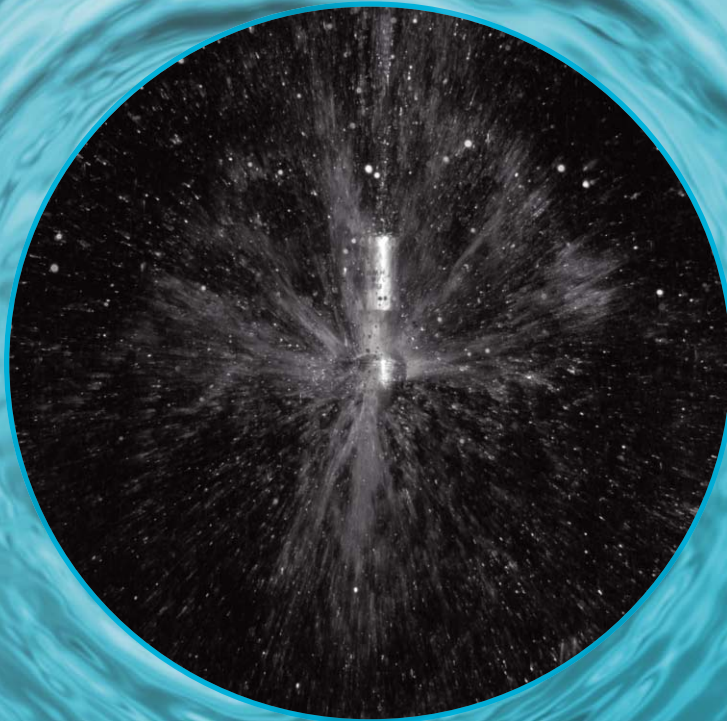


BETE®

NOZZLES FOR BOTTLE, DRUM, AND TANK WASHING



TW 0216

TANK WASHING

When choosing a suitable tank cleaning nozzle, three different designs are available:

- Stationary tank cleaning nozzles
- Rotating tank cleaning nozzles
- Tank cleaning machines

Stationary tank washing nozzles

Stationary nozzles, such as the CLUMP spray head, are characterized by a particularly large cross-section. In addition, these nozzles are extremely low maintenance. Due to the special design of the TW series, only small intake pipes are needed on the tanks.

Rotating tank cleaning nozzles

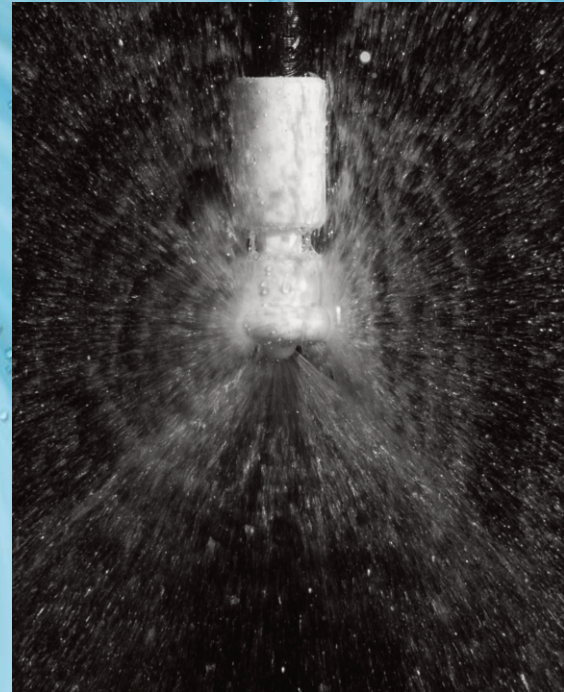
Rotating nozzles are agent-driven spray heads that remove soiling through their droplet impact pressure and the quantity of cleaning agent. The standard spray angle is 360°. HydroWhirl® S nozzles are used where cleaning needs to be done with a strong fan of liquid, and they are ATEX-approved.

Tank cleaning machines

The areas of application of a tank cleaning machine are where the highest cleaning efficiency are necessary, such as:

- Beer tanks, boilers, fermenters, and malt containers
- Raw milk storage, processing containers, spray dryers, and silos

A tank cleaning machine features optimized full jet nozzles, so that containers with diameters of 100 feet or more can be cleaned. The maximum water flow volumes are up to 160 gpm at 40 psi. In order to shorten the cleaning time, target jet cleaners can be equipped with up to 4 full jet nozzles.



ABOUT BETE

At BETE Fog Nozzle, Inc., our success has always been focused on understanding our customers' business and providing effective engineered solutions to their most difficult fluid process challenges. With more than 60 years of experience designing and fabricating spray nozzles, BETE has the engineering expertise on which customers can count.

BETE's mission goes beyond just selling spray nozzles: it is to provide engineered spraying solutions that exceed customer expectations in every detail. Extensive in-house capabilities; including integrated 3DCAD/CAM design, rapid prototyping, investment casting, CNC machining, welded fabrication, and spray testing; make it possible to offer the highest level of quality throughout every phase of production.

The BETE Difference is our unparalleled ability to respond quickly and effectively to any kind of spraying challenge anywhere in the world with the most knowledgeable customer service in the industry.



CHOOSING A TANK WASHING NOZZLE

Adequate coverage and effective scrubbing are of prime importance in bottle, drum, and tank washing. Choosing from the variety of tank washing nozzles can be confusing. In selecting BETE nozzles you should consider the following vessel characteristics and nozzle design criteria: size and shape of vessel to be cleaned, vessel opening, type of material to be removed, and spray coverage.

Size and Shape of Vessel to be Cleaned

BETE's tank washing nozzles can be used to clean, wash, and rinse every size vessel from small bottles, moderately sized tanks, to railroad tankers.

The TW series is the best choice for cleaning small bottles, kegs, and barrels due to its compact design. Medium-sized tanks up to 6m or are best cleaned using the HydroWhirl® S, HydroWhirl Poseidon®, or the CLUMP series because of their omni-directional spray.

Where higher impact and larger coverage is needed, BETE's tank washing machines, the HydroWhirl Orbitor 100 and the HydroWhirl Orbitor, are the perfect choice.

Tank Washing Nozzle	up to	coverage distance in feet (diameter)											
		5	10	15	20	25	30	40	50	60	70	80+	
TW 12 - 20	6'												
TW 1	12'												
CLUMP	15'												
HydroWhirl S	20'												
HydroWhirl Poseidon	25'												
HydroWhirl Orbitor 100	55'												
HydroWhirl Orbitor	130'												up to 130'



What is ATEX (Ex)?

ATEX is an acronym that stands for 'ATmosphere EXplosible'.

At the same time, ATEX is an abbreviation for European Directive 94/9/EC concerning the placement on the market of explosion-protected electrical and mechanical equipment.

**All HydroWhirl Orbitor, HydroWhirl Orbitor 100,
and HydroWhirl S nozzles
are available with ATEX approval.**

HydroWhirl® S

slotted rotating spray nozzle for quick, efficient tank cleaning

The HydroWhirl® S nozzle directs the cleaning water through a rotating head at the tip of the spray assembly. This produces a vigorous moving spray action against all areas of the walls of a tank. The spray pattern from the HydroWhirl S head uses impact and repetition to quickly wash the tank. This spray pattern is especially effective at breaking up and removing contaminants.

Advantages of the HydroWhirl S rotary spray nozzle.

- Cleans more quickly, and uses less water and lower pressure than static tank washers
- Lower flow and pressure mean smaller pump size resulting in lower operating costs

The HydroWhirl S nozzle has been carefully designed for long service life.

Low-maintenance bearing design

- Self-cleaning bearings are lubricated by water flow to clear away particles

High-precision machining and finish

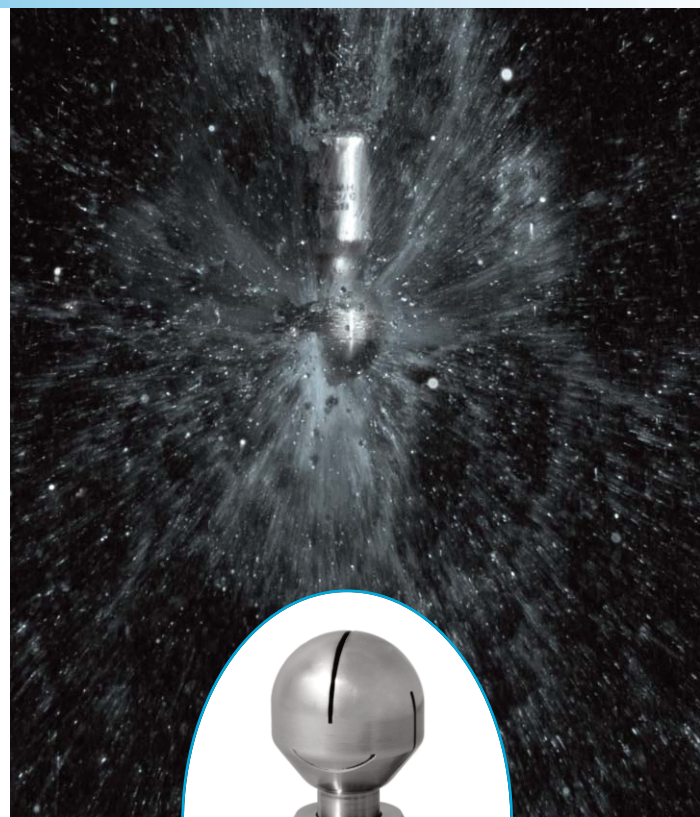
- Stainless steel construction – corrosion resistant
- Laser-welded design for durable assembly
- Surface finish of 0.8 microns R_a or better
- Made from FDA-approved materials for use in Clean-in-Place (CIP) applications

Comprehensive quality control

- Material traceability controlled throughout production
- Lifecycle lab testing validates minimum service life of 300 hours
- All HydroWhirl S nozzle are available with ATEX approval for Zone 0.

Design flexibility

- Available in many different sizes and connections: threaded, clip-on, or welded
- Spray Angles:
360°, 90° Up, 90° Down, 180° Up, 180° Down, 270° Up, 270° Down
- Flow range: 1.26 – 90.9 gpm (4.39 – 338 L/min)
- Dual bearing design – nozzle operates effectively in any orientation



Surface finish ideal for sanitary applications

The HydroWhirl S nozzle is an outstanding combination of design, quality, and engineering. The HydroWhirl S nozzle is ideal for anyone who needs reliable, efficient cleaning of tanks and other interior spaces.

All 360° HydroWhirl S nozzles are available with ATEX approval.



HydroWhirl® S

Tank Washing - Slotted Spray Nozzle

DESIGN FEATURES

- Cleans more quickly, and uses less water and lower pressure than static tank washers
- Surface finish of 0.8 microns R_a or better: ideal for sanitary applications
- Laser-welded design for durability
- Stainless steel construction - corrosion-resistant material
- Connections: threaded, clip-on, and welded
- Made from FDA approved materials for use in Clean-In-Place (CIP) applications

SPRAY CHARACTERISTICS

- Self-cleaning bearings
- Vigorous moving spray action
- Spray Angles: 360°, 90° Down*, 180° Up*, 180° Down, 270° Up, 270° Down, *Not available in all flow rates.

Flow rates: 1.26 to 90.9 gpm

All HydroWhirl S nozzles are available with ATEX approval.



STANDARD CONNECTION SIZES

Additional connection sizes available on request

Connection Type	Nozzle Number														
	HWS-20-3 HWS-20-4 HWS-20		HWS-30-5 HWS-30-6 HWS-30		HWS-40-7.5 HWS-40-8 HWS-40-9 HWS-40			HWS-40HF-11 HWS-40HF			HWS-50-16 HWS-50				
FNPT/G	1/8"	-	1/4"	3/8"	-	1/2"	3/4"	-	1/2"	3/4"	-	1"	1-1/4"	1-1/2"	-
Pipe Clip On		-	-		-	-		-	-		-				
Pipe Weld		1/4"	1/4"		1/2"	1/2"		1"	1/2"		1"	1"			2"
Dim F (in)	0.41	0.54	0.54	0.68	0.84	0.84	1.05	1.32	0.84	1.05	1.32	1.32	1.66	1.90	2.38
Tube Clip On	-	-	-	1/2"	3/4"	-	1"	-	1"	-	1"	1-1/4"	1-1/2"	2"	
Tube Weld	3/8"	1/2"	3/8"			3/4"		3/4"							
Dim F (in)	0.38	0.50	0.38	0.5	0.75	0.75	1.00		0.75	1.00		1.00	1.25	1.5	2.00
DIN Clip On**	DN8	-	-	DN15	-	DN20	DN25	-	DN20	DN25	DN40	DN50			
DIN Weld**		DN10	DN10		DN15			DN15							
Dim F (mm)	10	13	13	19		19	23	29	19	23	29	41		53	

Optimal cleaning performance achieved between 30-50 PSI; maximum operating pressure is 150 PSI.

HydroWhirl® S Flow Rates and Dimensions

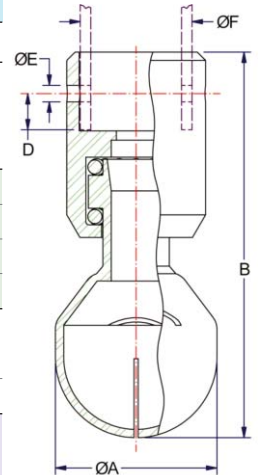
Nozzle Number	GALLONS PER MINUTE @PSI						Dimensions (in)					Wt (oz)	Coverage Diameter (ft) @ 40 PSI
	10 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	A	B (NPT) B (G)	C	D (MAX)	E		
HWS-20-3	1.26	1.63	1.89	2.10	2.28	2.44	0.66	1.68	2.72	0.15	.086	0.88	4.9
HWS-20-4	2.14	2.79	3.26	3.64	3.97	4.26		1.96					6
HWS-20	3.16	4.31	5.45	6.41	7.16	7.83		-					-
HWS-30-5	2.31	3.29	4.12	4.80	5.37	5.88	1.1	2.38	3.28	0.21	.086	3.28	8
HWS-30-6	5.54	6.97	7.98	8.78	9.46	10.1		2.62					
HWS-30	5.70	8.10	9.96	11.5	12.9	14.3		-					
HWS-40-7.5	5.60	7.87	9.60	11.1	12.4	13.6	1.53	3.65	4.25	0.35	.156	10.8	11
HWS-40-8	6.39	8.96	10.9	12.6	14.1	15.4		3.94					
HWS-40-9	7.94	11.3	13.9	16.0	17.8	19.6		-					
HWS-40	9.08	13.1	16.1	18.3	20.3	22.2	1.53	3.65	4.25	0.35	.156	10.6	13
HWS-40HF-11	12.2	17.1	20.8	24.1	26.9	29.4		3.94					
HWS-40HF	15.0	21.3	26.0	29.7	32.6	35.4		-					
HWS-50-16	24.2	33.8	41.4	47.8	53.4	58.5	2.72	6.21	7.09	0.35	.219	53.8	18
HWS-50	37.2	52.4	64.1	74.2	82.9	90.9		6.47					

Standard Materials: Nozzle: 316L Stainless Steel; Ball Bearings: 316 Stainless Steel

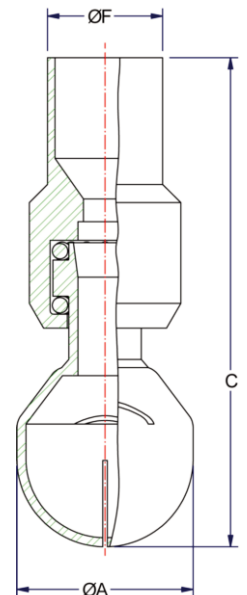
Flow rates represent threaded connections with a 360° spray angle.

Flow rates may vary for other connection types and spray angles.

**Per DIN 11866 Part A



Threaded and Clip On Connections



Weld On Connections

HydroWhirl Poseidon® spray nozzles for quick, efficient tank cleaning

The HydroWhirl Poseidon tank-washing nozzle directs the cleaning water through a rotating head at the tip of the spray assembly. This produces a slow-moving, high-impact spray action against internal surfaces of the tank. The HydroWhirl Poseidon nozzle head uses impact and repetition to quickly break up and wash away contamination. The combination of the spray pattern and slow rotation of the HydroWhirl Poseidon tank-washing nozzle is especially effective at removing scum rings or tougher, stuck-on material.

Advantages of the HydroWhirl® Poseidon® rotary tank-washing nozzle:

- Cleans more quickly and uses less water and lower pressure than static tank washers
- Complete 360° omnidirectional coverage
- Slow rotation speed provides higher impact and more efficient cleaning.
- Durable PTFE nozzle construction withstands extreme chemical and elevated temperature environments.
- Simple internal design allows reliable flow-through operation
- Design validated by lab testing to 200 °F (93 °C)
- Maintenance-friendly design allows disassembly, inspection, and reassembly with basic hand tools.
- Made from FDA-approved materials for use in Clean-in-Place (CIP) applications

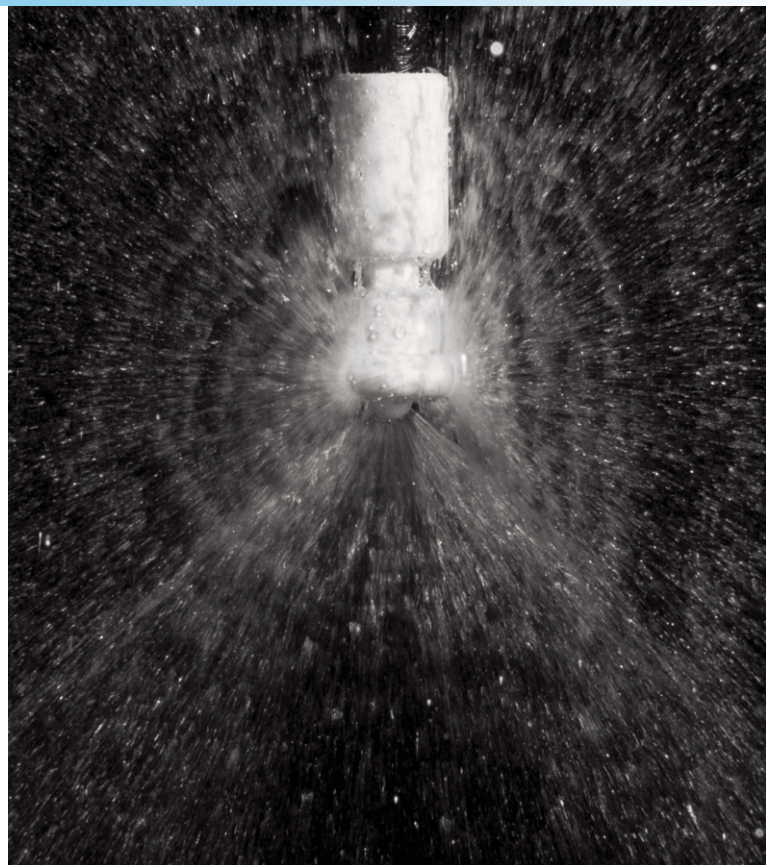
The HydroWhirl Poseidon tank-washing nozzle has been carefully designed for long service life

Comprehensive Quality Control:

- Material traceability controlled throughout production
- BETE product quality is maintained using a quality system registered to ISO 9001-2008

Design flexibility:

- Available with pipe, tube, or DIN clip-on connections. Threaded connections available upon request.
- Flow range: 4.45 to 82.4 gpm



The HydroWhirl Poseidon tank washing nozzle is an outstanding combination of design, quality, and performance.

The HydroWhirl Poseidon tank washing nozzle is ideal for anyone who needs a polymer nozzle for reliable, efficient cleaning of tanks and other interior spaces.

HydroWhirl® Poseidon®

Tank Washing - PTFE Spray Nozzle

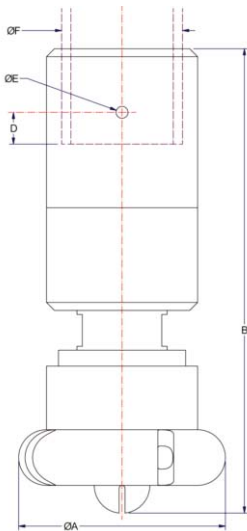
DESIGN FEATURES

- Cleans more quickly, and uses less water and lower pressure than static tank washers
- PTFE construction:
 - Ideal for harsh chemical environments
 - Corrosion resistant
- Four connections: threaded, pipe, tube, or DIN clip-on.
- Made from FDA-approved materials for use in Clean-In-Place (CIP) applications.

SPRAY CHARACTERISTICS

- Slow spinning, longer spray dwell time on the target surface increases impact over conventional rotating designs
- Complete 360° omnidirectional spray pattern

Flow rates: 4.45 to 82.4 gpm



STANDARD CONNECTION SIZES

Connection Type	Nozzle Number											
	HWP-10			HWP-23 HWP-28			HWP-32 HWP-37			HWP-48 HWP-55 HWP-65 HWP-73		
FNPT/BSP	1/4"	3/8"	1/2"	3/8"	1/2"	3/4"	1/2"	3/4"	1"	1"	1-1/4"	1-1/2"
Pipe Clip-On							X					
Dim F (in)	0.54	0.68	0.84	0.68	0.84	1.05	0.84	1.05	1.32	1.32	1.66	1.90
Tube Clip-On	1/2"	3/4"	3/4"	1"	1"	1"	1"	1-1/4"	1-1/2"	1-1/2"	1-3/4"	1-3/4"
Dim F (in)	0.50	0.75	0.75	1.00	1.00	1.00	1.00	1.25	1.50	1.50	1.75	1.75
DIN Clip On (DIN 11866 Part A)	DN10	DN15	DN15	DN20	DN20	DN20	DN20	DN25	DN25	DN25	DN40	DN40
Dim F (mm)	13	19	19	23	23	23	23	29	29	29	41	41

HydroWhirl Poseidon Nozzle Flow Rates* and Dimensions

Nozzle Number	Spray Angle	GALLONS PER MINUTE @PSI						Dimensions (in)				Wt (oz)	Coverage Diameter (ft) @40PSI
		10 psi	20 psi	30 psi	40 psi	50 psi	60 psi	A	B	D MAX	E		
HWP-10	360°	4.45	6.31	7.75	8.96	10.0	11.0	1.68	3.94	0.50	0.09	3	9
HWP-23		9.42	13.4	16.5	19.0	21.3	23.4	1.95	4.12	0.50	0.16	4	11
HWP-28		10.7	15.2	18.6	21.5	24.0	26.3						14
HWP-32		11.7	16.8	20.8	24.1	27.1	29.8	3.00	6.40	0.50	0.19	21	14
HWP-37		15.1	21.6	26.5	30.8	34.5	37.9						16
HWP-48		20.6	29.3	36.0	41.7	46.8	51.3	3.30	7.30	0.50	0.19	29	24
HWP-55		23.5	33.4	41.1	47.6	53.3	58.5						
HWP-65		30.7	43.4	53.3	61.6	68.9	75.5						
HWP-73		33.4	47.4	58.2	67.2	75.2	82.4						25

Standard Materials: Nozzle: PTFE; Retaining Clip: 316 stainless steel

*Flow rates shown are for threaded connections, clip-on flow rates may differ. Contact BETE for more information.

www.BETE.com

HydroWhirl Orbitor 100 tank cleaning machine is ideal for high impact cleaning

The HydroWhirl® Orbitor 100 is a versatile tank cleaning machine designed to meet the high standards required in the food, brewing, beverage, dairy, and chemical industries combining high performance cleaning efficiency with extended operating life and reduced life cycle costs.

Advantages of the HydroWhirl Orbitor 100 tank cleaning machine.

- The HydroWhirl Orbitor 100 can be stripped, maintained, and rebuilt in less than 15 minutes.
- The HydroWhirl Orbitor 100 is self cleaning and self lubricating.
- Enhanced external cleaning with dedicated nozzles that clean the external surfaces of the machine and its mounting pipe.
- The HydroWhirl Orbitor 100 is ideal for use in small to medium tanks where the product is difficult to clean and where high impact cleaning is required.
- Designed with minimum moving parts to ensure extended operating life and reduced down time.
- Easily fits through Ø4" (100 mm) openings; or Ø3.35" (85 mm) when nozzle head vertically aligned

Available Versions:

- 4 nozzle machines
- Variable cycle times
- Female connections

HydroWhirl Orbitor 100 Applications:

Typically used where high impingement cleaning is required and where the most efficient use of utilities is necessary.

BREWING & WINERIES

Bright beer tanks, coppers, maltings, brew kettles, fermentors, storage tanks

COATINGS AND PAINTS

Storage silos, process vessels, mixers

FOOD AND DAIRY

Raw milk storage, spray driers, process vessels, storage silos

CHEMICAL

Process vessels, mixers, storage silos

BEVERAGE

Process vessels, storage silos



Key Features and Benefits:

- Designed to meet hygienic standards; external surface finish: 0.5 microns Ra or better
- Self cleaning; self lubricating = no process contamination
- Optimum consumption of water, chemicals, and time = reduced operating costs
- Minimum moving parts = reduced lifecycle costs
- High impact jets; orbital wash pattern = high efficiency cleaning process
- Compact design = will fit through small access flanges and vessel openings
- 4 nozzle configurations



Orbitor 100

HydroWhirl Orbitor

HydroWhirl® Orbitor 100

High Impact Rotary Tank Cleaning Machine

DESIGN FEATURES

- Easily field-serviced to reduce maintenance costs
- Minimum moving parts to extend operating life
- Self cleaning; self lubricating
- High-impact jets; orbital wash pattern = high efficiency cleaning process
- Ideal for small to medium tanks, easily fits through Ø4" (100 mm) openings
- 4 nozzle configurations
- Female connections

SPRAY CHARACTERISTICS

- 360° wash pattern
- Variable cycle times
- High impact cleaning

Flow rates: 12 - 52.4 gpm

Working Pressure: 45 - 145 psi

Materials:

Housing and Nozzle Head: 316L

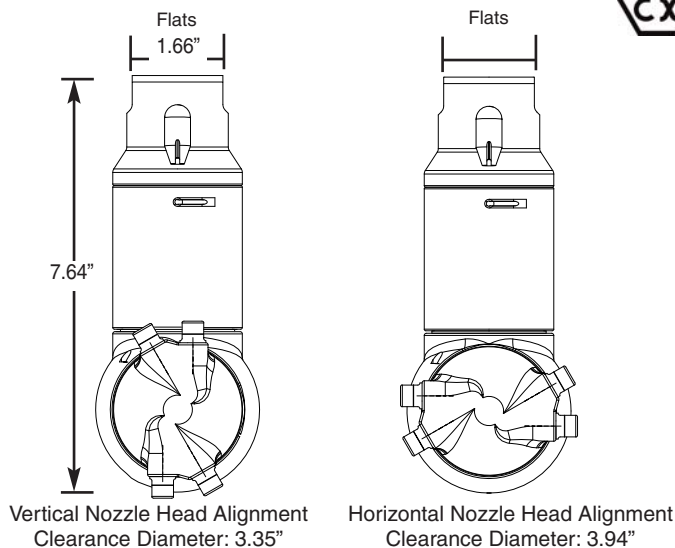
Gears: PEEK + 316 SS

Bushings/Seals: Carbon Filled PTFE

Max. Working Temp.: 200 °F (95 °C)

Max. Ambient Temp.: 285 °F (140 °C)

Weight: 5.5 Lbs



All HydroWhirl Orbitor 100 tank cleaning machines are available with ATEX approval

Performance may vary with ATEX models.



4 nozzle spray pattern

# Nozzles X Orifice Size	4 x 3mm			4 x 4mm			4 x 5mm			4 x 6mm		
Connection Size	3/4" and 1"			3/4" and 1"			3/4" and 1"			3/4" and 1"		
Pressure (PSI)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)
45	12.0	12.5	6.0	17.8	14.4	5.4	23.7	16.4	4.4	30.6	18.0	3.9
60	13.9	14.9	5.4	20.3	17.1	4.7	26.7	19.1	3.9	34.0	20.6	3.4
75	15.8	17.0	4.8	22.7	19.4	4.1	29.6	21.4	3.4	37.3	22.9	3.0
90	17.6	18.8	4.3	25.1	21.3	3.6	32.3	23.2	3.0	40.6	24.7	2.6
100	18.8	19.8	4.0	26.6	22.3	3.3	34.1	24.3	2.8	42.8	25.7	2.4
115	20.5	21.0	3.6	28.9	23.6	2.9	36.7	25.4	2.4	46.0	26.9	2.1
130	22.2	22.0	3.2	31.2	24.5	2.7	39.1	26.2	2.2	49.2	27.8	1.9
145	23.9	22.6	2.9	33.4	25.0	2.5	41.4	26.6	2.0	52.4	28.2	1.7

www.BETE.com

Jet lengths are effective cleaning lengths

HydroWhirl® Orbitor tank cleaning machine is ideal for high impact cleaning

The HydroWhirl® Orbitor is a versatile tank cleaning machine designed to meet the high standards required in the food, brewing, beverage, dairy, and chemical industries combining high performance cleaning efficiency with extended operating life and reduced life cycle costs.

Advantages of the HydroWhirl Orbitor tank cleaning machine.

- The HydroWhirl Orbitor can be stripped, maintained, and rebuilt in less than 15 minutes.
- The HydroWhirl Orbitor is self cleaning and self lubricated.
- Enhanced external cleaning with dedicated nozzles that clean the external surfaces of the machine and its mounting pipe.
- Designed for use where high impact cleaning is required.
- The HydroWhirl Orbitor is ideal for use in larger tanks and where the product is difficult to clean.
- Designed with minimum moving parts to ensure extended operating life and reduced down time.

Available Versions:

- 2 or 4 nozzle machines
- Variable cycle times
- Male or Female connections
- 360° wash pattern
- 180° down wash pattern
- 180° up wash pattern

Typical HydroWhirl Orbitor Applications:

Typically used where high impingement cleaning is required and where the most efficient use of utilities is necessary.

BREWING

Bright beer tanks, coppers, maltings

COATINGS AND PAINTS

Storage silos, process vessels, mixers

FOOD AND DAIRY

Raw milk storage, spray driers, process vessels, storage silos

CHEMICAL

Process vessels, mixers, storage silos

BEVERAGE

Process vessels, storage silos



Key Features and Benefits:

- Designed to meet hygienic standards
- Optimum consumption of water, chemicals, and time = reduced operating costs
- Minimum moving parts = reduced lifecycle costs
- Self cleaning; self lubricating = no process contamination
- High impact jets; orbital wash pattern = high efficiency cleaning process
- Compact design = will fit through small access flanges
- 2 or 4 nozzle configuration = wash pattern variable up to super intense
- External Surface Finish: 0.5 microns Ra or better



All HydroWhirl Orbitor tank cleaning machines are available with ATEX approval.

HydroWhirl® Orbitor

High Impact Rotary Tank Cleaning Machine

DESIGN FEATURES

- Easily field-serviced to reduce maintenance costs
- Minimum moving parts to extend operating life
- Self cleaning; self lubricating
- High-impact jets; orbital wash pattern = high efficiency cleaning process
- Compact design
- 2 or 4 nozzle configurations = wash pattern variable up to super intense
- Male or female connections



Orbitor 2 nozzle
spray pattern



Orbitor 4 nozzle
spray pattern

SPRAY CHARACTERISTICS

- 360° wash pattern.
180° patterns available on request
- Variable cycle times
- High impact cleaning

Flow rates: 21.5 - 160 gpm

Working Pressure: 45 - 145 psi

Materials:

Housing: 316L
Nozzle Head: 316L
Gears: PEEK + 316 SS
Bushings/Seals: Carbon Filled PTFE

Max. Working Temp.: 200 °F (95 °C)

Max. Ambient Temp.: 285 °F (140 °C)

Weight: 16.5 Lbs

Minimum opening size is 5" for either 2-nozzle or 4-nozzle standard-capacity model.



All HydroWhirl Orbitor tank cleaning machines are available with ATEX approval.



Jet lengths are effective cleaning lengths

# Nozzles X Orifice Size	4 X 4.2 mm			4 x 5 mm			4 x 6 mm			4 x 7 mm			4 x 8 mm		
Connection Size	1" and 1-1/2"			1" and 1-1/2"			1-1/2"			1-1/2"			1-1/2"		
Pressure (PSI)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)
45	22.6	9.5	11	31.4	13.1	13	38.6	17.4	15.5	59.1	21.3	11.4	68.3	23.6	15.5
60	26.5	9.8	9.3	36.4	13.8	10.8	45.7	18.7	12.9	67.7	23.3	9.8	79.0	26.2	12.9
75	30.0	11.5	7.9	40.8	15.4	9.4	52.1	20.3	11	75.2	25.3	8.7	88.4	29.5	11
90	33.3	13.1	6.9	44.8	17.1	8	58.0	23.0	9.5	81.9	27.9	8.1	96.9	32.5	9.5
100	35.3	16.4	6.3	47.2	20.7	7.3	61.8	26.2	8.4	86.0	30.8	7.5	102	34.8	8.5
115	38.1	20.3	5.8	50.8	24.6	6.8	67.0	30.8	7.6	91.9	33.8	7.1	110	36.7	7.8
130	40.8	23.3	5.6	54.0	27.9	6.5	72.1	33.8	7	97.3	36.7	6.9	117	40.0	7
145	43.4	25.6	5.5	57.2	29.5	6.4	76.8	36.7	6.9	102	39.4	6.6	123	42.6	6.9
# Nozzles X Orifice Size	2 x 6 mm			2 x 7 mm			2 x 8 mm			*2 x 10 mm			*2 x 12.5 mm		
Connection Size	1-1/2"			1-1/2"			1-1/2"			1-1/2"			1-1/2"		
Pressure (PSI)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)	Flow (gpm)	Jet Length (ft)	Cycle Time (min)
45	21.5	18.0	33	26.1	21.3	37.5	33.5	23.6	25.7	59.1	32.1	41	89.4	33.1	26.8
60	25.4	19.7	27.2	31.3	23.6	31.6	39.3	26.2	22.9	68.7	34.4	34.2	103	36.7	24
75	28.8	20.7	24.7	36.0	25.9	28.2	44.4	29.5	20.5	77.2	37.7	30.5	115	39.7	21.7
90	31.9	23.0	22.6	40.4	27.9	25.8	49.1	32.5	18.9	84.9	41.7	28	126	44.0	19.8
100	33.9	26.2	21	43.2	29.2	24	52.0	34.8	17.5	89.8	45.6	26	133	48.5	18.4
115	36.7	29.5	19.5	47.2	30.2	22.3	56.2	36.7	16.4	96.6	49.9	24.5	143	53.8	17.2
130	39.4	33.5	18.4	51.1	37.0	21	60.1	40.0	15.6	103	55.8	23.2	152	60.0	16.3
145	41.9	37.7	17.4	54.7	40.4	20	63.8	42.6	14.9	109	61.7	22	160	65.9	15.5

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*High Capacity Jet Machine

TW

Tank Washing

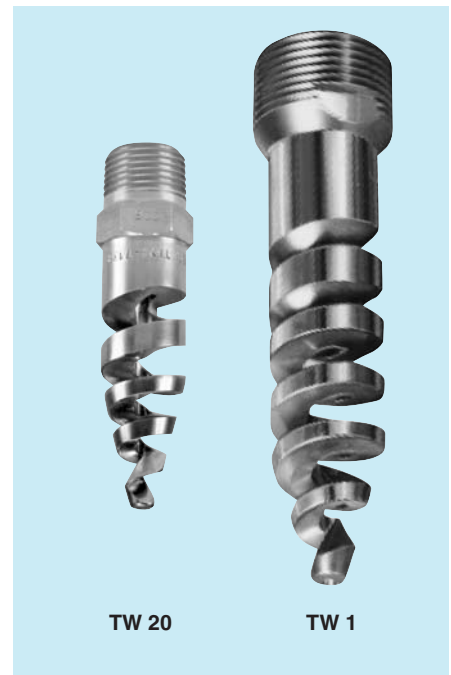
DESIGN FEATURES

- Clog-resistant spiral design
- Energy efficient
- Compact design; fits small openings

SPRAY CHARACTERISTICS

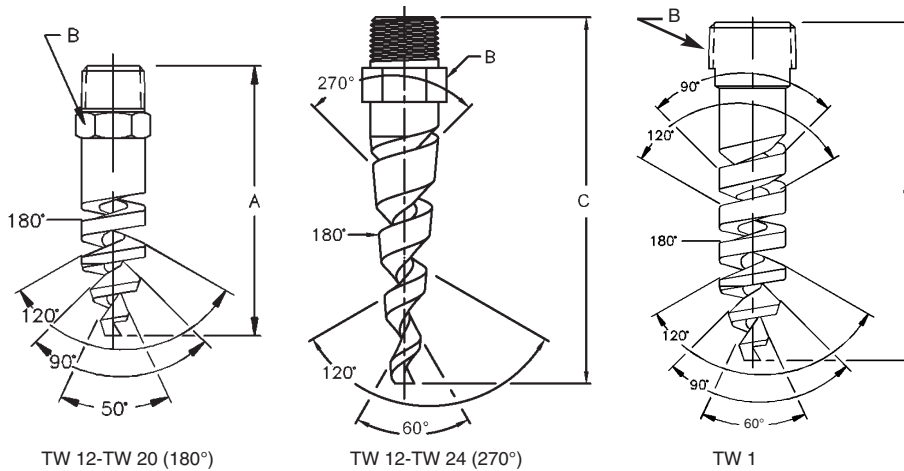
- Easy to maintain
- Unique patterns that spray in opposing directions

Flow rates: 3.0 to 163 gpm



TW 20

TW 1



TW 12-TW 20 (180°)

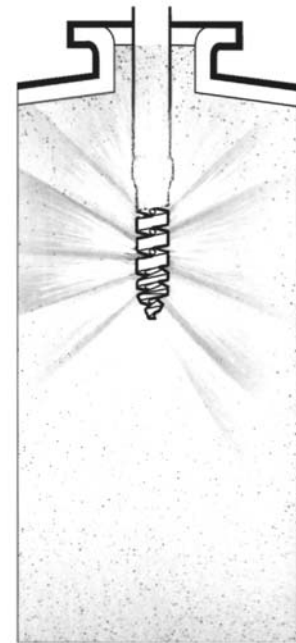
TW 12-TW 24 (270°)

TW 1

Tank Washing TW Coverage Chart When spraying at 30-40 PSI

Pipe Size	Nozzle Number	Scrubbing Diameter (ft.)	Rinsing Diameter (ft.)
3/8	TW12	1.25	2.5
	TW14	1.5	4.0
	TW16	2.0	5.0
	TW20	3.0	7.0
1/2	TW24	4.0	9.0
1	TW1	8.0	20

Dimensions are approximate. Check with BETE for critical dimension applications.



Tank Washing Flow Rates and Dimensions TW 180° and 270°, 3/8", 1/2", and 1" Pipe Sizes

Male Pipe Size	Nozzle Number	Available Spray Angle	K Factor	GALLONS PER MINUTE @ PSI										Approx. (in.)		Dimensions (in.)			Wt. (oz.)
				10 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI	Orifice Dia	Free Pass. Dia.				
3/8	TW12	180° 270°	0.949	3.00	4.24	5.20	6.00	6.71	7.35	8.49	9.49	13.4	19.0	0.19	0.13	2.88	0.75	3.63	1.75
	TW14	180° 270°	1.28	4.05	5.73	7.01	8.10	9.06	9.92	11.5	12.8	18.1	25.6	0.22	0.13				
	TW16	180° 270°	1.68	5.30	7.50	9.18	10.6	11.9	13.0	15.0	16.8	23.7	33.5	0.25	0.13				
	TW20	180° 270°	2.61	8.25	11.7	14.3	16.5	18.4	20.2	23.3	26.1	36.9	52.2	0.31	0.13				
1/2	TW24	270°	3.81	12.1	17.0	20.9	24.1	26.9	29.5	34.1	38.1	53.9	76.2	0.41	0.17		0.88	4.25	6.4
1	TW1	270°	8.06	26.0	36.0	45.0	51.0	57.0	63.0	72.0	80.6	115	163	0.56	0.20		1.13	5.75	10.5

Flow Rate (GPM) = $K \sqrt{PSI}$

Standard Materials: Brass, 316 Stainless Steel

CLUMP

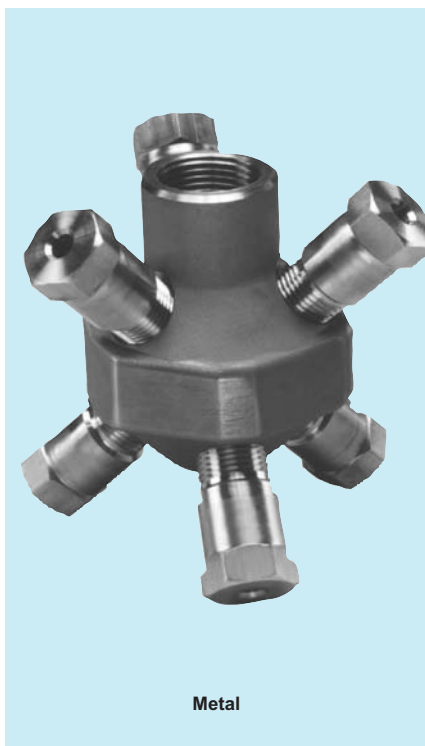
Tank Washing Nozzles

DESIGN FEATURES

- Each nozzle in the stationary cluster is a BETE clog-resistant full cone nozzle of the MaxiPass® series
- Can be supplied with various other BETE nozzles for any desired application
- Female connection

SPRAY CHARACTERISTICS

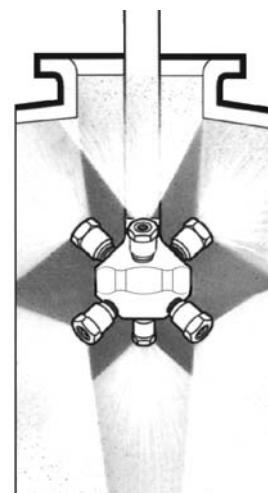
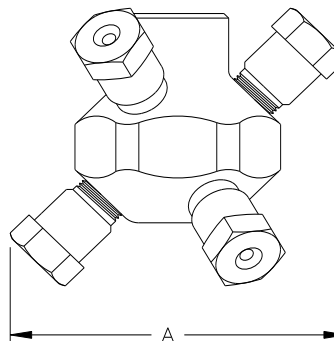
- Spherical omnidirectional coverage
 - Six nozzles arranged in cluster to project spray in all directions
- Flow rates:** 7.52 to 80.6 gpm
(Special flow rates available)



CLUMP Coverage Chart

When spraying at 40-50 psi

Female Pipe Size	Nozzle Number	Scrubbing Diameter (ft.)	Rinsing Diameter (ft.)
3/4"	CLUMP125	4	8
	CLUMP156	4	12
	CLUMP187	6	14
1"	CLUMP187	6	14
	CLUMP218	8	14
	CLUMP250	10	16



Dimensions are approximate. Check with BETE for critical dimension applications.

Typical CLUMP installation

CLUMP Flow Rates and Dimensions

Spherical, 360° Spray Angle, 3/4" and 1" Pipe Size

Female Pipe Size	Nozzle Number	K Factor	GALLONS PER MINUTE @ PSI							Minimum Entrance Opening (in.) A	Weight (oz.)	
			10 PSI	15 PSI	20 PSI	30 PSI	40 PSI	60 PSI	80 PSI		Metal	Plas.
3/4"	CLUMP125	2.50	7.36	8.91	10.2	12.3	14.1	17.1	19.6	4.75	36.32	4.82
	CLUMP156	3.96	11.7	14.2	16.2	19.6	22.4	27.1	31.1			
	CLUMP187	5.72	16.9	20.4	23.4	28.3	32.4	39.2	44.9			
1"	CLUMP187	5.72	16.9	20.4	23.4	28.3	32.4	39.2	44.9	5.75	69.60	9.26
	CLUMP218	9.10	26.9	32.5	37.2	45.0	51.5	62.3	71.4			
	CLUMP250	10.30	30.3	36.7	42.0	50.8	58.2	70.4	80.6			

$$\text{Flow Rate (GPM)} = K (\text{PSI})^{0.47}$$

Standard Materials: 316 Stainless Steel and Brass. Other materials available on request.

Spray angle performance varies with pressure. Contact BETE for specific data on critical applications.



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