

*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

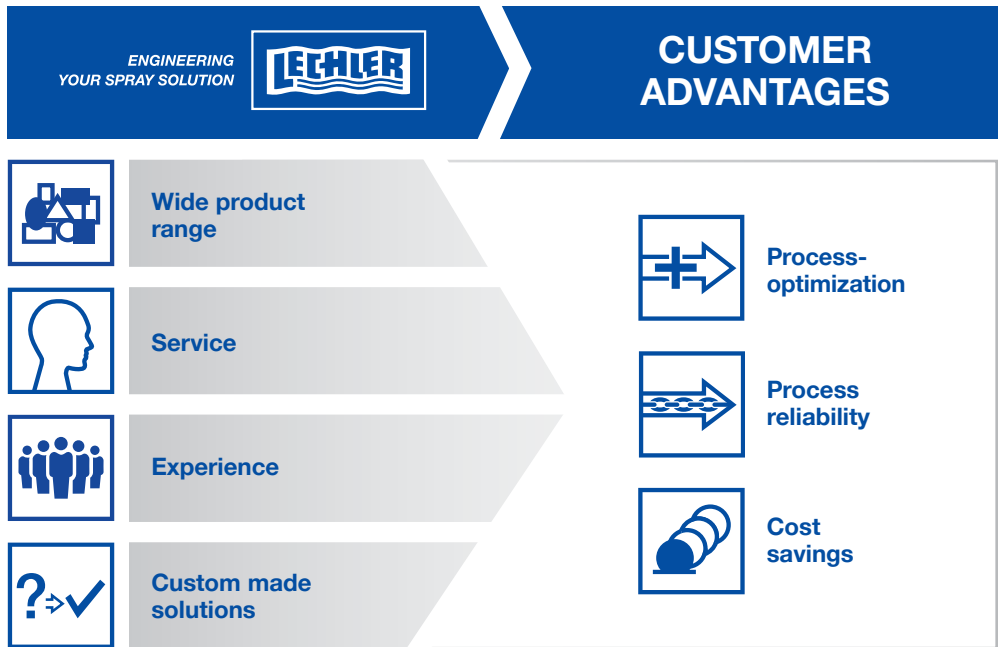
and innovative solutions. Lechler has been at the forefront of innovation in nozzle technology due to the extensive knowledge of nozzles and deep understanding of industry processes among our 670 employees.

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



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

Content	Page
Applications	4
Disinfection and hygiene	5
Product preparation	6-7
Product processing	8-9
Filling and packing	10-11
Planning criteria	12-17
Products	
Tank cleaning nozzles	18-40
Pneumatic atomizing nozzles	41-46
Hollow cone nozzles	47-50
Full cone nozzles	51-56
Flat fan nozzles	57-69
Air nozzles	70-72
Solid Stream Nozzles	75
Accessories	76-79
VarioSpray II	80-81

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



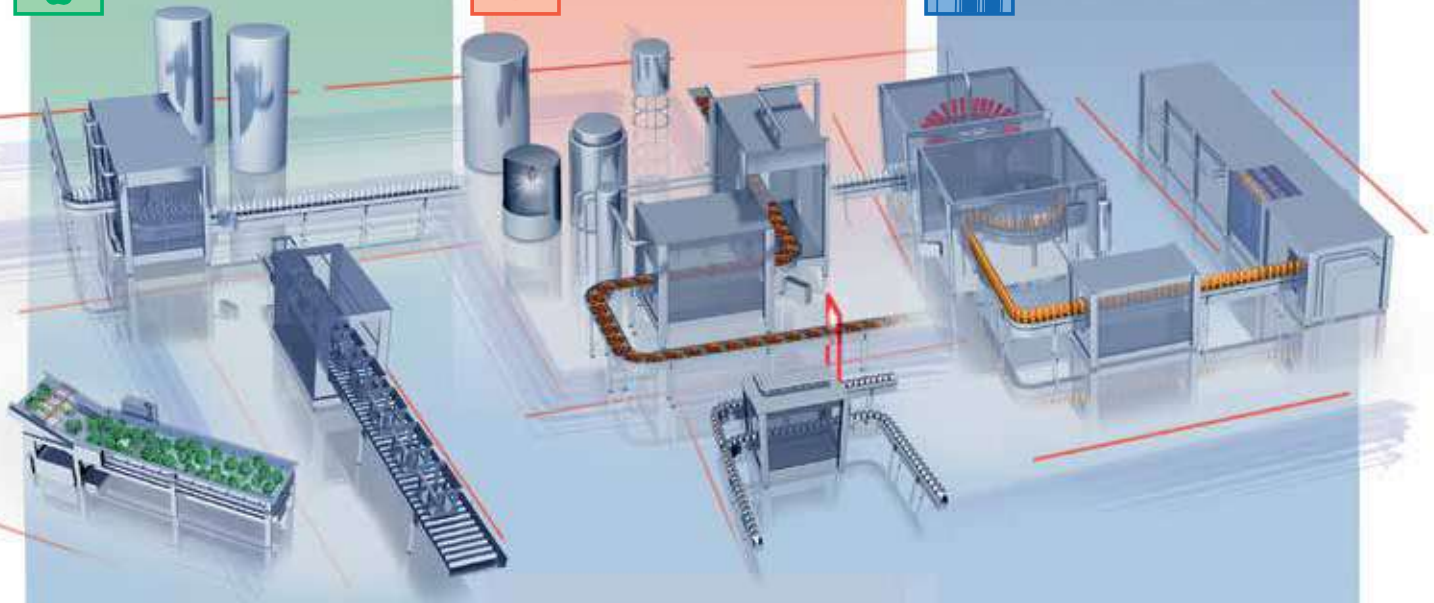
Product preparation



Product processing



Filling and packing



Tank cleaning / CIP

Belt lubrication

Belt cleaning

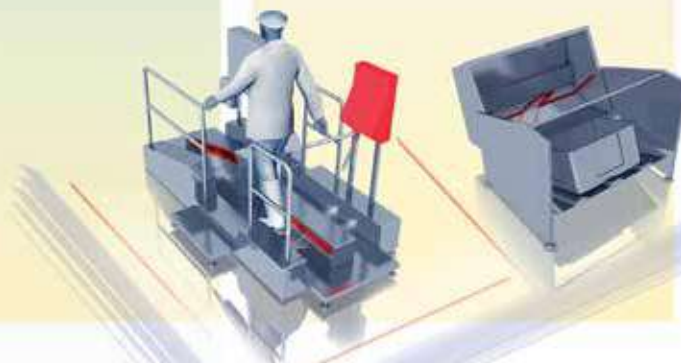
- Container washers
- Cleaning of fruit and vegetables
- Pretreatment of equipment
- Humidification
- Bottle and barrel cleaning
- Filter cleaning

- 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



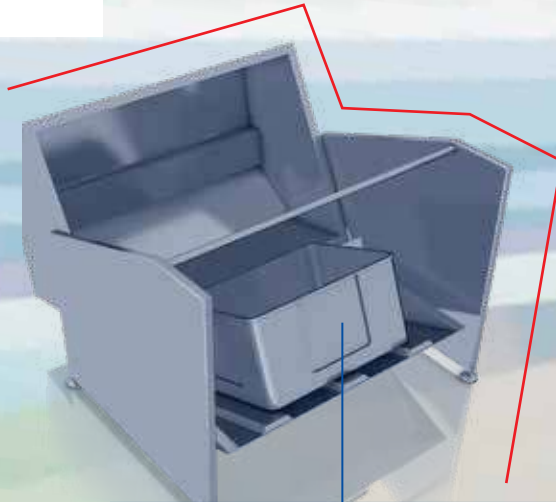
LECHLER NOZZLES FOR DISINFECTION AND HYGIENE APPLICATIONS



Hand disinfection

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

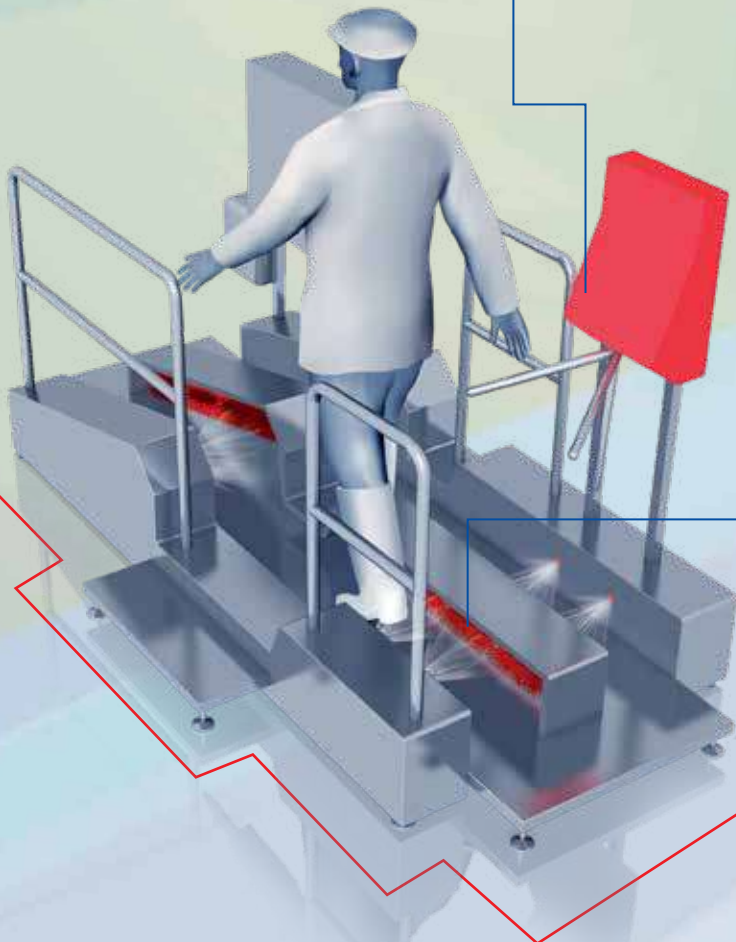
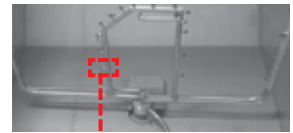
Hollow cone nozzles atomize disinfectants very finely and ensure wide surface coverage and high disinfectant efficiency.



Work equipment disinfection

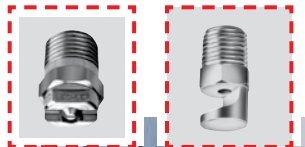
Short throughput times are needed when cleaning and disinfecting trolleys and containers for production.

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**.



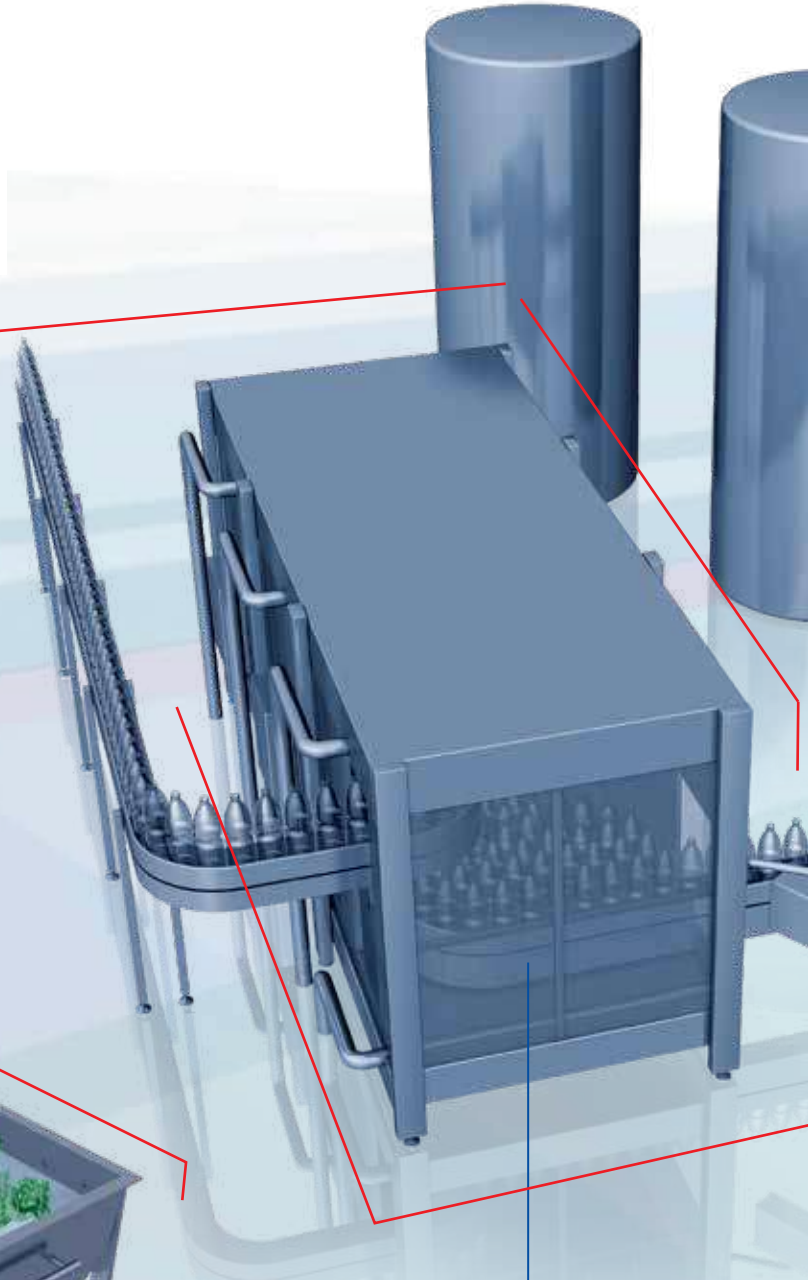
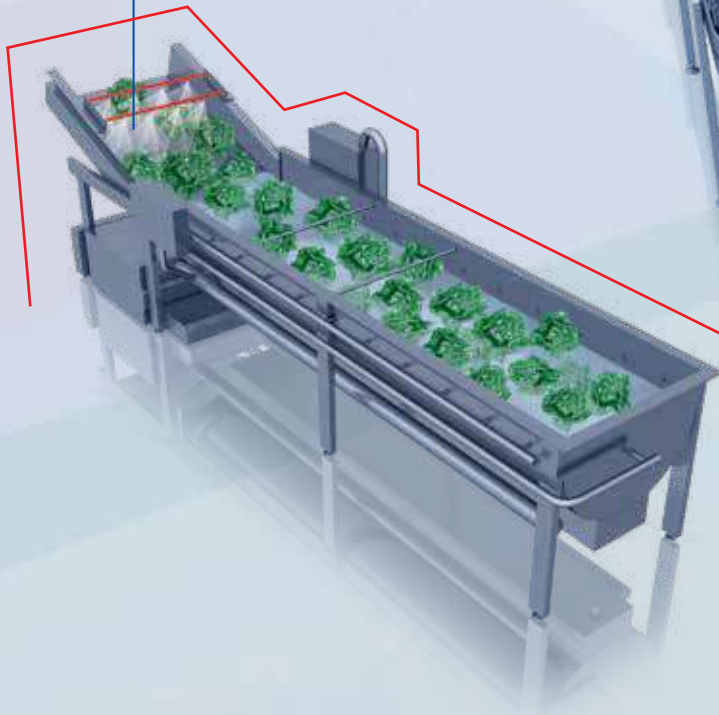
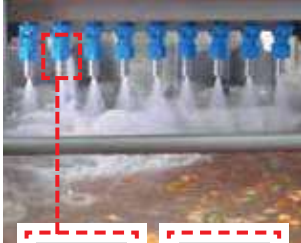


LECHLER NOZZLES FOR PRODUCT PREPARATION APPLICATIONS



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.



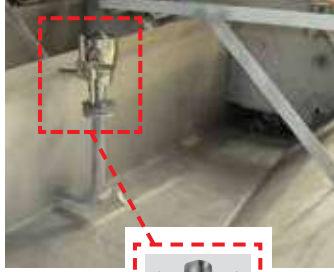
Bottle and barrel cleaning

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.

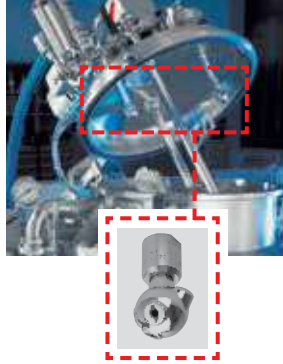




LECHLER NOZZLES FOR PRODUCT PROCESSING APPLICATIONS

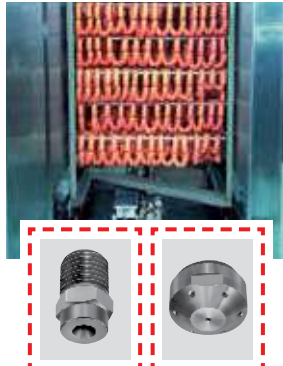
Cleaning containers

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.



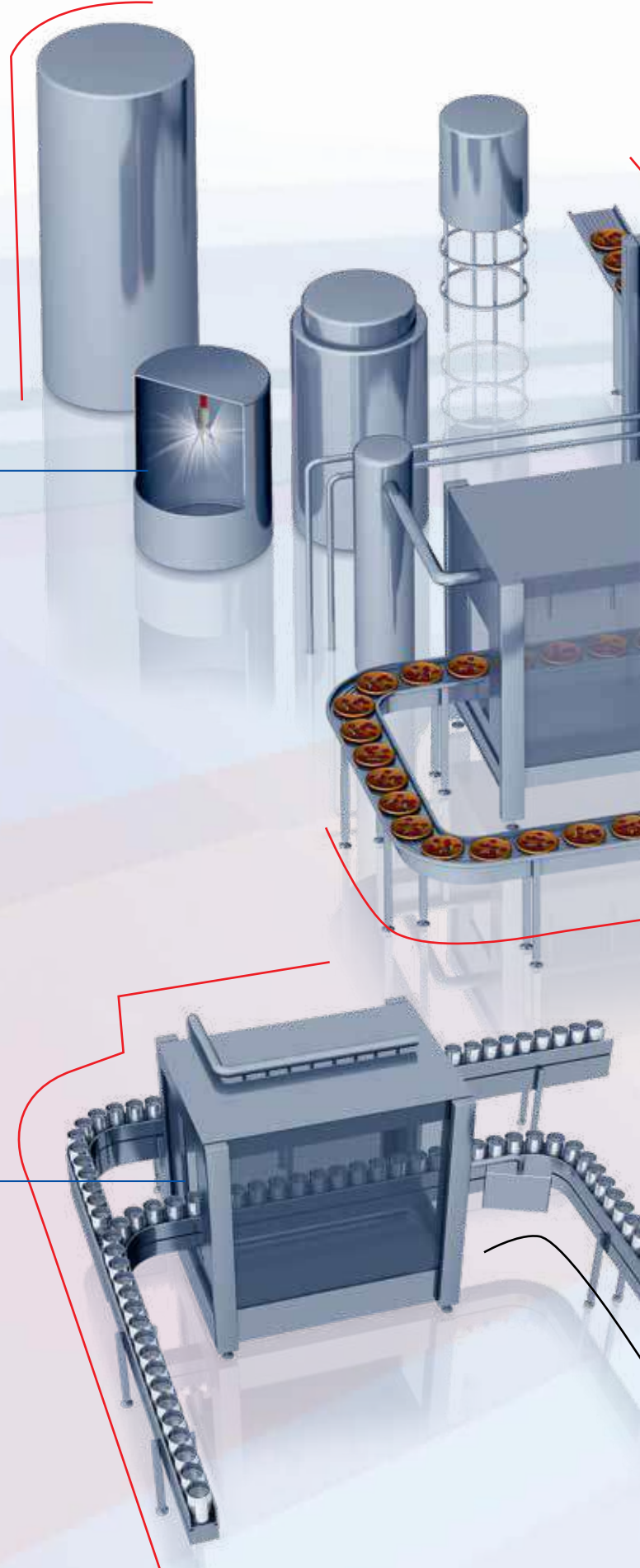
Sausage cooling

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

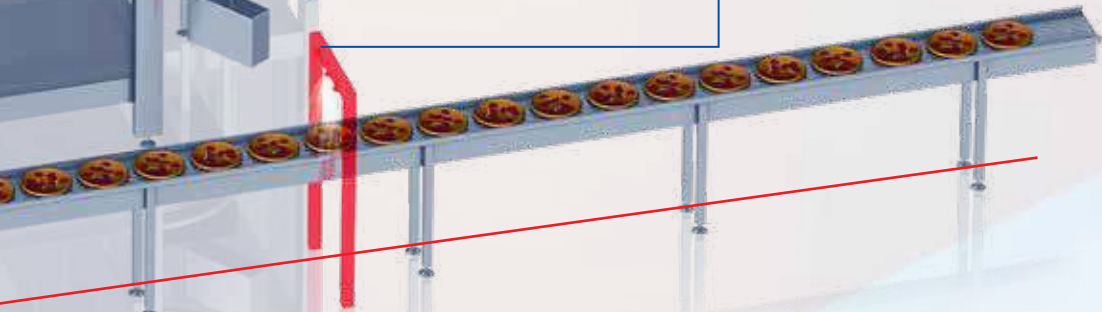
Before the foodstuffs are transferred, the cans must be disinfected on both the outside and inside. **Flat fan nozzles** and **full cone nozzles** can be utilized for this process.





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

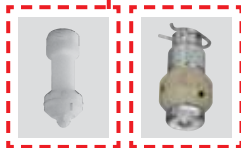
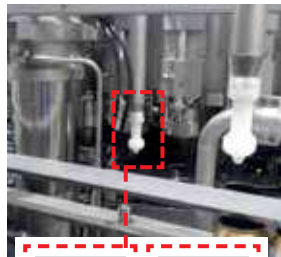
Sterilization



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.

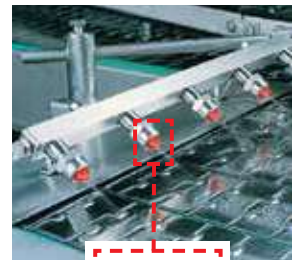
Filler equipment cleaning

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.



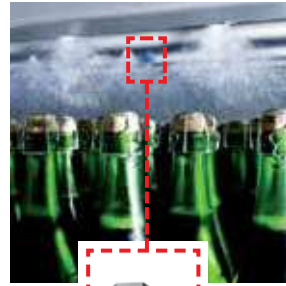
Belt lubrication

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

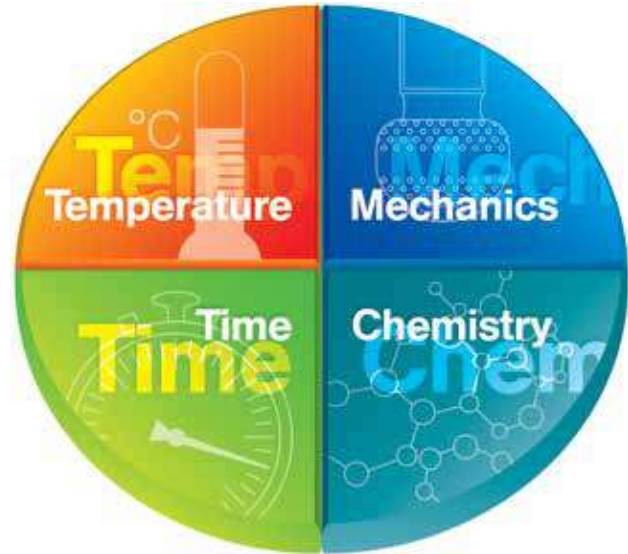


Figure 1: Sinner's circle with equal proportions of the temperature, time, chemistry and mechanical factors.

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.

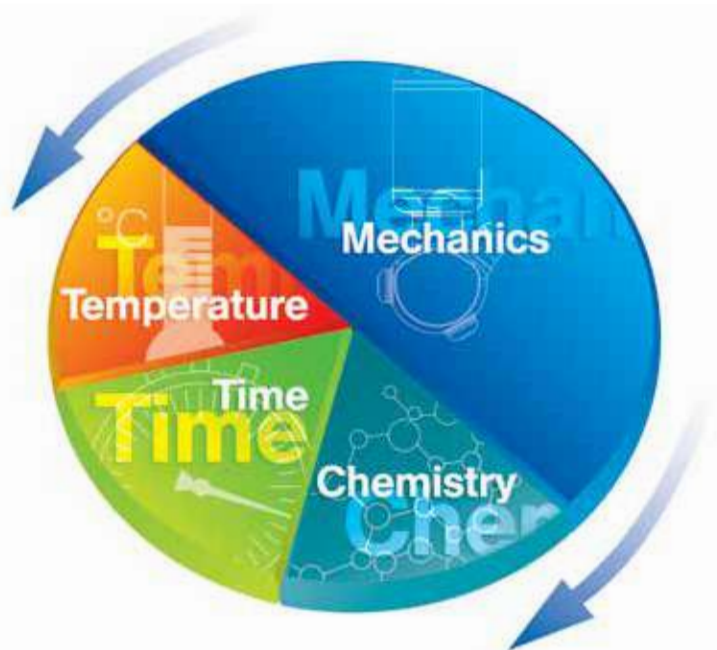


Figure 2: Lechler nozzles and rotating cleaning nozzles have high mechanical cleaning efficiency. This reduces the proportion of the other factors, as well as the resulting costs.

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).

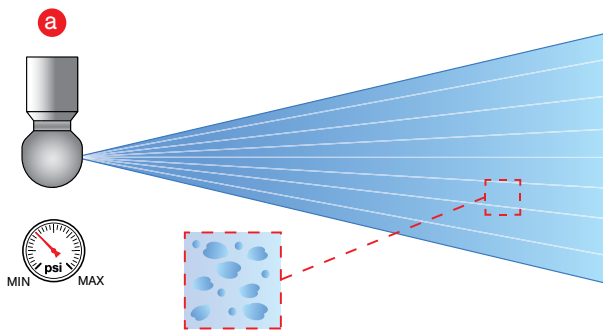


Figure 3: Rotating cleaning nozzles with recommended operating pressure

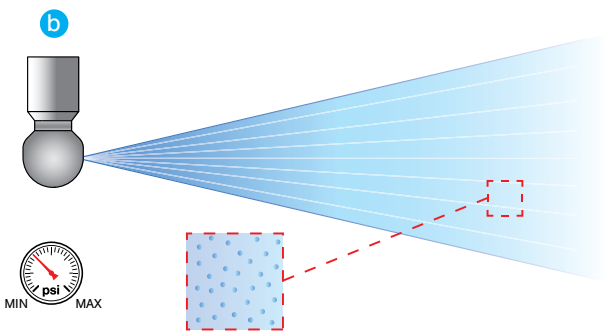


Figure 4: Rotating cleaning nozzles with operating pressure too high

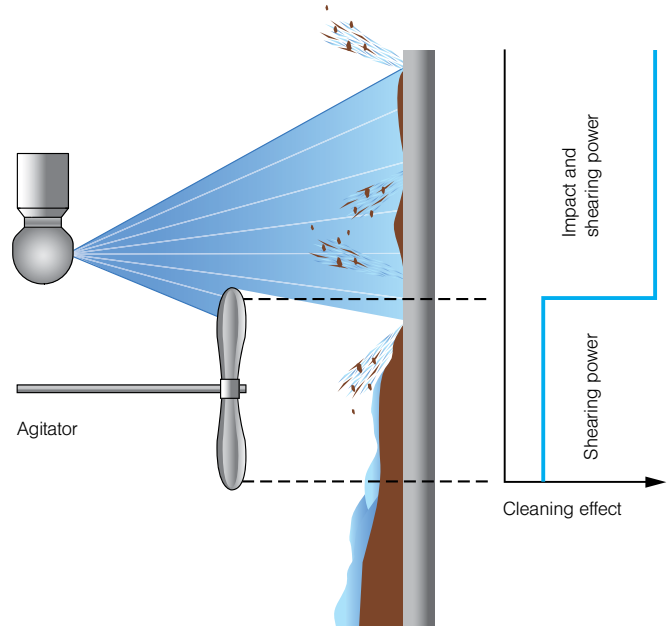


Figure 5: Cleaning mechanisms, impact and shearing power

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.

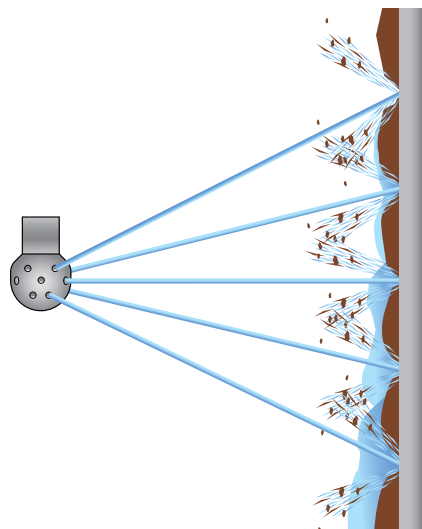


Figure 6: Cleaning with a spray ball

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.

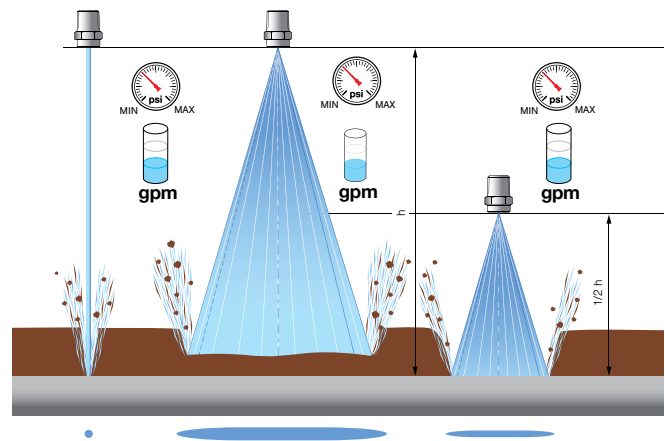


Figure 8: Comparison of the cleaning result of three nozzles with identical pressure and flow rate.

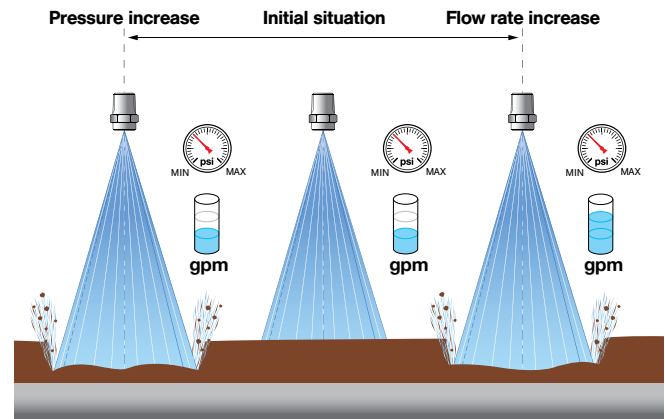


Figure 9: Comparison of the cleaning result of three nozzles with pressure or flow rate increase.



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.

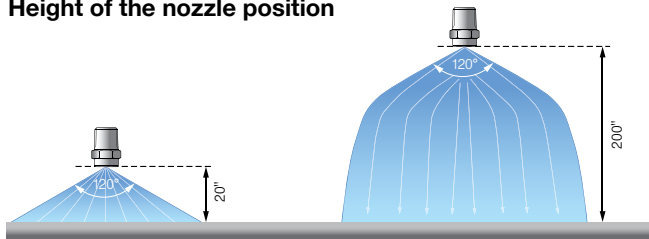
Depending on the version, Lechler single-fluid nozzles can spray the fluid as a hollow cone, solid stream or flat fan. The solid stream nozzle does not spray, but rather produces

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**

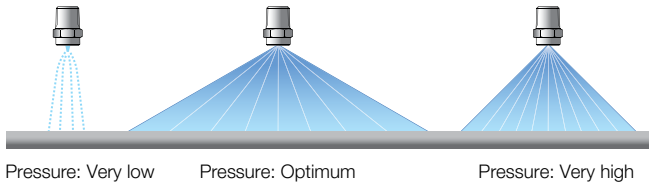
Equipment and components must be designed accordingly so they are easy to clean. Hygienic design prevents recesses and gaps that can harbor dirt, unfavorable flow areas (dead spaces) and sinks that hinder the run-off of fluids. At the same time, attention is paid to maintaining the least surface roughness 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

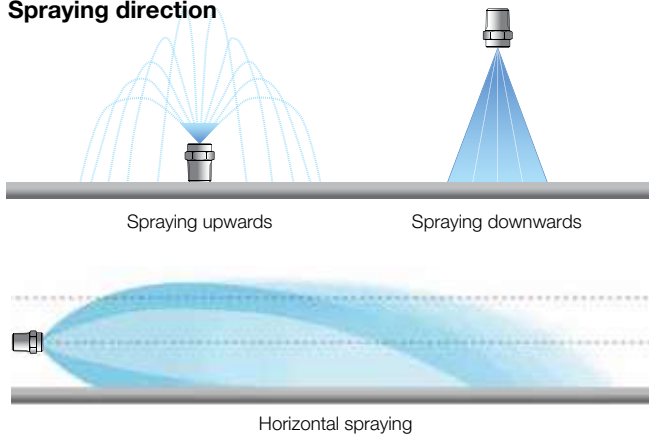


Figure 10: Spray patterns under different working conditions and installations



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.

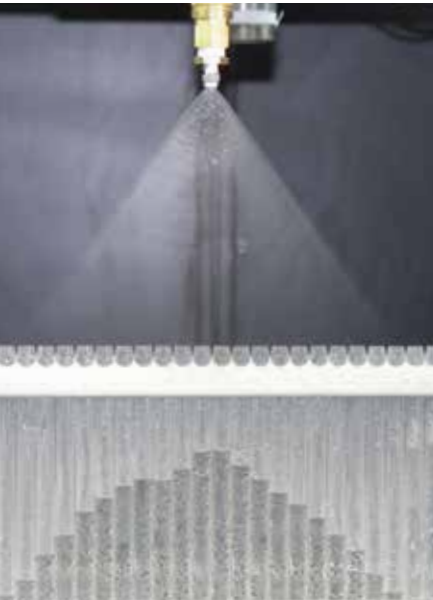


Figure 12: Liquid distribution measurement

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^3/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.

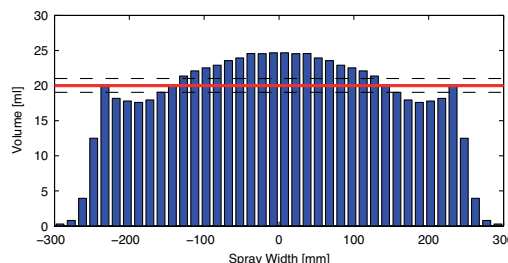


Figure 14: Liquid distribution of a Lechler high-pressure flat fan nozzle

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.

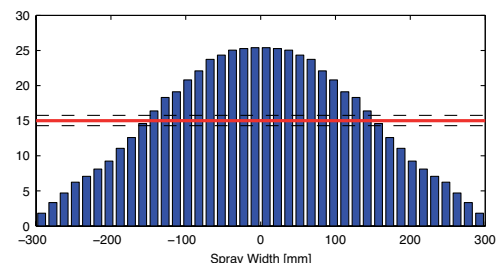
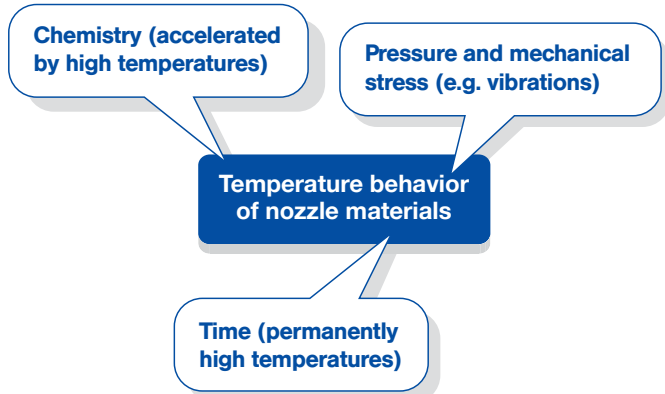


Figure 15: Liquid distribution of a Lechler standard flat fan nozzle

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

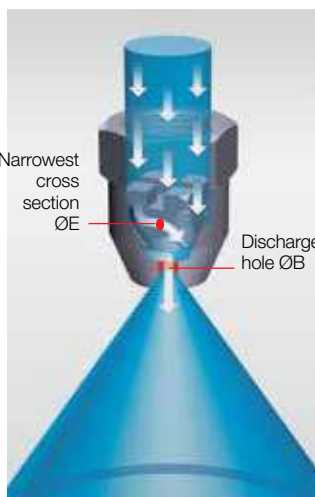


Figure 17: Narrowest free cross section

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.

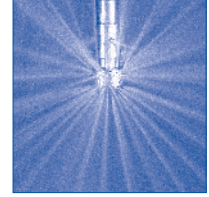


Figure 19: Wear of a full cone nozzle

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[®] 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	
	527. 209. 1Y. 00. 75	.031	13	60	19	23	2.7	1.3	.75	.13	.50	17
	527. 289. 1Y. 01. 50	.043	37	170	53	65	4.6	2.6	1.51	.19	1.00	20
	527. 449. 1Y. 02. 00	.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:

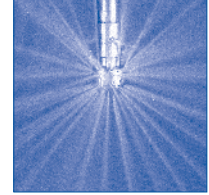
- No moving parts
- Self-draining
- Easy to inspect
- Proven use in hygienically sensitive environments

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:

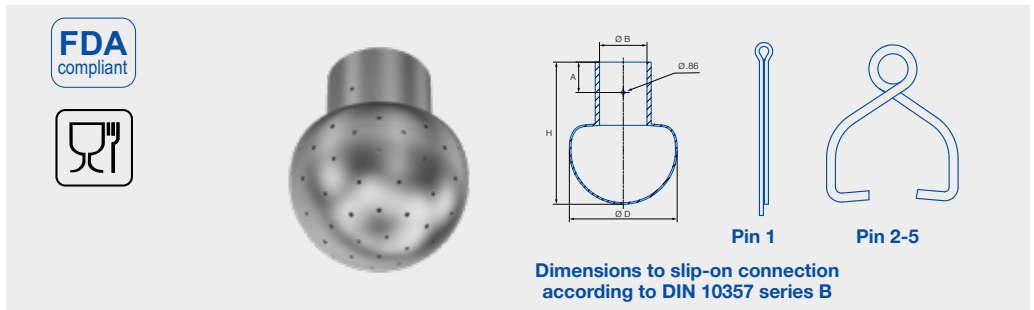
316L stainless steel
Pin: 316L SS

Max. fluid temperature:

392°F

Recommended operating pressure:

30 psi



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

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.

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.



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

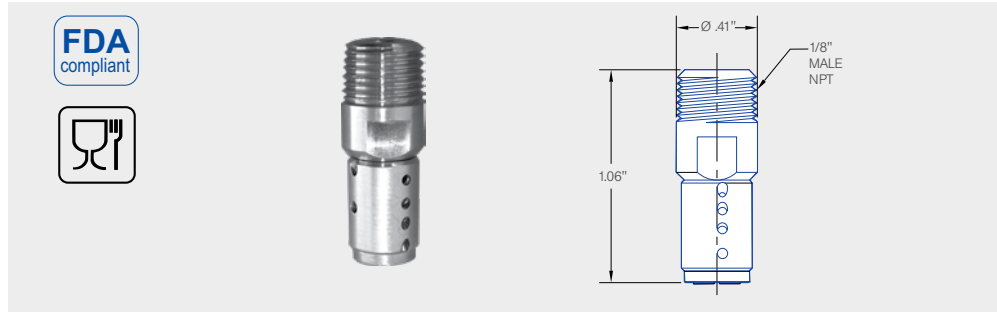
Weight:
.025 lb.



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° 	500. 234. G9. BA	.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

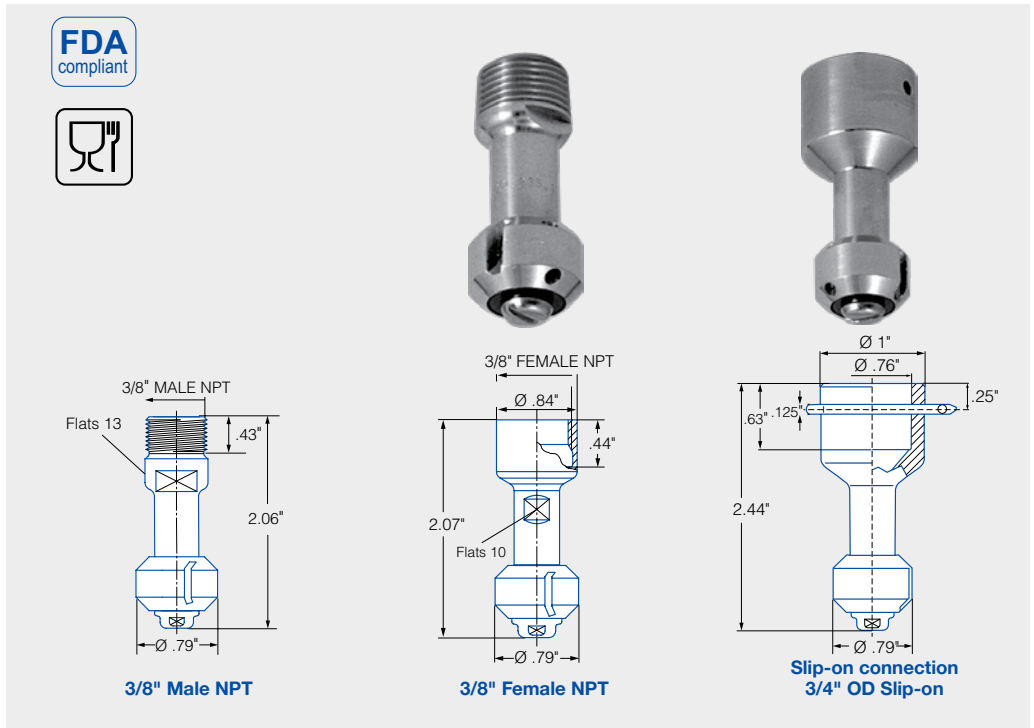
Weight:
566 thread .1 lb.
566 slip-on .2 lb.

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.

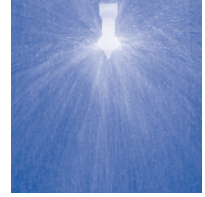
Slip-on information: - R-clip made of stainless steel 316L SS is included (Ordering number: 095.022.1Y.50.94.E)
- Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and rotating cleaning nozzle.

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

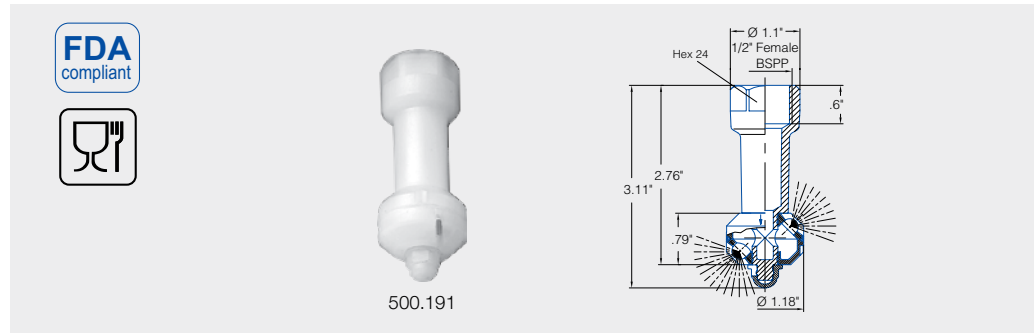
Weight: .06 lb.

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

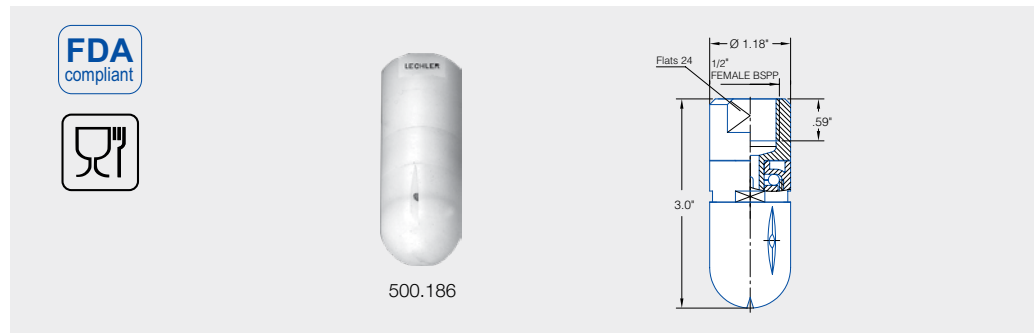
Weight: .15 lb.

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

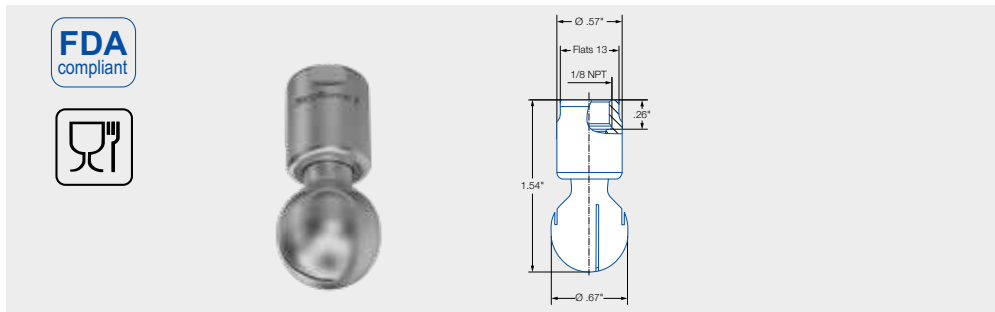
Max. temperature:
284°F / 140°C

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 _{max} = 100 psi)				
			20 psi	30 psi	2 bar	40 psi	
360°	5M1.879.1Y.BB	0.016	3.2	4.0	15	4.6	4.6
	5M1.929.1Y.BB	0.019	4.5	5.5	20	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.

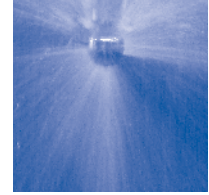
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.



**ATEX version
on request**



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

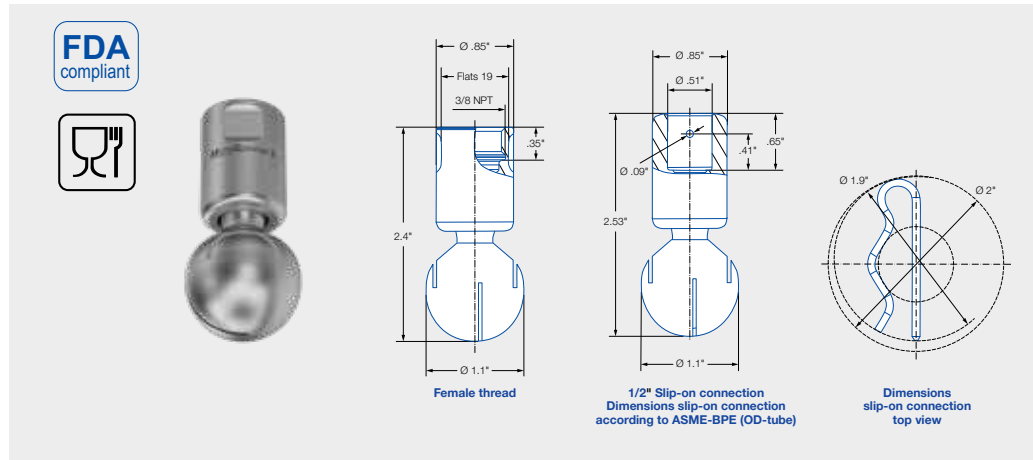
Max. fluid temperature:
284°F

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 _{max} = 100 psi)				
		3/8 NPT	1/2" Slip-on		20 psi	30 psi	2 bar	40 psi	
60° 	5M2.952.1Y	BF	TF05	.06	5.0	6.2	23	7.1	-
	5M2.042.1Y	BF	TF05	.12	8.8	10.8	40	12.4	-
180° 	5M2.004.1Y	BF	TF05	.04	7.0	8.6	32	9.9	5.9
360° 	5M2.969.1Y	BF	TF05	.03	5.6	6.8	25	7.9	5.6
	5M2.049.1Y	BF	TF05	.04	8.6	10.5	39	12.2	5.9

*This product is also available in Hastelloy C22



ATEX version on request

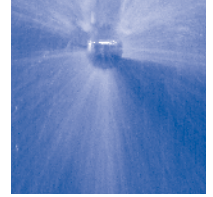
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

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

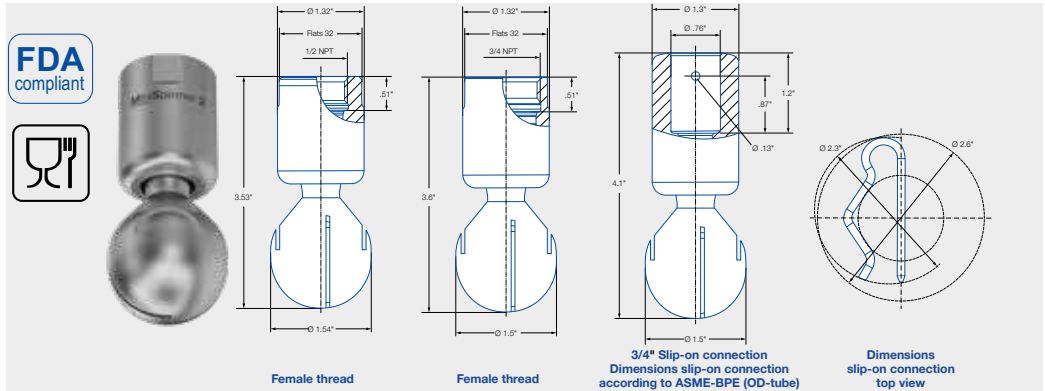
Max. fluid temperature:
284°F






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 _{max} = 100 psi)				
		1/2 NPT	3/4 NPT	3/4" Slip-on		20 psi	30 psi	2 bar	40 psi	
60° 	5M3.122.1Y	BH	-	TF07	.10	13.8	16.6	63	19.5	-
180° 	5M3.133.1Y	-	BL	TF07	.05	14.7	18.0	67	20.8	8.5
180° 	5M3.134.1Y	-	BL	TF07	.05	14.7	18.0	67	20.8	8.5
360° 	5M3.999.1Y	-	BL	TF07	.02	6.6	8.1	30	9.4	5.9
	5M3.089.1Y	-	BL	TF07	.03	10.8	13.2	49	15.2	6.9
	5M3.139.1Y	-	BL	TF07	.03	15.2	18.7	69	21.5	7.5
	5M3.209.1Y	-	BL	TF07	.06	21.9	26.8	100	30.9	8.5

*This product is also available in Hastelloy C22

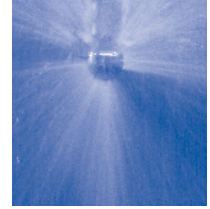
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

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

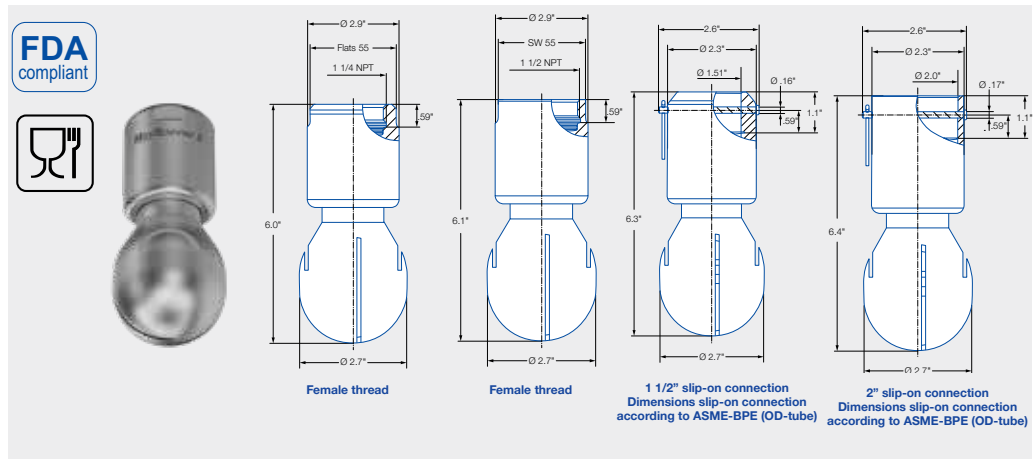
Max. fluid temperature:
284°F

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 _{max} = 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.

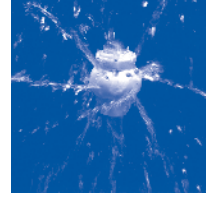


ATEX version on request

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

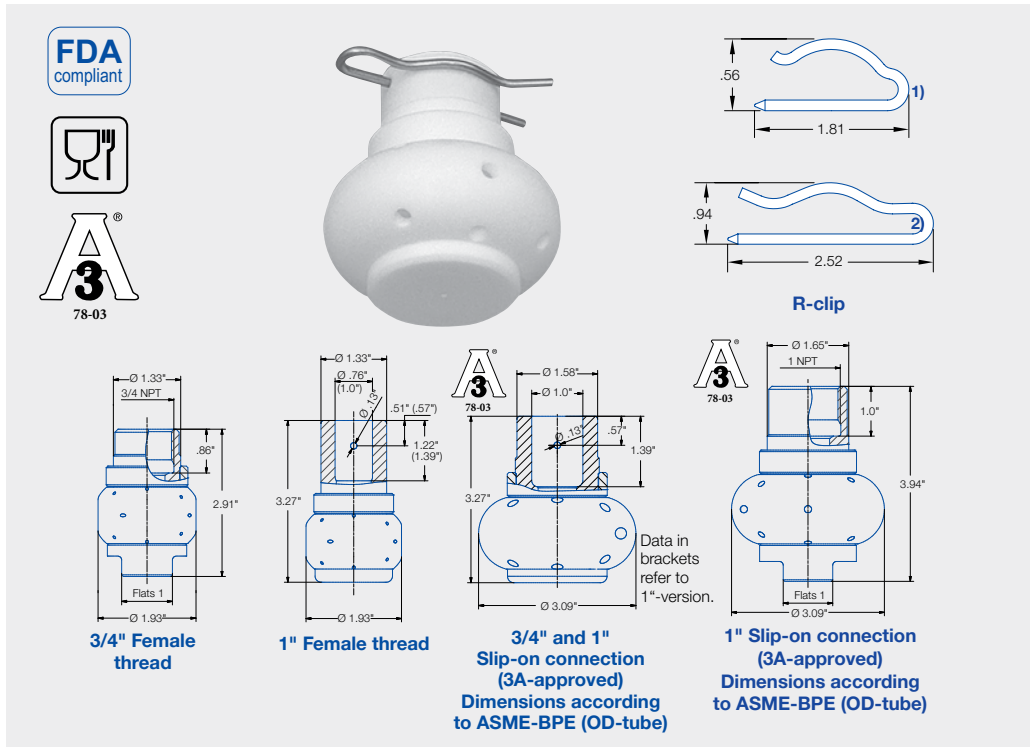
Weight:
3/4" .32 lb.
1" .68 lb.

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.

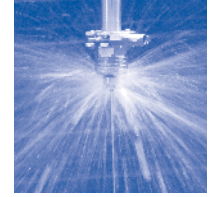
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

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:

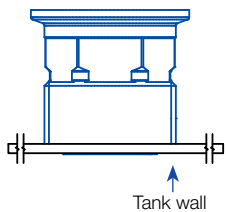
Line strainer with a mesh size of 0.3 mm/50 mesh

Bearing:

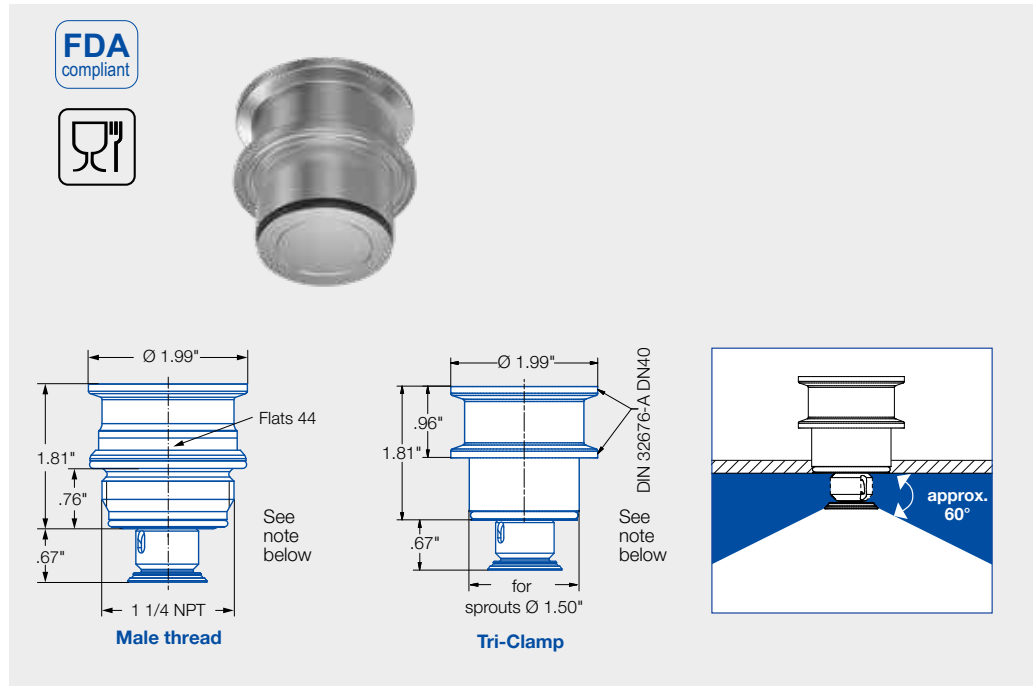
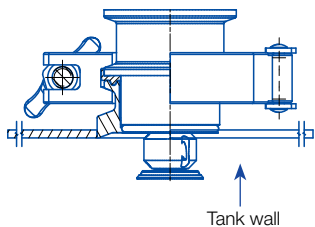
Sleeve bearing made of PEEK

Nozzle installation

With thread in idle position



With Tri-Clamp in operating position



Spray angle	Ordering no.	Tank connection		Free Passage 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.

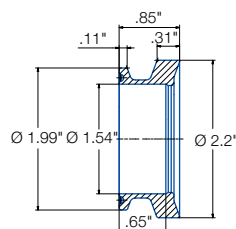
The PopUp Whirly is not suitable for operation with compressed air or any other gas. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

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

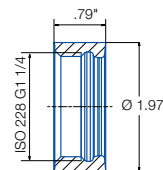


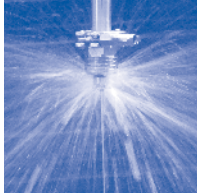
Weld-in socket for Thread-Version

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

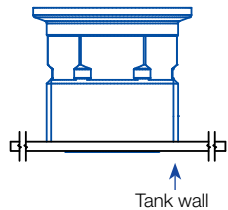
Installation:
Operates in every direction

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

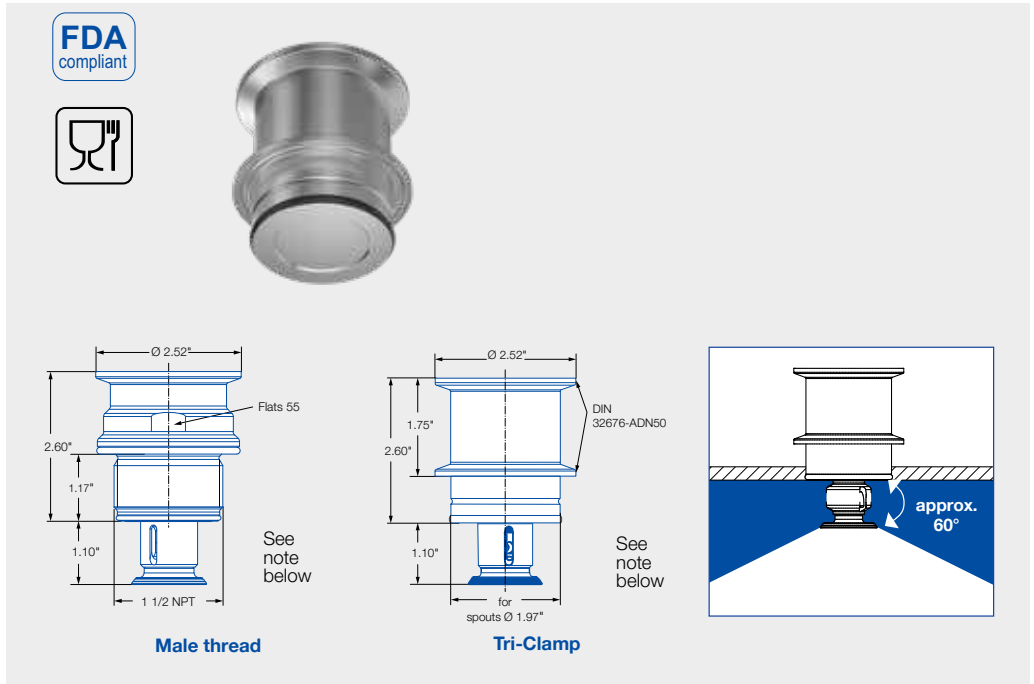
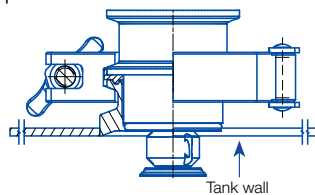
Bearing:
Sleeve bearing made of PEEK

Nozzle installation

With thread in idle position



With Tri-Clamp in operating position

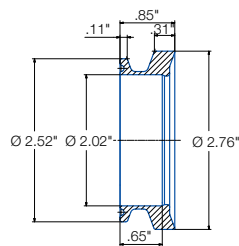


Spray angle	Ordering no.	Tank connection		Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
		1 1/2" Male BSPP	Tri Clamp		20 psi	30 psi	liters per minute	40 psi	
	5P3. 043. 1Y. AR	○	-	.05	3.3	4	15.0	4.7	7.2
	5P3. 043. 1Y. 00	-	○	.05	3.3	4	15.0	4.7	7.2

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

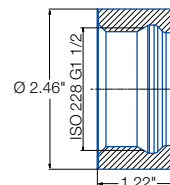


Ordering number
050.020.1Y.01.01

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



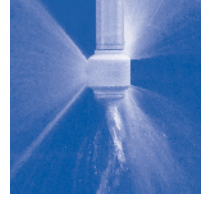
Ordering number
050.020.1Y.BS.00

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.

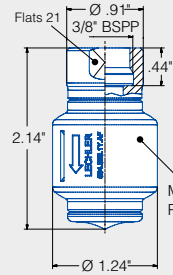
Material:
316L SS
PEEK

Bearing:
Sleeve bearing

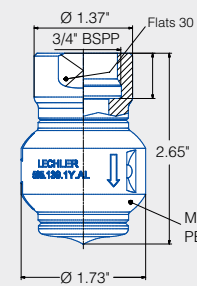
Installation:
Operates in every direction

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

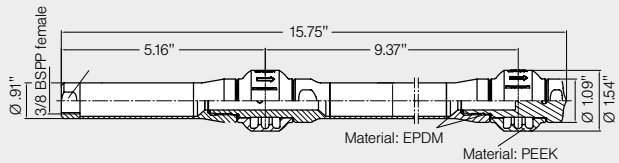
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

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

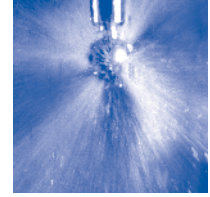


Available on request.





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

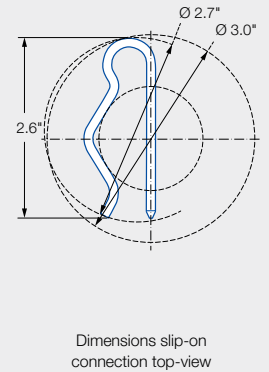
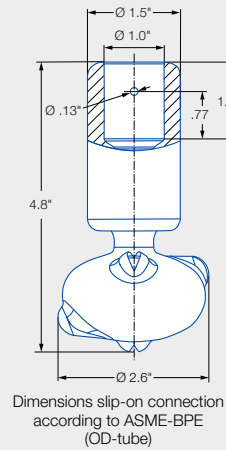
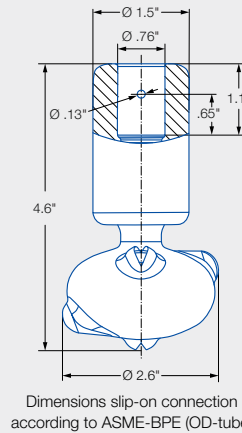
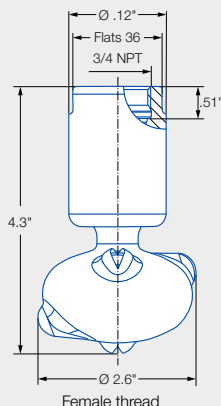
Max. fluid temperature:
284°F

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 _{max} = 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.

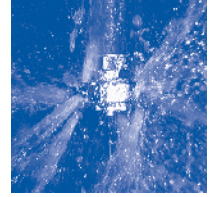
Slip-on information: - R-clip made of stainless steel 316L SS is included(Ordering no.: 095.022.1Y.50.60.E).

- 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

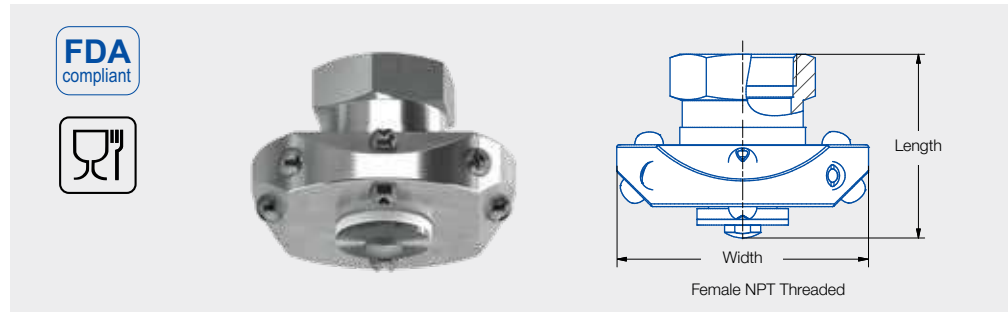
Bearing: Sleeve bearing





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.

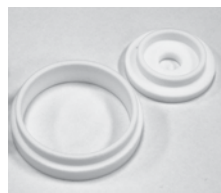
The PTFE bearings and other wear parts can be replaced easily to extend the life of the unit. A rebuild kit contains: Top seal, bottom seal and complete instructions.

Size	Product code
1"	057.701.55.01
2"	057.702.55.01

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

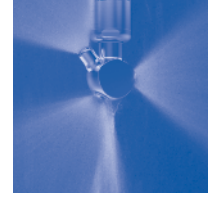
* Contact Lechler for maximum ambient temperature.

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

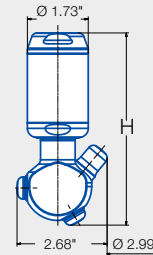
Nozzle dimensions [in]

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

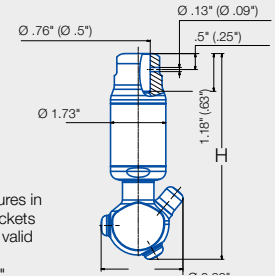


ATEX version on request

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	Type	Ordering no.						Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)					Max. tank diameter [ft]
		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.

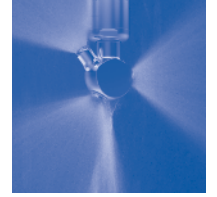
Example for ordering: Type 5S2.956.1Y + Conn. BF = Ordering no. 5S2.956.1Y.BF

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:

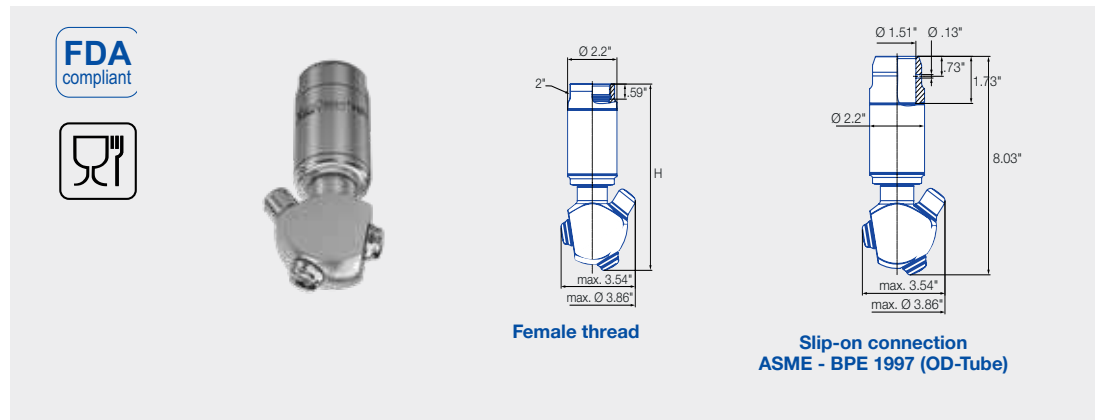
Double ball bearing

Rotation monitoring sensor:

Sensor compatible,
Info: see page 37

Nozzle dimensions [in]

Connection	Max. Height [H]
BN	7.28
BQ	7.28
BS	7.36



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

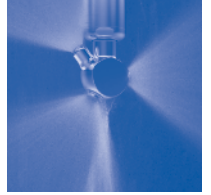
Slip-on information

- 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** = **Ordering no.** = **5S5.293.1Y.BN**



Rotating cleaning nozzle "XactClean® HP2" Series 5S6/5S7



- Suitable for use with steam
- Flat fan with high impact
- Controlled rotation

Materials:

Stainless steel 1.4404 (316L)
PEEK, EPDM

Max. temperature:

302°F

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

Information on operation

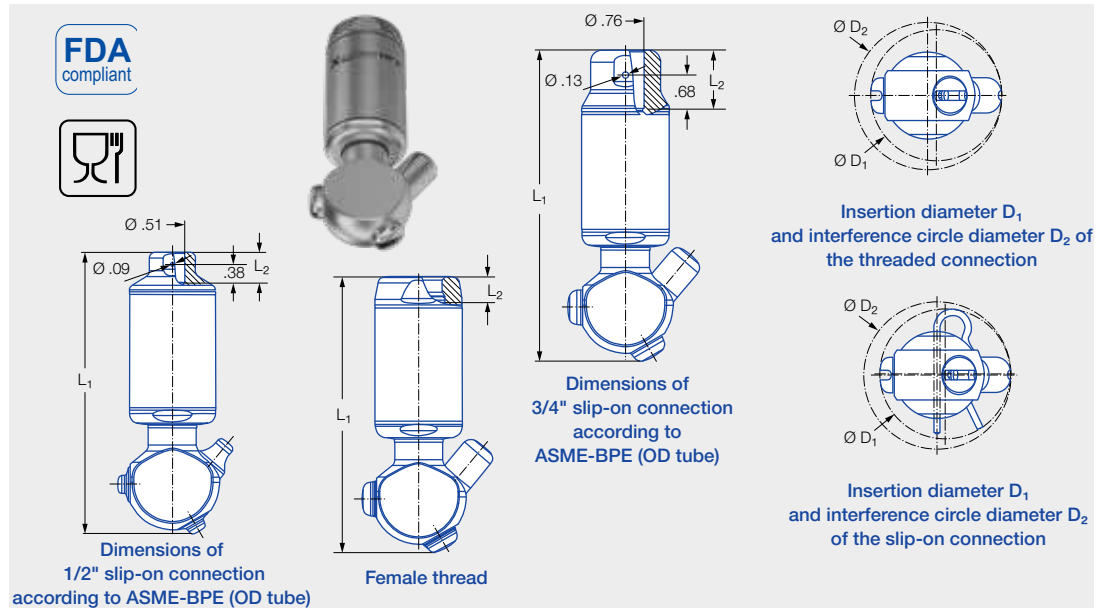
- Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

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.

*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.



Spray angle	Order number						Narrowest cross-section Ø [in]	V̇ water [gal/min]					Max. tank diameter [ft]
	Type	Connection						p [psi]					
		3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	1/2" slip-on connection		3/4" slip-on connection	30	45	3.0 bar	75	
180°	5S6.963.1Y	BF	BH			TF05	0.07	6.60	8.19	31	10.57	15.06	11.5
	5S7.043.1Y		BH			TF07	0.08	10.83	13.21	50	17.17	24.30	13.1
	5S7.113.1Y		BH	BL		TF07	0.08	15.85	19.28	73	24.83	35.13	19.7
	5S7.183.1Y			BL		TF07	0.08	23.51	28.79	109	37.25	52.57	23.0
	5S7.223.1Y			BL		TF07	0.08	29.32	35.93	136	46.23	65.51	24.6
	5S7.253.1Y			BL	BN	TF07	0.08	35.66	43.59	165	56.27	79.52	26.2
180°	5S6.964.1Y	BF	BH			TF05	0.07	6.60	8.19	31	10.57	15.06	11.5
	5S7.044.1Y		BH			TF07	0.08	10.83	13.21	50	17.17	24.30	13.1
	5S7.114.1Y		BH	BL		TF07	0.08	15.85	19.28	73	24.83	35.13	19.7
	5S7.184.1Y			BL		TF07	0.08	23.51	28.79	109	37.25	52.57	23.0
	5S7.224.1Y			BL		TF07	0.08	29.32	35.93	136	46.23	65.51	24.6
	5S7.254.1Y			BL	BN	TF07	0.08	35.66	43.59	165	56.27	79.52	26.2
270°	5S6.965.1Y	BF	BH			TF05	0.07	6.60	8.19	31	10.57	15.06	11.5
	5S7.045.1Y		BH			TF07	0.08	10.83	13.21	50	17.17	24.30	13.1
	5S7.115.1Y		BH	BL		TF07	0.08	15.85	19.28	73	24.83	35.13	19.7
	5S7.185.1Y			BL		TF07	0.08	23.51	28.79	109	37.25	52.57	23.0
	5S7.225.1Y			BL		TF07	0.08	29.32	35.93	136	46.23	65.51	24.6
	5S7.255.1Y			BL	BN	TF07	0.08	35.66	43.59	165	56.27	79.52	26.2
270°	5S6.966.1Y	BF	BH			TF05	0.07	6.60	8.19	31	10.57	15.06	11.5
	5S7.046.1Y		BH			TF07	0.08	10.83	13.21	50	17.17	24.30	13.1
	5S7.116.1Y		BH	BL		TF07	0.08	15.85	19.28	73	24.83	35.13	19.7
	5S7.186.1Y			BL		TF07	0.08	23.51	28.79	109	37.25	52.57	23.0
	5S7.226.1Y			BL		TF07	0.08	29.32	35.93	136	46.23	65.51	24.6
	5S7.256.1Y			BL	BN	TF07	0.08	35.66	43.59	165	56.27	79.52	26.2
360°	5S6.969.1Y	BF	BH			TF05	0.06	6.60	8.19	31	10.57	15.06	11.5
	5S7.049.1Y		BH			TF07	0.08	10.83	13.21	50	17.17	24.30	13.1
	5S7.119.1Y		BH	BL		TF07	0.08	15.85	19.28	73	24.83	35.13	19.7
	5S7.189.1Y			BL		TF07	0.08	23.51	28.79	109	37.25	52.57	23.0
	5S7.229.1Y			BL		TF07	0.08	29.32	35.93	136	46.23	65.51	24.6
	5S7.259.1Y			BL	BN	TF07	0.08	35.66	43.59	165	56.27	79.52	26.2



High impact tank cleaning machine

MeshClean

Series 5T2/5T3



- Gear-controlled
- Particularly powerful solid jets
- Operating pressures up to 217 psi possible

Recommended operating pressure:
75 psi

Temperature:
302°F,

Weight:
5T2/5T3 approx. 2.2 lb.

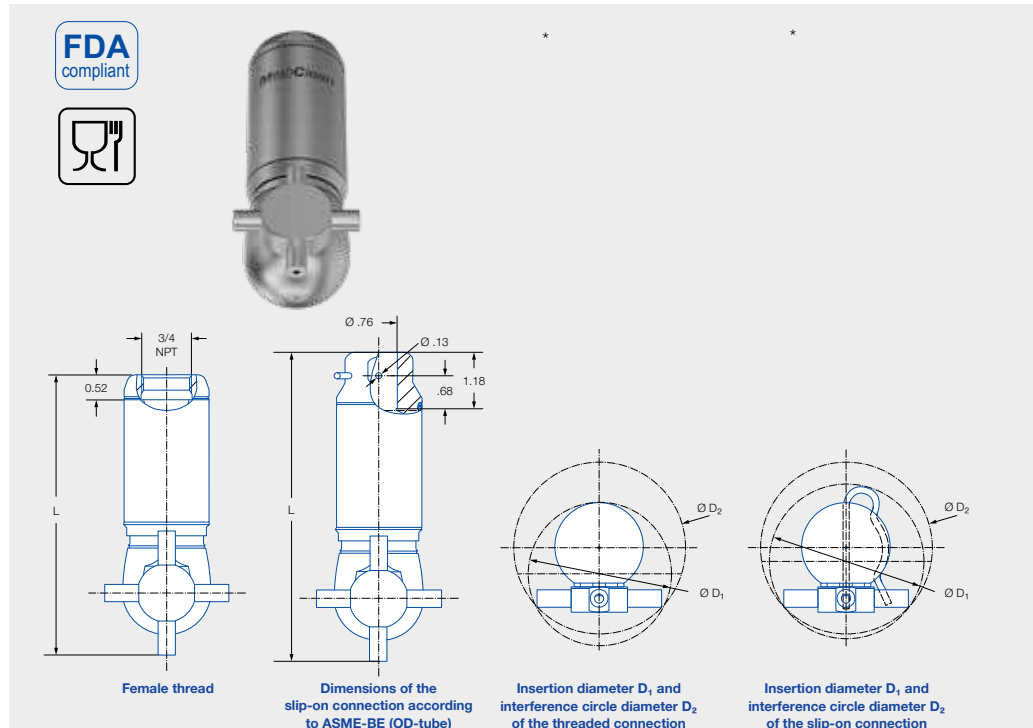
Materials:
Stainless steel 1.4404 (316 SS),
PTFE, PEEK, EPDM

Bearing:
Ball bearing

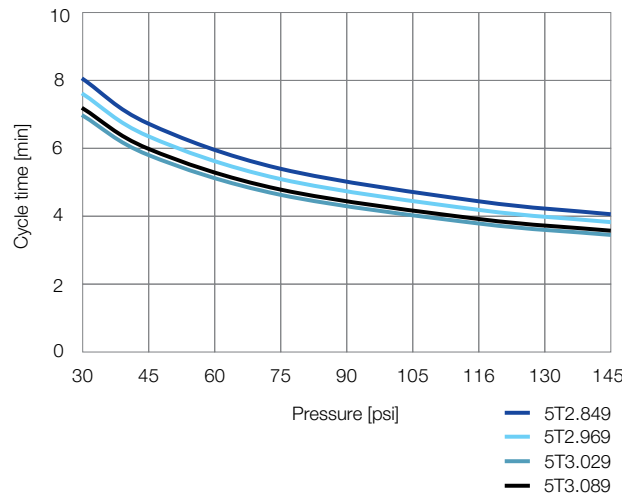
Required prefiltration:
Line filter with 0.2 mm/
80 mesh

Installation:
Operation in every direction is possible

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



Spray angle	Ordering no.			Flow Rate (Gallons Per Minute)				Dimensions [in]						Max. tank diameter [ft]
	Type	Code		p [psi] (p _{max} = 218 psi)				Female thread			Slip-on connection			
		3/4" NPT	3/4" Slip-on connection	30	75	5.0	at 75 psi [SCFM]	L	Ø D ₁	Ø D ₂	L	Ø D ₁	Ø D ₂	
360°	5T2.849.1Y	BL	TF07	3.43	0.79	20	0.7	5.59	2.68	3.23	6.18	3.03	3.23	37.7
	5T2.969.1Y	BL	TF07	6.60	1.57	40	1.4	5.59	2.68	3.23	6.18	3.03	3.23	39.4
	5T3.029.1Y	BL	TF07	9.25	2.17	55	1.9	5.59	2.68	3.23	6.18	3.03	3.23	41.0
	5T3.089.1Y	BL	TF07	13.21	3.11	79	2.8	5.83	2.91	3.58	6.42	3.23	3.58	42.7



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





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.

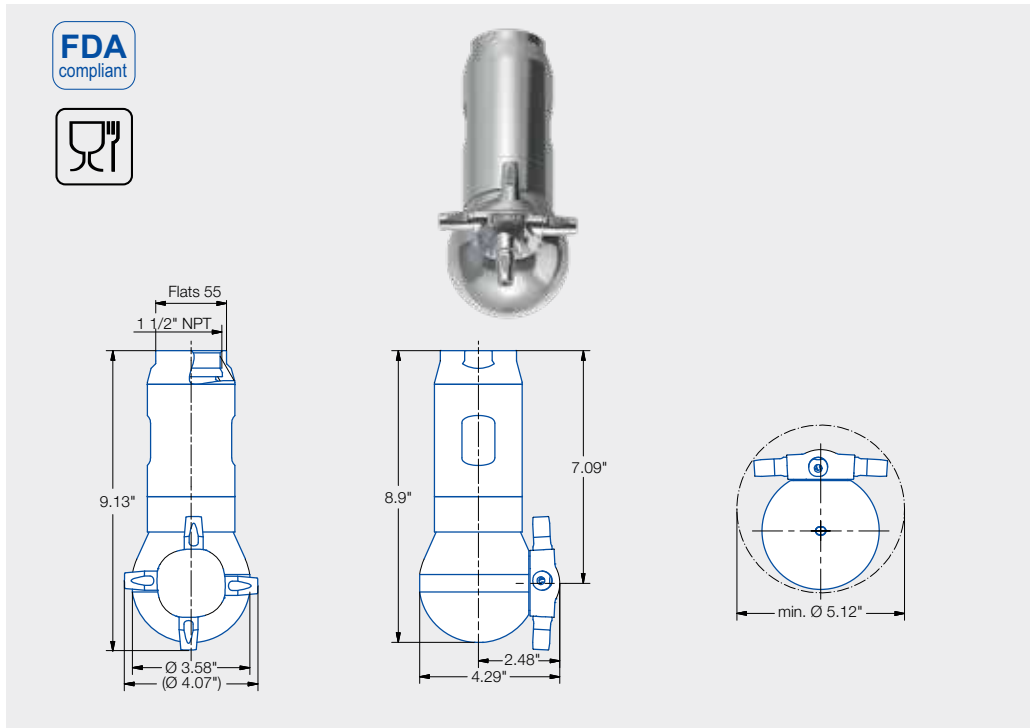
Materials:
AISI 316 L SS, AISI 632 SS, PTFE, PEEK, Zirconium oxide, EPDM, 32 RA surface finish is included with every material



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

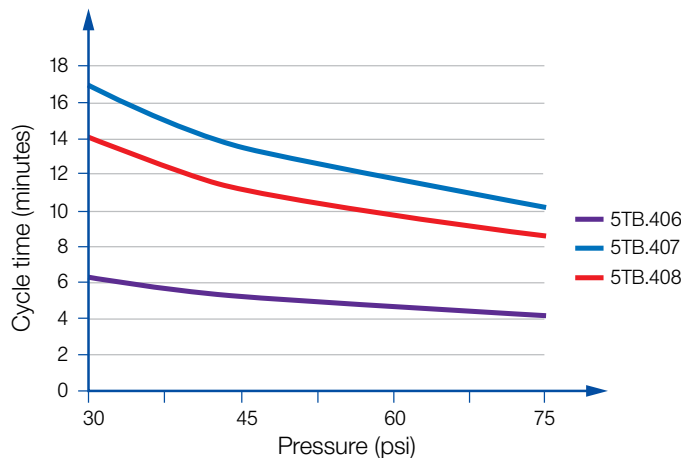


Spray angle 	Ordering no.	Free Passage (in.)	Number, Ø Nozzles [mm]	Flow Rate (Gallons Per Minute)				Max pressure (psi)	Max. tank diameter [ft]	
				liters per minute 2 bar	30 psi	40 psi	75 psi			145 psi
	5TB. 406. 1Y. BS	.236	4 x 6.0	107	29	33	45	63	362	46
	5TB. 407. 1Y. BS	.236	4 x 7.0	132	35	41	56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

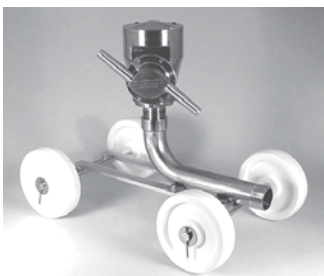
Installation:
Operates in every direction

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

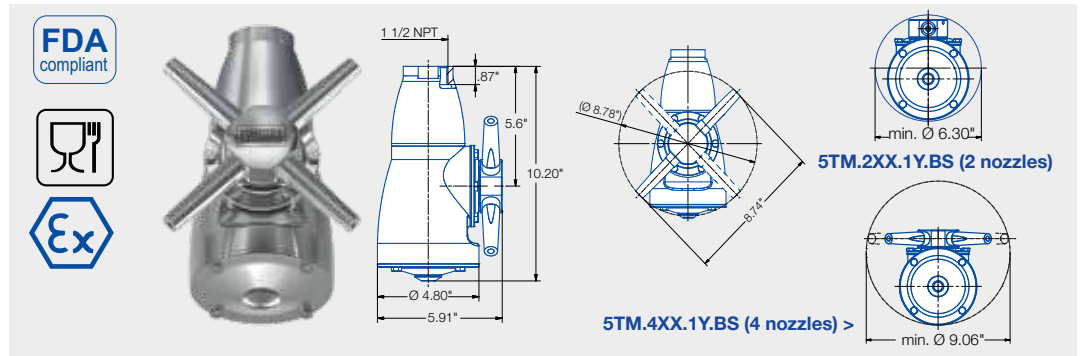
Rotation monitoring sensor:
Sensor compatible,
Info: see page 37



Our special mounting bracket provides the ability for the 5TM to reach the far ends of long horizontal tanks/ tankers. Mounting bracket part number: **099.164.17.00.0**

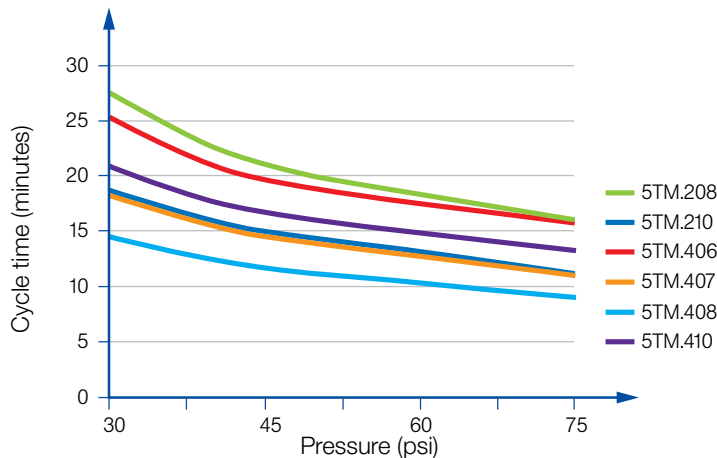


Portable cart for easier transporting of your 5TM from tank to tank. The cart part number is **M20.000.17.BR**.
For use with "BR" connection only.



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



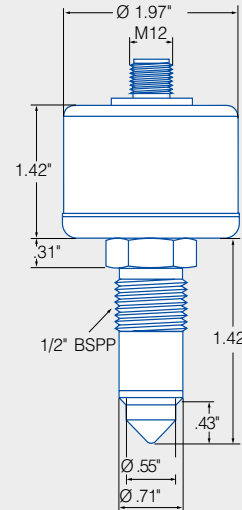
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.





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:
 $U_b = 24\text{ V} \pm 20\%$
 (18 to 32 VDC)
- Power requirements:
 $< 20\text{ mA}$
- 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 $+212^\circ\text{F}$

Materials

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

Operating principle

- Capacitive

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 no.
Rotation monitoring sensor with weld-in sleeve	050.040.00.00.0
Cable set for first-time operation	050.040.00.00.01.0

* Software download (free of charge): www.lechler.com/software/rotationcontrolsystem

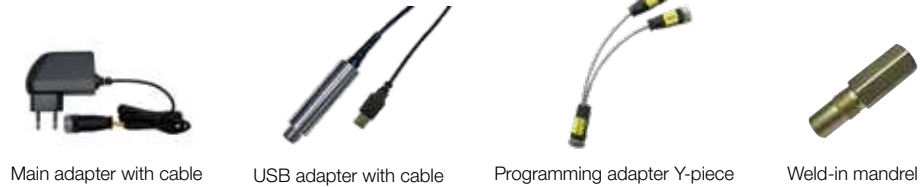


Rotation Monitoring Sensor

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



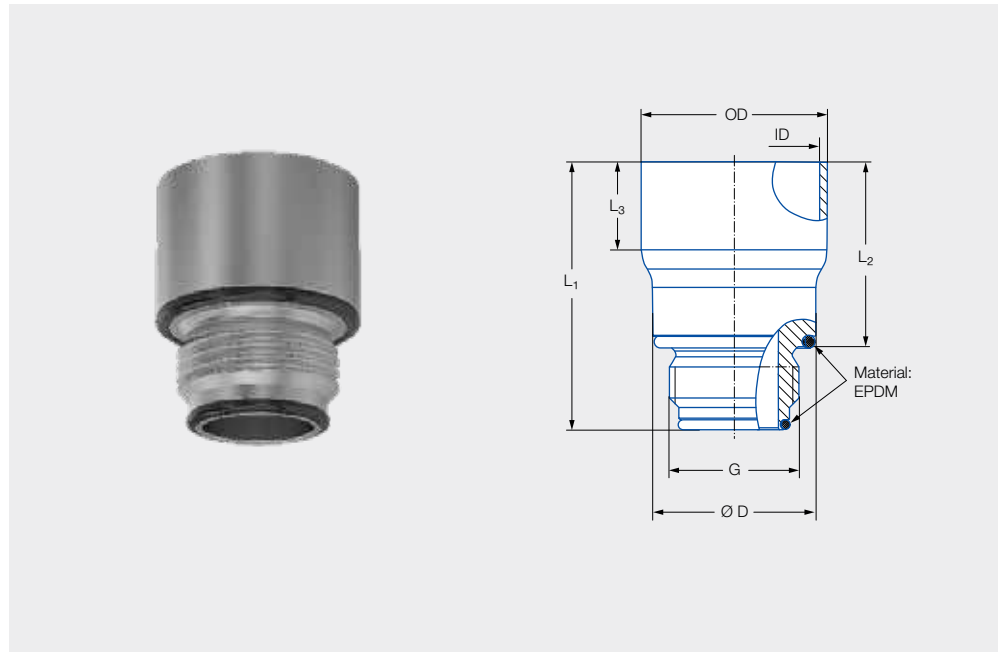
Figure 4



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



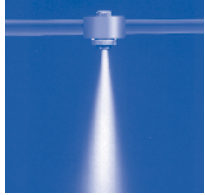
Installation

Ordering no.	Connection thread BSPP male	Dimensions [in]				Dimensions OD = Outer diameter ID = Inner diameter [in]		Pipe standard
		L ₁	L ₂	L ₃	Ø D	OD	ID	
05C.190.1Y.AE.16	3/8	1.89	1.41	.71	.85	.75	.62	DIN EN 10357 series D
05C.230.1Y.AE.15	3/8	1.89	1.41	.71	.85	.91	.79	DIN EN 10357 series A
05C.250.1Y.AE.12	3/8	1.89	1.41	.67	.85	.98	22,6	DIN EN 10357 series D
05C.250.1Y.AG.12	1/2	2.20	1.54	.71	1.22	.98	.89	DIN EN 10357 series D
05C.350.1Y.AK.15	3/4	2.17	1.49	.83	1.32	1.38	1.26	DIN EN 10357 series A
05C.380.1Y.AK.12	3/4	2.17	1.49	.71	1.32	1.50	1.40	ISO 2037
05C.381.1Y.AK.15	3/4	2.17	1.49	.71	1.32	1.50	1.39	DIN EN 10357 series D
05C.381.1Y.AM.16	1	2.32	1.54	.91	1.59	1.50	1.37	DIN EN 10357 series D
05C.508.1Y.AP.15	1 1/4	2.24	1.50	.87	1.94	2.00	1.88	DIN EN 10357 series D
05C.635.1Y.AR.16	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	05C.000.E9.AE.00
1/2	05C.000.E9.AG.00
3/4	05C.000.E9.AK.00
1	05C.000.E9.AM.00
1 1/4	05C.000.E9.AP.00
1 1/2	05C.000.E9.AR.00

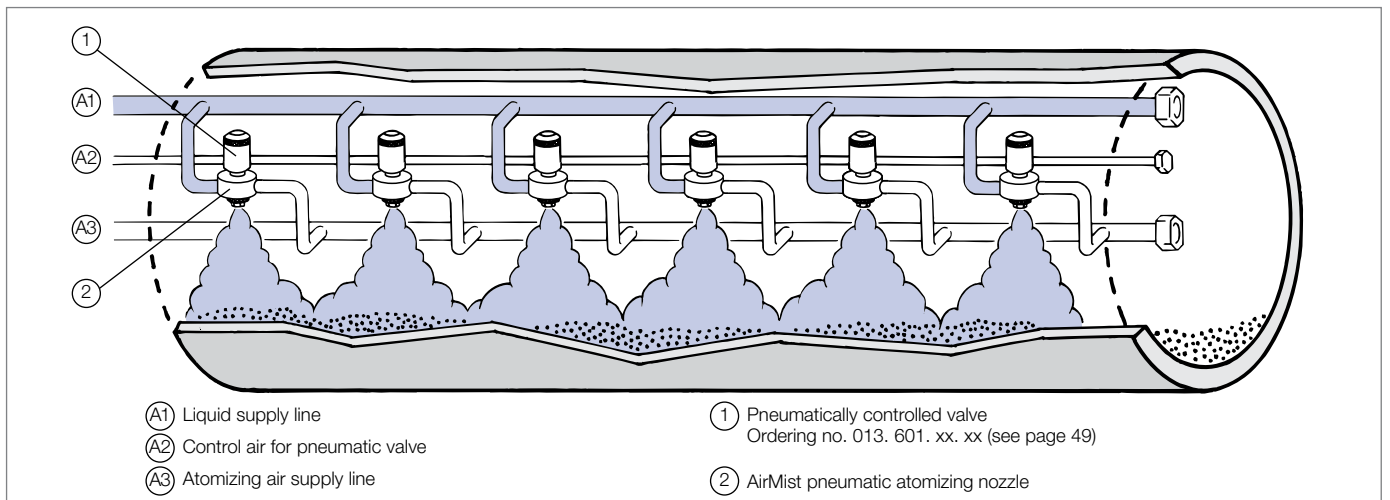
O-ring set is also available on request in FKM.



Pneumatic atomizing nozzles, Flat fan, pressure principle, internal mixing Series 136.4

Spray angle	Ordering no.		Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure Air Flow SCFM (Standard Cubic Feet Per Minute)												Spray Dimensions									
	Type	Mat. no.		10 psi			20 psi			40 psi			60 psi			Air psi	Liq. psi	D1 (in.)	D2 (in.)						
				Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM										
	316L SS 1Y	303 SS 16																							
60°	136. 425. xx. B2	○	○	.020	12	1.7	.71	20	2.5	1.0	35	3.5	1.5	35	4.3	1.5	17	10	6	8					
					17	1.5	.94	26	2.3	1.2	38	3.4	1.6	41	4.1	1.7	32	20	6	10					
					23	1.2	1.1	32	2.1	1.4	44	3.2	1.8	46	4.0	1.9	44	30	7	10					
					29	1.1	1.4	38	1.9	1.6	49	3.1	2.0	52	3.8	2.1	49	40	8	13					
					35	.85	1.5	44	1.7	1.8	55	2.9	2.2	58	3.7	2.2									
					41	.69	1.7	49	1.5	2.0	61	2.7	2.4	64	3.5	2.4									
					44	.58	1.8	55	1.3	2.2	67	2.6	2.5	70	3.4	2.6									
								58	1.3	2.3	73	2.4	2.7	75	3.2	2.8									
								64	1.1	2.5	78	2.3	2.9	81	3.1	3.0									
								70	.95	2.6	84	2.1	3.1	87	3.0	3.2									
								75	.74	2.8	87	2.1	3.2												
								81	.58	3.0															
								87	.42	3.2															
					60°	136. 452. xx. B2	○	○	.059	15	5.0	2.3	26	8.2	3.1	46	13	4.5	55	19	4.8	15	10	5	7
										20	2.3	3.4	29	6.7	3.7	52	10	5.5	61	15	5.7	26	20	6	9
										26	2.0	4.1	32	5.3	4.2	58	8.3	6.6	67	13	6.6	38	30	6	10
										32	1.1	4.9	35	4.1	4.7	64	6.3	7.6	73	11	7.7	52	40	7	11
										38	.26	5.8	38	3.3	5.2	70	4.7	8.5	78	8.9	8.7				
41	.03	6.1	41	2.7						5.7	75	3.5	9.4	84	7.3	9.7									
											81	2.8	10	87	6.4	10									
											87	2.3	11												
80°	136. 433. xx. B2	○	○	.016						15	3.1	1.2	26	4.8	1.6	44	8.2	2.2	55	9.9	2.6	20	10	6	8
										17	2.1	1.4	29	4.0	1.9	49	6.7	2.6	61	8.6	2.9	32	20	7	10
					20	1.4	1.6	32	3.2	2.1	55	5.4	3.0	67	7.3	3.4	44	30	8	12					
					23	.98	1.9	35	2.6	2.4	61	4.3	3.5	73	6.2	3.8	55	60	12	19					
					38	2.0	2.5	67	3.3	3.9	78	5.1	4.2												
								41	1.6	2.8	73	2.5	4.3	84	4.2	4.6									
								44	1.2	2.9	78	1.7	4.7	87	3.8	4.9									

Example Type + Material no. (xx) = Ordering no.
for ordering: 136. 425. xx. B2 + 1Y = 136. 425. 1Y. B2



Cereal dampening in a mixing drum

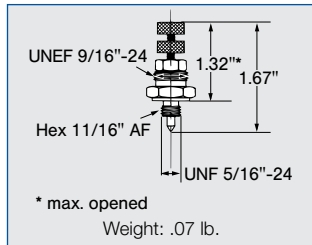


Accessories for pneumatic atomizing nozzles Series 136

Regulating device and shut-off needle:

Shuts off flow and controls liquid supply — manually operated

1A

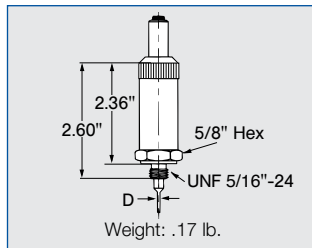


Ordering no.		For all 136 series nozzles
Assembly part no.	Mat. no.	
	303 SS 16	
015. 600	○	

Regulating device with quick-cleaning needle:

Combines orifice cleaning with liquid flow control — manually operated

1B

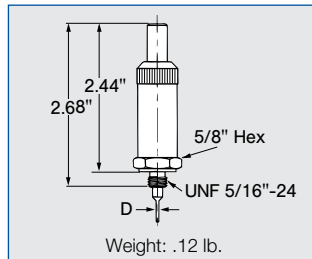


Ordering no.		Use the 6th digit to determine appropriate accessory Example: 136.414.1Y.B2	Needle diameter D (in.)	
Assembly part no.	Mat. no.			
	303 SS 16	Brass 35		
013. 601. xx. 30	○	○	136. xx1. xx. B2	.085
013. 602. xx. 30	○	○	136. xx2. xx. B2	.048
013. 603. xx. 30	○	○	136. xx3. xx. B2	.034
013. 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

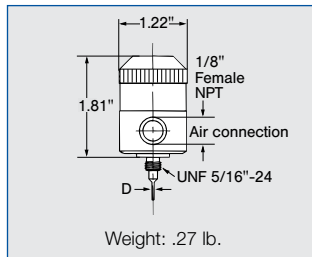


013. 601. xx. 20	○	○	136. xx1. xx. B2	.085
013. 602. xx. 20	○	○	136. xx2. xx. B2	.048
013. 603. xx. 20	○	○	136. xx3. xx. B2	.034
013. 604. xx. 20	○	○	136. xx4. xx. B2	.024
013. 605. xx. 20	○	○	136. xx5. xx. B2	.016
013. 606. xx. 20	○	○	136. xx6. xx. B2	.012

Pneumatically controlled valve:

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

1D



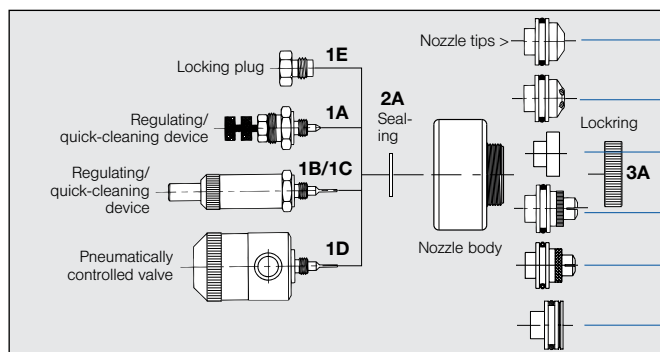
013. 601. xx. 10	○	○	136. xx1. xx. B2	.085
013. 602. xx. 10	○	○	136. xx2. xx. B2	.048
013. 603. xx. 10	○	○	136. xx3. xx. B2	.034
013. 604. xx. 10	○	○	136. xx4. xx. B2	.024
013. 605. xx. 10	○	○	136. xx5. xx. B2	.016
013. 606. xx. 10	○	○	136. xx6. xx. B2	.012

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

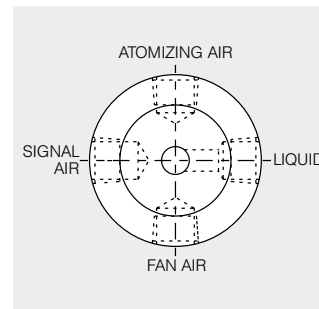
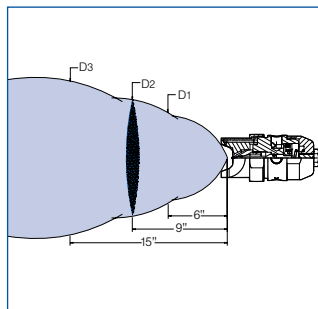
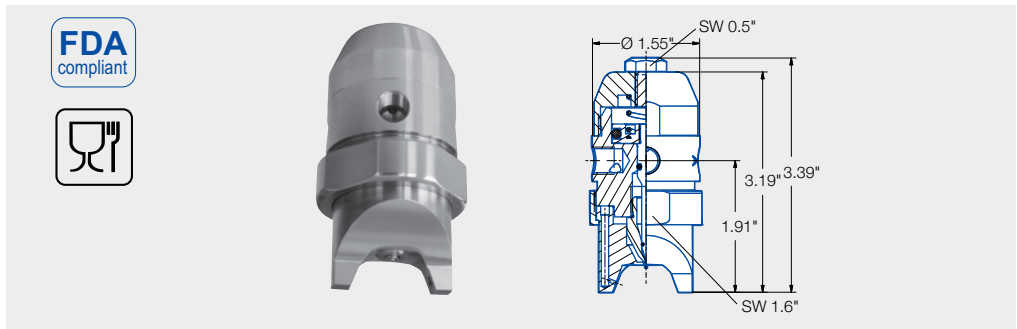


Versatile design with built-in pneumatic needle valve for liquid flow control and automatic clean-out. Three nozzle body configurations offer flexible tailoring to your specific application needs. Models feature individual controls for on-off operation, atomizing air, and fan air, allowing adjustments 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.

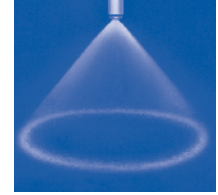
Signal Air (P)

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.





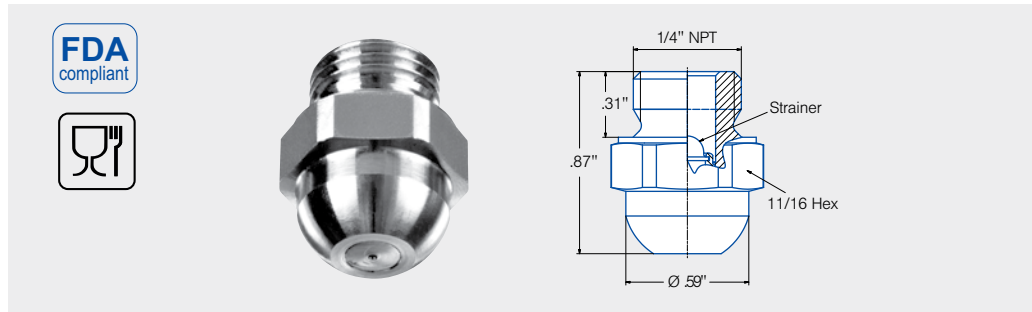
Axial-flow hollow cone nozzles Series 220





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				liters per minute								
		430F SS: 11	316L SS: 1Y					Male 1/4" NPT	30 psi	45 psi	5 bar	75 psi	100 psi	150 psi		
60°	220. 004	○	○	BC	.004	.004	.002	-	-	.013	.003	.004	.005	.007	4	100
	220. 014	○	○	BC	.006	.006	.002	-	.004	.019	.005	.006	.007	.010	4	100
	220. 054	○	○	BC	.008	.006	.002	.004	.006	.027	.007	.008	.010	.014	6	140
80°	220. 085	○	○	BC	.010	.010	.004	.007	.008	.040	.011	.012	.015	.021	6	140
	220. 125	○	○	BC	.014	.014	.004	.010	.013	.062	.016	.019	.023	.033	6	140
	220. 145	○	○	BC	.016	.016	.004	.014	.017	.082	.022	.026	.031	.043	6	140
	220. 165	○	○	BC	.018	.018	.004	.017	.021	.103	.027	.032	.039	.054	6	140
	220. 185	○	○	BC	.022	.014	.008	.022	.027	.130	.034	.041	.049	.069	6	140
	220. 205	○	○	BC	.024	.014	.008	.028	.034	.168	.044	.053	.063	.089	6	140
	220. 245	○	○	BC	.028	.020	.008	.044	.053	.261	.069	.082	.097	.138	6	140
	220. 285	○	○	BC	.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.

*** Materials**

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

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



Axial-flow full cone nozzles Series 490 / 491



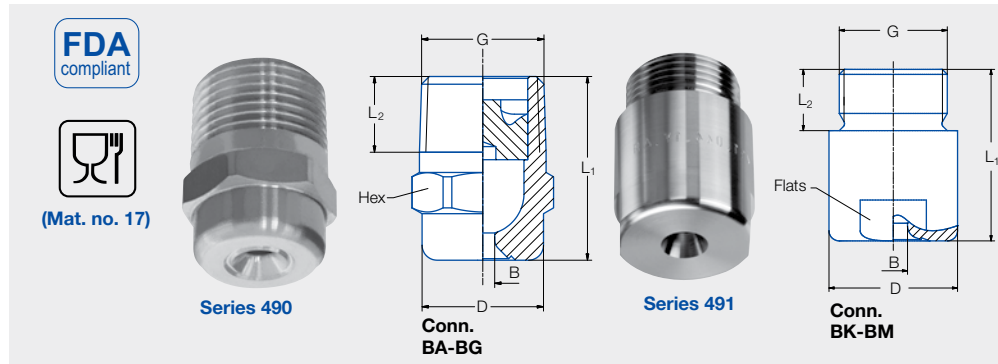
Non-clogging nozzle design. Stable spray angle. Particularly even liquid distribution.

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.)				Hex	Weight Brass
		L ₁	L ₂	D	Hex		
BA	1/8 NPT	0.71	0.26	0.39	7/16	.03	
BC	1/4 NPT	0.87	0.39	0.51	9/16	.04	
BE	3/8 NPT	0.96	0.39	0.63	11/16	.07	
BE	3/8 NPT	1.18	0.39	0.63	11/16	.11	
BG	1/2 NPT	1.28	0.51	0.83	14/16	.13	
BG	1/2 NPT	1.71	0.51	0.83	14/16	.19	
BK	3/4 NPT	1.65	0.59	1.26	1-1/16	.42	
BK	3/4 NPT	1.97	0.59	1.26	1-1/16	.44	
BM	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	2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	H=8"	H=20"
		316 L	Brass	Male NPT																			
45°	490. 403	○	○	BA	-	-	-	-	-	-	.049	.049	.17	.23	1.00	0.27	.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	○	○	BA	-	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	○	○	-	-	-	-	-	BM	-	.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	1/8"	1/4"	3/8"	1/2"	3/4"	1"	30 psi						40 psi	60 psi	80 psi	100 psi	150 psi				
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	-	.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	.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	1.82	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	○	○	-	-	BE	-	-	-	.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: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





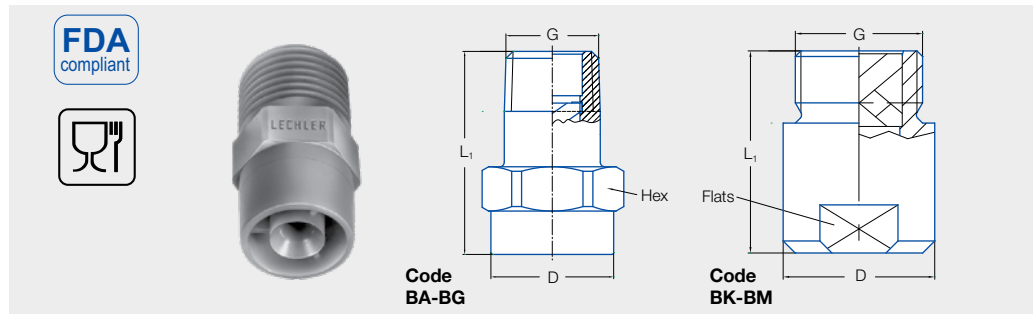
Axial-flow full cone nozzles Series 460 / 461



**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 ₁	D	Hex/Flats	
BA	1/8	.71	.51	9/16	.03
BC	1/4	.87	.51	9.16	.04
BE	3/8	1.18	.63	11/16	.07
BG	1/2	1.65	.83	7/8	.15
BK	3/4	1.97	1.09	1-1/8	.38
BM	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		30 psi	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
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	○	-	-	-	-	-	-	-	.229	.193	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	9	34
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	15	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	BK	-	.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	BK	-	.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

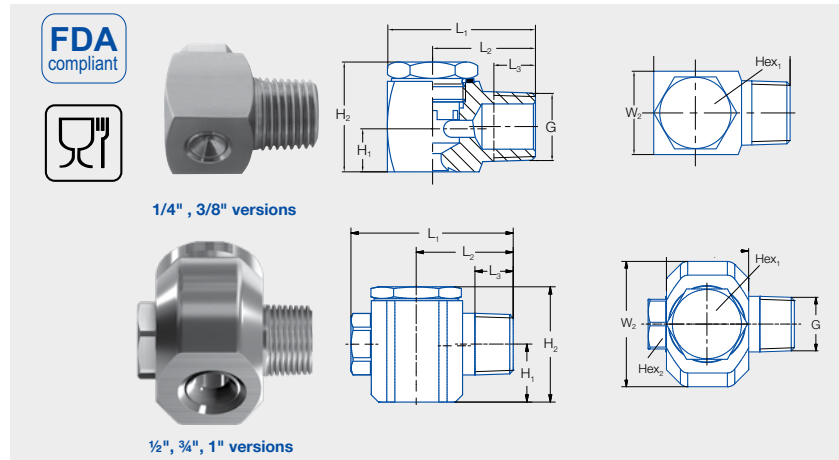
Series 422 / 423



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 ₁	L ₂	L ₃	H ₁	H ₂	W ₁	W ₂	Hex ₁	Hex ₂	
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	Ordering no.								Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)					Spray Diam. D (in.) @ 40 psi				
		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	30	1/4"	3/8"	1/2"	3/4"	1"												1 1/4"
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	○	○	-	-	-	-	-	-	-	-	-	49.0	69.0	315	98	120	139	155	15	38	
423.446	○	○	-	-	-	-	-	-	-	-	-	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 Type + Material no. + Conn. = Ordering no.
 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"
		ASIS 316L 1Y	Brass 30	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



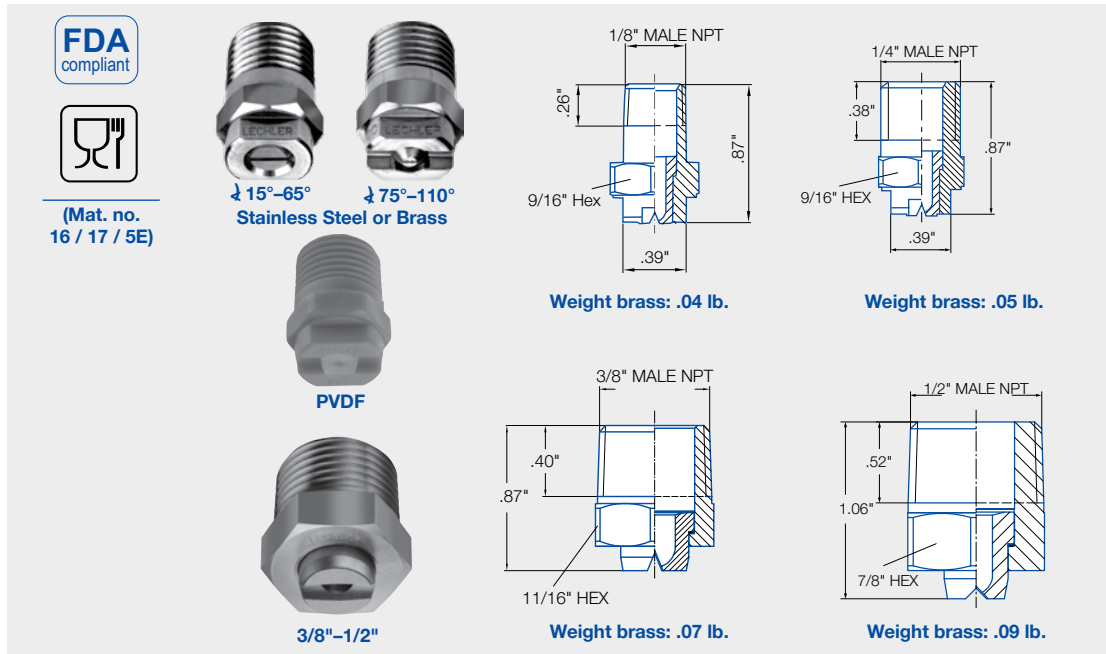
Flat fan nozzles Series 632 / 633



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.				Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)								Spray Coverage @ 30 psi				
		Material no.						Male NPT				liters per minute				H=10"	H=20"			
		303 SS 16 ¹⁾	316 SS 17 ²⁾	Brass 30	PVDF 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: **632. 402 + 16 + BA = 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 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.						liters per minute						H=10"	H=20"	
		303 SS 16	316 SS 17 ¹⁾	Brass 30	PVDF 5E			10 psi	20 psi	2 bar	40 psi	60 psi	80 psi			100 psi
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	13
	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.





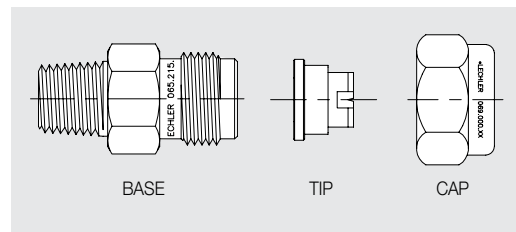
Flat fan nozzles for retaining nut Series 652



Spray angle 	Ordering no.					Equivalent (in.) Orifice diam.	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 ¹⁾	Brass 30	PVDF 5E											
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:
1/4"	11/16 x 16	065. 215. XX. 10	17 316 SS
3/8"	11/16 x 16	065. 211. XX. 10	
1/4"	3/8 BSPP	065. 215. XX. 11	30 Brass
3/8"	3/8 BSPP	065. 215. XX. 12	
Caps			Other materials available.
To fit 11/16x16		069. 000. XX. 00	
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



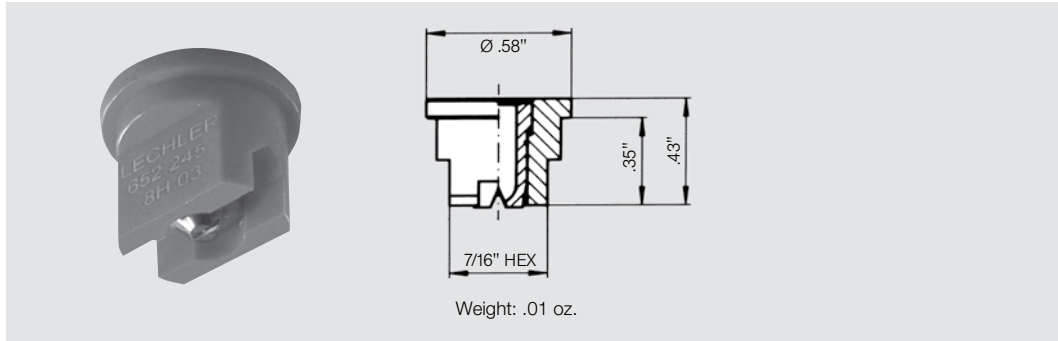
Precision standard design axial flat fan nozzle tips. Low volume, stable spray angles at a wide range of pressures. For use with nozzle base and cap.

Applications:

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

Material:

POM base with 303 SS insert
 POM base and insert

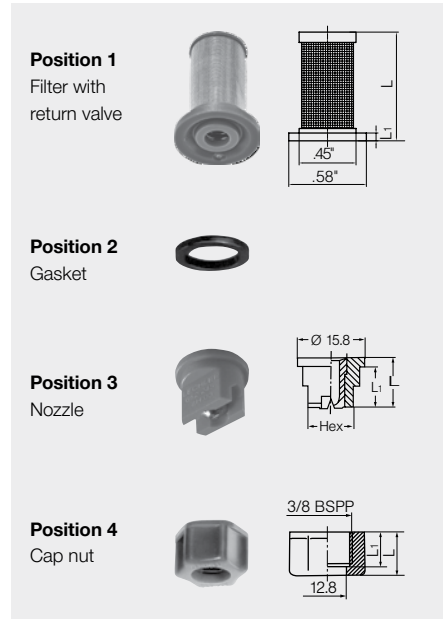


Spray angle	Ordering no.		Color	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute)				Spray Coverage @ 30 psi	
	Type	Material no.				15 psi	liters per minute 2 bar	45 psi	75 psi	H=10"	H=20"
75°	652. 145. xx. 03	○ ○	Green	.006	.012	.011	.05	.016	.021	11	22
	652. 165. xx. 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.]			** (in.)
					L	L ₁	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	-

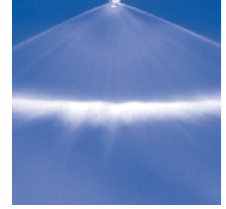
* Housing POM, Nozzle insert 303 SS
 ** Size of mesh





Tongue-type nozzles for retaining nut

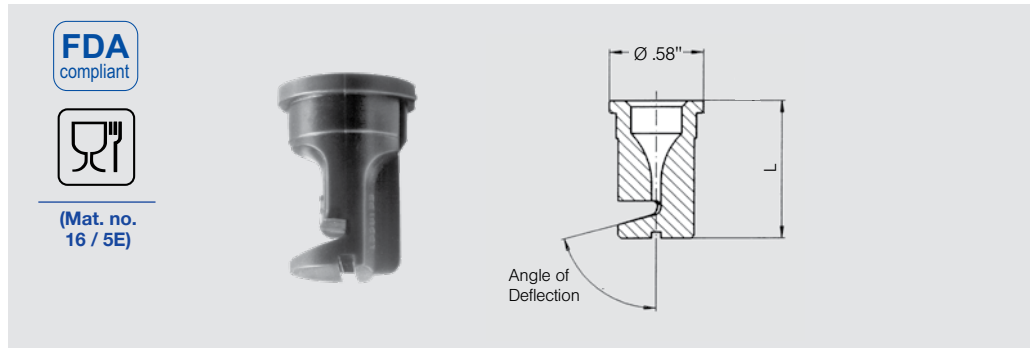
Series 684 / 688/ 689




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 	
		Type	Material no.			10 psi	20 psi	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 			
		Type	Material no.			Connection	10 psi	20 psi	2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	L		Hex	H=10"	H=20"	
			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	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: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





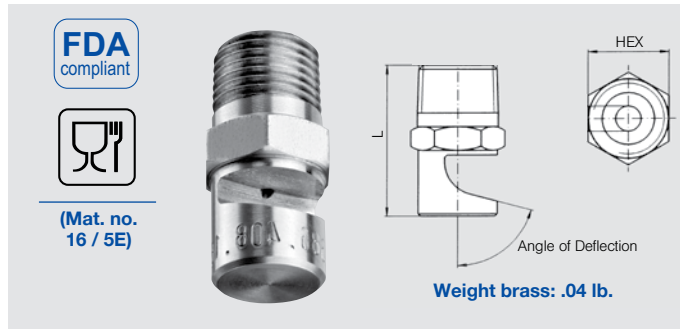
Tongue-type nozzles Series 686



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.



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	PVD 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)

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



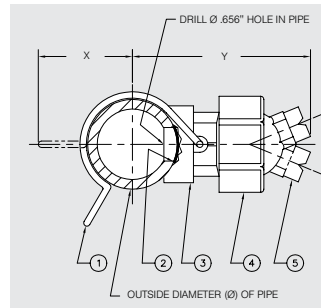
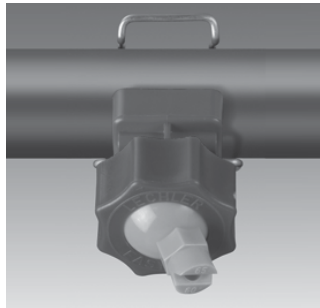
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$



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.

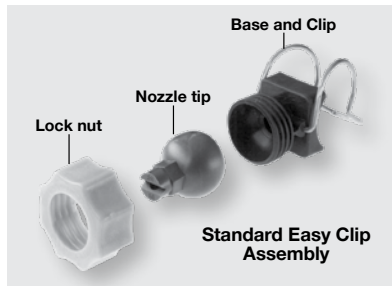


- 1 Spring Clip (stainless steel)
- 2 O-ring (EPDM-standard, Viton-special order)
- 3 Body base (Glass reinforced polypropylene)
- 4 Lock nut (Glass reinforced polypropylene)
- 5 Nozzle tip (Talc composition polypropylene)

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: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$



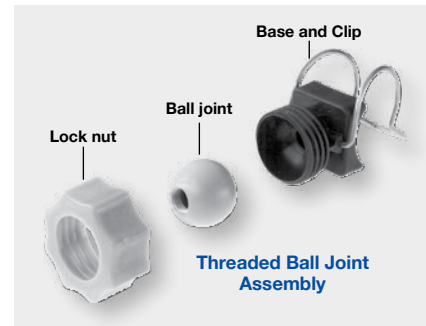
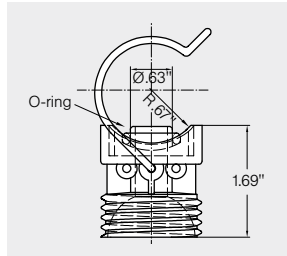


Easy-Clip nozzle system



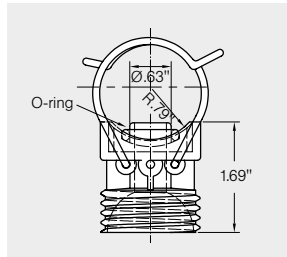
Single clip with o-ring

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



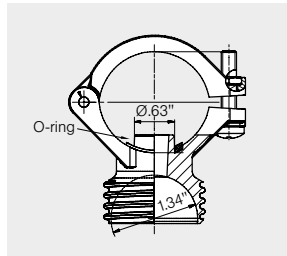
Double clip with o-ring

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



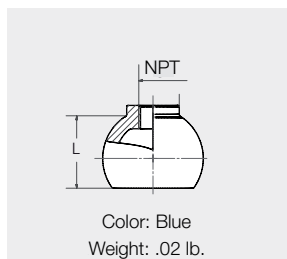
Replacement pipe o-ring

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



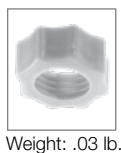
Adapter ball joint

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



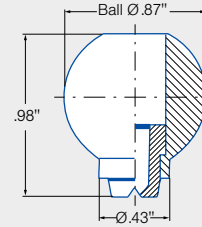
Swivelling nozzle for precise adjusting of jet direction. No gaskets necessary. Long, unproblematic service life.

Applications:

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



(Mat. no. 16 / 17)



All-around swivelling 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.				liters per minute											
		303 SS 16	Brass 30			10 psi	20 psi	2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi			
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.


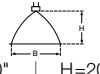
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$





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 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	 H=10" H=20"			
		303 SS 16	Brass 30															
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

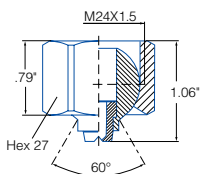
Retaining nut

092. 020. 16. 00. 02

Material: 303 SS

092. 020. 30. 00. 02

Material: Brass



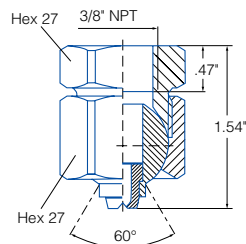
Socket

092. 020. 16. BF. 03

Material: 303 SS

092. 020. 30. BF. 03

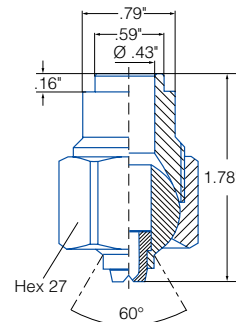
Material: Brass



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*

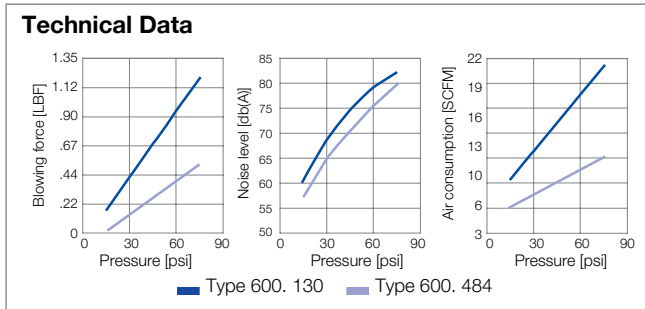
* Complies with OSHA requirements on noise level

600.130 (POM or PP)

600.484.56 (POM)

1/4" Male NPT
3.54"
.98"
.19"
2.4"
1.85"

.56"
.98"
.35"
.20"
3.54"
2.4"
.98"



1/4 BSPP

M 12 x 1.25

**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
	PP Natural S2	POM 56										
600.130	○	○	BC -	-	6.5	10.8	14.9	19.1	.05	75 psi	120	
600.130	-	○	- 01	Hose nipple (5/16" barb) Steel Extension (L=3.3")	6.5	10.8	14.9	19.1	.05	75 psi	120	
600.484	-	○	BC -	-	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.

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



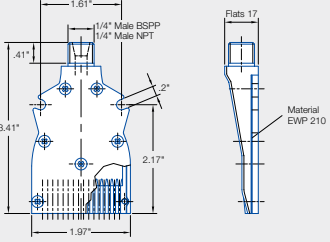




(Mat. no. 1Y)




600.283.42 (Aluminum)

Complies with OSHA requirements on noise level only

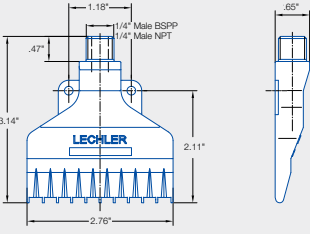







600.493.1Y (Stainless steel 316L SS)

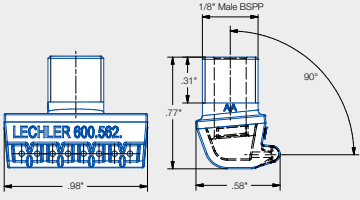
Complies with OSHA requirements



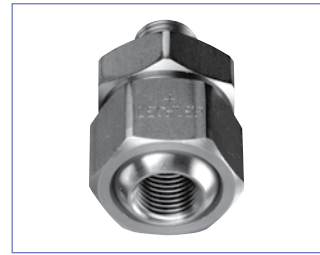
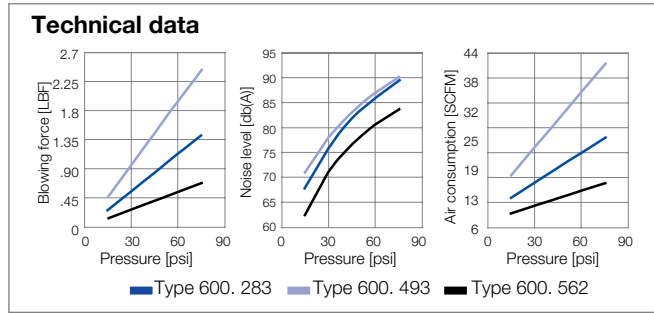


600.562.1Y.10 (Stainless steel 316L SS)

Complies with OSHA requirements



Weight: .6oz Tmax: 1022 °F



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	-	○	- BC	Aluminum flat WHISPERBLAST	8.5	13.5	18.6	23.8	.14	120 psi	400
600.493	○	-	- 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 for ordering: Type + Material no. + Conn. = Ordering no.
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.

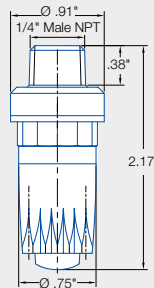
Applications:

Targeted blowing out and blowing off with compressed air guns.

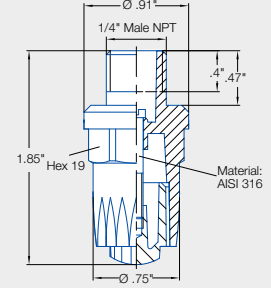
Reduction of noise level of up to 12 dB (A).



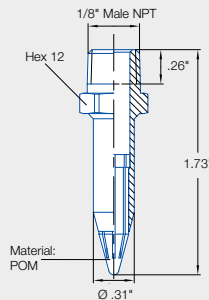
600.326.5K (ABS)



600.326.3W (Zinc)



600.388.30 (Brass, POM)



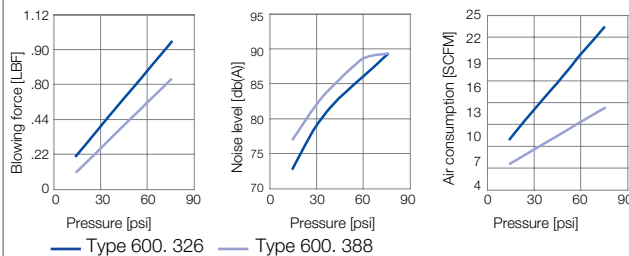
Mini-round jet nozzle. Compact design.

Applications:

Especially for blowing out pocket holes.



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.				Male NPT								
	Brass 30	ABS 5K	Zinc 3W		1/8"	1/4"	15 psi	30 psi	45 psi				60 psi
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

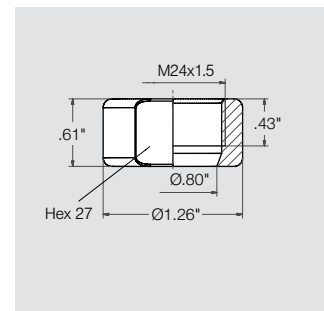
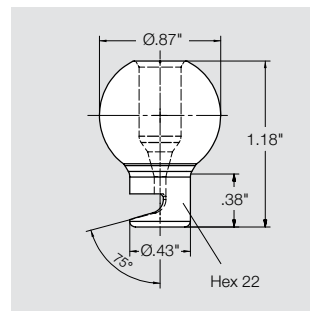
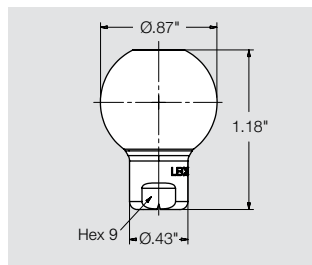
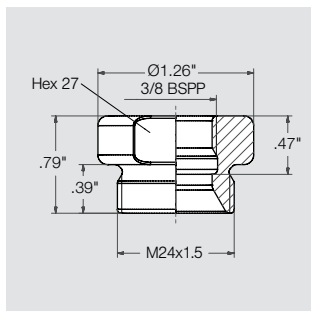
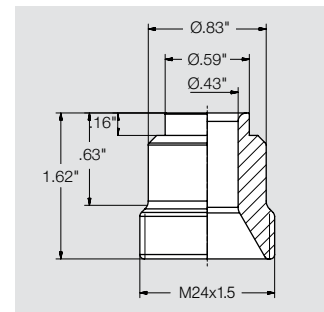
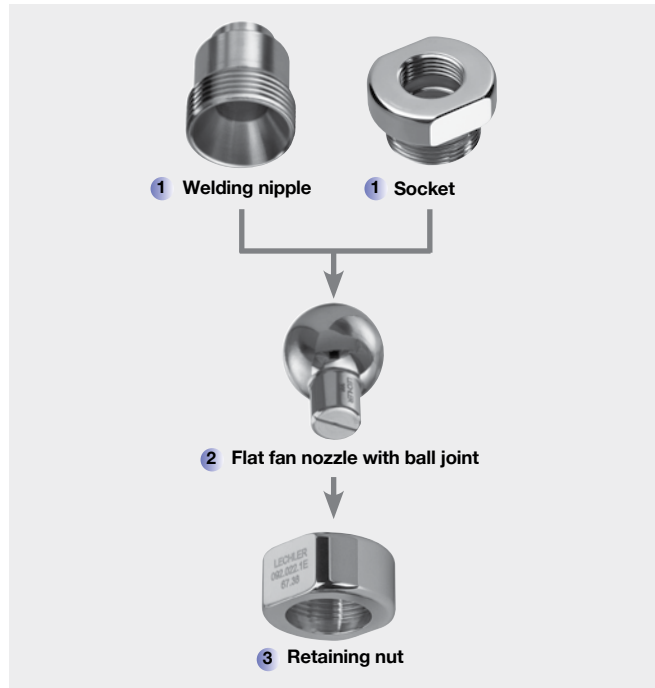


Features

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.

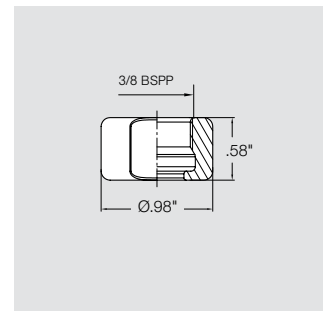
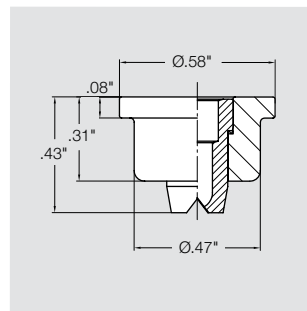
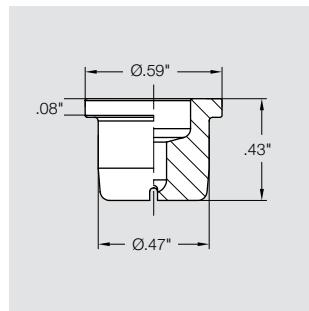
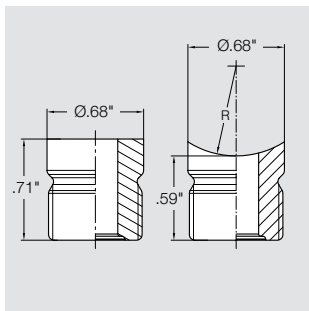
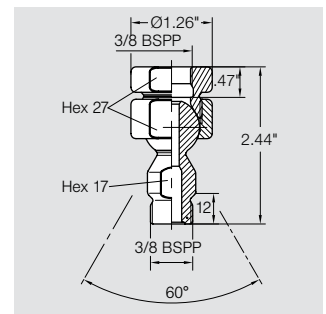
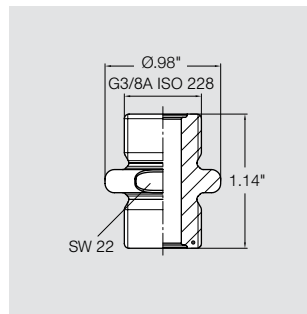
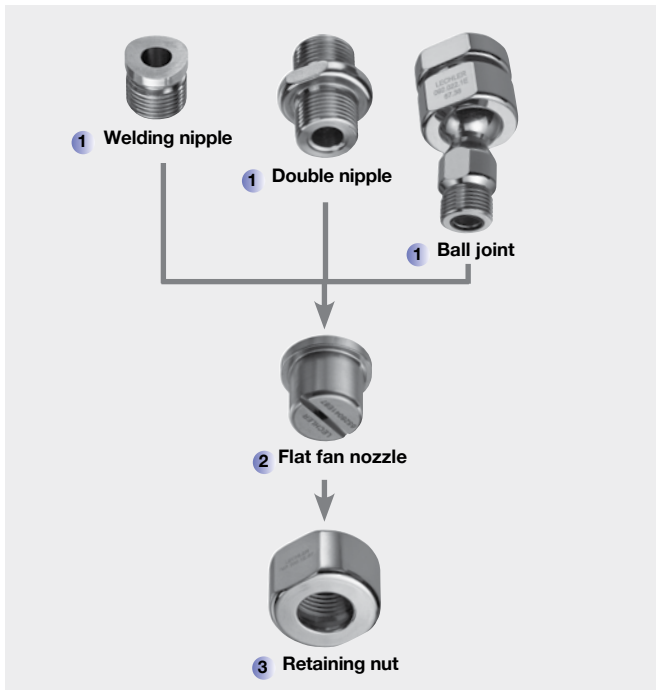
	Ordering no.	GPM @ 40 psi
45°	676. 641. 17. 67	1.24
	676. 402. 17. 67	.31
	676. 562. 17. 67	.78
	676. 722. 17. 67	1.95
	676. 802. 17. 67	3.1
45°	676. 763. 17. 67	2.48
	676. 883. 17. 67	4.96
60°	676. 514. 17. 67	.59
	676. 764. 17. 67	2.48
90°	676. 366. 17. 67	.19
	676. 646. 17. 67	1.24
120°	676. 647.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

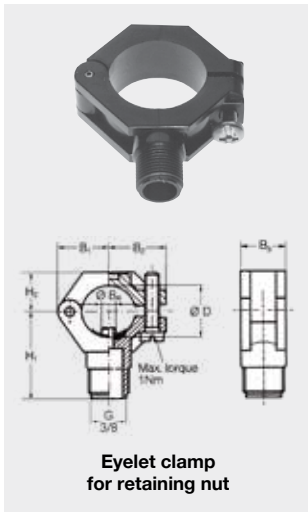
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$



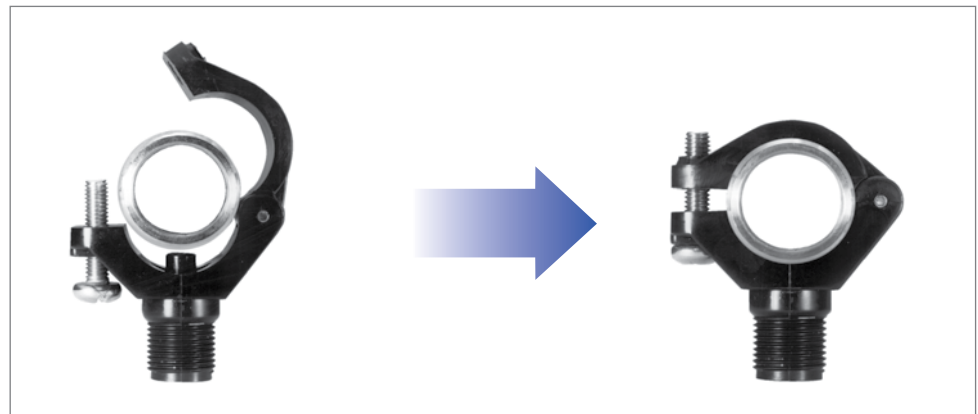


Accessories

Eyelet clamps / Retaining nuts

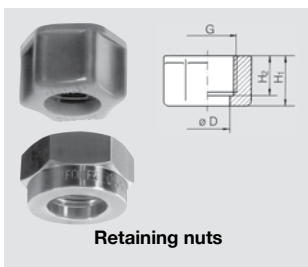


For series	Ordering no.				Screw (Material)	Dimensions (in.)							Weight (Nylon)	
	Type	Material no.				Pipe ϕ	Drill hole diameter	B_R	B_1	B_2	B_3	H_1		H_2
		51	53	5E										
2TR 302 468 652 679 684	090.053	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	304 SS	$\frac{3}{8}$ "	$\frac{1}{4}$ "	.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



Example **Type** + **Material no.** = **Ordering no.**
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 16	316SS 17	316L-SS 1Y	Brass 30	POM 56						
2TR 468 548*	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	.13

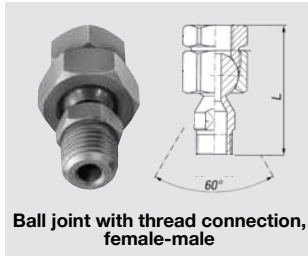
Example **Type** + **Material no.** = **Ordering no.**
for ordering: 065.200 + 17 = 065.200.17



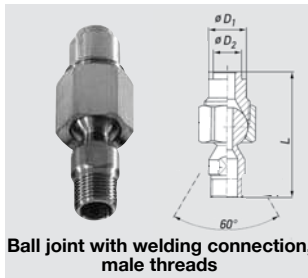
Accessories

Ball joints

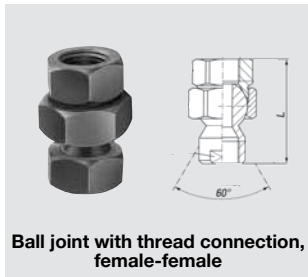
Ball joints



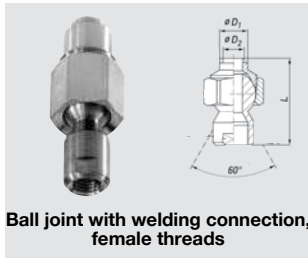
Ball joint with thread connection, female-male



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 ₁	D ₂	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

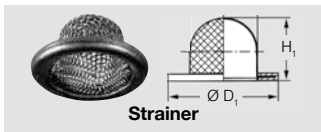
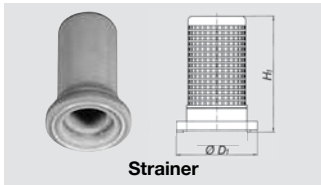
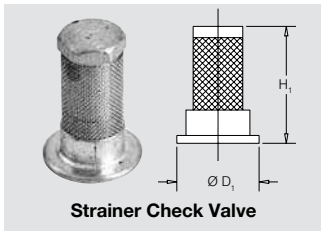


Strainers



For nozzle size	Ordering no.	Material	Strainer mesh	Color	Dimensions (in.)				Weight (lb.)
					H ₁	H ₂	D ₁	D ₂	
xxx.32x- xxx.44x	065. 268. 7J	Santoprene	50	Blue	.85	.10	.71	.44	.004
xxx.48x- xxx.56x	065. 269. 7J	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 ₁	D ₁	
		Monel 26	Brass 30	POM 56							
With check valve	065. 260	-	○	-	-	8	50	.011	.81	.58	.004
	065. 265	-	-	○	Blue	8	50	.011	.81	.58	.004
	065. 266	-	-	○	Red	8	24	.026	.81	.58	.004
No check valve	065. 250	-	○	-	-	-	50	.011	.85	-	.004
	065. 257	-	-	○	Blue	-	50	.011	.81	.58	.004
	065. 256	-	-	○	Red	-	24	.026	.81	.58	.004
No check valve	065. 252	○	-	-	-	-	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

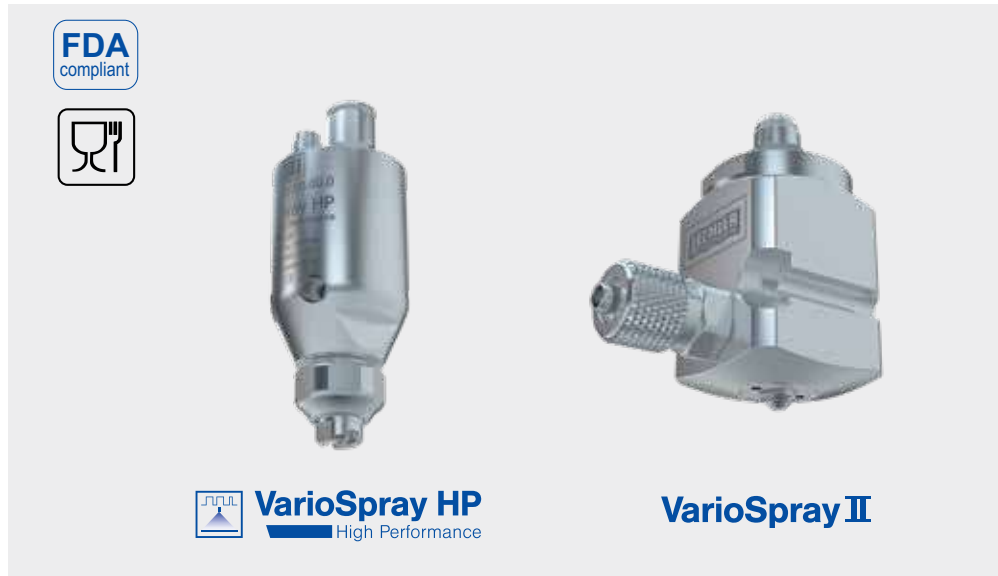
The HP valve range can be used to atomize a wide variety of liquids. All parts that come into contact with liquids are made of stainless steel, thereby complying with EC 1935/2004 and FDA regulations.

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.

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

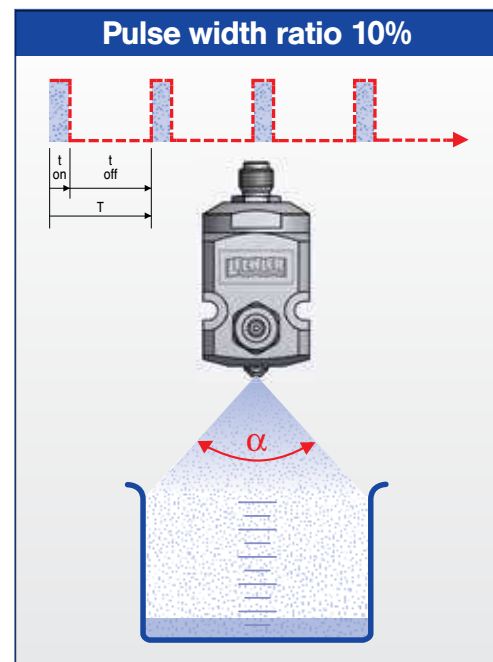
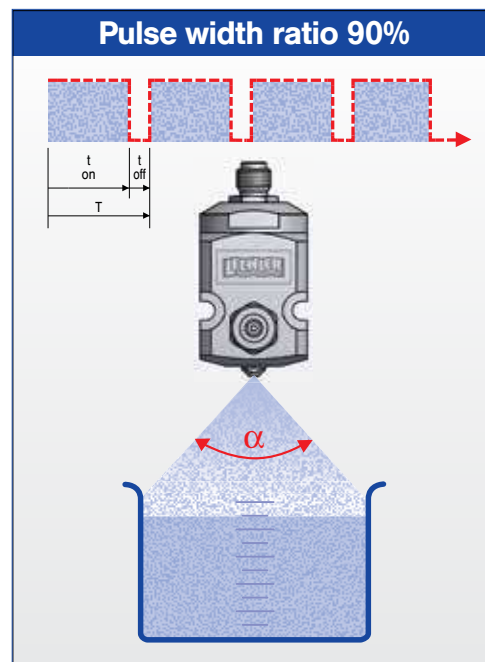
- Simple adjustment of the pulse width and cycle frequency
- Flushing function
- Modular design and modular system
- Start/stop signal (e.g. via light barrier)
- Individual valve control for VarioSpray HP

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.



Product features

Minimum flow rates

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

- Reduced costs
- Greater efficiency

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

- Flexible belt speeds

- Increased productivity
- Shorter production time

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

- More flexible production

Continuously variable flow rate

- Flexible adjustment of the volume applied for different products

- Shorter product change-over times

Different flow rates have no influence on spraying parameters

- Constant spray angle
- Uniform droplet size

- Constant process parameters

Flow rate is not regulated by pressure

- No high pressure required
- Simple setup

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

No atomization air

- No aerosol formation
- Reduced loss of liquid

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

Food-compliant

- Spraying/humidification of foods

- Compliance with legal requirements

ENGINEERING
YOUR SPRAY SOLUTION



LECHLER WORLD-WIDE



Edition 2/17 • USA • Subject to technical modification

Lechler, Inc. · Precision Nozzles · Nozzle Systems

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