubbles. Moreover, the mixed flow of air and water is evenly discharged in multiple directions along the circumference.



- 1 Anti-wicking Cable Entry**
Prevents water incursion due to capillary action should the cable sheath be damaged or the end of cable submerged. Also prevents moist air from infiltrating the motor housing and condensation from forming inside the housing due to temperature differences between the housing and outside air.
- 2 Motor Protector**
Miniature Thermal Protector
Single-phase:
Detects excess heat, therefore, protecting the pump against overheating and dry-running.
Three-phase:
React to excessive heat caused by dry-running. The bimetal strip opens to cause the control panel to shut the power supply.
Circle Thermal Protector
Directly cuts the motor circuit if excessive heat builds up or overcurrent occurs in the motor.
- 3 Dual Inside Mechanical Seals with Silicon Carbide Face**
Isolated in the oil chamber where a clean, non-corrosive and abrasion-free lubricating environment is maintained. Compared with the water-cooled outside mechanical seal, it reduces the risk of failure caused by dry-heating and adhering matter. The silicon carbide provides 5 times higher corrosion, wear and heat resistance than the tungsten carbide. Rubber parts are made of NBR or FPM (FKM) which provides higher resistance to heat and chemicals.
- 4 Oil Lifter**
Provides lubrication and cooling of the seal faces down to 1/3 of normal oil level, thus maintaining a stable shaft sealing effect and prolonging seal life longer. The Oil Lifter is Tsurumi original design.

Submersible Self-aspirating Jet Aerators: BER & PLS (with Aeration Kit) series

With the jet injector mechanism, the aspirated air mixes with water and is ejected through the diffuser, simultaneously agitating and aerating the ponded water. The mixed air-water is ejected powerfully in one direction, which effectively agitates the water across a wide area.



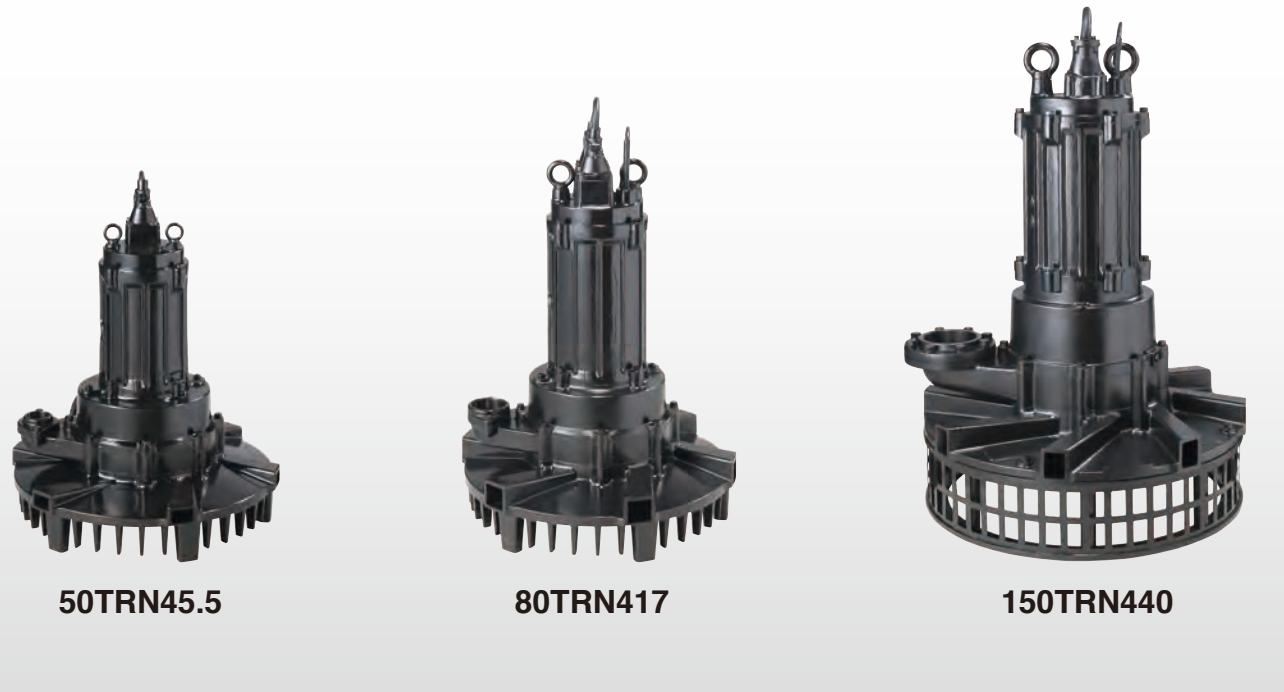
Mixed Flow of Air-water
Tiny bubbles are discharged in multiple/one direction, whereby creating convective currents that agitate the water. As the bubbles rise, a large amount of oxygen dissolves in the water.

- 5 Oil Seal (excluding PLS)**
Used as a "Dust Seal," it protects the mechanical seal from abrasive particles.
- 6 Air Seal Mechanism (TRN)**
Protects the mechanical seals by flooding the air passage with an "air seal" that prevents water from contacting the mechanical seals during operation. This proprietary technology helps to prolong the service-life of the mechanical seals.
- 7 Special Semi-open Impeller & Suction Cover (TRN)**
Generates a liquid flow that causes negative pressure to form on the backside of the impeller vanes and draw in air from above the water's surface. Both the impeller and suction cover are highly wear-resistant 410 stainless steel casting.
- 8 Air Release Valve (BER)**
Fitted on the pump casing to prevent the air lock. When air flows through the valve, the ball stays at the bottom, but when the pumped water starts to flow, the ball closes the outlet because of its buoyancy.
- 9 Semi-open Channel Impeller (BER)**
Vortex Impeller (PLS)
Minimizes the possibility of trouble due to clogging by solid matters.
- 10 Nozzle Ring (BER)**
Nozzle Flange (PLS)
Channels the water discharged from the pump into a jet, as part of the jet injector mechanism.
- 11 Diffuser (BER & PLS)**
Creates a mixed flow of air and water by injecting the aspirated air into the water.

TRN –Submersible Self-aspirating Aerators–

Submersible aerators that generate tiny bubbles to produce a high amount of dissolved oxygen and enable efficient aeration and agitation

The TRN-series is a submersible self-aspirating aerator designed for aeration and mixing of wastewater. The liquid flow generated by Tsurumi's special semi-open impeller causes negative pressure to form on the backside of the impeller vanes and draw in air from above the water's surface. The aspirated air, mixed with water viciously by mechanical forces inside the impeller and guide vane, transforms into tiny bubbles. Moreover, the mixed flow of air and water is evenly discharged in multiple directions along the circumference. The compounded action of the air lift and convective currents that are generated in the process makes aeration and agitation very efficient and increases the amount of oxygen dissolved in the water.



Model	Air-inlet Bore mm	Motor Output kW	Phase	Starting Method	Solids Passage mm	Max. Water Depth ^{*2} m	No. of Outlets	Dimensions L x H mm	Dry Weight ^{*3} kg	Cable Length m
32TRN2.75	32	0.75	Three	D. O. L.	10	3.5	6	420 x 473	55	6
32TRN21.5	32	1.5		D. O. L.	12	3.5	6	420 x 473	55	6
50TRN42.2	50	2.2		D. O. L.	12	3.6	6	700 x 689	140	6
50TRN43.7	50	3.7		D. O. L.	12	4	6	700 x 694	150	6
50TRN45.5	50	5.5		D. O. L. ^{*1}	15	4	6	700 x 835	150	8
80TRN47.5	80	7.5		D. O. L. ^{*1}	15	4.5	6	700 x 868	175	8
80TRN412	80	12		Star-Delta	15	6	6	700 x 898	192	8
80TRN417	80	17		Star-Delta	15	6	6	700 x 958	213	8
100TRN424	100	24		Star-Delta	22	6	8	1000 x 1225	435	10
150TRN440	150	40		Star-Delta	25	6	8	1050 x 1459	583	10

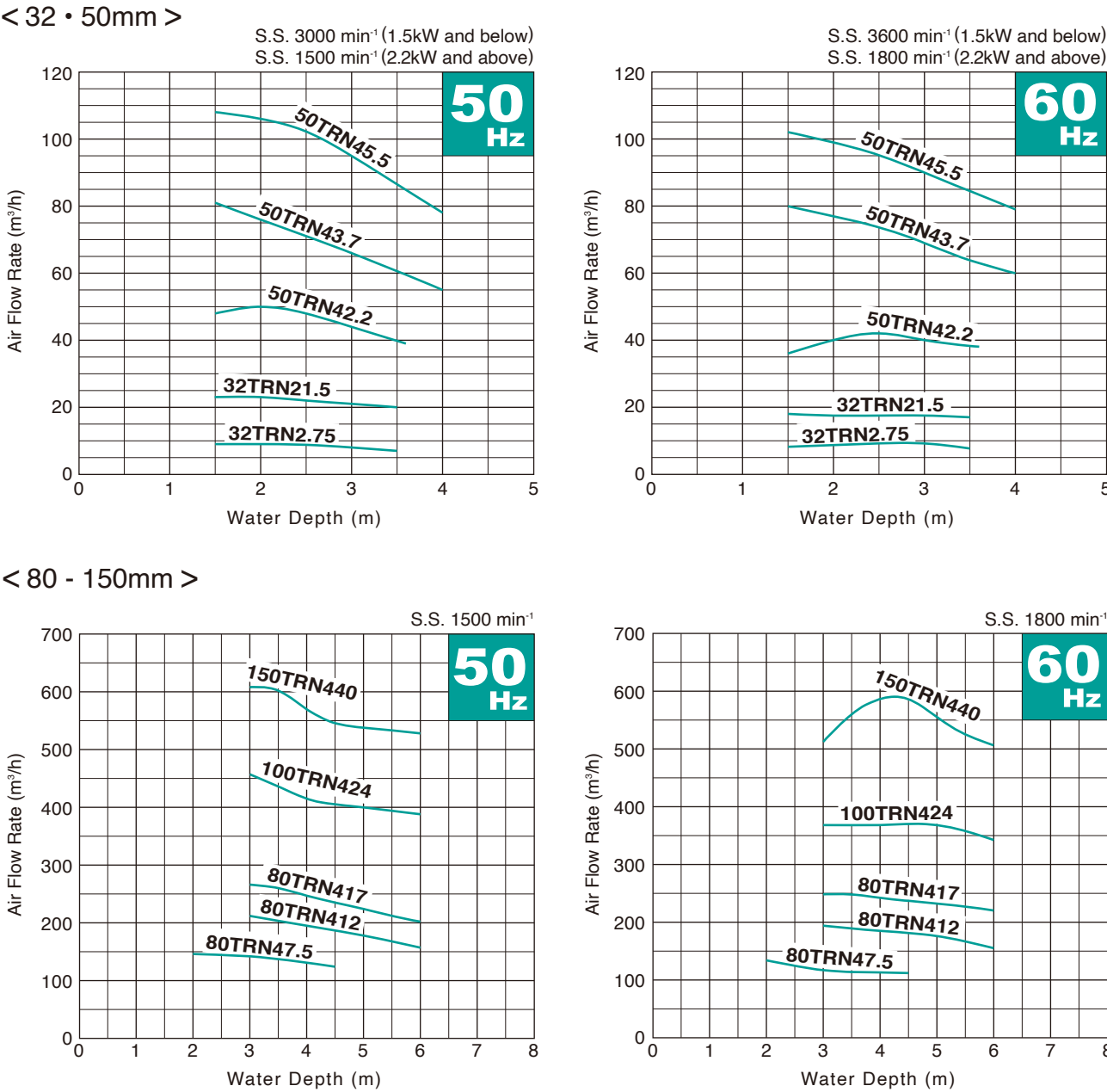
^{*1} Star-Delta available upon request
^{*2} Max. water depth is the load limit of the motor. The load placed on the motor increase the deeper the submersible aerator is installed, therefore if the aerator is operated below the max. water depth, the overload will trip the motor protection device and stop the aerator from running continuously.
^{*3} Weights excluding cable

Accessory

- Silencer & Valve Set

Air Flow Rate - Water Depth Curves

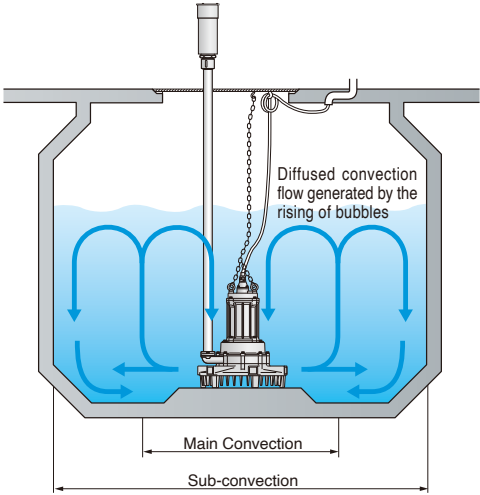
The air flow rates are expressed at the standard condition, i.e. temperature of 20°C, 1 atm and may vary by up to approximately 5%.



Convection Pattern & Recommended Tank Dimensions

Main Convection
Convection made by rising bubbles. (The minimum distance that must be provided between each aerator)

Sub-convection
The maximum convection that can keep solids sus-pended to prevent sedi-mentation of solids.



Model	Motor Output kW	Max. Water Depth m	Main Convection φm	Sub-convection	
				Circular Tank φm	Square Tank m
32TRN2.75	0.75	3.5	1.4	3.5	3
32TRN21.5	1.5	3.5	1.8	4.5	4
50TRN42.2	2.2	3.6	2.4	6	5.5
50TRN43.7	3.7	4	3	7	6.5
50TRN45.5	5.5	4	3.8	9	8
80TRN47.5	7.5	4.5	4.4	10	9
80TRN412	12	6	5.2	12	11
80TRN417	17	6	5.6	13	11.5
100TRN424	24	6	6.3	14.5	13
150TRN440	40	6	7.3	17	15

• Tank dimensions are given at max. water depth. Dimensions will vary according to equipment depth.
• For good quality aeration and agitation, it is recommended to install a haunch on the bottom of the tank.

BER
PLS with Aeration Kit

–Submersible Self-
aspirating Jet Aerators–

BER: Submersible jet aerators optimized for pre-aeration and prevention of bacterial spoilage
PLS with Aeration Kit: Lightweight, compact resin-made submersible jet aerators for shallow water application

The BER-series and PLS with aeration kit series are a submersible self-aspirating jet aerators combined a submersible pump with a venturi-jet based diffuser. The liquid flow generated by the submerged pump causes negative pressure to form around the nozzle, whereby drawing in air from above the water’s surface. With this jet injector mechanism, the aspirated air mixes with water and is ejected through the diffuser, simultaneously agitating and aerating the ponded water. The mixed air-water is ejected powerfully in one direction, which effectively agitates the water across a wide area. Because the PLS-series uses food-grade liquid paraffin for lubricating oil, this jet aerator is safe and fish-friendly if used for water circulation and aquarium, aquaculture/fish farms.



	Model		Air-inlet Bore mm	Motor Output kW	Phase	Starting Method	Solids Passage mm	Max. ^{*2} Water Depth 50 / 60Hz m	Dimensions L x H mm		Dry Weight ^{*3} kg		Cable Length m
	Free Standing	Guide Rail Fitting							Free Standing	Guide Rail Fitting	Free Standing	Guide Rail Fitting	
BER	8-BER	TOS-8BER	25	0.75	Three	D. O. L.	20	4 / 3.5	674 x 464	674 x 514	28	23	6
	15-BER	TOS-15BER	32	1.5	Three	D. O. L.	20	4	895 x 562	910 x 603	43	34	6
	22-BER	TOS-22BER	50	2.2	Three	D. O. L.	35	4.5	1158 x 705	1162 x 793	73	73	6
	37-BER	TOS-37BER	50	3.7	Three	D. O. L.	35	5	1163 x 779	1167 x 862	87	87	6
	55-BER	TOS-55BER	50	5.5	Three	D. O. L.	35	6	1415 x 942	1422 x 1006	142	126	8
PLS with Aeration Kit	50PLS2.15S	–	25	0.15	Single	Capacitor Run	38 (10) ^{*1}	1.2	390 x 316	–	7.6	–	5
	50PLS2.4S	–	25	0.4	Single	Capacitor Run	24 (10) ^{*1}	1.2	396 x 321	–	8.5	–	5
	50PLS2.75S	–	25	0.75	Single	Capacitor Run	24 (10) ^{*1}	1.2	396 x 321	–	10.4	–	5

^{*1} Figure in () shows the solids passage of the pump with a strainer.

^{*2} Max. water depth is the load limit of the motor. The load placed on the motor increase the deeper the submersible aerator is installed, therefore if the aerator is operated below the max. water depth, the overload will trip the motor protection device and stop the aerator from running continuously.

^{*3} Weights excluding cable
Weights of guide rail fitting excluding duckfoot bend

Accessories (BER-series only)

- Free Standing**

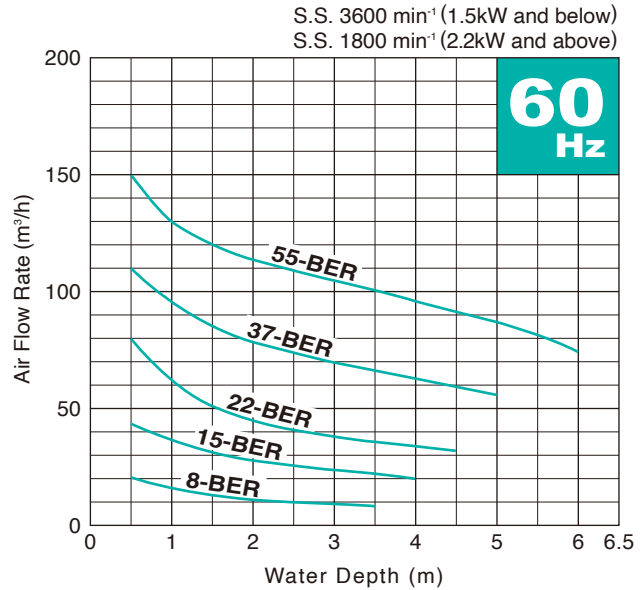
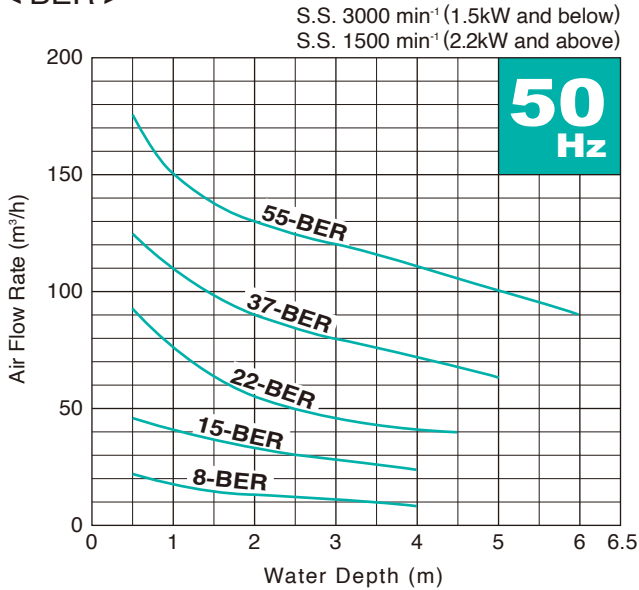
 - Silencer & Valve Set
 - Lifting Chain 5m (with Shackles)
 - Suction Casing
 - Threaded Oval Flange
- Guide Rail Fitting**

 - Diffuser
 - Diffuser Base
- Suction Casing
 - Threaded Oval Flange
 - Diffuser

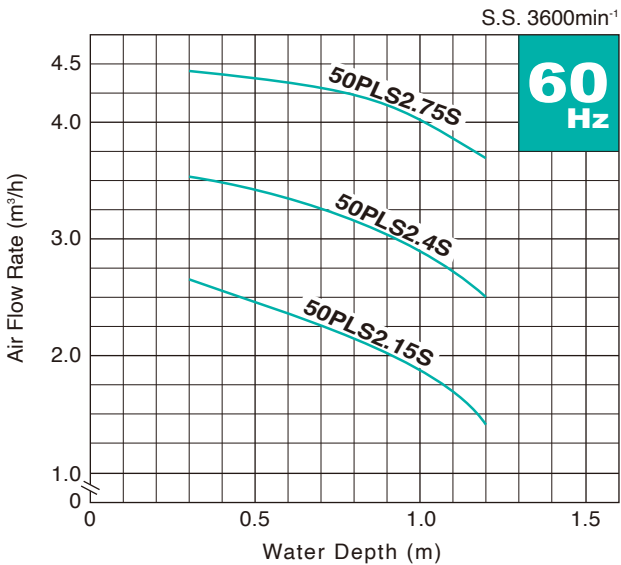
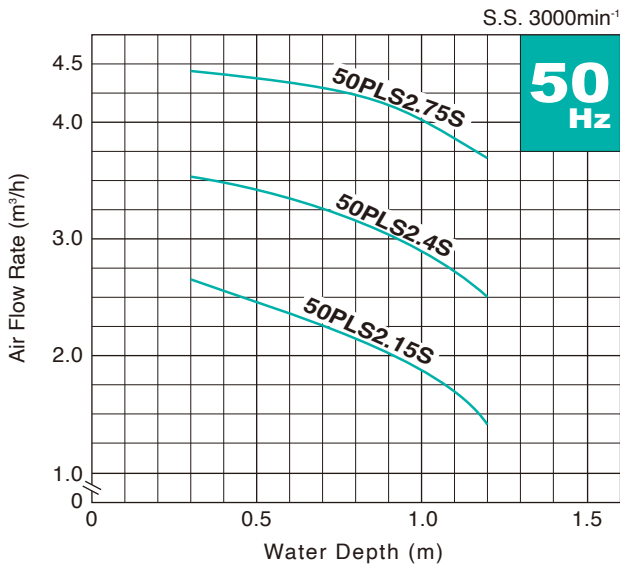
Air Flow Rate - Water Depth Curves

The air flow rates are expressed at the standard condition, i.e. temperature of 20°C, 1 atm and may vary by up to approximately 5%.

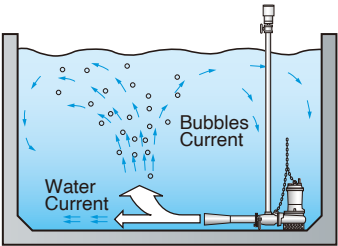
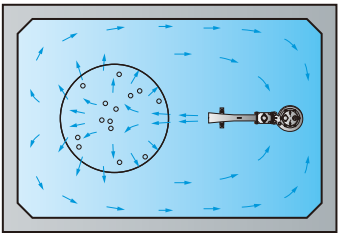
< BER >



< PLS with Aeration Kit >



Convection Pattern & Recommended Tank Dimensions (BER-series)



Model	Motor Output kW	Max. Water Depth 50/60Hz m	Max. Tank Dimensions 50/60Hz		
			Length m	Width m	Depth m
8-BER	0.75	4 / 3.5	3	2	4 / 3.5
15-BER	1.5	4	4	3.5	4
22-BER	2.2	4.5	5	4.5	4.5
37-BER	3.7	5	6	5	5
55-BER	5.5	6	7	7	6

Specifications

			TRN									BER					PLS with Aeration Kit					
			32TRN2.75	32TRN21.5	50TRN42.2	50TRN43.7	50TRN45.5	80TRN47.5	80TRN412	80TRN417	100TRN424	150TRN440	8-BER	15-BER	22-BER	37-BER	55-BER	50PLS2.15S	50PLS2.4S	50PLS2.75S		
PUMP	Air-inlet Bore	mm	32		50			80			100	150	25	32	50			25				
	Air-inlet Connection		Threaded Oval Flange									JIS 10kg/cm² Flange		Threaded Oval Flange					Threaded Flange			
	Diffuser		—											Structure Steel + Nylon Coated					304 Stainless Steel			
	Solids Passage	mm	10	12			15			22	25	20		35			38 (10)**	24 (10)**	24 (10)**			
	Impeller		Special Semi-open											Channel					Vortex			
			304 Stainless Steel Casting	410 Stainless Steel Casting									Gray Cast Iron					Glass-fiver Reinforced Resin (PPO-GF)				
	Suction Cover		410 Stainless Steel Casting											Gray Cast Iron					—			
	Middle Plate		—	410 Stainless Steel					410 Stainless Steel Casting			—										
	Oil Seal		Nitrile Butadiene Rubber											Nitrile Butadiene Rubber					—			
	Air Passage & Guide Vane / Casing		Gray Cast Iron											Gray Cast Iron					Glass-fiver Reinforced Resin (ABS-GF)			
Shaft Seal		Dual Inside Mechanical Seals (with Oil Lifter)											Dual Inside Mechanical Seals (with Oil Lifter)									
		Silicon Carbide											Silicon Carbide									
MOTOR	Type		Continuous-duty Rated, Dry-type Induction Motor											Continuous-duty Rated, Dry-type Induction Motor								
	Output	kW	0.75	1.5	2.2	3.7	5.5	7.5	12	17	24	40	0.75	1.5	2.2	3.7	5.5	0.15	0.4	0.75		
	Phase		Three											Three					Single			
	Pole		2		4									2		4			2			
	Speed (S.S.) 50/60Hz	min ⁻¹	3000/3600			1500/1800									3000/3600		1500/1800			3000/3600		
	Insulation		F											F or E	F				E			
	Starting Method		D.O.L.				D.O.L.*3		Star-Delta					D.O.L.					Capacitor Run			
	Motor Protector (built-in)		CTP						MTP					CTP					MTP		CTP	
	Lubricant	ml	1400		5100		6000			10000	16000	440	900	1350		4300	150	240				
			Turbine Oil (ISO VG32)											Turbine Oil (ISO VG32)					Liquid Paraffin (ISO VG32)			
Frame		Gray Cast Iron											Gray Cast Iron					304 Stainless Steel				
Shaft		420 Stainless Steel											420 Stainless Steel							304 Stainless Steel		
Power Cable	m	6				8			10		6				8		5					
		PVC				Chloroprene Rubber							PVC				Chloroprene Rubber	PVC				
Max. Water Depth **1 50/60Hz		m	3.5		3.6	4.0		4.5	6.0			4.0 / 3.5		4.0	4.5	5.0	6.0	1.2				
No. of Outlets		m	6 (Multiple Directions)							8 (Multiple Directions)		1 (One Direction)										
Dry Weight*2	Free Standing	kg	55		140	150		175	192	213	435	583	28	43	73	87	142	7.6	8.5	10.4		
	Guide Rail Fitting	kg	—											23	34	73	87	126	—			

*1 Max. water depth is the load limit of the motor. The load placed on the motor increase the deeper the submersible aerator is installed, therefore if the aerator is operated below the max. water depth, the overload will trip the motor protection device and stop the aerator from running continuously.

*2 All weights excluding cable

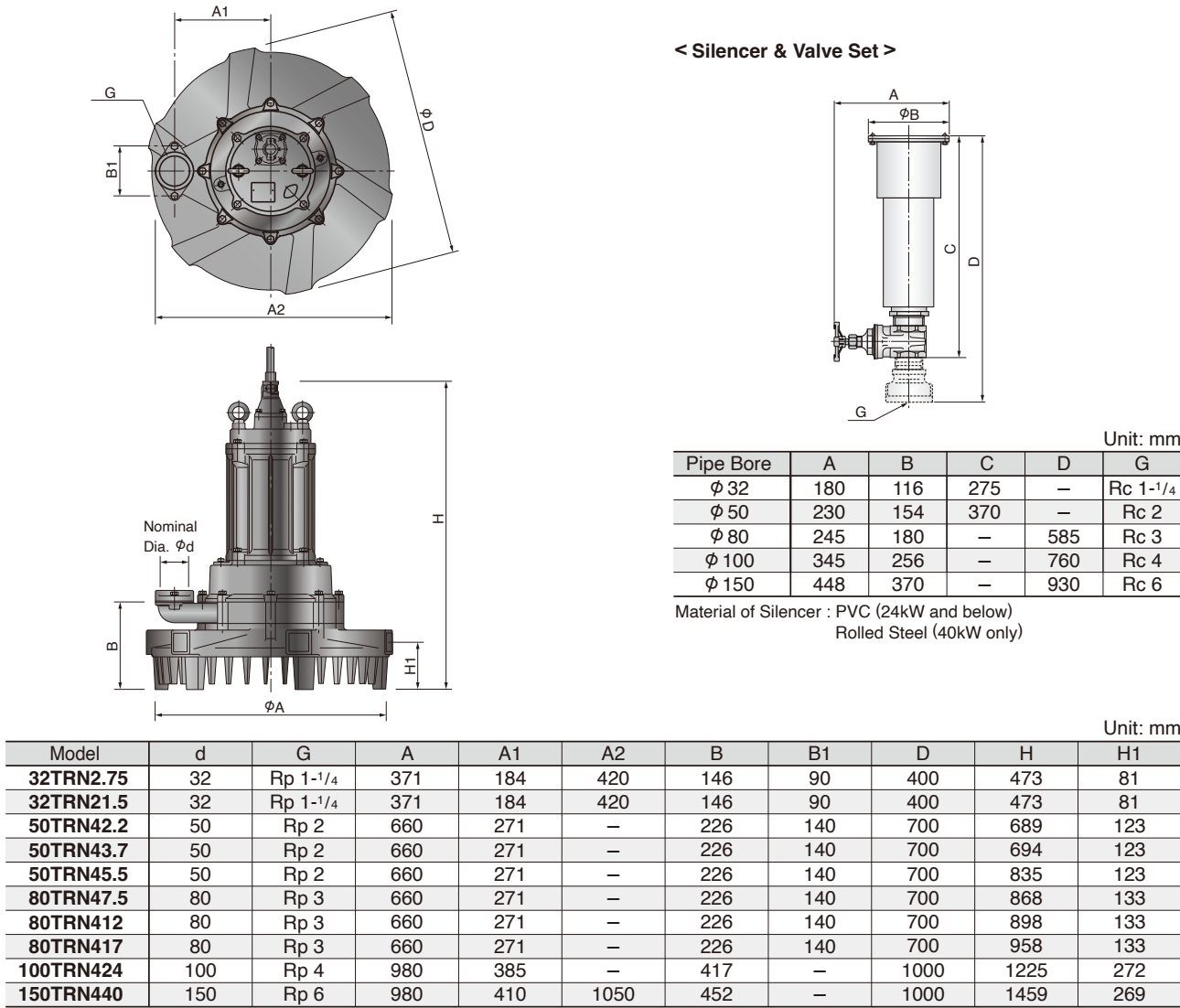
*3 Star-Delta available upon request

Weights of guide rail fitting excluding duckfoot bend

*4 Figure in () shows the solids passage of the pump with a strainer.

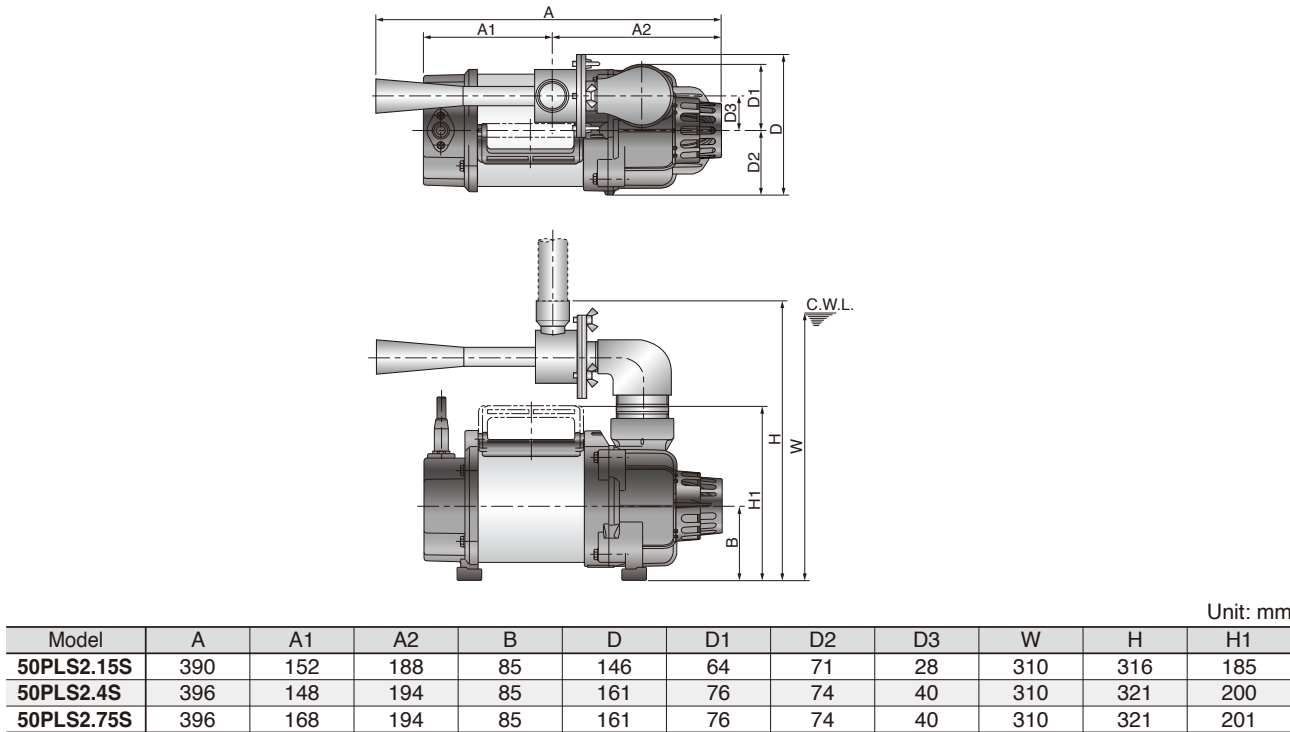
Dimensions

TRN



PLS with Aeration Kit

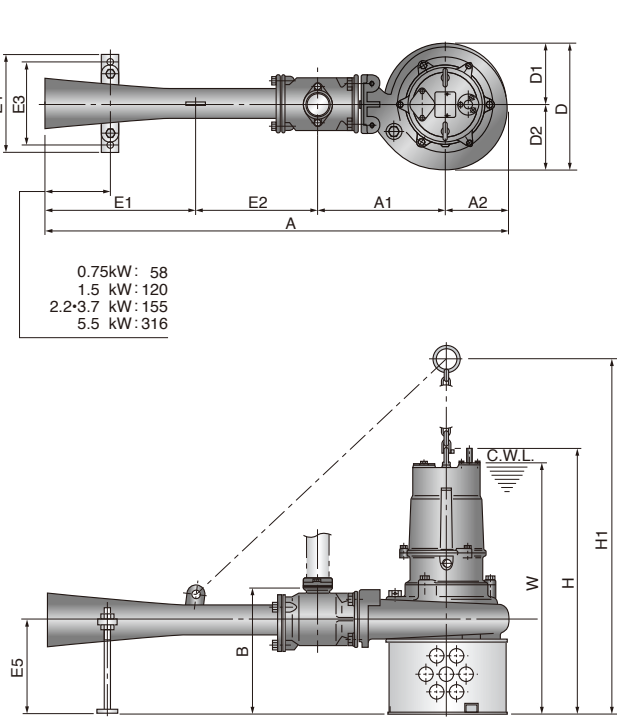
C.W.L.: Continuous Running Water Level



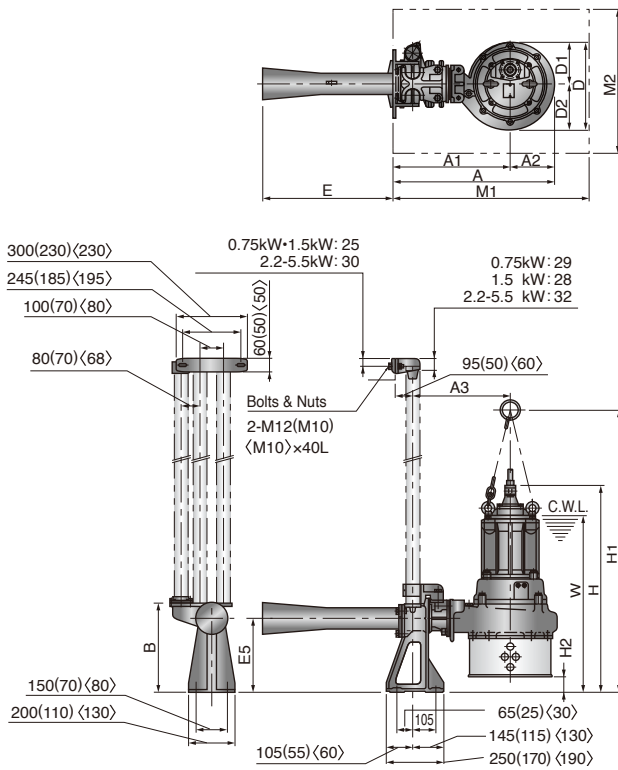
BER

C.W.L.: Continuous Running Water Level

< Free Standing >



< Guide Rail Fitting >



* Figure in () shows the dimensions of model TOS-8BER.
Figure in < > shows the dimensions of model TOS-15BER.

Free Standing

Unit: mm

Model	A	A1	A2	B	D	D1	D2	W	H	H1	E1	E2	E3	E4	E5
8-BER	674	200	97	195	194	97	97	435	464	595	208	169	150	180	150
15-BER	895	244	114	225	222	111	111	490	562	—	270	267	150	180	160
22-BER	1158	317	154	312	316	150	166	665	705	1102	380	307	220	260	232
37-BER	1163	317	159	317	325	150	175	740	779	1147	380	307	220	260	237
55-BER	1415	360	194	341	391	188	203	820	942	1169	460	401	220	260	256

Guide Rail Fitting

Unit: mm

Model	A	A1	A2	A3	B	D	D1	D2	W	H	H1	H2	M1	M2	E	E5
TOS-8BER	385	288	97	238	238	194	97	97	485	514	645	50	550	350	289	200
TOS-15BER	467	353	114	293	250	222	111	111	530	603	—	41	650	450	443	200
TOS-22BER	616	462	154	367	385	316	150	166	750	793	972	88	700	450	546	320
TOS-37BER	621	462	159	367	385	325	150	175	820	862	1048	83	700	450	546	320
TOS-55BER	711	517	194	422	385	391	188	203	885	1006	1368	65	750	500	711	320

< Silencer & Valve Set >

