

TRN/BER

SUBMERSIBLE AERATORS



 **TSURUMI PUMP**TM
BUILT FOR WORK[®]

Submersible Self-Aspirating Aerators

Tsurumi's submersible aerators are used at water 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: 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** are submersible jet aerators that generate a powerful unidirectional flow. Both TRN and BER 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



The **TRN-series** is built to draw air on its own by generating negative pressure behind a proprietary 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 series** combines 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 proprietary 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

Selection Table

		Submersible Aerators	Submersible Jet Aerators
		TRN	BER
Air-inlet Bore	in.	1 1/4 - 6	1 - 2
Motor Output	HP	1 - 54	1 - 7.5
Pole		2 • 4	2 • 4
Impeller		Special Semi-open	Channel
Max. Water Depth	ft.	11.5 - 19.7 (Capable of deeper water tank in combination with a blower)	11.5 - 19.7
No. of Outlets		6 • 8 (Multiple Directions)	1 (One Direction)
Guide Rail Fitting System		No	Yes
Features		<ul style="list-style-type: none"> • Built with a proprietary 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.
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.)

Guide Rail Fitting System (BER Series)

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.

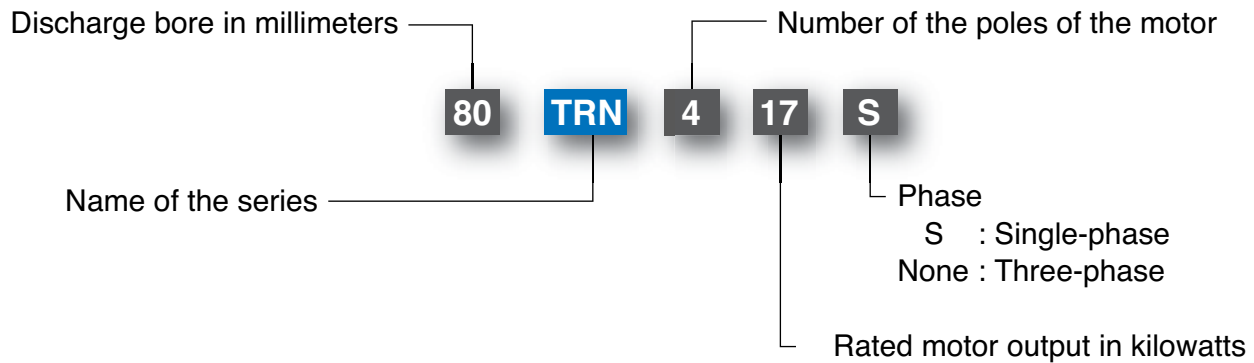
Accessories

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

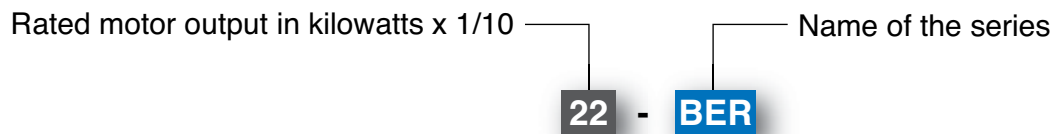


Model Number Designation

TRN Series



BER Series

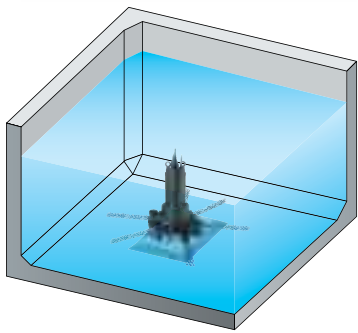


Mixed flow of air-water profile during operation

► Submersible Aerators: TRN series

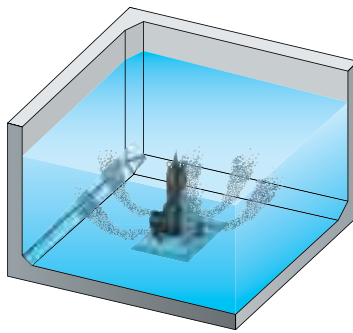
Start of operation

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



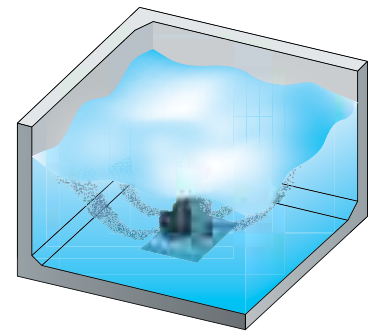
Rising by airlift

Tiny bubbles produce a high amount of dissolved oxygen.



Agitation by convection

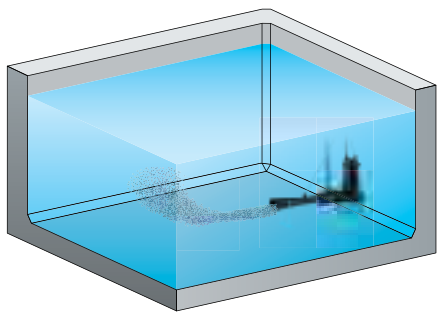
The rising bubbles enable efficient aeration and agitation.



► Submersible Jet Aerators: BER Series

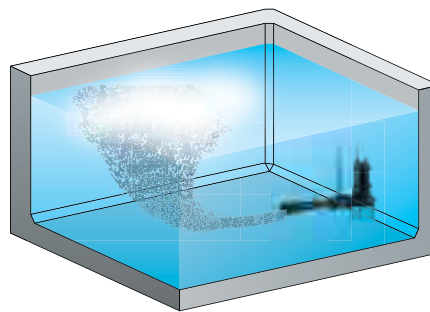
Rising by airlift

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.

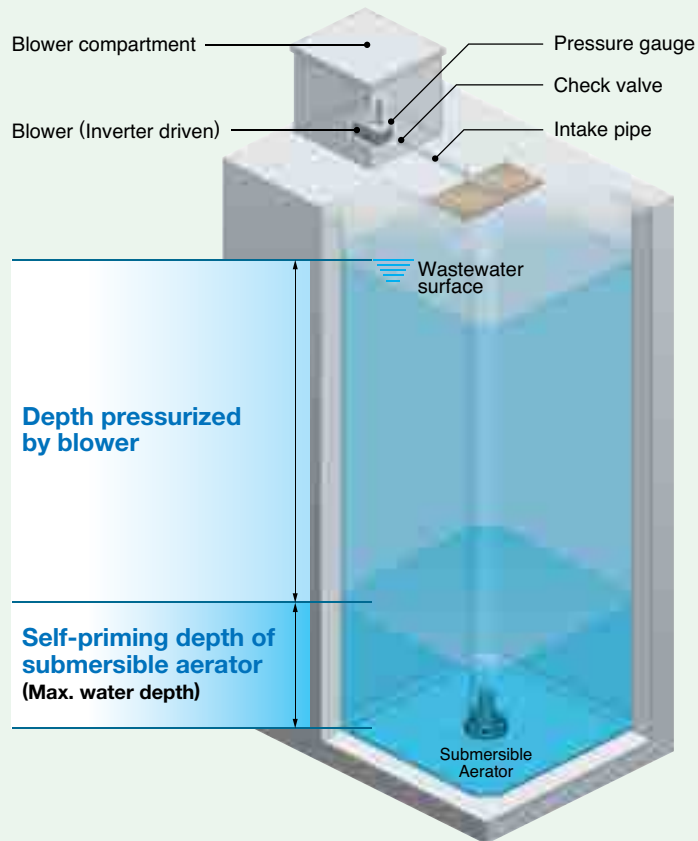


Special Offer for TRN series

How to aerate in tank deeper than max. water depth

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

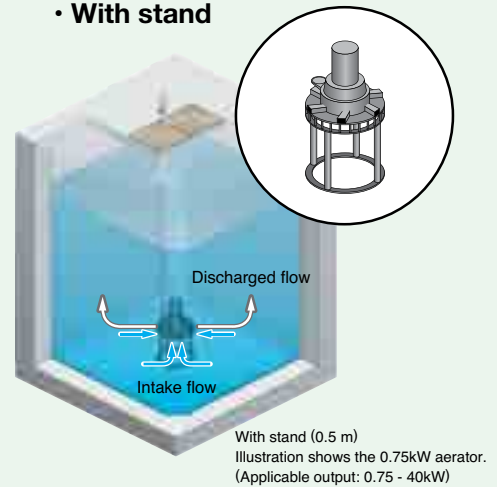
Applicable for deep tank aeration below max. water depth. Because it draws air on its own, the aerator works with a general-purpose blower instead of a high-pressure blower.



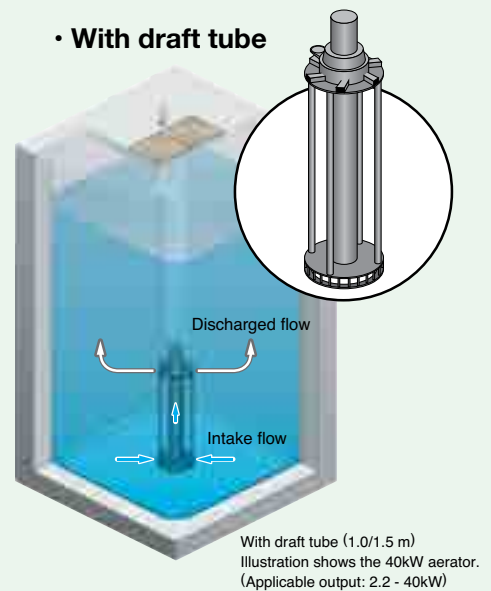
- Blowers must be inverter-driven.
- Provide 1 blower for each submersible aerator.

► Optional specifications

• With stand



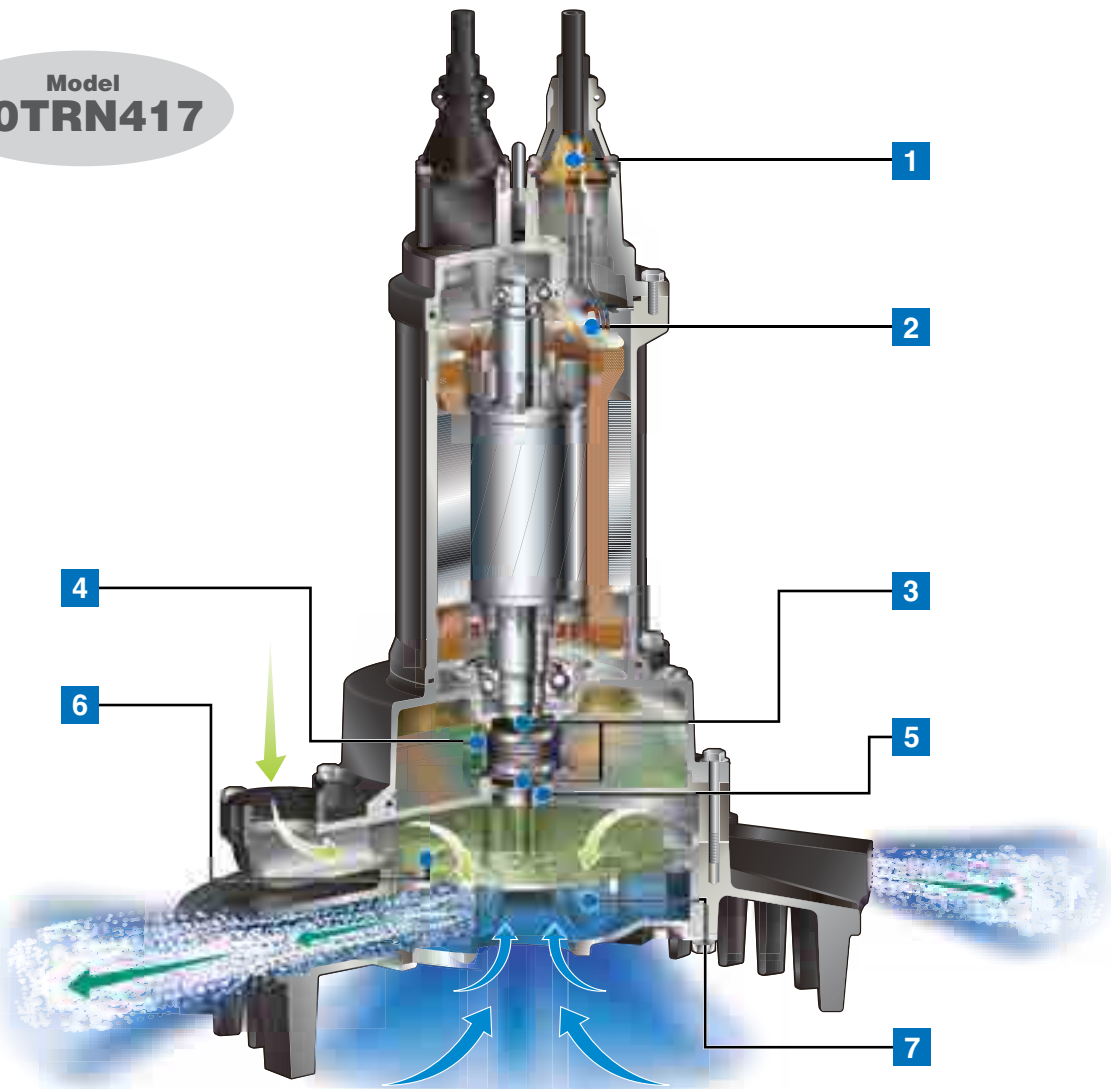
• With draft tube



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.

Model
80TRN417



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

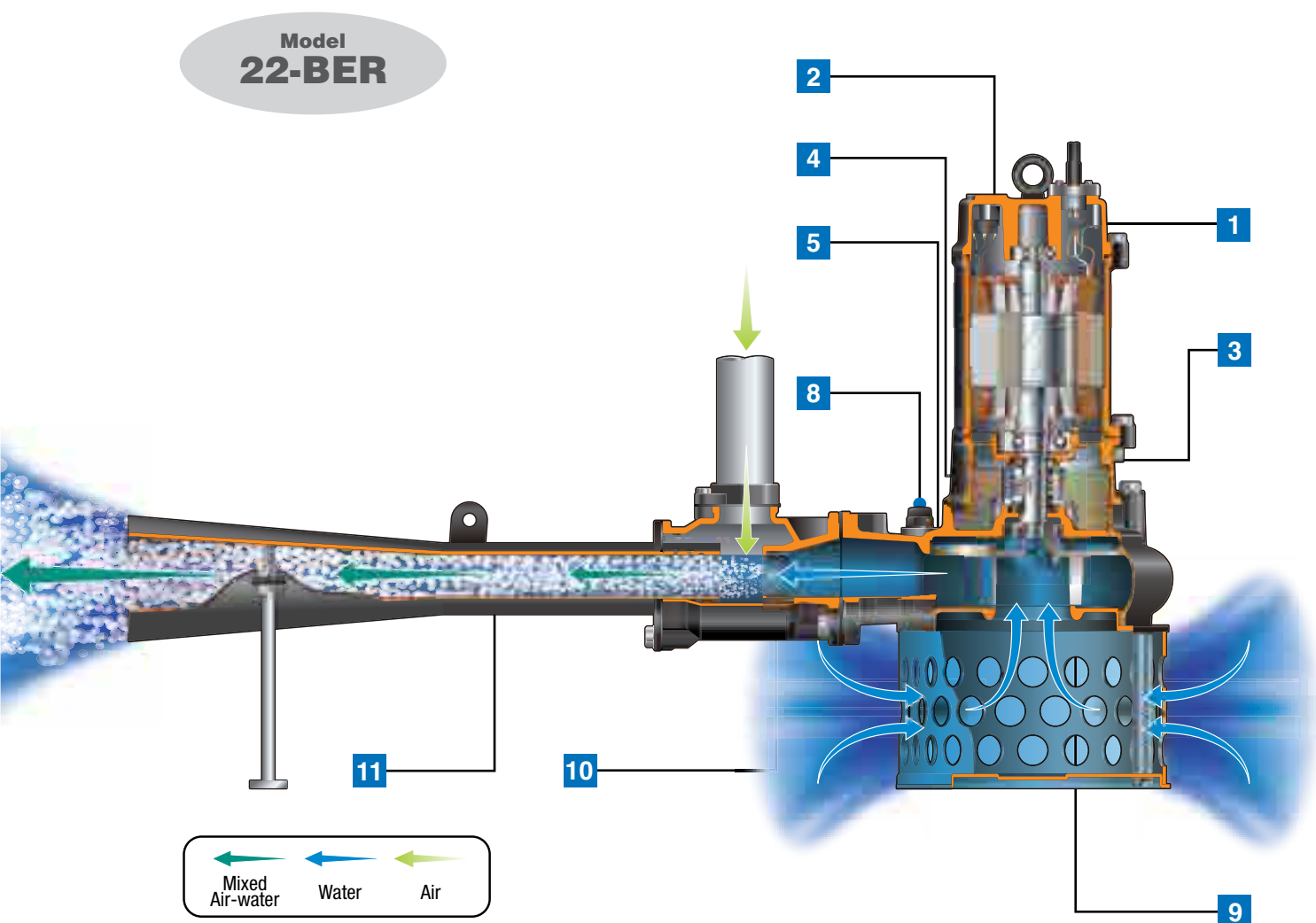
Isolated in the oil chamber where a clean, non-corrosive and abrasion-free lubricating environment is maintained. Compared with the water-cooled outside mechanical seal, it reduces the risk of failure caused by dry-heating and adhering matter. The Silicon carbide provides 5 times higher corrosion, wear 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 [Patented]

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.

Submersible Self-aspirating Jet Aerators: BER 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

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)

Minimizes the possibility of trouble due to clogging by foreign matters.

10 Nozzle Ring (BER)

Channels the water discharged from the pump into a jet, as part of the jet injector mechanism.

11 Diffuser (BER)

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 proprietary 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.



50TRN45.5



80TRN417



150TRN440

Model	Air-inlet Bore in	Motor Output HP	Phase	Starting Method	Solids Passage in	Max. Water Depth ^{*2} ft	No. of Outlets	Dimensions L x H in	Dry Weight ^{*3} lbs	Cable Length ft
32TRN2.75	32	1	Three	D. O. L.	0.394	11.5	6	14 5/8 x 18 5/8	121	32
32TRN21.5	32	2		D. O. L.	0.394	11.5	6	14 5/8 x 18 5/8	121	32
50TRN42.2	50	3		D. O. L.	0.472	11.8	6	26 x 27 1/8	309	32
50TRN43.7	50	5		D. O. L.	0.472	13.1	6	26 x 27 5/16	331	32
50TRN45.5	50	7.5		D. O. L. ^{*1}	0.591	13.1	6	26 x 32 7/8	375	32
80TRN47.5	80	10		D. O. L. ^{*1}	0.591	14.8	6	26 x 34 3/16	419	32
80TRN412	80	16		Star-Delta	0.591	19.7	6	26 x 35 3/8	441	32
80TRN417	80	23		Star-Delta	0.591	19.7	6	26 x 37 11/16	485	32
100TRN424	100	32		Star-Delta	0.886	19.7	8	38 9/16 x 48 1/4	960	32
150TRN440	150	54		Star-Delta	0.886	19.7	8	38 9/16 x 57 7/16	1280	32

^{*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

Included Accessory

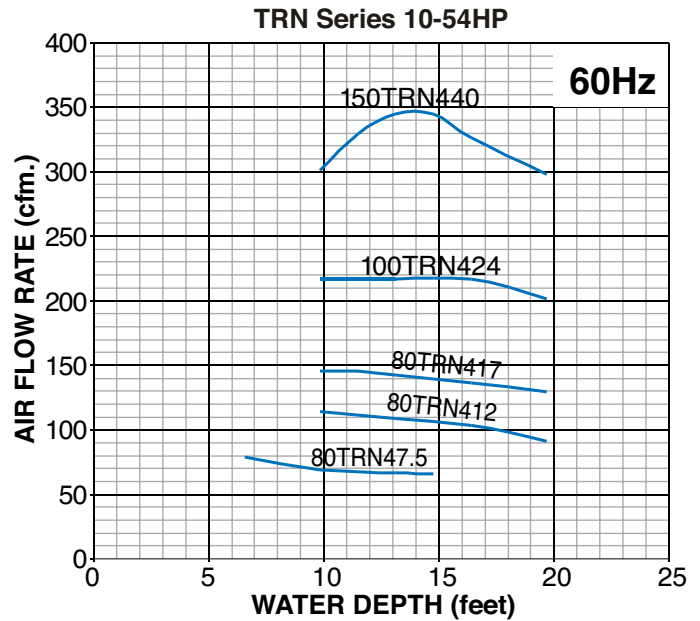
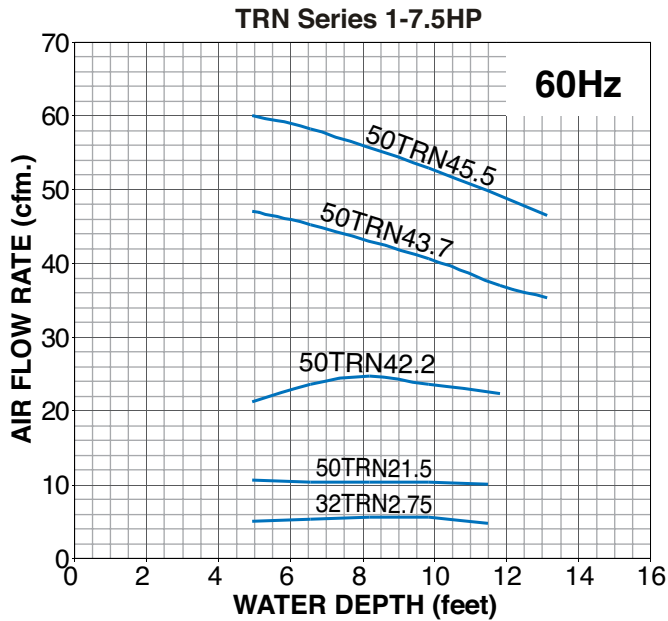
- Silencer & Valve Set

Optional Accessory

- Stand
- Draft Tube

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%.



Note:

The air flow rates are expressed at the standard condition, i.e. temperature of 68°F (20°C), 1 atm. (Result may vary by up to approximately 5%.)

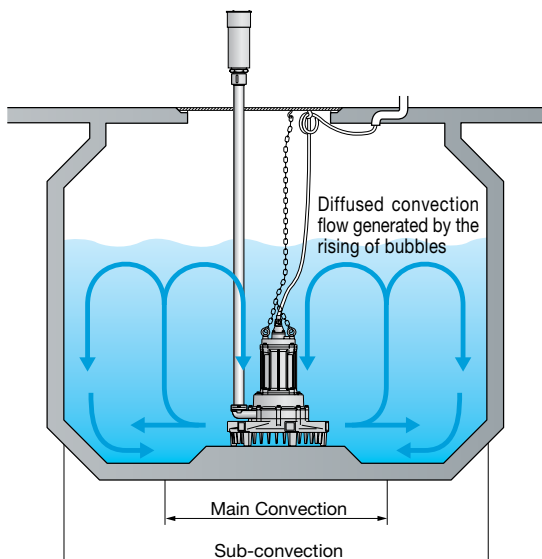
Convection Pattern & Recommended Tank Dimensions

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 suspended to prevent sedimentation of solids.



Model	Max. Water Depth ft	Main Convection Øft	Sub-convection	
			Circular Tank Øft	Square Tank ft
32TRN2.75	11.5	4.6	11	10
32TRN21.5	11.5	5.9	15	13
50TRN42.2	11.8	7.9	20	18
50TRN43.7	13.1	9.8	23	21
50TRN45.5	13.1	12.5	30	26
80TRN47.5	14.8	14.4	33	30
80TRN412	19.7	17.1	39	36
80TRN417	19.7	18.4	43	38
100TRN424	19.7	20.1	48	43
150TRN440	19.7	24.0	56	49

- 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 –Submersible Self-Aspirating Jet Aerators–

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

The BER Series is 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.



22-BER



TOS-15BER

Model		Air-inlet Bore in	Motor Output HP	Phase	Starting Method	Solids Passage in	Max. Water Depth ^{*2} 60Hz ft	Dimensions L x H in		Dry Weight ^{*3} lbs		Cable Length ft
Free Standing	Guide Rail Fitting							Free Standing	Guide Rail Fitting	Free Standing	Guide Rail Fitting	
8-BERS2	TOS-8BERS2	1	1	Three	D. O. L.	0.79	11.5	26 9/16 x 22 1/2	21 5/8 x 24 1/2	77	66	32
8-BER4	TOS-8BER4	1	1	Three	D. O. L.	0.79	11.5	26 9/16 x 18 1/4	21 5/8 x 20 1/4	62	51	32
15-BER3	TOS-15BER3	1 1/4	2	Three	D. O. L.	0.79	13.1	35 1/4 x 22 1/8	25 9/16 x 23 3/4	95	75	32
22-BER5	TOS-22BER5	2	3	Three	D. O. L.	1.38	14.8	45 9/16 x 23 3/4	27 9/16 x 30 3/16	165	134	32
37-BER5	TOS-37BER5	2	5	Three	D. O. L.	1.38	16.4	45 13/16 x 29 5/8	27 9/16 x 32 15/16	201	170	32
55-BER7	TOS-55BER7	2	7.5	Three	D. O. L.	1.38	19.7	55 11/16 x 37 1/16	29 1/2 x 39 5/8	328	291	32

^{*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

Included Accessories

Free Standing

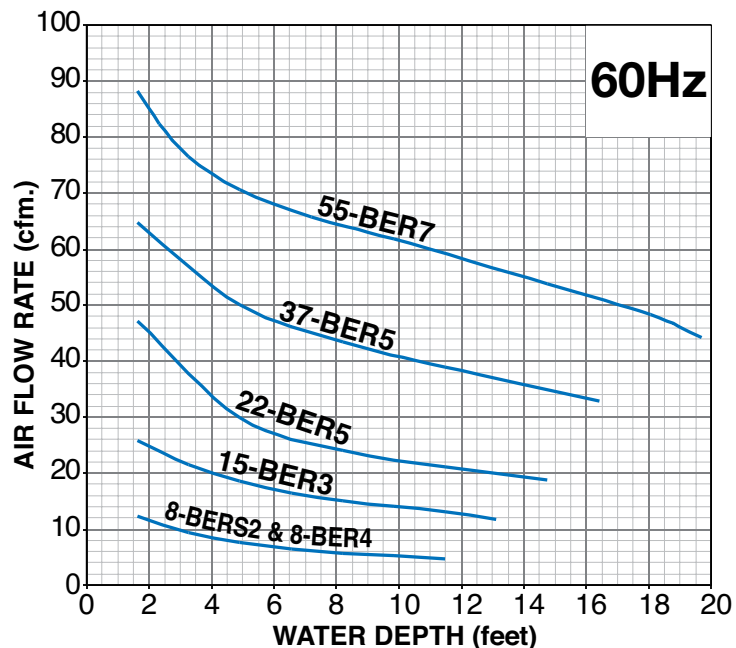
- Silencer & Valve Set
- Lifting Chain 5m (with Shackles)
- Suction Casing
- Screwed Flange
- Diffuser
- Diffuser Base

Guide Rail Fitting

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

Air Flow Rate - Water Depth Curves

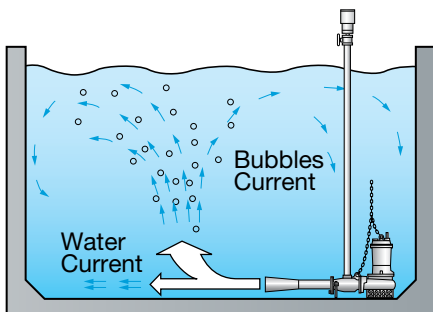
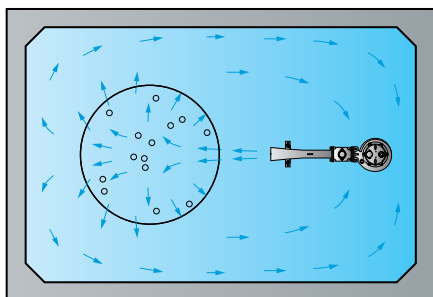
The air flow rates are expressed at the standard condition, i.e. temperature of 20°C, 1 atm and may vary by up to approximately 5%.



Note:

The air flow rates are expressed at the standard condition, i.e. temperature of 68°F (20°C), 1 atm. (Result may vary by up to approximately 5%.)

Convection Pattern & Recommended Tank Dimensions



Model	Motor Output HP	Max. Tank Dimension			Max. Water Depth ft
		Length ft	Width ft	Depth ft	
8-BERS2	1	10	7	11.5	11.5
8-BER4	1	10	7	11.5	11.5
15-BER3	2	13	11	13.1	13.1
22-BER5	3	16	16	14.8	14.8
37-BER5	5	20	20	16.4	16.4
55-BER7	7.5	23	23	19.7	19.7

Specifications

			TRN									
			32TRN2.75	32TRN21.5	50TRN42.2	50TRN43.7	50TRN45.5	80TRN47.5	80TRN412	80TRN417	100TRN424	150TRN440
PUMP	Air-inlet Bore	in	1.5		2			3			4	6
	Air-inlet Connection		Threaded Oval Flange								JIS 10kg/cm² Flange	
	Diffuser		—									
	Solids Passage	in	3/8	1/2			9/16			7/8	1	
	Impeller		Special Semi-open									
			410 Stainless Steel Casting									
	Suction Cover		410 Stainless Steel Casting									
	Middle Plate		—	410 Stainless Steel					410 Stainless Steel Casting			
	Oil Seal		Nitrile Butadiene Rubber									
	Air Passage & Guide Vane / Casing		Gray Cast Iron									
Shaft Seal		Dual Inside Mechanical Seals (with Oil Lifter)										
		Silicon Carbide										
MOTOR	Type		Continuous-duty Rated, Dry-type Induction Motor									
	Output	HP	1	2	3	5	7.5	10	16	23	32	54
	Phase		Three									
	Pole		2		4							
	Speed 60Hz	RPM	3600		1800							
	Insulation		F									
	Starting Method		D.O.L.				D.O.L.*2		Star-Delta			
	Motor Protector (built-in)		CTP						MTP			
	Lubricant	oz	47		172		203			338	541	
			Turbine Oil (ISO VG32)									
	Frame		Gray Cast Iron									
	Shaft		420 Stainless Steel									
	Power Cable	ft	32				32			32		
			PVC				Chloroprene Rubber					
Max. Water Depth 60Hz		ft	11.5		11.8	13.1		14.8	19.7			
No. of Outlets		ft	6 (Multiple Directions)								8 (Multiple Directions)	
Free Standing lbs			121		309	331		386	423	470	959	1285
Dry Weight**			—									
Guide Rail Fitting lbs			—									

*¹ All weights excluding cable

Weights of guide rail fitting excluding duckfoot bend

*² Star-Delta available upon request

*³ Figure in () shows the solids passage of the pump with a strainer.

			BER					
			8-BER	15-BER	22-BER	37-BER	55-BER	
PUMP	Air-inlet Bore	in	1	1.5	2			
	Air-inlet Connection		Threaded Oval Flange					
	Diffuser		Structure Steel + Nylon Coated					
	Solids Passage	in	0.78		1.38			
	Impeller	Channel						
		Gray Cast Iron						
	Suction Cover		Gray Cast Iron					
	Middle Plate		—					
	Oil Seal		Nitrile Butadiene Rubber					
	Air Passage & Guide Vane / Casing		Gray Cast Iron					
	Shaft Seal	Dual Inside Mechanical Seals (with Oil Lifter)						
		Silicon Carbide						
MOTOR	Type		Continuous-duty Rated, Dry-type Induction Motor					
	Output	HP	1	2	3	5	7.5	
	Phase		Three					
	Pole		2		4			
	Speed 60Hz	RPM	3600		1800			
	Insulation		E	F				
	Starting Method		D.O.L.					
	Motor Protector (built-in)		CTP					
	Lubricant	oz	15	30	45		145	
		Turbine Oil (ISO VG32)						
	Frame		Gray Cast Iron					
	Shaft		420 Stainless Steel					
	Power Cable	ft	32				32	
		PVC					Chloroprene Rubber	
Max. Water Depth 60Hz			ft	11.5	13.1	14.8	16.4	19.7
No. of Outlets			1 (One Direction)					
Dry Weight**	Free Standing	lbs	62	95	165	201	313	
	Guide Rail Fitting	lbs	51	75	161	192	278	

*¹ All weights excluding cable

Weights of guide rail fitting excluding duckfoot bend

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*³ Figure in () shows the solids passage of the pump with a strainer.

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