

*ENGINEERING  
YOUR SPRAY SOLUTION*



## Precision Spray Nozzles for the Food and Beverage Industry



**Food and Beverage  
Industry**

# LECHLER – YOUR COMPETENT NOZZLE TECHNOLOGY PARTNER

The food and beverage industry is facing enormous challenges. To offer consumers a more extensive product range, improved processes are required. At the same time, increasingly strict hygiene regulations and increasing rationalization pressure are demanding highly efficient and safe processes.



For over 130 years, Lechler has been developing and manufacturing precision nozzles for various applications. We utilize all of the experience acquired throughout our company's history to provide conventional

and innovative solutions. Lechler has been at the forefront of innovation in nozzle technology due to the extensive knowledge of nozzles and deep understanding of industry processes among our 670 employees.

Today, Lechler manufactures nozzles in Germany, the USA, England, Hungary, India, and China. We have a passion for precision innovation and

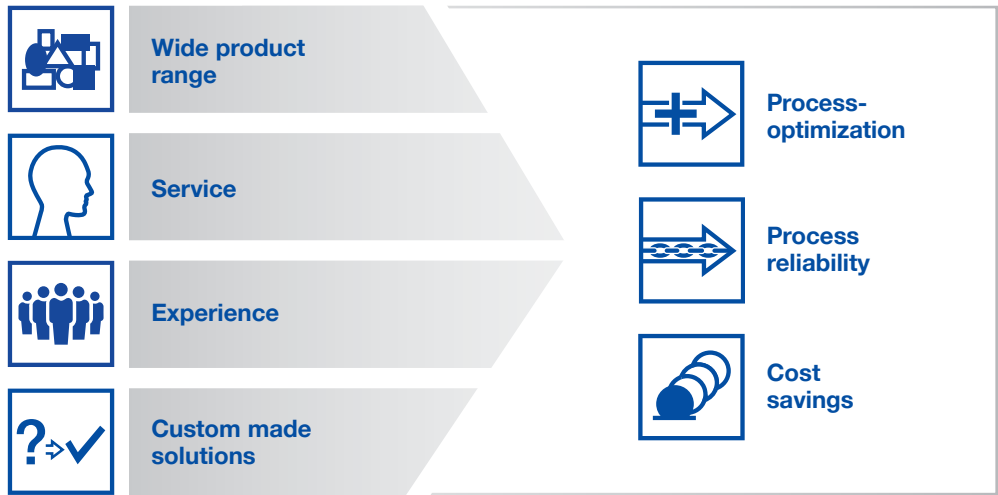
the drive to always be better. Our global sales network includes more than 40 sales offices around the world.



# WIDE RANGE OF SERVICES FOR YOUR SUCCESS

ENGINEERING YOUR SPRAY SOLUTION 

## CUSTOMER ADVANTAGES



### Nozzles for the food and beverage industry

In this brochure we have compiled an overview of our precision spray nozzles for the food and beverage industry.

If you cannot find a suitable solution for your particular application, please contact us. Our application engineers would be happy to develop the optimum solution for your needs.

We will provide you with our solutions throughout the process chain:

-  **Disinfection and hygiene**
-  **Product preparation**
-  **Product processing**
-  **Filling and packing**

Thanks to our detailed knowledge of the individual process steps, we are also able to offer you advice on an individual basis and work out custom solutions for you.

**You will find more information, ideas and tools for using nozzle technology and spraying technology at [www.LechlerUSA.com](http://www.LechlerUSA.com)**

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# LECHLER NOZZLES ARE USED IN MANY FIELDS IN THE FOOD AND BEVERAGE INDUSTRY



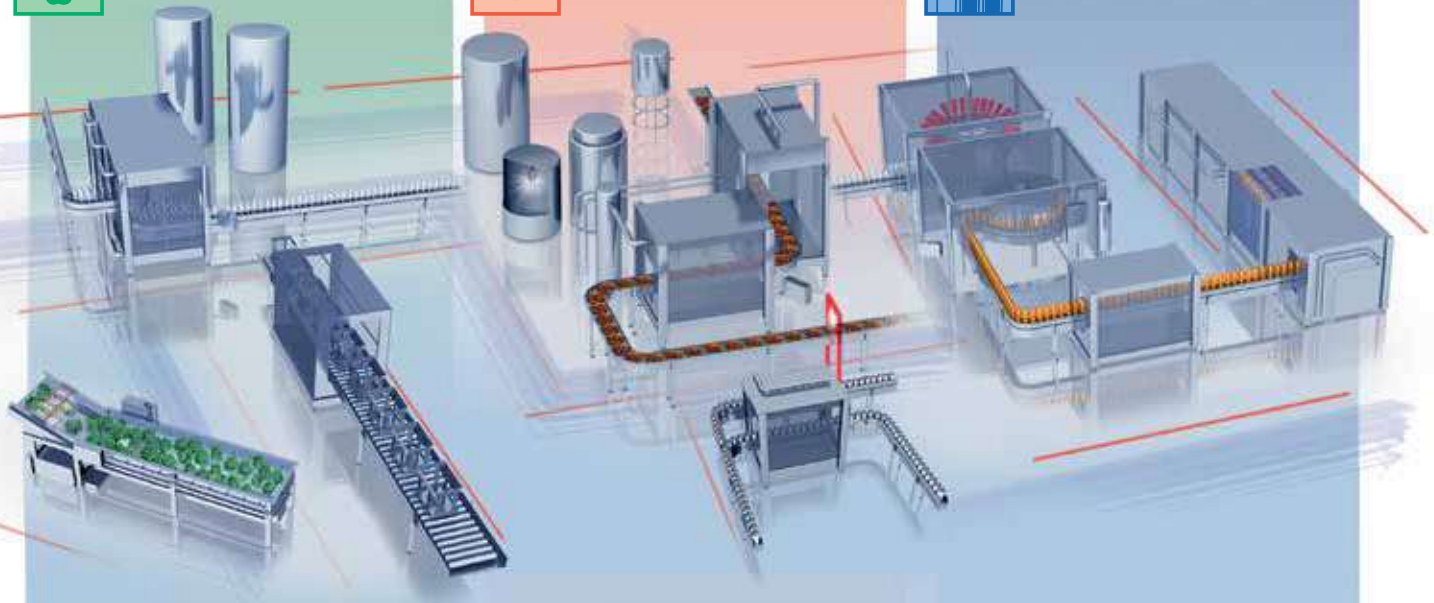
## Product preparation



## Product processing



## Filling and packing



### Tank cleaning / CIP

### Belt lubrication

### Belt cleaning

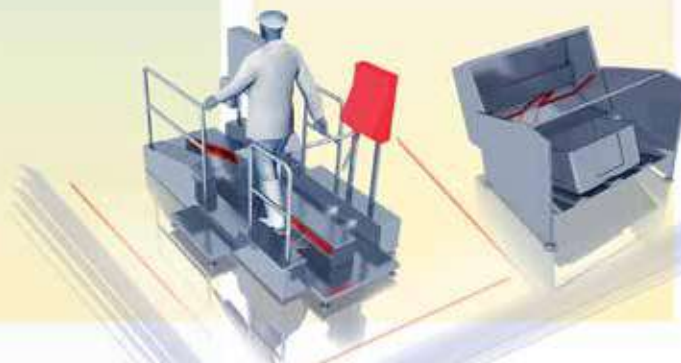
- Container washers
- Cleaning of fruit and vegetables
- Pretreatment of equipment
- Humidification
- Bottle and barrel cleaning
- Filter cleaning

- Product cleaning
- Release agent spray deposition
- Soaking
- Coating
- Degassing of liquids
- Concentrating
- Belt cooling
- Spray drying

- Filler cleaning
- Pasteurization
- Sterilization
- Sorting cans and bottles
- Detection
- Anti-scuffing
- PET bottle cooling



## Disinfection and hygiene



- Disinfection
- Hand disinfection
- Boot disinfection
- Room disinfection
- Hygiene sluices





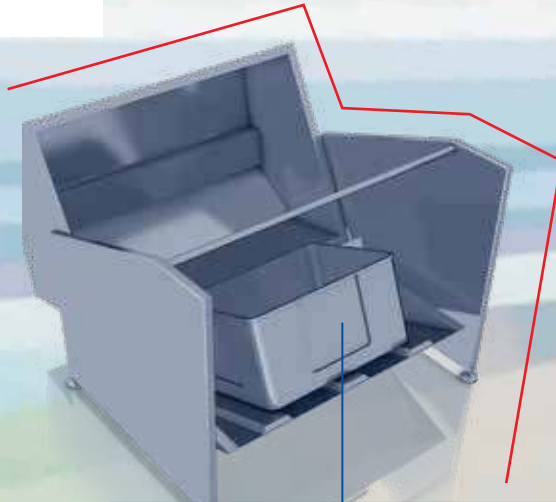
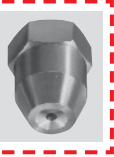
# LECHLER NOZZLES FOR DISINFECTION AND HYGIENE APPLICATIONS



## Hand disinfection

Hygiene sluices are a fundamental element of production that is as sterile as possible.

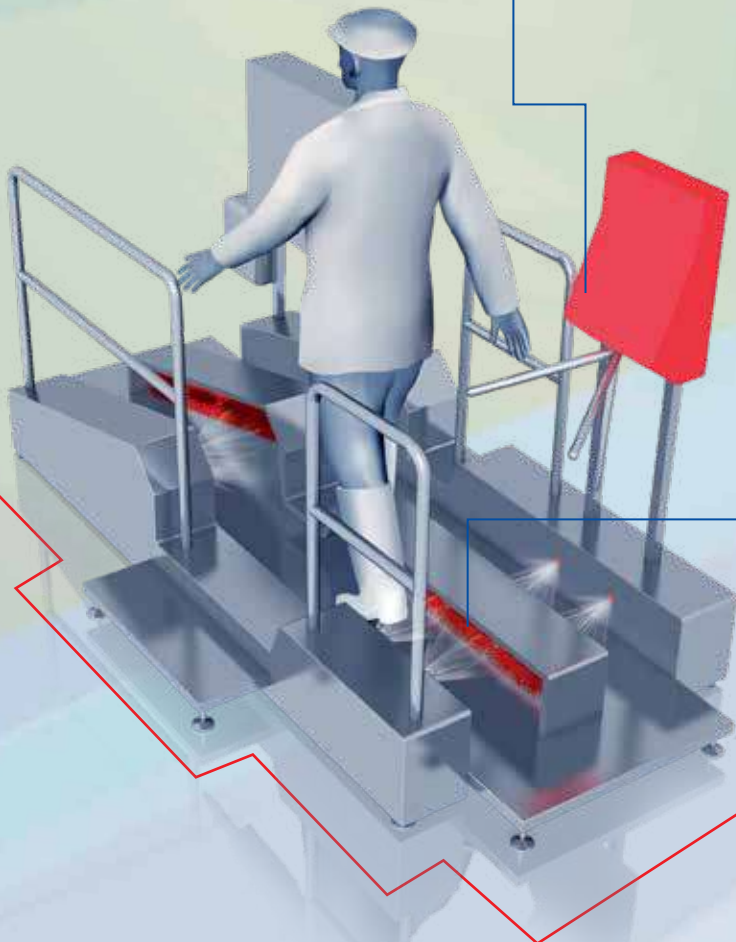
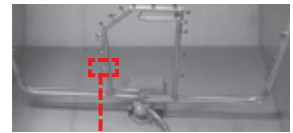
**Hollow cone nozzles** atomize disinfectants very finely and ensure wide surface coverage and high disinfectant efficiency.



## Work equipment disinfection

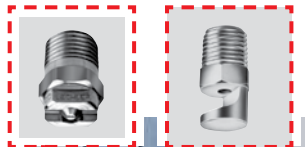
Short throughput times are needed when cleaning and disinfecting trolleys and containers for production.

**Flat fan nozzles** with a high spray force are the first choice for that job.



## Sole and boot cleaning

These systems are mostly linked in combination with hand disinfectant systems. For cleaning the brushes and spraying with new disinfectant, we recommend our **series 632 and 686 flat fan or deflector nozzles**.



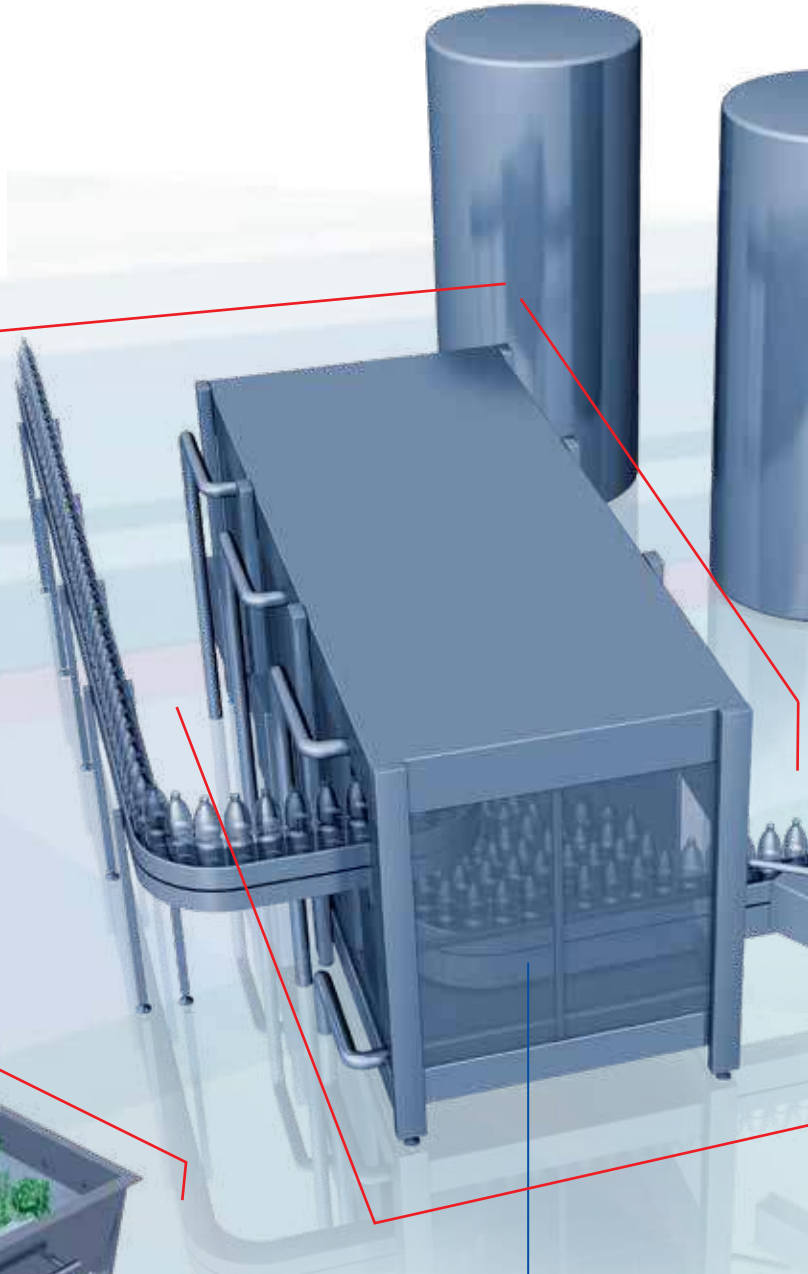
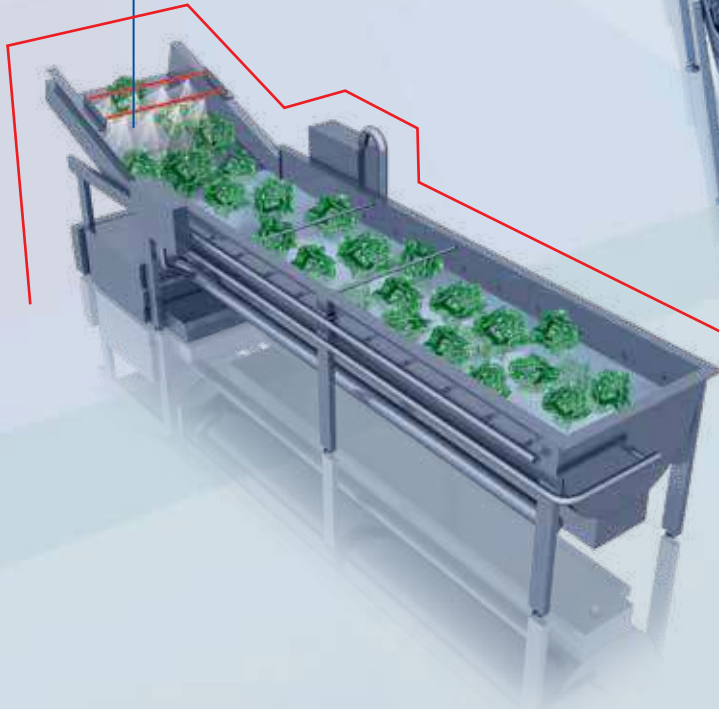
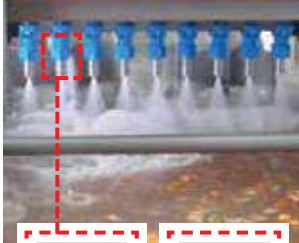


# LECHLER NOZZLES FOR PRODUCT PREPARATION APPLICATIONS



## Cleaning of fruit and vegetables

**Series 468 full cone nozzles** with a 60° spray angle clean cut fruits and vegetables. Simple assembly with an eyelet clamp and bayonet quick release allows nozzles to be changed quickly.



## Bottle and barrel cleaning

Various types of nozzles are used in these systems. **Flat fan** and **deflector-type nozzles** are used for powerful cleaning of heavy dirt. **Full cone nozzles** are utilized for rinsing applications and **tank cleaning nozzles** are used for cleaning the interior of barrels.



### Equipment cleaning and tank cleaning

**High impact tank cleaning machines and tank cleaning nozzles** with controlled rotation speed were specially developed for tackling very heavy dirt. The example shows the **high impact tank cleaning machine 5TM** in a bottle washing machine.



### Other nozzle applications in the product preparation field

- Humidification
- Filter cleaning
- Foam suppression
- Animal carcass cleaning
- Drum and plate washing systems e.g. for cleaning fish
- Cleaning, lubricating cutting knives, belts and other equipment.
- Product detection with air
- Blowing off surfaces with air

### Pack washers

In most cases, cleaning is performed with a mixture of immersion baths and spraying stations. The preferred option is **flat fan nozzles**. **Deflector nozzles** produce a particularly powerful flat fan spray at low pressure.





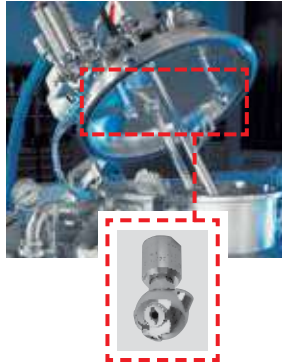


# LECHLER NOZZLES FOR PRODUCT PROCESSING APPLICATIONS



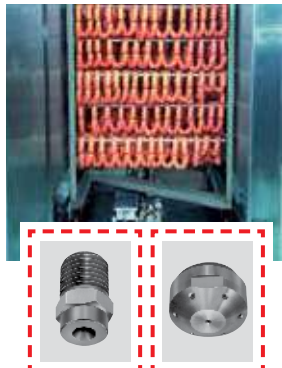
## Cleaning containers

Optimum container cleaning requires targeted harmonization with the respective application. Lechler offers a wide range of **Tank cleaning rotating nozzles** and will support you in finding the right solution.



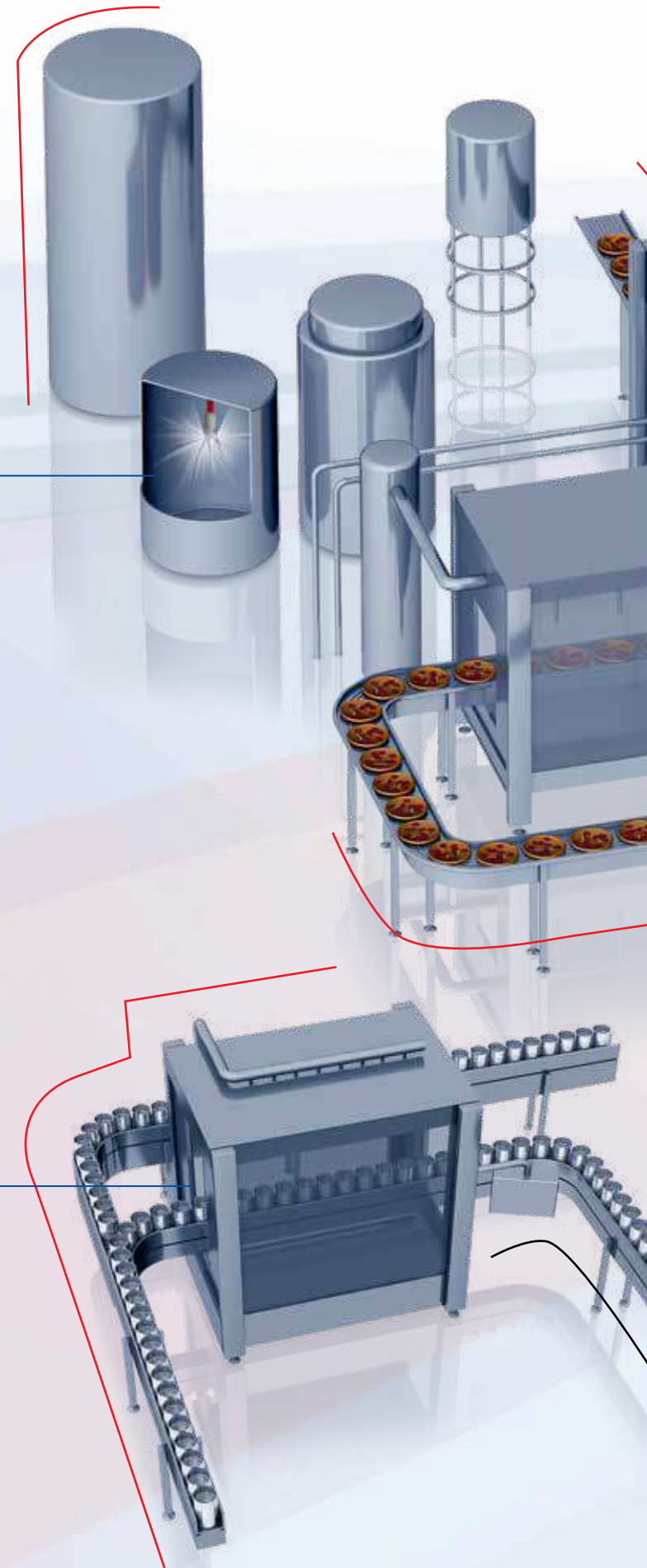
## Sausage cooling

In the meat-processing industry, sausage products are cooled by means of sausage showers. **Full cone nozzles or cluster head nozzles** are frequently used for that process.



## Can cleaning

Before the foodstuffs are transferred, the cans must be disinfected on both the outside and inside. **Flat fan nozzles** and **full cone nozzles** can be utilized for this process.







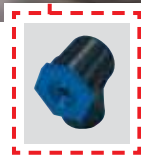
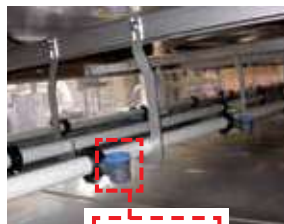
### Coating or disinfecting

Coating or disinfecting operations are widespread in food processing. The **VarioSpray II nozzle valve system** with pulse width modulation impresses with its enormous flexibility and offers the possibility of spraying very small, precise volumes of fluid.



### Belt cooling

With belt cooling, the product (e.g. rissoles) is transported on a belt. The underside of the belt is sprayed with water or a coolant. Due to the fine droplets, **hollow cone nozzles** are often used for this process.



### Other applications

Product cleaning

Soaking

Concentrating

Degassing of liquids

Release agent spray deposition

Spray drying

Blanching of vegetables

Sugar production

Tobacco processing



# LECHLER NOZZLES FOR FILLING AND PACKING

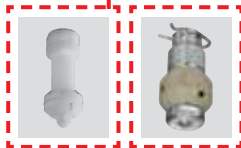
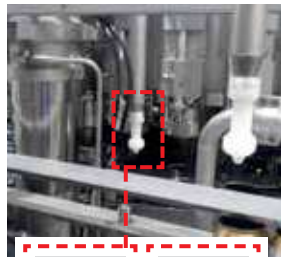
## Sterilization



Disinfection is an essential step in the production of food and beverage. The example shows **series 136 pneumatic atomizing nozzles** for the internal disinfection of PET bottles.

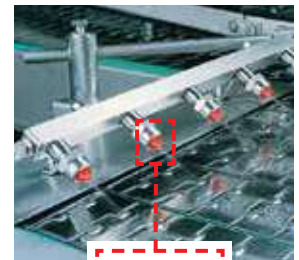
## Filler equipment cleaning

Filling machines are cleaned regularly with a permanently installed nozzle system. For this process, Lechler supplies **series 500 rotating cleaning nozzles** and **series 594/595 hygienic whirly nozzles** with FDA and EHEDG approval.



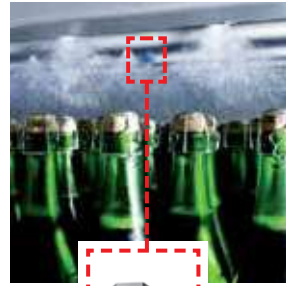
## Belt lubrication

This term refers to spraying a soapy solution, known as the belt lubricant, onto the conveyor belt in order to reduce the friction coefficient. Special **series 652.xxx.8H.03 flat fan nozzles** are used for this process.



### Pasteurization

One of the final production stages is the targeted heating of the product in a pasteurizer. The heat is transferred using **Lechler full cone or hollow cone nozzles** that apply a dense water film onto the packaging.



### Other applications

- Rinsing of bottles
- Anti-scuffing
- Cooling and moistening bread
- Release agent application
- Drying labels and bottles
- Sorting cans and bottles
- Product detections with air
- PET bottle cooling

### Package and label drying

There are numerous applications in which **Lechler air nozzles**, such as the **Whisperblast® series**, are preferred because of the low level of noise produced compared to the standard **air nozzles**. In the example to the right, **Lechler Whisperblast® nozzles** are being used for drying the seal so that the subsequent marking is not smudged.





# WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

<p>① <b>The fundamentals of cleaning technology</b></p> <p>Sinner's circle</p> <p>Cost reduction with efficient cleaning processes</p>	<p>⑤ <b>Spray angle and spraying behavior</b></p>
<p>② <b>Mechanical cleaning with Lechler rotating cleaning nozzles</b></p> <p>Cleaning effects</p> <p>Foam cleaning with Lechler nozzles</p>	<p>⑥ <b>Hygienic design and surface quality</b></p> <p>⑦ <b>Fluid distribution</b></p> <p>⑧ <b>Droplet sizes</b></p> <p>⑨ <b>Temperature behavior</b></p> <p>⑩ <b>Viscosity</b></p> <p>⑪ <b>Narrowest cross section</b></p> <p>⑫ <b>Connections</b></p> <p>⑬ <b>Materials and wear</b></p>
<p>③ <b>Chemical cleaning</b></p> <p>Foam cleaning with Lechler nozzles</p>	
<p>④ <b>Impact</b></p> <p>Impact surface and spray pattern</p> <p>Pressure</p> <p>Flow rate</p>	

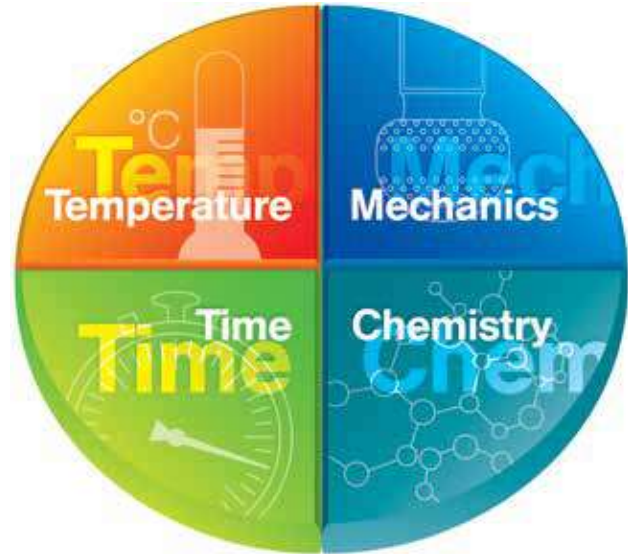


Figure 1: Sinner's circle with equal proportions of the temperature, time, chemistry and mechanical factors.

## ① The fundamentals of cleaning technology

### Sinner's circle

The Sinner's circle illustrates the interplay between the four main factors for successful cleaning:

- Chemistry (choice of cleaning agent)
- Mechanical (removal of dirt with pressure or friction)
- Temperature (at which cleaning is performed)
- Time (duration of the total cleaning processes)

The proportion of the individual factors as a part of the entire cleaning process can be varied, provided that the total is 100 percent. This results in significant savings potentials. As a result, the intensification

of mechanical cleaning enables the consumption of cleaning agents or the duration of cleaning to be reduced. Consequently, the mechanical factor takes up a greater part of the Sinner's circle, while the other factors can end up being reduced.

### Cost reduction via efficient cleaning processes

This is precisely where our nozzles and rotating cleaning nozzles come into play, having been specifically developed for delivering a high mechanical cleaning action. Their greater efficiency helps to permanently reduce ongoing costs for energy and cleaning agents, and also the duration of cleaning. Consequently, a one-off investment in improved nozzle technology pays for itself after only a short time.

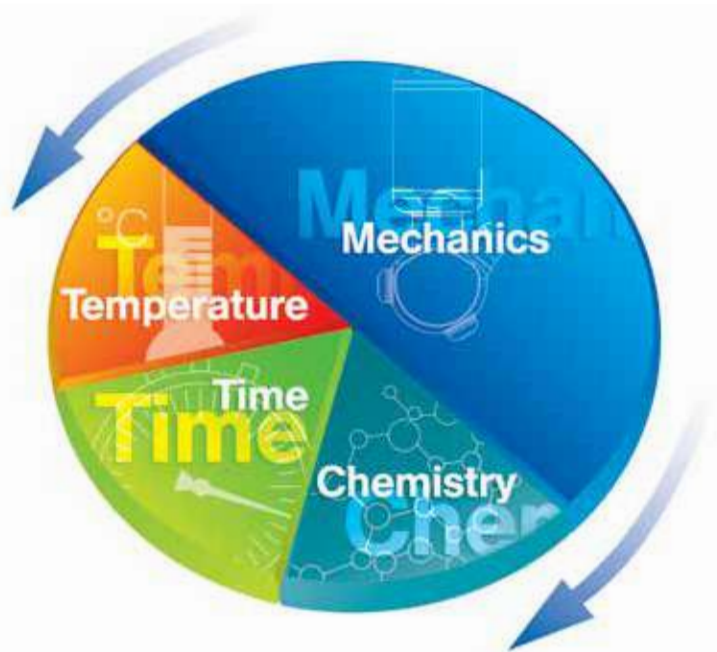


Figure 2: Lechler nozzles and rotating cleaning nozzles have high mechanical cleaning efficiency. This reduces the proportion of the other factors, as well as the resulting costs.

② **Mechanical cleaning with Lechler rotating cleaning nozzles**

**Cleaning effects**

Lechler rotating cleaning nozzles deliver the greatest possible impact in order to clean the container wall. To achieve this, large droplets must strike at high speed. This enables dirt to be removed that cannot dissolve in the cleaning fluid. Important influencing variables are the distance between the nozzle and wall, and the operating

pressure. Neither must be too great or the fluid will break down into smaller droplets (see Figs. 3 and 4) and the impact will be reduced.

Besides the impact, the fluid running down the container wall also has a significant cleaning effect. If the formed film is thick enough, the resulting shear stresses can remove light to moderate dirt. In that case, unsprayed patches are less of an issue than is the case during impact cleaning (see Fig. 5).

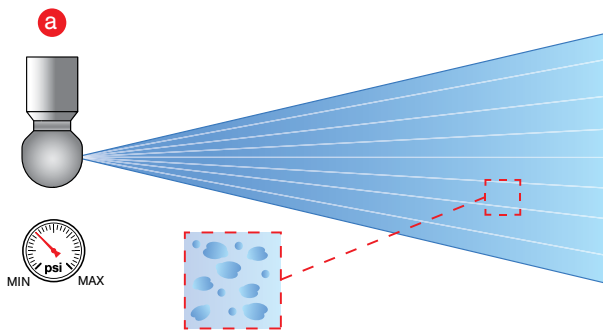


Figure 3: Rotating cleaning nozzles with recommended operating pressure

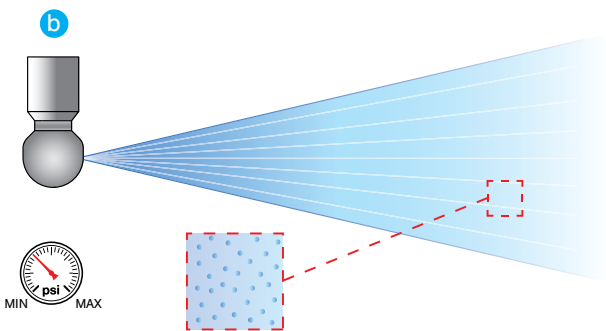


Figure 4: Rotating cleaning nozzles with operating pressure too high

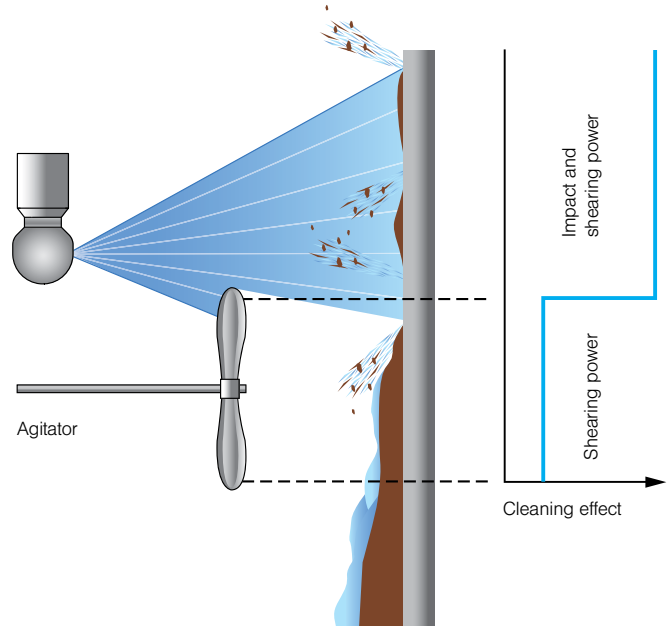


Figure 5: Cleaning mechanisms, impact and shearing power

**Rotating cleaning nozzles or spray ball?**

Due to their simple construction, spray balls are economical and have a very fine surface finish inside and outside. Whereas, rotating cleaning nozzles spray the entire container wall in a

fan-like pattern, the droplets from the spray balls strike only in concentrated spots. The remaining surface is simply cleaned by the shear stresses of the fluid running off (see Fig. 6). The fluid consumption is significantly greater in comparison to rotating cleaning nozzles.

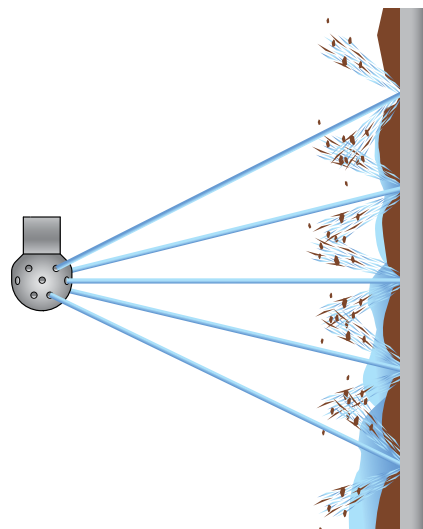


Figure 6: Cleaning with a spray ball

# WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

## ③ Chemical cleaning

In the majority of all cleaning processes, the chemical cleaning effect involves fluids. Either the dirt is dissolved in the cleaning fluid or the adhesion between the dirt and the container wall is reduced. Higher temperatures can support the chemical cleaning effect.

## Foam cleaning with nozzles

Foam cleaning is primarily based on the chemical cleaning effect. Since the foam sticks more firmly to the surface, it can be effective longer than cleaning fluids that drip off quickly. The mechanical cleaning effect plays a correspondingly subordinate role. Here, the task of the nozzle is to distribute the foam homogeneously. Your choice, therefore, greatly depends on the type of foam.

## ④ Impact

The impact force of a liquid jet on a surface plays an important role in cleaning technology. The ratio of the impact force (F) to the impact surface (A) is referred to as the Impact (I).

$$I = \frac{\text{Impact force}}{\text{Impact surface}} = \frac{F}{A} \left[ \frac{\text{LB}}{\text{in}^2} \right]$$

It can be controlled via the following parameters:

### Impact surface and spray shape

The impact surface is the area where the droplet hits. The smaller the impact surface, the greater the impact values. Nozzles with high impact are, for example, solid stream nozzles and flat fan nozzles with a narrow spray angle.

### Pressure

The impact increases linearly with the connected pressure. If the pressure is doubled while maintaining the same flow rate,

the impact is also doubled.

### Flow rate

Increasing the flow rate by using a larger nozzle increases the impact, assuming that the other parameters (spray angle, pressure and medium) remain the same.

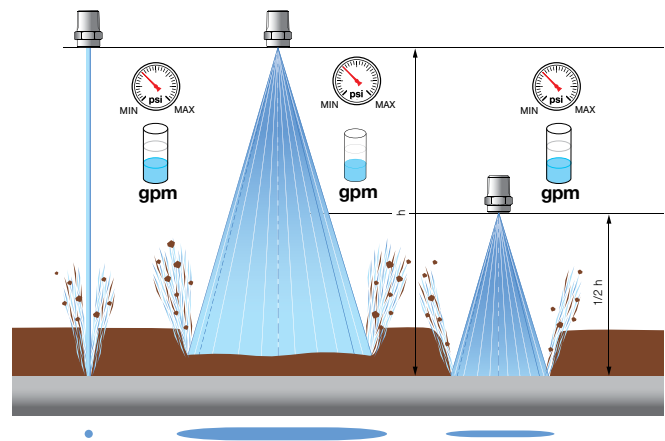


Figure 8: Comparison of the cleaning result of three nozzles with identical pressure and flow rate.

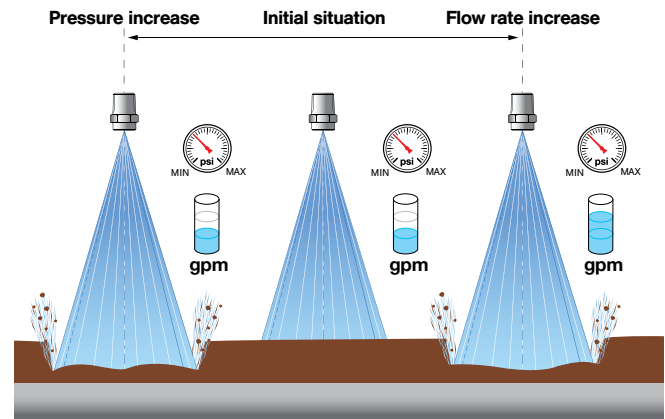


Figure 9: Comparison of the cleaning result of three nozzles with pressure or flow rate increase.



Figure 7: Foam cleaning with a Lechler PVDF MicroWhirly



⑤ **Spray angle, spraying distance, spraying behavior**

Depending on the application, we supply single-fluid nozzles with spray angles from 0° (solid stream nozzles) to 360° (tank-cleaning nozzles). Gravity and air flows influence the spray pattern.

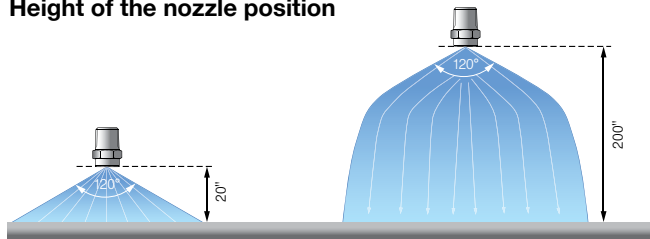
Depending on the version, Lechler single-fluid nozzles can spray the fluid as a hollow cone, solid stream or flat fan. The solid stream nozzle does not spray, but rather produces

a closed spray pattern that hits at a concentrated point. The droplets only begin to break up after some distance. Twin-fluid nozzles have a narrow spray angle of approximately 20° due to the high speed at which the compressible medium exits. However, as the distance from the nozzle increases, the spray pattern becomes increasingly less sharply delineated. Twin-fluid nozzles normally produce full cone or flat fan spray patterns.

⑥ **Hygienic design and surface quality**

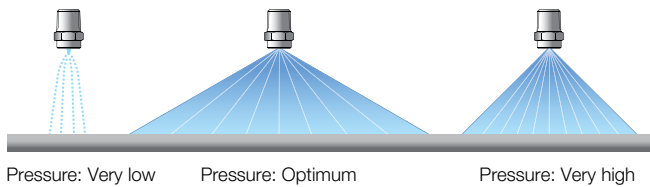
Equipment and components must be designed accordingly so they are easy to clean. Hygienic design prevents recesses and gaps that can harbor dirt, unfavorable flow areas (dead spaces) and sinks that hinder the run-off of fluids. At the same time, attention is paid to maintaining the least surface roughness possible, max. Ra 0.8 µm. Lechler supplies various nozzles and rotating cleaning nozzles that have been designed with these requirements in mind.

**Height of the nozzle position**



The diagram above illustrates how height influences the spray pattern

**Changing the nozzle pressure**



**Spraying direction**

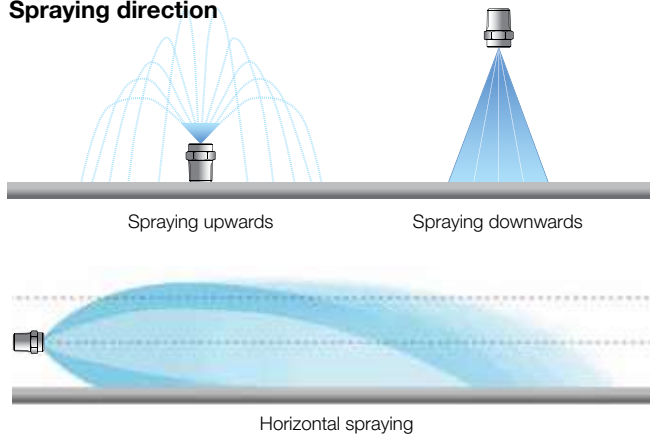


Figure 10: Spray patterns under different working conditions and installations



For many Lechler rotating cleaning nozzles we only use materials that comply with the regulations of the **FDA** (Food and Drug Administration).

The series 573/583 rotating cleaning nozzles and the series 527/591 spray balls also meet the strict hygiene requirements in accordance with **3-A**.

# WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

## ⑦ Liquid distribution

An even liquid distribution is crucial to processes such as coating. This requires several nozzles to be arranged next to each other. This is because a single nozzle produces a parabolic liquid distribution while several nozzles arranged next to each other allow an almost even distribution via overlapping.

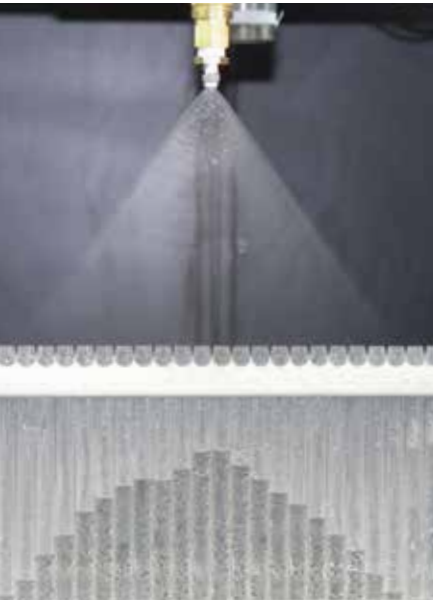


Figure 12: Liquid distribution measurement

### Measuring the distribution

The liquid distribution in a plane can be determined with the aid of a combination of Plexiglas cylinders. The filling level of the individual cylinders is determined automatically. This measuring process can also record the liquid distribution of a nozzle over a moving measuring plane. This enables conveyor belt spraying to be simulated, for example.

## ⑧ Droplet sizes

Lechler twin-fluid nozzles can produce very fine to extremely fine droplets. The size depends mainly on the flow rate ratio of the compressible medium used (m<sup>3</sup>/h) to the atomized fluid (l/min): The greater the ratio, the finer the atomization. In the case of single-fluid nozzles however, the decisive factors are pressure, nozzle type and flow rate across the droplet spectrum. Increasing pressure results in finer atomization, but mostly only up to a certain level.



Figure 13: Droplet size measurement

Lechler hollow cone nozzles produce very fine to fine droplets at the same pressure and flow rate. Full cone nozzles produce slightly coarser droplet spectrums, and finally flat fan nozzles have the coarsest droplet spectrum.

The following generally applies: Within a series and at a given pressure, nozzles with a lower flow rate produce finer droplet spectrums than nozzles with a higher flow rate.

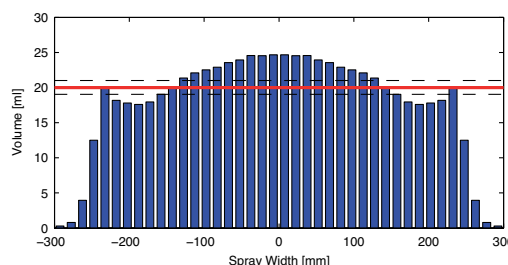


Figure 14: Liquid distribution of a Lechler high-pressure flat fan nozzle

## ⑨ Temperature behavior of nozzle materials

Applications with temperatures up to 284°F are very common. These include, for example, most cleaning applications and sterilization processes. Applications with higher temperatures are rare, and applications at very low temperatures are even rarer. The general temperature information from material data sheets must always be scrutinized for every single case of nozzle use. Pressure, mechanical stress type, chemistry and time are decisive factors for the suitability of a nozzle material at increased temperatures. Chemical processes can be more aggressive at high temperatures.

A material may be able to withstand them if this temperature occurs for a very short period only. In all materials, high temperatures result in reduced strength values. The mechanical stress type must also be taken into account in high-pressure applications in particular. In addition, vibrations in the system can cause premature failure.

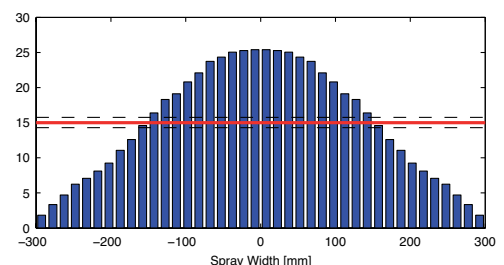
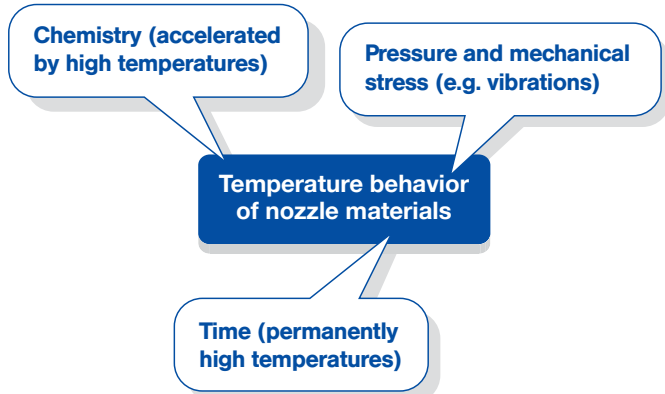


Figure 15: Liquid distribution of a Lechler standard flat fan nozzle

## 10 Viscosity

Increasing viscosity of the fluid can reduce the flow rate, change the spray pattern (narrower spraying angle) and allow the droplet spectrum to become coarser.

Depending on the fluid properties, it is possible to counteract this to a certain extent by means of higher pressure. For very viscous substances, it is recommended to use twin-fluid nozzles in most cases. It can also be helpful to take account of the fluid's rheology.



Figure 16: Atomization of gelatin with a Lechler ViscoMist twin-fluid nozzle

## 11 Narrowest cross section

The risk of a nozzle blocking depends greatly on its narrowest cross section ( $\varnothing E$ ). Experience has shown that for smooth operation, the maximum particle size in the fluid should not exceed one-third of the narrowest cross

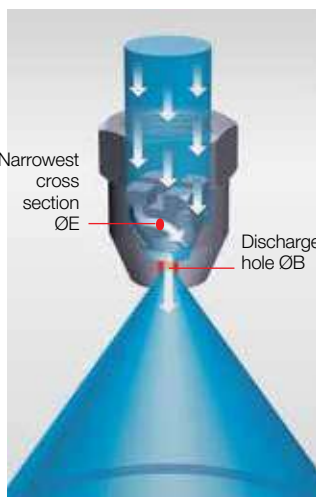


Figure 17: Narrowest free cross section

section. Hollow cone and full cone nozzles with axial flow have an internal swirl. Hollow cone and full cone nozzles with inflow at the side (tangential or eccentric design) do not need a swirl and are, therefore, much less prone to blockages. In the field of flat fan nozzles, our deflector nozzles represent a special design that is less susceptible to blockages.

## 12 Connections

Nozzles are mainly constructed with the thread standards ISO 228, DIN 2999 (EN 10226-1) and NPT. A distinction is made here between sealing and non-sealing threads. In the case of non-sealing threads, Teflon® strip or a thread paste is used to provide the seal. Not all nozzles can be connected with a thread. For non-threaded nozzles, we supply flange solutions that conform to the standards DIN 2527, EN 1092-1 and ASME B 16.5. Aseptic clamp connections (Tri-Clamp connections) conforming to the standard DIN 11864-3 are also possible. Whether a connection other than the standard connection is feasible for a nozzle must be decided on an individual case basis.

## 13 Materials and wear

Nozzle wear depends greatly on the conditions of use and on the nozzle material. Normally, the nozzle's fluid discharge opening wears as a result of material abrasion. The following conditions of use can speed up wear:

- Solids in the fluid and also hard particles
- Operating the nozzle above the recommended pressure range
- Using chemically aggressive substances

The nozzle body can also wear from the outside if the nozzle is used in a harmful environment (corrosive gases, radiation, temperature, rebound water with particles).

## Nozzle wear

As wear increases, the spray pattern quality becomes increasingly worse. In most cases, this can be seen very easily with the naked eye. At the same time, a change occurs in the spraying parameters, for example an increased flow rate. The cause of the change is damage to the nozzle opening cross section due to material removal. Wear leads to a worse production result and higher costs. Fig. 18 shows an example of a heavily worn spray ball. For these



Figure 18: Chemical corrosion of a spray ball

reasons, regular maintenance intervals and nozzle replacement are particularly important for achieving a high degree of process capability.

## Material selection

Particularly noticeable manifestations of wear occur when fluids with a high solid content are atomized. Such particle-laden fluids cause significant wear if the particles have a greater hardness than the nozzle material (Fig. 19). This can be remedied by selecting a different material. The table below of the various materials and their average Vickers hardness is a means of approximate guidance.

**As always: Contact us and we will find the optimum solution for your application.**



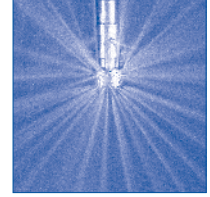
Figure 19: Wear of a full cone nozzle

Nozzle material	Vickers hardness (HV)
Aluminium	~ 80
Brass	80 – 150
Titanium (Grade 1 bis 4)	125 – 210
Hastelloy®	200 – 250
Stainless steel	220 – 270
Stainless steel (hardened)	390 – 690
Carbide	1000 – 2300
Ceramic	1500 – 2700
Sapphire / ruby	~ 2300





# Static spray balls Series 527



- Effective solid jets
- 3A<sup>®</sup> certification

**Max. tank diameter:**

- 3/4" inlet 12 ft.
- 1-1/2" inlet 18 ft.
- 2" inlet 25 ft.

**Recommended operating pressure:**

20 psi

**Max. fluid temperature:**

392°F

**Weight:**

- 3/4" inlet .11 lb.
- 1-1/2" inlet .52 lb.
- 2" inlet 1.43 lb.

**Material:**

316L SS

**Installation:**

Operates in every direction

**Filtration:**

- 3/4" — Line strainer with 50 mesh size
- 1-1/2" — Line strainer with 50 mesh size
- 2" — Line strainer with 30 mesh size

**Note:** There are no threaded inlets available.



Spray angle 	Ordering no.	Free Passage (in.)	Flow Rate (Gallons Per Minute)				Dimensions approx. (in.)					Max. tank diameter [ft]
			20 psi	2 bar	40 psi	60 psi	Height H (in.)	Diameter D (in.)	B	C	A	
	<b>527. 209. 1Y. 00. 75</b>	.031	13	60	19	23	2.7	1.3	.75	.13	.50	17
	<b>527. 289. 1Y. 01. 50</b>	.043	37	170	53	65	4.6	2.6	1.51	.19	1.00	20
	<b>527. 449. 1Y. 02. 00</b>	.067	92	420	130	160	6.0	4.0	2.01	.19	1.00	27

**The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.**

Slip-on information: - R-clip made of stainless steel 316L SS is included.  
- Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and static spray ball.

In most applications, static spray balls do not deliver the same cleaning power as rotating nozzles, anyway they do have advantages that make them indispensable for certain tasks:

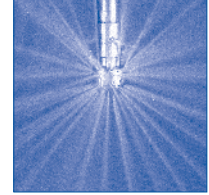
- No moving parts
- Self-draining
- Easy to inspect
- Proven use in hygienically sensitive environments

Should a rotating nozzle stop turning for some reason, parts of the tank may remain uncleaned. This cannot happen with spray balls. However, gaps can occur in the spray pattern if individual openings are blocked with soil.

Compared to rotating nozzles, static spray balls usually need two to three times the amount of liquid.



# Static spray balls RinseClean Series 5B2/5B3



- Popular spray ball design
- Powerful solid jets

### Materials:

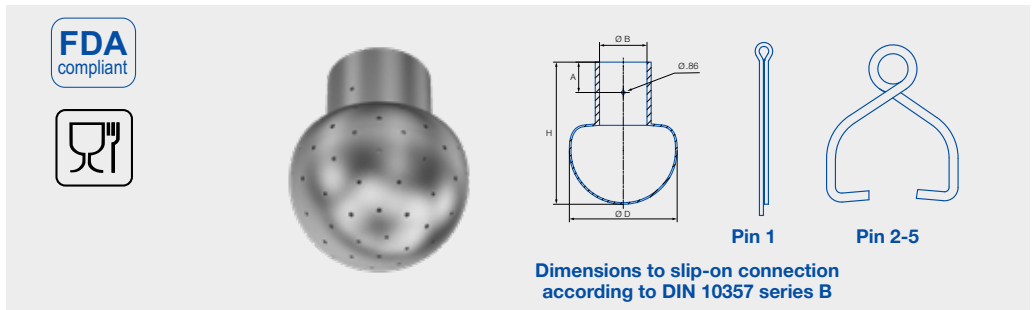
316L stainless steel  
Pin: 316L SS





### Max. fluid temperature:

392°F

### Recommended operating pressure:

30 psi



Spray angle 	Ordering no.	E Ø [in]	Flow Rate (Gallons per minute)					Dimensions [in]					Max. tank diameter [ft]
	Type		20 psi	30 psi	40 psi	liters per minute 2 bar	60 psi	Ø D	Height H	Con- nection B	Distance to bore hole A	Pin	
360° 	<b>5B2.879.1Y.D0.80.0</b>	.03	3.4	4.0	4.7	15	5.6	.79	1.46	0.32	.35	1	7
	<b>5B3.089.1Y.D1.20.0</b>	.04	10.9	13.4	15.5	50	18.6	1.10	1.65	0.48	.35	1	7
	<b>5B3.139.1Y.D1.20.0</b>	.06	14.3	17.5	20.2	65	24.8	1.10	1.65	0.48	.35	1	8
	<b>5B3.209.1Y.D1.80.0</b>	.06	22.0	26.9	31.0	100	38.2	1.10	1.65	0.72	.35	1	8
	<b>5B3.309.1Y.D2.20.0</b>	.07	39.5	48.4	55.8	180	68.6	2.52	3.31	0.87	.71	2	12
	<b>5B3.379.1Y.D2.80.0</b>	.08	57.0	69.9	80.7	260	98.7	2.52	3.31	1.11	.71	3	17
	<b>5B3.389.1Y.D4.00.0</b>	.08	61.4	75.2	86.9	280	106.4	2.52	3.31	1.59	.71	4	17
	<b>5B3.409.1Y.D3.40.0</b>	.09	70.1	86.0	99.3	320	121.6	2.52	3.31	1.35	.71	4	17
	<b>5B3.449.1Y.D2.80.0</b>	.12	89.9	110.2	127.2	410	155.7	2.52	3.31	1.11	.71	3	18
	<b>5B3.489.1Y.D3.40.0</b>	.11	112.0	137.0	158.2	510	193.9	2.52	3.31	1.35	.71	4	18
	<b>5B3.499.1Y.D4.00.0</b>	.11	118.5	145.1	167.5	540	205.1	2.52	3.31	1.59	.71	4	18
	<b>5B3.539.1Y.D5.20.0</b>	.13	147.0	180.0	207.8	670	254.7	3.54	4.37	2.06	.98	5	18
180° 	<b>5B3.083.1Y.D1.80.0</b>	.05	10.9	13.4	15.5	50	18.9	1.10	1.65	0.72	.35	1	7
	<b>5B3.253.1Y.D2.20.0</b>	.07	28.5	34.9	40.3	130	49.3	2.52	3.31	0.87	.71	2	10
	<b>5B3.323.1Y.D2.80.0</b>	.09	43.7	53.7	62.0	200	76.0	2.52	3.31	1.11	.71	3	11
	<b>5B3.463.1Y.D5.20.0</b>	.13	100.8	123.6	142.7	460	174.7	3.54	4.37	2.06	.98	5	18
180° 	<b>5B3.114.1Y.D1.80.0</b>	.06	13.0	16.1	18.6	60	22.9	1.10	1.65	0.72	.35	1	7
	<b>5B3.274.1Y.D2.20.0</b>	.09	32.9	40.3	46.5	150	57.1	2.52	3.31	0.87	.71	2	10
	<b>5B3.394.1Y.D2.80.0</b>	.12	63.6	77.9	90.0	290	110.1	2.52	3.31	1.11	.71	3	16
	<b>5B3.444.1Y.D5.20.0</b>	.13	87.8	107.5	124.1	400	152.0	3.54	4.37	2.06	.98	5	17

**The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.**

E = narrowest free cross section

In most applications, static spray balls do not deliver the same cleaning power as rotating nozzles, anyway they do have advantages that make them indispensable for certain tasks:

- No moving parts
- Self-draining
- Easy to inspect
- Proven use in hygienically sensitive environments

### Slip-on information:

- Pin made of 316L SS is included.
- Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and static spray ball.

Should a rotating nozzle stop turning for some reason, parts of the tank may remain uncleaned. This cannot happen with spray balls. However, gaps can occur in the spray pattern if individual openings are blocked with soil.

Compared to rotating nozzles, static spray balls usually need two to three times the amount of liquid.



# Rotating cleaning nozzle "PicoWhirly" Series 500.234



- Very compact design
- Self-rotating
- Rotating solid jets
- Completely made of stainless steel

**Recommended operating pressure:**  
40 psi

**Max. fluid temperature:**  
200°F

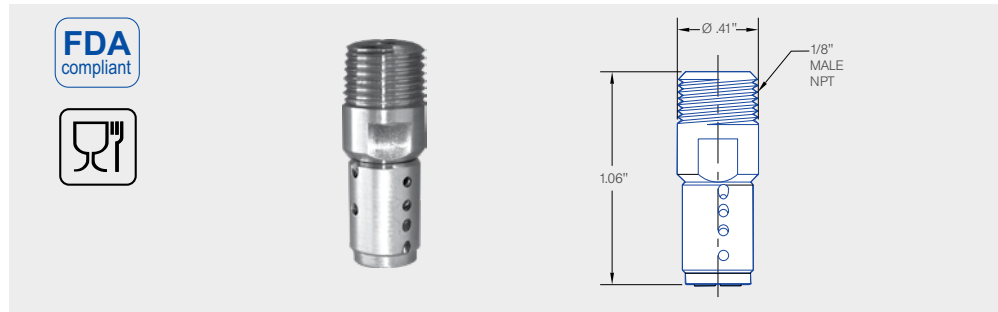
**Weight:**  
.025 lb.



**Material:**  
Kolsterized 316L SS

**Bearing:**  
Sleeve bearing

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 50 mesh size



Spray angle 	Ordering no.  Connection 1/8" Male NPT	Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
			20 psi	liters per minute 2 bar	40 psi	60 psi	
300° 	<b>500. 234. G9. BA</b>	.07	1.8	8.0	2.5	3.0	3

**The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.**

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.





# Rotating cleaning nozzle "MicroWhirly" Series 566



- Compact design
- Self-rotating
- Effective flat jet nozzles

**Recommended operating pressure:**  
40 psi

**Max. fluid temperature:**  
266°F

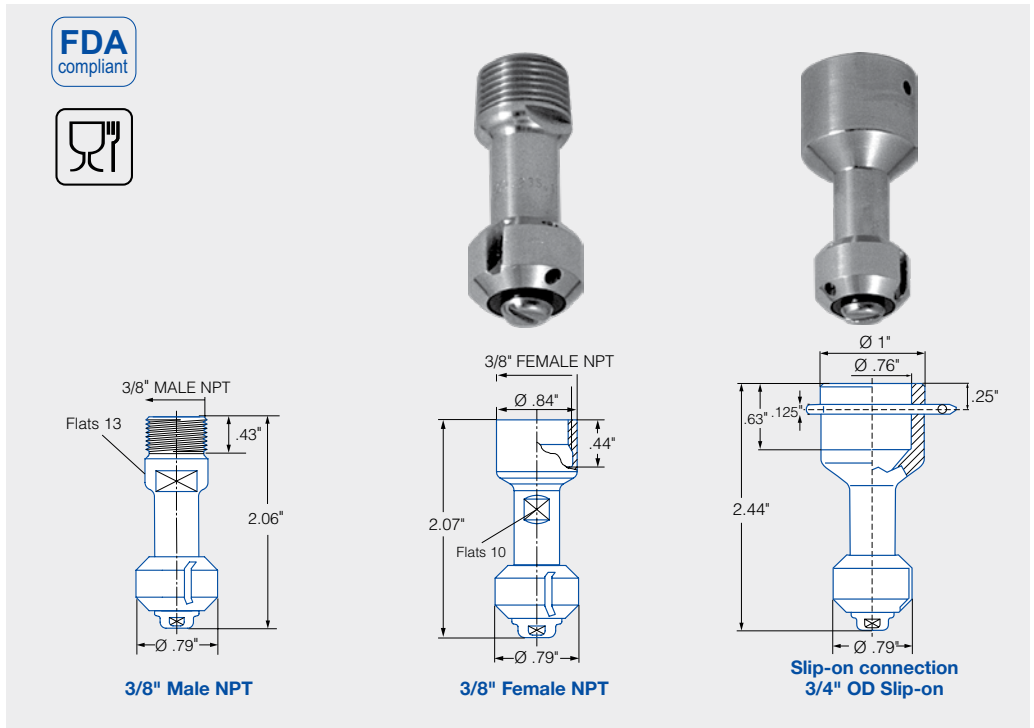
**Weight:**  
566 thread .1 lb.  
566 slip-on .2 lb.

**Material:**  
316L SS  
PEEK

**Bearing:**  
Sleeve bearing

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 50 mesh size



**ATEX version on request**

Spray angle	Ordering no.				Free Pas-sage Ø (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
	Type	Connection				20 psi	liters per minute	40 psi	60 psi	
		3/8" Male NPT	3/8" Female NPT	3/4" OD Slip-on						
180°	566. 873. 1Y	BE	BF	TF07	.04	3.3	15	4.7	5.7	5.2
	566. 933. 1Y	BE	BF	TF07	.04	4.6	21	6.5	8.0	5.6
180°	566. 874. 1Y	BE	BF	TF07	.04	3.3	15	4.7	5.7	5.2
	566. 934. 1Y	BE	BF	TF07	.04	4.6	21	6.5	8.0	5.6
360°	566. 879. 1Y	BE	BF	TF07	.04	3.3	15	4.7	5.7	5.2
	566. 939. 1Y	BE	BF	TF07	.04	4.6	21	6.5	8.0	5.6

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

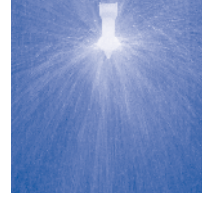
Slip-on information: - R-clip made of stainless steel 316L SS is included (Ordering number: 095.022.1Y.50.94.E)  
- Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and rotating cleaning nozzle.

**Example of ordering:** Type + Connection = Ordering no.  
566. 873. 1Y + BE = 566. 873. 1Y. BE





# Rotating cleaning nozzle "PVDF MicroWhirly" Series 500.191



- Very inexpensive
- Self-rotating
- Effective flat jet nozzles
- Completely made of PVDF

**Recommended operating pressure:**  
30 psi

**Max. fluid temperature:**  
194°F

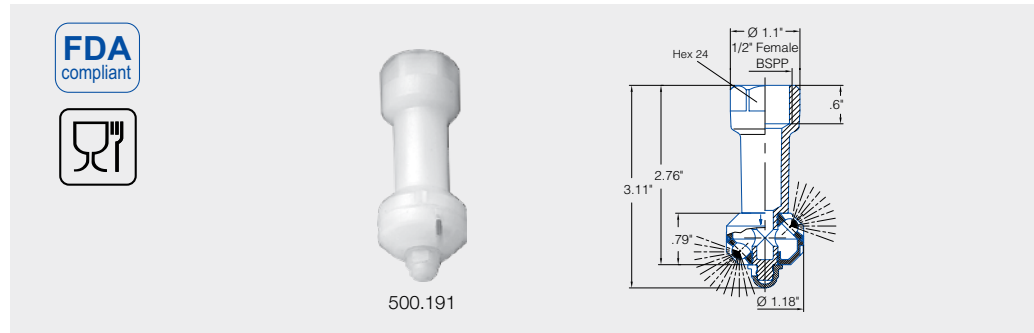
**Weight:** .06 lb.

**Material:** PVDF

**Bearing:** Sleeve bearing

**Installation:**  
Operates in every direction

**Filtration:** Line strainer with 50 mesh size



Spray angle	Ordering no.	Free Passage (in.)	Connection	Flow Rate (Gallons Per Minute)					Max. tank diameter [ft]
				20 psi	30 psi	liters per minute	40 psi	60 psi	
180°	500. 191. 5E. 02	.086	1/2" Female BSPP	2.9	3.5	13	4.0	4.9	2.6
180°	500. 191. 5E. 01	.086	1/2" Female BSPP	2.9	3.5	13	4.0	4.9	2.6
360°	500. 191. 5E. 00	.086	1/2" Female BSPP	4.4	5.4	20	6.2	7.6	3.6

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

The PVDF MicroWhirly is not suitable for operation with compressed air or any other gas. Operation above the recommended operating pressure has negative effects on the cleaning result and wear.

## Plastic Mini Whirly series 500.186

- Good corrosion resistance
- Very compact design
- Free spinning, self-lubricating, and self-flushing
- Operates in every position
- Fits 1/2" NPT connections

**Recommended operating pressure:**  
30 psi

**Max. fluid temperature:**  
122°F

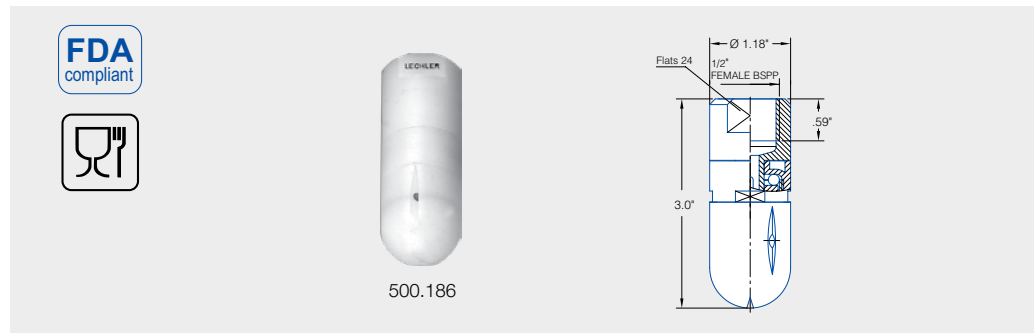
**Weight:** .15 lb.

**Material:** POM, 316 SS

**Bearing:** Ball bearing

**Installation:**  
Operates in every direction

**Filtration:** Line strainer with 50 mesh size



Spray angle	Ordering no.	Free Passage (in.)	Flow Rate (Gallons Per Minute)					Max. tank diameter [ft]
			20 psi	30 psi	liters per minute	40 psi	60 psi	
300°	500. 186. 56. AH	.075	4.0	4.8	18	5.6	6.8	4.3

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.





# Rotating cleaning nozzle “NanoSpinner 2” Series 5M1

- Entirely made from stainless steel
- Self-rotating
- Efficient slot design
- Modern double ball bearing

**Materials:**  
316L SS

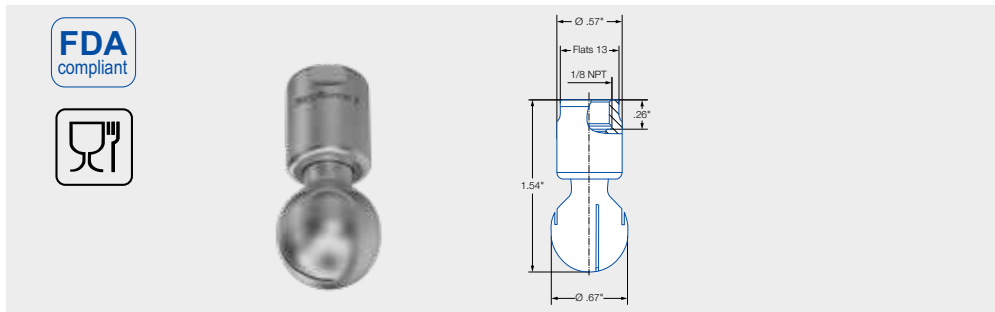
**Max. temperature:**  
284°F / 140°C

**Recommended operating pressure:**  
30 psi

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 170 mesh size

**Bearing:**  
Double ball bearing made of 316L SS



Spray angle	Ordering number Type 1/8 NPT	E Ø [in]	V [l/min]				Max. tank diameter [ft]
			p [psi] (p <sub>max</sub> = 100 psi)				
			20 psi	30 psi	2 bar	40 psi	
360°	<b>5M1.879.1Y.BB</b>	0.016	3.2	4.0	<b>15</b>	4.6	4.6
	<b>5M1.929.1Y.BB</b>	0.019	4.5	5.5	<b>20</b>	6.3	5.2

\*This product is also available in Hastelloy C22

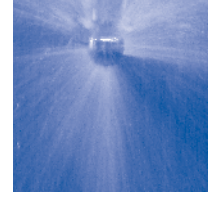
**The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.**

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.





# Rotating cleaning nozzle "MicroSpinner 2" Series 5M2



- Entirely made from stainless steel
- Self-rotating
- Efficient slot design
- Modern double ball bearing

**Recommended operating pressure:**  
30 psi

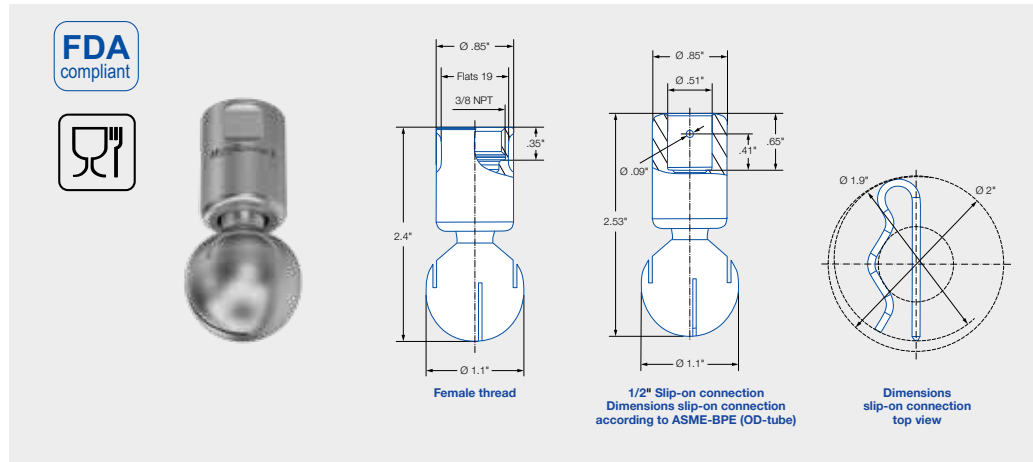
**Max. fluid temperature:**  
284°F

**Materials:**  
316L SS

**Bearing:**  
Double ball bearing

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 170 mesh size



Spray angle 	Ordering number			E Ø [in]	V [gal/min]				Max. tank diameter [ft]
	Type	Connection			p [psi] (p <sub>max</sub> = 100 psi)				
		3/8 NPT	1/2" Slip-on		20 psi	30 psi	<b>2 bar</b>	40 psi	
60° 	<b>5M2.952.1Y</b>	<b>BF</b>	<b>TF05</b>	.06	5.0	6.2	<b>23</b>	7.1	-
	<b>5M2.042.1Y</b>	<b>BF</b>	<b>TF05</b>	.12	8.8	10.8	<b>40</b>	12.4	-
180° 	<b>5M2.004.1Y</b>	<b>BF</b>	<b>TF05</b>	.04	7.0	8.6	<b>32</b>	9.9	5.9
360° 	<b>5M2.969.1Y</b>	<b>BF</b>	<b>TF05</b>	.03	5.6	6.8	<b>25</b>	7.9	5.6
	<b>5M2.049.1Y</b>	<b>BF</b>	<b>TF05</b>	.04	8.6	10.5	<b>39</b>	12.2	5.9

\*This product is also available in Hastelloy C22



**ATEX version on request**

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

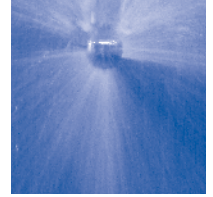
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

**Example**    **Type**    +    **Mat. no.** +    **Conn.**    =    **Ordering no.**  
**for ordering:** 5M2. 049.    +    1Y    +    BF    =    5M2. 049. 1Y. BF





# Rotating cleaning nozzle "MiniSpinner 2" Series 5M3



- Entirely made from stainless steel
- Self-rotating
- Efficient slot design
- Modern double ball bearing

**Recommended operating pressure:**  
30 psi

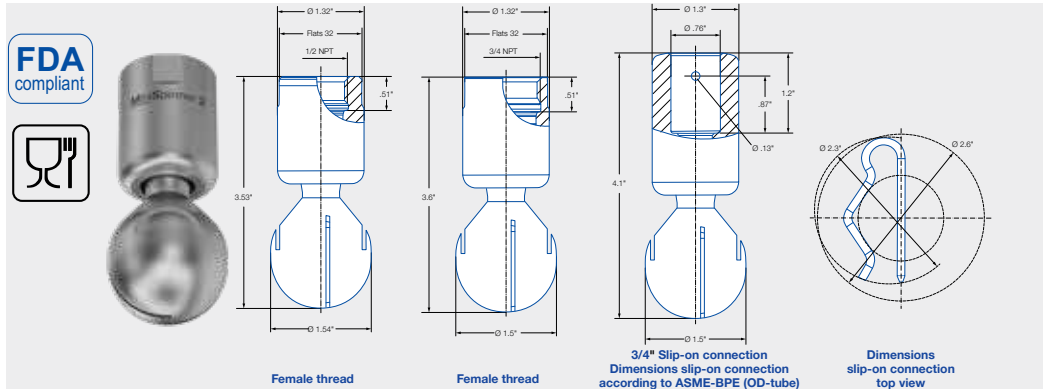
**Max. fluid temperature:**  
284°F






**Materials:**  
316L SS

**Bearing:**  
Double ball bearing

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 170 mesh size



Spray angle 	Ordering number				E Ø [in]	V [gal/min]				Max. tank diameter [ft]
	Type	Connection				p [psi] (p <sub>max</sub> = 100 psi)				
		1/2 NPT	3/4 NPT	3/4" Slip-on		20 psi	30 psi	<b>2 bar</b>	40 psi	
60° 	<b>5M3.122.1Y</b>	<b>BH</b>	-	<b>TF07</b>	.10	13.8	16.6	<b>63</b>	19.5	-
180° 	<b>5M3.133.1Y</b>	-	<b>BL</b>	<b>TF07</b>	.05	14.7	18.0	<b>67</b>	20.8	8.5
180° 	<b>5M3.134.1Y</b>	-	<b>BL</b>	<b>TF07</b>	.05	14.7	18.0	<b>67</b>	20.8	8.5
360° 	<b>5M3.999.1Y</b>	-	<b>BL</b>	<b>TF07</b>	.02	6.6	8.1	<b>30</b>	9.4	5.9
	<b>5M3.089.1Y</b>	-	<b>BL</b>	<b>TF07</b>	.03	10.8	13.2	<b>49</b>	15.2	6.9
	<b>5M3.139.1Y</b>	-	<b>BL</b>	<b>TF07</b>	.03	15.2	18.7	<b>69</b>	21.5	7.5
	<b>5M3.209.1Y</b>	-	<b>BL</b>	<b>TF07</b>	.06	21.9	26.8	<b>100</b>	30.9	8.5

\*This product is also available in Hastelloy C22

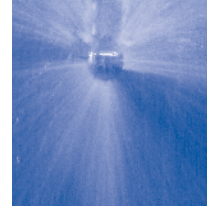
**The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.**

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

**Example    Type    +    Conn.    =    Ordering no.**  
**for ordering: 5M3. 134. 1Y. +    BH    =    5M3. 134. 1Y. BH**



# Rotating cleaning nozzle "MaxiSpinner 2" Series 5M4



- Entirely made from stainless steel
- Self-rotating
- Efficient slot design
- Modern double ball bearing

**Recommended operating pressure:**  
30 psi

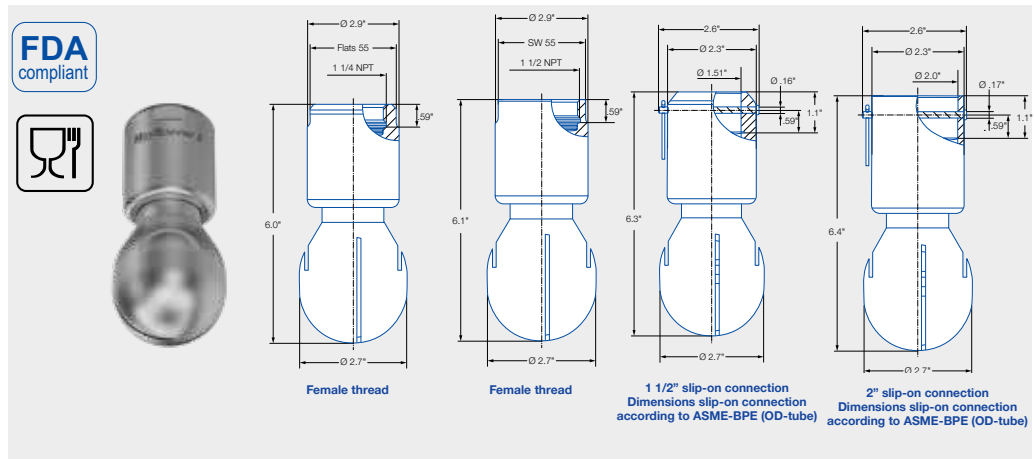
**Max. fluid temperature:**  
284°F

**Materials:**  
316L SS

**Bearing:**  
Double ball bearing

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 170 mesh size



Spray angle	Ordering number					E Ø [in]	V [gal/min]				Max. tank diameter [ft]
	Type	Connection					p [psi] (p <sub>max</sub> = 100 psi)*				
		1 1/4 NPT	1 1/2 NPT	1 1/2" Slip-on	2" Slip-on		20 psi	30 psi	2 bar	40 psi	
360°	5M4.279.1Y	BQ	BS	TF15	TF20	.07	33.0	40.4	150	46.6	13.1
	5M4.329.1Y	BQ	BS	TF15	TF20	.08	43.9	53.8	200	62.1	14.8
	5M4.369.1Y	BQ	BS	TF15	TF20	.09	54.8	67.2	250	77.5	16.4

\*This product is also available in Hastelloy C22

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

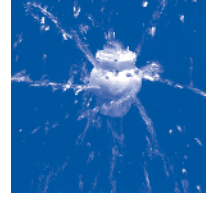


**ATEX version on request**

**Example**    **Type**    +    **Mat. no.** +    **Conn.**    =    **Ordering no.**  
for ordering: 5M4. 369.    +    1Y    +    BQ    =    5M4. 369. 1Y. BQ



# Rotating cleaning nozzle "PTFE Whirly" Series 573 / 583



- Self-rotating
- Rotating solid jets
- Recommended for tanks made of glass and enamel
- 3A® version available

**Max. tank diameter:**  
Rinsing: 18 ft.  
Cleaning: 10 ft.

**Recommended operating pressure:**  
30 psi

**Max. fluid temperature:**  
203°F

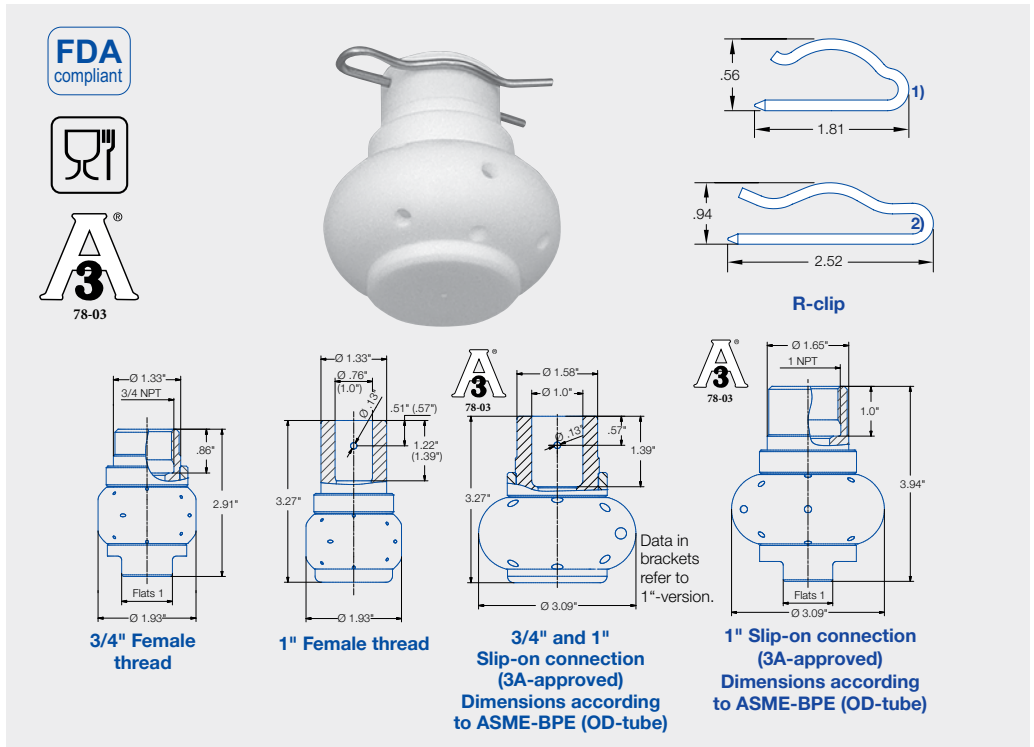
**Weight:**  
3/4" .32 lb.  
1" .68 lb.

**Material:**  
PTFE  
R-Clip made of 316L SS included with the tube slip-on. For reordering: 095.022.1Y.50.88.E (3/4") 095.022.1Y.50.60.E (1")

**Bearing:** Sleeve bearing

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 50 mesh size



Spray angle	R-clip	Ordering no.						Free Passage (in.)	Flow Rate (Gallons Per Minute)				Dimensions for female thread version		Max. tank diameter [ft]	
		Type	Connection						20 psi	30 psi	liters per minute		Height H [in]	Diameter D [in]		
			3/4" Female NPT	1" Female NPT	3/4" Slip-on	1" Slip-on	1 1/2" Tri-Clamp				40 psi	60 psi				
270°	1)	583. 116. 55	BL	-	TF07*	-	15	.094	15	18	67	21	26	2.91	1.93	8.2
	1)	583. 266. 55	BL	-	TF07*	-	15	.133	32	39	145	45	55	2.91	1.93	9.2
	2)	583. 346. 55	-	BN	-	-	15	.232	49	60	225	70	85	3.94	3.09	10.5
270°	1)	573. 116. 55	BL	-	TF07*	-	15	.094	15	18	67	21	26	2.91	1.93	8.2
	1)	573. 266. 55	BL	-	TF07*	-	15	.133	32	39	145	45	55	2.91	1.93	9.2
	2)	573. 346. 55	-	BN	-	-	15	.232	49	60	225	70	85	3.94	3.09	10.5
360°	1)	583. 119. 55	BL	-	TF07*	-	15	.071	13	16	58	18	22	2.91	1.93	7.9
	1)	583. 209. 55	BL	-	TF07*	-	15	.138	22	27	100	31	38	2.91	1.93	8.2
	1)	583. 269. 55	BL	-	TF07*	-	15	.189	32	39	145	45	55	2.91	1.93	9.2
	2)	583. 279. 55	-	BN	-	TF10*	15	.146	33	40	150	47	57	3.94	3.09	9.8
	2)	583. 349. 55	-	BN	-	TF10*	15	.220	50	61	226	70	86	3.94	3.09	10.5

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

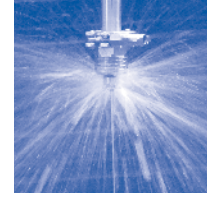
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

**Example**    **Type**    +    **Conn.**    =    **Ordering no.**  
for ordering: 583. 266. 55.    +    BL    =    583. 266. 55. BL

\* The slip-on version has been authorized to use the 3-A® Symbol by the 3-A® Sanitary Symbol Council Administrative Council for Spray Cleaning Devices (78-01).



# Pop-up rotating cleaning nozzle "PopUp Whirly" Series 5P2



- For installation in the tank wall
- Cleaning with foam is possible
- Self-rotating

### Materials:

AISI 316L SS,  
AISI 316Ti SS (spring),  
AISI 316 SS (snap ring),  
PEEK (slide bearing),  
FKM (O-ring)

### Max. temperature:

284°F / 140°C

### Recommended operating pressure:

30 psi, 5P2: opening pressure approx. 14.5 psi; closing pressure approx. 7 psi,

### Installation:

Operates in every direction

### Filtration:

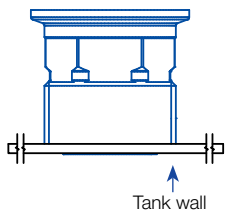
Line strainer with a mesh size of 0.3 mm/50 mesh

### Bearing:

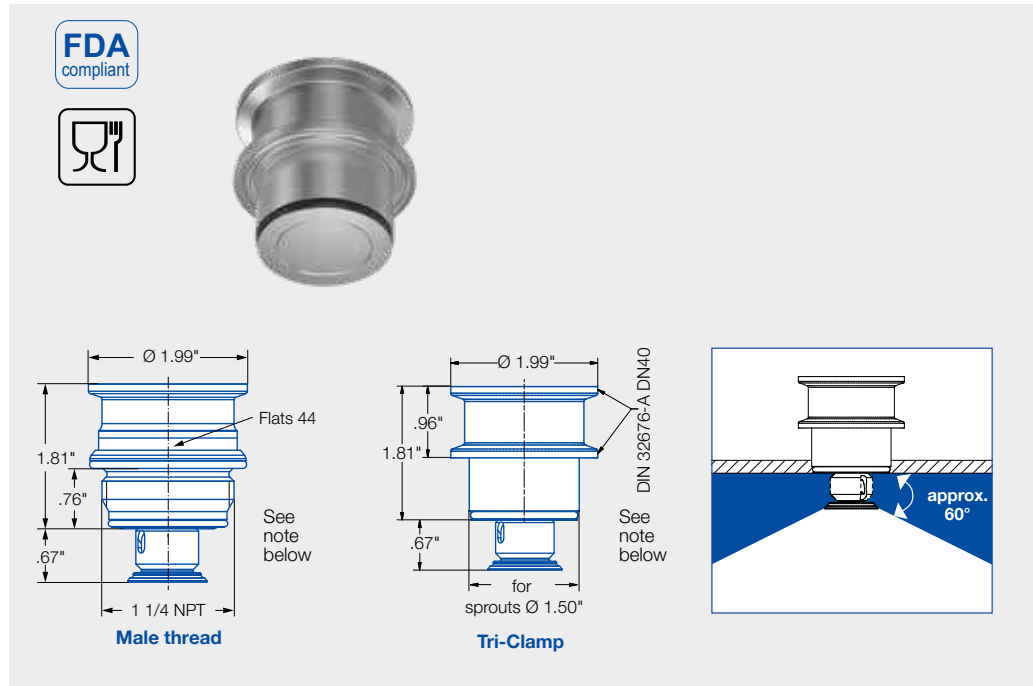
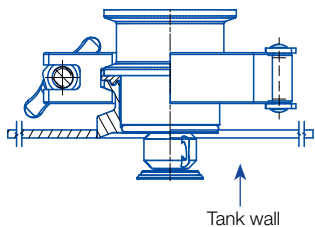
Sleeve bearing made of PEEK

### Nozzle installation

With thread in idle position



With Tri-Clamp in operating position

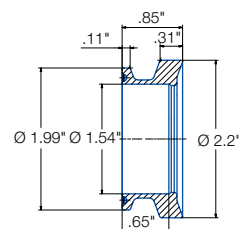


Spray angle	Ordering no.	Tank connection		Free Passage $\text{Ø}$ (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
		1 1/4" Male BSP	Tri Clamp		20 psi	30 psi	liters per minute	40 psi	
	5P2. 873. 1Y. AP	○	-	.04	3.3	4	15.0	5	2.6
	5P2. 873. 1Y. 00	-	○	.04	3.3	4	15.0	5	2.6
	5P2. 923. 1Y. AP	○	-	.04	3.3	5.4	20.0	6	3.3
	5P2. 923. 1Y. 00	-	○	.04	3.3	5.4	20.0	6	3.3

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

The PopUp Whirly is not suitable for operation with compressed air or any other gas. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

### Weld-in flange for Tri-Clamp-Version



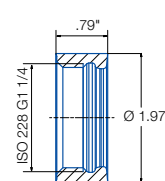
Ordering number  
050.020.1Y.01.00

Material  
316L SS

### Information

Gasket with a thickness of .08 in must be used if the nozzle is installed with this weld-in flange.  
Not sold with nozzle. Use standard DIN32676-A / DN40

### Weld-in socket for Thread-Version



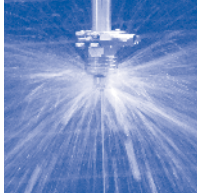
Ordering number  
050.020.1Y.BQ.00

Material  
316L SS

### Information

The thread is hygienically sealed with 2 O-rings included in the scope of delivery.





# Pop-up rotating cleaning nozzle "PopUp Whirly" Series 5P3

- For installation in the tank wall
- Suitable for cleaning with foam
- Self-rotating

### Materials:

AISI 316L SS,  
AISI 316Ti SS (spring),  
AISI 316 SS (snap ring), PEEK  
(slide bearing),  
FKM (O-ring)

**Max. temperature:**  
284°F / 140°C

**Recommended operating pressure:**  
5P3: opening pressure approx.  
13 psi, closing pressure  
approx. 7 psi

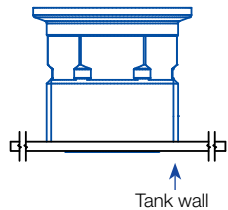
**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with a mesh size  
of 0.3 mm/50 mesh

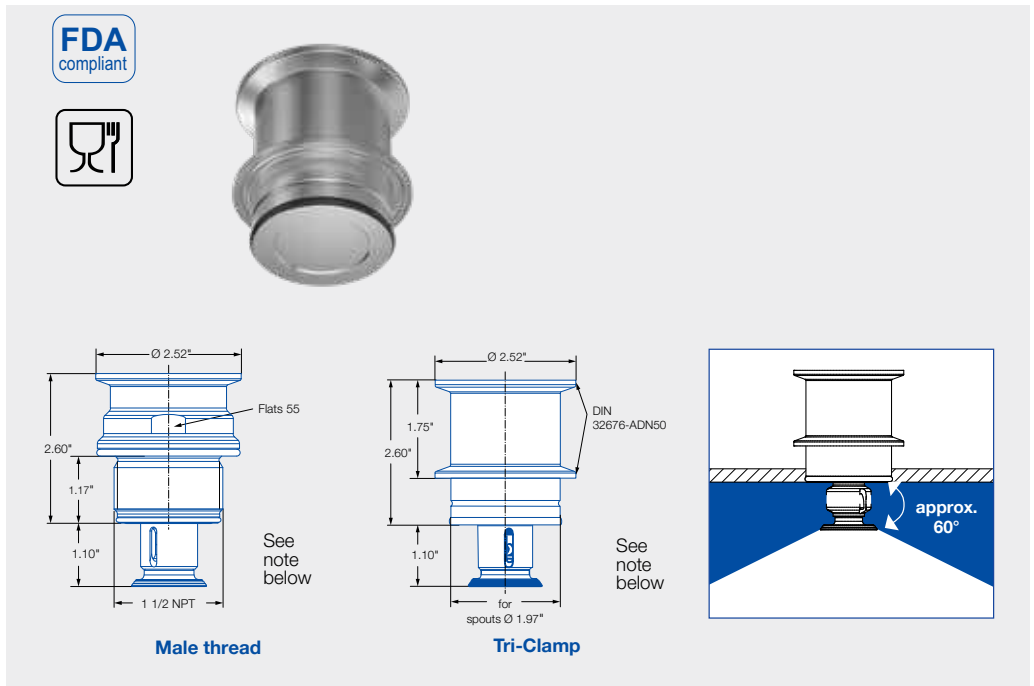
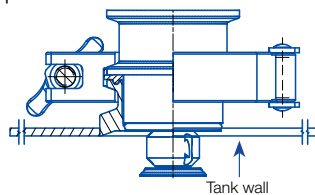
**Bearing:**  
Sleeve bearing made of PEEK

### Nozzle installation

With thread in idle position



With Tri-Clamp in operating position

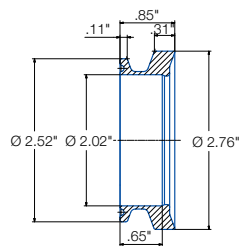


Spray angle	Ordering no.	Tank connection		Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
		1 1/2" Male BSPP	Tri Clamp		20 psi	30 psi	liters per minute	40 psi	
	<b>5P3. 043. 1Y. AR</b>	○	-	.05	3.3	4	15.0	4.7	7.2
	<b>5P3. 043. 1Y. 00</b>	-	○	.05	3.3	4	15.0	4.7	7.2

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

The PopUp Whirly is not suitable for operation with compressed air or any other gas. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

### Weld-in flange for Tri-Clamp-Version

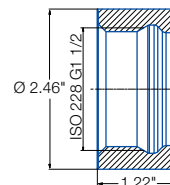


**Ordering number**  
050.020.1Y.01.01

**Material**  
316L SS

**Information**  
Gasket with a thickness of .08 in must be used if the nozzle is installed with this weld-in flange. Not sold with nozzle. Use standard DIN32676-A / DN50

### Weld-in socket for Thread-Version



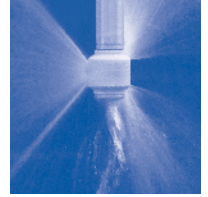
**Ordering number**  
050.020.1Y.BS.00

**Material**  
316L SS

**Information**  
The thread is hygienically sealed with 2 O-rings included in the scope of delivery.



# Rotating cleaning nozzle "Hygienic Whirly" Series 594 / 595



- Self-rotating
- Effective flat jet nozzles
- Very good performance with foam usage

**Recommended operating pressure:**  
40 psi

**Max. fluid temperature:**  
212°F; short-term up to 280°F

**Weight:**  
594 .4 lb.  
595 .6 lb.

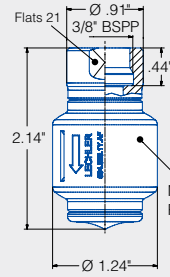
**Material:**  
316L SS  
PEEK

**Bearing:**  
Sleeve bearing

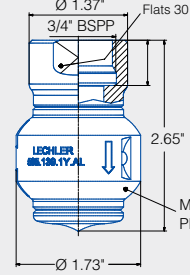
**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with 50 mesh size



**Please note:** To protect the products' inner workings, we suggest use of a line strainer with a 50 mesh size. For further information, please contact Lechler. The nozzles with a slip-on connection type fitting may have a higher flow rate than listed due to the self-flushing design around the customer's tube which is inserted into the nozzle socket.



**Standard version female thread 594.XX9.1Y.AF**



**Standard version female thread 595.139.1Y.AL**

Spray angle 	Ordering no.			Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
	Type	Connection			20 psi	liters per minute 2 bar	30 psi	40 psi	
		3/8" Female BSPP	3/4" Female BSPP						
360° 	594. 829. 1Y	AF	-	.067	2.4	11	3.0	3.4	3
	594. 879. 1Y	AF	-	.098	3.3	15	4.0	4.7	4
	595. 009. 1Y	AF	-	.157	7.0	32	8.6	9.9	5
	595. 049. 1Y	AF	-	.165	8.8	40	10.7	12.4	7
	595. 139. 1Y	-	AL	-	.197	14.7	67	18.0	20.8

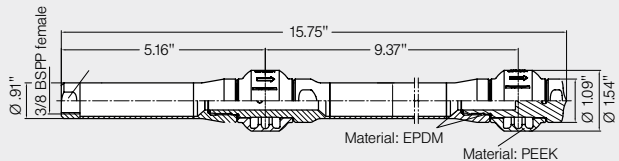
**The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.**

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

## Rotating lance

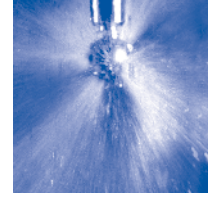


Available on request.





# Rotating cleaning nozzle "Whirly 2.0" Series 5W9



- Popular and proven design
- Powerful flat jets
- Wide range of flow rates

**Recommended operating pressure:**  
30 psi

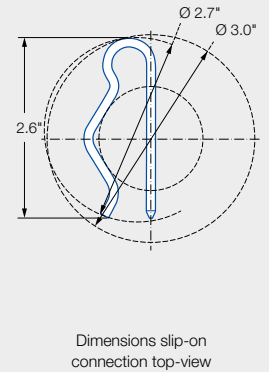
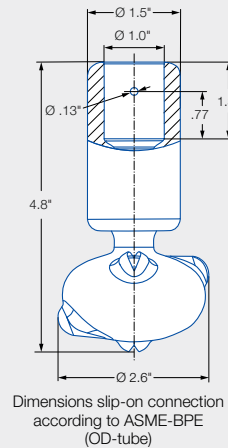
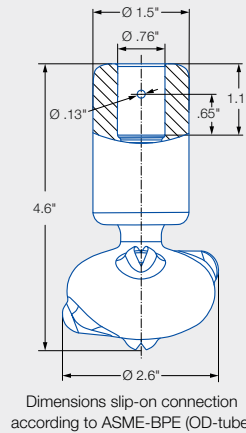
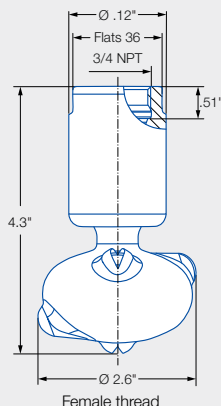
**Max. fluid temperature:**  
284°F

**Material:**  
Stainless steel 316L SS  
PEEK




**Bearing:**  
Double ball bearing

**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with a mesh size of 0.1 mm/170 mesh size



**ATEX version on request**

Spray angle	Ordering no.				Free Passage Ø (in.)	∇ water [gal/min]					Max. tank diameter [ft]
	Type	Connection				p [psi] (p <sub>max</sub> = 87 psi)					
		3/4 NPT	3/4"- Slip-on connection	1" Slip-on connection		20 psi	30 psi	2 bar	40 psi	60 psi	
270° 	5W9.075.1Y	BL	TF07	TF10	.79	10.6	12.9	48	15	18.3	5.9
	5W9.145.1Y	BL	TF07	TF10	.11	15.6	19.1	71	22	27.0	6.9
	5W9.195.1Y	BL	TF07	TF10	.13	21.3	26.1	97	30	36.9	8.5
270° 	5W9.076.1Y	BL	TF07	TF10	.79	10.6	12.9	48	15	18.3	5.9
	5W9.106.1Y	BL	TF07	TF10	1.0	12.8	15.6	58	18	22.0	6.9
	5W9.196.1Y	BL	TF07	TF10	1.3	21.3	26.1	97	30	36.9	8.5
360° 	5W9.079.1Y	BL	TF07	TF10	.06	10.6	12.9	48	15	18.3	5.9
	5W9.149.1Y	BL	TF07	TF10	.09	15.6	19.1	71	22	27.0	6.9
	5W9.199.1Y	BL	TF07	TF10	.12	21.3	26.1	97	30	36.9	8.5
	5W9.279.1Y	BL	TF07	TF10	.20	31.9	39.1	145	45	55.2	9.8

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

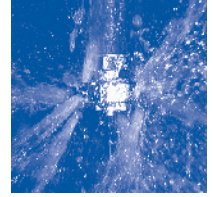
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

Slip-on information: - R-clip made of stainless steel 316L SS is included (Ordering no.: 095.022.1Y.50.60.E).  
- Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and rotating cleaning nozzle.

**Example**    **Type**    +    **Conn.**    =    **Ordering no.**  
**for ordering: 569.055.1Y. + BL = 569.055.1Y.BL**



# Rotating cleaning nozzle "Gyro" Series 577



- Self-rotating
- Effective flat jet nozzles
- Large free cross sections, less prone to clogging

**Max. tank diameter:**

1" 11 ft.  
2" 18 ft.

**Recommended operating pressure:**

40 psi

**Max. fluid temperature:**

194°F

**Weight:**

1" 1.65 lb.  
2" 4 lb.

**Material:**

316 SS  
PTFE

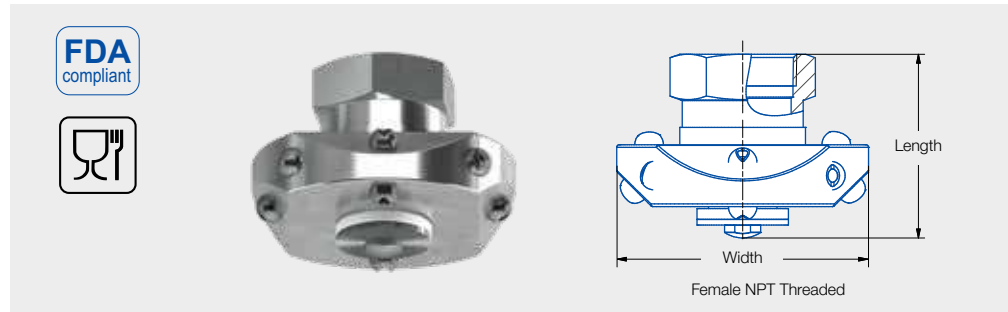
**Bearing:** Sleeve bearing

**Installation:**

Vertically facing downward

**Filtration:**

Line strainer with 20 mesh size



Spray angle 	Ordering no.			Flow Rate (Gallons Per Minute)				Dimensions	
	Type	Connection		20 psi	liters per minute 2 bar	40 psi	60 psi	Length (in.)	Width (in.)
		1" Female NPT	2" Female NPT						
180° 	577. 284. 1Y	BN	-	36	161	51	62	2.8	4.6
	577. 364. 1Y	BN	-	57	258	80	98	2.8	4.6
	577. 494. 1Y	-	BW	145	538	167	205	4.1	6.1
270° 	577. 285. 1Y	BN	-	36	161	51	62	2.8	4.6
	577. 405. 1Y	-	BW	71	322	100	122	4.1	6.1
360° 	577. 289. 1Y	BN	-	36	161	51	62	2.8	4.6
	577. 369. 1Y	BN	-	57	258	80	98	2.8	4.6
	577. 409. 1Y	-	BW	71	322	100	122	4.1	6.1
	577. 439. 1Y	-	BW	85	386	120	147	4.1	6.1
	577. 499. 1Y	-	BW	145	538	167	205	4.1	6.1

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

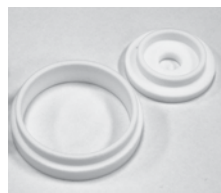
The PTFE bearings and other wear parts can be replaced easily to extend the life of the unit. A rebuild kit contains: Top seal, bottom seal and complete instructions.

**Example**    **Type**    +    **Conn.**    =    **Ordering no.**  
for ordering: 577. 284. 1Y    +    BN    =    577. 284. 1Y. BN

**Size**    **Product code**  
1"    057.701.55.01  
2"    057.702.55.01

\* Contact Lechler for maximum ambient temperature.

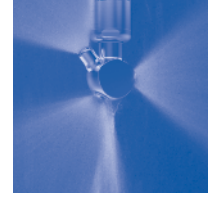
**Contents of Gyro rebuild kit**







# Rotating cleaning nozzle "XactClean® HP" Series 5S2 / 5S3



- Controlled rotation
- Powerful flat jet nozzles
- Very efficient tank cleaning nozzle

### Materials:

316L SS, 316 SS, 632 SS, PEEK, PEEK ESD (ATEX version only), PTFE, Zirconium oxide, EPDM

### Max. temperature:

203°F/ 95°C

### Recommended operating pressure:

75 psi

### Installation:

Operation in every direction is possible

### Filtration:

Line strainer with a mesh size of 0.3 mm/50 mesh

### Bearing:

Double ball bearing

### Rotation monitoring sensor:

Sensor compatible, Info: see page 37

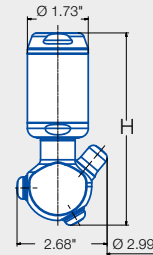
### Nozzle dimensions [in]

Connection	H
BF	5.83
BH	5.87
BL	5.47
BN	5.47
TF05 (T5)	5.91
TF07 (T7)	6.46

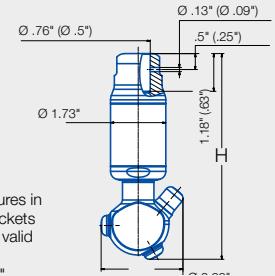


**ATEX version on request**

Slip-on information: - R-clip made of stainless steel 316L SS is included(Ordering no.: 095.022.1Y.50.60.E).  
- Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and rotating cleaning nozzle.



Female thread



Figures in brackets are valid for 1/2" version

Slip-on connection ASME - BPE 1997 (OD-Tube)

Spray angle	Ordering no.							Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)					Max. tank diameter [ft]
	Type	Connection							liters per minute	30 psi	40 psi	75 psi	145 psi	
		3/8" Female NPT	1/2" Female NPT	3/4" Female NPT	1" Female NPT	1/2" OD Slip-on	3/4" OD Slip-on							
180°	5S2.953.1Y	BF	BH	-	-	TF05 (T5)	-	.08	25	6.6	7.8	10.6	15.1	11.5
	5S3.053.1Y	-	BH	-	-	-	TF07 (T7)	.08	41	10.8	12.8	17.2	24.3	13
	5S3.113.1Y	-	BH	BL	-	-	TF07 (T7)	.08	60	15.9	18.4	24.8	35.1	20
	5S3.183.1Y	-	-	BL	-	-	TF07 (T7)	.08	89	23.5	27.7	37.3	52.6	23
	5S3.233.1Y	-	-	BL	-	-	TF07 (T7)	.08	111	29.3	34.3	46.2	65.5	25
	5S3.263.1Y	-	-	BL	BN	-	TF07 (T7)	.08	135	35.7	41.8	56.3	79.5	26
180°	5S2.954.1Y	BF	BH	-	-	TF05 (T5)	-	.08	25	6.6	7.8	10.6	15.1	11.5
	5S3.054.1Y	-	BH	-	-	-	TF07 (T7)	.08	41	10.8	12.8	17.2	24.3	13
	5S3.114.1Y	-	BH	BL	-	-	TF07 (T7)	.08	60	15.9	18.4	24.8	35.1	20
	5S3.184.1Y	-	-	BL	-	-	TF07 (T7)	.08	89	23.5	27.7	37.3	52.6	23
	5S3.234.1Y	-	-	BL	-	-	TF07 (T7)	.08	111	29.3	34.3	46.2	65.5	25
	5S3.264.1Y	-	-	BL	BN	-	TF07 (T7)	.08	135	35.7	41.8	56.3	79.5	26
270°	5S2.955.1Y	BF	BH	-	-	TF05 (T5)	-	.08	25	6.6	7.8	10.6	15.1	11.5
	5S3.055.1Y	-	BH	-	-	-	TF07 (T7)	.08	41	10.8	12.8	17.2	24.3	13
	5S3.115.1Y	-	BH	BL	-	-	TF07 (T7)	.08	60	15.9	18.4	24.8	35.1	20
	5S3.185.1Y	-	-	BL	-	-	TF07 (T7)	.08	89	23.5	27.7	37.3	52.6	23
	5S3.235.1Y	-	-	BL	-	-	TF07 (T7)	.08	111	29.3	34.3	46.2	65.5	25
	5S3.265.1Y	-	-	BL	BN	-	TF07 (T7)	.08	135	35.7	41.8	56.3	79.5	26
270°	5S2.956.1Y	BF	BH	-	-	TF05 (T5)	-	.08	25	6.6	7.8	10.6	15.1	11.5
	5S3.056.1Y	-	BH	-	-	-	TF07 (T7)	.08	41	10.8	12.8	17.2	24.3	13
	5S3.116.1Y	-	BH	BL	-	-	TF07 (T7)	.08	60	15.9	18.4	24.8	35.1	20
	5S3.186.1Y	-	-	BL	-	-	TF07 (T7)	.08	89	23.5	27.7	37.3	52.6	23
	5S3.236.1Y	-	-	BL	-	-	TF07 (T7)	.08	111	29.3	34.3	46.2	65.5	25
	5S3.266.1Y	-	-	BL	BN	-	TF07 (T7)	.08	135	35.7	41.8	56.3	79.5	26
360°	5S2.959.1Y	BF	BH	-	-	TF05 (T5)	-	.07	25	6.6	7.8	10.6	15.1	11.5
	5S3.059.1Y	-	BH	-	-	-	TF07 (T7)	.08	41	10.8	12.8	17.2	24.3	13
	5S3.119.1Y	-	BH	BL	-	-	TF07 (T7)	.08	60	15.9	18.4	24.8	35.1	20
	5S3.189.1Y	-	-	BL	-	-	TF07 (T7)	.08	89	23.5	27.7	37.3	52.6	23
	5S3.239.1Y	-	-	BL	-	-	TF07 (T7)	.08	111	29.3	34.3	46.2	65.5	25
	5S3.269.1Y	-	-	BL	BN	-	TF07 (T7)	.08	135	35.7	41.8	56.3	79.5	26

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

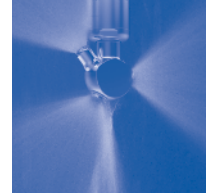
Example for ordering: Type 5S2.956.1Y + Conn. BF = Ordering no. 5S2.956.1Y.BF

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.





# Rotating cleaning nozzle "XactClean® HP+" Series 5S5



- Controlled rotation
- Powerful flat jet nozzles
- Very efficient tank cleaning nozzle

### Materials:

AISI 316L SS,  
AISI 316 SS,  
AISI 632 SS, PEEK, PTFE,  
Zirconium oxide, EPDM

### Max. temperature:

203°F/ 95°C

### Recommended operating pressure:

45 psi

### Installation:

Operation in every direction is possible

### Filtration:

Line strainer with a mesh size of 0.3 mm/50 mesh

### Bearing:

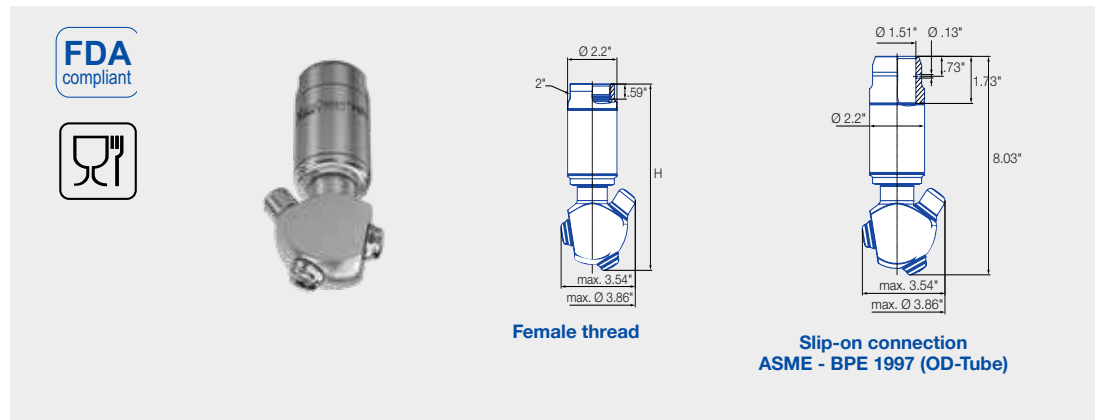
Double ball bearing

### Rotation monitoring sensor:

Sensor compatible,  
Info: see page 37

### Nozzle dimensions [in]

Connection	Max. Height [H]
<b>BN</b>	7.28
<b>BQ</b>	7.28
<b>BS</b>	7.36



Spray angle	Type	Ordering no.				Free passage Ø [in] liters per minute	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
		Connection					2 bar	30 psi	45 psi	75 psi	
		1 NPT	1 1/4 NPT	1 1/2 NPT	1 1/2" Slip-on						
180°	<b>5S5.293.1Y</b>	<b>BN</b>	-	-	<b>TF15</b>	.12	165	44.3	54.3	70.1	29.5
	<b>5S5.323.1Y</b>	<b>BN</b>	<b>BQ</b>	-	<b>TF15</b>	.12	200	53.7	65.8	84.9	30.2
	<b>5S5.363.1Y</b>	-	<b>BQ</b>	<b>BS</b>	<b>TF15</b>	.12	250	67.2	82.3	106.1	30.8
180°	<b>5S5.294.1Y</b>	<b>BN</b>	-	-	<b>TF15</b>	.12	165	44.3	54.3	70.1	29.5
	<b>5S5.324.1Y</b>	<b>BN</b>	<b>BQ</b>	-	<b>TF15</b>	.12	200	53.7	65.8	84.9	30.2
	<b>5S5.364.1Y</b>	-	<b>BQ</b>	<b>BS</b>	<b>TF15</b>	.12	250	67.2	82.3	106.1	30.8
270°	<b>5S5.295.1Y</b>	<b>BN</b>	-	-	<b>TF15</b>	.12	165	44.3	54.3	70.1	29.5
	<b>5S5.325.1Y</b>	<b>BN</b>	<b>BQ</b>	-	<b>TF15</b>	.12	200	53.7	65.8	84.9	30.2
	<b>5S5.365.1Y</b>	-	<b>BQ</b>	<b>BS</b>	<b>TF15</b>	.12	250	67.2	82.3	106.1	30.8
270°	<b>5S5.296.1Y</b>	<b>BN</b>	-	-	<b>TF15</b>	.12	165	44.3	54.3	70.1	29.5
	<b>5S5.326.1Y</b>	<b>BN</b>	<b>BQ</b>	-	<b>TF15</b>	.12	200	53.7	65.8	84.9	30.2
	<b>5S5.366.1Y</b>	-	<b>BQ</b>	<b>BS</b>	<b>TF15</b>	.12	250	67.2	82.3	106.1	30.8
360°	<b>5S5.299.1Y</b>	<b>BN</b>	-	-	<b>TF15</b>	.12	165	44.3	54.3	70.1	29.5
	<b>5S5.329.1Y</b>	<b>BN</b>	<b>BQ</b>	-	<b>TF15</b>	.12	200	53.7	65.8	84.9	30.2
	<b>5S5.369.1Y</b>	-	<b>BQ</b>	<b>BS</b>	<b>TF15</b>	.12	250	67.2	82.3	106.1	30.8
	<b>5S5.399.1Y</b>	-	<b>BQ</b>	<b>BS</b>	<b>TF15</b>	.12	300	80.6	98.7	127.3	31.5

E = narrowest free cross-section · BSPP on request

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

### Information on operation

- Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

### Slip-on information

- R-clip made of 316L SS is included (Ordering no.: 095.013.1Y.06.45.0).
- Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and rotating cleaning nozzle.

Example of ordering: **5S5.293.1Y.** + **BN** = **5S5.293.1Y.BN**



# High impact tank cleaning machine "IntenseClean Hygienic" Series 5TA



- Gear-controlled
- Particularly powerful solid jets
- Two different sizes for a variety of container sizes
- Operating pressures up to 217 psi possible

**Recommended operating pressure:**  
75 psi

**Temperature:**  
203°F, 266°F (Environment)

**Weight:**  
5TA approx. 2 lb.

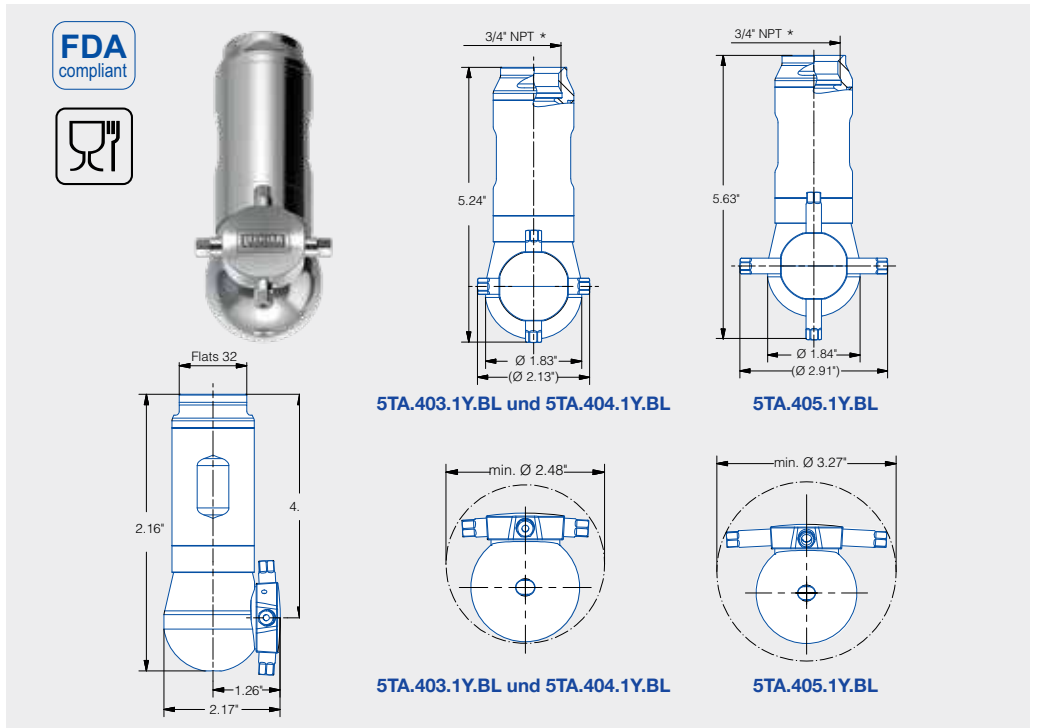
**Materials:**  
316L SS,  
316 SS,  
632 SS,  
PTFE, PEEK, Zirconium oxide, EPDM



**Bearing:**  
Ball bearing

**Required prefiltration:**  
Line filter with 0.2 mm/  
80 mesh

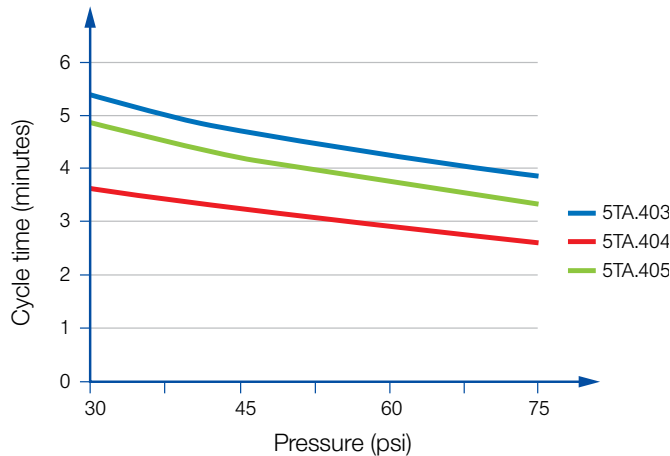
**Installation:**  
Operation in every direction is possible

**Rotation monitoring sensor:**  
Sensor compatible,  
Info: see page 37



Spray angle 	Ordering no.	Free Passage (in.)	Number, Ø Nozzles [mm]	Flow Rate (Gallons Per Minute)					Max. tank diameter [ft]	
				liters per minute 2 bar	30 psi	40 psi	75 psi	145 psi Max Pressure (psi)		
360° 	5TA. 403. 1Y. BL	.059	4 x 3.0	25	6	7	10	14	217	39
	5TA. 404. 1Y. BL	.059	4 x 4.0	35	9	11	15	21	217	41
	5TA. 405. 1Y. BL	.059	4 x 5.0	50	13	16	21	30	217	43

\* Slip-on connection on request



The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.



**ATEX version on request**

Cycle time depending on pressure of series 5TA



# High impact tank cleaning machine "IntenseClean Hygienic" Series 5TB



- Gear-controlled
- Particularly powerful solid jets
- Two different sizes for a variety of container sizes
- Operating pressures up to 362 psi possible

**Recommended operating pressure:**

75 psi

**Temperature:**

203°F, 266°F (Environment)

**Weight:**

5TB approx. 8.8 lb.

**Materials:**

AISI 316 L SS, AISI 632 SS, PTFE, PEEK, Zirconium oxide, EPDM, 32 RA surface finish is included with every material

**Bearing:**

Ball bearing

**Required prefiltration:**

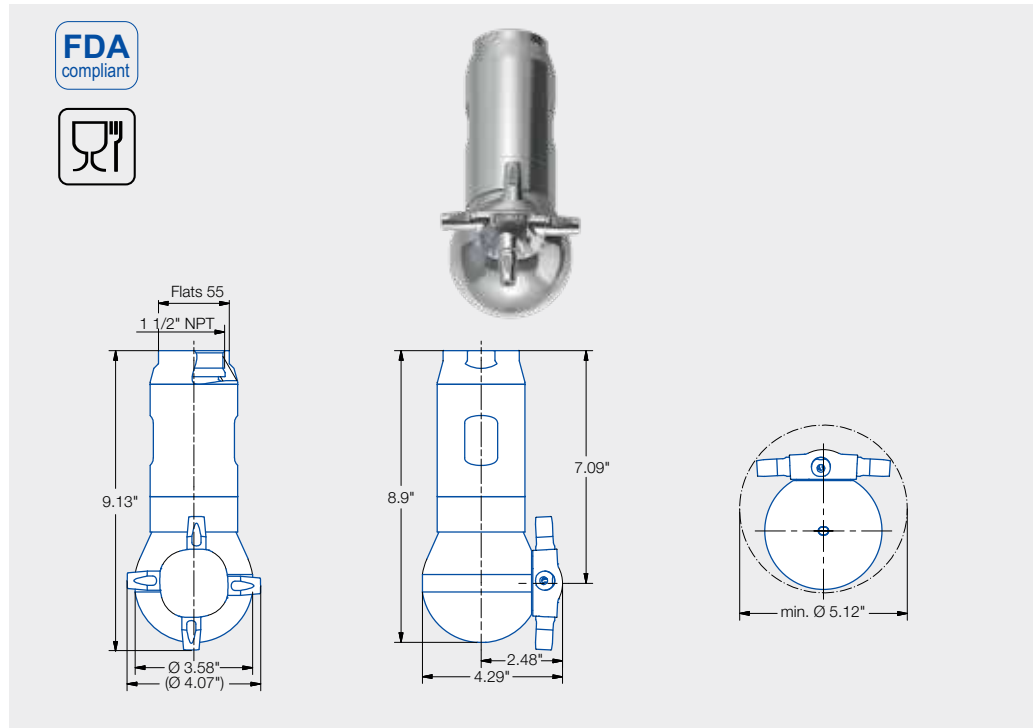
Line filter with 0.2 mm/ 80 mesh



**Installation:**

Operation in every direction is possible

**Rotation monitoring sensor:**

Sensor compatible, Info: see page 37

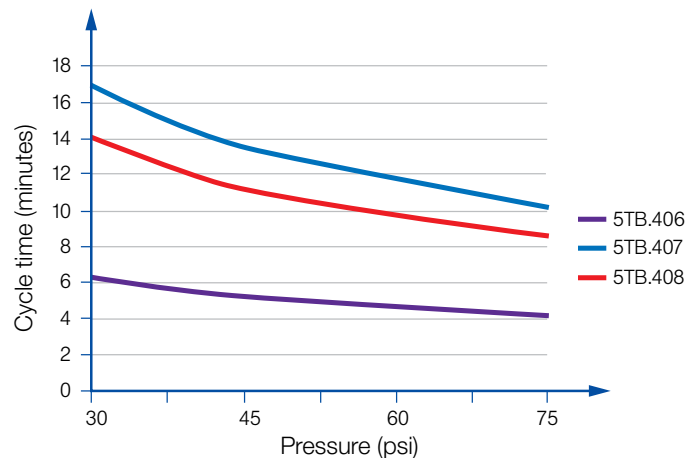


Spray angle 	Ordering no.	Free Passage (in.)	Number, Ø Nozzles [mm]	Flow Rate (Gallons Per Minute)					Max pressure (psi)	Max. tank diameter [ft]
				liters per minute 2 bar	30 psi	40 psi	75 psi	145 psi		
	<b>5TB. 406. 1Y. BS</b>	.236	4 x 6.0	107	29	33	45	63	362	46
	<b>5TB. 407. 1Y. BS</b>	.236	4 x 7.0	132	35	41	56	78	362	46
	<b>5TB. 408. 1Y. BS</b>	.236	4 x 8.0	150	40	47	64	89	362	49

The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.



**ATEX version on request**



Cycle time depending on pressure of series 5TB







# High impact tank cleaning machine Series 5TM



- Gear-driven
- Very powerful solid jets
- Popular and proven design

**Recommended operating pressure:**  
75 psi

**Max. fluid temperature:**  
5TM: 203°F/95°C

**Weight:** Approx. 16.5 lb.

**Material:**  
316L SS, 304 SS, 302 SS,  
PTFE, PEEK

**Bearing:**  
Ball and slide bearings

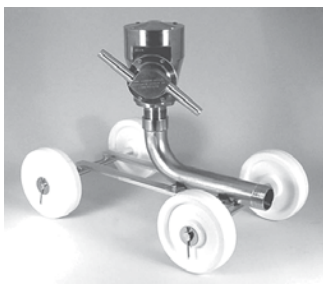
**Installation:**  
Operates in every direction

**Filtration:**  
Line strainer with a mesh size of  
0.2 mm/80 Mesh

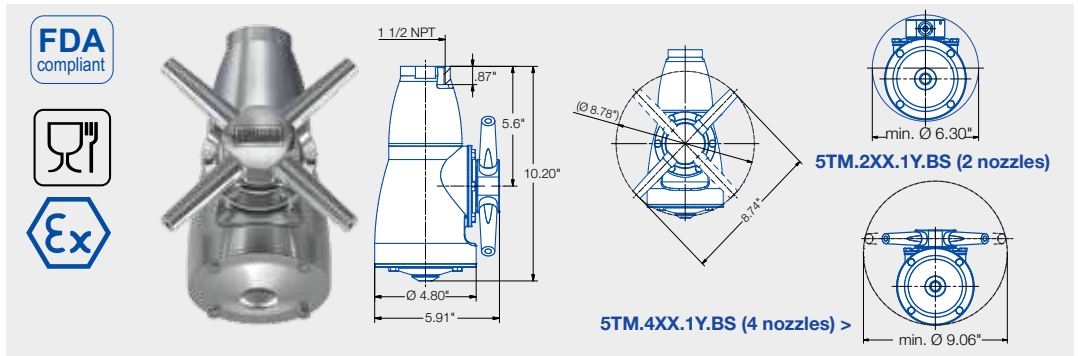
**Rotation monitoring sensor:**  
Sensor compatible,  
Info: see page 37



Our special mounting bracket provides the ability for the 5TM to reach the far ends of long horizontal tanks/ tankers. Mounting bracket part number: **099.164.17.00.00**

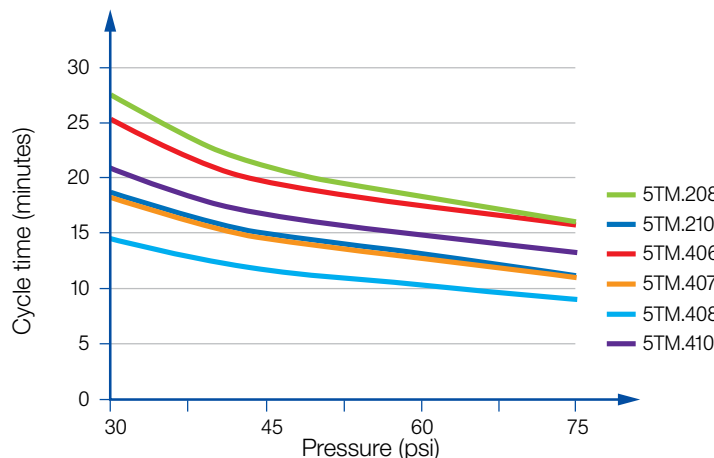


Portable cart for easier transporting of your 5TM from tank to tank. The cart part number is **M20.000.17.BR**.  
**For use with "BR" connection only.**



Type	Connection			Free Passage (in.)	No. of Nozzles x Diameter	Flow Rate	Operating Pressure				Max. tank diameter [ft]
	1 1/2" Male NPT	1 1/2" Female NPT	1 1/2" CL150 Flange				40 psi	60 psi	80 psi	100 psi	
<b>5TM. 208. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.314	2 x 8mm	Flow Rate	39 gpm	48 gpm	55 gpm	61 gpm	79
<b>5TM. 209. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.354	2 x 9mm	Flow Rate	45 gpm	54 gpm	60 gpm	65 gpm	79
<b>5TM. 210. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.394	2 x 10mm	Flow Rate	50 gpm	61 gpm	70 gpm	79 gpm	79
<b>5TM. 211. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.433	2 x 11mm	Flow Rate	57 gpm	68 gpm	78 gpm	80 gpm	75
<b>5TM. 406. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.236	4 x 6mm	Flow Rate	43 gpm	53 gpm	61 gpm	69 gpm	59
<b>5TM. 407. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.276	4 x 7mm	Flow Rate	53 gpm	65 gpm	75 gpm	83 gpm	66
<b>5TM. 408. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.315	4 x 8mm	Flow Rate	62 gpm	76 gpm	88 gpm	98 gpm	72
<b>5TM. 409. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.354	4 x 9mm	Flow Rate	74 gpm	88 gpm	98 gpm	106 gpm	75
<b>5TM. 410. 1Y</b>	<b>BR</b>	<b>BS</b>	<b>015</b>	.394	4 x 10mm	Flow Rate	81 gpm	99 gpm	114 gpm	128 gpm	75

**Example** Type + Conn. = Ordering no.  
for ordering: **5TM. 208. 17** + **BR** = **5TM. 208. 17. BR**



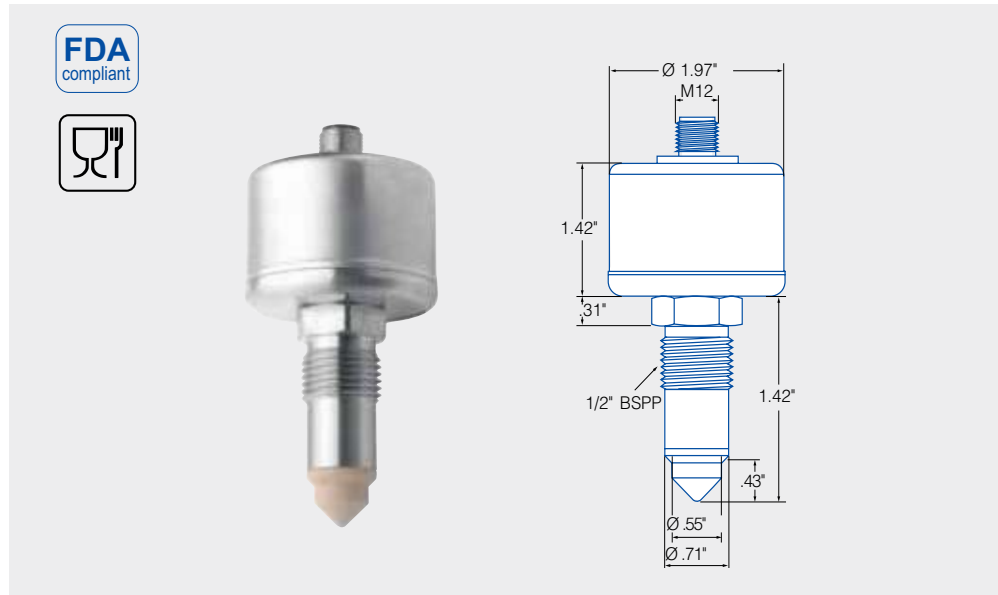
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.





# Rotation Monitoring Sensor

Cleaning processes can be easily and reliably monitored with the Lechler rotation monitoring sensor. The sensor records the presence of liquid flowing over the sensor tip. With the aid of the software\*, the sensor function can be specifically adjusted to the tank size, pressure and nozzle.



## Electrical data

- Supply voltage:  
Ub = 24 V +/-20%  
(18 to 32 VDC)
- Power requirements:  
< 20 mA
- Output signal:  
PNP, 50 mA short circuit  
protected, active

## Operating conditions

- Ambient external  
temperature:  
14°F up to 140°F
- Process internal  
temperature:  
0° up to +212°F

## Materials

- Socket (G 1/2"):  
316L SS
- Probe tip:  
PEEK
- Body:  
303 SS

## Operating principle

- Capactive

## Advantages

- Reliable recognition of any  
faults during the cleaning  
cycle
- The process connection of  
the sensor is in compliance  
with the hygiene guidelines  
of the EHEDG
- Simple operation
- Can be connected to PLC
- Only needs to be set up  
once using the software  
provided
- Can be specifically adapted  
to each cleaning task



## Ordering data

Ordering data	Ordering no.
Rotation monitoring sensor with weld-in sleeve	050.040.00.00.00.0
Cable set for first-time operation	050.040.00.00.01.0

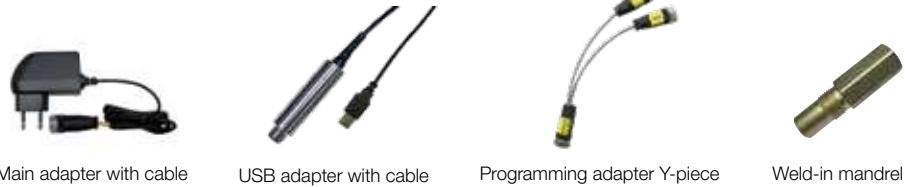


# Rotation Monitoring Sensor

Rotation monitoring sensor with weld-in sleeve



Cable set for first-time operation/installation



## Lances

A common way to insert a tank cleaning nozzle into a tank for cleaning is by way of a lance. As with any inlet connection for a tank cleaning product, nozzles may be connected to a lance in these ways:

- Threaded
- Tri-Clamp
- Slip-on (secured with an R-clip)
- Welded
- Flanged

There are two types of lances that can be used for tank cleaning:

- Standard (or fixed length)
- Retractable

Either can simply be bolted to the tank wall while the lance end is inserted into the tank.

The standard lance (see **Figures 1-3**) has a fixed length so care must be taken to ensure the lance is of the proper length for the size of the tank. On the retractable lance (see **Figure 4**), the shaft actually retracts, returning the nozzle back into the flange portion of the assembly so it only comes out when cleaning is performed.

Whatever your tank cleaning lance needs, even for something special like **Figure 3**, Lechler can fabricate one specifically for your application, be it for food, pharmaceutical, chemical processing or any other industry.



Figure 1



Figure 3



Figure 2

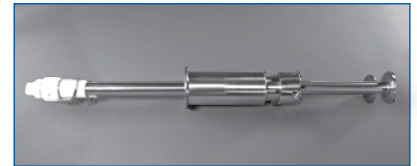


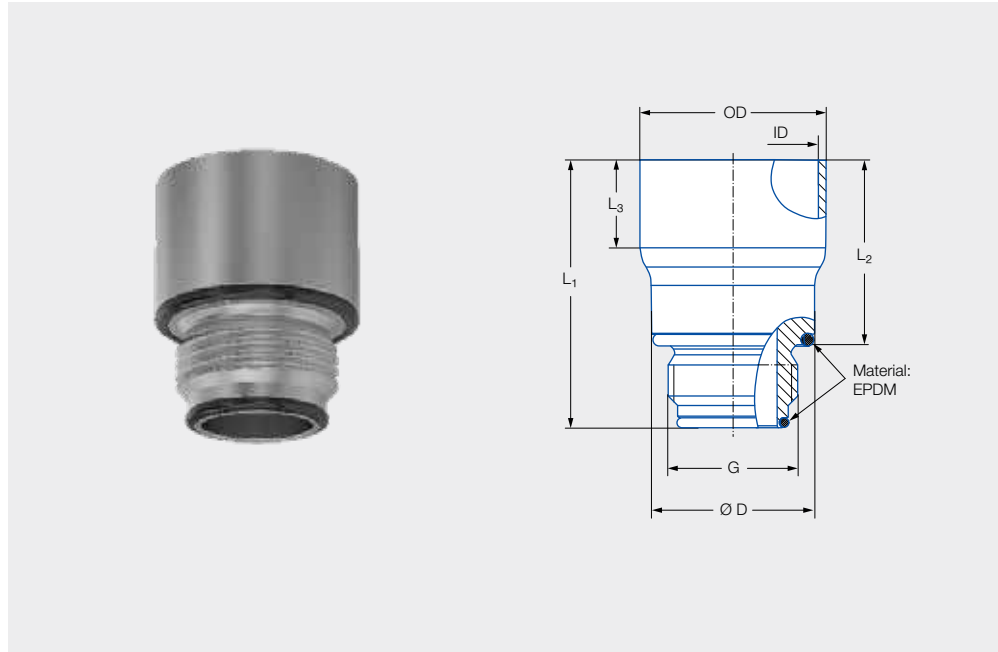
Figure 4



# Adapter »HygienicFit« Series 05C

## Series 05C

The HygienicFit ensures a hygienic connection between your tank cleaning nozzle and the supply line. The adaptor is welded onto the connection pipe, while the Lechler tank cleaning nozzle is screwed onto it. The O-rings on the adapter completely encapsulate the thread, thereby providing a perfectly hygienic connection to the system. Through the use of the O-rings, the HygienicFit also offers a reliable thread lock.



**Materials**  
316L SS;  
EPDM (O-Ring)



**Max. temperature**  
302 °F/ 150 °C



**Installation**

Ordering no.	Connection thread BSPP male	Dimensions [in]				Dimensions OD = Outer diameter ID = Inner diameter [in]		Pipe standard
		L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	Ø D	OD	ID	
<b>05C.190.1Y.AE.16</b>	3/8	1.89	1.41	.71	.85	.75	.62	DIN EN 10357 series D
<b>05C.230.1Y.AE.15</b>	3/8	1.89	1.41	.71	.85	.91	.79	DIN EN 10357 series A
<b>05C.250.1Y.AE.12</b>	3/8	1.89	1.41	.67	.85	.98	22,6	DIN EN 10357 series D
<b>05C.250.1Y.AG.12</b>	1/2	2.20	1.54	.71	1.22	.98	.89	DIN EN 10357 series D
<b>05C.350.1Y.AK.15</b>	3/4	2.17	1.49	.83	1.32	1.38	1.26	DIN EN 10357 series A
<b>05C.380.1Y.AK.12</b>	3/4	2.17	1.49	.71	1.32	1.50	1.40	ISO 2037
<b>05C.381.1Y.AK.15</b>	3/4	2.17	1.49	.71	1.32	1.50	1.39	DIN EN 10357 series D
<b>05C.381.1Y.AM.16</b>	1	2.32	1.54	.91	1.59	1.50	1.37	DIN EN 10357 series D
<b>05C.508.1Y.AP.15</b>	1 1/4	2.24	1.50	.87	1.94	2.00	1.88	DIN EN 10357 series D
<b>05C.635.1Y.AR.16</b>	1 1/2	2.48	1.73	.87	2.20	2.50	2.37	DIN EN 10357 series D

## Spare parts set of O-rings, EPDM

Thread type BSPP	Ordering no.
3/8	<b>05C.000.E9.AE.00</b>
1/2	<b>05C.000.E9.AG.00</b>
3/4	<b>05C.000.E9.AK.00</b>
1	<b>05C.000.E9.AM.00</b>
1 1/4	<b>05C.000.E9.AP.00</b>
1 1/2	<b>05C.000.E9.AR.00</b>

O-ring set is also available on request in FKM.















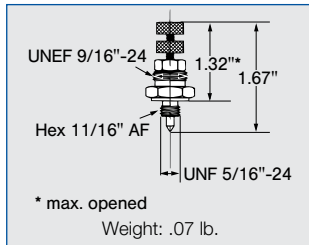


# Accessories for pneumatic atomizing nozzles Series 136

## Regulating device and shut-off needle:

Shuts off flow and controls liquid supply — manually operated

1A

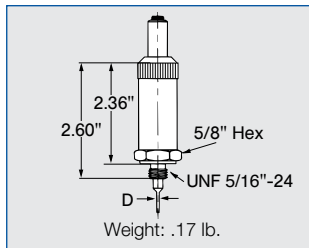


Ordering no.		For all 136 series nozzles
Assembly part no.	Mat. no.	
	303 SS 16	
015. 600	○	

## Regulating device with quick-cleaning needle:

Combines orifice cleaning with liquid flow control — manually operated

1B

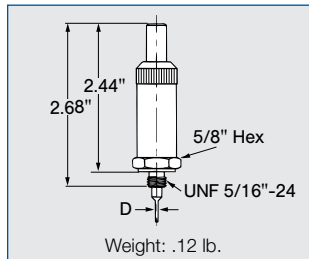


Ordering no.		Use the 6th digit to determine appropriate accessory Example: 136.414.1Y.B2	Needle diameter D (in.)	
Assembly part no.	Mat. no.			
	303 SS 16	Press button Plate 35		
013. 601. xx. 30	○	○	136. xx1. xx. B2	.085
013. 602. xx. 30	○	○	136. xx2. xx. B2	.048
013. 603. xx. 30	○	○	136. xx3. xx. B2	.034
013. 604. xx. 30	○	○	136. xx4. xx. B2	.024
013. 605. xx. 30	○	○	136. xx5. xx. B2	.016
013. 606. xx. 30	○	○	136. xx6. xx. B2	.012

## Quick-cleaning device:

Does orifice cleaning with push-button pin — manually operated

1C

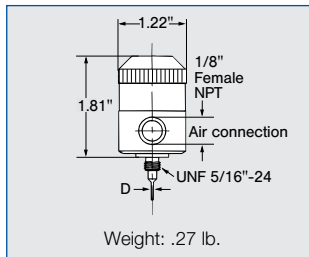


013. 601. xx. 20	○	○	136. xx1. xx. B2	.085
013. 602. xx. 20	○	○	136. xx2. xx. B2	.048
013. 603. xx. 20	○	○	136. xx3. xx. B2	.034
013. 604. xx. 20	○	○	136. xx4. xx. B2	.024
013. 605. xx. 20	○	○	136. xx5. xx. B2	.016
013. 606. xx. 20	○	○	136. xx6. xx. B2	.012

## Pneumatically controlled valve:

Opening pressure 30 psi, max. 180 cycles/min. Connects to separate air inlet for fast on/off operation — externally controlled

1D



013. 601. xx. 10	○	○	136. xx1. xx. B2	.085
013. 602. xx. 10	○	○	136. xx2. xx. B2	.048
013. 603. xx. 10	○	○	136. xx3. xx. B2	.034
013. 604. xx. 10	○	○	136. xx4. xx. B2	.024
013. 605. xx. 10	○	○	136. xx5. xx. B2	.016
013. 606. xx. 10	○	○	136. xx6. xx. B2	.012

**Example**    **Type**    +    **Material no. (xx)** = **Ordering no.**  
for ordering: 013. 602. xx. 20 + 16 = 013. 602. 16. 20

1E for Series 136/166

Locking plug

156. 000. 1Y. 00. 04

2A for Series 136

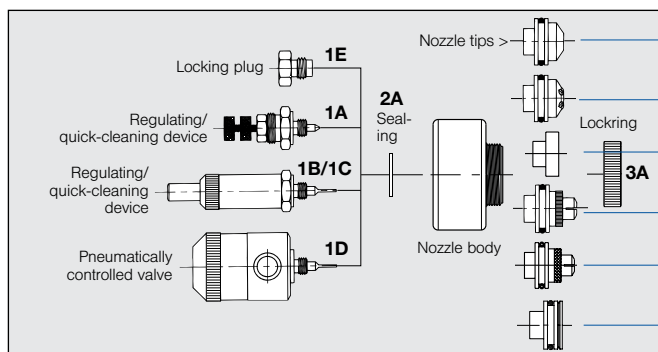
Seal

095. 015. 7A. 03. 04

3A for Series 136/166

Lockring

136. 000. 1Y. 00. 07



### Nozzle tips\*

- Series 136.1/166.1  
**136. xxx. 1Y. 00. 03**
- Series 136.2/166.2  
**136. xxx. 1Y. 00. 03**
- Series 136.3/166.3  
**136. xxx. 1Y. 00. 03**
- Series 136.4/166.4  
**136. xxx. 1Y. 00. 03**
- Series 136.5/166.5  
**136. xxx. 1Y. 00. 03**
- Series 136.6/166.6  
**136. xxx. 1Y. 00. 03**

\* Use the 3 digits from the full nozzle assembly for the spare tip part number  
Example:  
136.414.17.B2





# Pneumatic atomizing nozzles, for atomizing viscous media Series 176 ViscoMist™

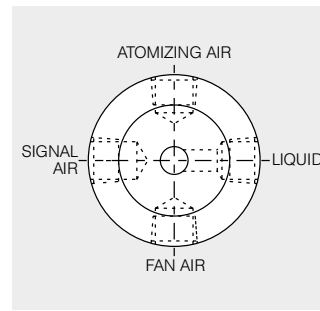
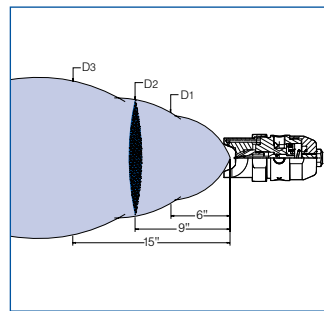
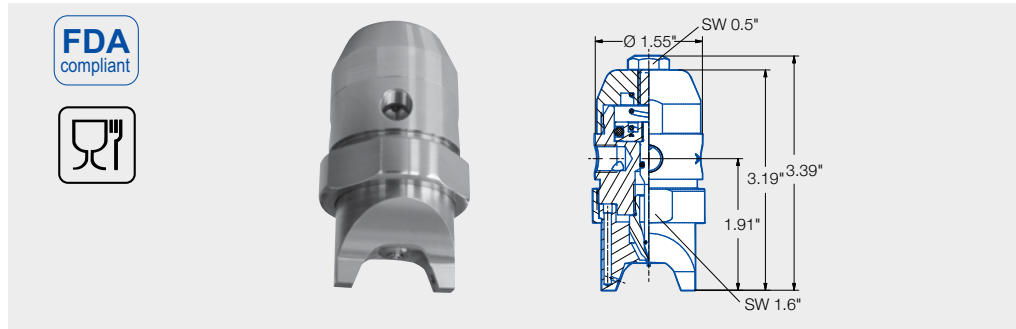


**Versatile design with built-in pneumatic needle valve for liquid flow control and automatic clean-out. Three nozzle body configurations offer flexible tailoring to your specific application needs. Models feature individual controls for on-off operation, atomizing air, and fan air, allowing adjustments to droplet size and spray pattern as appropriate without compromising required flow. Has been newly redesigned for greater anti-bearding.**

**Applications:**

- Spraying viscous fluids
- Coating
- Glazing
- Sanitizing
- Humidification
- Recirculating liquids

All nozzle inlet connections:  
1/8" female NPT



**Nozzle Body 4**

This configuration has four process connections: one for liquid, and three for air. One air connection controls atomizing air, one controls fan air, and the third controls signal air for on-off operations, so each aspect can be individually adjusted. Therefore, atomizing air can be set at less than 40 psi if desired without affecting the on-off operation, for instance.

The ViscoMist™ has greatly minimized the following problem, but it is still a situation to be aware of:

**Bearding/Caking**

- **What is it**—Build-up of material around the inside or outside of the orifice due to evaporation of the liquid being sprayed. This dried solid material blocks all or part of the nozzle orifice or internal flow passages.
- **Symptoms**
  - Reduced flow rate
  - Reduced spray angle
  - Irregular spray pattern
- **Solution**—Thoroughly clean nozzle, if necessary, using cleansers and solvents which will not affect the nozzle material.

**Description of inlet ports and their symbols**

The ViscoMist™ has three Nozzle Body styles available. For all styles, next to each inlet port on the nozzle is stamped one or more letters representing the spray aspect(s) that port controls. These spray aspects and the letter representing each are as follows:

**Atomizing Air (A)**

The Atomizing Air Port influences the atomization of the liquid into either small or large droplet sizes, simultaneously affecting spray distribution in the center of the spray pattern. To achieve finer liquid atomization, increase the atomizing air pressure.

**Fan Air (F)**

The Fan Air Port flattens the atomized liquid, thus giving it a flat fan spray distribution. With the appropriate nozzle body configuration, this distribution can be adjusted independently to control the liquid spray width. To achieve a wider spray distribution, increase the fan air pressure.

**Liquid(M)**

The liquid flow rate is directly proportional to the liquid pressure rate. Subsequently, the higher the liquid pressure rate is, the higher the liquid flow rate will be. The liquid "On" or "Off" cycle is dependent on the Piston-controlled Signal Air supply.

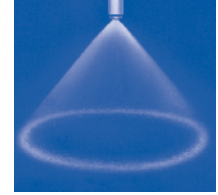
**Signal Air (P)**

Air supplied to this port actuates a piston located within the nozzle to retract or extend the Clean-Out/Liquid Shut-Off Needle. Retracting the needle allows the liquid to flow from the nozzle. A minimum of 40 psi air pressure to this port is required to operate the nozzle.





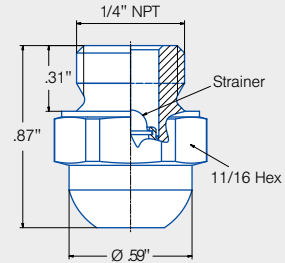
# Axial-flow hollow cone nozzles Series 220





**Extremely fine, fog-like hollow cone spray.**

**Applications:**

Disinfection, humidification, cooling.



Spray angle 	Ordering no.				Orifice diam. (in.)	Free Passage (in.)	Mesh size Strainer (in.)	Flow Rate (Gallons Per Minute)							Spray Diam. D (in.) @ 72 psi  H=4"	Theoretical Spray Width @ 72.5 psi (5 bar) H=100mm
	Type	Material no.		Connection				30 psi	45 psi	5 bar	75 psi	100 psi	150 psi	300 psi		
		430F SS <b>11</b>	316L SS <b>1Y</b>													
60°	<b>220. 004</b>	○	○	<b>BC</b>	.004	.004	.002	-	-	.013	.003	.004	.005	.007	4	100
	<b>220. 014</b>	○	○	<b>BC</b>	.006	.006	.002	-	.004	.019	.005	.006	.007	.010	4	100
	<b>220. 054</b>	○	○	<b>BC</b>	.008	.006	.002	.004	.006	.027	.007	.008	.010	.014	6	140
80°	<b>220. 085</b>	○	○	<b>BC</b>	.010	.010	.004	.007	.008	.040	.011	.012	.015	.021	6	140
	<b>220. 125</b>	○	○	<b>BC</b>	.014	.014	.004	.010	.013	.062	.016	.019	.023	.033	6	140
	<b>220. 145</b>	○	○	<b>BC</b>	.016	.016	.004	.014	.017	.082	.022	.026	.031	.043	6	140
	<b>220. 165</b>	○	○	<b>BC</b>	.018	.018	.004	.017	.021	.103	.027	.032	.039	.054	6	140
	<b>220. 185</b>	○	○	<b>BC</b>	.022	.014	.008	.022	.027	.130	.034	.041	.049	.069	6	140
	<b>220. 205</b>	○	○	<b>BC</b>	.024	.014	.008	.028	.034	.168	.044	.053	.063	.089	6	140
	<b>220. 245</b>	○	○	<b>BC</b>	.028	.020	.008	.044	.053	.261	.069	.082	.097	.138	6	140
	<b>220. 285</b>	○	○	<b>BC</b>	.035	.022	.008	.065	.080	.390	.103	.122	.146	.206	6	140

**Example**    Type    +    Material no.    +    Conn.    =    Ordering no.  
for ordering: 220. 004    +    1Y                    +    BC                =    220. 004. 1Y. BC

**The integrated strainer avoids clogging of the nozzle and increases its service life.**

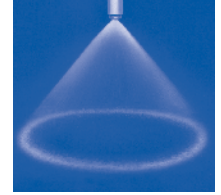
**Nozzles of series 220 replace series 212 which are still available on request.**

**\* Materials**

Mat. no.	Housing	Nozzle insert	Strainer
11	430F SS	430F SS	316L SS
1Y	316L SS	316L SS	316L SS



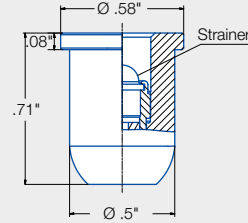
# Axial-flow hollow cone nozzles for retaining nut Series 226



**Hollow cone nozzle for assembly with retaining nut. Extremely fine, fog-like hollow cone spray.**

**Applications:**

Disinfection, humidification, cooling.



Spray angle	Ordering no.		Orifice diam. (in.)	Free Passage (in.)	Mesh size Strainer (in.)	Flow Rate (Gallons Per Minute)							Spray Diam. D (in.) @ 72 psi 	Theoretical Spray Width @ 72.5 psi (5 bar) H=100mm
	Type	Material no.				30 psi		45 psi		liters per minute				
						303 SS 16				5 bar	75 psi	100 psi		
60°	226. 004	○	.004	.004	.002	-	-	.013	.003	.004	.005	.007	4	100
	226. 014	○	.006	.006	.002	-	.004	.019	.005	.006	.007	.010	4	100
	226. 054	○	.008	.006	.002	.004	.006	.027	.007	.008	.010	.014	6	140
80°	226. 085	○	.010	.010	.004	.007	.008	.040	.011	.012	.015	.021	6	140
	226. 125	○	.014	.014	.004	.010	.013	.062	.016	.019	.023	.033	6	140
	226. 145	○	.016	.016	.004	.014	.017	.082	.022	.026	.031	.043	6	140
	226. 165	○	.018	.018	.004	.017	.021	.103	.027	.032	.039	.054	6	140
	226. 185	○	.022	.014	.008	.022	.027	.130	.034	.041	.049	.069	6	140
	226. 205	○	.024	.014	.008	.028	.034	.168	.044	.053	.063	.089	6	140
	226. 245	○	.028	.020	.008	.044	.053	.261	.069	.082	.097	.138	6	140
	226. 285	○	.035	.022	.008	.065	.080	.390	.103	.122	.146	.206	6	140

**Example** Type + Material no. + Conn. = Ordering no.  
for ordering: 226. 004 + 16 + BC = 220. 004. 1Y. BC

**The integrated strainer avoids clogging of the nozzle and increases its service life.**

**\* Materials**

Mat. no.	Housing	Nozzle insert	Strainer
16	303 SS	430F SS	316L SS

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$











# Axial-flow full cone nozzles Series 490 / 491



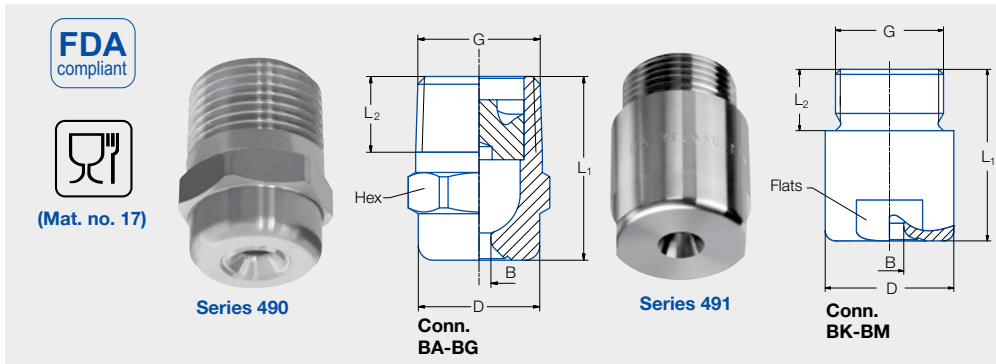
**Non-clogging nozzle design. Stable spray angle. Particularly even liquid distribution.**

**Applications:**

Cleaning and washing processes, surface spraying, Container cleaning, foam precipitation, degassing of liquids.

**Series 490/491 represents a new generation within the axial-flow full cone nozzles product group. These nozzles were developed using state-of-the-art design and simulation methods (CFD).**

**Nozzles of series 490/491 replace series 460/461 which are still available on request.**



Conn.	G	Dimensions (in.)				Weight Brass
		L <sub>1</sub>	L <sub>2</sub>	D	Hex	
<b>BA</b>	1/8 NPT	0.71	0.26	0.39	7/16	.03
<b>BC</b>	1/4 NPT	0.87	0.39	0.51	9/16	.04
<b>BE</b>	3/8 NPT	0.96	0.39	0.63	11/16	.07
<b>BE</b>	3/8 NPT	1.18	0.39	0.63	11/16	.11
<b>BG</b>	1/2 NPT	1.28	0.51	0.83	14/16	.13
<b>BG</b>	1/2 NPT	1.71	0.51	0.83	14/16	.19
<b>BK</b>	3/4 NPT	1.65	0.59	1.26	1-1/16	.42
<b>BK</b>	3/4 NPT	1.97	0.59	1.26	1-1/16	.44
<b>BM</b>	1 NPT	2.20	0.67	1.57	1-7/16	.77

Subject to technical modification. In a critical installation situation, please ask for the exact dimensions.

Spray Angle	Ordering no.										Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute)								Spray Coverage (in.) @ 30 psi		
	Type	Mat. no.		Connection									10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	H=8"	H=20"
		316 L	Brass	Male NPT																			
		1Y	30	1/8"	1/4"	3/8"	1/2"	3/4"	1"														
45°	490. 403	○	○	BA	-	-	-	-	-	.049	.049	.17	.23	1.00	.27	.30	.35	.40	.43	.51	6	16	
	490. 523	○	○	BA	-	-	-	-	-	.067	.067	.35	.46	2.00	0.54	.60	.71	.79	.87	1.02	6	16	
	490. 603	○	○	-	BC	BE	-	-	-	.079	.079	.54	.72	3.15	0.84	.95	1.11	1.25	1.37	1.61	6	16	
	490. 643	-	○	-	BC	BE	-	-	-	.096	.098	.69	.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	6	16	
	490. 683	-	○	-	BE	-	-	-	-	.100	.100	.86	1.14	5.00	1.34	1.50	1.77	1.98	2.17	2.55	6	16	
	490. 703	-	○	-	BE	-	-	-	-	.104	.104	.97	1.27	5.60	1.50	1.68	1.98	2.22	2.43	2.85	6	16	
	490. 723	○	○	-	BE	-	-	-	-	.112	.112	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	6	16	
	490. 783	-	○	-	-	BG	-	-	-	.136	.136	1.55	2.05	9.00	2.41	2.70	3.18	3.57	3.90	4.58	6	16	
	490. 843	-	○	-	-	BG	-	-	-	.150	.150	2.16	2.85	12.50	3.35	3.76	4.42	4.96	5.42	6.37	6	16	
60°	490. 404	○	○	BA	-	-	-	-	-	.045	.045	.17	0.23	1.00	.27	.30	.35	.40	.43	0.51	9	22	
	490. 444	○	-	BA	-	-	-	-	-	.049	.049	.22	0.29	1.25	.33	.38	.44	.49	.54	0.64	9	22	
	490. 484	○	○	BA	-	-	-	-	-	.057	.057	.28	0.36	1.60	.43	.48	.57	.63	.69	0.82	9	22	
	490. 524	○	○	BA	-	-	-	-	-	.063	.063	.35	0.46	2.00	.54	.60	.71	.79	.87	1.02	9	22	
	490. 564	○	○	BA	-	-	-	-	-	.071	.071	.43	0.57	2.50	.67	.75	.88	.99	1.08	1.27	9	22	
	490. 604	○	○	BA	BC	BE	-	-	-	.081	.081	.54	0.72	3.15	.84	.95	1.11	1.25	1.37	1.61	9	22	
	490. 644	○	○	-	BC	BE	-	-	-	.091	.091	.69	0.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	9	22	
	490. 684	○	○	-	BC	BE	-	-	-	.102	.102	.86	1.14	5.00	1.34	1.50	1.77	1.98	2.17	2.55	9	22	
	490. 724	○	○	-	BC	BE	-	-	-	.112	.110	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	9	22	
	490. 764	○	○	-	BE	-	-	-	-	.128	.128	1.38	1.82	8.00	2.14	2.40	2.83	3.17	3.47	4.08	9	22	
	490. 804	○	○	-	BE	-	-	-	-	.146	.146	1.72	2.28	10.00	2.68	3.00	3.53	3.97	4.34	5.10	9	22	
	490. 844	○	○	-	-	BG	-	-	-	.159	.159	2.16	2.85	12.50	3.35	3.76	4.42	4.96	5.42	6.37	9	22	
	490. 884	○	○	-	-	BG	-	-	-	.183	.183	2.76	3.64	16.00	4.28	4.81	5.65	6.34	6.94	8.16	9	22	
	490. 924	○	○	-	-	-	BK	-	-	.205	.205	3.45	4.56	20.00	5.36	6.01	7.07	7.93	8.67	10.20	9	22	
	490. 964	○	○	-	-	-	BK	-	-	.228	.228	4.31	5.69	25.00	6.70	7.51	8.83	9.91	10.84	12.74	9	22	
	491. 044	○	○	-	-	-	-	BK	-	.285	.285	6.90	9.11	40.00	10.71	12.02	14.14	15.86	17.34	20.39	9	22	
491. 084	○	○	-	-	-	-	BM	-	.321	.321	8.63	11.38	50.00	13.39	15.02	17.67	19.82	21.67	25.49	9	22		

Continued on next page.






# Axial-flow full cone nozzles

## Series 490 / 491



Spray Angle 	Ordering no.									Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute)										Spray Coverage (in.) @ 30 psi	
	Type	Mat. no.		Connection								10 psi	20 psi	2 bar	liters per minute						H=8"	H=20"	
		1Y	30	Male NPT											30 psi	40 psi	60 psi	80 psi	100 psi	150 psi			
				1/8"	1/4"	3/8"	1/2"	3/4"	1"														
90°	490. 406	○	○	BA	-	-	-	-	-	.047	.047	.17	.23	1.00	.27	.30	.35	.40	.43	.51	15	34	
	490. 446	-	○	BA	-	-	-	-	-	.051	.051	.22	.29	1.25	.33	.38	.44	.49	.54	.64	15	34	
	490. 486	○	○	BA	-	-	-	-	-	.057	.057	0.28	.36	1.60	.43	.48	.57	.63	.69	.82	15	34	
	490. 526	○	○	BA	-	-	-	-	-	.067	.067	.35	.46	2.00	.54	.60	.71	.79	.87	1.02	15	34	
	490. 566	○	○	BA	-	-	-	-	-	.075	.075	.43	.57	2.50	.67	.75	.88	.99	1.08	1.27	15	34	
	490. 606	○	○	BA	-	BE	-	-	-	.081	.081	.54	.72	3.15	.84	.95	1.11	1.25	1.37	1.61	15	34	
	490. 646	○	○	-	BC	BE	-	-	-	.094	.094	.69	.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	15	38	
	490. 686	○	○	-	BC	BE	-	-	-	.106	.106	.86	1.14	5.00	1.34	1.50	1.77	1.98	2.17	2.55	15	38	
	490. 726	○	○	-	BC	BE	-	-	-	.126	.110	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	15	38	
	490. 746	○	○	-	-	BE	-	-	-	.124	.124	1.23	1.62	7.10	1.90	2.13	2.51	2.82	3.08	3.62	15	38	
	490. 766	○	○	-	-	BE	-	-	-	.134	.134	1.38	1.82	8.00	2.14	2.40	2.83	3.17	3.47	4.08	15	38	
	490. 806	○	○	-	-	BE	-	-	-	.154	.154	1.72	2.28	10.00	2.68	3.00	3.53	3.97	4.34	5.10	15	38	
	490. 846	○	○	-	-	BE	-	-	-	.183	.157	2.16	2.85	12.50	3.35	3.76	4.42	4.96	5.42	6.37	15	38	
	490. 886	○	○	-	-	-	BG	-	-	.215	.177	2.76	3.64	16.00	4.28	4.81	5.65	6.34	6.94	8.16	15	38	
	490. 926	○	○	-	-	-	BG	-	-	.232	.177	3.45	4.56	20.00	5.36	6.01	7.07	7.93	8.67	10.20	15	38	
	490. 966	○	○	-	-	-	BG	BK	-	.258	.191	4.31	5.69	25.00	6.70	7.51	8.83	9.91	10.84	12.74	15	38	
	491. 006	○	○	-	-	-	BG	BK	-	.297	.285	5.44	7.17	31.50	8.44	9.47	11.13	12.49	13.66	16.06	15	38	
	491. 046	○	○	-	-	-	-	BK	BK	.339	.315	6.90	9.11	40.00	10.71	12.02	14.14	15.86	17.34	20.39	15	38	
	491. 086	○	○	-	-	-	-	BK	BM	.372	.285	8.63	11.38	50.00	13.39	15.02	17.67	19.82	21.67	25.49	15	38	
491. 126	○	○	-	-	-	-	-	BM	.409	.315	10.87	14.35	63.00	16.87	18.93	22.26	24.98	27.31	32.12	15	38		
491. 146	○	-	-	-	-	-	-	BM	.433	.295	12.25	16.17	71.00	19.01	21.33	25.09	28.15	30.78	36.20	15	38		
120°	490. 368	○	○	BA	-	-	-	-	-	.033	.026	.11	.14	.63	.17	.19	.22	.25	.27	.32	27	48	
	490. 408	○	○	BA	-	-	-	-	-	.047	.047	.17	.23	1.00	.27	.30	.35	.40	.43	.51	27	48	
	490. 448	○	○	BA	-	-	-	-	-	.051	.051	.22	.29	1.25	.33	.38	.44	.49	.54	.64	27	48	
	490. 488	○	○	BA	-	-	-	-	-	.057	.057	.28	0.36	1.60	.43	.48	.57	.63	.69	.82	27	48	
	490. 528	○	○	BA	-	-	-	-	-	.067	.067	.35	.46	2.00	.54	.60	.71	.79	.87	1.02	27	48	
	490. 568	○	○	BA	-	-	-	-	-	.075	.075	.43	.57	2.50	.67	.75	.88	.99	1.08	1.27	27	48	
	490. 608	○	○	-	BC	-	-	-	-	.083	.081	.54	.72	3.15	.84	.95	1.11	1.25	1.37	1.61	27	48	
	490. 648	○	○	-	BC	BE	-	-	-	.094	.094	.69	.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	27	52	
	490. 688	○	○	-	BC	BE	-	-	-	.108	.108	.86	1.14	5.00	1.34	1.50	1.77	1.98	2.17	2.55	27	52	
	490. 728	○	○	-	BC	BE	-	-	-	.126	.110	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	27	52	
	490. 748	○	○	-	-	BE	-	-	-	.126	.126	1.23	1.62	7.10	1.90	2.13	2.51	2.82	3.08	3.62	27	52	
	490. 768	○	○	-	-	BE	-	-	-	.136	.136	1.38	1.94	8.00	2.14	2.40	2.83	3.17	3.47	4.08	27	52	
	490. 808	○	○	-	-	BE	-	-	-	.154	.154	1.72	2.28	10.00	2.68	3.00	3.53	3.97	4.34	5.10	27	52	
	490. 848	○	○	-	-	-	-	-	-	.185	.157	2.16	2.85	12.50	3.35	3.76	4.42	4.96	5.42	6.37	27	52	
	490. 888	○	○	-	-	-	BG	-	-	.201	.177	2.76	3.64	16.00	4.28	4.81	5.65	6.34	6.94	8.16	27	52	
	490. 928	○	○	-	-	-	BG	-	-	.228	.187	3.45	4.56	20.00	5.36	6.01	7.07	7.93	8.67	10.20	27	52	
	490. 968	○	○	-	-	-	BG	BK	-	.262	.191	4.31	5.69	25.00	6.70	7.51	8.83	9.91	10.84	12.74	27	52	
	491. 048	○	○	-	-	-	-	BK	-	.362	.230	6.90	9.11	40.00	10.71	12.02	14.14	15.86	17.34	20.39	27	52	
	491. 128	○	○	-	-	-	-	-	BM	.425	.305	10.87	14.35	63.00	16.87	18.93	22.26	24.98	27.31	32.12	27	52	
491. 148	○	-	-	-	-	-	-	BM	.449	.301	12.25	16.17	71.00	19.01	21.33	25.09	28.15	30.78	36.20	27	52		

Example Type + Material no. + Conn. = Ordering no.  
for ordering: 490. 368 + 1Y + BA = 490. 368. 1Y. BA

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





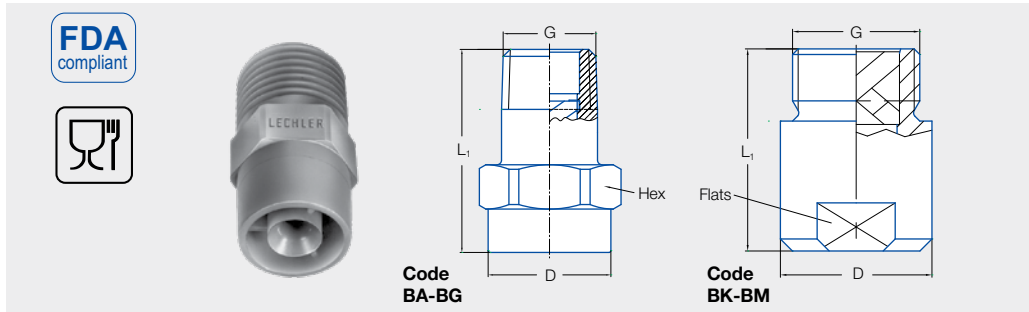
# Axial-flow full cone nozzles Series 460 / 461



**Very uniform spray pattern.  
Large free cross-sections,  
due to optimized  
x-style swirl insert.**

**Applications:**

Cleaning and washing process, cooling of gaseous fluids and solids, surface spraying, spraying onto mats in air washers, improving of chemical reactions.



Conn. Code	Dimensions (in.)				Weight Brass (lb.)
	Male NPT	L <sub>1</sub>	D	Hex/Flats	
<b>BA</b>	1/8	.71	.51	9/16	.03
<b>BC</b>	1/4	.87	.51	9.16	.04
<b>BE</b>	3/8	1.18	.63	11/16	.07
<b>BG</b>	1/2	1.65	.83	7/8	.15
<b>BK</b>	3/4	1.97	1.09	1-1/8	.38
<b>BM</b>	1	2.20	1.32	1-3/8	.79

Subject to technical modifications. Please enquire about the exact dimensions if the installation situation is critical!

Spray angle	Ordering no.								Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)								Spray Diam. D (in.) @ 30 psi			
	Type	Mat. no.		Connection				10 psi			20 psi	liters per minute		40 psi	60 psi	80 psi	100 psi	150 psi	H=8"	H=20"		
		5E	53	1/8"	1/4"	3/8"	1/2"					3/4"	1"								2	30
60°	460.644	○	-	-	BC	BE	-	-	-	.095	.075	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	9	22
	460.964	○	-	-	-	-	-	BK	-	.229	.193	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	9	22
90°	460.326	○	-	BA	-	-	-	-	-	.032	.022	.07	.09	0.4	.11	.12	.14	.16	.17	.20	15	34
	460.406	○	-	BA	-	-	-	-	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	15	34
	460.486	○	-	BA	-	-	-	-	-	.057	.047	.28	.36	1.6	.43	.48	.57	.63	.69	.82	15	34
	460.526	○	-	BA	-	-	-	-	-	.065	.051	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	15	34
	460.606	○	-	BA	-	BE	-	-	-	.081	.057	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	1.5	34
	460.646	○	-	-	BC	BE	-	-	-	.091	.071	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	15	38
	460.726	○	-	-	-	BE	-	-	-	.116	.079	1.1	1.4	6.3	1.7	1.9	2.2	2.5	2.7	3.2	15	38
	460.746	○	-	-	-	BE	-	-	-	.130	.075	1.2	1.6	7.1	1.9	2.1	2.5	2.8	3.1	3.6	15	38
	460.766	○	-	-	-	BE	-	-	-	.130	.095	1.4	1.8	8.0	2.1	2.4	2.8	3.2	3.5	4.1	15	38
	460.806	○	-	-	-	BE	-	-	-	.146	.106	1.7	2.3	10.0	2.7	3.0	3.5	4.0	4.3	5.1	15	38
	460.846	○	-	-	-	BE	-	-	-	.160	.126	2.2	2.8	12.5	3.3	3.8	4.4	5.0	5.4	6.4	15	38
	460.886	○	-	-	-	BE	BG	-	-	.185	.122	2.8	3.6	16.0	4.3	4.8	5.7	6.3	6.9	8.2	15	38
	460.926	○	-	-	-	-	BG	-	-	.205	.150	3.5	4.6	20	5.4	6.0	7.1	7.9	8.7	10.2	15	38
	460.966	○	-	-	-	-	BG	BK	-	.229	.150	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	15	38
	461.006	○	-	-	-	-	BG	-	-	.252	.150	5.4	7.2	32	8.4	9.5	11.1	12.5	13.7	16.1	15	38
	461.046	-	○	-	-	-	-	BK	-	.284	.209	6.9	9.1	40	10.7	12.0	14.1	15.9	17.3	20	15	38
461.086	○	-	-	-	-	-	BK	-	.323	.209	8.6	11.4	50	13.4	15.0	17.7	19.8	22	25	15	38	
461.126	○	-	-	-	-	-	-	BM	.366	.256	10.9	14.3	63	16.9	18.9	22	25	27	32	15	38	
461.146	○	-	-	-	-	-	-	BM	.390	.264	12.3	16.2	71	19.0	21	25	28	31	36	15	38	
120°	460.408	○	-	BA	-	-	-	-	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	27	48
	460.488	○	-	BA	-	-	-	-	-	.059	.039	.28	.36	1.6	.43	.48	.57	.63	.69	.82	27	48
	460.528	○	-	BA	-	-	-	-	-	.065	.047	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	27	48
	460.608	○	-	BA	-	-	-	-	-	.083	.055	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	27	48
	460.648	○	-	-	BC	BE	-	-	-	.097	.063	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	27	52
	460.728	○	-	-	-	BE	-	-	-	.122	.075	1.1	1.4	6.3	1.7	1.9	2.2	2.5	2.7	3.2	27	52
	460.748	○	-	-	-	BE	-	-	-	.130	.075	1.2	1.6	7.1	1.9	2.1	2.5	2.8	3.1	3.6	27	52
	460.768	○	-	-	-	BE	-	-	-	.138	.075	1.4	1.8	8.0	2.1	2.4	2.8	3.2	3.5	4.1	27	52
	460.808	○	-	-	-	BE	-	-	-	.150	.095	1.7	2.3	10.0	2.7	3.0	3.5	4.0	4.3	5.1	27	52
	460.848	○	-	-	-	BE	-	-	-	.165	.106	2.2	2.8	12.5	3.3	3.8	4.4	5.0	5.4	6.4	27	52
	460.888	○	-	-	-	BE	BG	-	-	.181	.122	2.8	3.6	16.0	4.3	4.8	5.7	6.3	6.9	8.2	27	52
	460.968	○	-	-	-	-	BG	-	-	.232	.162	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	27	52
	461.048	-	○	-	-	-	-	BK	-	.299	.193	6.9	9.1	40	10.7	12.0	14.1	15.9	17.3	20	27	52

**Example** Type + Material no. + Conn. = Ordering no.  
for ordering: 460.728 + 5E + BE = 460.728.5E.BE





# Tangential-flow full cone nozzles

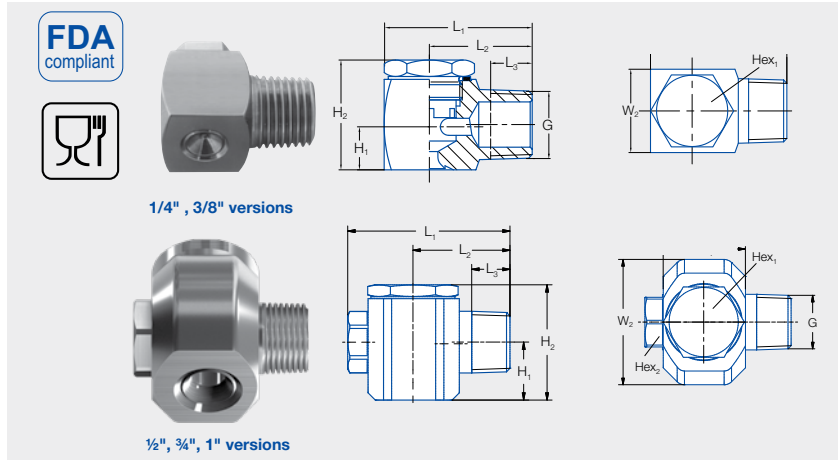
## Series 422 / 423



**Tangentially arranged liquid supply.**  
**Without swirl inserts.**  
**Non-clogging.**  
**Stable spray angle.**  
**Uniform spray.**

### Applications:

Cleaning and washing process, cooling of gaseous fluids and solids, surface spraying, spraying onto mats in air washers, improving on chemical reactions, continuous casting, foam control.



Dimensions (in)										Wt (lb.)
Inlet (NPT) G	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	H <sub>1</sub>	H <sub>2</sub>	W <sub>1</sub>	W <sub>2</sub>	Hex <sub>1</sub>	Hex <sub>2</sub>	
1/4	1.1	.79	.39	.31	.83	.61	.63	.43	-	.09
3/8	1.42	.98	.39	.43	1.05	.91	.87	.75	-	.22
1/2	2.20	1.32	.51	.79	1.58	1.26	1.89	1.06	.75	.52
3/4	2.58	1.52	.57	.93	2.24	1.57	2.48	1.42	1.06	1.37
1	3.45	1.91	.66	1.07	2.6	2.17	3.07	1.61	1.42	2.76

Spray angle	Type	Mat. no.		Ordering no.								Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)						Spray Diam. D (in.) @ 40 psi		
		AISI 316L	Brass	Connection										liters per minute						H=8" H=20"		
		1Y	30	Male NPT										10 psi	20 psi	40 psi	60 psi	80 psi	100 psi			
60°	422.644	○	○	-	BE	-	-	-	-	-	-	.118	.118	.62	.88	4.0	1.2	1.5	1.8	2.0	9	20
90°	422.406	○	○	BC	-	-	-	-	-	-	-	.059	.057	.16	.22	1.0	.31	.38	.44	.49	15	34
	422.486	○	○	BC	-	-	-	-	-	-	-	.075	.071	.25	.35	1.6	.50	.61	.70	.78	15	34
	422.566	○	○	BC	-	-	-	-	-	-	-	.091	.087	.39	.55	2.5	.78	.95	1.1	1.2	15	34
	422.606	○	○	-	BE	-	-	-	-	-	-	.102	.099	.49	.69	3.2	.98	1.2	1.4	1.6	15	34
	422.646	○	○	-	BE	-	-	-	-	-	-	.118	.114	.62	.88	4.0	1.2	1.5	1.8	2.0	15	38
	422.766	○	○	-	BE	-	-	-	-	-	-	.164	.162	1.2	1.8	8.0	2.5	3.0	3.5	3.9	15	38
	422.886	○	○	-	BE	-	-	-	-	-	-	.23	.23	2.5	3.5	16.0	5.0	6.1	7.0	7.9	15	38
	422.966	○	-	-	BG	-	-	-	-	-	-	.315	.315	3.9	5.5	25	7.8	9.5	11.0	12.3	15	38
	423.006	○	-	-	BG	-	-	-	-	-	-	.343	.343	4.8	6.8	31	9.6	11.8	13.6	15.2	15	38
	423.046	○	-	-	-	BK	-	-	-	-	-	.426	.402	6.2	8.8	40	12	15	18	20	15	38
	423.086	○	-	-	-	BK	-	-	-	-	-	.449	.433	7.8	11.0	50	15.5	19.0	22	25	15	38
	423.126	○	-	-	-	BK	-	-	-	-	-	.500	.485	9.8	13.8	63	19.5	24	28	31	15	38
	423.146	○	-	-	-	-	BM	-	-	-	-	.552	.532	11.0	15.6	71	22	27	31	35	15	38
	423.206	○	-	-	-	-	BM	-	-	-	-	.670	.630	15.5	21.9	100	31	38	44	49	15	38
423.286	○	-	-	-	-	-	BP	-	-	-	.748	.748	25.0	35.0	160	50	61	71	79	15	38	
423.366	○	-	-	-	-	-	-	BR	-	-	.875	-	38.0	54.0	246	76	93	107	120	15	38	
423.406	○	-	-	-	-	-	-	-	BV	-	-	-	49.0	69.0	315	98	120	139	155	15	38	
423.446	○	-	-	-	-	-	-	-	BV	-	-	-	62.0	88.0	400	124	152	175	196	27	38	
120°	422.568	○	○	BC	-	-	-	-	-	-	-	.091	.087	.39	.55	2.5	.78	.95	1.1	1.2	27	48
	422.728	○	○	-	BE	-	-	-	-	-	-	.146	.142	.98	1.4	6.3	2.0	2.4	2.8	3.1	27	63
	422.808	○	-	-	BE	-	-	-	-	-	-	.183	.181	1.6	2.2	10.0	3.1	3.8	4.4	4.9	27	63
	422.848	○	○	-	BE	-	-	-	-	-	-	.205	.201	1.9	2.7	12.5	3.9	4.8	5.5	6.1	27	63
	422.888	○	○	-	BE	-	-	-	-	-	-	.229	.225	2.5	3.5	16.0	5.0	6.1	7.0	7.9	27	63
	422.928	○	-	-	BG	-	-	-	-	-	-	.288	.288	3.1	4.4	20	6.2	7.6	8.8	9.8	27	63
	422.968	○	○	-	BG	-	-	-	-	-	-	.315	.315	3.9	5.5	25	7.8	9.5	11.0	12.3	27	63
	423.008	○	-	-	BG	-	-	-	-	-	-	.343	.343	4.8	6.8	31	9.6	11.8	13.6	15.2	27	63
	423.128	○	-	-	-	BK	-	-	-	-	-	.500	.485	9.8	13.8	63	19.5	24	28	31	27	63
	423.208	○	-	-	-	BM	-	-	-	-	-	.670	.630	15.5	21.9	100	31	38	44	49	27	63

Example for ordering: **422.886 + 1Y + BE = 422.886.1Y.BE**

Different metallurgies may be available upon request.








# Tangential-flow full cone nozzles

## Series 422 / 423



Spray angle 	Ordering no.										Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)						Spray Diam. D (in.) @ 40 psi		
	Type	Mat. no.		Connection									10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	H=8"   H=20"	
		1Y AlSi 30L	30 Brass	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	2"											
120°	422. 488	-	○	BC	-	-	-	-	-	-	.075	.071	.25	.35	1.6	.50	.61	.70	.78	27	48
	422. 568	○	○	BC	-	-	-	-	-	-	.091	.087	.39	.55	2.5	.78	.95	1.1	1.2	27	48
	422. 608	-	○	-	BE	-	-	-	-	-	.102	.099	.49	.69	3.2	.98	1.2	1.4	1.6	27	63
	422. 728	○	○	-	BE	-	-	-	-	-	.146	.142	.98	1.4	6.3	2.0	2.4	2.8	3.1	27	63
	422. 808	○	-	-	BE	-	-	-	-	-	.183	.181	1.6	2.2	10.0	3.1	3.8	4.4	4.9	27	63
	422. 848	○	○	-	BE	-	-	-	-	-	.205	.201	1.9	2.7	12.5	3.9	4.8	5.5	6.1	27	63
	422. 888	○	○	-	BE	-	-	-	-	-	.229	.225	2.5	3.5	16.0	5.0	6.1	7.0	7.9	27	63
	422. 928	○	-	-	-	BG	-	-	-	-	.288	.288	3.1	4.4	20	6.2	7.6	8.8	9.8	27	63
	422. 968	○	○	-	-	BG	-	-	-	-	.315	.315	3.9	5.5	25	7.8	9.5	11.0	12.3	27	63
	423. 008	○	-	-	-	BG	-	-	-	-	.343	.343	4.8	6.8	31	9.6	11.8	13.6	15.2	27	63
	423. 048	○	-	-	-	-	BK	-	-	-	.426	.402	6.2	8.8	40	12	15	18	20	27	63
	423. 088	○	-	-	-	-	BK	-	-	-	.449	.433	7.8	11.0	50	15.5	19.0	22	25	27	63
	423. 128	○	-	-	-	-	BK	-	-	-	.500	.485	9.8	13.8	63	19.5	24	28	31	27	63
	423. 148	○	-	-	-	-	-	BM	-	-	.552	.532	11.0	15.6	71	22	27	31	35	27	63
	423. 208	○	-	-	-	-	-	BM	-	-	.670	.630	15.5	21.9	100	31	38	44	49	27	63
423. 288	○	-	-	-	-	-	-	BP	-	.748	.748	25.0	35.0	160	50	61	71	79	27	63	
423. 448	○	-	-	-	-	-	-	-	BV	*	*	62.0	88.0	400	124	152	175	196	27	63	

**Example** Type + Material no. + Conn. = Ordering no.  
for ordering: 422. 846 + 1Y + BE = 422. 846. 1Y. BE

Different metallurgies may be available upon request.

\* Call factory





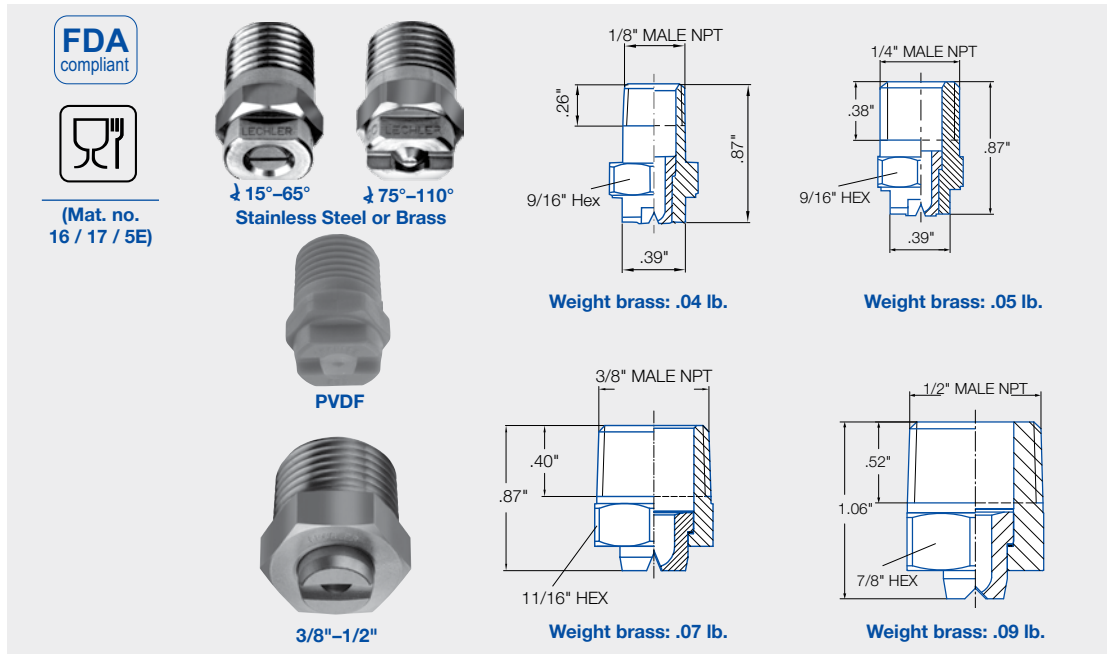
# Flat fan nozzles Series 632 / 633



**Standard design with conical, self-sealing thread connection. Stable spray angle. Uniform, parabolical distribution of liquid. Spray pipes equipped with these nozzles show an extremely uniform total distribution of liquid.**

### Applications:

Cleaning (e.g. surfaces, filters, belts), crate washers, lubricating, coating.



Spray angle	Type	Ordering no.				Material no.				Connection				Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)						Spray Coverage @ 30 psi	
		303 SS		316 SS		Brass		PVDF		Male NPT						liters per minute		psi		H=10"	H=20"		
		16 <sup>1)</sup>	17 <sup>2)</sup>	30	5E	1/8"	1/4"	3/8"	1/2"	10 psi	20 psi	2 bar	40 psi			60 psi	80 psi	100 psi					
20°	632. 301	○	○	○	○	BA	BC	-	-	.028	.024	.05	.07	.32	.10	.12	.14	.16	3	5			
	632. 361	○	○	○	○	BA	BC	-	-	.039	.032	.10	.14	.63	.20	.24	.28	.31	3	5			
	632. 401	○	○	○	○	BA	BC	-	-	.047	.035	.16	.22	1.0	.31	.38	.44	.49	3	5			
	632. 441	○	○	○	○	BA	BC	-	-	.053	.043	.19	.27	1.3	.39	.48	.55	.61	3	6			
	632. 481	○	○	○	○	BA	BC	-	-	.059	.047	.25	.35	1.6	.50	.61	.70	.78	3	6			
	632. 511	○	○	○	○	BA	BC	-	-	.065	.055	.29	.42	1.9	.59	.72	.83	.93	3	6			
	632. 561	○	○	○	-	-	BC	BE	-	.079	.059	.39	.55	2.5	.78	.95	1.1	1.2	3	6			
	632. 601	○	○	○	-	-	BC	BE	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	3	6			
	632. 671	○	○	○	-	-	BC	BE	-	.106	.087	.74	1.0	4.8	1.5	1.8	2.1	2.3	3	6			
	632. 721	○	○	○	-	-	BC	BE	-	.118	.098	.98	1.4	6.3	2.0	2.4	2.8	3.1	3	6			
	632. 801	○	○	○	-	-	BC	BE	-	.157	.126	1.6	2.2	10.0	3.1	3.8	4.4	4.9	3	6			
	632. 841	○	○	○	-	-	-	-	BG	.177	.142	1.9	2.7	12.5	3.9	4.8	5.5	6.1	3	6			
	632. 881	○	○	○	-	-	-	-	BG	.197	.157	2.5	3.5	16.0	5.0	6.1	7.0	7.9	3	6			
	632. 921	○	○	○	-	-	-	-	BG	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	3	6			
632. 941	○	○	○	-	-	BC	-	-	.224	.189	3.5	4.9	22.4	7.0	8.5	9.8	11.0	3	6				
633. 001	○	○	○	-	-	-	-	BG	.276	.220	4.9	6.9	31.5	9.8	12.0	13.9	15.5	3	6				
633. 041	○	○	○	-	-	-	-	BG	.315	.236	6.2	8.8	40.0	12.4	15.2	17.6	19.6	3	6				
30°	632. 302	○	○	○	-	BA	BC	-	-	.024	.020	.05	.07	.32	.10	.12	.14	.16	5	9			
	632. 362	○	○	○	○	BA	BC	-	-	.039	.028	.10	.14	.63	.20	.24	.28	.31	5	9			
	632. 402	○	○	○	○	BA	BC	-	-	.047	.035	.16	.22	1.0	.31	.38	.44	.49	5	9			
	632. 442	○	○	○	○	BA	BC	-	-	.053	.039	.19	.27	1.3	.39	.47	.55	.61	5	9			
	632. 482	○	○	○	○	BA	BC	-	-	.059	.043	.25	.35	1.6	.50	.61	.70	.78	5	9			
	632. 512	○	○	○	○	BA	BC	-	-	.065	.055	.29	.42	1.9	.59	.72	.83	.93	5	9			
	632. 542	○	○	○	○	BA	BC	-	-	.069	.061	.35	.49	2.3	.70	.86	.99	1.1	5	9			
	632. 562	○	○	○	○	BA	BC	-	-	.079	.059	.39	.55	2.5	.78	.95	1.1	1.2	5	9			
	632. 602	○	○	○	○	BA	BC	-	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	5	9			
	632. 672	○	○	○	-	-	BC	BE	-	.106	.083	.74	1.0	4.8	1.5	1.8	2.1	2.3	5	9			
	632. 722	○	○	○	-	-	BC	BE	-	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	5	9			
	632. 802	○	○	○	-	-	BC	BE	-	.158	.122	1.6	2.2	10.0	3.1	3.8	4.4	4.9	5	10			

30° parts continued on next page.

Continued on next page.

**Example for ordering:** Type 632. 402 + Material no. 16 + Conn. BA = Ordering no. 632. 402. 16. BA

Other sizes available upon request.

1) We reserve the right to deliver AISI 303 or AISI 304 under the material no. 16.  
2) We reserve the right to deliver AISI 316L under the material no. 17.




Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





# Flat fan nozzles Series 632 / 633



Spray angle 	Ordering no.								Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)						Spray Coverage @ 30 psi			
	Type	Material no.				Connection					10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	H=10"	H=20"	
		303 SS 16 <sup>1)</sup>	316 SS 17 <sup>2)</sup>	Brass 30	PDF 5E	Male NPT 1/8" 1/4" 3/8" 1/2"														
75°	632. 145	○	-	○	-	BA	BC	-	-	.006	.012	.008	.011	.05	.016	.019	.022	.025	11	22
	632. 165	○	-	○	-	BA	BC	-	-	.008	.013	.011	.015	.07	.022	.027	.031	.034	11	22
	632. 185	○	-	○	-	BA	BC	-	-	.014	.008	.012	.018	.08	.025	.030	.035	.039	12	23
	632. 215	○	-	○	-	BA	BC	-	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	12	23
	632. 245	○	-	○	-	BA	BC	-	-	.020	.012	.025	.035	.16	.05	.06	.07	.08	12	23
	632. 275	○	-	○	-	BA	BC	-	-	.024	.012	.03	.05	.22	.07	.08	.10	.11	12	23
	632. 485	○	-	-	○**	BA	BC	-	-	.059	.037	.25	.35	1.6	.50	.61	.70	.78	12	23
	632. 565	-	-	-	○	BA	BC	-	-	.079	.049	.39	.55	2.5	.78	.95	1.1	1.2	12	23
	632. 605	-	-	○*	○*	BA	BC	-	-	.087	.055	.49	.69	3.2	.98	1.2	1.4	1.5	12	23
	632. 675	-	-	○	○	-	BC	-	-	.106	.068	.74	1.0	4.8	1.5	1.8	2.1	2.3	12	23
632. 725	-	-	○	-	-	BC	-	-	.118	.081	.98	1.4	6.3	2.0	2.4	2.8	3.1	12	23	
90°	632. 216	○	-	○	-	BA	BC	-	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	15	28
	632. 246	○	-	○	-	BA	BC	-	-	.020	.012	.025	.035	.16	.050	.061	.071	.079	15	28
	632. 306	○	○	○	○	BA	BC	-	-	.028	.016	.05	.07	.32	.10	.12	.14	.16	15	29
	632. 336	○	○	○	○	BA	BC	-	-	.035	.020	.07	.10	.45	.14	.17	.20	.22	16	31
	632. 366	○	○	○	○	BA	BC	-	-	.039	.020	.10	.14	.63	.20	.24	.28	.31	17	32
	632. 406	○	○	○	○	BA	BC	-	-	.047	.028	.16	.22	1.0	.31	.38	.44	.49	17	32
	632. 446	○	○	○	○	BA	BC	-	-	.053	.032	.19	.27	1.3	.39	.48	.55	.61	17	33
	632. 486	○	○	○	○	BA	BC	-	-	.059	.032	.25	.35	1.6	.50	.61	.70	.78	17	33
	632. 516	○	○	○	○	BA	BC	-	-	.065	.035	.29	.42	1.9	.59	.72	.83	.93	17	33
	632. 566	○	○	○	○	BA	BC	-	-	.079	.043	.39	.55	2.5	.78	.95	1.1	1.2	18	33
	632. 606	○	○	○	○	BA	BC	-	-	.087	.047	.49	.69	3.2	.98	1.2	1.4	1.5	18	34
	632. 676	○	○	○	○*	-	BC	BE	-	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	18	34
	632. 726	○	○	○	○*	-	BC	BE	-	.118	.067	.98	1.4	6.3	2.0	2.4	2.8	3.1	19	35
	632. 806	○	○	○	○*	-	BC	-	BG	.158	.095	1.6	2.2	10.0	3.1	3.8	4.4	4.9	19	35
	632. 846	○	○	○	○*	-	BC	-	BG	.177	.095	1.9	2.7	12.5	3.9	4.8	5.5	6.1	19	35
	632. 886	○	○	○	○*	-	BC	-	BG	.197	.122	2.5	3.5	16.0	5.0	6.1	7.0	7.9	19	36
	632. 926	○	○	○	○*	-	BC	-	BG	.217	.165	3.1	4.4	20.0	6.2	7.6	8.8	9.8	21	40
	632. 946	○	○	○	○	-	BC	-	-	.224	.150	3.5	4.9	22.4	7.0	8.5	9.8	11.0	21	40
	632. 966	○	○	○	○	-	-	-	BG	.236	.185	3.9	5.5	25.0	7.8	9.5	11.0	12.3	21	40
	633. 006	-	-	○	-	-	-	-	BG	.276	.165	4.9	6.9	31.5	9.8	12.0	13.9	15.5	21	40
633. 086	○	-	-	-	-	-	-	BG	.354	.268	7.7	11.0	50.0	15.5	19.0	21.9	24.5	21	40	
120°	632. 187	○	-	○	-	BA	BC	-	-	.014	.008	.012	.018	.08	.025	.030	.035	.039	25	47
	632. 217	○	-	○	-	BA	BC	-	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	25	48
	632. 247	○	-	○	-	BA	BC	-	-	.020	.008	.025	.035	.16	.05	.06	.07	.08	26	48
	632. 277	○	-	○	-	BA	BC	-	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	26	49
	632. 307	○	○	○	○	BA	BC	-	-	.028	.012	.05	.07	.32	.10	.12	.14	.16	26	49
	632. 337	○	○	○	○	BA	BC	-	-	.035	.016	.07	.10	.45	.14	.17	.20	.22	26	50
	632. 367	○	○	○	○	BA	BC	-	-	.039	.020	.10	.14	.63	.20	.24	.28	.31	26	50
	632. 407	○	○	○	○	BA	BC	-	-	.047	.024	.16	.22	1.0	.31	.38	.44	.49	26	50
	632. 447	○	○	○	○	BA	BC	-	-	.053	.024	.19	.27	1.3	.39	.48	.55	.61	27	50
	632. 487	○	○	○	○	BA	BC	-	-	.059	.024	.25	.35	1.6	.50	.61	.70	.78	27	50
	632. 517	○	○	○	○	BA	BC	-	-	.065	.035	.29	.42	1.9	.59	.72	.83	.93	27	50
	632. 567	○	○	○	○	BA	BC	-	-	.079	.035	.39	.55	2.5	.78	.95	1.1	1.2	27	51
	632. 607	○	○	○	○	BA	BC	-	-	.087	.043	.49	.69	3.2	.98	1.2	1.4	1.5	28	51
	632. 677	○	○	○	○*	-	BC	BE	-	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	28	52
	632. 727	○	○	○	○*	-	BC	BE	-	.118	.063	.98	1.4	6.3	2.0	2.4	2.8	3.1	29	54
	632. 767	○	○	○	○*	-	BC	BE	-	.138	.067	1.2	1.8	8.0	2.5	3.0	3.5	3.9	30	55
	632. 807	○	○*	○*	-	-	BC	-	BG	.158	.079	1.6	2.2	10.0	3.1	3.8	4.4	4.9	31	57
632. 847	○*	○*	○*	○*	-	BC	-	BG	.177	.091	1.9	2.7	12.5	3.9	4.8	5.5	6.1	31	57	

- \* Only available in connection BC
- \*\* Only available in connection BA
- + Only available in connection BG

Other sizes available upon request.

**Example**    Type    +    Material no.    +    Conn.    =    Ordering no.  
**for ordering:** 632. 406    +    16                    +    BA            =    632. 406. 16. BA

- 1) We reserve the right to deliver AISI 303 or AISI 304 under the material no. 16.
- 2) We reserve the right to deliver AISI 316L under the material no. 17.





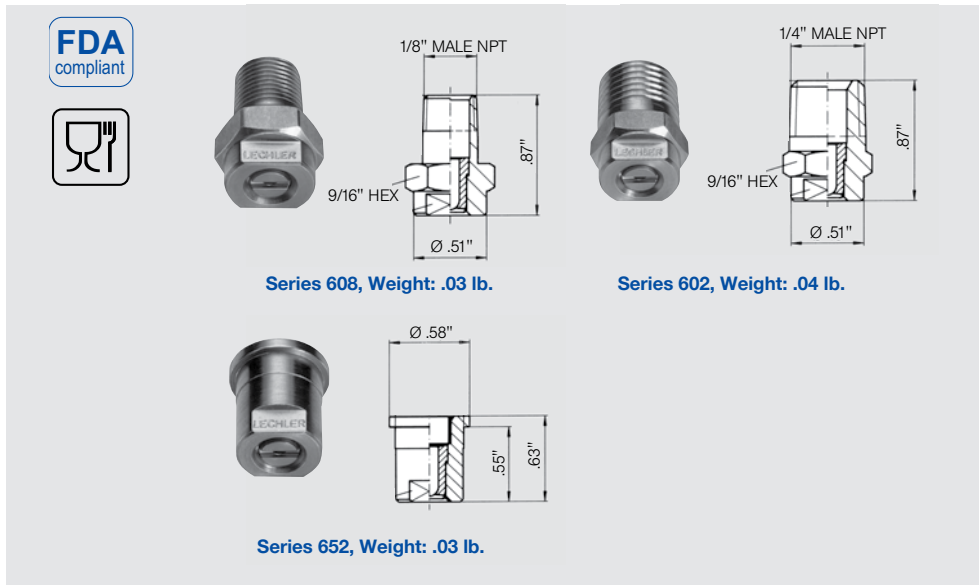
# High pressure flat fan nozzles Series 602 / 608 / 652



**Wide flat fan with a sharply delimited jet pattern. Particularly clog-proof.**

**Applications:**

Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.



Nozzle Code			Flow Rate Code				Equivalent Orifice diam. (in.)	Flow Rate (Gallons Per Minute)							
1/8"	1/4"	nut	Spray Angle					40 psi	600 psi	1000 psi	1500 psi	liters per minute			
			20°	30°	45°	60°						100 bar	2000 psi	3000 psi	4500 psi
<b>608</b>	<b>602</b>	<b>652</b>	<b>361</b>	<b>362</b>	<b>363</b>	<b>364</b>	.039	.20	.77	.99	1.2	4.5	1.4	1.7	2.1
608	302	352	371	372	373	374	.040	.21	.81	1.1	1.3	4.8	1.5	1.8	2.2
<b>608</b>	<b>602</b>	<b>652</b>	<b>381</b>	<b>382</b>	<b>383</b>	<b>384</b>	.043	.25	.95	1.2	1.5	5.6	1.7	2.1	2.6
608	602	652	391	392	393	394	.046	.28	1.1	1.4	1.5	5.7	1.9	2.4	3.0
<b>608</b>	<b>602</b>	<b>652</b>	<b>401</b>	<b>402</b>	<b>403</b>	<b>404</b>	.046	.30	1.2	1.5	1.8	6.8	2.1	2.6	3.2
<b>608</b>	<b>602</b>	<b>652</b>	<b>411</b>	<b>412</b>	<b>413</b>	<b>414</b>	.051	.34	1.3	1.7	2.1	7.8	2.4	3.0	3.6
608	602	652	441	442	443	-	.052	.38	1.5	1.9	2.3	8.7	2.7	3.3	4.0
<b>608</b>	<b>602</b>	<b>652</b>	<b>451</b>	<b>452</b>	<b>453</b>	<b>454</b>	.053	.40	1.6	2.0	2.5	9.2	2.8	3.5	4.3
608	602	652	461	462	-	-	.054	.43	1.7	2.2	2.6	9.8	3.0	3.7	4.6
<b>608</b>	<b>602</b>	<b>652</b>	<b>471</b>	<b>472</b>	<b>473</b>	<b>474</b>	.055	.45	1.7	2.3	2.8	10.3	3.2	3.9	4.8
<b>608</b>	<b>602</b>	<b>652</b>	<b>481</b>	<b>482</b>	<b>483</b>	<b>484</b>	.061	.51	2.0	2.5	3.1	11.5	3.6	4.4	5.4
<b>608</b>	<b>602</b>	<b>652</b>	<b>501</b>	<b>502</b>	<b>503</b>	<b>504</b>	.063	.55	2.1	2.8	3.4	12.6	3.9	4.8	5.9
<b>608</b>	<b>602</b>	<b>652</b>	<b>521</b>	<b>522</b>	<b>523</b>	<b>524</b>	.067	.60	2.3	3.0	3.7	13.8	4.3	5.2	6.4
<b>608</b>	<b>602</b>	<b>652</b>	<b>531</b>	<b>532</b>	<b>533</b>	<b>534</b>	.070	.65	2.5	3.3	4.0	14.8	4.6	5.6	6.9
<b>608</b>	<b>602</b>	<b>652</b>	<b>541</b>	<b>542</b>	<b>543</b>	<b>544</b>	.070	.70	2.7	3.5	4.3	15.9	4.9	6.0	7.4
<b>608</b>	<b>602</b>	<b>652</b>	<b>551</b>	<b>552</b>	<b>553</b>	<b>554</b>	.074	.75	2.9	3.7	4.6	17.0	5.3	6.5	7.9
<b>608</b>	<b>602</b>	<b>652</b>	<b>571</b>	<b>572</b>	<b>573</b>	<b>574</b>	.080	.80	3.1	4.0	4.9	18.2	5.6	6.9	8.4
608	602	652	581	582	583	584	.081	.87	3.4	4.4	5.3	19.8	6.2	7.5	9.2
<b>608</b>	<b>602</b>	<b>652</b>	<b>591</b>	<b>592</b>	<b>593</b>	<b>594</b>	.082	.90	3.5	4.5	5.5	20.5	6.4	7.8	9.6
<b>608</b>	<b>602</b>	<b>652</b>	<b>601</b>	<b>602</b>	<b>603</b>	<b>604</b>	.090	1.0	3.9	5.0	6.1	22.8	7.1	8.7	10.6
-	602	652	621	622	623	624	.094	1.1	4.3	5.5	6.7	25.1	7.8	9.5	11.7
-	<b>602</b>	<b>652</b>	<b>641</b>	<b>642</b>	<b>643</b>	<b>644</b>	.098	1.2	4.8	6.2	7.6	28.5	8.7	10.7	13.1
-	602	652	651	652	653	654	.100	1.3	5.1	6.6	8.0	29.9	9.3	11.3	13.9
-	602	652	661	662	663	664	.104	1.4	5.4	7.0	8.5	31.7	9.8	12.0	14.7
-	<b>602</b>	<b>652</b>	<b>671</b>	<b>672</b>	<b>673</b>	<b>674</b>	.106	1.5	5.7	7.4	9.1	34.2	10.5	12.8	15.7
-	<b>602</b>	<b>652</b>	<b>701</b>	<b>702</b>	<b>703</b>	<b>704</b>	.118	1.7	6.7	8.7	10.6	39.9	12.3	15.0	18.4
-	<b>602</b>	<b>652</b>	-	-	<b>723</b>	<b>724</b>	.120	2.0	7.8	10.0	12.3	45.6	14.2	17.3	21
-	602	652	-	-	763	764	.138	2.5	9.68	12.5	15.3	57.0	17.7	21.7	26.5
-	<b>602</b>	<b>652</b>	-	-	<b>793</b>	-	.154	2.9	11.4	14.7	18.0	68.4	21	25	31

Connection Code	Connection	*Maximum pressure
<b>A3. 00</b>	Male BSPT	Approx. 5000 psi
<b>A3. 07</b>	Male NPT	Approx. 5000 psi
<b>A3. 29</b>	Retainer cap	Approx. 3000 psi

**Example for ordering:** **602.** + **361** + **A3. 07** = **602. 361. A3. 07**  
 (see bolded column headings above) (.99 gpm & 20° spray angle @ 1000 psi; 1/4" Male NPT)

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





# Flat fan nozzles for retaining nut Series 652



**Assembly with retaining nut. Easy nozzle changing, simple jet alignment. Uniform, parabolic distribution of liquid. Spray pipes equipped with these nozzles show an extremely uniform total liquid distribution.**

### Applications:

Cleaning (e.g. surfaces, filters, belts), crate washers, lubricating, coating.



Spray angle	Ordering no.					Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)							Spray Coverage @ 30 psi	
	Type	Material no.						10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	H=10"	H=20"
		303 SS 16	316 SS 17 <sup>1)</sup>	Brass 30	PVDF 5E											
20°	652. 301	○	○	○	○	.028	.024	.05	.07	.32	.10	.12	.14	.16	3	5
	652. 361	○	○	○	○	.039	.032	.10	.14	.63	.20	.24	.28	.31	3	5
	652. 441	○	○	○	○	.053	.043	.19	.27	1.3	.39	.48	.55	.61	3	5
	652. 481	○	○	○	○	.059	.047	.25	.35	1.6	.50	.61	.70	.78	3	5
	652. 511	-	-	-	○	.065	.055	.29	.42	1.9	.59	.72	.83	.93	3	5
30°	652. 302	○	○	○	○	.024	.020	.05	.07	.32	.10	.12	.14	.16	5	9
	652. 362	○	○	○	○	.039	.028	.10	.14	.63	.20	.24	.28	.31	5	9
	652. 402	○	○	○	○	.047	.035	.16	.22	1.0	.31	.38	.44	.49	5	9
	652. 442	○	○	○	○	.053	.039	.19	.27	1.3	.39	.48	.55	.61	5	9
	652. 482	○	○	○	○	.059	.043	.25	.35	1.6	.50	.61	.70	.78	5	9
	652. 562	○	○	○	○	.079	.059	.39	.55	2.5	.78	.95	1.1	1.2	5	9
	652. 602	○	○	○	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	5	9
	652. 642	○	○	○	-	.099	.071	.62	.88	4.0	1.2	1.5	1.8	2.0	5	9
	652. 722	○	○	○	-	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	5	9
	652. 762	○	○	○	-	.138	.106	1.2	1.8	8.0	2.5	3.0	3.5	3.9	5	9
	652. 802	○	○	○	-	.158	.122	1.6	2.2	10.0	3.1	3.8	4.4	4.9	5	9
45°	652. 303	○	○	○	-	.028	.020	.05	.07	.32	.10	.12	.14	.16	7	13
	652. 363	○	○	○	-	.039	.024	.10	.14	.63	.20	.24	.28	.31	7	13
	652. 403	○	○	○	-	.047	.035	.16	.22	1.0	.31	.38	.44	.49	7	13
	652. 443	○	○	○	-	.053	.039	.19	.27	1.3	.39	.48	.55	.61	7	13
	652. 483	○	○	○	-	.059	.043	.25	.35	1.6	.50	.61	.70	.78	7	13
	652. 513	○	○	○	-	.065	.047	.29	.42	1.9	.59	.72	.83	.93	7	13
	652. 563	○	○	○	-	.079	.055	.39	.55	2.5	.78	.95	1.1	1.2	7	13
	652. 603	○	○	○	-	.087	.067	.49	.69	3.2	.98	1.2	1.4	1.5	7	13
	652. 643	○	○	○	-	.099	.071	.62	.88	4.0	1.2	1.5	1.8	2.0	7	14
	652. 723	○	○	○	-	.118	.095	.98	1.4	6.3	2.0	2.4	2.8	3.1	7	14
	652. 763	○	○	○	-	.138	.102	1.2	1.8	8.0	2.5	3.0	3.5	3.9	7	14
652. 803	○	○	○	-	.158	.118	1.6	2.2	10.0	3.1	3.8	4.4	4.9	8	14	
60°	652. 304	○	○	○	○	.028	.016	.05	.07	.32	.10	.12	.14	.16	11	21
	652. 334	○	○	○	○	.035	.020	.07	.10	.45	.14	.17	.20	.22	11	21
	652. 364	○	○	○	○	.039	.024	.10	.14	.63	.20	.24	.28	.31	11	21
	652. 404	○	○	○	○	.047	.032	.16	.22	1.0	.31	.38	.44	.49	11	21
	652. 444	○	○	○	○	.053	.035	.19	.27	1.3	.39	.48	.55	.61	11	21
	652. 484	○	○	○	○	.059	.039	.25	.35	1.6	.50	.61	.70	.78	11	21
	652. 514	○	○	○	○	.065	.043	.29	.42	1.9	.59	.72	.83	.93	11	21
	652. 564	○	○	○	○	.079	.051	.39	.55	2.5	.78	.95	1.1	1.2	11	21
	652. 604	○	○	○	○	.087	.059	.49	.69	3.2	.98	1.2	1.4	1.5	11	20
	652. 644	○	○	○	○	.099	.063	.62	.88	4.0	1.2	1.5	1.8	2.0	11	20
	652. 674	○	○	○	○	.106	.071	.74	1.0	4.8	1.5	1.8	2.1	2.3	11	20
	652. 724	○	○	○	○	.118	.083	.98	1.4	6.3	2.0	2.4	2.8	3.1	11	20
	652. 764	○	○	○	-	.138	.091	1.2	1.8	8.0	2.5	3.0	3.5	3.9	11	20
	652. 804	○	○	○	-	.158	.102	1.6	2.2	10.0	3.1	3.8	4.4	4.9	11	20
	652. 844	○	-	○	○	.177	.118	1.9	2.7	12.5	3.9	4.8	5.5	6.1	11	20
652. 884	○	-	○	-	.197	.134	2.5	3.5	16.0	5.0	6.1	7.0	7.8	11	20	
652. 944	○	○	○	-	.225	.173	3.5	4.9	22	7.0	8.5	9.8	11.0	11	20	

Continued on next page.

**Example for ordering:** Type + Material no. = Ordering no.  
652. 403 + 30 = 652. 403. 30

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.




Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$



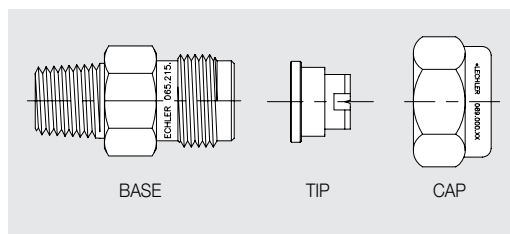
# Flat fan nozzles for retaining nut Series 652



Spray angle 	Ordering no.					Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)							Spray Coverage @ 30 psi	
	Type	Material no.						10 psi	20 psi	liters per minute	40 psi	60 psi	80 psi	100 psi	H=10"	H=20"
		16 316 SS	17 <sup>1)</sup> 316 SS	30 Brass	5E PVDF											
75°	652. 145	○	-	○	-	.008	.005	.008	.011	.05	.016	.019	.022	.025	11	22
	652. 165	○	-	○	-	.008	.003	.011	.015	.07	.022	.027	.031	.034	11	22
	652. 185	○	-	○	-	.008	.006	.012	.018	.08	.025	.030	.035	.039	11	22
	652. 215	○	-	○	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	11	22
	652. 245	○	-	○	-	.020	.012	.025	.035	.16	.05	.06	.07	.08	11	22
	652. 275	○	-	○	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	11	22
90°	652. 216	○	-	○	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	15	30
	652. 276	○	-	○	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	18	31
	652. 306	○	-	○	-	.028	.016	.05	.07	.32	.10	.12	.14	.16	18	31
	652. 336	○	○	○	○	.035	.020	.07	.10	.45	.14	.17	.20	.22	18	31
	652. 366	○	○	○	○	.039	.020	.10	.14	.63	.20	.24	.28	.31	18	31
	652. 406	○	○	○	○	.047	.028	.16	.22	1.0	.31	.38	.44	.49	18	31
	652. 446	○	○	○	○	.053	.032	.19	.27	1.3	.39	.48	.55	.61	18	31
	652. 486	○	○	○	○	.059	.032	.25	.35	1.6	.50	.61	.70	.78	18	31
	652. 516	○	○	○	○	.065	.035	.29	.42	1.9	.59	.72	.83	.93	18	31
	652. 566	○	○	○	○	.079	.043	.39	.55	2.5	.78	.95	1.1	1.2	18	32
	652. 606	○	○	○	○	.087	.047	.49	.69	3.2	.98	1.2	1.4	1.5	18	32
	652. 646	○	○	○	○	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	18	32
	652. 676	○	○	○	○	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	18	32
	652. 726	○	○	○	○	.118	.067	.98	1.4	6.3	2.0	2.4	2.8	3.1	18	32
	652. 766	○	○	○	-	.138	.075	1.2	1.8	8.0	2.5	3.0	3.5	3.9	18	32
	652. 806	○	○	○	○	.158	.095	1.6	2.2	10.0	3.1	3.8	4.4	4.9	18	32
652. 846	-	-	○	○	.177	.095	1.9	2.7	12.5	3.9	4.8	5.5	6.1	18	32	
652. 886	○	-	○	○	.197	.122	2.5	3.5	16.0	5.0	6.1	7.0	7.8	18	33	
120°	652. 187	○	-	○	-	.014	.008	.012	.018	.08	.025	.030	.035	.039	25	48
	652. 217	○	-	○	-	.016	.008	.017	.024	.11	.034	.042	.048	.054	26	48
	652. 247	○	-	○	-	.020	.008	.025	.035	.16	.05	.06	.07	.08	26	49
	652. 277	○	-	○	-	.024	.012	.034	.05	.22	.07	.08	.10	.11	26	49
	652. 307	○	-	○	○	.028	.012	.05	.07	.32	.10	.12	.14	.16	26	50
	652. 337	○	○	○	○	.035	.016	.07	.10	.45	.14	.17	.20	.22	26	50
	652. 367	○	○	○	○	.039	.020	.10	.14	.63	.20	.24	.28	.31	26	50
	652. 407	○	○	○	○	.047	.024	.16	.22	1.0	.31	.38	.44	.49	26	50
	652. 447	○	○	○	○	.053	.024	.19	.27	1.3	.39	.48	.55	.61	26	50
	652. 487	○	○	○	○	.059	.024	.25	.35	1.6	.50	.61	.70	.78	26	50
	652. 517	○	○	○	○	.065	.035	.29	.42	1.9	.59	.72	.83	.93	26	50
	652. 567	○	○	○	○	.079	.035	.39	.55	2.5	.78	.95	1.1	1.2	26	50
	652. 607	○	○	○	○	.087	.043	.49	.69	3.2	.98	1.2	1.4	1.5	27	51
	652. 647	○	○	○	-	.099	.051	.62	.88	4.0	1.2	1.5	1.8	2.0	27	51
	652. 677	○	○	○	-	.106	.055	.74	1.0	4.8	1.5	1.8	2.1	2.3	27	51
	652. 727	○	○	○	○	.118	.063	.98	1.4	6.3	2.0	2.4	2.8	3.1	27	52
652. 767	○	○	○	-	.138	.067	1.2	1.8	8.0	2.5	3.0	3.5	3.9	28	52	
652. 807	○	○	○	-	.158	.079	1.6	2.2	10.0	3.1	3.8	4.4	4.9	28	52	
652. 847	-	-	-	○	.177	.091	1.9	2.7	12.5	3.9	4.8	5.5	6.1	31	57	
652. 887	-	-	-	○	.197	.102	2.5	3.5	16.0	5.0	6.1	7.0	7.8	31	57	

### Bases and Caps for Mounting

Inlet NPT Male	Outlet Male	Part No.	Standard Materials: 17 316 SS 30 Brass
1/4"	11/16 x 16	065. 215. XX. 10	
3/8"	11/16 x 16	065. 211. XX. 10	
1/4"	3/8 BSPP	065. 215. XX. 11	Other materials available.
3/8"	3/8 BSPP	065. 215. XX. 12	
Caps			
To fit 11/16x16		069. 000. XX. 00	Other materials available.
To fit 3/8 BSPP		065. 200. XX. 00	



**Example**    Type    +    Material no.    =    Ordering no.  
for ordering: 652. 407 + 30                    = 652. 407. 30

1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





# Flat fan nozzles for belt lubrication

## Series 652. xxx. 8H. 03



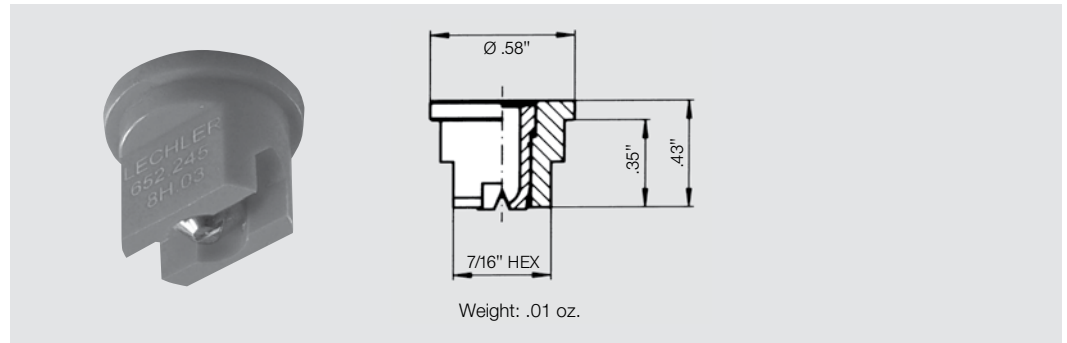
**Precision standard design axial flat fan nozzle tips. Low volume, stable spray angles at a wide range of pressures. For use with nozzle base and cap.**

**Applications:**

- Conveyor lubrication
- Low flow cleaning or lubricating
- Board and web rinsing

**Material:**

POM base with 303 SS insert  
POM base and insert

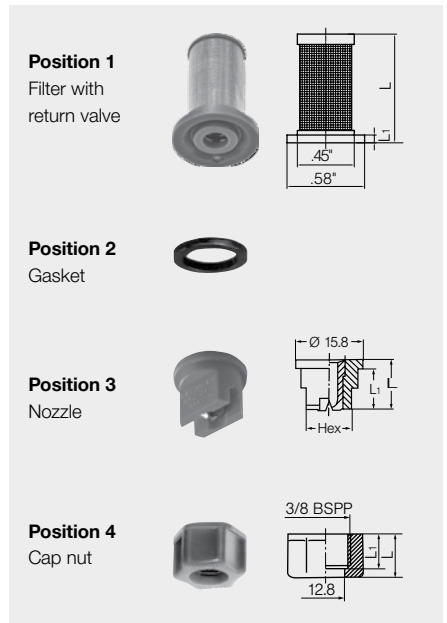


Spray angle	Ordering no.		Color	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)				Spray Coverage @ 30 psi		
	Type	Material no.				15 psi	liters per minute 2 bar	45 psi	75 psi	H=10"	H=20"	
		56										8H
75°	652. 145. xx. 03	○	○	Green	.006	.012	.011	.05	.016	.021	11	22
	652. 165. xx. 03	-	○	Black	.008	.013	.013	.07	.023	.030	11	22
	652. 185. xx. 03	○	○	Red	.014	.008	.016	.08	.026	.034	11	22
	652. 215. xx. 03	-	○	Blue	.016	.008	.021	.11	.036	.05	11	22
	652. 245. xx. 03	-	○	Orange	.020	.012	.032	.16	.05	.07	11	22
	652. 275. xx. 03	-	○	Brown	.024	.012	.042	.22	.07	.09	11	22
110°	652. 187. xx. 03	-	○	Gray	.014	.008	.016	.08	.026	.034	25	48
	652. 247. xx. 03	-	○	Black	.020	.008	.021	.16	.05	.07	26	49
	652. 277. xx. 03	-	○	Black	.024	.012	.032	.22	.07	.09	26	49

**Example**    Type    +    Material no.    +    Conn.    =    Ordering no.  
for ordering: 651. 145    +    8H                    +    03                    =    652. 145. 8H. 03

Pos.	Name	Ordering no.	Material	Color	Dimensions [in.]			Filter ** (in.)
					L	L <sub>1</sub>	SW	
1	Filter with return valve	095. 016. 53. 11. 00	PP	blue	.83	.05	-	.003
		095. 016. 53. 14. 63	PP	green	.83	.05	-	.003
2	Gasket	065. 240. 55	PTFE	-	-	-	-	-
		065. 240. 72	EWP 210	-	-	-	-	-
3	Nozzle	Ordering no. see flow tables	303 SS	-	.43	.35	.39	-
			POM/303 SS*	-	.47	.39	.31	-
4	Cap nut	065. 200. 16	303 SS	-	.51	.39	.87	-
		065. 200. 56	POM	black	.57	.45	.87	-

\* Housing POM, Nozzle insert 303 SS  
\*\* Size of mesh





# Tongue-type nozzles for retaining nut

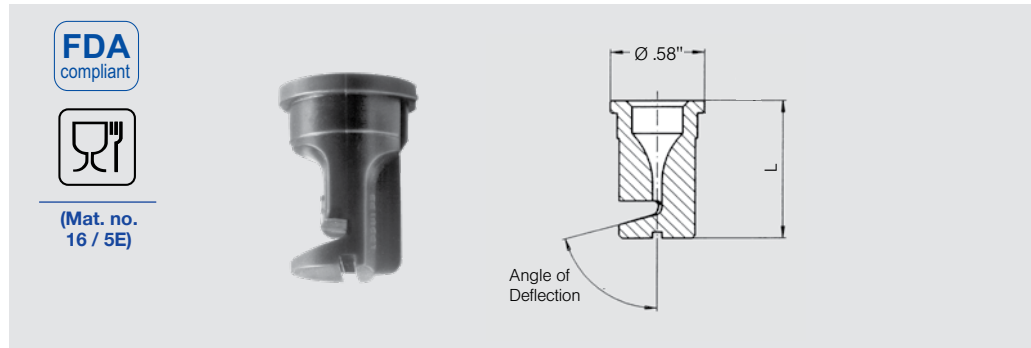
## Series 684 / 688/ 689




**Assembly with retaining nut.**  
**Wide flat fan with a sharply delimited spray pattern.**  
**Particularly clog-proof.**  
**Easy nozzle changing.**  
**Simple jet alignment.**

### Applications:

Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.




Spray angle	Deflector angle	Ordering no.		Color for version 56 POM *version 5E PVDF is blue	Orifice diam. (in.)	Flow Rate (Gallons Per Minute)								Length (L) (in.)	Spray Width B (in.) @ 30 psi  H=10"	
		Type	Material no.			10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi			
			56													5E
140°	75°	684. 348	○	-	Green	.028	.08	.11	.50	.13	.16	.19	.22	.25	.8	54
		684. 368	○	○	Yellow	.032	.10	.14	.63	.17	.20	.24	.28	.31	.8	54
		684. 408	○	-	Blue	.039	.16	.22	1.0	.27	.31	.38	.44	.49	.8	54
		684. 448	○	-	Red	.047	.19	.27	1.3	.35	.39	.48	.55	.61	.8	54
		684. 488	○	○	Brown	.051	.25	.35	1.6	.43	.50	.61	.70	.78	.8	54
		684. 528	○	-	Grey	.059	.31	.44	2.0	.54	.62	.76	.88	.98	.8	54
		684. 568	○	○	White	.067	.39	.55	2.5	.67	.78	.95	1.1	1.2	.7	54
		684. 608	○	-	Light blue	.075	.49	.69	3.2	.86	.98	1.2	1.4	1.5	.7	54
		684. 688	○	-	Green	.095	.78	1.1	5.0	1.3	1.6	1.9	2.2	2.5	.7	54
		684. 728	○	○	Black*	.106	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	.7	54
684. 808	○	-	Purple	.134	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	.6	54		

**Hard, sharp flat fan, narrowly delimited jet pattern. Not prone to clogging.**

### Applications:

Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.



Spray angle	Deflector angle	Ordering no.			Orifice diam. (in.)	Flow Rate (Gallons Per Minute)								Dimensions (in.)		Weight 303 SS (lb.)	Spray Width B (in.) @ 30 psi  H=10" H=20"			
		Type	Material no.			Connection	10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	L		Hex			
			16	5E														Male NPT 3/8" 3/4"		
45°	35°	688. 763	○	-	BE	-	.118	1.2	1.8	8.0	2.1	2.5	3.0	3.5	3.9	1.7	3/4	.25	9	17
	30°	688. 843	○	-	BE	-	.150	1.9	2.7	12.5	3.4	3.9	4.8	5.5	6.1	2.0	3/4	.29	9	17
	29°	688. 923	○	-	BE	-	.189	3.1	4.4	20	5.4	6.2	7.6	8.8	9.8	2.3	7/8	.54	9	17
	35°	689. 003	○	○	-	BK	-	.236	4.9	6.9	32	8.6	9.8	12.0	13.8	15.5	3.1	1-1/4 15/16*	.67 .07*	10

\* Measurement for PVDF model

**Example**    **Type**    +    **Material no.**    +    **Conn.**    =    **Ordering no.**  
**for ordering:** 688. 923    +    16                    +    BE            =    688. 923. 16. BE

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$







# Tongue-type nozzles Series 686



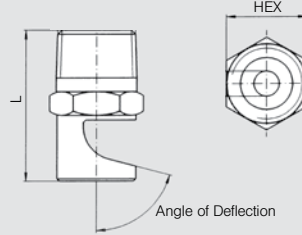
**Wide flat fan with a sharply delimited jet pattern. Particularly clog-proof.**

**Applications:**

Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.



(Mat. no. 16 / 5E)



Weight brass: .04 lb.

Dimensions (in.)			
Inlet (NPT)	L	HEX	Wt. (lb.)
1/8	.91	7/16	.03
1/4	1.10	9/16	.06
3/8	1.26	11/16	.09
1/2	1.58	7/8	.20

Spray angle	Deflector angle	Type	Ordering no.				Orifice diam. (in.)	Flow Rate (Gallons Per Minute)								Spray Width B (in.) @ 30 psi 
			Material no.			Connection		10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	
			316 SS 17	Brass 30	PVDF 5E	Male NPT 1/8" 1/4" 3/8" 1/2"										
90°	75°	686. 366	-	○	-	BA - - -	.031	.10	.14	.63	.17	.20	.24	.28	.31	20
	75°	686. 406	-	○	-	BA - - -	.039	.16	.22	1.0	.27	.31	.38	.44	.49	21
	40°	686. 686	-	○	-	- BC - - -	.094	.78	1.1	5.0	1.3	1.6	1.9	2.2	2.5	21
	40°	686. 726	-	○	-	BA - - -	.106	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	21
	40°	686. 806	-	○	-	- BC - - -	.133	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	21
	40°	686. 886	○	-	-	- BC - - -	.165	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.8	21
	40°	686. 926	○	-	-	- - BE - -	.185	3.1	4.4	20	5.4	6.2	7.6	8.8	9.8	21
140°	75°	686. 368	○	○	-	BA - - -	.032	.10	.14	.63	.17	.20	.24	.28	.31	54
	75°	686. 408	○	○	-	BA - - -	.039	.16	.22	1.0	.27	.31	.38	.44	.49	54
	75°	686. 448	○	○	-	BA BC - - -	.047	.19	.27	1.3	.35	.39	.48	.55	.61	54
	75°	686. 488	○	○	-	BA BC - - -	.051	.25	.35	1.6	.43	.50	.61	.70	.78	54
	75°	686. 528	○	○	-	BA BC - - -	.059	.31	.44	2.0	.54	.62	.76	.88	.98	54
	75°	686. 568	○	○	○	BA BC* - - -	.067	.39	.55	2.5	.67	.78	.95	1.1	1.2	54
	75°	686. 608	○	○	-	BA BC - - -	.075	.49	.69	3.2	.86	.98	1.2	1.4	1.5	54
	75°	686. 648	○	○	-	- BC - - -	.087	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	54
	75°	686. 688	○	○	-	BA BC - - -	.095	.78	1.1	5.0	1.4	1.6	1.9	2.2	2.5	54
	75°	686. 728	-	○	-	BA BC - - -	.106	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	54
	75°	686. 768	○	○	-	BA* BC - - -	.118	1.2	1.8	8.0	2.2	2.5	3.0	3.5	3.9	54
	75°	686. 808	○	○	-	BA BC - - -	.134	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	54
	75°	686. 828	○	○	-	BA BC - - -	.142	1.7	2.5	11.2	3.0	3.5	4.3	4.9	5.5	54
	75°	686. 848	○	○	-	BA* BC - - -	150	1.9	2.7	12.5	3.4	3.9	4.8	5.5	6.1	54
	75°	686. 868	○	○	-	- BC - - -	.158	2.2	3.1	14.0	3.8	4.3	5.3	6.1	6.9	54
	75°	686. 888	○	○	-	- BC - - -	165	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.8	54
	75°	686. 908	○	○	-	- BC - - -	.177	2.8	3.9	18.0	4.8	5.6	6.8	7.9	8.8	54
75°	686. 928	○	-	-	- - BE - -	.185	3.1	4.4	20	5.4	6.2	7.6	8.8	9.8	54	
75°	686. 968	○	○	-	- - BE BG	.209	3.9	5.5	25	6.7	7.8	9.5	11.0	12.3	54	
75°	686. 988	○	○	-	- - BE BG	.221	4.3	6.1	28	7.5	8.7	10.6	12.3	13.7	54	

\* Only available in 316 SS (material no. 17)

<b>Example</b>	<b>Type</b>	<b>+</b>	<b>Material no.</b>	<b>+</b>	<b>Conn.</b>	<b>=</b>	<b>Ordering no.</b>
for ordering:	686. 908	+	17	+	BC	=	686. 908. 17. BC



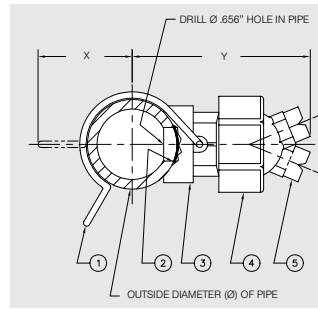
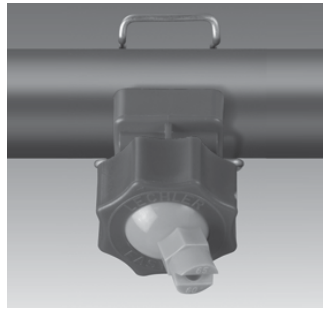
Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$



# Easy-Clip nozzle system



Excellent for quick and easy header construction. These spring mounting bases allow flexible nozzle alignment and a wide range of angles and flow rates. Drill .656" hole in the pipe for mounting. Assembly clamps to pipe. Nozzle ball tip adjusts as needed. No welding or threading. Maximum pressure 60 psi.

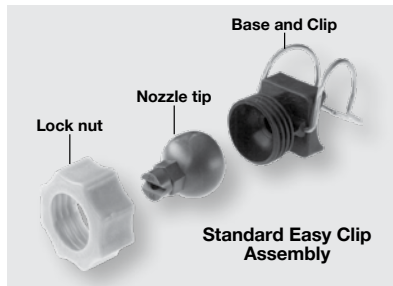


- 1 Spring Clip (stainless steel)
- 2 O-ring (EPDM—standard, Viton—special order)
- 3 Body base (Glass reinforced polypropylene)
- 4 Lock nut (Glass reinforced polypropylene)
- 5 Nozzle tip (Talc composition polypropylene)

Pipe Size	Pipe Ø	X	Y	Weight (lb)
1"	1.32"	1.70"	3.21"	.14
1 1/4"	1.66"	1.89"	3.41"	.15
1 1/2"	1.90"	2.02"	3.50"	.15
2"	2.38"	2.25"	3.74"	.17

### Applications:

- Parts washing and degreasing
- Phosphating lines
- Pre-painting processing



### Easy Clip complete nozzle assembly

Type	Ordering no.					Flow Rate (Gallons Per Minute)					Spray angle in degrees at			Color	Item 5 (see top chart) Replacement Nozzle Tip Ordering no.
	Mat. no.	To Mount on Pipe size				10 psi	15 psi	20 psi	25 psi	30 psi	10 psi	20 psi	30 psi		
	53	1"	1 1/4"	1 1/2"	2"										
676. 605	○	30	31	32	33	.50	.60	.70	.80	.90	52	70	82	Black	676. 605. 53. 30. 01
676. 724	○	30	31	32	33	1.0	1.2	1.4	1.6	1.7	57	62	67	Gray	676. 724. 53. 30. 01
676. 804	○	30	31	32	33	1.5	1.8	2.1	2.4	2.6	55	62	67	Purple	676. 804. 53. 30. 01
676. 844	○	30	31	32	33	2.0	2.4	2.8	3.2	3.5	54	61	65	Yellow	676. 844. 53. 30. 01
676. 882	○	30	31	32	33	2.5	3.1	3.5	4.0	4.3	34	36	41	Dark Green	676. 882. 53. 30. 01
676. 883	○	30	31	32	33	2.5	3.1	3.5	4.0	4.3	44	48	51	Pink	676. 883. 53. 30. 01
676. 884	○	30	31	32	33	2.5	3.1	3.5	4.0	4.3	53	60	64	Red	676. 884. 53. 30. 01
676. 923	○	30	31	32	33	3.0	3.7	4.2	4.7	5.2	43	48	50	Orange	676. 923. 53. 30. 01
676. 924	○	30	31	32	33	3.0	3.7	4.2	4.7	5.2	54	60	64	Green	676. 924. 53. 30. 01
676. 925	○	30	31	32	33	3.0	3.7	4.2	4.7	5.2	70	78	81	Beige	676. 925. 53. 30. 01
676. 926	○	30	31	32	33	3.0	3.7	4.2	4.7	5.2	86	96	99	Dark Green	676. 926. 53. 30. 01
676. 943	○	30	31	32	33	3.5	4.3	5.0	5.5	6.1	44	49	50	Blue	676. 943. 53. 30. 01
676. 965	○	30	31	32	33	3.5	4.3	5.0	5.5	6.1	72	78	82	Beige	676. 965. 53. 30. 01
677. 003	○	30	31	32	33	5.0	6.1	7.1	7.9	8.6	45	49	50	Gray	677. 003. 53. 30. 01

### Replacement parts

Item no. (see top chart)	Type	Ordering no.	For Pipe Size
1 and 3	Base and Clip	092. 080. 53. 00. 00	1"
		092. 081. 53. 00. 00	1 1/4"
		092. 082. 53. 00. 00	1 1/2"
		092. 083. 53. 00. 00	2"
4	Lock nut	092. 080. 53. 00. 02	
2	O-ring	092. 015. 6C. 04. 32	

Example Type + Material no. + Pipe Size = Ordering no.  
 for ordering: 676. 884 + 53 + 32 = 676. 884. 53. 32 (Nozzle assembly to mount on 1 1/2" pipe)

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$



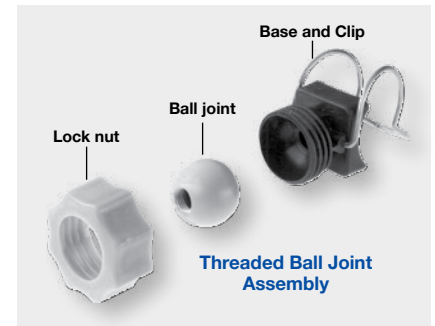
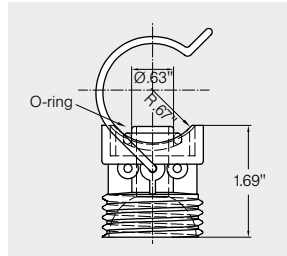


# Easy-Clip nozzle system



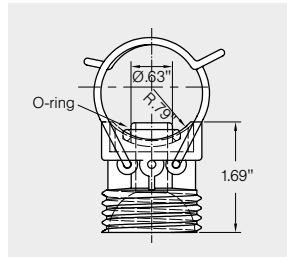
## Single clip with o-ring

Ordering no.	Material	For Pipe		Weight (lb.)
		Tap Ø	D	
092. 080. 53. 00	PP	.63"	1"	.08
092. 081. 53. 00	PP	.63"	1-1/4"	.09
092. 082. 53. 00	PP	.63"	1-1/2"	.11
092. 083. 53. 00	PP	.63"	2"	.11



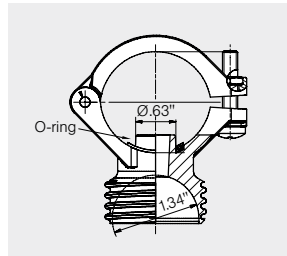
## Double clip with o-ring

Ordering no.	Material	For Pipe		Weight (lb.)
		Tap Ø	D	
092. 090. 53. 00	PP	.63"	1"	.08
092. 091. 53. 00	PP	.63"	1-1/4"	.09
092. 092. 53. 00	PP	.63"	1-1/2"	.11
092. 093. 53. 00	PP	.63"	2"	.11



## Clamp assembly with o-ring

Ordering no.	Material	For Pipe		Weight (lb.)
		Tap Ø	D	
090. 023. 53. 43. 10	PP	.63"	1"	.08
090. 033. 53. 43. 10	PP	.63"	1-1/4"	.09
090. 043. 53. 43. 10	PP	.63"	1-1/2"	.11



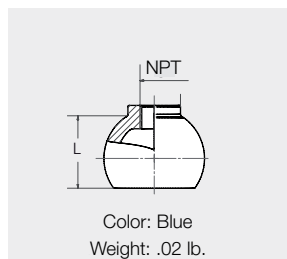
## Replacement pipe o-ring

Ordering no.
092. 015. 6C. 04. 32



## Adapter ball joint

Ordering no.	Mat.	L	For Nozzle	
			Connection Female NPT	Series
092. 080. 53. BB. 01	PP	1.12"	1/8"	490, 544, 632, 686
092. 080. 53. BD. 01	PP	1.28"	1/4"	490, 544, 632, 686
092. 080. 53. BF. 01	PP	1.24"	3/8"	490, 632, 686
092. 080. 53. BH. 01	PP	1.30"	1/2"	490, 632, 686



## Lock nut

Ordering no.
092. 080. 53. 00. 02







# Flat fan nozzle with ball joint Series 676




**Swivelling nozzle for precise adjusting of jet direction. No gaskets necessary. Long, unproblematic service life.**

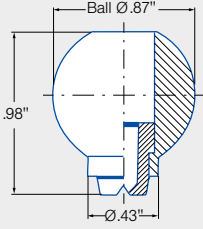
**Applications:**

Cleaning (e.g. surfaces, filters, belts), crate washers, lubricating, coating.

(Mat. no. 16 / 17)





**All-around swiveling ability: 30°  
Weight: .10 lb.**

Spray angle	Ordering no.			Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)										Spray Width B (in.) @ 30 psi	
	Type	Material no.				10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	H=10" H=20"		
		303 SS 16	Brass 30														
20°	676. 301	○	○	.028	.024	.05	.07	.32	.09	.10	.12	.14	.16	.19	3	5	
	676. 361	○	○	.039	.031	.10	.14	.63	.17	.20	.24	.28	.31	.38	3	5	
	676. 441	○	○	.053	.043	.19	.27	1.3	.34	.39	.48	.55	.61	.75	3	6	
	676. 481	○	○	.059	.047	.25	.35	1.6	.43	.50	.61	.70	.78	.96	3	6	
30°	676. 302	○	○	.028	.020	.05	.07	.32	.09	.10	.12	.14	.16	.19	5	9	
	676. 362	○	○	.039	.028	.10	.14	.63	.17	.20	.24	.28	.31	.38	5	9	
	676. 402	○	○	.047	.035	.16	.22	1.0	.27	.31	.38	.44	.49	.60	5	9	
	676. 482	○	○	.059	.043	.25	.35	1.6	.43	.50	.61	.70	.78	.96	5	9	
	676. 562	○	○	.079	.059	.39	.55	2.5	.67	.78	.95	1.1	1.2	1.5	5	9	
	676. 642	○	○	.098	.071	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	2.4	5	9	
	676. 722	○	○	.118	.094	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	3.8	5	9	
	676. 762	○	○	.138	.106	1.2	1.8	8.0	2.1	2.5	3.0	3.5	3.9	4.8	5	10	
676. 802	○	○	.157	.122	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	6.0	5	10		
45°	676. 303	○	○	.028	.020	.05	.07	.32	.09	.10	.12	.14	.16	.19	6	11	
	676. 363	○	○	.039	.024	.10	.14	.63	.17	.20	.24	.28	.31	.38	6	11	
	676. 403	○	○	.047	.035	.16	.22	1.0	.27	.31	.38	.44	.49	.60	7	13	
	676. 483	○	○	.059	.043	.25	.35	1.6	.43	.50	.61	.70	.78	.96	7	13	
	676. 563	○	○	.079	.055	.39	.55	2.5	.67	.78	.95	1.1	1.2	1.5	7	14	
	676. 643	○	○	.098	.071	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	2.4	8	15	
	676. 723	○	○	.118	.094	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	3.8	8	15	
	676. 763	○	○	.138	.102	1.2	1.8	8.0	2.1	2.5	3.0	3.5	3.9	4.8	8	15	
676. 803	○	○	.157	.118	1.6	2.2	10.0	2.7	3.1	3.8	4.4	4.9	6.0	8	15		
60°	676. 304	○	○	.028	.016	.05	.07	.32	.09	.10	.12	.14	.16	.19	8	17	
	676. 334	○	○	.035	.020	.07	.10	.45	.12	.14	.17	.20	.22	.27	9	17	
	676. 364	○	○	.039	.024	.10	.14	.63	.17	.20	.24	.28	.31	.38	9	18	
	676. 404	○	○	.047	.031	.16	.22	1.0	.27	.31	.38	.44	.49	.60	10	19	
	676. 444	○	○	.053	.035	.19	.27	1.3	.34	.39	.48	.55	.61	.75	10	19	
	676. 484	○	○	.059	.039	.25	.35	1.6	.43	.50	.61	.70	.78	.96	10	20	
	676. 514	○	○	.065	.043	.29	.42	1.9	.51	.59	.72	.83	.93	1.1	11	20	
	676. 564	○	○	.079	.051	.39	.55	2.5	.67	.78	.95	1.1	1.2	1.5	11	21	
	676. 604	○	○	.087	.059	.49	.69	3.2	.85	.98	1.2	1.4	1.5	1.9	11	22	
	676. 644	○	○	.098	.063	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	2.4	12	22	
	676. 674	○	○	.106	.071	.74	1.0	4.8	1.3	1.5	1.8	2.1	2.3	2.9	12	23	
	676. 724	○	○	.118	.083	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	3.8	12	23	
676. 764	○	○	.138	.091	1.2	1.8	8.0	2.1	2.5	3.0	3.5	3.9	4.8	12	23		
75°	676. 145	○	○	.006	.012	.008	.011	.05	.013	.016	.019	.022	.025	.030	11	22	
	676. 165	○	○	.008	.013	.011	.015	.07	.019	.022	.027	.031	.034	.04	11	22	
	676. 185	○	○	.014	.008	.012	.018	.08	.021	.025	.030	.04	.04	.05	12	23	
	676. 215	○	○	.016	.008	.017	.024	.11	.030	.034	.04	.05	.05	.07	12	23	
	676. 245	○	○	.020	.012	.025	.035	.16	.043	.05	.06	.07	.08	.10	12	23	
	676. 275	○	○	.024	.012	.034	.05	.22	.06	.07	.08	.10	.11	.13	12	23	

**Example**    Type    +    Material no.    =    Ordering no.  
for ordering: 676. 301    +    16    =    676. 301. 16

Continued on next page.

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





# Flat fan nozzle with ball joint Series 676



Spray angle	Ordering no.				Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)										Spray Width B (in.) @ 30 psi	
	Type	Material no.		10 psi			20 psi	liters per minute	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	H=10"	H=20"		
		303 SS	Brass															
90°	676. 216	○	○	.016	.008	.017	.024	.11	.030	.034	.04	.05	.05	.07	15	28		
	676. 276	○	○	.024	.012	.034	.05	.22	.06	.07	.08	.10	.11	.13	15	28		
	676. 306	○	○	.028	.016	.05	.07	.32	.09	.10	.12	.14	.16	.19	15	29		
	676. 336	○	○	.035	.020	.07	.10	.45	.12	.14	.17	.20	.22	.27	16	31		
	676. 366	○	○	.039	.020	.10	.14	.63	.17	.20	.24	.28	.31	.38	17	32		
	676. 406	○	○	.047	.028	.16	.22	1.0	.27	.31	.38	.44	.49	.60	17	32		
	676. 446	○	○	.053	.031	.19	.27	1.3	.34	.39	.48	.55	.61	.75	17	33		
	676. 486	○	○	.059	.031	.25	.35	1.6	.43	.50	.61	.70	.78	.96	17	33		
	676. 516	○	○	.065	.035	.29	.42	1.9	.51	.59	.72	.83	.93	1.1	17	33		
	676. 566	○	○	.079	.043	.39	.55	2.5	.67	.78	.95	1.1	1.2	1.5	18	33		
	676. 606	○	○	.087	.047	.49	.69	3.2	.85	.98	1.2	1.4	1.5	1.9	18	34		
	676. 646	○	○	.098	.051	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	2.4	18	34		
	676. 676	○	○	.106	.055	.74	1.0	4.8	1.3	1.5	1.8	2.1	2.3	2.9	18	34		
	676. 726	○	○	.118	.067	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	3.8	19	35		
120°	676. 187	○	○	.014	.008	.012	.018	.08	.021	.025	.030	.035	.039	.05	25	47		
	676. 217	○	○	.016	.008	.017	.024	.11	.030	.034	.042	.048	.054	.07	25	48		
	676. 247	○	○	.020	.008	.025	.035	.16	.04	.05	.06	.07	.08	.10	26	48		
	676. 277	○	○	.024	.012	.034	.05	.22	.06	.07	.08	.10	.11	.13	26	49		
	676. 307	○	○	.028	.012	.05	.07	.32	.09	.10	.12	.14	.16	.19	26	49		
	676. 337	○	○	.035	.016	.07	.10	.45	.12	.14	.17	.20	.22	.27	26	50		
	676. 367	○	○	.039	.020	.10	.14	.63	.17	.20	.24	.28	.31	.38	26	50		
	676. 407	○	○	.047	.024	.16	.22	1.0	.27	.31	.38	.44	.49	.60	26	50		
	676. 447	○	○	.053	.024	.19	.27	1.3	.34	.39	.48	.55	.61	.75	27	50		
	676. 487	○	○	.059	.024	.25	.35	1.6	.43	.50	.61	.70	.78	.96	27	50		
	676. 517	○	○	.065	.035	.29	.42	1.9	.51	.59	.72	.83	.93	1.1	27	50		
	676. 567	○	○	.079	.035	.39	.55	2.5	.67	.78	.95	1.1	1.2	1.5	27	51		
	676. 607	○	○	.087	.043	.49	.69	3.2	.85	.98	1.2	1.4	1.5	1.9	28	51		
	676. 647	○	○	.098	.051	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	2.4	28	51		
	676. 677	○	○	.106	.055	.74	1.0	4.8	1.3	1.5	1.8	2.1	2.3	2.9	28	52		
	676. 727	○	○	.118	.063	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	3.8	29	54		
	676. 767	○	○	.138	.067	1.2	1.8	8.0	2.1	2.5	3.0	3.5	3.9	4.8	30	55		

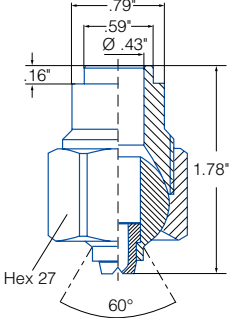
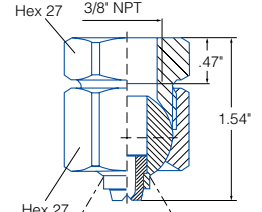
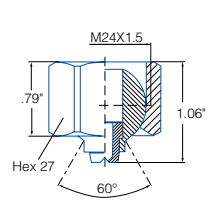
**Example**    **Type**    +    **Material no.**    =    **Ordering no.**  
 for ordering: 676. 301    +    16    =    676. 301. 16

### Accessories

**Retaining nut**  
**092. 020. 16. 00. 02**  
 Material: 303 SS  
**092. 020. 30. 00. 02**  
 Material: Brass

**Socket**  
**092. 020. 16. BF. 03**  
 Material: 303 SS  
**092. 020. 30. BF. 03**  
 Material: Brass

**Welding nipple**  
**092. 020. 17. 00. 04**  
 Material: 316Ti SS







# Multi-channel flat fan nozzles for air Whisperblast®, Plastic versions Series 600.130 / 600.484

**Extremely  
silent!**

Provides focused blasting power with minimal air consumption and noise. Flat configuration can be used individually or side-by-side to create a very effective air knife.

### Applications:

Blowing off and blowing out, cleaning, drying, cooling, sorting with air.




**FDA**  
compliant


(Mat. no.  
16 / 5E)

**OSHA**<sup>\*</sup>

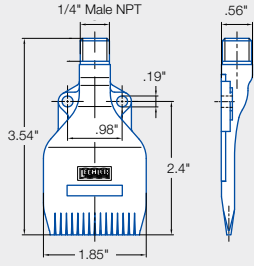
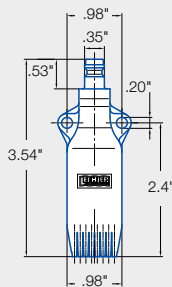
\* Complies with OSHA requirements on noise level

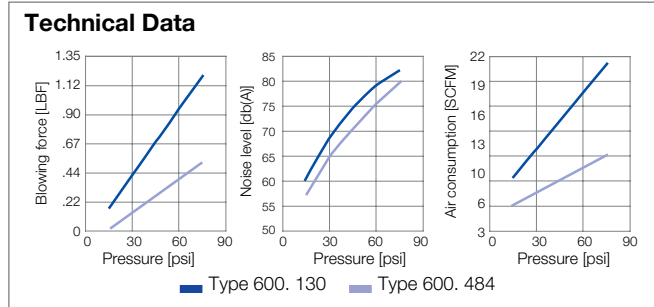


**600.130 (POM or PP)**



**600.484.56 (POM)**



**Socket  
Ordering no.  
095.016.30.14.23.0**

Material: Brass  
For connection of series 600.130 with compressed air guns.

Type	Ordering no.		Description	Accessories	Capacity for Air (Standard Cubic Feet per Minute)				Approx. Wt. (lb.)	Max. Pressure	Max. Temp. °F	
	Material no.	Connection			15 psi	30 psi	45 psi	60 psi				
												1/4" Male NPT
<b>600.130</b>	○	○	BC -	Original flat WHISPERBLAST	6.5	10.8	14.9	19.1	.05	75 psi	120	
<b>600.130</b>	-	○	- 01	Flat WHISPERBLAST (1/4" Male NPT) w/accessories	Hose nipple (5/16" barb) Steel Extension (L=3.3")	6.5	10.8	14.9	19.1	.05	75 psi	120
<b>600.484</b>	-	○	BC -	Flat Mini-WHISPERBLAST	3.1	4.7	6.4	8.0	.03	75 psi	120	

**Example for ordering:** Type + Material no. + Conn. = Ordering no.  
600.130 + 56 + BC = 600.130.56.BC





# Multi-channel flat fan nozzles for air Whisperblast®, metallic versions Series 600.283 / 600.493 / 600.562

Provides focused blasting power with minimal air consumption and noise. Flat configuration can be used individually or side-by-side to create a very effective air knife.

### Applications:

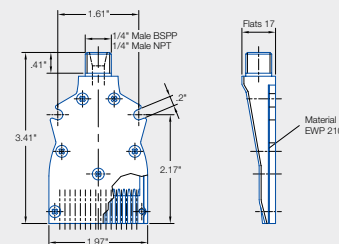
Blowing off and blowing out, cleaning, drying, cooling, conveying with air.



(Mat. no. 1Y)



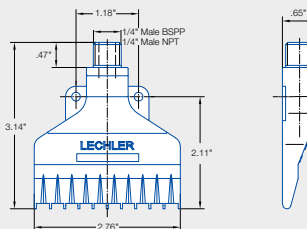
Complies with OSHA requirements on noise level only



600. 283. 42 (Aluminum)



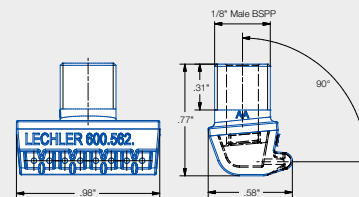
Complies with OSHA requirements



600. 493. 1Y (Stainless steel 316L SS)



Complies with OSHA requirements



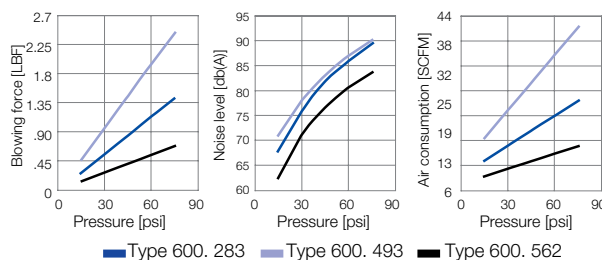
600. 562. 1Y. 10 (Stainless steel 316L SS)

Weight: .6oz Tmax: 1022 °F

For more information please ask for our special brochure "Nozzles and Accessories for Compressed Air."



### Technical data



Ball joints see page 72

Type	Ordering no.		Description	Capacity for Air (Standard Cubic Feet per Minute)				Approx. Wt. (lb.)	Max. Pressure	Max. Temp. °F		
	Material no.	Connection		15 psi	30 psi	45 psi	60 psi					
600. 283	316L SS 1Y	Aluminum 42	Male NPT 1/8" 1/4"	- BC	Aluminum flat WHISPERBLAST	8.5	13.5	18.6	23.8	.14	120 psi	400
600. 493	○	-	- BC	- BC	Flat WHISPERBLAST	11.1	16.9	22.7	28.5	.28	150 psi	1000
600. 562	○	-	20 -	-	Tangential air nozzle	-	5.3	-	-	.06	150 psi	356

Example Type + Material no. + Conn. = Ordering no.  
for ordering: 600. 283 + 42 + BC = 600. 283. 42. BC





# Multi-channel round jet nozzles for air

## Series 600.326 / 600.388


Provides focused blasting power with minimal air consumption and noise. Round configuration excellent for spot blasting, clearing holes, or use on hand guns.

### Applications:


Targeted blowing out and blowing off with compressed air guns.

Reduction of noise level of up to 12 dB (A).






**600.326.5K (ABS)**



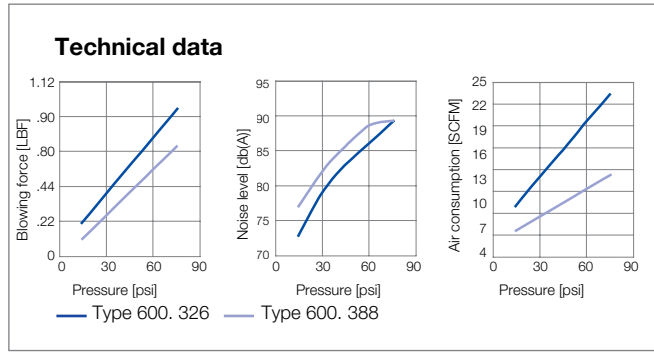
**600.326.3W (Zinc)**



**600.388.30 (Brass, POM)**

**Mini-round jet nozzle. Compact design.**

**Applications:**  
Especially for blowing out pocket holes.



Ball joints see page 72

Type	Ordering no.			Description	Capacity for Air (Standard Cubic Feet per Minute)					Approx. Wt. (lb.)	Max. Pressure	Max. Temp. °F
	Material no.				Connection		15 psi	30 psi	45 psi			
	Brass	ABS	Zinc	Male NPT								
	30	5K	3W	1/8" 1/4"								
600.326	○	○	-	BA BC	Round WHISPERBLAST	5.3	8.8	12.4	16.0	19.5	0.05	100 psi 120
600.326	-	-	○	- BC	Round WHISPERBLAST	5.3	8.8	12.4	16.0	19.5	0.10	100 psi 200
600.388	○	-	-	BA -	MiniBlast	3.0	4.6	6.2	7.8	9.4	0.14	100 psi 120

**Example** Type + Material no. + Conn. = Ordering no.  
for ordering: 600.326 + 5K + BC = 600.326.5K.BC



# Nozzles and accessories in Hygienic Design

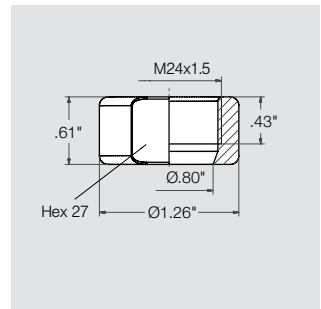
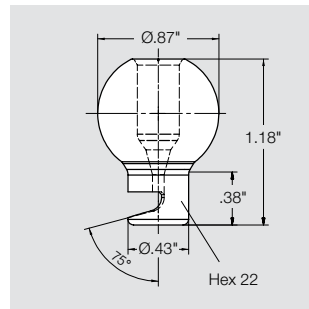
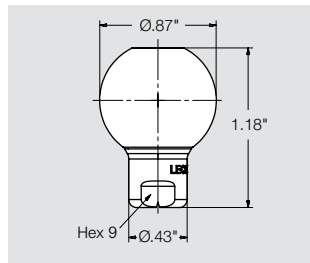
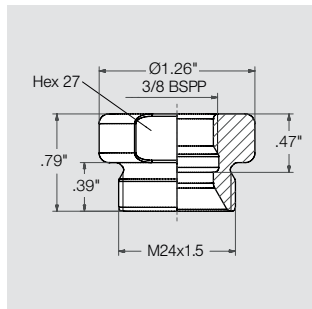
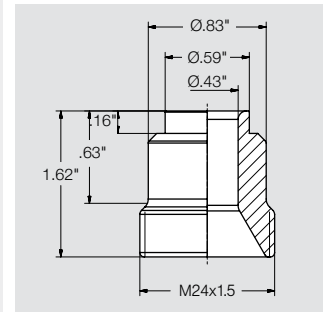
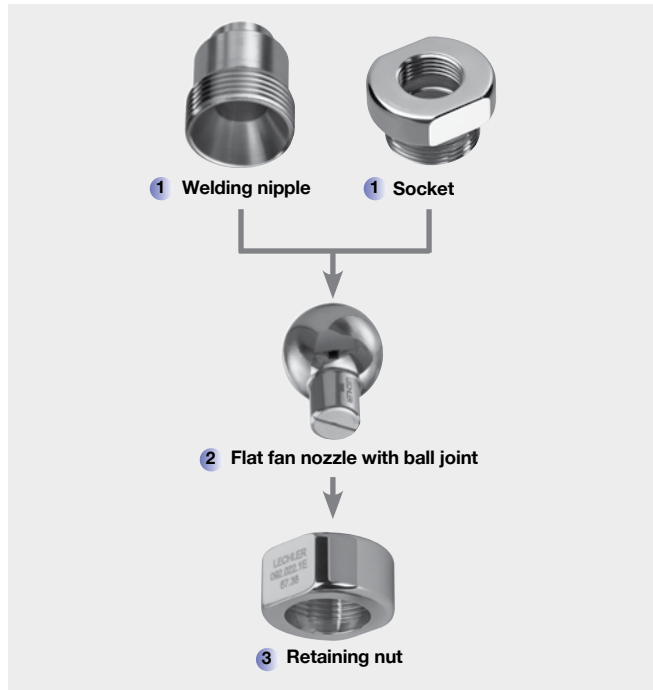


## Features

The hygienically designed nozzles and accessories are characterized by their very good surface finish (RA < 0,8 µm\*). This minimizes the tendency for soiling and provides good cleanability. The nozzles and accessories are available in 316L (1.4435) or 316TI (1.4571) and the seals are made of FDA approved EPDM.

## Applications

Aseptic filling, suitable for high hygienic demands.



\*Surface quality of the thread flanks and welding surfaces may vary.

	Ordering no.	GPM @ 40 psi
45°	676. 641. 17. 67	1.24
	30° 676. 402. 17. 67	.31
	676. 562. 17. 67	.78
	676. 722. 17. 67	1.95
	676. 802. 17. 67	3.1
45°	676. 763. 17. 67	2.48
	676. 883. 17. 67	4.96
60°	676. 514. 17. 67	.59
	676. 764. 17. 67	2.48
90°	676. 366. 17. 67	.19
	676. 646. 17. 67	1.24
120°	676. 647. 17. 67	1.24
	676. 767. 17. 67	2.48

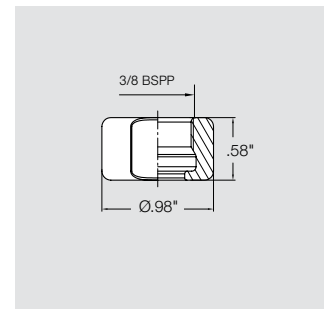
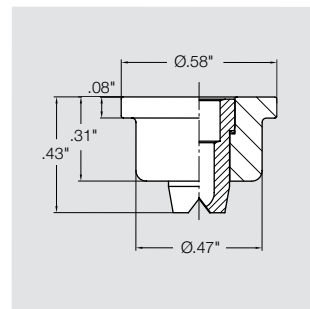
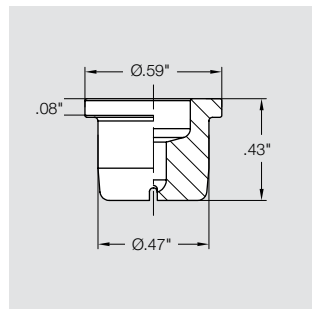
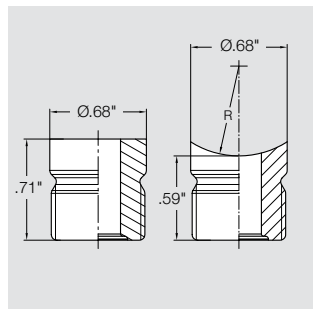
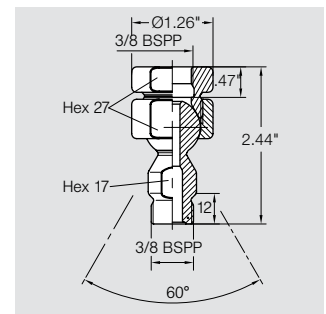
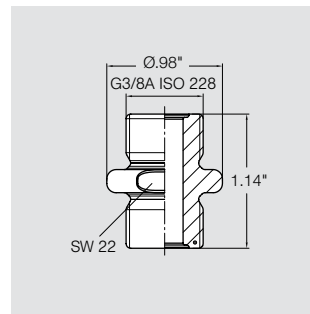
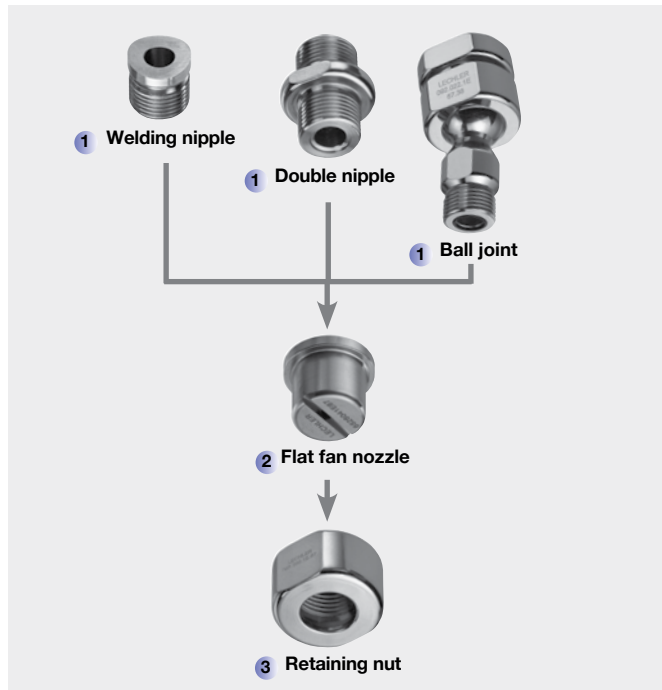
	Ordering no.	GPM @ 40 psi
140°	6ZK. 648. 1E. 67	1.24

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





# Nozzles and accessories in Hygienic Design



Ordering no.	Radius (in.)
652. 210. 1E. 67. 00	no radius
652. 217. 1E. 67. 10	.39
652. 217. 1E. 67. 13	.49
652. 217. 1E. 67. 16	.63
652. 217. 1E. 67. 20	.79
652. 217. 1E. 67. 31	1.22

Ordering no.	GPM @ 40 psi
60° 652. 604. 1E. 87	.96
652. 924. 1E. 87	6.2

Ordering no.	GPM @ 40 psi
60° 652. 484. 17. 87	.50
652. 514. 17. 87	.59
652. 544. 17. 87	.68
652. 564. 17. 87	.78
652. 604. 17. 87	.96
652. 644. 17. 87	1.24
652. 674. 17. 87	1.46
652. 724. 17. 87	1.95
652. 764. 17. 87	2.48

Conversion formula for the above series:  $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$



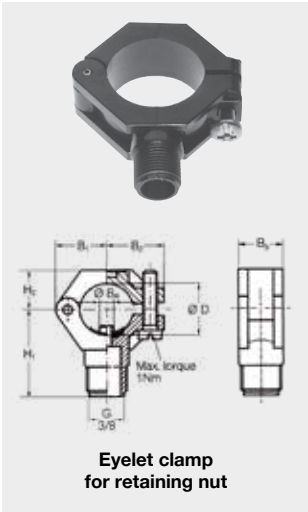




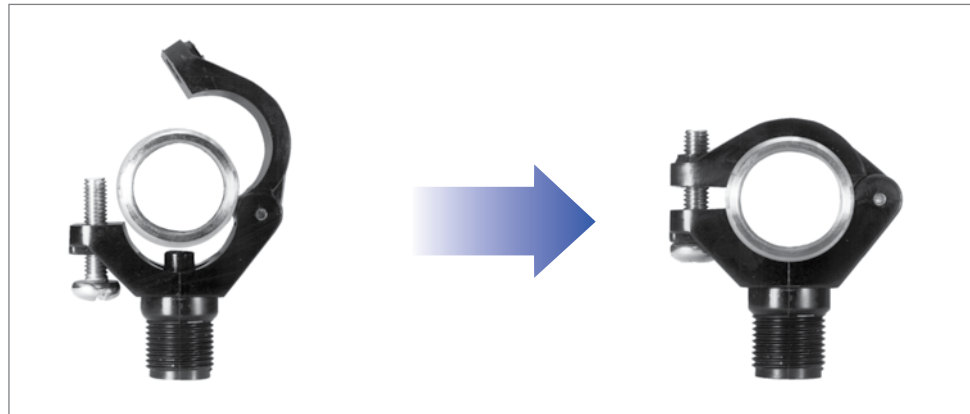


# Accessories

## Eyelet clamps / Retaining nuts

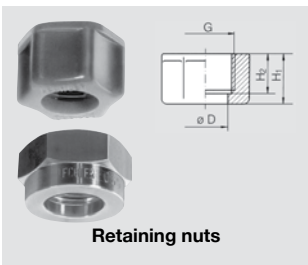


For series	Ordering no.				Screw (Material)	Dimensions (in.)							Weight (Nylon)	
	Type	Material no.				Pipe $\phi$	Drill hole diameter	$B_R$	$B_1$	$B_2$	$B_3$	$H_1$		$H_2$
		51	53	5E										
2TR 302 468 652 679 684	090.053	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	304 SS	$\frac{3}{8}$ "	$\frac{1}{4}$ "	.25	.75	.87	.73	1.36	.57	.05
	090.003	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		$\frac{1}{2}$ "	$\frac{1}{4}$ "	.25	.84	.94	.73	1.44	.65	.05
	090.013	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		$\frac{3}{4}$ "	$\frac{5}{16}$ "	.31	.96	1.05	.87	1.56	.69	.06
	090.023	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		1"	$\frac{7}{16}$ "	.43	1.18	1.22	.87	1.73	.83	.07
	090.033	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		$1\frac{1}{4}$ "	$\frac{1}{2}$ "	.51	1.34	1.40	.99	1.89	.99	.09



<b>Example</b>	<b>Type</b>	<b>+</b>	<b>Material no.</b>	<b>=</b>	<b>Ordering no.</b>
for ordering:	090.053	+	51	=	090.053.51

For filters and non-return valves, please refer to page 64.



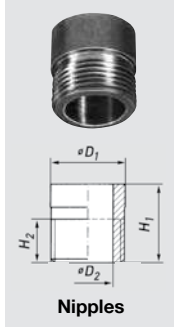
For series	Ordering no.						Dimensions (in.)					Weight (Brass) lb.
	Type	Material no.					For thread	$H_1$	$H_2$	D	Hex	
		303 SS	316SS	316L SS	Brass	POM						
2TR 468 548 652 660 679 684	065.200	<input type="radio"/>	<input type="radio"/>	-	<input type="radio"/>	<input type="radio"/>	$\frac{3}{8}$ " BSPP	.57	.40	.50	.87	.06
	069.000	<input type="radio"/>	-	<input type="radio"/>	<input type="radio"/>	-	$1\frac{1}{16}$ "-16	.57	.40	.50	.87	.06
	656/664	065.600	<input type="radio"/>	<input type="radio"/>	-	<input type="radio"/>	<input type="radio"/>	$\frac{3}{4}$ " BSPP	.63	.51	.79	1.26

<b>Example</b>	<b>Type</b>	<b>+</b>	<b>Material no.</b>	<b>=</b>	<b>Ordering no.</b>
for ordering:	065.200	+	17	=	065.200.17

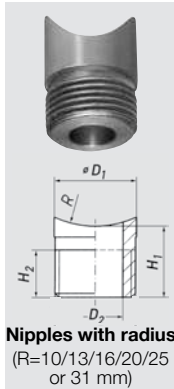


# Accessories Nipples

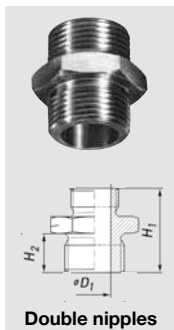
## Nipples



For series	Ordering no.				Dimensions (in.)								Weight (Brass) lb.	
	Type	Material no.				Inlet	Outlet	H <sub>1</sub>	H <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	R		HEX
		02	17	30	53									
2TR 468 652 679 684	<b>065. 210. xx. 00</b>	○	○	○	○	-	3/8" Male BSPP	.71	.39	.68	.45	-	-	.04
656 657	<b>065. 610. xx. 00</b>	○	○	-	○	-	3/4" Male BSPP	1.06	.55	1.10	.71	-	-	.13



2TR 468 652 679 684	<b>065. 217. xx. 10</b>	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.39	-	.04
	<b>065. 217. xx. 13</b>	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.51	-	.04
	<b>065. 217. xx. 16</b>	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.63	-	.04
	<b>065. 217. xx. 20</b>	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.79	-	.04
	<b>065. 217. xx. 25</b>	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.98	-	.04
	<b>065. 217. xx. 31</b>	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	1.22	-	.04



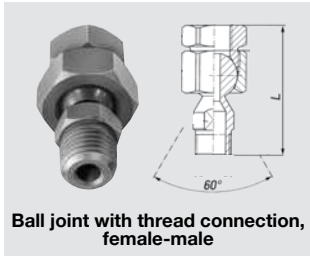
2TR 468 652 679 684	<b>065. 215. xx. 11</b>	-	○	○	-	1/4" Male NPT	3/8" Male BSPP	1.44	.39	-	-	-	11/16	.06
	<b>065. 215. xx. 12</b>	-	○	○	-	3/8" Male NPT	3/8" Male BSPP	1.38	.39	-	-	-	11/16	.06
	<b>065. 211. xx. 15</b>	-	○	○	-	1/2" Male NPT	3/8" Male BSPP	1.38	.39	-	-	-	7/8	.06
	<b>065. 221. xx. 11</b>	-	○	○	-	1/2" Male NPT	3/8" Male BSPP	1.25	.39	-	-	-	11/16	.06
	<b>065. 211. xx. 11</b>	-	○	○	-	1/8" Male NPT	11/16"-16	1.38	.39	-	-	-	11/16	.06
	<b>065. 215. xx. 10</b>	-	○	○	-	1/4" Male NPT	11/16"-16	1.44	.39	-	-	-	11/16	.06
	<b>065. 211. xx. 10</b>	-	○	○	-	3/8" Male NPT	11/16"-16	1.25	.39	-	-	-	11/16	.06
	<b>065. 211. xx. 14</b>	-	○	○	-	1/2" Male NPT	11/16"-16	1.38	.39	-	-	-	7/8	.06
	<b>065. 221. xx. 10</b>	-	○	○	-	1/4" Female NPT	11/16"-16	1.25	.39	-	-	-	11/16	.06
656 657 664 665	<b>065. 611. xx. BK</b>	-	○	○	-	3/4" Male NPT	3/4" Male BSPP	1.65	.55	.71	-	-	1-1/4	.20

**Example**    Type    +    Material no. (xx)    =    Ordering no.  
**for ordering:** 065. 215. xx. 11 + 17    =    065. 215. 17. 11

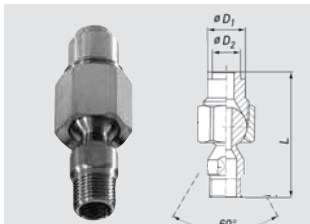


# Accessories Ball joints

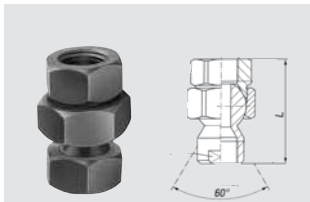
## Ball joints



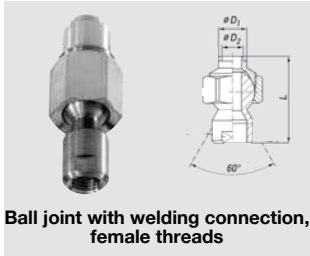
Ball joint with thread connection, female-male



Ball joint with welding connection, male threads



Ball joint with thread connection, female-female



Ball joint with welding connection, female threads

For series	Ordering no.			Dimensions (in.)							Weight (Brass) lb.
	Type	Material no.			Inlet	Outlet	D <sub>1</sub>	D <sub>2</sub>	Largest HEX	L	
		303 SS/316 SS 16	303 SS 16	Brass 30							
2TR 302 468 652 679 684	092. 022. xx. BE. BD	-	○	○	1/4" Female NPT	3/8" Male NPT	-	-	1-1/16	2.51	.18
	091. 124. xx. BE. BF	-	○	○	3/8" Female NPT	3/8" Male NPT	-	-	1-1/8	2.10	.19
2TR 302 468 652 679 684	092. 022. xx. SE. BE	○	-	-	-	3/8" Male NPT	.79	.59	1-1/16	2.67	.34
422 490 544 632 686 688	092. 010. xx. BB. BB	-	○	○	1/8" Female NPT	1/8" Female NPT	-	-	7/8	1.70	.09
	092. 020. xx. BD. BD	-	○	○	1/4" Female NPT	1/4" Female NPT	-	-	1-1/16	2.37	.13
	092. 021. xx. BF. BD	-	○	○	3/8" Female NPT	1/4" Female NPT	-	-	1-1/16	2.30	.18
	092. 030. xx. BF. BF	-	○	○	3/8" Female NPT	3/8" Female NPT	-	-	1-1/8	2.23	.18
422 490 544 632 686 688	092. 020. xx. SD. BB	-	○	○	-	1/8" Female NPT	.79	.59	1-1/16	2.53	.33
	091. 030. xx. SF. BF	-	○	○	-	3/8" Female NPT	.87	.59	1-3/16	2.31	.33

**Example**    Type                    +    Material no. (xx) =    Ordering no.  
for ordering: 092. 010. xx. BB. BB + 16                    =    092. 010. 16. BB. BB



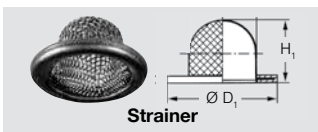
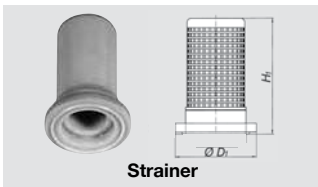
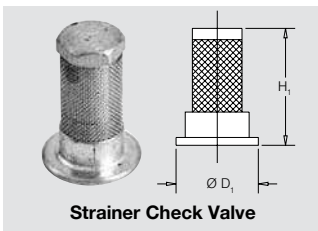
# Accessories Strainers

## Strainers



For nozzle size	Ordering no.	Material	Strainer mesh	Color	Dimensions (in.)				Weight (lb.)
					H <sub>1</sub>	H <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	
xxx.32x-xxx.44x	<b>065. 268. 7J</b>	Santoprene	50	Blue	.85	.10	.71	.44	.004
xxx.48x-xxx.56x	<b>065. 269. 7J</b>	Santoprene	25	Red	.85	.10	.71	.44	.004

## Strainers



Valve option	Ordering no.				Color	Opening pressure (psi)	Dimensions (in.)				Weight (Brass) lb.
	Type	Material no.					Mesh size	Mesh opening	H <sub>1</sub>	D <sub>1</sub>	
		Monel 26	Brass 30	POM 56							
With check valve	<b>065. 260</b>	-	○	-	-	8	50	.011	.81	.58	.004
	<b>065. 265</b>	-	-	○	Blue	8	50	.011	.81	.58	.004
	<b>065. 266</b>	-	-	○	Red	8	24	.026	.81	.58	.004
No check valve	<b>065. 250</b>	-	○	-	-	-	50	.011	.85	-	.004
	<b>065. 257</b>	-	-	○	Blue	-	50	.011	.81	.58	.004
	<b>065. 256</b>	-	-	○	Red	-	24	.026	.81	.58	.004
No check valve	<b>065. 252</b>	○	-	-	-	-	80	.007	.31	.58	.004

**Example**    Type    +    Material no.    =    Ordering no.  
**for ordering:** 065. 260 + 30                    =    065. 260. 30





# Nozzle valve systems for variable atomization of very small liquid volumes

## VarioSpray

### VarioSpray HP

The HP valve range can be used to atomize a wide variety of liquids. All parts that come into contact with liquids are made of stainless steel, thereby complying with EC 1935/2004 and FDA regulations.

### VarioSpray II

Nozzle valves in the VarioSpray II range can efficiently atomize the most miniscule liquid volumes. Their size makes these valves ideal for use in tight spaces. VarioSpray II is also available in a food version that complies with EC 1935/2004 and FDA regulations.

### Applications:

Application of oil for applying seasonings, web humidification, release agent application, humidification.



## Benefits across the board

### Flexibility

The Lechler VarioSpray system is completely modular, allowing it to be adapted to individual requirements as flexibly as possible.

The result is a perfectly coordinated product portfolio including

- Optimum valve control by perfectly matched electronic components
- Modular spray headers
- Various predefined Lechler control concepts
- Individual advice from our sales personnel

### Resource and cost savings

The aerosol-free atomization of small and minimal liquid volumes offers specific benefits for spray nozzle operation. The fact that no atomization air is used means a huge reduction in rebound effects.

The following costs are reduced as a result:

- Installation cleaning
- Operating costs of extraction systems
- Liquid losses because the liquid to be atomized is applied to the product in a more targeted manner

### Minimal amounts

Thanks to the use of pulse-width-modulated valves, even the smallest liquid quantities can be hydraulically atomized with maximum precision.

This control method permits

- flexible and immediate response to changed ambient parameters (e.g. belt speed)
- uniform jet and spray quality
- further application benefits due to a significantly increased turn-down ratio



# Nozzle valve systems for variable atomization of very small liquid volumes

## VarioSpray

### Innovative and flexible spraying technology opens up new applications

Faster, more precise and now more sustainable. The demand for more efficient production processes is increasing in almost every industry. Even already extremely efficient spraying processes are affected – particularly when spraying very small liquid volumes.

Pneumatic atomizing systems are often used here because very small flow rates can be achieved using compressed air. However, this often makes control and installation extremely complex. Additionally, the use of air can have an unfavorable effect on operating costs. Aerosols may also be formed and liquid is lost due to the rebound effect.

With the VarioSpray II and VarioSpray HP hydraulic pulse-width-modulated nozzle valve systems, Lechler offers two alternatives that are as versatile as they are reliable.

### What is pulse width modulation?

Pulse width modulation refers to the variation of the ON time  $t_{on}$  / OFF time  $t_{off}$  of a square-wave signal when the frequency  $f$  remains constant. Here, the frequency  $f$  corresponds to the reciprocal value of the period duration  $T$ .

The ratio of the ON time  $t_{on}$  to the period duration  $T$  is referred to as the pulse width ratio (DC = duty cycle). The pulse width ratio determines the flow rate. The valve is open during the ON time  $t_{on}$ . The shorter the DC, the less the flow rate.

Depending on the frequency selected, the pulsation is barely visible to the human eye.

With hydraulic nozzle systems, the narrowest cross section of the spray nozzle determines the liquid flow rate. For reasons of economy and production, however, arbitrary reduction of this narrowest cross section is not possible.

Instead, we use flexible timing of the spray duration to realize minimal flow rates – without the need for an expensive and complex pneumatic atomizing system.

In addition to the VarioSpray II and VarioSpray HP nozzle valve systems, a control unit is also required to permit simple modification of the pulse width and cycle frequency.

### Your benefits

- Simple adjustment of the pulse width and cycle frequency
- Flushing function
- Modular design and modular system
- Start/stop signal (e.g. via light barrier)
- Individual valve control for VarioSpray HP

### Product features

#### Minimum flow rates

- Liquid saving
- No expensive, complex twin-fluid system

#### Cycle frequency up to 200 Hz for VarioSpray HP, up to 100 Hz for VarioSpray II

- Flexible belt speeds

#### High turn-down ratio up to 29:1 with VarioSpray HP, up to 11:1 with VarioSpray II

- Wide range of flow rates covered by one nozzle

#### Continuously variable flow rate

- Flexible adjustment of the volume applied for different products

#### Different flow rates have no influence on spraying parameters

- Constant spray angle
- Uniform droplet size

#### Flow rate is not regulated by pressure

- No high pressure required
- Simple setup

#### No atomization air

- No aerosol formation
- Reduced loss of liquid

#### Food-compliant

- Spraying/humidification of foods

## Your benefit

- ➔ Reduced costs
- ➔ Greater efficiency

- ➔ Increased productivity
- ➔ Shorter production time

- ➔ More flexible production

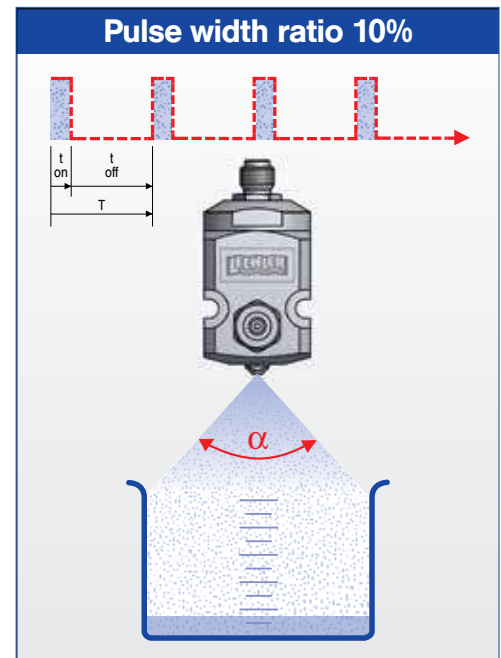
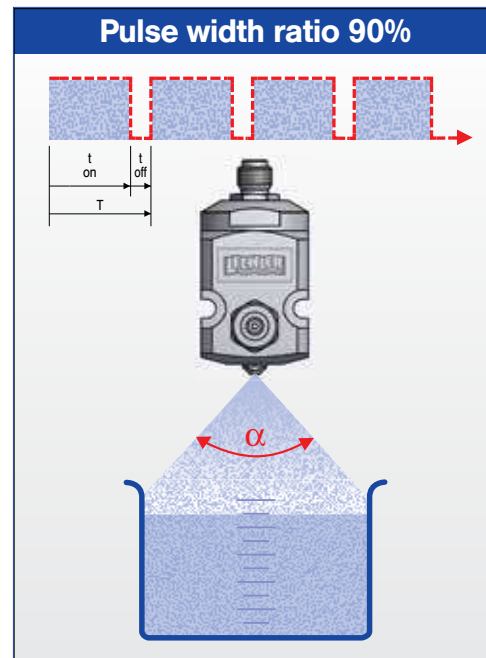
- ➔ Shorter product change-over times

- ➔ Constant process parameters

- ➔ Short installation time
- ➔ Low maintenance requirement
- ➔ Low operating costs

- ➔ Reduced risks to health
- ➔ No environmental pollution
- ➔ Reduced costs

- ➔ Compliance with legal requirements



ENGINEERING  
YOUR SPRAY SOLUTION



## LECHLER WORLD-WIDE



Edition 2/17 • USA • Subject to technical modification

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