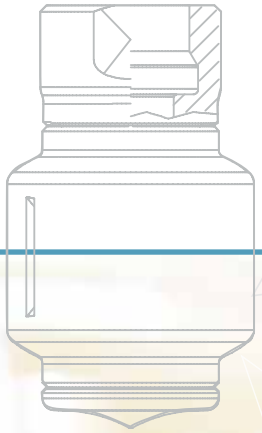
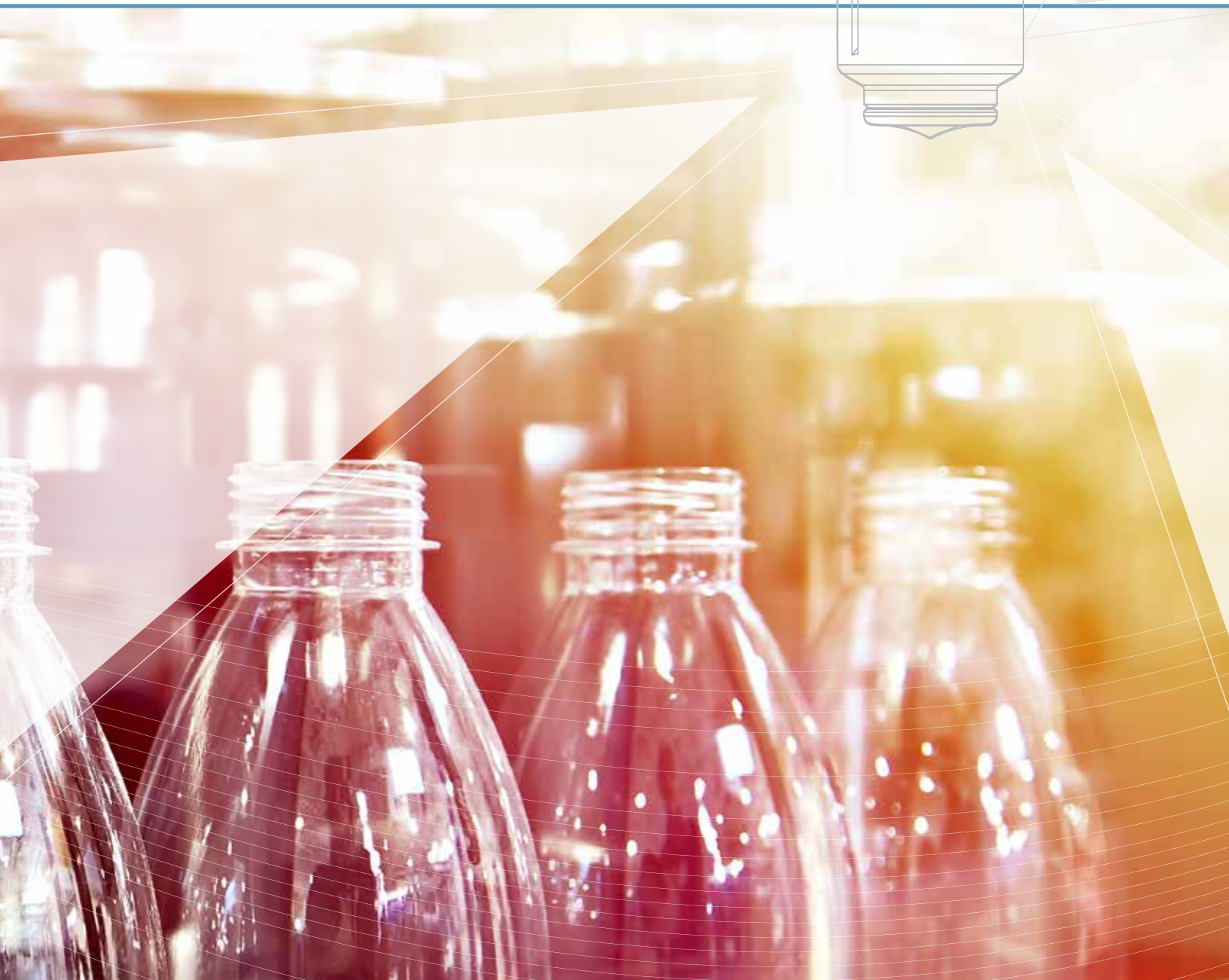
ENGINEERING
YOUR SPRAY SOLUTION

PRECISION SPRAY NOZZLES FOR THE FOOD AND BEVERAGE INDUSTRY





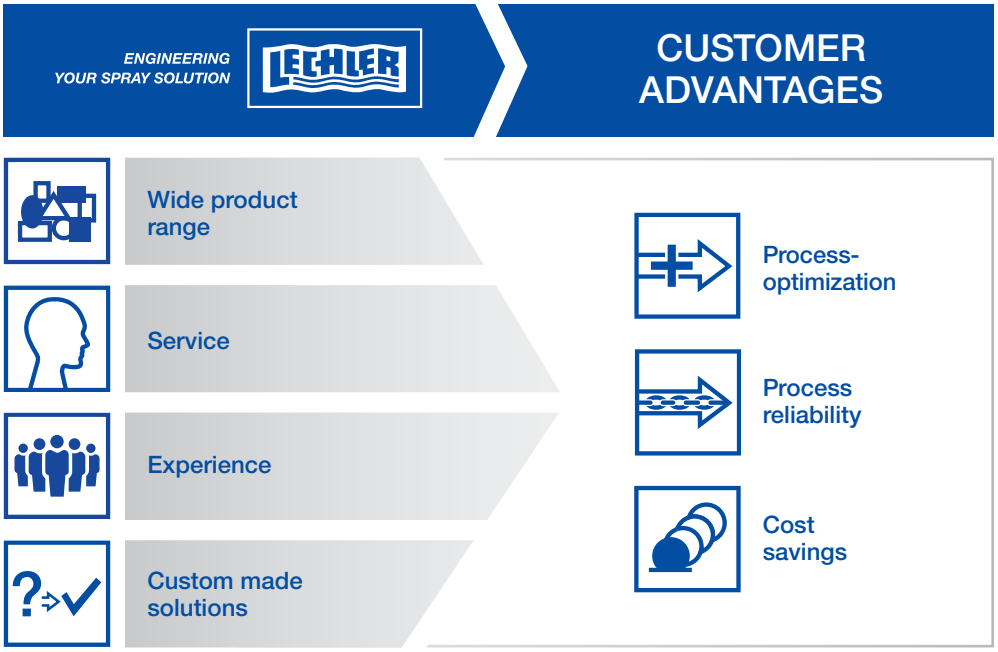
LECHLER – YOUR COMPETENT NOZZLE TECHNOLOGY PARTNER

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 thoughout 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.

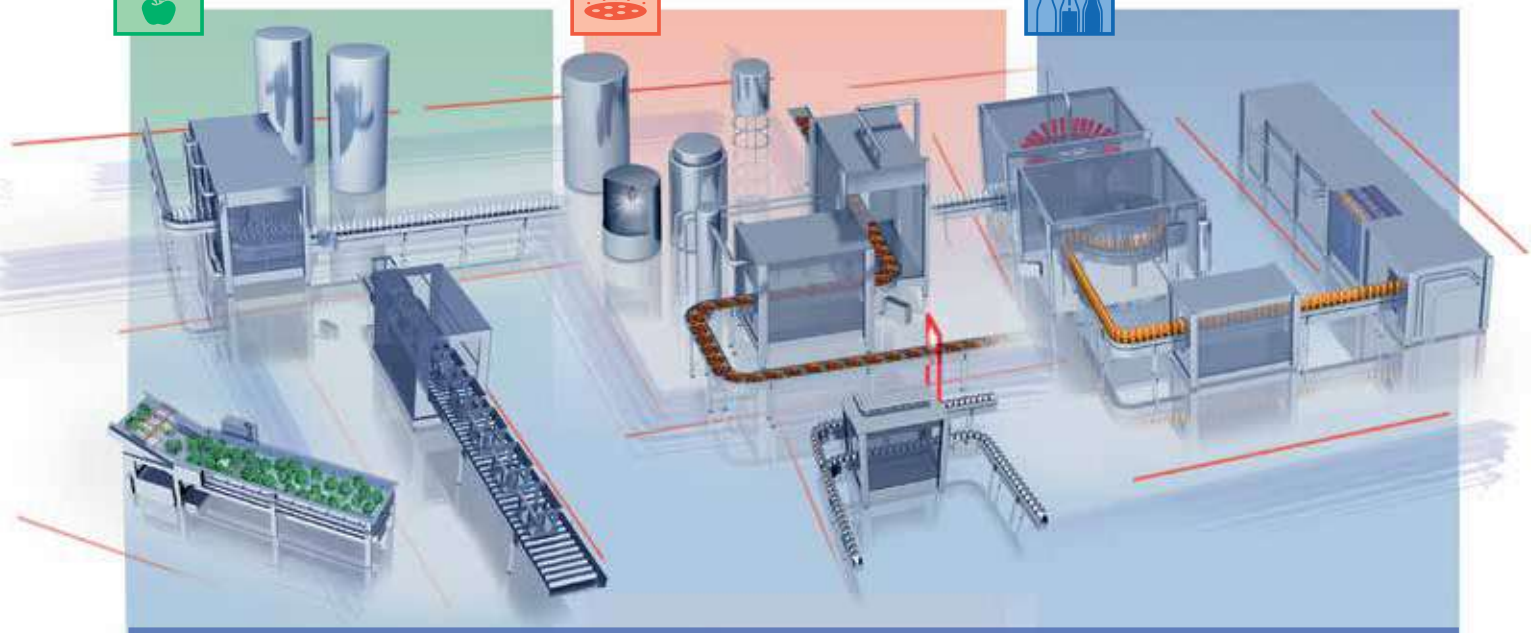
You will find more information, ideas and tools for using nozzle technology and spraying technology at www.LechlerUSA.com

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

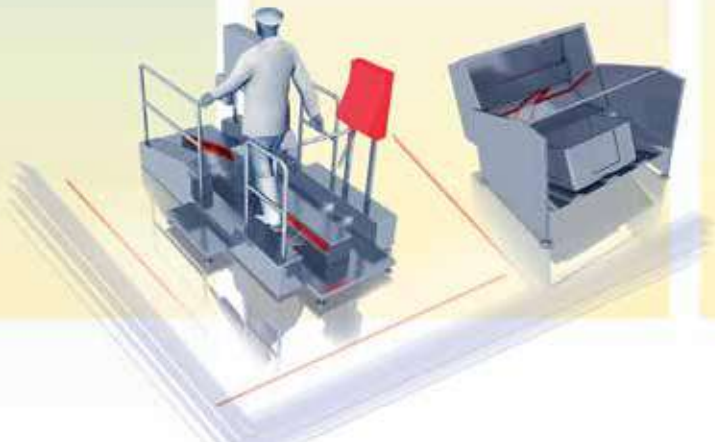
Belt cleaning

- 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

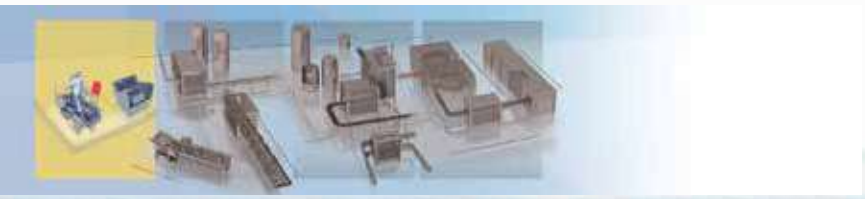
- Filler cleaning
- Pasteurization
- Sterilization
- Sorting cans and bottles
- Detection
- Anti-scuffing
- PET bottle cooling

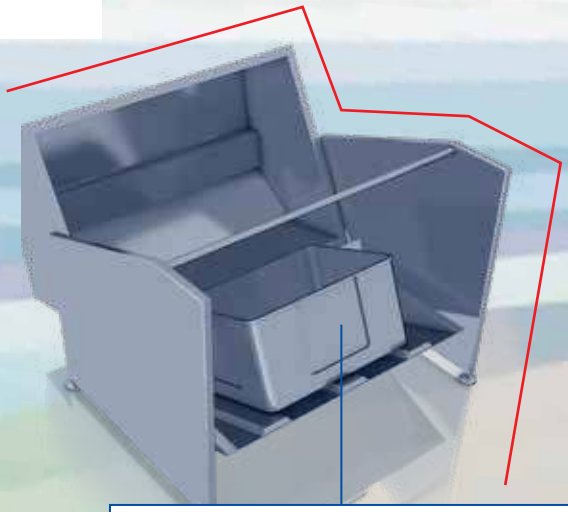
Disinfection and hygiene



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

LECHLER NOZZLES FOR DISINFECTION AND HYGIENE APPLICATIONS



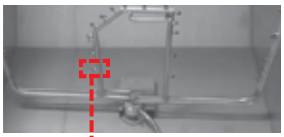


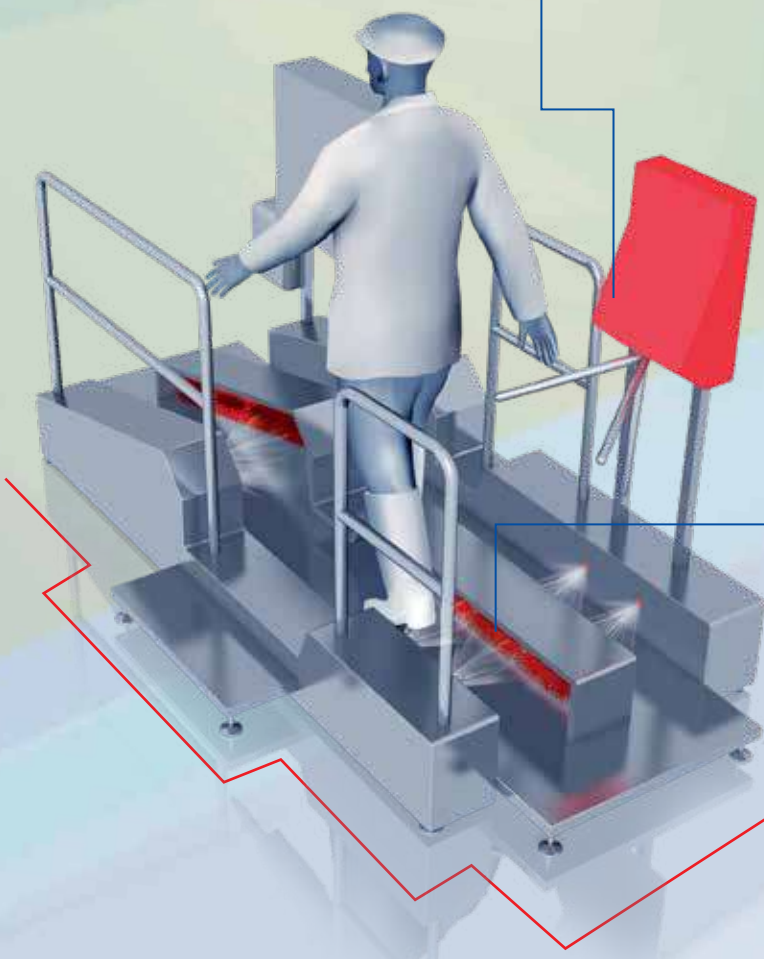
Hand disinfection

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.

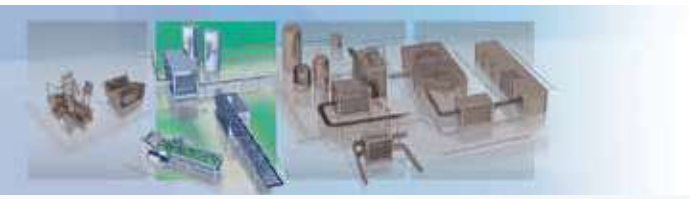




Sole and boot cleaning

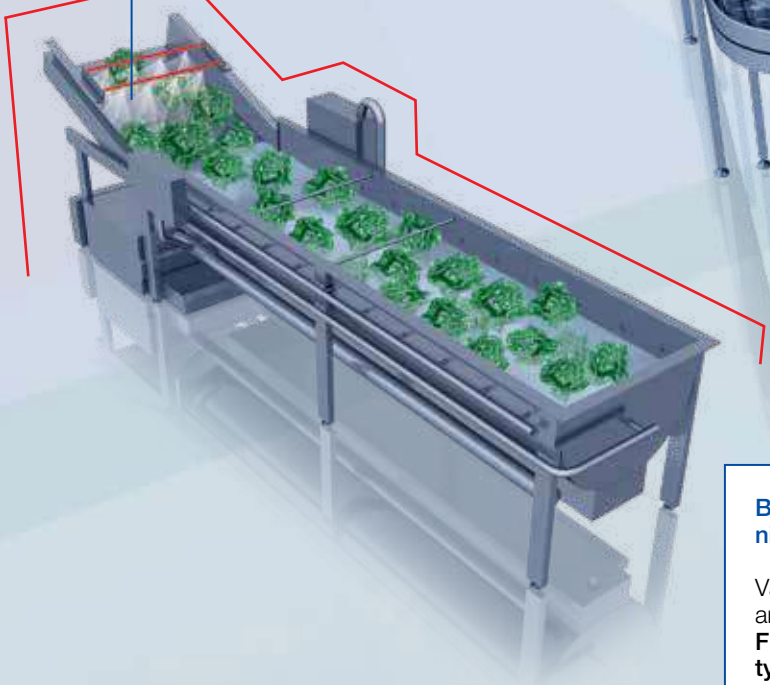
These systems are mostly linked in combination with hand disinfectant systems. For cleaning the brushes and spraying with new disinfectant, we recommend our **series 632 and 686 flat fan or deflector nozzles**.

LECHLER NOZZLES FOR PRODUCT PREPARATION APPLICATIONS



Cleaning of fruit and vegetables

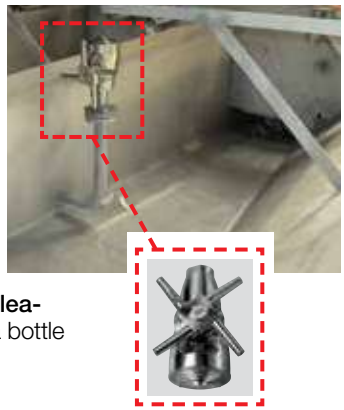
Series 468 full cone nozzles with a 60° spray angle clean cut fruits and vegetables. Simple assembly with an eyelet clamp and bayonet quick release allows nozzles to be changed quickly.



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.

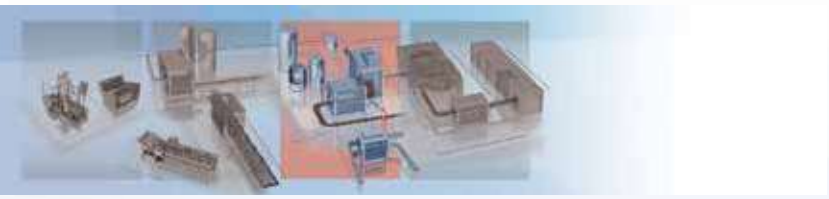
Other nozzle applications in the product preparation field

- 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

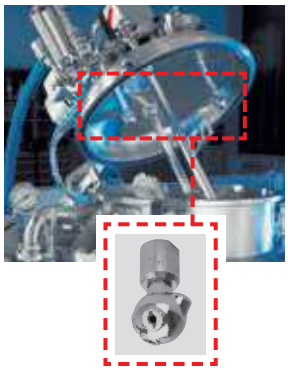
In most cases, cleaning is performed with a mixture of immersion baths and spraying stations. The preferred option is **flat fan nozzles**. **Deflector nozzles** produce a particularly powerful flat fan spray at low pressure.

LECHLER NOZZLES FOR PRODUCT PROCESSING APPLICATIONS



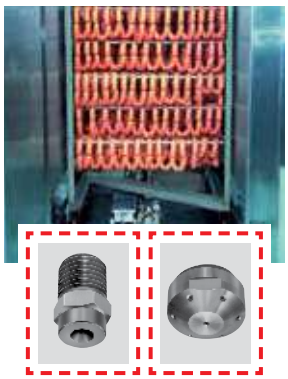
Cleaning containers

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.

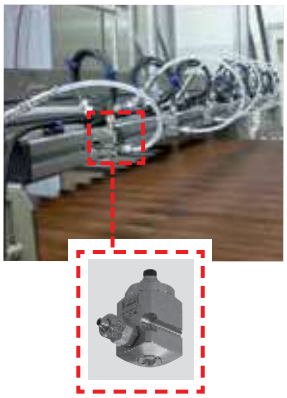


Can cleaning

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.

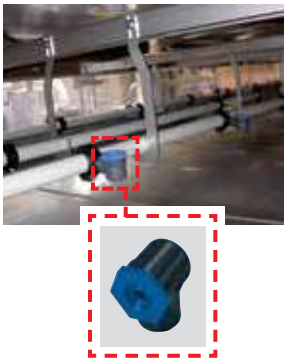
Coating or disinfecting

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

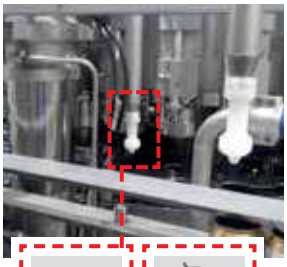
LECHLER NOZZLES FOR FILLING AND PACKING

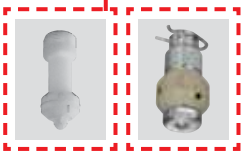
Sterilization

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

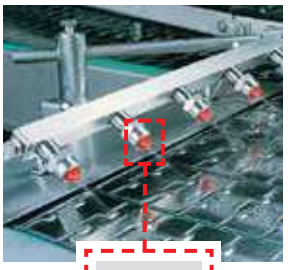
Filling machines are cleaned regularly with a permanently installed nozzle system. For this process, Lechler supplies **series 500 rotating cleaning nozzles and series 594/595 hygienic whirly nozzles** with FDA and EHEDG approval.





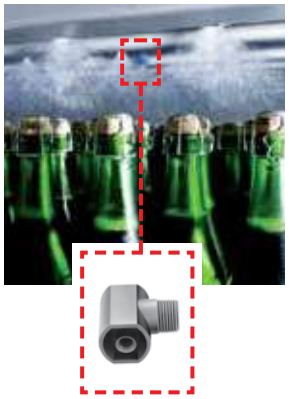
Belt lubrication

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



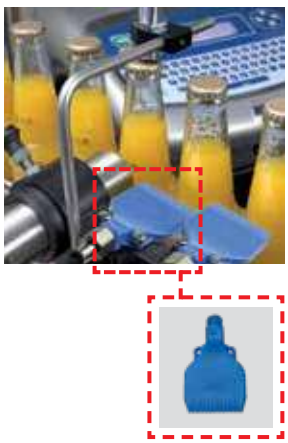
Pasteurization

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.



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.



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

WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

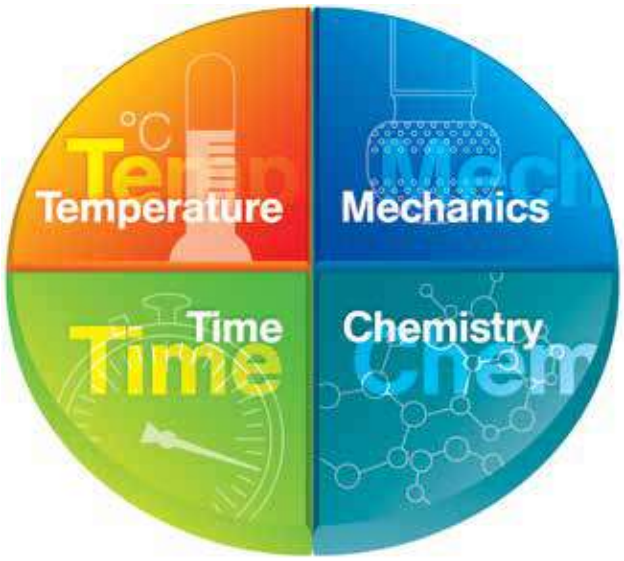


Figure 1: Sinner's circle with equal proportions of the temperature, time, chemistry and mechanical factors.

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.

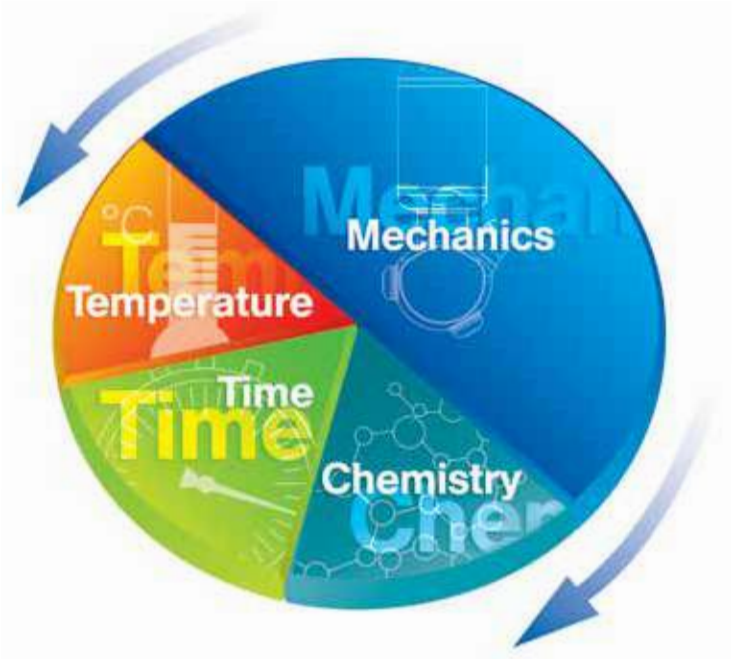


Figure 2: Lechler nozzles and rotating cleaning nozzles have high mechanical cleaning efficiency. This reduces the proportion of the other factors, as well as the resulting costs.

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).

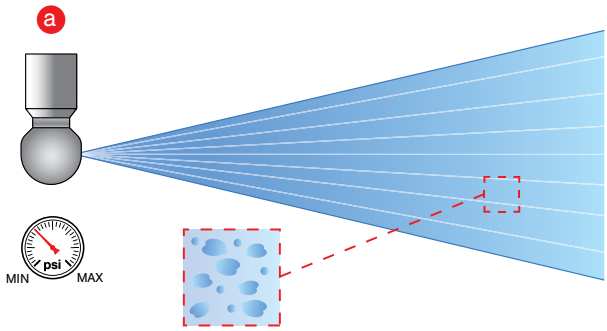


Figure 3: Rotating cleaning nozzles with recommended operating pressure

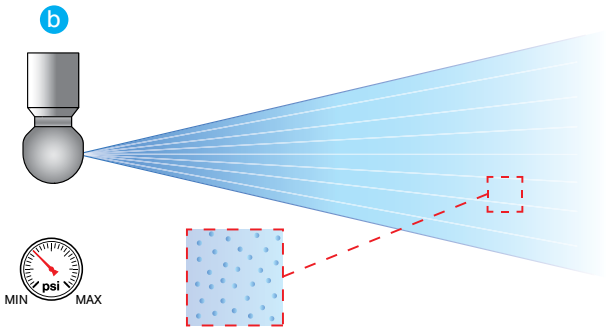


Figure 4: Rotating cleaning nozzles with operating pressure too high

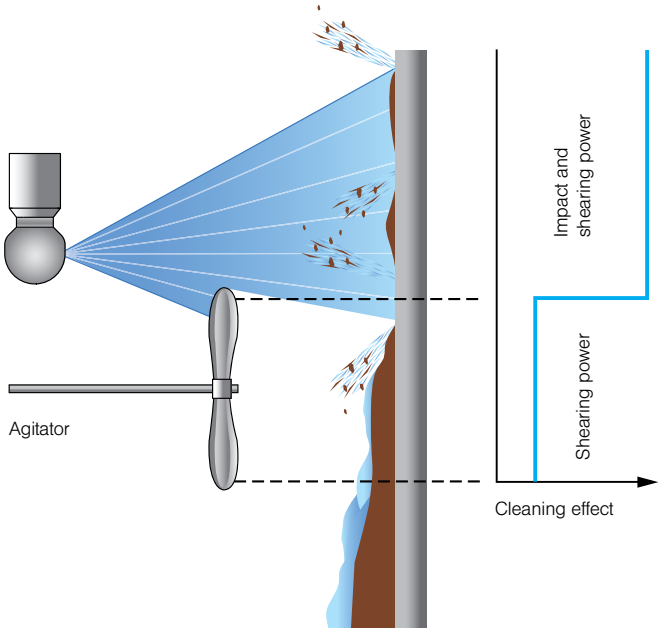


Figure 5: Cleaning mechanisms, impact and shearing power

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.

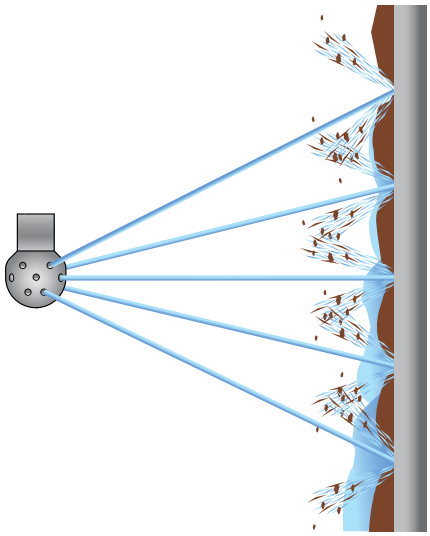


Figure 6: Cleaning with a spray ball

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).

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

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.

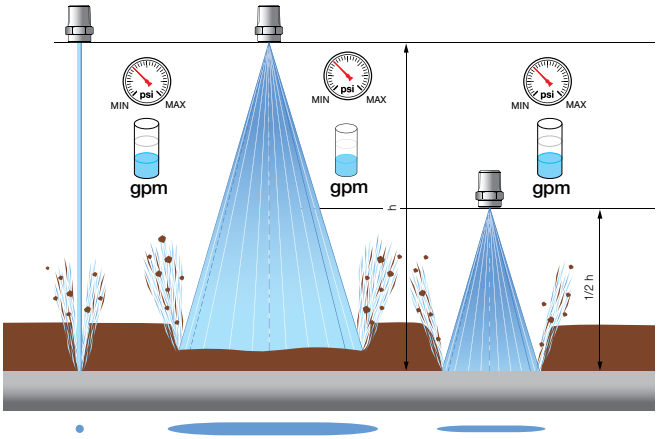


Figure 8: Comparison of the cleaning result of three nozzles with identical pressure and flow rate.

Figure 7: Foam cleaning with a Lechler PVDF MicroWhirly

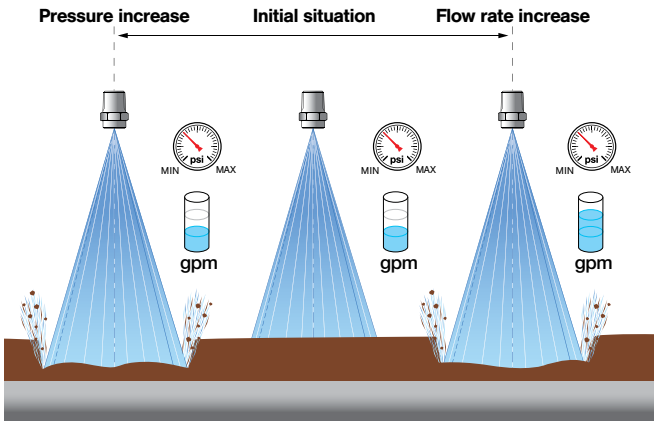


Figure 9: Comparison of the cleaning result of three nozzles with pressure or flow rate increase.

⑤ Spray angle, spraying distance, spraying behavior

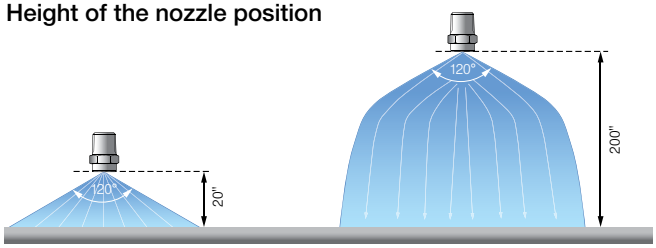
Depending on the application, we supply single-fluid nozzles with spray angles from 0° (solid stream nozzles) to 360° (tank-cleaning nozzles). Gravity and air flows influence the spray pattern.

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

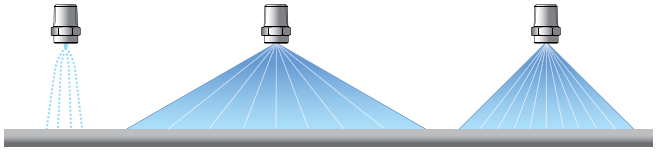
Equipment and components must be designed accordingly so they are easy to clean. Hygienic design prevents recesses and gaps that can harbor dirt, unfavorable flow areas (dead spaces) and sinks that hinder the run-off of fluids. At the same time, attention is paid to maintaining the least surface roughness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



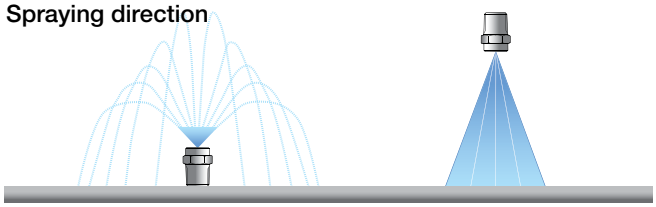
The diagram above illustrates how height influences the spray pattern

Changing the nozzle pressure



Pressure: Very low | Pressure: Optimum | Pressure: Very high

Spraying direction



Spraying upwards | Spraying downwards

Horizontal spraying

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).

78-03

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.

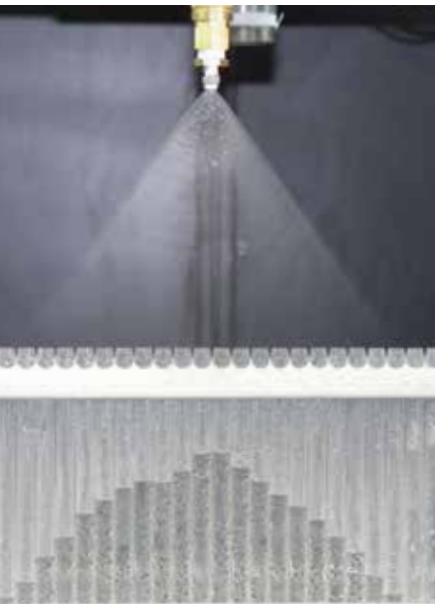


Figure 12: Liquid distribution measurement

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

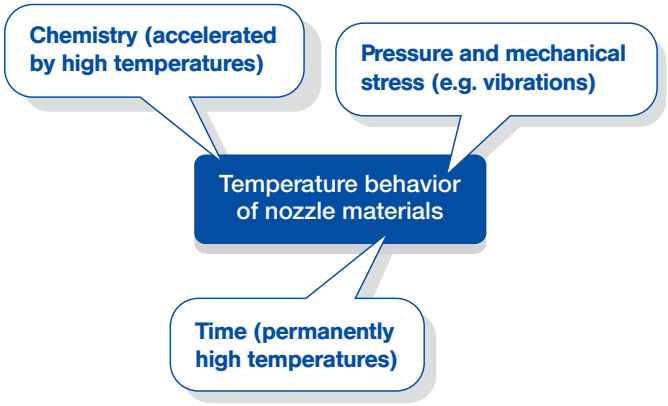
Lechler hollow cone nozzles produce very fine to fine droplets at the same pressure and flow rate. Full cone nozzles produce slightly coarser droplet spectrums, and finally flat fan nozzles have the coarsest droplet spectrum.

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.

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.



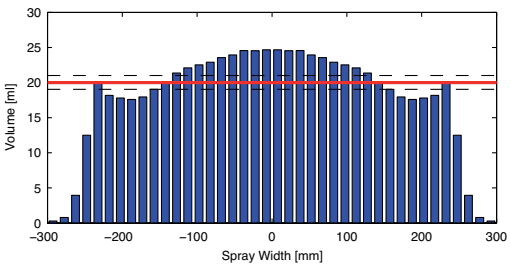


Figure 14: Liquid distribution of a Lechler high-pressure flat fan nozzle

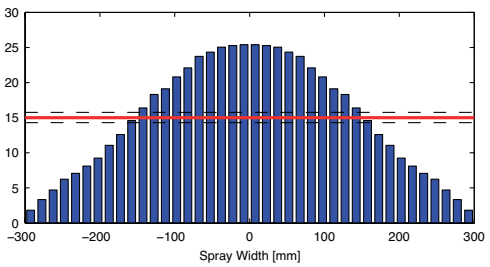


Figure 15: Liquid distribution of a Lechler standard flat fan nozzle

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 (ØE). Experience has shown that for smooth operation, the maximum particle size in the fluid should not exceed one-third of the narrowest cross 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.

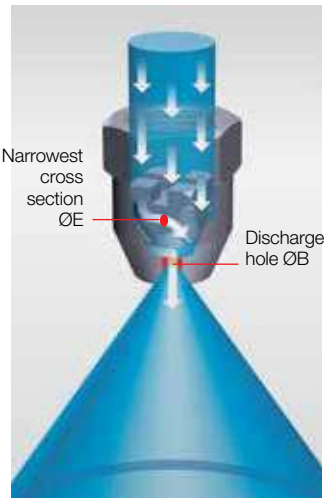


Figure 17: Narrowest free cross section

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

Material selection

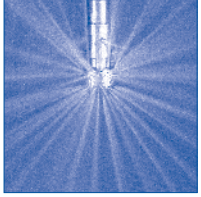
Particularly noticeable manifestations of wear occur when fluids with a high solid content are atomized. Such particle-laden fluids cause significant wear if the particles have a greater hardness than the nozzle material (Fig. 19). This can be remedied by selecting a different material. The table below 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 18: Chemical corrosion of a spray ball

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

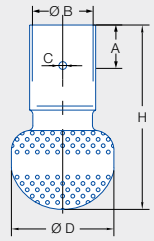
1-1/2" — Line strainer with 50 mesh size

2" — Line strainer with 30 mesh size

Note: There are no threaded inlets available.

FDA compliant

78-03



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

Spray angle	Ordering no.	Free Passage (in.)	Flow Rate (Gallons Per Minute) 20 psi	2 bar	40 psi	60 psi	Dimensions approx. (in.) Height H (in.)	Diameter D (in.)	B	C	A	Max. tank diameter [ft]
360°	**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.

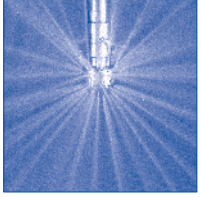
In most applications, static spray balls do not deliver the same cleaning power as rotating nozzles, anyway they do have advantages that make them indispensable for certain tasks:

- 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**



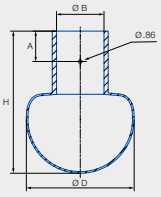
- Popular spray ball design
- Powerful solid jets

Materials:
316L stainless steel
Pin: 316L SS

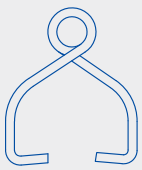
Max. fluid temperature:
392°F

Recommended operating pressure:
30 psi

FDA compliant



Pin 1



Pin 2-5

Dimensions to slip-on connection according to DIN 10357 series B

Spray angle	Ordering no. / Type	E Ø [in]	Flow Rate (Gallons per minute) 20 psi	30 psi	40 psi	liters per minute 2 bar	60 psi	Dimensions [in] Ø D	Height H	Con-nection B	Distance to bore hole A	Pin	Max. tank diameter [ft]
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.

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.

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.

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.

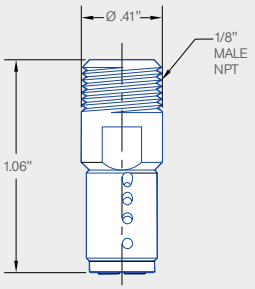
Material:
Kolsterized 316L SS

Bearing:
Sleeve bearing

Installation:
Operates in every direction

Filtration:
Line strainer with 50 mesh size

FDA compliant



Spray angle	Ordering no. Connection 1/8" Male NPT	Free Passage Ø (in.)	Flow Rate (Gallons Per Minute) 20 psi	liters per minute 2 bar	40 psi	60 psi	Max. tank diameter [ft]
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.

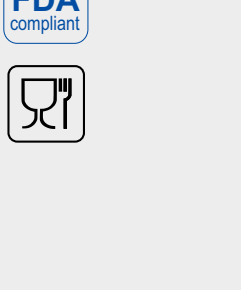
Material:
316L SS
PEEK

Bearing:
Sleeve bearing

Installation:
Operates in every direction

Filtration:
Line strainer with 50 mesh size

FDA compliant



3/8" Male NPT

3/8" Female NPT

Slip-on connection
3/4" OD Slip-on

ATEX version on request

Spray angle	Ordering no. Type	Connection 3/8" Male NPT	3/8" Female NPT	3/4" OD Slip-on	Free Passage Ø (in.)	Flow Rate (Gallons Per Minute) 20 psi	liters per minute 2 bar	40 psi	60 psi	Max. tank diameter [ft]
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

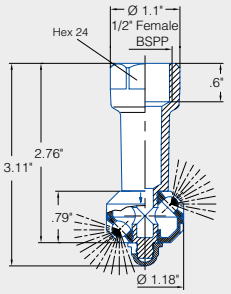
Bearing: Sleeve bearing

Installation:
Operates in every direction

Filtration: Line strainer with 50 mesh size

FDA compliant

500.191



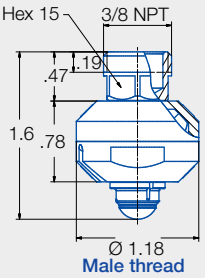
Spray angle	Ordering number Type	E Ø [in]	Connection NPT female	V̇ [gal/min] p [psi] (p_{max} = 75 psi) 20 psi	30 psi	2 bar	40 psi	60 psi	Max. tank diameter [ft]
180°	**500.191.5E.02**	.086	1/2"	2.9	3.5	13	4.0	4.9	2.6
180°	**500.191.5E.01**	.086	1/2"	2.9	3.5	13	4.0	4.9	2.6
270°	**500.191.5E.31**	.086	1/2"	4.4	5.4	20	6.2	7.6	3.6
360°	**500.191.5E.00**	.086	1/2"	4.4	5.4	20	6.2	7.6	3.6

E = narrowest free cross section

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.

FDA compliant

Compact version



Spray angle	Ordering number Type	E Ø [in]	Connection NPT male	V̇ [gal/min] p [psi] (p_{max} = 75 psi) 20	30	2 bar	40	60	Max. tank diameter [ft]
180°	**500.191.5E.21**	.086	3/8"	2.8	3.5	13	4.0	4.9	2.6
360°	**500.191.5E.22**	.086	3/8"	4.4	5.4	20	6.2	7.6	3.6

E = narrowest free cross section

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.

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

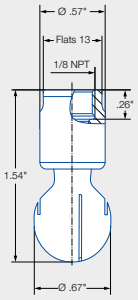
Recommended operating pressure:
30 psi

Installation:
Operates in every direction

Filtration:
Line strainer with 170 mesh size

Bearing:
Double ball bearing made of 316L SS

FDA compliant



Spray angle	Ordering number: Type 1/8" Female NPT	Connection: 1/8 NPT	Connection: Ø .4 inches in accordance with DIN 11866 Series B	Connection: 1/2" slip-on connection	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi] (p_{max} = 100 psi): 15	30	2 bar	45	Max. tank diameter [ft]
360°	**5M1.879.1Y**	BB	TF04	TF05[1]	0.016	2.85	**4.03**	**15**	4.94	4
	5M1.929.1Y	BB	TF04	TF05[1]	0.020	3.80	**5.37**	**20**	6.58	5

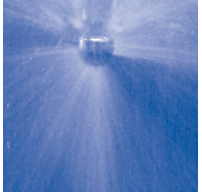
*This product is also available in Hastelloy C22

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.

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

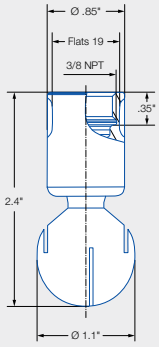
Materials:
316L SS

Bearing:
Double ball bearing

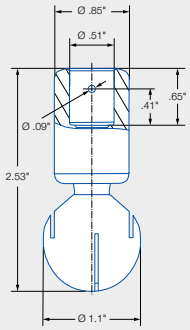
Installation:
Operates in every direction

Filtration:
Line strainer with 170 mesh size

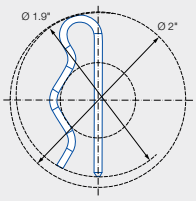
FDA compliant



Female thread



1/2" Slip-on connection
Dimensions slip-on connection
according to ASME-BPE (OD-tube)



Dimensions
slip-on connection
top view

Spray angle	Ordering number					Narrowest free cross section Ø [in]	V̇ water [gal/min]				Max. tank diameter [ft]
	Type	Mat. no.		Connection			p [psi] (p_{max} = 100 psi)				
		1Y	21				15	30	2 bar	45	
		Stainless steel 1.4404 (316L)	2.4602 (Alloy 22)	3/8" Female NPT	1/2"-Slip-on						
60°	5M2.952	●	●	BF	TF05	0.06	4.37	6.18	23	7.57	–
	5M2.042	●	●	BF	TF05	0.12	7.60	10.75	40	13.16	–
180°	5M2.004	●	●	BF	TF05	0.04	6.08	8.60	32	10.53	6
360°	5M2.969	●	●	BF	TF05	0.03	4.75	6.72	25	8.23	5
	5M2.049	●	●	BF	TF05	0.04	7.41	10.48	39	12.83	6

*This product is also available in Hastelloy C22

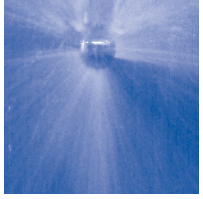
ATEX version on request

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 for ordering:	Type	+	Mat. no.	+	Conn.	=	Ordering no.
	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

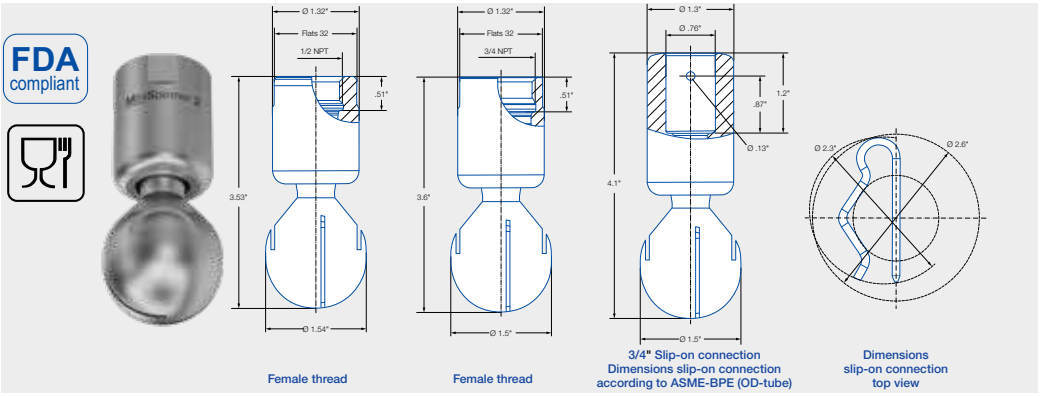
Max. fluid temperature:
284°F

Materials:
316L SS

Bearing:
Double ball bearing

Installation:
Operates in every direction

Filtration:
Line strainer with 170 mesh size



Spray angle	Ordering number						Narrowest free cross section Ø [in]	V̇ water [gal/min]				Max. tank diameter [ft]
	Type	Mat. no.		Connection				p [psi] (p_{max} = 100 psi)				
		1Y	21	1/2" Female NPT	3/4" Female NPT	3/4"- Slip-on		15	30	2 bar	45	
		Stainless steel 1.4404 (316L)	2.4602 (Alloy 22)									
60°	**5M3.122.1Y**	●	●	**BH**		**TF07**	0.102	11.97	**16.93**	**63**	20.73	–
180°	**5M3.133.1Y**	●	●		**BL**	**TF07**	0.047	12.73	**18.00**	**67**	22.05	8
180°	**5M3.134.1Y**	●	●		**BL**	**TF07**	0.051	12.73	**18.00**	**67**	22.05	8
360°	**5M3.999.1Y**	●	●		**BL**	**TF07**	0.016	5.70	**8.06**	**30**	9.87	5
	5M3.089.1Y	●	●		**BL**	**TF07**	0.028	9.31	**13.16**	**49**	16.12	6
	5M3.139.1Y	●	●		**BL**	**TF07**	0.031	13.11	**18.54**	**69**	22.70	7
	5M3.209.1Y	●	●		**BL**	**TF07**	0.059	19.00	**26.87**	**100**	32.90	8

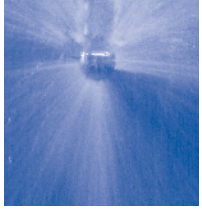
*This product is also available in Hastelloy C22

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 for ordering:	Type	+	Conn.	=	Ordering no.
	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

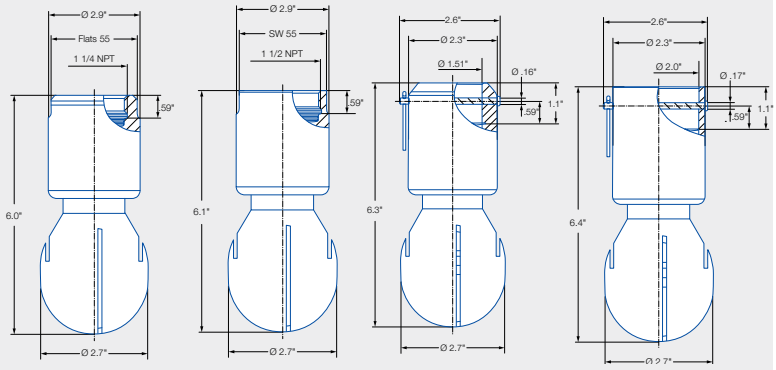
Materials:
316L SS

Bearing:
Double ball bearing

Installation:
Operates in every direction

Filtration:
Line strainer with 170 mesh size

FDA compliant



Spray angle	Type	Ordering number: Mat. no. 1Y (1.4404 (316L))	Ordering number: Mat. no. 21 (2.4602 (Alloy 22))	Connection: 1 1/4" Female NPT	Connection: 1 1/2" Female NPT	Connection: 1 1/2" Slip-on	Connection: 2"- Slip-on	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi] (p_{max} = 100 psi)* 15	30	2 bar	45	Max. tank diameter [ft]
360°	**5M4.279.1Y**	●	●	**BQ**	**BS**	**TF15**	**TF20**	0.07	28.49	**40.30**	**150**	49.35	13
	5M4.329.1Y	●	●	**BQ**	**BS**	**TF15**	**TF20**	0.08	37.99	**53.73**	**200**	65.81	15
	5M4.369.1Y	●	●	**BQ**	**BS**	**TF15**	**TF20**	0.09	47.49	**67.16**	**250**	82.26	16

*This product is also available in Hastelloy C22

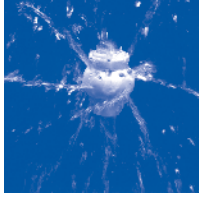
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

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

ATEX version on request

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

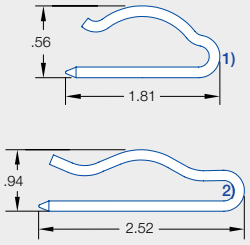
Filtration:
Line strainer with 50 mesh size

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.

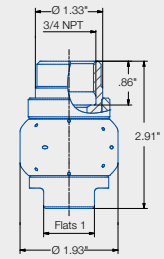
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

FDA compliant

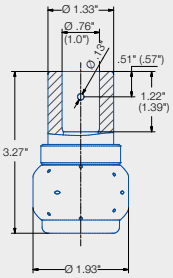
78-03



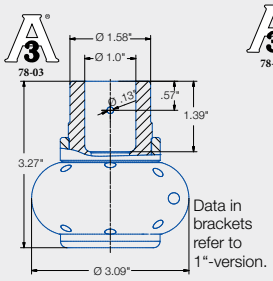
R-clip



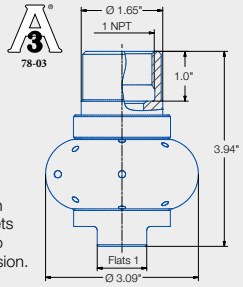
3/4" Female thread



1" Female thread



3/4" and 1" Slip-on connection (3A-approved) Dimensions according to ASME-BPE (OD-tube)

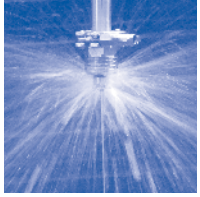


1" Slip-on connection (3A-approved) Dimensions according to ASME-BPE (OD-tube)

Spray angle	Ordering number: Type	Connection: 3/4" NPT	1" NPT	3/4" Slip-on	1" Slip-on	1 1/2" Tri-Clamp	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi] (p_{max} = 85 psi): 15	30	2 bar	45	Pin	Max. tank diameter [ft]
180°	**583.114.55**	BL		TF07*			.083	12.73	**18.00**	**67**	22.05	1	8
	583.264.55	BL		TF07*			.129	27.55	**38.95**	**145**	47.71	1	9
	583.344.55		BN				.279	42.74	**60.45**	**225**	74.03	2	10
180°	**573.114.55**	BL		TF07*			.083	12.73	**18.00**	**67**	22.05	1	8
	573.264.55	BL		TF07*			.129	27.55	**38.95**	**145**	47.71	1	9
	573.344.55		BN				.232	42.74	**60.45**	**225**	74.03	2	10
270°	**583.116.55**	BL		TF07*			0.09	12.73	**18.00**	**67**	22.05	1	8
	583.266.55	BL		TF07*			.133	27.55	**38.95**	**145**	47.71	1	9
	583.346.55		BN		TF10*		.232	42.74	**60.45**	**225**	74.03	2	10
270°	**573.116.55**	BL		TF07*			0.09	12.73	**18.00**	**67**	22.05	1	8
	573.226.55	BL		TF07*			.133	27.55	**38.95**	**145**	47.71	1	9
	573.346.55		BN		TF10*		.232	42.74	**60.45**	**225**	74.03	2	10
360°	**583.119.55**	BL		TF07*	TF10*	15	0.07	11.02	**15.58**	**58**	19.08	1	8
	583.209.55	BL		TF07*	TF10*	15	0.14	19.00	**26.87**	**100**	32.90	1	8
	583.269.55	BL		TF07*		15	0.19	27.55	**38.95**	**145**	47.71	1	9
	583.279.55		BN		TF10*	15	0.15	28.49	**40.30**	**150**	49.35	2	10
	583.349.55		BN		TF10*	15	0.22	42.74	**60.45**	**225**	74.03	2	10

Example for ordering:	Type	+	Conn.	=	Ordering no.
	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

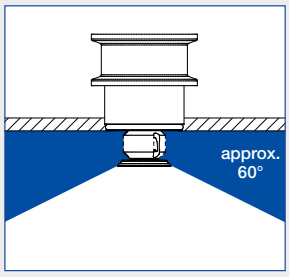
Recommended operating pressure:
30 psi, 5P2: opening pressure approx. 14.5 psi; closing pressure approx. 7 psi,

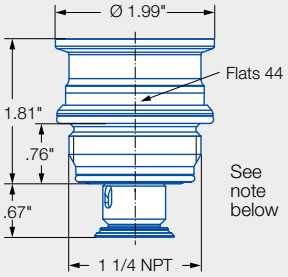
Installation:
Operates in every direction

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

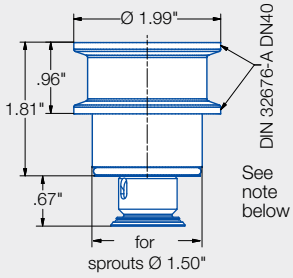
Bearing:
Sleeve bearing made of PEEK

FDA compliant





Male thread



Tri-Clamp

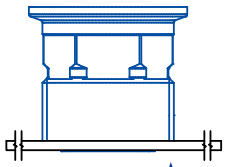
Spray angle	Ordering no.	Tank connection		Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
		1¼" Male BSPP	Tri Clamp		20 psi	30 psi	liters per minute 2 bar	40 psi	
	5P2. 873. 1Y. AP	○	-	.04	3.3	4	15.0	5	2.6
	5P2. 873. 1Y. 00	-	○	.04	3.3	4	15.0	5	2.6
	5P2. 923. 1Y. AP	○	-	.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.

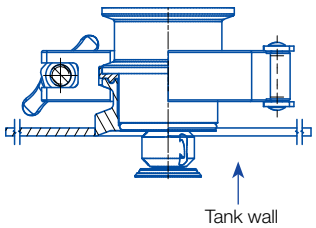
The PopUp Whirly is not suitable for operation with compressed air or any other gas. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

Nozzle installation

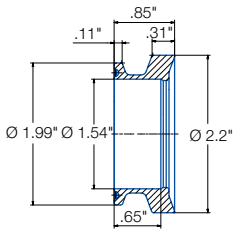
With thread in idle position



With Tri-Clamp in operating position



Weld-in flange for Tri-Clamp-Version

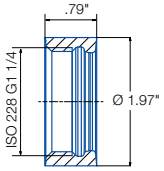


Ordering number
050.020.1Y.01.00

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

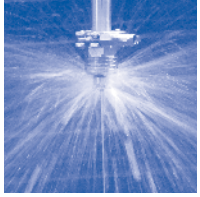
Weld-in socket for Thread-Version



Ordering number
050.020.1Y.AQ.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

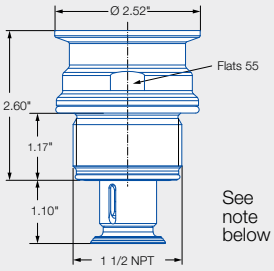
Recommended operating pressure:
5P3: opening pressure approx. 13 psi, closing pressure approx. 7 psi

Installation:
Operates in every direction

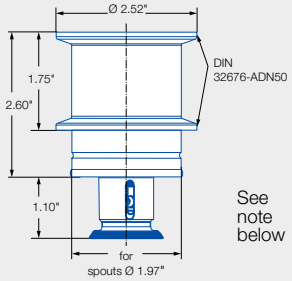
Filtration:
Line strainer with a mesh size of 0.3 mm/50 mesh

Bearing:
Sleeve bearing made of PEEK

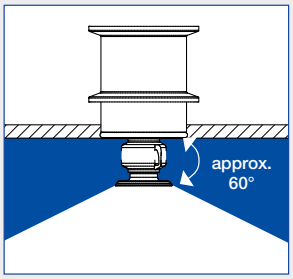
FDA compliant



Male thread



Tri-Clamp



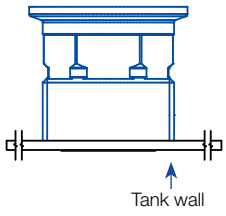
Spray angle	Ordering no.	Tank connection		Free Passage Ø (in.)	Flow Rate (Gallons Per Minute)				Max. tank diameter [ft]
		1 1/2" Male BSPP	Tri Clamp		20 psi	30 psi	liters per minute 2 bar	40 psi	
	5P3. 043. 1Y. AR	○	-	.05	3.3	4	15.0	4.7	7.2
	5P3. 043. 1Y. 00	-	○	.05	3.3	4	15.0	4.7	7.2

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.

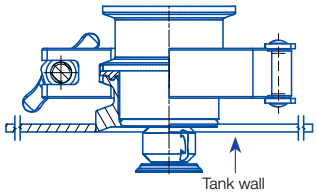
The PopUp Whirly is not suitable for operation with compressed air or any other gas. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

Nozzle installation

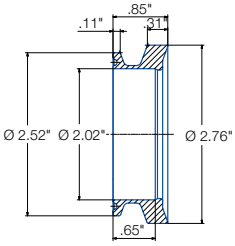
With thread in idle position



With Tri-Clamp in operating position



Weld-in flange for Tri-Clamp-Version

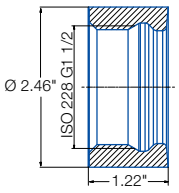


Ordering number
050.020.1Y.01.01

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

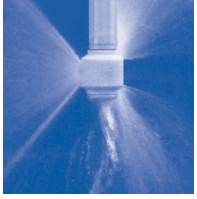


Ordering number
050.020.1Y.AS.00

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.

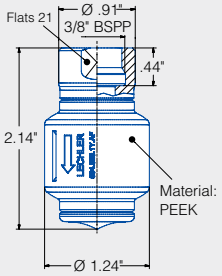
Material:
316L SS
PEEK

Bearing:
Sleeve bearing

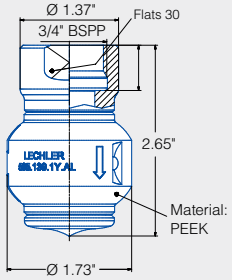
Installation:
Operates in every direction

Filtration:
Line strainer with 50 mesh size

FDA compliant



Standard version female tread 594.XX9.1Y.AF



Standard version female thread 595.139.1Y.AL

Spray angle	Ordering number: Type	Connection: 3/8" Female BSPP	Connection: 3/4" Female BSPP	Connection: 3/4" slip-on	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi] (p_{max} = 75 psi): 7	15	30	45	Liters per min. 3 bar	75	Max. tank diameter [ft]
360°	**594.829.1Y**	**AF**		**67**	0.07	1.48	2.17	3.07	**3.76**	**14**	4.86	2
	594.879.1Y	**AF**		**67**	0.10	1.91	2.79	3.95	**4.84**	**18**	6.24	4
	595.009.1Y	**AF**		**67**	0.16	4.13	6.05	8.55	**10.48**	**39**	13.53	5
	595.049.1Y	**AF**		**67**	0.17	5.19	7.60	10.75	**13.16**	**49**	17.00	6
	595.139.1Y		**AL**	**67**	2.00	8.69	12.72	17.99	**22.03**	**82**	28.44	9

NPT thread available on request.

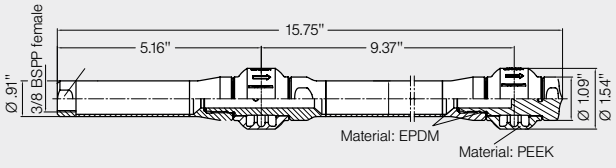
Please note: To protect the products’ inner workings, we suggest use of a line strainer with a 50 mesh size. For further information, please contact Lechler.

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.

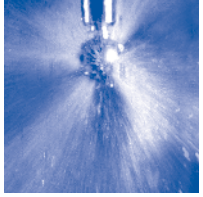
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

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

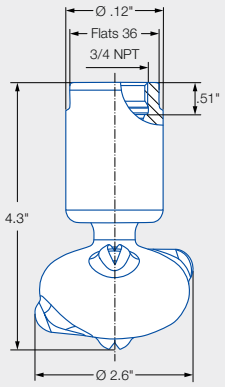
Material:
Stainless steel 316L SS
PEEK

Bearing:
Double ball bearing

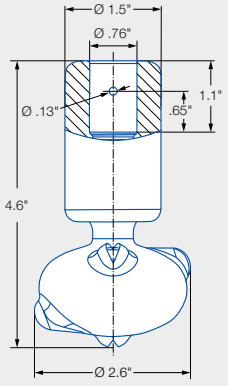
Installation:
Operates in every direction

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

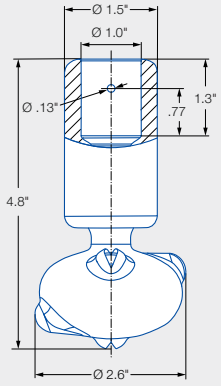
FDA compliant



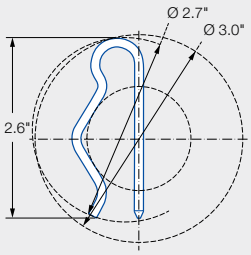
Female thread



Dimensions slip-on connection according to ASME-BPE (OD-tube)



Dimensions slip-on connection according to ASME-BPE (OD-tube)



Dimensions slip-on connection top-view

Spray angle	Ordering number: Type	Connection: 3/4" Female NPT	3/4" Slip-on	1" Slip-on	1.5" Slip-on	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi] (p_{max} = 87 psi): 20	30	Liters per min. 2 bar	40	60	80	Max. tank diameter [ft]
270°	**5W9.075.1Y**	**BL**	**TF07**	**TF10**	**TF15**	0.08	10.53	**12.90**	**48**	14.89	18.23	21.06	6
	5W9.145.1Y	**BL**	**TF07**	**TF10**	**TF15**	0.11	15.57	**19.07**	**71**	22.02	26.97	31.15	7
	5W9.195.1Y	**BL**	**TF07**	**TF10**	**TF15**	0.13	21.27	**26.06**	**97**	30.09	36.85	42.55	8
270°	**5W9.076.1Y**	**BL**	**TF07**	**TF10**	**TF15**	0.08	10.53	**12.90**	**48**	14.89	18.23	21.06	6
	5W9.106.1Y	**BL**	**TF07**	**TF10**	**TF15**	0.10	12.72	**15.58**	**58**	17.99	22.03	25.44	7
	5W9.196.1Y	**BL**	**TF07**	**TF10**	**TF15**	0.13	21.27	**26.06**	**97**	30.09	36.85	42.55	8
360°	**5W9.079.1Y**	**BL**	**TF07**	**TF10**	**TF15**	0.06	10.53	**12.90**	**48**	14.89	18.23	21.06	6
	5W9.149.1Y	**BL**	**TF07**	**TF10**	**TF15**	0.09	15.57	**19.07**	**71**	22.02	26.97	31.15	7
	5W9.199.1Y	**BL**	**TF07**	**TF10**	**TF15**	0.12	21.27	**26.06**	**97**	30.09	36.85	42.55	8
	5W9.279.1Y	**BL**	**TF07**	**TF10**	**TF15**	0.14	31.80	**38.95**	**145**	44.98	55.09	63.61	10

ATEX version on request

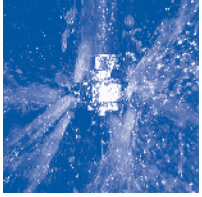
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

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.

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 for ordering:	Type	+	Conn.	=	Ordering no.
	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.

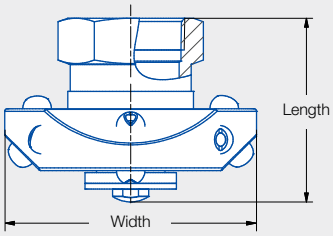
Material:
316 SS
PTFE

Bearing: Sleeve bearing

Installation:
Vertically facing downward

Filtration:
Line strainer with 20 mesh size

FDA compliant



Female NPT Threaded

Spray angle	Ordering number: Type	Connection: 1" Female NPT	Connection: 2" Female NPT	V̇ water [gal/min] p [psi] (p_{max} = 75 psi): 20	30	40	45	3 bar	Liters per min. 60	75	Max. tank diameter [ft]
180°	**577.283.1Y**	**BN**		35.82	43.87	50.66	**53.73**	**200**	62.04	69.36	11
	577.363.1Y	**BN**		56.59	69.31	80.04	**84.89**	**316**	98.03	109.60	13
	577.403.1Y		**BW**	70.56	86.42	99.79	**105.85**	**394**	122.22	136.65	14
	577.433.1Y		**BW**	84.71	103.75	119.80	**127.07**	**473**	146.73	164.05	15
	577.523.1Y		**BW**	140.24	171.75	198.32	**210.35**	**783**	242.90	271.57	18
180°	**577.284.1Y**	**BN**		35.82	43.87	50.66	**53.73**	**200**	62.04	69.36	11
	577.364.1Y	**BN**		56.59	69.31	80.04	**84.89**	**316**	98.03	109.60	13
	577.404.1Y		**BW**	70.56	86.42	99.79	**105.85**	**394**	122.22	136.65	14
	577.434.1Y		**BW**	84.71	103.75	119.80	**127.07**	**473**	146.73	164.05	15
	577.494.1Y		**BW**	118.03	144.55	44.84	**177.04**	**659**	204.43	61.40	18
270°	**577.285.1Y**	**BN**		35.82	43.87	50.66	**53.73**	**200**	62.04	69.36	11
	577.365.1Y	**BN**		56.59	69.31	80.04	**84.89**	**316**	98.03	109.60	13
	577.405.1Y		**BW**	70.56	86.42	99.79	**105.85**	**394**	122.22	136.65	14
	577.435.1Y		**BW**	84.71	103.75	119.80	**127.07**	**473**	146.73	164.05	15
	577.495.1Y		**BW**	118.03	144.55	44.84	**177.04**	**659**	204.43	61.40	18
360°	**577.289.1Y**	**BN**		35.82	43.87	50.66	**53.73**	**200**	62.04	69.36	11
	577.369.1Y	**BN**		56.59	69.31	80.04	**84.89**	**316**	98.03	109.60	13
	577.409.1Y		**BW**	70.56	86.42	99.79	**105.85**	**394**	122.22	136.65	14
	577.439.1Y		**BW**	84.71	103.75	119.80	**127.07**	**473**	146.73	164.05	15
	577.499.1Y		**BW**	118.03	144.55	44.84	**177.04**	**659**	204.43	61.40	18

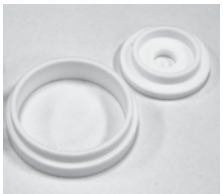
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

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

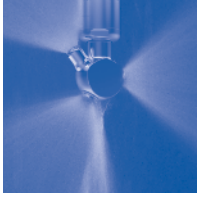
Contents of Gyro rebuild kit



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

* Contact Lechler for maximum ambient temperature.

Rotating cleaning nozzle **“XactClean® HP”**
Series 5S2 / 5S3



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

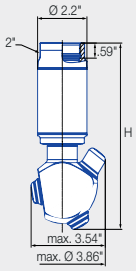
Bearing:
Double ball bearing

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

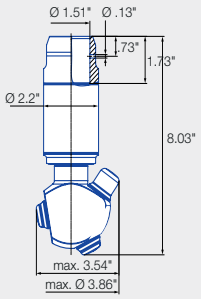
Nozzle dimensions [in]

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

FDA compliant



Female thread



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

Spray angle	Ordering no. Type	Connection 1 NPT	1 1/4 NPT	1 1/2 NPT	1 1/2" Slip-on	Free passage Ø [in]	Flow Rate (Gallons Per Minute) liters per minute 2 bar	30 psi	45 psi	75 psi	Max. tank diameter [ft]
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

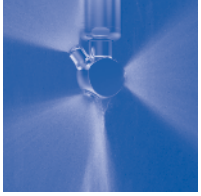
- Operation with compressed air only for short-term usage. Operation above the recommended operating pressure means higher wear and smaller droplets. This might have adverse effects on the cleaning result.

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:	Type	+	Connection	=	Ordering no.
	5S5.293.1Y.	**+**	**BN**	**=**	**5S5.293.1Y.BN**

Rotating cleaning nozzle **“XactClean® HP2”**
Series 5S6/5S7



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

Stainless steel 1.4404 (316L)
PEEK, EPDM

302°F

45 psi

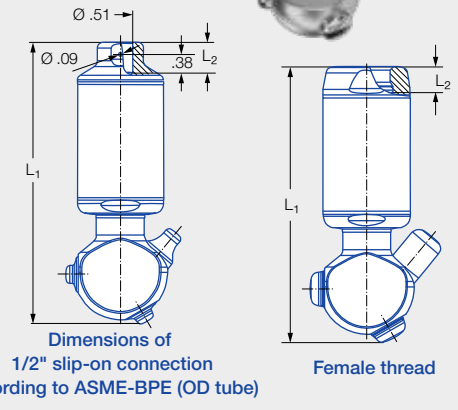
Operation in every direction is possible

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

Double ball bearing

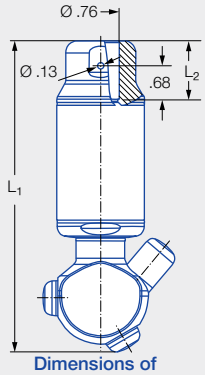
Sensor compatible,
Info: see page 37

FDA compliant

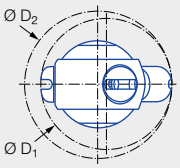


Dimensions of 1/2" slip-on connection according to ASME-BPE (OD tube)

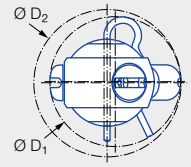
Female thread



Dimensions of 3/4" slip-on connection according to ASME-BPE (OD tube)



Insertion diameter D_1 and interference circle diameter D_2 of the threaded connection



Insertion diameter D_1 and interference circle diameter D_2 of the slip-on connection

Spray angle	Type	Order number: Connection 3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	1/2" slip-on connection	3/4" slip-on connection	Narrowest cross-section Ø [in]	V̇ water [gal/min] p [psi] 30	45	3.0 bar	75	145	Max. tank diameter [ft]
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

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

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

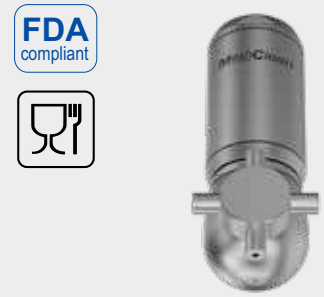
Bearing:
Ball bearing

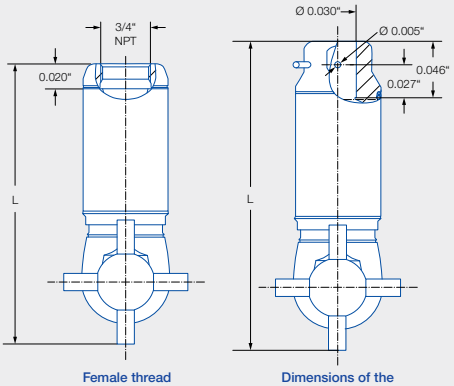
Required prefiltration:
Line filter with 0.2 mm/ 80 mesh

Installation:
Operation in every direction is possible

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

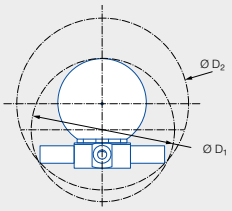
FDA compliant



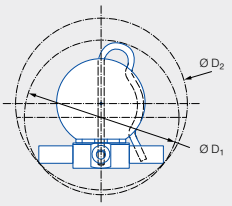


Female thread

Dimensions of the slip-on connection according to ASME-BE (OD-tube)

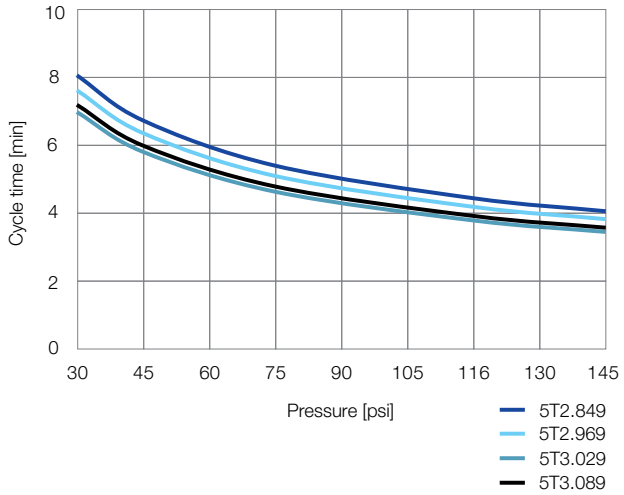


Insertion diameter D_1 and interference circle diameter D_2 of the threaded connection



Insertion diameter D_1 and interference circle diameter D_2 of the slip-on connection

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.

- 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.

ATEX version on request

High impact tank cleaning machine
MeshClean+
Series 5T5

- Powerful solid jet nozzles
- Suitable for large tanks with persistent soiling
- Active self-cleaning through special nozzle designs
- Low maintenance

Recommended operating pressure:
75 psi

Temperature:
302°F, 207°F (ATEX)

Weight:
5T5 approx. 8.12 lb.

Materials:
Stainless steel 1.4404 (316L), stainless steel 1.4532 (632), PTFE, PEEK, zirconium oxide, EPDM

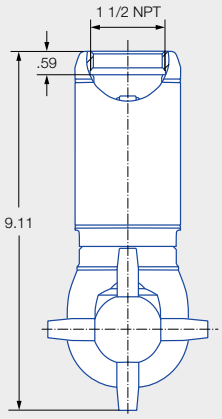
Bearing:
Ball bearing

Required prefiltration:
Line filter with 0.2 mm/ 80 mesh

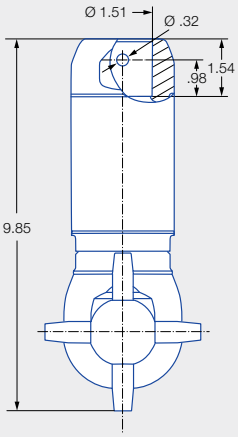
Installation:
Operation in every direction is possible

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

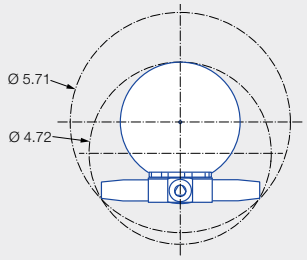
FDA compliant



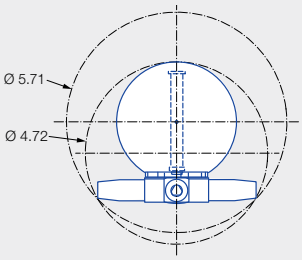
Female thread



Dimensions of slip-on connection according to ASME-BPE (OD tube)



Insertion diameter and interference circle diameter of the slip-on connection



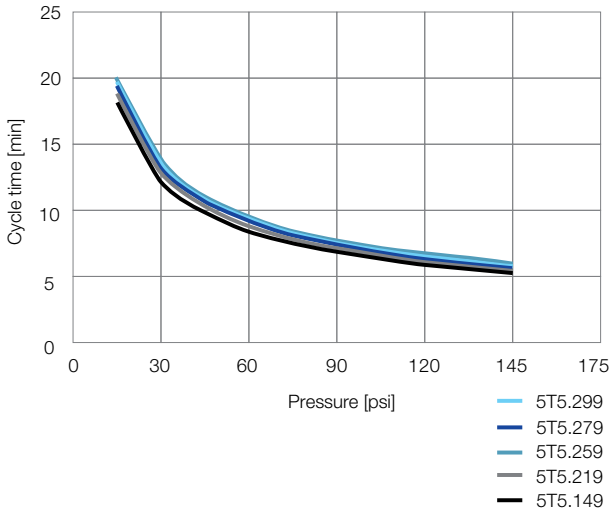
Insertion diameter and interference circle diameter of the threaded connection

Spray angle	Ordering number: Type	Connection: 1 1/2 NPT EPDM	1 1/2 NPT FKM	1 1/2" slip-on connection EPDM	1 1/2" slip-on connection FKM	Narrowest cross-section Ø [in]	Quantity x Ø nozzle [in]	V̇ water [gal/min] p [psi] (p_{max} = 218 psi) 30	45	75	5 bar (liters per minute)	145	V̇ water at 75 psi [SCFM]	Max. tank diameter [ft]
360°	**5T5.149.1Y**	**BS**	**45**	**TF15**	**34**	0.17	4 × .17	18.86	23.10	**29.82**	**111**	41.46	3.9	50
	5T5.219.1Y	**BS**	**45**	**TF15**	**34**	0.22	4 × .22	28.72	35.17	**45.40**	**169**	63.13	5.9	54
	5T5.259.1Y	**BS**	**45**	**TF15**	**34**	0.25	4 × .25	35.51	43.49	**56.15**	**209**	78.07	7.4	56
	5T5.279.1Y	**BS**	**45**	**TF15**	**34**	0.28	4 × .28	40.44	49.53	**63.94**	**238**	88.90	8.4	57
	5T5.299.1Y	**BS**	**45**	**TF15**	**34**	0.31	4 × .31	45.71	55.98	**72.27**	**269**	100.48	9.5	55

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

Duration of cleaning cycle



High impact tank cleaning machine
Series 5TM

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

Recommended operating pressure:
75 psi

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

Weight: Approx. 16.5 lb.

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

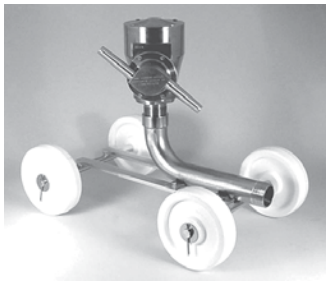
Bearing:
Ball and slide bearings

Installation:
Operates in every direction

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

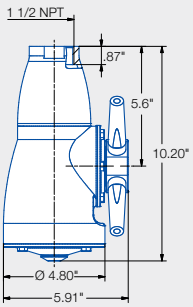
Rotation monitoring sensor:
Sensor compatible,
Info: see page 37

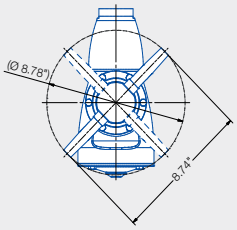
Our special mounting bracket provides the ability for the 5TM to reach the far ends of long horizontal tanks/ tankers. Mounting bracket part number: **099.164.17.00.00.0**



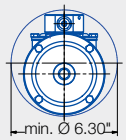
Portable cart for easier transporting of your 5TM from tank to tank. The cart part number is **M20.000.17.BR.**
For use with "BR" connection only.

FDA compliant

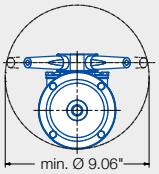




5TM.4XX.1Y.BS (4 nozzles) >



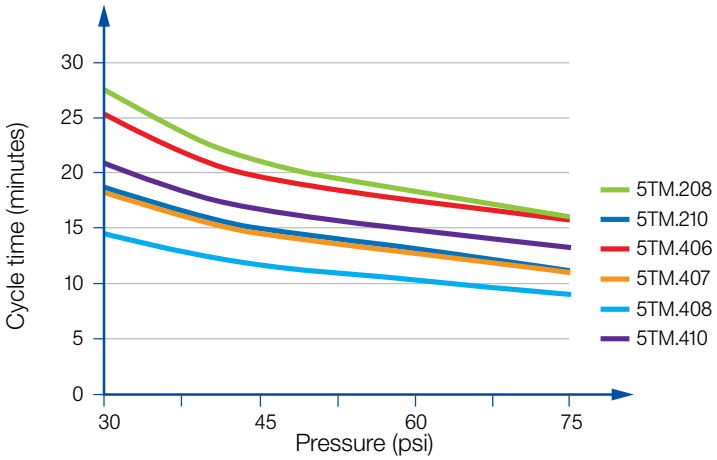
5TM.2XX.1Y.BS (2 nozzles)



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



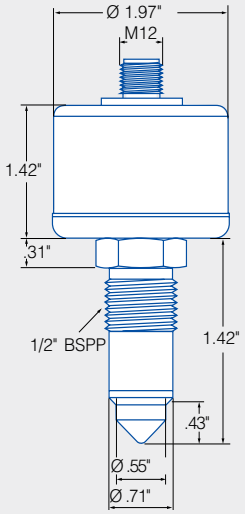
Cycle time depending on pressure of series 5TM

ATEX version on request

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.

FDA compliant



Electrical data

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

Operating conditions

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

Materials

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

Operating principle

- Capactive

Advantages

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

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

Rotation monitoring sensor with weld-in sleeve

Cable set for first-time operation/installation

Main adapter with cable

USB adapter with cable

Programming adapter Y-piece

Weld-in mandrel

* 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

Main adapter with cable

USB adapter with cable

Programming adapter Y-piece

Weld-in mandrel

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 2

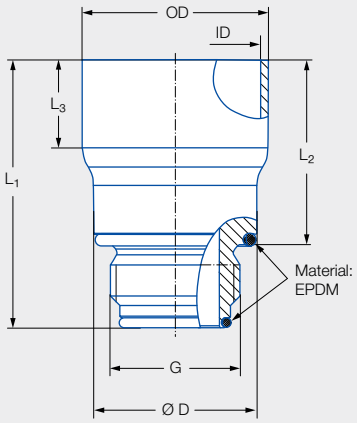
Figure 3

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

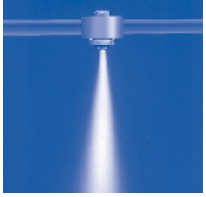
Installation

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.

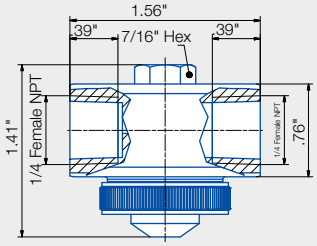


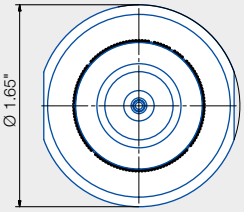
Pneumatic atomizing nozzles, **Full cone, pressure principle, internal mixing Series 136.1**

Fine full cone atomization and fogging with air or gas. Liquid pressure principle. Internal mixing of fluids.

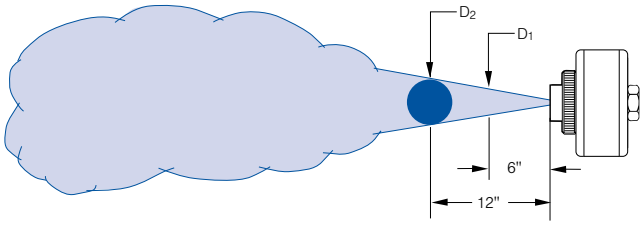
Applications:
Humidification of air, cooling, disinfection (e.g. bottles), coating, dosing, release agent applications.

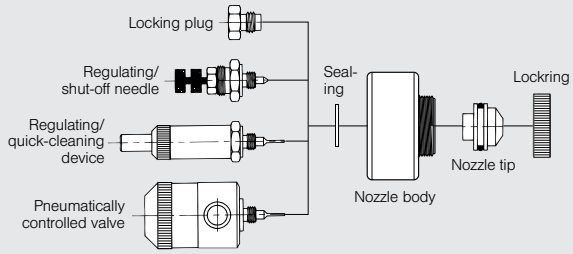
Series 136.1





Weight brass: .44 lb.





For accessories for series 136, please refer to page 35.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute) 10 psi Air psi	10 psi GPH	10 psi SCFM	20 psi Air psi	20 psi GPH	20 psi SCFM	40 psi Air psi	40 psi GPH	40 psi SCFM	60 psi Air psi	60 psi GPH	60 psi SCFM	Spray Dimensions Air psi	Liq. psi	D1 (in.)	D2 (in.)
20°	**136. 115. xx. B2**	○	○	.020	6	1.6	.18	20	1.5	.47	35	2.4	.65	44	2.9	.71	12	10	2	4
					12	1.0	.35	26	1.1	.59	41	2.0	.71	49	2.5	.82	26	20	2	4
					17	.45	.53	32	.58	.82	46	1.6	.88	55	2.2	.94	38	30	2	4
								38	.32	1.0	52	1.2	1.1	61	1.8	1.1	46	40	2	4
											64	.53	1.5	73	1.1	1.5	64	60	2	4
											75	.11	1.8	84	.55	1.8				
	136. 125. xx. B2	○	○	.020	12	1.2	.88	17	1.8	1.1	41	2.4	1.9	49	2.8	2.3	20	10	2	4
					17	1.2	1.1	23	1.7	1.3	46	2.3	2.2	55	2.7	2.5	32	20	2	4
					23	1.1	1.4	29	1.6	1.5	52	2.2	2.4	61	2.6	2.7	41	30	2	4
					29	.92	1.5	35	1.5	1.8	58	2.1	2.6	73	2.5	3.2	49	40	2	4
					35	.79	1.8	41	1.4	2.0	64	2.0	2.8	78	2.4	3.4	61	60	2	4
					41	.71	1.9	46	1.3	2.2	70	1.9	3.1	84	2.3	3.6				
	136. 134. xx. B2	○	○	.028	17	3.5	1.6	29	5.1	2.3	44	7.5	3.1	55	8.6	3.6	26	10	2	4
					23	3.3	1.9	35	4.8	2.6	49	7.3	3.4	61	8.5	4.0	41	20	2	4
					29	3.1	2.3	41	4.6	2.9	55	7.1	3.7	67	8.3	4.3	55	30	2	4
					35	3.0	2.6	46	4.4	3.2	61	6.8	4.0	73	8.1	4.6	75	40	3	4
					41	2.9	2.9	52	4.3	3.5	67	6.6	4.3	78	7.9	4.9	87	60	3	4
					46	2.9	3.2	58	4.1	3.8	73	6.4	4.6	84	7.7	5.2				
	136. 142. xx. B2	○	○	.098	20	6.4	3.0	23	14	2.8	46	19	4.7	55	25	5.4	12	10	2	4
					26	5.4	3.7	29	11	3.5	52	17	5.4	61	22	5.9	23	20	3	4
					32	5.3	4.2	35	9.3	4.2	58	15	6.2	67	20	6.7	44	30	2	4
					38	5.1	4.8	41	8.0	4.9	64	13	6.9	73	18	7.4	58	40	3	4
					44	4.6	5.5	46	7.6	5.6	70	12	7.6	78	17	8.1	87	60	3	4
					49	4.4	6.1	52	7.4	6.2	75	11	8.3	84	15	8.8				

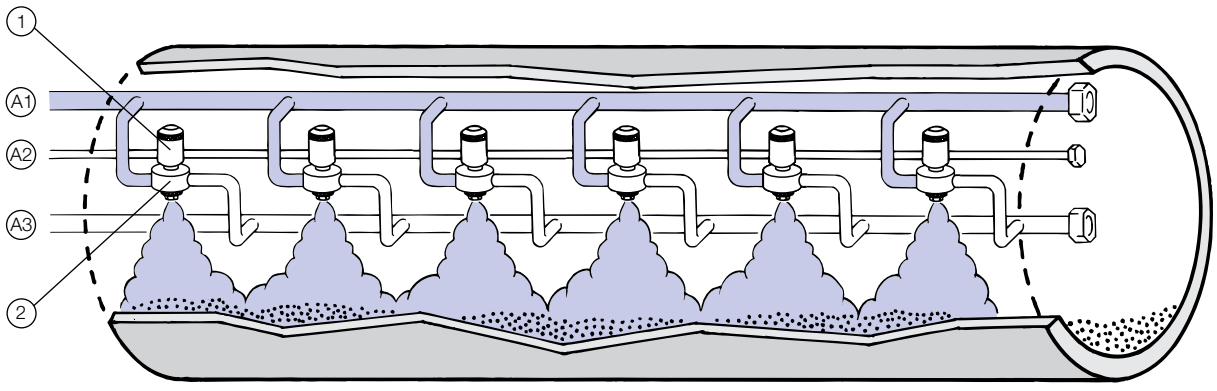
Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 115. xx. B2	+	1Y	=	136. 115. 1Y. B2

Additional flow rate data available upon request. The body is also available in a rectangular design.

Spray angle	Ordering number			Narrowest free cross section Ø [in]	Liquid pressure p [psi]												Spray dimensions			
	Type	Material number			10			20			40			60						
		1Y	16																	
		Stainless steel 316L	Stainless steel 303		**p** air [psi]	V̇ water [gal/h]	$\dot{V}_n$ air [SCFM]	**p** air [psi]	$\dot{V}$ water [gal/h]	$\dot{V}_n$ air [SCFM]	**p** air [psi]	$\dot{V}$ water [gal/h]	$\dot{V}_n$ air [SCFM]	**p** air [psi]	$\dot{V}$ water [gal/h]	$\dot{V}_n$ air [SCFM]	**p** air [psi]	**p** water [psi]	Ø D_1 [in]	Ø D_2 [in]
20°	**136.134.xx.B2**	●	●	0.03	17	**3.5**	1.6	29	**5.1**	2.3	44	**7.5**	3.1	55	**9.6**	3.6	26	10	2	4
					23	**3.3**	1.9	35	**4.8**	2.6	49	**7.2**	3.4	61	**8.4**	4.0	41	22	2	4
					29	**3.1**	2.3	41	**4.6**	2.9	55	**7.0**	3.7	67	**8.2**	4.3	55	29	2	4
					35	**3.0**	2.6	46	**4.4**	3.2	61	**6.8**	4.0	73	**8.1**	4.6	75	44	3	4
					41	**2.9**	2.9	52	**4.2**	3.5	67	**6.6**	4.3	78	**7.9**	4.9	87	58	3	4
					46	**2.8**	3.2	58	**4.1**	3.8	73	**6.4**	4.6	84	**7.7**	5.2	–	–	–	–
					52	**2.8**	3.5	64	**4.0**	4.1	78	**6.2**	4.9	–	**–**	–	–	–	–	–
					58	**2.7**	3.8	70	**3.9**	4.5	84	**6.1**	5.2	–	**–**	–	–	–	–	–
					64	**2.6**	4.1	75	**3.8**	4.8	–	**–**	–	–	**–**	–	–	–	–	–
					70	**2.6**	4.5	81	**3.7**	5.1	–	**–**	–	–	**–**	–	–	–	–	–
					75	**2.5**	4.8	87	**3.6**	5.4	–	**–**	–	–	**–**	–	–	–	–	–
					81	**2.4**	5.1	–	**–**	–	–	**–**	–	–	**–**	–	–	–	–	–
					87	**2.2**	5.4	–	**–**	–	–	**–**	–	–	**–**	–	–	–	–	–
	136.142.xx.B2	●	●	0.10	20	**6.4**	3.0	23	**14.1**	2.8	46	**18.7**	4.7	55	**24.6**	5.4	12	10	2	4
					26	**5.4**	3.7	29	**11.2**	3.5	52	**16.5**	5.4	61	**22.0**	5.9	23	22	3	4
					32	**5.3**	4.2	35	**9.3**	4.2	58	**14.7**	6.2	67	**19.9**	6.7	44	29	2	4
					38	**5.1**	4.8	41	**8.0**	4.9	64	**13.0**	6.9	73	**18.2**	7.4	58	44	3	4
					44	**4.6**	5.5	46	**7.5**	5.6	70	**11.8**	7.6	78	**16.8**	8.1	87	58	3	4
					49	**4.3**	6.1	52	**7.4**	6.2	75	**11.1**	8.3	84	**15.2**	8.8	–	–	–	–
					55	**4.5**	6.7	58	**7.2**	6.8	81	**10.7**	8.9	–	**–**	–	–	–	–	–
					61	**4.3**	7.3	64	**6.8**	7.4	87	**10.5**	9.5	–	**–**	–	–	–	–	–
					67	**3.9**	7.8	70	**6.4**	7.9	–	**–**	–	–	**–**	–	–	–	–	–
					73	**3.7**	8.4	75	**5.9**	8.6	–	**–**	–	–	**–**	–	–	–	–	–
					78	**3.4**	9.0	81	**5.7**	9.2	–	**–**	–	–	**–**	–	–	–	–	–
					84	**3.3**	9.5	87	**5.6**	9.8	–	**–**	–	–	**–**	–	–	–	–	–

E = narrowest free cross section (water)

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136.134.xx.A2	+	**1Y**	=	**136.134.1Y.A2**



A1 Liquid supply line
A2 Control air for pneumatic valve
A3 Atomizing air supply line

1 Pneumatically controlled valve
Ordering no. 013.60x.xx.xx (see Page 43)
2 Pneumatic atomizing nozzle
Ordering no. 136.xxx.xx.xx

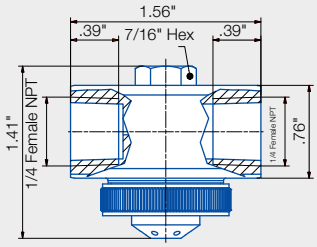
Cereal dampening in a mixing drum

Pneumatic atomizing nozzles, **Full cone, pressure principle, internal mixing Series 136.2**

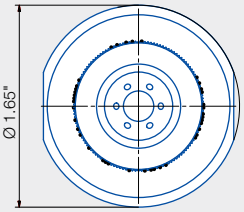
Fine full cone atomization and fogging with air or gas.
Especially wide spray angle of 60°.
Pressure principle.
Internal mixing of fluids.

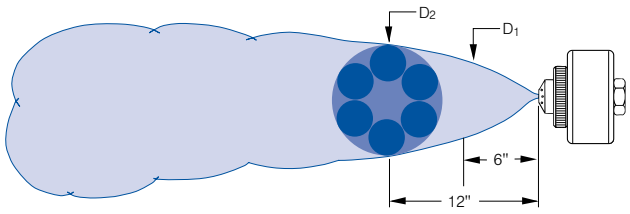
Applications:
Humidification of air, cooling, disinfection (e.g. bottles), coating, dosing, release agent applications.

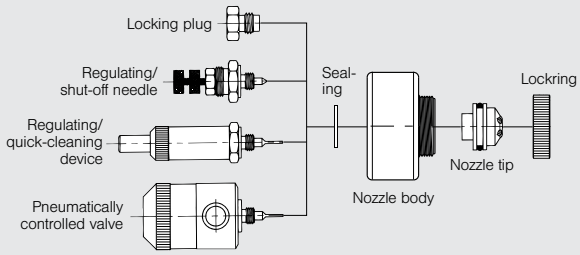
Series 136.2



Weight brass: .44 lb.





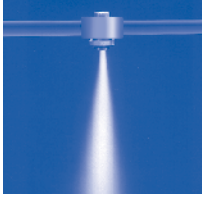


For accessories for series 136, please refer to page 35.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute)												Spray Dimensions			
					10 psi			20 psi			40 psi			60 psi						
					Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	GPH	SCFM	Air psi	Liq. psi	D1 (in.)	D2 (in.)
60°	**136. 215. xx. B2**	○	○	.020	15	.79	.77	23	1.5	1.0	41	2.2	1.4	55	2.5	1.8	15	10	8	12
					17	.48	.88	26	1.3	1.1	46	1.9	1.6	61	2.2	2.1	23	20	9	15
					20	.18	1.1	29	1.0	1.2	52	1.5	1.9	67	1.8	2.3	35	30	9	15
								32	.74	1.4	58	1.1	2.1	73	1.4	2.5	46	40	10	15
								35	.45	1.5	64	.58	2.4	78	1.0	2.8	61	60	10	16
								38	.21	1.6	70	.21	2.6	84	.61	3.1				
											73	.11	2.7	87	.37	3.3				
	136. 222. xx. B2	○	○	.039	12	4.6	1.6	23	6.8	2.4	44	11	3.4	55	15	3.8	12	10	10	18
					15	1.6	2.5	26	3.9	3.1	46	8.3	4.1	58	12	4.3	23	20	10	18
								29	1.8	3.9	49	5.9	4.8	61	9.9	5.0	33	30	10	18
								32	.50	4.8	52	3.9	5.6	64	7.8	5.7	46	40	10	18
											55	2.2	6.5	67	5.7	6.6	61	60	10	18
											58	1.2	7.2	70	4.0	7.3				
														73	2.6	8.1				
	136. 231. xx. B2	○	○	.055	23	6.8	3.0	38	12	4.1	52	25	4.6	61	35	4.3	29	10	9	15
					29	4.7	3.6	44	8.7	4.8	58	21	5.5	67	31	5.3	38	20	10	16
					35	3.0	4.2	49	6.5	5.4	64	17	6.2	73	27	6.1	35	30	10	17
					41	1.8	4.8	55	4.8	6.0	70	15	7.0	78	23	6.9	52	40	10	17
								61	3.5	6.6	75	12	7.7	84	20	7.8	61	60	10	17
								67	2.5	7.1	81	10	8.3	87	19	8.1				

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 215. xx. B2	+	1Y	=	136. 215. 1Y. B2

Additional flow rate data available upon request.
The body is also available in a rectangular design.

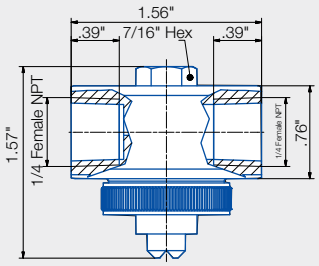


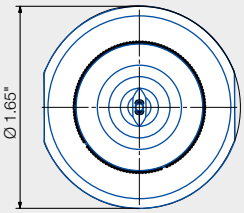
Pneumatic atomizing nozzles, **Flat fan, pressure principle, internal mixing Series 136.4**

Particularly fine flat fan atomization with air or gas.
Pressure principle.
Internal mixing of fluids.

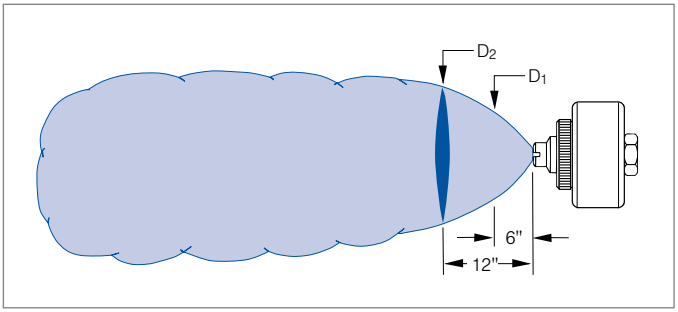
Applications:
Belt lubrication, cooling, humidification of goods, coating, dosing (e.g. Conveyor belt), release agent applications.

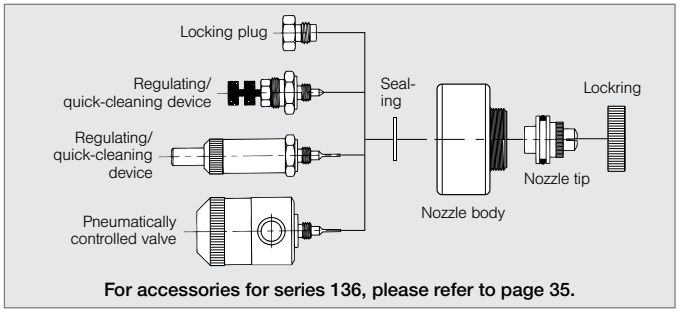
Series 136.4





Weight brass: .44 lb.





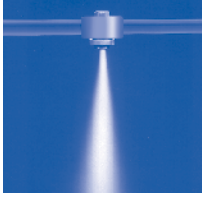
For accessories for series 136, please refer to page 35.

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute) 10 psi Air psi	10 psi GPH	10 psi SCFM	20 psi Air psi	20 psi GPH	20 psi SCFM	40 psi Air psi	40 psi GPH	40 psi SCFM	60 psi Air psi	60 psi GPH	60 psi SCFM	Spray Dimensions Air psi	Liq. psi	D1 (in.)	D2 (in.)
45°	**136. 414. xx. B2**	○	○	.028	15	2.0	.77	20	3.8	.88	32	5.9	1.2	44	6.6	1.5	20	10	3	5
					17	1.6	.88	23	3.4	.94	38	5.3	1.4	49	6.1	1.6	35	20	4	6
					20	1.1	1.0	26	3.1	1.1	44	4.7	1.5	55	5.5	1.8	46	30	4	6
					23	.71	1.1	29	2.7	1.2	49	4.1	1.8	61	5.0	2.1	55	40	5	7
					26	.34	1.2	32	2.4	1.3	55	3.5	2.0	67	4.5	2.2				
								35	2.0	1.4	61	2.9	2.2	73	3.9	2.5				
								38	1.6	1.5	67	2.3	2.4	78	3.4	2.7				
								41	1.2	1.6	73	1.7	2.6	84	2.9	2.9				
								46	.55	1.9	84	.66	3.1							
	136. 443. xx. B2	○	○	.039	17	3.7	.88	23	7.0	.94	44	9.8	1.5	52	12	1.7	17	10	4	6
					20	3.1	1.0	26	6.4	1.1	49	8.7	1.8	58	11	1.9	29	20	5	7
					23	2.5	1.1	29	5.8	1.2	55	7.8	2.0	64	10	2.2	41	30	6	7
					26	2.1	1.2	32	5.3	1.3	61	6.9	2.2	70	9.2	2.4	55	40	6	8
								35	4.8	1.4	67	6.1	2.5	75	8.4	2.6				
								38	4.3	1.5	73	5.3	2.7	81	7.7	2.9				
								41	3.8	1.6	78	4.6	2.9	87	6.9	3.1				
								46	3.0	1.9	87	3.7	3.2							
								52	2.3	2.1										
	136. 462. xx. B2	○	○	.059	17	5.0	1.5	29	5.8	1.2	44	16	2.4	55	20	2.7	17	10	5	6
					23	3.2	2.0	35	4.8	1.4	49	14	2.8	58	19	3.0	35	20	5	7
					29	2.5	2.4	41	3.8	1.6	55	12	3.4	61	17	3.2	46	30	5	7
					35	1.9	2.8	46	3.0	1.9	61	10	3.9	64	16	3.5	55	40	6	8
					41	1.5	3.2	52	2.3	2.1	67	8.8	4.4	67	15	3.8				
					46	1.3	3.5	58	2.1	2.3	73	7.8	4.8	70	14	3.9				
					52	.95	3.9	64	1.6	2.5	78	6.7	5.2	73	14	4.2				
					58	.85	4.2	70	1.2	2.7	84	5.8	5.7	75	13	4.5				
					64	.58	4.6	75	.85	2.9	87	5.4	5.8	78	12	4.8				
								84	.21	3.2				84	12	5.1				

Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 414. xx. B2	+	1Y	=	136. 414. 1Y. B2

Additional flow rate data available upon request.
The body is also available in a rectangular design.

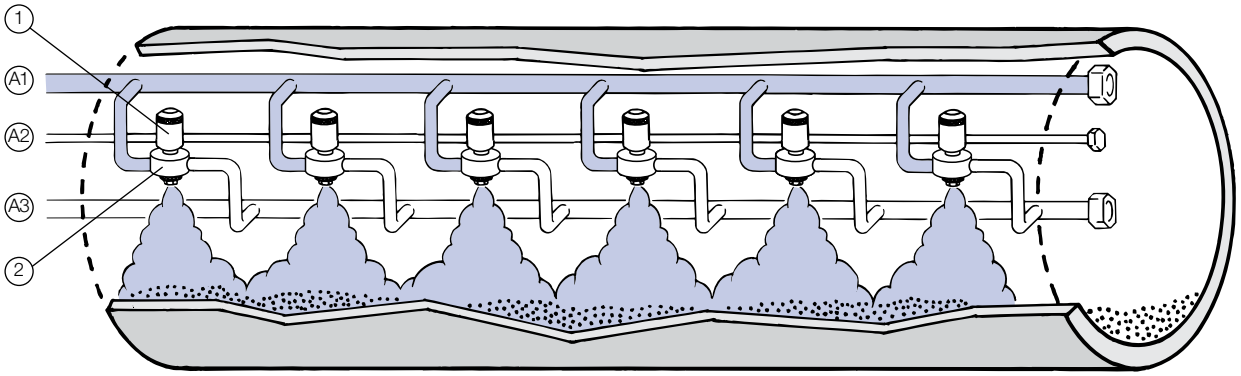
Continued on next page.



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

Spray angle	Ordering no. Type	Mat. no. 316L SS 1Y	Mat. no. 303 SS 16	Maximum Free Passage (in.)	Liquid Flow GPH (Gallons Per Hour) at Indicated Liquid Pressure / Air Flow SCFM (Standard Cubic Feet Per Minute) 10 psi Air psi	10 psi GPH	10 psi SCFM	20 psi Air psi	20 psi GPH	20 psi SCFM	40 psi Air psi	40 psi GPH	40 psi SCFM	60 psi Air psi	60 psi GPH	60 psi SCFM	Spray Dimensions Air psi	Liq. psi	D1 (in.)	D2 (in.)
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										
	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 for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	136. 425. xx. B2	+	1Y	=	136. 425. 1Y. B2



(A1) Liquid supply line
(A2) Control air for pneumatic valve
(A3) Atomizing air supply line

(1) Pneumatically controlled valve
Ordering no. 013. 601. xx. xx (see page 49)

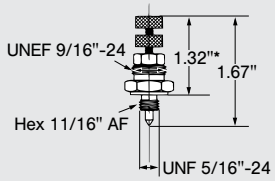
(2) AirMist pneumatic atomizing nozzle

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



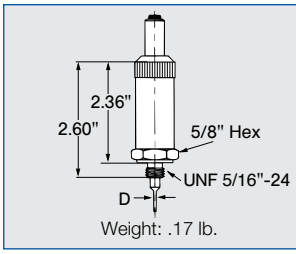
* max. opened

Weight: .07 lb.

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

Regulating device with quick-cleaning needle:
Combines orifice cleaning with liquid flow control — manually operated

1B

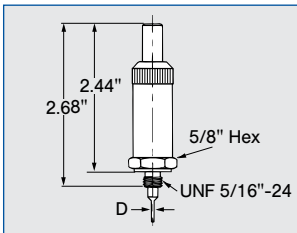


Weight: .17 lb.

Ordering no.			Use the 6th digit to determine appropriate accessory Example: 136.41**4**.1Y.B2	Needle diameter D (in.)
Assembly part no.	Mat. no. 303 SS 16	Brass Nickel Plate 35		
013. 601. xx. 30	○	○	136. xx**1**. xx. B2	.085
013. 602. xx. 30	○	○	136. xx**2**. xx. B2	.048
013. 604. xx. 30	○	○	136. xx**4**. xx. B2	.024

Quick-cleaning device:
Does orifice cleaning with push-button pin — manually operated

1C

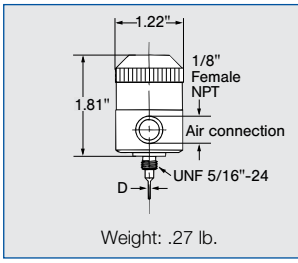


Weight: .12 lb.

013. 601. xx. 20	○	○	136. xx**1**. xx. B2	.085
013. 602. xx. 20	○	○	136. xx**2**. xx. B2	.048
013. 604. xx. 20	○	○	136. xx**4**. xx. B2	.024

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

1D



Weight: .27 lb.

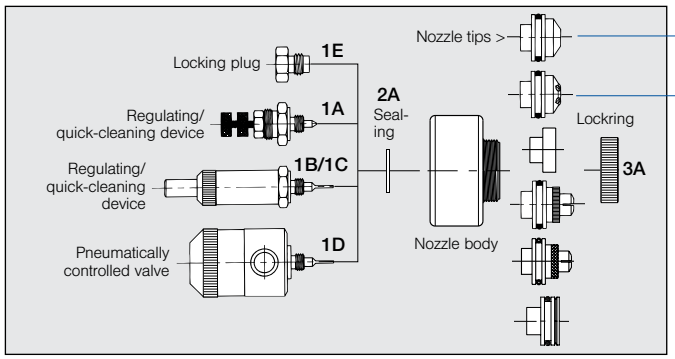
013. 601. xx. 10	○	○	136. xx**1**. xx. B2	.085
013. 602. xx. 10	○	○	136. xx**2**. xx. B2	.048
013. 604. xx. 10	○	○	136. xx**4**. xx. B2	.024

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

1E for Series 136/166
Locking plug
156. 000. 1Y. 00. 04

2A for Series 136
Seal
095. 015. 7A. 03. 04

3A for Series 136/166
Lockring
136. 000. 1Y. 00. 07



Nozzle tips*
Series 136.1/166.1
136. xxx. 1Y. 00. 03
Series 136.2/166.2
136. xxx. 1Y. 00. 03

* Use the 3 digits from the full nozzle assembly for the spare tip part number
Example: 136.**414**.17.B2

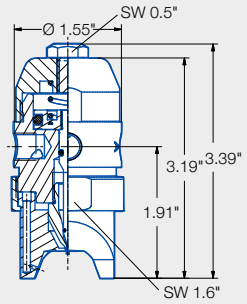
Pneumatic atomizing nozzles, **for atomizing viscous media Series 176 ViscoMist™**

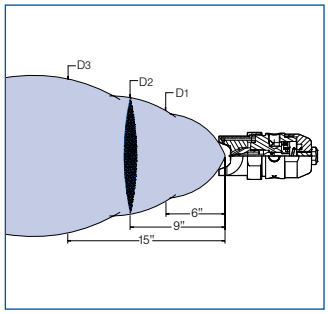
Versatile design with built-in pneumatic needle valve for liquid flow control and automatic clean-out. Three nozzle body configurations offer flexible tailoring to your specific application needs. Models feature individual controls for on-off operation, atomizing air, and fan air, allowing adjustments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

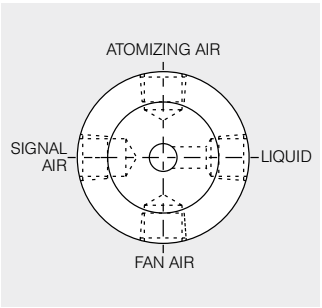
Applications:
- Spraying viscous fluids
- Coating
- Glazing
- Sanitizing
- Humidification
- Recirculating liquids

All nozzle inlet connections: 1/8" female NPT

FDA compliant







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:

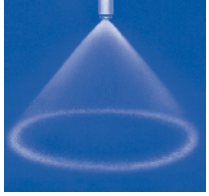
Atomizing Air (A)
The Atomizing Air Port influences the atomization of the liquid into either small or large droplet sizes, simultaneously affecting spray distribution in the center of the spray pattern. To achieve finer liquid atomization, increase the atomizing air pressure.

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.

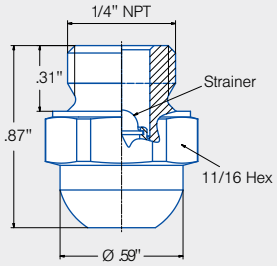
Axial-flow hollow cone nozzles
Series 220



Extremely fine, fog-like hollow cone spray.

Applications:
Disinfection, humidification, cooling.

FDA compliant



Spray angle	Ordering no. Type	Material no 430F SS* 11	Material no 316LL SS* 1Y	Connection Male 1/4" NPT	Orifice diam. (in.)	Free Passage (in.)	Mesh size Strainer (in.)	Flow Rate (Gallons Per Minute) 30 psi	45 psi	liters per minute 5 bar	75 psi	100 psi	150 psi	300 psi	Spray Diam. D (in.) @ 72 psi H=4"	Theoretical Spray Width @ 72.5 psi (5 bar) H=100mm
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 for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	220. 004	+	1Y	+	BC	=	220. 004. 1Y. BC

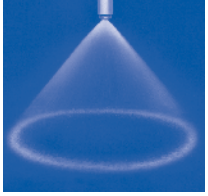
Nozzles of series 220 replace series 212 which are still available on request.

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

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

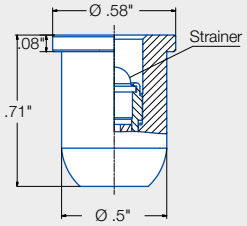


Axial-flow hollow cone nozzles for retaining nut
Series 226

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

Applications:
Disinfection, humidification, cooling.

FDA compliant



Spray angle	Ordering no. Type	Material no. 303 SS* 16	Orifice diam. (in.)	Free Passage (in.)	Mesh size Strainer (in.)	Flow Rate (Gallons Per Minute) 30 psi	45 psi	liters per minute 5 bar	75 psi	100 psi	150 psi	300 psi	Spray Diam. D (in.) @ 72 psi H=4"	Theoretical Spray Width @ 72.5 psi (5 bar) H=100mm
60°	226. 004	○	.004	.004	.002	-	-	.013	.003	.004	.005	.007	4	100
	226. 014	○	.006	.006	.002	-	.004	.019	.005	.006	.007	.010	4	100
	226. 054	○	.008	.006	.002	.004	.006	.027	.007	.008	.010	.014	6	140
80°	226. 085	○	.010	.010	.004	.007	.008	.040	.011	.012	.015	.021	6	140
	226. 125	○	.014	.014	.004	.010	.013	.062	.016	.019	.023	.033	6	140
	226. 145	○	.016	.016	.004	.014	.017	.082	.022	.026	.031	.043	6	140
	226. 165	○	.018	.018	.004	.017	.021	.103	.027	.032	.039	.054	6	140
	226. 185	○	.022	.014	.008	.022	.027	.130	.034	.041	.049	.069	6	140
	226. 205	○	.024	.014	.008	.028	.034	.168	.044	.053	.063	.089	6	140
	226. 245	○	.028	.020	.008	.044	.053	.261	.069	.082	.097	.138	6	140
	226. 285	○	.035	.022	.008	.065	.080	.390	.103	.122	.146	.206	6	140

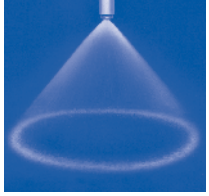
Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	226. 004	+	16	+	BC	=	220. 004. 1Y. BC

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

* Materials

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

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



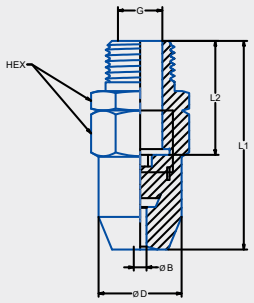
Axial-flow hollow cone nozzles
Series 214 / 216 / 218

Fine, uniform hollow cone spray.

Applications:
Cooling and cleaning of air and gas, dust control, spraying onto filters, spray drying, desuperheating.

FDA compliant

(Mat. no. 17)



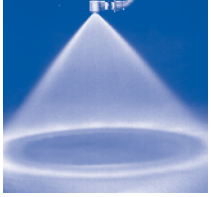
Ordering no.	Dimensions [in]					Weight [lb]
	Thread size Male NPT	Hex (mm)	L_1	L_2	Ø D_1	
214.xxx.YY.BA	1/8	17	1.531	0.718	0.625	0.15
214.xxx.YY.BC	1/4	17	1.593	0.718	0.625	0.20
216.xxx.YY.BC	1/4	22	1.468	1.156	0.843	0.25
216.xxx.YY.BE	3/8	22	1.468	1.156	0.843	0.25
218.xxx.YY.BG	1/2	27	2.531	1.406	1.031	0.30

Spray angle	Ordering no. Type	Mat. no. 316 SS 17	Mat. no. Brass 30	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	40 psi	60 psi	80 psi	100 psi	Spray Diam. D (in.) @ 40 psi H=10"
60°	214. 184	○	○	BA	BC	-	-	.020	.019	.01	.02	.08	.02	.03	.04	.04	8
80°	214. 245	○	○	BA	BC	-	-	.039	.019	.02	.04	.16	.05	.06	.07	.08	18
	214. 305	○	○	BA	BC	-	-	.071	.019	.05	.07	.32	.10	.12	.14	.16	18
60°	216. 324	○	○	-	BC	BE	-	.039	.039	.06	.09	.40	.12	.15	.18	.20	8
	216. 364	○	○	-	BC	BE	-	.055	.055	.10	.14	.63	.20	.24	.28	.31	8
	216. 404	○	○	-	BC	BE	-	.079	.078	.16	.22	1.0	.31	.38	.44	.49	8
90°	216. 496	○	○	-	BC	BE	-	.118	.078	.26	.37	1.7	.53	.65	.75	.83	20
	216. 566	○	○	-	BC	BE	-	.158	.078	.39	.55	2.5	.78	.95	1.1	1.2	20
	216. 646	○	○	-	BC	BE	-	.138	.078	.62	.88	4.0	1.2	1.5	1.8	2.0	20
	216. 686	○	○	-	BC	BE	-	.158	.078	.78	1.1	5.0	1.6	1.9	2.2	2.5	20
	216. 726	○	○	-	BC	BE	-	.197	.078	.98	1.4	6.3	2.0	2.4	2.8	3.1	20
	216. 776	○	○	-	BC	BE	-	.236	.078	1.3	1.9	8.5	2.6	3.2	3.7	4.2	20
	218. 646	○	○	-	-	-	BG	.197	.078	.62	.88	4.0	1.2	1.5	1.9	2.0	20
	218. 666	○	○	-	-	-	BG	.217	.078	.70	.99	4.5	1.4	1.7	2.0	2.2	20
	218. 706	○	○	-	-	-	BG	.256	.078	.87	1.2	5.6	1.7	2.1	2.5	2.8	20
	218. 766	○	○	-	-	-	BG	.197	.078	1.2	1.8	8.0	2.5	3.0	3.5	3.9	20
	218. 826	○	○	-	-	-	BG	.256	.078	1.7	2.5	11.2	3.5	4.3	4.9	5.5	20
	218. 846	○	○	-	-	-	BG	.296	.078	1.9	2.7	12.5	3.9	4.8	5.5	6.1	20
	218. 886	○	○	-	-	-	BG	.355	.094	2.5	3.5	16.0	5.0	6.1	7.0	7.9	20

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	216. 496	+	17	+	BC	=	216. 496. 17. BC

This product line is also available in larger capacities up to 5 gpm @ 40 psi. Please contact Lechler if you require a larger size.

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



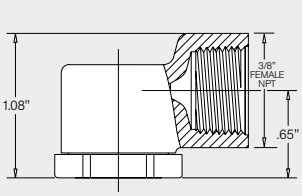
Tangential-flow hollow cone nozzles
Plastic version
Series 302

Uniform hollow cone spray. Non-clogging nozzle, without swirl insert.

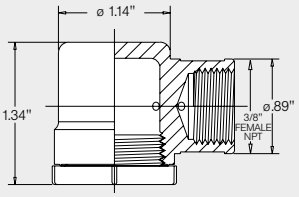
Applications:
Dust control, spraying onto filters, foam control, pasteurization.

FDA compliant

(Mat. no. 5E / 53)



Type 302.32X–302.48X
Weight: .03 lb.



Type 302.52X–302.99X
Weight: .04 lb.

Spray angle	Ordering no. Type	Material no. PVDF 5E	Material no. Nylon 51	Material no. PP 53	Connection Female 3/8" NPT	Connection Female 3/8" BSPP	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Spray Diameter D (in.) @ 30 psi H=10"	H=20"
60°	302. 364	-	○	○	-	00	.051	.051	.10	.14	.63	.17	.20	.24	.28	.31	8	14
80°	302. 545	○	○	-	-	00	.193	.091	.35	.49	2.2	.59	.70	.85	.98	1.1	16	28
90°	302. 326	○	○	-	-	00	.041	.041	.06	.09	.40	.11	.12	.15	.18	.20	16	28
	302. 366	○	○	-	-	00	.051	.051	.10	.14	.63	.17	.20	.24	.28	.31	16	28
	302. 406	○	○	○	-	00	.061	.061	.16	.22	1.0	.27	.31	.38	.44	.49	16	35
	302. 526	-	○	○	BF	-	.197	.079	.31	.44	2.0	.54	.62	.76	.88	.98	16	35
	302. 566	-	○	○	BF	-	.197	.095	.39	.55	2.5	.67	.78	.95	1.1	1.2	16	35
	302. 606	-	○	○	BF	-	.197	.126	.49	.69	3.2	.86	.98	1.2	1.4	1.5	18	37
	302. 686	-	○	-	BF	-	.296	.134	.78	1.1	5.0	1.3	1.6	1.9	2.2	2.5	20	41
	302. 766	-	○	-	BF	-	.355	.169	1.2	1.8	8.0	2.2	2.5	3.0	3.5	3.9	20	41
	302. 846	-	○	○	BF	-	.433	.205	1.9	2.7	12.5	3.4	3.9	4.8	5.5	6.1	22	45
	302. 886	○	○	○	BF	-	.433	.252	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.8	22	45
	302. 966	-	○	-	BF	-	.433	.339	3.9	5.5	25.0	6.7	7.8	9.5	11.0	12.3	22	45
130°	302. 328	○	-	-	-	00	.053	.032	.06	.09	.40	.11	.12	.15	.18	.20	28	54
	302. 408	○	○	-	-	00	.144	.051	.16	.22	1.0	.27	.31	.38	.44	.49	28	54
	302. 528	-	○	-	BF	-	.197	.079	.31	.44	2.0	.54	.62	.76	.88	.98	28	54
	302. 568	-	○	-	BF	-	.197	.095	.39	.55	2.5	.67	.78	.95	1.1	1.2	31	60
	302. 608	○	○	○	BF	-	.197	.126	.49	.69	3.2	.86	.98	1.2	1.4	1.5	31	60
	302. 648	-	○	○	BF	-	.296	.118	.62	.88	4.0	1.1	1.2	1.5	1.8	2.0	37	73
	302. 688	-	○	-	BF	-	.296	.134	.78	1.1	5.0	1.3	1.6	1.9	2.2	2.5	37	73
	302. 728	-	○	-	BF	-	.296	.162	.98	1.4	6.3	1.7	2.0	2.4	2.8	3.1	37	73
	302. 768	-	○	-	BF	-	.355	.169	1.2	1.8	8.0	2.2	2.5	3.0	3.5	3.9	37	73
	302. 848	-	○	-	BF	-	.433	.205	1.9	2.7	12.5	3.7	3.9	4.8	5.5	6.1	37	73
	302. 888	-	○	○	BF	-	.433	.252	2.5	3.5	16.0	4.3	5.0	6.1	7.0	7.9	37	73
	302. 968	○	○	-	BF	-	.433	.339	3.9	5.5	25.0	6.7	7.8	9.5	11.0	12.3	37	73

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	302. 566	+	51	+	BF	=	302. 566. 51. BF

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

Axial-flow full cone nozzles
Series 490 / 491

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

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

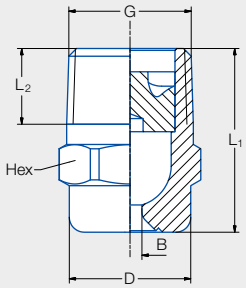
Series 490/491 represents a new generation within the axial-flow full cone nozzles product group. These nozzles were developed using state-of-the-art design and simulation methods (CFD).

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

FDA compliant

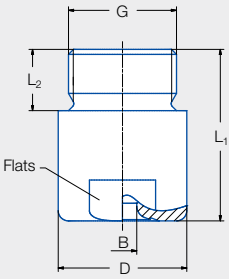
(Mat. no. 17)

Series 490



Conn. BA-BG

Series 491



Conn. BK-BM

Conn.	G	Dimensions (in.) L_1	L_2	D	Hex	Weight Brass
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. Type	Mat. no. 316 L 1Y	Mat. no. Brass 30	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	3/4"	1"	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Coverage (in.) @ 30 psi H=8"	H=20"
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	○	○	-	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	-	○	-	BC	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.

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

Axial-flow full cone nozzles
Series 490 / 491

Spray Angle	Ordering no. Type	Mat. no. 316 L 1Y	Mat. no. Brass 30	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	3/4"	1"	Orifice diam. (in.)	Free Passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Coverage (in.) @ 30 psi H=8"	H=20"
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	036	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	○	○	BA	BC	-	-	-	-	.083	.081	.54	.72	3.15	.84	.95	1.11	1.25	1.37	1.61	27	48
	490. 648	○	○	-	BC	BE	-	-	-	.094	.094	.69	.91	4.00	1.07	1.20	1.41	1.59	1.73	2.04	27	52
	490. 688	○	○	-	BC	BE	-	-	-	.108	.108	.86	1.14	5.00	1.34	1.50	1.77	1.98	2.17	2.55	27	52
	490. 728	○	○	-	BC	BE	-	-	-	.126	.110	1.09	1.43	6.30	1.69	1.89	2.23	2.50	2.73	3.21	27	52
	490. 748	○	○	-	-	BE	-	-	-	.126	.126	1.23	1.62	7.10	1.90	2.13	2.51	2.82	3.08	3.62	27	52
	490. 768	○	○	-	-	BE	-	-	-	.136	.136	1.38	1.94	8.00	2.14	2.40	2.83	3.17	3.47	4.08	27	52
	490. 808	○	○	-	-	BE	-	-	-	.154	.154	1.72	2.28	10.00	2.68	3.00	3.53	3.97	4.34	5.10	27	52
	490. 848	○	○	-	-	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 for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	490. 368	+	1Y	+	BA	=	490. 368. 1Y. BA

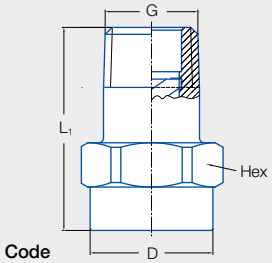
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

Axial-flow full cone nozzles
Series 460 / 461

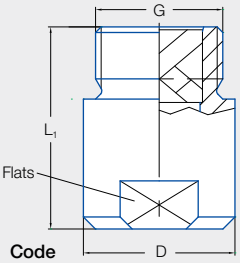
Very uniform spray pattern. Large free cross-sections, due to optimized x-style swirl insert.

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

FDA compliant



Code BA-BG



Code BK-BM

Conn. Code	Dimensions (in.)				Weight Brass (lb.)
	Male NPT	L_1	D	Hex/Flats	
BA	1/8	.71	.51	14	.03
BC	1/4	.87	.51	14	.04
BE	3/8	1.18	.63	17	.07
BG	1/2	1.65	.83	22	.15
BK	3/4	1.97	1.09	27	.38
BM	1	2.20	1.32	27	.79

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

Spray angle	Ordering no. Type	Mat. no. PVDF 5E	Mat. no. Polypro 53	Connection Male NPT 1/8"	1/4"	3/8"	1/2"	3/4"	1"	Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Diam. D (in.) @ 30 psi H=8"	H=20"
60°	460. 644	○	-	-	BC	BE	-	-	-	.095	.075	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	9	22
	460. 964	○	-	-	-	-	-	BK	-	.229	.193	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	9	22
90°	460. 326	○	-	BA	-	-	-	-	-	.032	.022	.07	.09	0.4	.11	.12	.14	.16	.17	.20	15	34
	460. 406	○	-	BA	-	-	-	-	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	15	34
	460. 486	○	-	BA	-	-	-	-	-	.057	.047	.28	.36	1.6	.43	.48	.57	.63	.69	.82	15	34
	460. 526	○	-	BA	-	-	-	-	-	.065	.051	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	15	34
	460. 606	○	-	BA	-	BE	-	-	-	.081	.057	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	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	○	-	-	BC	BE	-	-	-	.116	.079	1.1	1.4	6.3	1.7	1.9	2.2	2.5	2.7	3.2	15	38
	460. 746	○	-	-	-	BE	-	-	-	.130	.075	1.2	1.6	7.1	1.9	2.1	2.5	2.8	3.1	3.6	15	38
	460. 766	○	-	-	-	BE	-	-	-	.130	.095	1.4	1.8	8.0	2.1	2.4	2.8	3.2	3.5	4.1	15	38
	460. 806	○	-	-	-	BE	-	-	-	.146	.106	1.7	2.3	10.0	2.7	3.0	3.5	4.0	4.3	5.1	15	38
	460. 846	○	-	-	-	BE	-	-	-	.160	.126	2.2	2.8	12.5	3.3	3.8	4.4	5.0	5.4	6.4	15	38
	460. 886	○	-	-	-	BE	BG	-	-	.185	.122	2.8	3.6	16.0	4.3	4.8	5.7	6.3	6.9	8.2	15	38
	460. 926	○	-	-	-	-	BG	-	-	.205	.150	3.5	4.6	20	5.4	6.0	7.1	7.9	8.7	10.2	15	38
	460. 966	○	-	-	-	-	BG	BK	-	.229	.150	4.3	5.7	25	6.7	7.5	8.8	9.9	10.8	12.7	15	38
	461. 006	○	-	-	-	-	BG	-	-	.252	.150	5.4	7.2	32	8.4	9.5	11.1	12.5	13.7	16.1	15	38
	461. 046	-	○	-	-	-	-	BK	-	.284	.209	6.9	9.1	40	10.7	12.0	14.1	15.9	17.3	20	15	38
	461. 086	○	-	-	-	-	-	BK	-	.323	.209	8.6	11.4	50	13.4	15.0	17.7	19.8	22	25	15	38
	461. 126	○	-	-	-	-	-	-	BM	.366	.256	10.9	14.3	63	16.9	18.9	22	25	27	32	15	38
	461. 146	○	-	-	-	-	-	-	BM	.390	.264	12.3	16.2	71	19.0	21	25	28	31	36	15	38
120°	460. 408	○	-	BA	-	-	-	-	-	.047	.033	.17	.23	1.0	.27	.30	.35	.40	.43	.51	27	48
	460. 488	○	-	BA	-	-	-	-	-	.059	.039	.28	.36	1.6	.43	.48	.57	.63	.69	.82	27	48
	460. 528	○	-	BA	-	-	-	-	-	.065	.047	.35	.46	2.0	.54	.60	.71	.79	.87	1.0	27	48
	460. 608	○	-	BA	-	-	-	-	-	.083	.055	.54	.72	3.2	.84	.95	1.1	1.2	1.4	1.6	27	48
	460. 648	○	-	-	BC	-	-	-	-	.097	.063	.69	.91	4.0	1.1	1.2	1.4	1.6	1.7	2.0	27	52
	460. 728	○	-	-	BC	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

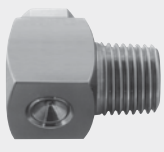
Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	460. 728	+	5E	+	BE	=	460. 728. 5E. BE

Tangential-flow full cone nozzles
Series 422 / 423

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

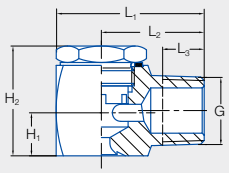
Applications:
Cleaning and washing process, cooling of gaseous fluids and solids, surface spraying, spraying onto mats in air washers, improving on chemical reactions, continuous casting, foam control.

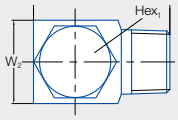
FDA compliant

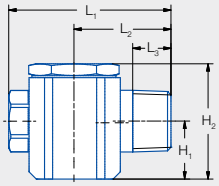


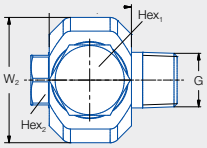
1/4" , 3/8" versions

½", ¾", 1" versions









Dimensions (in)										
Inlet (NPT) G	L_1	L_2	L_3	H_1	H2	W_1	W2	Hex_1	Hex2	Wt (lb.)
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	Ordering Number											Bore diameter [in]	Narrowest free cross sections Ø [in]	V̇ water gal/min] p [psi]							Spray diameter D [in] (at p = 30 psi)	
	Type	Material number		Connection																	H =10 [in]	H =20 [in]
		1Y	30														Liters per min.					
		316L SS	Brass	1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	1-1/4 NPT	2 NPT				10	20	30	2 bar	40	60	80	100		
30°	422.882	●				BE						0.193	0.193	2.48	3.51	4.30	**16.00**	4.96	6.08	7.02	7.85	6	15
	423.082	●					BK					0.323	0.323	7.76	10.97	13.43	**50.00**	15.51	19.00	21.94	24.53	6	15
	423.202	●							BP			0.472	0.472	15.51	21.94	26.87	**100.00**	31.03	38.00	43.88	49.06	6	15
60°	422.364	●		BC								0.045	0.043	0.09	0.13	0.16	**0.60**	0.19	0.23	0.26	0.29	10	20
	422.484	●		BC								0.071	0.071	0.25	0.35	0.43	**1.60**	0.50	0.61	0.70	0.78	10	20
	422.524	●			BE							0.079	0.079	0.31	0.44	0.54	**2.00**	0.62	0.76	0.88	0.98	10	20
	422.564	●			BE							0.089	0.089	0.39	0.55	0.67	**2.50**	0.78	0.95	1.10	1.23	10	20
	422.644	●	●		BE							0.118	0.118	0.62	0.88	1.07	**4.00**	1.24	1.52	1.76	1.96	10	20
	422.724	●			BE							0.142	0.142	0.98	1.38	1.69	**6.30**	1.95	2.39	2.76	3.09	10	20
	422.784	●				BG						0.163	0.163	1.40	1.97	2.42	**9.00**	2.79	3.42	3.95	4.42	10	20
	422.884	●				BG						0.252	0.252	2.48	3.51	4.30	**16.00**	4.96	6.08	7.02	7.85	15	25
	423.124	●					BK					0.441	0.441	9.77	13.82	16.93	**63.00**	19.55	23.94	27.65	30.91	15	25
	423.174	●						BM				0.500	0.500	13.19	18.65	22.84	**85.00**	26.37	32.30	37.30	41.70	15	25
	423.414	●								BV		0.969	0.969	51.97	73.50	90.00	**335.00**	103.95	127.31	147.00	164.30	15	25

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	422. 886	+	1Y	+	BE	=	422. 886. 1Y. BE

Different metallurgies may be available upon request.

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

Tangential-flow full cone nozzles
Series 422 / 423

Spray angle	Ordering Number: Type	Material number: 1Y 316L SS	Material number: 30 Brass	Connection: 1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	1-1/4 NPT	2 NPT	2-1/2 NPT	3 NPT	Bore diameter [in]	Narrowest free cross sections Ø [in]	Liters per min. 10	20	30	2 bar	40	60	80	100	Spray diameter D [in] (at p = 30 psi) H =10 [in]	H =20 [in]
90°	422.286	●		BC									0.027	0.027	0.04	0.05	0.07	**0.25**	0.08	0.09	0.11	0.12	20	35
	422.326	●		BC									0.033	0.031	0.06	0.09	0.11	**0.40**	0.12	0.15	0.18	0.20	20	35
	422.346	●		BC									0.037	0.035	0.08	0.11	0.13	**0.50**	0.16	0.19	0.22	0.25	20	35
	422.366	●		BC									0.043	0.043	0.09	0.13	0.16	**0.60**	0.19	0.23	0.26	0.29	20	35
	422.406	●	●	BC									0.059	0.057	0.16	0.22	0.27	**1.00**	0.31	0.38	0.44	0.49	20	35
	422.446	●		BC									0.065	0.063	0.20	0.29	0.35	**1.30**	0.40	0.49	0.57	0.64	20	35
	422.486	●		BC									0.075	0.071	0.25	0.35	0.43	**1.60**	0.50	0.61	0.70	0.78	20	35
	422.506	●		BC									0.079	0.079	0.28	0.39	0.48	**1.80**	0.56	0.68	0.79	0.88	20	36
	422.526	●		BC									0.083	0.083	0.31	0.44	0.54	**2.00**	0.62	0.76	0.88	0.98	20	36
	422.566	●	●	BC									0.091	0.087	0.39	0.55	0.67	**2.50**	0.78	0.95	1.10	1.23	20	36
	422.606	●	●		BE								0.102	0.099	0.49	0.69	0.85	**3.15**	0.98	1.20	1.38	1.55	20	36
	422.646	●	●		BE								0.118	0.114	0.62	0.88	1.07	**4.00**	1.24	1.52	1.76	1.96	20	36
	422.686	●	●		BE								0.130	0.126	0.78	1.10	1.34	**5.00**	1.55	1.90	2.20	2.45	20	36
	422.706	●			BE								0.138	0.134	0.87	1.23	1.50	**5.60**	1.74	2.13	2.46	2.75	20	38
	422.726	●	●		BE								0.146	0.142	0.98	1.38	1.69	**6.30**	1.95	2.39	2.76	3.09	20	38
	422.766	●			BE								0.163	0.161	1.24	1.76	2.15	**8.00**	2.48	3.04	3.51	3.92	20	38
	422.786	●			BE								0.173	0.169	1.40	1.97	2.42	**9.00**	2.79	3.42	3.95	4.42	20	38
	422.806	●	●		BE								0.183	0.181	1.55	2.19	2.69	**10.00**	3.10	3.80	4.39	4.91	20	38
	422.846	●	●		BE								0.205	0.201	1.94	2.74	3.36	**12.50**	3.88	4.75	5.49	6.13	20	38
	422.886	●	●		BE								0.229	0.225	2.48	3.51	4.30	**16.00**	4.96	6.08	7.02	7.85	20	40
	422.926	●				BG							0.287	0.287	3.10	4.39	5.37	**20.00**	6.21	7.60	8.78	9.81	20	40
	422.966	●				BG							0.315	0.315	3.88	5.49	6.72	**25.00**	7.76	9.50	10.97	12.27	20	40
	423.006	●				BG							0.343	0.343	4.81	6.80	8.33	**31.00**	9.62	11.78	13.60	15.21	20	40
	423.046	●					BK						0.426	0.402	6.21	8.78	10.75	**40.00**	12.41	15.20	17.55	19.62	20	40
	423.086	●					BK						0.449	0.433	7.76	10.97	13.43	**50.00**	15.51	19.00	21.94	24.53	20	40
	423.126	●					BK						0.500	0.485	9.77	13.82	16.93	**63.00**	19.55	23.94	27.65	30.91	20	40
	423.146	●						BM					0.552	0.532	11.02	15.58	19.07	**71.00**	22.03	26.98	31.16	34.83	20	40
	423.206	●						BM					0.670	0.630	15.51	21.94	26.87	**100.00**	31.03	38.00	43.88	49.06	20	40
	423.286	●							BP				0.748	0.748	24.82	35.11	42.98	**160.00**	49.63	60.79	70.19	78.48	20	40
	423.406	●								BV			0.965	0.965	48.87	69.11	84.63	**315.00**	97.72	119.68	138.19	154.50	20	40
	423.486	●									BY		1.240	1.240	77.57	109.70	134.33	**500.00**	155.11	189.97	219.35	245.25	20	40
	423.526	●										MA	1.398	1.398	97.74	138.23	169.25	**630.00**	195.43	239.36	276.39	309.01	20	40

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

Different metallurgies may be available upon request.

* Call factory

Tangential-flow full cone nozzles
Series 422 / 423

Spray angle	Ordering Number: Type	Material number: 1Y 316L SS	Material number: 30 Brass	Connection: 1/4 NPT	3/8 NPT	1/2 NPT	3/4 NPT	1 NPT	1-1/4 NPT	2 NPT	2-1/2 NPT	Bore diameter [in]	Narrowest free cross sections Ø [in]	V̇ water [gal/min] p [psi]: 10	20	30	Liters per min. 2 bar	40	60	80	100	Spray diameter D [in] (at p = 30 psi) H =10 [in]	H =20 [in]
120°	422.368	●		BC								0.047	0.047	0.09	0.13	0.16	**0.60**	0.19	0.23	0.26	0.29	26	47
	422.408	●		BC								0.059	0.057	0.16	0.22	0.27	**1.00**	0.31	0.38	0.44	0.49	26	47
	422.448	●		BC								0.065	0.063	0.19	0.27	0.34	**1.25**	0.39	0.47	0.55	0.61	26	47
	422.488	●	●	BC								0.075	0.071	0.25	0.35	0.43	**1.60**	0.50	0.61	0.70	0.78	26	47
	422.508	●		BC								0.079	0.075	0.28	0.39	0.48	**1.80**	0.56	0.68	0.79	0.88	26	47
	422.528	●		BC								0.083	0.079	0.31	0.44	0.54	**2.00**	0.62	0.76	0.88	0.98	26	47
	422.568	●	●	BC								0.091	0.087	0.39	0.55	0.67	**2.50**	0.78	0.95	1.10	1.23	26	47
	422.608	●	●		BE							0.102	0.098	0.49	0.69	0.85	**3.15**	0.98	1.20	1.38	1.55	26	47
	422.648	●			BE							0.118	0.114	0.62	0.88	1.07	**4.00**	1.24	1.52	1.76	1.96	26	47
	422.688	●			BE							0.130	0.126	0.78	1.10	1.34	**5.00**	1.55	1.90	2.19	2.45	26	47
	422.708	●			BE							0.138	0.134	0.87	1.23	1.50	**5.60**	1.74	2.13	2.46	2.75	26	47
	422.728	●	●		BE							0.146	0.142	0.98	1.38	1.69	**6.30**	1.95	2.39	2.76	3.09	30	55
	422.768	●			BE							0.163	0.161	1.24	1.76	2.15	**8.00**	2.48	3.04	3.51	3.92	30	55
	422.788	●			BE							0.173	0.169	1.40	1.97	2.42	**9.00**	2.79	3.42	3.95	4.42	30	55
	422.808	●			BE							0.183	0.181	1.55	2.19	2.69	**10.00**	3.10	3.80	4.39	4.91	33	58
	422.848	●	●		BE							0.205	0.201	1.94	2.74	3.36	**12.50**	3.88	4.75	5.49	6.13	33	58
	422.888	●	●		BE							0.228	0.224	2.48	3.51	4.30	**16.00**	4.96	6.08	7.02	7.85	33	58
	422.928	●				BG						0.287	0.287	3.10	4.39	5.37	**20.00**	6.21	7.60	8.78	9.81	35	63
	422.968	●	●			BG						0.315	0.315	3.88	5.49	6.72	**25.00**	7.76	9.50	10.97	12.27	35	63
	422.988	●				BG						0.331	0.331	4.34	6.14	7.52	**28.00**	8.69	10.64	12.29	13.74	35	63
	423.008	●				BG						0.343	0.343	4.89	6.91	8.46	**31.50**	9.77	11.97	13.82	15.45	35	63
	423.048	●					BK					0.426	0.402	6.21	8.78	10.75	**40.00**	12.41	15.20	17.55	19.62	35	63
	423.088	●					BK					0.449	0.433	7.76	10.97	13.43	**50.00**	15.51	19.00	21.94	24.53	35	63
	423.128	●					BK					0.500	0.485	9.77	13.82	16.93	**63.00**	19.55	23.94	27.65	30.91	35	63
	423.148	●						BM				0.552	0.532	11.02	15.58	19.07	**71.00**	22.03	26.98	31.16	34.83	35	63
	423.208	●						BM				0.670	0.630	15.51	21.94	26.87	**100.00**	31.03	38.00	43.88	49.06	35	63
	423.288	●							BP			0.748	0.748	24.82	35.11	42.98	**160.00**	49.63	60.79	70.19	78.48	35	63
	423.368	●								BR		0.875	0.875	38.79	54.85	67.16	**250.00**	77.55	94.98	109.68	122.62	35	63
	423.448	●									BV	1.220	1.161	62.06	87.76	107.46	**400.00**	124.09	151.97	175.48	196.20	35	63

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

Different metallurgies may be available upon request.

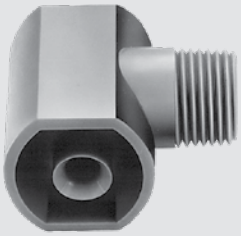
* Call factory

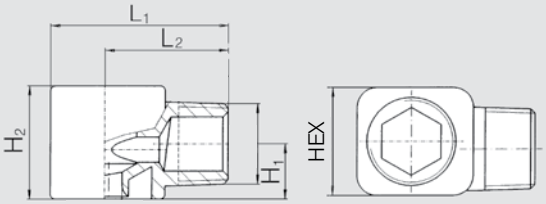
Tangential-flow full cone nozzles
Plastic version
Series 422 / 423

Vaneless tangential design combined with PVDF construction offers an excellent nozzle for critical environmental and chemical processing uses.

Applications:
- Mist eliminator washing
- Chemical reactors
- Scrubbers

FDA compliant





Dimensions (in.)						Wt. (lb.)
Inlet (Male NPT)	L1	L2	H1	H2	Hex	
1/4	1.10	.79	.31	.63	5/8	.02
3/8	1.42	.98	.44	.91	7/8	.04
1/2	1.95	1.32	.76	1.50	1-5/16	.09
3/4	2.30	1.52	.96	1.97	1-5/8	.11

Spray angle	Ordering number						Bore diameter B [in]	Narrowest free cross sections Ø [in]	V̇ water [gal/min]									Spray diameter D [in] (at p = 30 psi)	
	Type	Mat. no.	Connection						p [psi]										
		5E																	
		PVDF	1/4 NPT	3/8 NPT	1/2 BSPT	3/4 BSPT			10	20	30	Liters per min. 2 bar	40	60	80	100	145	H = 10 [in]	H = 20 [in]
60°	422.724	●		BE			0.142	0.142	0.97	1.38	1.69	**6.30**	1.95	2.39	2.76	3.09	3.72	10	20
90°	422.406	●	BC				0.059	0.057	0.15	0.22	0.27	**1.00**	0.31	0.38	0.44	0.49	0.59	20	35
	422.486		BC				0.075	0.071	0.25	0.35	0.43	**1.60**	0.49	0.61	0.70	0.78	0.94	20	35
	422.566	●	BC				0.091	0.087	0.39	0.55	0.67	**2.50**	0.77	0.95	1.10	1.22	1.48	20	36
	422.606	●		BE			0.102	0.098	0.49	0.69	0.84	**3.15**	0.98	1.20	1.38	1.54	1.86	20	36
	422.646	●		BE			0.118	0.114	0.62	0.88	1.07	**4.00**	1.24	1.52	1.75	1.96	2.36	20	36
	422.726	●		BE			0.146	0.142	0.98	1.38	1.69	**6.30**	1.95	2.39	2.76	3.09	3.72	20	38
	422.806	●		BE			0.183	0.181	1.55	2.19	2.69	**10.00**	3.10	3.80	4.38	4.90	5.90	20	38
	422.846	●		BE			0.209	0.209	1.94	2.74	3.36	**12.50**	3.88	4.75	5.48	6.13	7.38	20	38
	422.886	●		BE			0.228	0.228	2.48	3.51	4.30	**16.00**	4.96	6.08	7.02	7.85	9.45	20	40
	422.926	●			CG		0.287	0.287	3.10	4.39	5.37	**20.00**	6.20	7.60	8.77	9.81	11.81	20	40
	422.966	●			CG		0.315	0.315	3.88	5.48	6.71	**25.00**	7.75	9.50	10.97	12.26	14.76	20	40
	423.006	●			CG		0.343	0.343	4.88	6.91	8.46	**31.50**	9.77	11.97	13.82	15.45	18.60	20	40
	423.126	●				CK	0.472	0.472	9.77	13.82	16.92	**63.00**	19.54	23.93	27.64	30.90	37.21	20	40
120°	422.408	●	BC				0.059	0.057	0.15	0.22	0.27	**1.00**	0.31	0.38	0.44	0.49	0.59	26	47
	422.448	●	BC				0.065	0.063	0.19	0.27	0.33	**1.25**	0.39	0.47	0.55	0.61	0.74	26	47
	422.488	●	BC				0.075	0.075	0.25	0.35	0.43	**1.60**	0.49	0.61	0.70	0.78	0.94	26	47
	422.568	●	BC				0.094	0.094	0.39	0.55	0.67	**2.50**	0.77	0.95	1.10	1.22	1.48	26	47
	422.728	●		BE			0.157	0.154	0.98	1.38	1.69	**6.30**	1.95	2.39	2.76	3.09	3.72	30	55
	422.888	●		BE			0.260	0.236	2.48	3.51	4.30	**16.00**	4.96	6.08	7.02	7.85	9.45	33	58
	422.968	●			CG		0.315	0.315	3.88	5.48	6.71	**25.00**	7.75	9.50	10.97	12.26	14.76	35	63
	423.008	●			CG		0.343	0.343	4.88	6.91	8.46	**31.50**	9.77	11.97	13.82	15.45	18.60	35	63
	423.128	●				CK	0.500	0.484	9.77	13.82	16.92	**63.00**	19.54	23.93	27.64	30.90	37.21	35	63

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	422. 888	+	5E	+	BE	=	422. 888. 5E. BE

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

Flat fan nozzles
Series 632 / 633

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

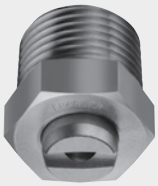
Applications:
Cleaning (e.g. surfaces, filters, belts), crate washers, lubricating, coating.

FDA compliant

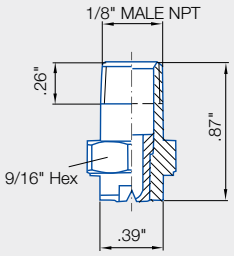
(Mat. no. 16 / 17 / 5E)

15°–65° 75°–110°
Stainless Steel or Brass

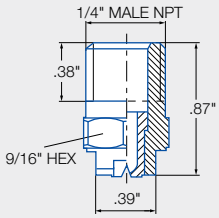
PVDF



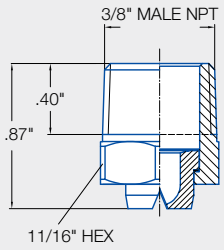
3/8"–1/2"



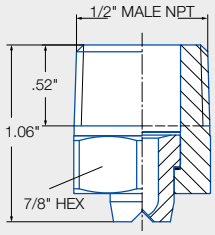
Weight brass: .04 lb.



Weight brass: .05 lb.



Weight brass: .07 lb.



Weight brass: .09 lb.

Spray angle	Ordering number: Type	Material number: 16[1] Stainless steel 303/ Stainless steel 304	Material number: 17[2] Stainless steel 316Ti/ Stainless steel 316L	Material number: 30 Brass	Material number: 5E PVDF	Connection: 1/8 NPT	Connection: 1/4 NPT	Connection: 3/8 NPT	Connection: 1/2 NPT	Equivalent bore diameter A [in]	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi]: 7	15	30	45	75	liters per minute 5 bar	100	145	Spray width B [in] (at p = 75 psi) H = 10 [in]	H = 20 [in]
20°	632.301	●	●	●	●	BA	BC			0.03	0.02	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.16	0.19	3	6
	632.361	●	●	●	●	BA	BC			0.04	0.03	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.31	0.37	3	6
	632.441	●	●	●	●	BA	BC			0.05	0.04	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.61	0.74	3	6
	632.481	●	●	●	●	BA	BC			0.06	0.05	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.78	0.95	3	6
30°	632.302	●	●	●	●	BA	BC			0.02	0.02	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.16	0.19	5	9
	632.362	●	●	●	●	BA	BC			0.04	0.03	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.31	0.37	5	9
	632.402	●	●	●	●	BA	BC			0.05	0.035	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.49	0.59	5	9
	632.482	●	●	●	●	BA	BC			0.06	0.04	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.78	0.95	5	9
	632.562	●	●	●	●	BA	BC			0.08	0.06	0.32	0.47	0.67	0.82	1.06	**3.95**	1.23	1.48	5	9
	632.642	●	●	●			BC			0.10	0.07	0.52	0.76	1.08	1.32	1.70	**6.33**	1.96	2.36	6	10
	632.722	●	●	●			BC			0.12	0.09	0.82	1.20	1.69	2.07	2.68	**9.96**	3.09	3.72	6	10
	632.762	●	●	●			BC			0.14	0.11	1.04	1.52	2.15	2.63	3.30	**12.65**	3.92	4.73	6	10
	632.802	●	●	●			BC			0.16	0.12	1.30	1.90	2.69	3.29	4.25	**15.81**	4.90	5.91	6	10
	632.882	●	●	●					BG	0.20	0.16	2.08	3.04	4.30	5.26	6.80	**25.32**	7.85	9.45	6	10
	632.922	●	●	●					BG	0.22	0.17	2.60	3.80	5.37	6.58	8.49	**31.65**	9.81	11.81	6	10
	632.962	●	●	●					BG	0.24	0.19	3.24	4.75	6.71	8.22	10.62	**39.52**	12.26	14.76	6	10
	633.002	●							BG	0.28	0.22	4.09	5.99	8.46	10.37	13.38	**49.82**	15.45	18.61	6	10

30° parts continued on next page.

Continued on next page.

Other sizes available upon request.

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

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

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

Flat fan nozzles
Series 632 / 633

Spray angle	Ordering number: Type	Material number: 16[1] Stainless steel 303/ Stainless steel 304	Material number: 17[2] Stainless steel 316Ti/ Stainless steel 316L	Material number: 30 Brass	Material number: 5E PVDF	Connection: 1/8 NPT	Connection: 1/4 NPT	Connection: 3/8 NPT	Connection: 1/2 NPT	Equivalent bore diameter A [in]	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi]: 7	15	30	45	75	**5 bar** (liters per minute)	100	145	Spray width B [in] (at p = 75 psi): H = 10 [in]	H = 20 [in]
45°	632.303	●	●	●		BA	BC			0.03	0.02	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.16	0.19	7	13
	632.363	●	●	●	●	BA	BC			0.04	0.023	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.31	0.37	7	14
	632.403	●	●	●	●	BA	BC			0.05	0.035	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.49	0.59	8	15
	632.483	●	●	●	●	BA	BC			0.06	0.04	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.78	0.95	8	15
	632.563	●	●	●	●	BA	BC			0.08	0.06	0.32	0.47	0.67	0.82	1.06	**3.95**	1.23	1.48	8	16
	632.643	●	●	●	●	BA	BC			0.10	0.07	0.52	0.76	1.08	1.32	1.70	**6.33**	1.96	2.36	9	16
	632.673	●	●	●			BC	BE		0.11	0.08	0.62	0.90	1.28	1.56	2.02	**7.51**	2.33	2.81	9	17
	632.723	●	●	●			BC	BE		0.12	0.09	0.82	1.20	1.69	2.07	2.68	**9.96**	3.09	3.72	9	17
	632.763	●	●	●			BC	BE		0.14	0.10	1.04	1.52	2.15	2.63	3.30	**12.65**	3.92	4.73	9	17
	632.803	●	●	●			BC	BE	BG	0.16	0.12	1.30	1.90	2.69	3.29	4.25	**15.81**	4.90	5.91	9	17
	632.843	●	●[1]	●			BC		BG	0.18	0.13	1.62	2.37	3.36	4.11	5.31	**19.76**	6.13	7.38	9	17
	632.883	●[1]	●[1]	●[1]	●[3]		BC		BG	0.20	0.15	2.08	3.04	4.30	5.26	6.80	**25.30**	7.85	9.45	9	17
	632.923	●	●	●					BG	0.22	0.165	2.60	3.80	5.37	6.58	8.49	**31.62**	9.81	11.81	9	17
	632.963	●	●	●					BG	0.24	0.173	3.24	4.75	6.72	8.23	10.62	**39.53**	12.26	14.77	9	17
60°	632.304	●	●	●	●	BA	BC			0.03	0.016	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.16	0.19	10	19
	632.334	●	●	●	●	BA	BC			0.035	0.02	0.06*	0.09*	0.12	0.15	0.19	**0.71**	0.22	0.27	10	19
	632.364	●	●	●	●	BA	BC			0.04	0.022	0.08*	0.12*	0.17	0.20	0.26	**1.00**	0.31	0.37	10	20
	632.404	●	●	●	●	BA	BC			0.047	0.03	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.49	0.59	10	20
	632.444	●	●	●	●	BA	BC			0.05	0.035	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.61	0.74	10	20
	632.484	●	●	●	●[3]	BA	BC			0.06	0.04	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.78	0.95	10	20
	632.514	●	●	●	●	BA	BC			0.065	0.043	0.25*	0.36	0.51	0.62	0.81	**3.00**	0.93	1.12	11	20
	632.564	●	●	●	●	BA	BC			0.08	0.05	0.32	0.47	0.67	0.82	1.06	**3.95**	1.23	1.48	11	21
	632.604	●	●	●	●	BA	BC			0.09	0.06	0.41	0.60	0.85	1.04	1.34	**4.98**	1.54	1.86	11	21
	632.644	●	●	●	●[3]		BC	BE		0.10	0.063	0.52	0.76	1.08	1.32	1.70	**6.33**	1.96	2.36	11	21
	632.674	●	●	●	●[3]		BC	BE		0.11	0.07	0.62	0.90	1.28	1.56	2.02	**7.51**	2.33	2.81	11	22
	632.724	●	●	●	●[3]		BC	BE		0.12	0.08	0.82	1.20	1.69	2.07	2.68	**9.96**	3.09	3.72	11	22
	632.764	●	●	●			BC	BE		0.14	0.09	1.04	1.52	2.15	2.63	3.30	**12.65**	3.92	4.73	11	22
	632.804	●	●	●	●[3]		BC		BG	0.16	0.10	1.30	1.90	2.69	3.29	4.25	**15.81**	4.90	5.91	11	23
	632.844	●	●	●	●[3]		BC		BG	0.18	0.12	1.62	2.37	3.36	4.11	5.31	**19.76**	6.13	7.38	11	23
	632.884	●	●	●	●[3]		BC		BG	0.20	0.13	2.08	3.04	4.30	5.26	6.80	**25.30**	7.85	9.45	11	23
	632.924	●	●	●					BG	0.22	0.16	2.60	3.80	5.37	6.58	8.49	**31.62**	9.81	11.81	11	23
	632.964	●	●	●					BG	0.24	0.17	3.24	4.75	6.72	8.23	10.62	**39.53**	12.26	14.77	11	23
	633.004	●	●						BG	0.28	0.19	4.09	5.98	8.46	10.36	13.38	**49.80**	15.45	18.60	11	23
	633.044	●	●	●					BG	0.31	0.22	5.19	7.60	10.75	13.16	16.99	**63.25**	19.62	23.63	11	23
	633.084	●	●	●					BG	0.35	0.27	6.49	9.50	13.43	16.45	21.24	**79.06**	24.53	29.53	11	23
75°	632.145	●		●		BA	BC			0.008	0.005	–	0.01*	0.014	0.017	0.021	**0.08**	0.025	0.03	15	27
	632.165	●		●		BA	BC			0.008	0.005	–	0.01*	0.017	0.02	0.027	**0.10**	0.03	0.04	15	27
	632.185	●		●		BA	BC			0.008	0.006	–	0.011*	0.02	0.03	0.035	**0.13**	0.04	0.05	15	27
	632.215	●		●		BA	BC			0.016	0.008	–	0.02*	0.03	0.04	0.05	**0.18**	0.06	0.07	15	27
	632.245	●		●		BA	BC			0.02	0.012	–	0.03*	0.04	0.05	0.07	**0.26**	0.08	0.10	15	27
	632.275	●		●		BA	BC			0.023	0.012	0.03*	0.04*	0.06	0.07	0.09	**0.35**	0.11	0.13	15	27

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

Continued on next page.

Other sizes available upon request.

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	632. 403	+	16	+	BA	=	632. 403. 16. BA

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

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

Flat fan nozzles
Series 632 / 633

Spray angle	Ordering number: Type	Material number: 16[1] Stainless steel 303/ Stainless steel 304	Material number: 17[2] Stainless steel 316Ti/ Stainless steel 316L	Material number: 30 Brass	Material number: 5E PVDF	Connection: 1/8 NPT	Connection: 1/4 NPT	Connection: 3/8 NPT	Connection: 1/2 NPT	Equivalent bore diameter A [in]	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi]: 7	15	30	45	75	liters per minute 5 bar	100	145	Spray width B [in] (at p = 75 psi) H = 10 [in]	H = 20 [in]
90°	632.216	●		●		BA	BC			0.016	0.008	–	0.02*	0.03	0.04	0.05	**0.18**	0.06	0.07	17	31
	632.276	●		●		BA	BC			0.02	0.012	0.03*	0.04*	0.06	0.07	0.09	**0.35**	0.11	0.13	17	31
	632.306	●	●	●	●	BA	BC			0.03	0.016	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.16	0.19	17	31
	632.336	●	●	●	●	BA	BC			0.035	0.02	0.06*	0.09*	0.12	0.15	0.19	**0.71**	0.22	0.27	17	32
	632.366	●	●	●	●	BA	BC			0.04	0.023	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.31	0.37	18	33
	632.406	●	●	●	●	BA	BC			0.047	0.028	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.49	0.59	18	33
	632.446	●	●	●	●	BA	BC			0.05	0.03	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.61	0.74	18	34
	632.486	●	●	●	●	BA	BC			0.06	0.03	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.78	0.95	19	34
	632.516	●	●	●	●	BA	BC			0.065	0.035	0.25*	0.36	0.51	0.62	0.81	**3.00**	0.93	1.12	19	35
	632.566	●	●	●	●	BA	BC			0.08	0.04	0.32	0.47	0.67	0.82	1.06	**3.95**	1.23	1.48	19	35
	632.606	●	●	●	●	BA	BC			0.09	0.047	0.41	0.60	0.85	1.04	1.34	**4.98**	1.54	1.86	20	36
	632.646	●	●	●	●[3]		BC	BE		0.10	0.05	0.52	0.76	1.08	1.32	1.70	**6.33**	1.96	2.36	20	37
	632.676	●	●	●	●[3]		BC	BE		0.11	0.06	0.62	0.90	1.28	1.56	2.02	**7.51**	2.33	2.81	20	37
	632.726	●	●	●	●[3]		BC	BE		0.12	0.067	0.82	1.20	1.69	2.07	2.68	**9.96**	3.09	3.72	20	39
	632.766	●	●	●	●[3]		BC	BE		0.14	0.07	1.04	1.52	2.15	2.63	3.40	**12.65**	3.92	4.73	21	39
	632.806	●	●	●	●[3]		BC		BG	0.16	0.09	1.30	1.90	2.69	3.29	4.25	**15.81**	4.90	5.91	21	41
	632.846	●	●	●	●[3]		BC		BG	0.18	0.09	1.62	2.37	3.36	4.11	5.31	**19.76**	6.13	7.38	21	41
	632.886	●	●	●	●[3]		BC		BG	0.20	0.12	2.08	3.04	4.30	5.26	6.80	**25.30**	7.85	9.45	21	42
	632.926	●	●	●	●[3]		BC		BG	0.22	0.14	2.60	3.80	5.37	6.58	8.49	**31.62**	9.81	11.81	21	42
	632.966	●	●	●					BG	0.24	0.15	3.24	4.75	6.72	8.23	10.62	**39.53**	12.26	14.77	21	42
120°	632.187	●		●		BA	BC			0.01	0.008	–	0.011*	0.02	0.03	0.035	**0.13**	0.04	0.05	25	42
	632.217	●		●		BA	BC			0.016	0.008	–	0.02*	0.03	0.04	0.05	**0.18**	0.06	0.07	26	43
	632.247	●		●		BA	BC			0.02	0.008	–	0.03*	0.04	0.05	0.07	**0.26**	0.08	0.10	26	43
	632.277	●		●		BA	BC			0.024	0.012	0.03*	0.04*	0.06	0.07	0.09	**0.35**	0.11	0.13	17	45
	632.307	●	●	●	●	BA	BC			0.03	0.012	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.16	0.19	17	49
	632.337	●	●	●	●	BA	BC			0.035	0.016	0.06*	0.09*	0.12	0.15	0.19	**0.71**	0.22	0.27	17	53
	632.367	●	●	●	●	BA	BC			0.04	0.02	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.31	0.37	18	56
	632.407	●	●	●	●	BA	BC			0.047	0.024	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.49	0.59	18	58
	632.447	●	●	●	●	BA	BC			0.05	0.024	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.61	0.74	18	60
	632.487	●	●	●	●	BA	BC			0.06	0.024	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.78	0.95	19	61
	632.517	●	●	●	●	BA	BC			0.065	0.035	0.25*	0.36	0.51	0.62	0.81	**3.00**	0.93	1.12	19	61
	632.567	●	●	●	●	BA	BC			0.08	0.035	0.32	0.47	0.67	0.82	1.06	**3.95**	1.23	1.48	19	63
	632.607	●	●	●	●	BA	BC			0.09	0.04	0.41	0.59	0.83	1.02	1.32	**4.98**	1.56	1.86	34	64
	632.647	●	●	●			BC	BE		0.10	0.05	0.53	0.75	1.06	1.29	1.67	**6.33**	1.98	2.36	35	65
	632.677	●	●	●	●[3]		BC	BE		0.11	0.055	0.63	0.89	1.25	1.54	1.98	**7.51**	2.35	2.81	35	65
	632.727	●	●	●	●[3]		BC	BE		0.12	0.06	0.82	1.20	1.69	2.07	2.68	**9.96**	3.09	3.72	35	66
	632.767	●	●	●	●[3]		BC	BE		0.14	0.07	1.06	1.50	2.11	2.59	3.34	**12.65**	3.95	4.73	35	67
	632.807	●	●	●			BC		BG	0.16	0.08	1.30	1.90	2.69	3.29	4.25	**15.81**	4.90	5.91	35	67
	632.847	●	●	●	●[3]		BC		BG	0.18	0.09	1.62	2.37	3.36	4.11	5.31	**19.76**	6.13	7.38	35	67
	632.887	●	●	●					BG	0.20	0.10	2.08	3.04	4.30	5.26	6.80	**25.30**	7.85	9.45	36	67
	632.927	●	●	●					BG	0.22	0.11	2.60	3.80	5.37	6.58	8.49	**31.62**	9.81	11.81	36	67

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

Other sizes available upon request.

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

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

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.

FDA compliant

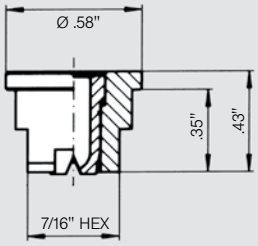
(Mat. no. 16 / 17 / 5E)

∢ 15°–75°

∢ 95°–110°

Stainless Steel or Brass

PVDF



Weight brass: .02 lb.

Spray angle	Ordering number					Equivalent bore diameter A [in]	Narrowest free cross section Ø [in]	V̇ water [gal/min] p [psi]							Spray width B [in] (at p = 75 psi)	
	Type	Material number 16 Stainless steel 303	17[1] Stainless steel 316Ti/ Stainless steel 316L	30 Brass	5E PVDF			7	15	30	45	75	liters per minute 5 bar	145	H = 10 [in]	H = 20 [in]
20°	652.301	●	●	●	●	0.03	0.02	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.19	3	6
	652.361	●	●	●	●	0.04	0.03	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.37	3	6
	652.441	●	●	●	●	0.05	0.04	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.74	3	6
	652.481	●	●	●	●	0.06	0.05	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.95	3	6
30°	652.302	●	●	●	●	0.02	0.02	0.04*	0.06*	0.08	0.11	0.13	**0.51**	0.19	5	9
	652.362	●	●	●	●	0.04	0.03	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.37	5	9
	652.402	●	●	●	●	0.05	0.035	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.59	5	9
	652.482	●	●	●	●	0.06	0.04	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.95	5	9
	652.562	●	●	●	●	0.08	0.06	0.32	0.47	0.67	0.82	1.06	**3.95**	1.48	5	9
	652.642	●	●	●		0.10	0.07	0.52	0.76	1.08	1.32	1.70	**6.33**	2.36	6	10
	652.722	●	●	●		0.12	0.09	0.82	1.20	1.69	2.07	2.68	**9.96**	3.72	6	10
	652.762	●	●	●		0.14	0.11	1.04	1.52	2.15	2.63	3.40	**12.65**	4.73	6	10
	652.802	●	●	●		0.16	0.12	1.30	1.90	2.69	3.29	4.25	**15.81**	5.91	6	10
45°	652.303	●	●	●		0.03	0.02	0.04*	0.06*	0.08	0.11	0.13	**0.51**	0.19	7	13
	652.363	●	●	●	●	0.04	0.024	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.37	7	14
	652.403	●	●	●	●	0.05	0.035	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.59	8	15
	652.483	●	●	●	●	0.06	0.04	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.95	8	15
	652.563	●	●	●	●	0.08	0.06	0.32	0.47	0.67	0.82	1.06	**3.95**	1.48	8	16
	652.643	●	●	●	●	0.10	0.07	0.52	0.76	1.08	1.32	1.70	**6.33**	2.36	9	16
	652.723	●	●	●		0.12	0.09	0.82	1.20	1.69	2.07	2.68	**9.96**	3.72	9	17
	652.763	●	●	●		0.14	0.10	1.04	1.52	2.15	2.63	3.40	**12.65**	4.73	9	17
	652.803	●	●	●		0.16	0.12	1.30	1.90	2.69	3.29	4.25	**15.81**	5.91	9	17

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

Continued on next page.

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

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

Flat fan nozzles for retaining nut
Series 652

Spray angle	Ordering number					Equivalent bore diameter A [in]	Narrowest free cross section Ø [in]	V̇ water [gal/min]							Spray width B [in] (at p = 75 psi)	
	Type	Material number						p [psi]								
		16 Stainless steel 303	17[1] Stainless steel 316Ti/ Stainless steel 316L	30 Brass	5E PVDF			7	15	30	45	75	liters per minute 5 bar	145	H = 10 [in]	H = 20 [in]
60°	652.304	●	●	●	●	0.03	0.016	0.04*	0.06	0.09	0.11	0.14	**0.51**	0.19	10	19
	652.334	●	●	●	●	0.035	0.02	0.06*	0.09	0.12	0.15	0.19	**0.71**	0.27	10	19
	652.364	●	●	●	●	0.04	0.024	0.08*	0.12	0.17	0.21	0.27	**1.00**	0.37	10	20
	652.404	●	●	●	●	0.047	0.03	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.59	10	20
	652.444	●	●	●	●	0.05	0.035	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.74	10	20
	652.484	●	●	●	●	0.06	0.04	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.95	10	20
	652.514	●	●	●	●	0.065	0.043	0.25*	0.36	0.51	0.62	0.81	**3.00**	1.12	11	20
	652.564	●	●	●	●	0.08	0.05	0.32	0.47	0.67	0.82	1.06	**3.95**	1.48	11	21
	652.604	●	●	●	●	0.09	0.06	0.41	0.60	0.85	1.04	1.34	**4.98**	1.86	11	21
	652.644	●	●	●	●	0.10	0.063	0.52	0.76	1.08	1.32	1.70	**6.33**	2.36	11	21
	652.674	●	●	●	●	0.11	0.07	0.62	0.90	1.28	1.56	2.02	**7.51**	2.81	11	22
	652.724	●	●	●	●	0.12	0.08	0.82	1.20	1.69	2.07	2.68	**9.96**	3.72	11	22
	652.764	●	●	●		0.14	0.09	1.04	1.52	2.15	2.63	3.40	**12.65**	4.73	11	22
	652.804	●	●	●	●	0.16	0.10	1.30	1.90	2.69	3.29	4.25	**15.81**	5.91	11	23
	652.844	●			●	0.18	0.12	1.62	2.37	3.36	4.11	5.31	**19.76**	7.38	11	23
	652.884	●		●		0.20	0.13	2.08	3.04	4.30	5.26	6.80	**25.30**	9.45	11	23
75°	652.145	●		●		0.008	0.004	–	0.01*	0.014	0.017	0.021	**0.08**	0.03	15	27
	652.165	●		●		0.008	0.005	–	0.01*	0.017	0.02	0.027	**0.10**	0.04	15	27
	652.185	●		●		0.008	0.006	–	0.011*	0.02	0.03	0.035	**0.13**	0.05	15	27
	652.215	●		●		0.016	0.008	–	0.02*	0.03	0.04	0.05	**0.18**	0.07	15	27
	652.245	●		●		0.02	0.012	–	0.03*	0.04	0.05	0.07	**0.26**	0.10	15	27
	652.275	●		●		0.024	0.012	0.03*	0.04*	0.06	0.07	0.09	**0.35**	0.13	15	27
90°	652.216	●		●		0.016	0.008	0.01*	0.02*	0.03	0.04	0.05	**0.18**	0.07	17	31
	652.246	●		●		0.02	0.012	0.02*	0.03*	0.04	0.05	0.07	**0.26**	0.10	17	31
	652.276	●		●		0.024	0.012	0.03*	0.04*	0.06	0.07	0.09	**0.35**	0.13	17	31
	652.306	●	●	●	●	0.03	0.016	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.19	17	31
	652.336	●	●	●	●	0.035	0.02	0.06*	0.09*	0.12	0.15	0.19	**0.71**	0.27	17	32
	652.366	●	●	●	●	0.04	0.02	0.08*	0.12	0.17	0.21	0.27	**1.00**	0.37	18	33
	652.406	●	●	●	●	0.047	0.028	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.59	18	33
	652.446	●	●	●	●	0.05	0.03	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.74	18	34
	652.486	●	●	●	●	0.06	0.03	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.95	19	34
	652.516	●	●	●	●	0.065	0.035	0.25*	0.36	0.51	0.62	0.81	**3.00**	1.12	19	35
	652.566	●	●	●	●	0.08	0.04	0.32	0.47	0.67	0.82	1.06	**3.95**	1.48	19	35
	652.606	●	●	●	●	0.09	0.047	0.41	0.60	0.85	1.04	1.34	**4.98**	1.86	20	36
	652.646	●	●	●	●	0.10	0.05	0.52	0.76	1.08	1.32	1.70	**6.33**	2.36	20	37
	652.676	●	●	●	●	0.11	0.06	0.62	0.90	1.28	1.56	2.02	**7.51**	2.81	20	37
	652.726	●	●	●	●	0.12	0.07	0.82	1.20	1.69	2.07	2.68	**9.96**	3.72	20	39
	652.766	●	●	●		0.14	0.075	1.04	1.52	2.15	2.63	3.40	**12.65**	4.73	21	39
	652.806	●	●	●	●	0.16	0.09	1.30	1.90	2.69	3.29	4.25	**15.81**	5.91	21	41
	652.846			●	●	0.18	0.09	1.62	2.37	3.36	4.11	5.31	**19.76**	7.38	21	41
	652.886	●		●	●	0.20	0.12	2.08	3.04	4.30	5.26	6.80	**25.30**	9.45	21	42

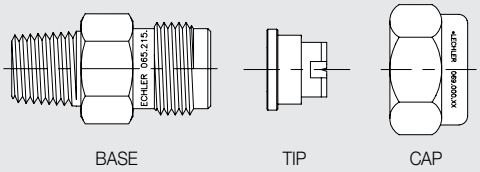
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

Flat fan nozzles for retaining nut
Series 652

Spray angle	Ordering number					Equivalent bore diameter A [in]	Narrowest free cross section Ø [in]	V̇ water [gal/min]							Spray width B [in] (at p = 75 psi)	
	Type	Material number						p [psi]								
		16 Stainless steel 303	17[1] Stainless steel 316Ti/ Stainless steel 316L	30 Brass	5E PVDF			7	15	30	45	75	liters per minute 5 bar	145	H = 10 [in]	H = 20 [in]
120°	652.187	●		●		0.01	0.008	–	0.011*	0.02	0.03	0.035	**0.13**	0.05	25	42
	652.217	●		●		0.016	0.008	–	0.02*	0.03	0.04	0.05	**0.18**	0.07	26	43
	652.247	●		●		0.02	0.008	–	0.03*	0.04	0.05	0.07	**0.26**	0.10	26	43
	652.277	●		●		0.024	0.012	–	0.04*	0.06	0.07	0.09	**0.35**	0.13	26	45
	652.307	●		●	●	0.03	0.012	0.04*	0.06*	0.09	0.11	0.14	**0.51**	0.19	28	49
	652.337	●	●	●	●	0.035	0.016	0.06*	0.09*	0.12	0.15	0.19	**0.71**	0.27	29	53
	652.367	●	●	●	●	0.04	0.02	0.08*	0.12*	0.17	0.21	0.27	**1.00**	0.37	31	56
	652.407	●	●	●	●	0.047	0.024	0.13*	0.19	0.27	0.33	0.42	**1.58**	0.59	33	58
	652.447	●	●	●	●	0.05	0.024	0.16*	0.24	0.34	0.41	0.53	**1.98**	0.74	33	60
	652.487	●	●	●	●	0.06	0.024	0.21*	0.30	0.43	0.53	0.68	**2.53**	0.95	33	61
	652.517	●	●	●	●	0.065	0.035	0.25*	0.36	0.51	0.61	0.81	**3.00**	1.12	33	61
	652.567	●	●	●	●	0.08	0.04	0.32	0.47	0.67	0.82	1.06	**3.95**	1.48	34	63
	652.607	●	●	●	●	0.09	0.043	0.41	0.60	0.85	1.04	1.34	**4.98**	1.86	34	64
	652.647	●	●	●		0.10	0.05	0.52	0.76	1.08	1.32	1.70	**6.33**	2.36	35	65
	652.677	●	●	●		0.11	0.06	0.62	0.90	1.28	1.56	2.02	**7.51**	2.81	35	65
	652.727	●	●	●	●	0.12	0.063	0.82	1.20	1.69	2.07	2.68	**9.96**	3.72	35	66
	652.767	●	●	●		0.14	0.07	1.04	1.52	2.15	2.63	3.40	**12.65**	4.73	35	67
	652.807	●		●		0.16	0.08	1.30	1.90	2.69	3.29	4.25	**15.81**	5.91	35	67
	652.847				●	0.18	0.09	1.62	2.37	3.36	4.11	5.31	**19.76**	7.38	35	67
	652.887				●	0.20	0.10	2.08	3.04	4.30	5.26	6.80	**25.30**	9.45	36	67

Bases and Caps for Mounting

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



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

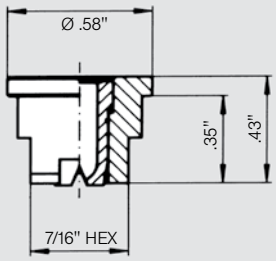
1) We reserve the right to deliver material 316 SS or 316L SS, if we show the material code 17.

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



Weight: .01 oz.

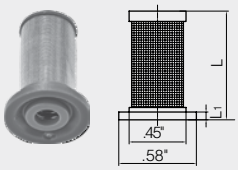
Spray angle	Ordering no. Type	Material no. POM 56	Material no. 303SS 8H	Color	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 15 psi	liters per minute 2 bar	45 psi	75 psi	Spray Coverage @ 30 psi H=10"	H=20"
75°	652. 145. xx. 03	○	○	Green	.006	.012	.011	.05	.016	.021	11	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 for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	651. 145	+	8H	+	03	=	652. 145. 8H. 03

Pos.	Name	Ordering no.	Material	Color	Dimensions [in.] L	L_1	SW	** (in.)
1	**Filter with return valve**	095. 016. 53. 11. 00 095. 016. 53. 14. 63	PP PP	blue green	.83 .83	.05 .05	- -	.003 .003
2	**Gasket**	065. 240. 55 065. 240. 72	PTFE EWP 210	- -	- -	- -	- -	- -
3	**Nozzle**	Ordering no. see flow tables	303 SS POM/303 SS*	- -	.43 .47	.35 .39	.39 .31	- -
4	**Cap nut**	065. 200. 16 065. 200. 56	303 SS POM	- black	.51 .57	.39 .45	.87 .87	- -

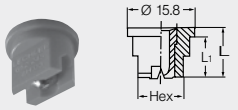
* Housing POM, Nozzle insert 303 SS
** Size of mesh

Position 1
Filter with return valve

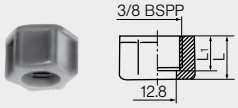


Position 2
Gasket

Position 3
Nozzle



Position 4
Cap nut



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

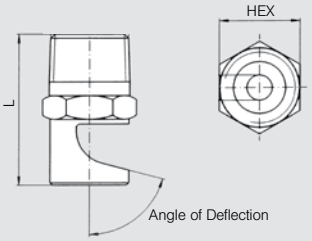
Tongue-type nozzles
Series 686

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.

FDA compliant

(Mat. no. 16 / 5E)



Weight brass: .04 lb.

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

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

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

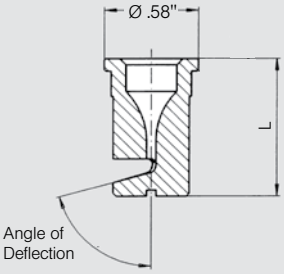
Tongue-type nozzles for retaining nut
Series 684 / 688/ 689

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.

FDA compliant

(Mat. no. 16 / 5E)



Spray angle	Deflector angle	Ordering no. Type	Material no. POM 56	Material no. PVDF 5E	Color for version 56 POM *version 5E PVDF is blue	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Length (L) (in.)	Spray Width B (in.) @ 30 psi H=10"
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.

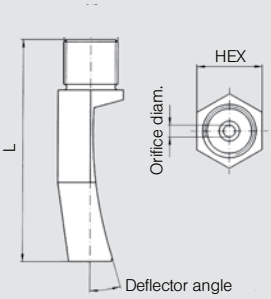
Applications:
Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.

FDA compliant

(Mat. no. 16 / 5E)

Series 688, Stainless Steel

Series 689, PVDF



Spray angle	Deflector angle	Ordering no. Type	Material no. 303 SS 16	Material no. PVDF 5E	Connection Male NPT 3/8"	Connection Male NPT 3/4"	Orifice diam. (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	Dimensions (in.) L	Dimensions (in.) Hex	Weight 303 SS (lb.)	Spray Width B (in.) @ 30 psi H=10"	H=20"
45°	35°	688. 763	○	-	BE	-	.118	1.2	1.8	8.0	2.1	2.5	3.0	3.5	3.9	1.7	19	.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	19	.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	22	.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 3.1*	32 24	.67 .07*	10	19

* Measurement for PVDF model

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

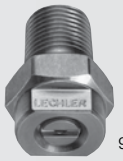
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

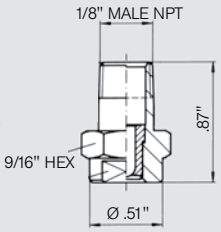
High pressure flat fan nozzles
Series 602 / 608 / 652

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

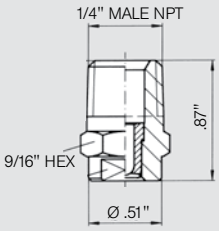
Applications:
Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.

FDA compliant

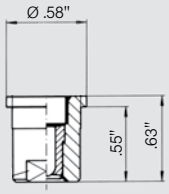




Series 608, Weight: .03 lb.



Series 602, Weight: .04 lb.



Series 652, Weight: .03 lb.

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

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

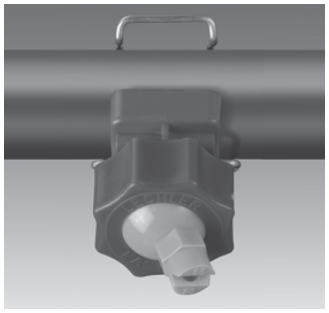
Example for ordering: (see bolded column headings above)	Nozzle code	+	Flow rate code	+	Connection code	=	Ordering no.
	602.	+	**361**	+	**A3. 07**	=	**602. 361. A3. 07**
							(.99 gpm & 20° spray angle @ 1000 psi; 1/4" Male NPT)

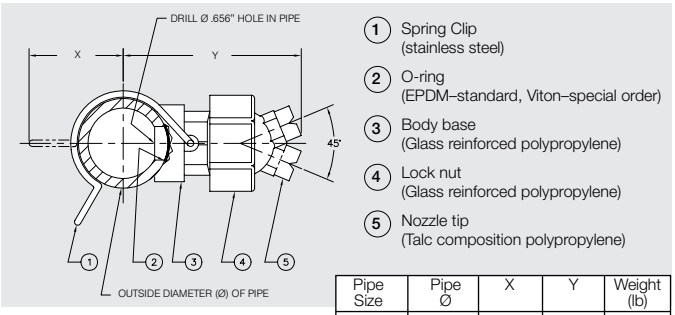
Conversion formula for the above series: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

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.

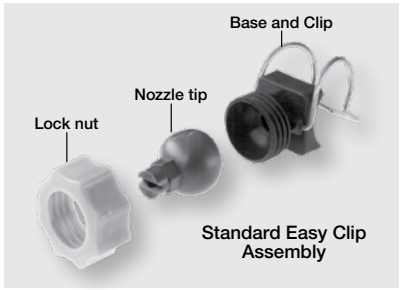
Applications:
- Parts washing and degreasing
- Phosphating lines
- Pre-painting processing





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



Sets – series 676 Easy-Clip

Designation	Spray angle	Ordering number Type	Nozzle Color	V̇ [gal/min] p [psi] 7	15	20	liters per minute 2 bar	30
Set 1 consisting of: Ball nozzle, Single clamp for 1 1/4" pipe, Retaining nut	60°	676.724.53.31	Grey	0.82	1.20	1.38	**6.30**	1.69
		676.764.53.31	Brown	1.04	1.52	1.75	**8.00**	2.15
		676.804.53.31	Purple	1.30	1.90	2.19	**10.00**	2.69
		676.844.53.31	Yellow	1.62	2.37	2.74	**12.50**	3.36
		676.884.53.31	Red	2.08	3.04	3.51	**16.00**	4.30
		676.904.53.31	Blue	2.36	3.46	3.99	**18.20**	4.89
		676.924.53.31	Green	2.60	3.80	4.39	**20.00**	5.37

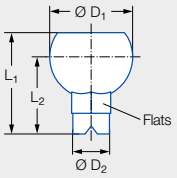
Designation	Ordering number Type	Ball Color	BSPP	Matches series
Set 2 consisting of: Ball joint, Single clamp for 1 1/4" pipe, Retaining nut	092.081.53.AB*	Beige	1/8	460, 490, 632, 686, 610, 544
	092.081.53.BD	Beige	1/4	422, 460, 490, 544, 612, 632, 686
	092.081.53.BF	Beige	3/8	422, 460, 490, 632, 686, 688
	092.081.53.AH*	Beige	1/2	422, 460, 490, 632, 686

* only available in metric

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

Individual parts – series 676 Easy-Clip

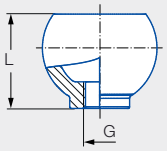
① Ball nozzle



Dimensions [in]				
L_1	L_2	Ø D_1	Ø D_2	Flats (mm)
1.63	1.24	1.34	0.59	16.0

Designation	Spray angle	Ordering number Type	Nozzle Color	V̇ [gal/min] p [psi] 7	15	20	liters per minute 2 bar	30
① Ball nozzle	60°	676.724.53.30.01	Grey	0.82	1.20	1.38	**6.30**	1.69
		676.764.53.30.01	Brown	1.04	1.52	1.75	**8.00**	2.15
		676.804.53.30.01	Purple	1.30	1.90	2.19	**10.00**	2.69
		676.844.53.30.01	Yellow	1.62	2.37	2.74	**12.50**	3.36
		676.884.53.30.01	Red	2.08	3.04	3.51	**16.00**	4.30
		676.904.53.30.01	Blue	2.36	3.46	3.99	**18.20**	4.89
		676.924.53.30.01	Green	2.60	3.80	4.39	**20.00**	5.37
Blind nozzle	–	092.080.53.00.01	Grey	–	–	–	–	–

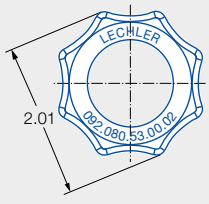
② Ball joint



Designation	Ordering number Type	Ball Color	BSPP	L [in]	Matches series
② Ball joint	092.080.53.AB.01	Beige	1/8	1.12	460, 490, 632, 686, 610, 544
	092.080.53.AD.01*	Beige	1/4	1.28	422, 460, 490, 544, 612, 632, 686
	092.080.53.AF.01*	Beige	3/8	1.24	422, 460, 490, 632, 686, 688
	092.080.53.AH.01	Beige	1/2	1.30	422, 460, 490, 632, 686

* Also available with NPT connection

③ Retaining nut



Designation	Ordering number Type
③ Retaining nut	092.080.53.00.02

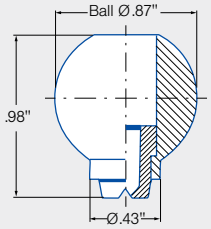
Flat fan nozzle with ball joint
Series 676

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.

FDA compliant

(Mat. no. 16 / 17)



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

Spray angle	Ordering no. Type	Material no. 303 SS 16	Material no. Brass 30	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Width B (in.) @ 30 psi H=10"	H=20"
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 for ordering:	Type	+	Material no.	=	Ordering no.
	676. 301	+	16	=	676. 301. 16

Continued on next page.

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

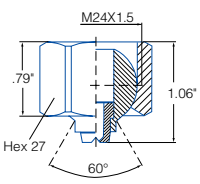
Flat fan nozzle with ball joint
Series 676

Spray angle	Ordering no. Type	Material no. 303 SS 16	Material no. Brass 30	Equivalent Orifice diam. (in.)	Free passage (in.)	Flow Rate (Gallons Per Minute) 10 psi	20 psi	liters per minute 2 bar	30 psi	40 psi	60 psi	80 psi	100 psi	150 psi	Spray Width B (in.) @ 30 psi H=10"	H=20"
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

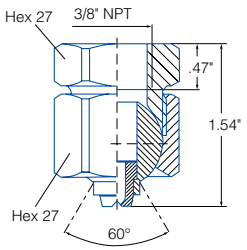
Example for ordering:	Type	+	Material no.	=	Ordering no.
	676. 301	+	**16**	=	**676. 301. 16**

Accessories

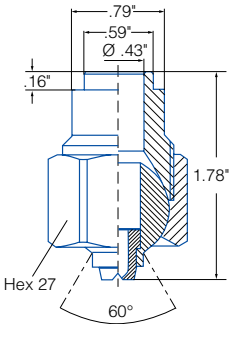
Retaining nut
092. 020. 16. 00. 02
Material: 303 SS
092. 020. 30. 00. 02
Material: Brass



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



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



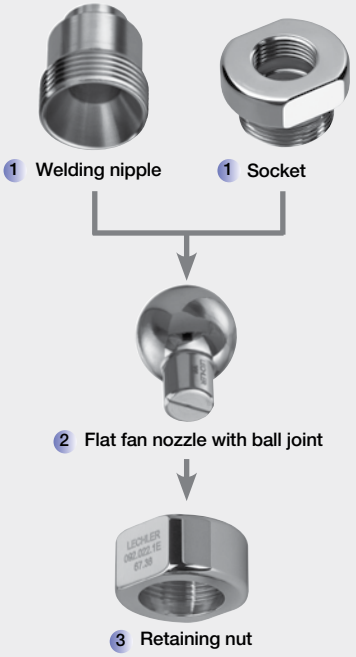
Retaining nipple
092.024.16.AC.03
Material: 303 SS
092.024.30.AC.03
Material: Brass

Available in metric only

Nozzles and accessories in Hygienic Design

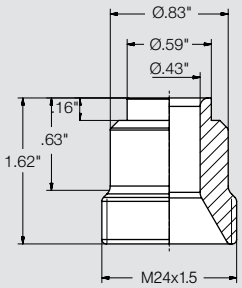
Features
The hygienically designed nozzles and accessories are characterized by their very good surface finish (RA < 0,8 µm*). This minimizes the tendency for soiling and provides good cleanability. The nozzles and accessories are available in 316L (1.4435) or 316TI (1.4571) and the seals are made of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

Applications
Aseptic filling, suitable for high hygienic demands.



1

Welding nipple for ball joint
Ordering no. 092.020.1E.67.04



1

Socket for ball joint
Ordering no. 092.020.1E.67.38

2

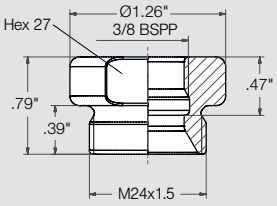
Flat fan nozzle with ball joint, 30° Swivel-mounted 30° in all directions.

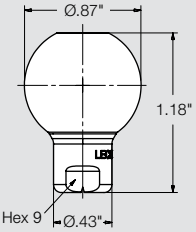
2

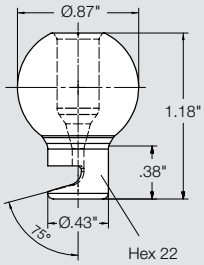
Tongue type nozzle with ball joint, Swivel-mounted 30° in all directions.

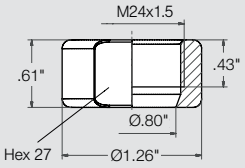
3

Retaining nut for ball joint
Ordering no. 092.020.1E.67.02









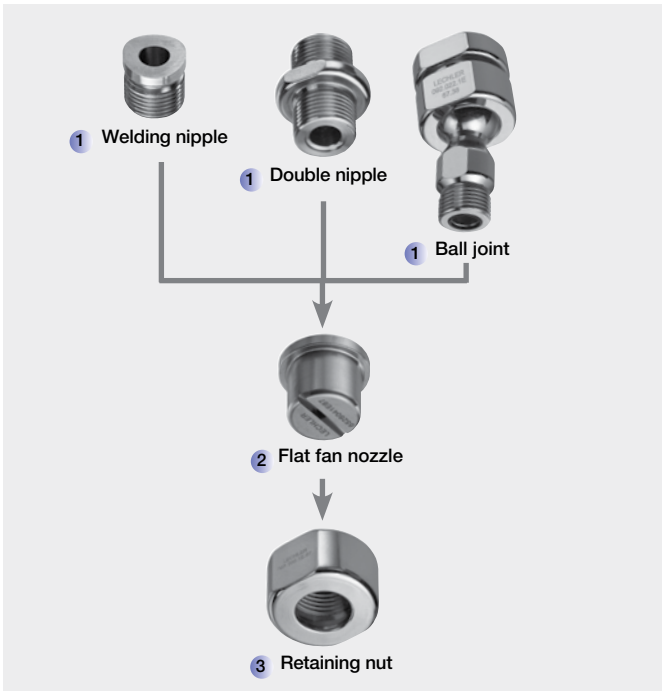
	Ordering no.	GPM @ 40 psi
45°	**676. 641. 17. 67**	1.24
30°	**676. 402. 17. 67**	.31
	676. 562. 17. 67	.78
	676. 722. 17. 67	1.95
	676. 802. 17. 67	3.1
45°	**676. 763. 17. 67**	2.48
	676. 883. 17. 67	4.96
60°	**676. 514. 17. 67**	.59
	676. 764. 17. 67	2.48
90°	**676. 366. 17. 67**	.19
	676. 646. 17.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

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

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

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

Nozzles and accessories in Hygienic Design

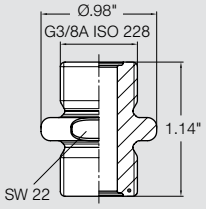


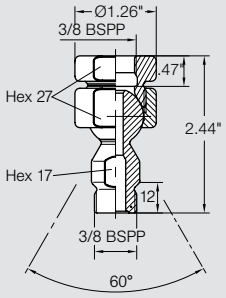
1

Double nipple
Ordering no. 065.211.1E.67

1

Ball joint
Ordering no. 092.022.1E.67.38





1

Welding nipple

2

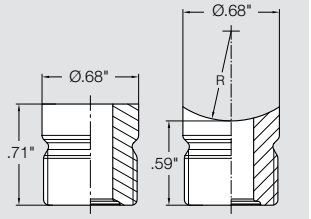
Flat fan nozzle
spray angle 60°

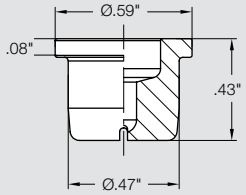
2

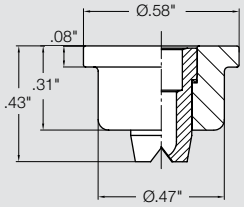
Modular flat fan nozzle
spray angle 60°

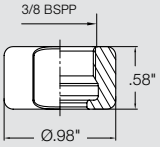
3

Retaining nut
Ordering no. 065.200.1E.67









Ordering no.	Radius (in.)
065. 210. 1E. 67. 00	no radius
065. 217. 1E. 67. 10	.39
065. 217. 1E. 67. 13	.49
065. 217. 1E. 67. 16	.63
065. 217. 1E. 67. 20	.79
065. 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: $V_2 = V_1 \sqrt{\frac{P_2}{P_1}}$

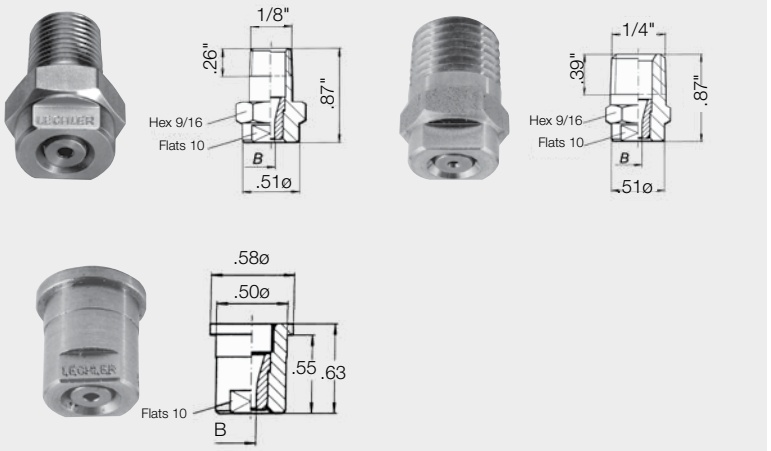
High-pressure solid steam nozzles
Series 546/548/550

Exceptionally tight solid stream nozzles for pressures up to 4500 psi. Available in 1/8" NPT or BSPT, 1/4" NPT or BSPT, or tip version.

Applications:
High-pressure cleaning, cutting and separating

Materials:
Nozzle body: 303 SS
Insert: Hardened stainless steel

FDA compliant



Nozzle Code			Flow Rate Code	Orifice diam.	Flow Rate (Gallons Per Minute)									
									liters per minute					
1/8" Male NPT or BSPT	1/4" Male NPT or BSPT	Tip		(in.)	300 psi	450 psi	725 psi	1000 psi	100 bar	1500 psi	2000 psi	3000 psi	4500 psi
550	546	548	300	.024	.27	.34	.43	.50	2.3	.61	.71	.87	1.1
550	546	548	360	.033	.54	.67	.84	.99	4.5	1.2	1.4	1.7	2.1
550	546	548	380	.037	.68	.84	1.1	1.3	5.7	1.5	1.8	2.1	2.7
550	546	548	390	.039	.74	.90	1.2	1.4	6.2	1.7	1.9	2.3	2.9
550	546	548	400	.041	.82	1.0	1.3	1.5	6.8	1.8	2.1	2.6	3.2
550	546	548	410	.042	.90	1.1	1.4	1.6	7.5	2.0	2.3	2.8	3.5
550	546	548	420	.044	.96	1.2	1.5	1.8	8.0	2.1	2.5	3.0	3.7
550	546	548	440	.045	1.0	1.27	1.6	1.9	8.7	2.3	2.7	3.3	4.0
550	546	548	450	.047	1.1	1.3	1.7	2.0	9.2	2.5	2.8	3.5	4.3
550	546	548	470	.050	1.2	1.5	1.9	2.3	10.3	2.8	3.2	3.9	4.8
550	546	548	480	.052	1.4	1.7	2.2	2.5	11.5	3.1	3.6	4.4	5.4
550	546	548	500	.055	1.5	1.9	2.4	2.8	12.6	3.4	3.9	4.8	5.9
550	546	548	520	.057	1.7	2.0	2.6	3.0	13.8	3.7	4.3	5.2	6.4
550	546	548	530	.059	1.8	2.2	2.8	3.3	14.8	4.0	4.6	5.6	6.9
550	546	548	540	.062	1.9	2.4	3.0	3.5	16.0	4.3	5.0	6.1	7.4
550	546	548	550	.064	2.0	2.5	3.2	3.7	16.9	4.5	5.2	6.4	7.9
550	546	548	570	.067	2.2	2.7	3.4	4.0	18.2	4.9	5.6	6.9	8.4
550	546	548	580	.069	2.4	2.9	3.7	4.4	19.8	5.3	6.2	7.5	9.2
550	546	548	590	.070	2.4	3.0	3.8	4.5	20.3	5.5	6.3	7.7	9.4
550	546	548	600	.074	2.7	3.3	4.2	5.0	23.0	6.1	7.0	8.6	10.5
550	546	548	620	.078	3.0	3.7	4.7	5.5	25.1	6.7	7.8	9.5	11.7
550	546	548	640	.082	3.4	4.2	5.3	6.2	28.3	7.6	8.8	10.7	13.2
550	546	548	650	.085	3.6	4.4	5.6	6.6	29.9	8.0	9.3	11.4	13.9
550	546	548	660	.087	3.8	4.7	5.9	7.0	37.7	8.5	9.8	12.0	14.7
550	546	548	670	.091	4.1	5.0	6.4	7.5	34.2	9.2	10.6	13.0	15.9
550	546	548	690	.095	4.5	5.5	7.0	8.3	37.6	10.1	11.7	14.3	17.5
550	546	548	700	.098	4.8	5.8	7.4	8.7	39.7	10.7	12.3	15.1	18.5
550	546	548	710	.100	5.0	6.1	7.8	9.2	41.7	11.2	12.9	15.9	19.4
550	546	548	720	.105	5.5	6.7	8.5	10.0	46.0	12.3	14.2	17.3	21.0
550	546	548	740	.109	6.0	7.3	9.3	10.9	49.7	13.4	15.4	18.9	23.1
550	546	548	760	.117	6.9	8.4	10.6	12.5	57.0	15.3	17.7	21.7	26.5
550	546	548	790	.127	8.1	9.9	12.5	14.7	67.0	18.0	20.8	25.5	31.2
550	546	548	800	.130	8.5	10.4	13.2	15.5	70.7	19.0	86.5	26.9	32.9

Connection Code	Connection	Maximum pressure
A3. 00	Male BSPT	Approx. 5000 psi
A3. 07	Male NPT	Approx. 5000 psi
A3. 29	Retainer cap	Approx. 3000 psi

Example for ordering: Nozzle code **550.** + Flow rate code **360.** + Connection code **A3. 07** = Ordering no. **550. 360. A3. 07**
(see bolded column headings above)
(.99 gpm & 0° spray angle at 1000 psi; 1/8"Male NPT)

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.

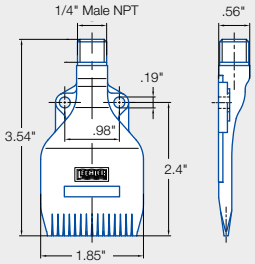
FDA compliant

(Mat. no. 16 / 5E)

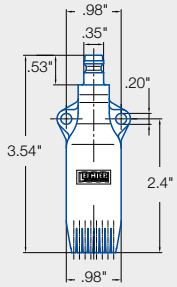
OSHA*

* Complies with OSHA requirements on noise level

600. 130 (POM or PP)

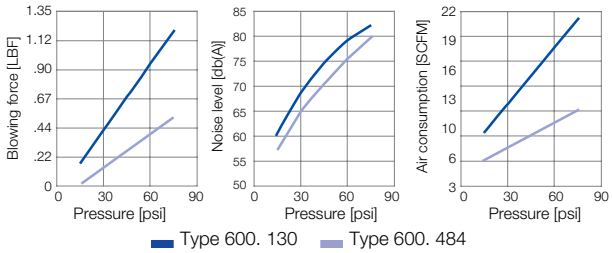


600. 484. 56 (POM)



600. 130. 56. 01
with accessories

Technical Data



Socket
Ordering no.
095.016.30.14.23.0

Material: Brass

For connection of series 600.130 with compressed air guns.

Ordering no. Type	Material no. Natural PP S2	Material no. POM 56	Connection 1/4" Male NPT	Connection Hose Barb	Description	Accessories	Capacity for Air (Standard Cubic Feet per Minute) 15 psi	30 psi	45 psi	60 psi	Approx. Wt. (lb.)	Max. Pressure	Max. Temp. °F
600. 130	○	○	**BC**	-	Original flat WHISPERBLAST		6.5	10.8	14.9	19.1	.05	75 psi	120
600. 130	-	○	-	**01**	Flat WHISPERBLAST (1/4" Male NPT) w/accessories	Hose nipple (5/16" barb) Steel Extension (L=3.3")	6.5	10.8	14.9	19.1	.05	75 psi	120
600. 484	-	○	**BC**	-	Flat Mini-WHISPERBLAST		3.1	4.7	6.4	8.0	.03	75 psi	120

Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	600. 130	+	**56**	+	**BC**	=	**600. 130. 56. BC**

Multi-channel flat fan nozzles for air
Whisperblast®, metalic 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.

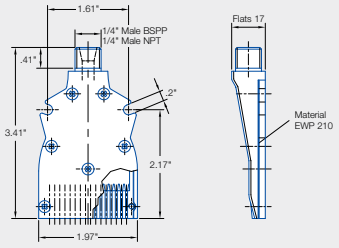
Applications:
Blowing off and blowing out, cleaning, drying, cooling, conveying with air.

FDA compliant

(Mat. no. 1Y)

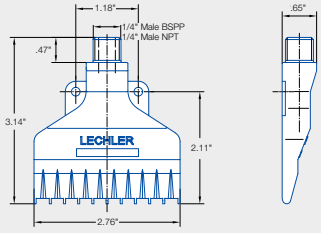
OSHA®

Complies with OSHA requirements on noise level only

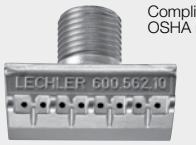


600. 283. 42 (Aluminum)

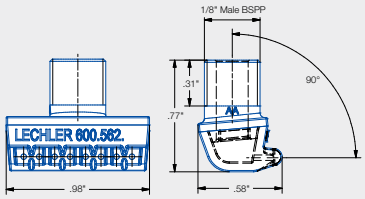
Complies with OSHA requirements



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



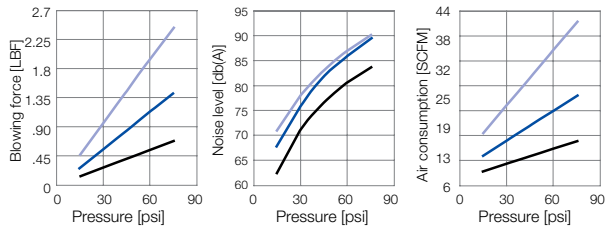
Complies with OSHA requirements



600. 562. 1Y. 10 (Stainless steel 316L SS) — **Weight: .6oz Tmax: 1022 °F**

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

Technical data



Ball joints see page 72

Ordering no. Type	Material no. 316L SS 1Y	Material no. Aluminum 42	Connection Male NPT 1/8"	Connection Male NPT 1/4"	Description	Capacity for Air (Standard Cubic Feet per Minute) 15 psi	30 psi	45 psi	60 psi	Approx. Wt. (lb.)	Max. Pressure	Max. Temp. °F
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

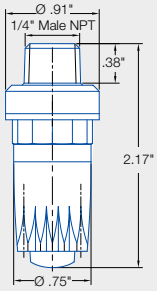
Provides focused blasting power with minimal air consumption and noise. Round configuration excellent for spot blasting, clearing holes, or use on hand guns.

Applications:
Targeted blowing out and blowing off with compressed air guns.

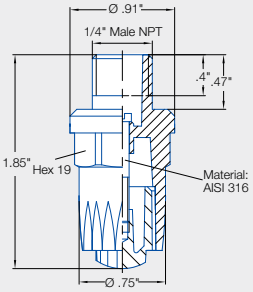
Reduction of noise level of up to 12 dB (A).

600. 326. 5K/3W mounted on a compressed air gun.

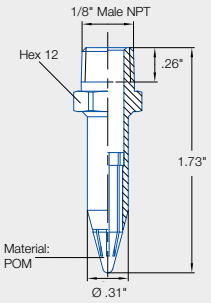
OSHA



600.326.5K (ABS)



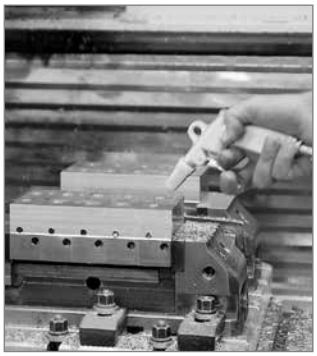
600.326.3W (Zinc)



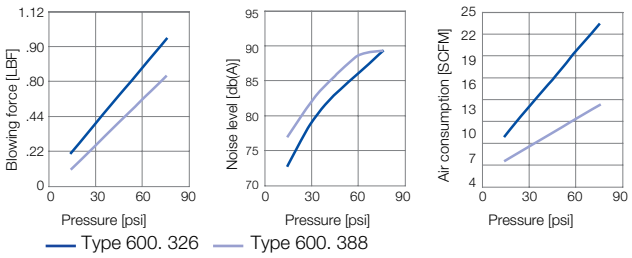
600.388.30 (Brass, POM)

Mini-round jet nozzle. Compact design.

Applications:
Especially for blowing out pocket holes.



Technical data

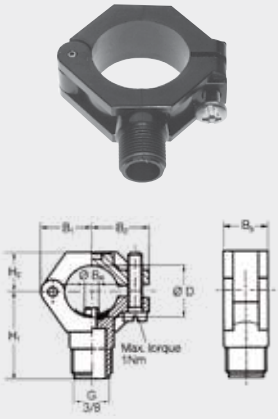


Ball joints see page 72

Ordering no.						Description	Capacity for Air (Standard Cubic Feet per Minute)					Approx. Wt.	Max. Pressure	Max. Temp.
Type	Material no.			Connection			15 psi	30 psi	45 psi	60 psi	75 psi	(lb.)		°F
	Brass 30	ABS 5K	Zinc 3W	Male NPT 1/8"	1/4"									
600. 326	○	○	-	BA	BC	Round WHISPERBLAST	5.3	8.8	12.4	16.0	19.5	0.05	100 psi	120
600. 326	-	-	○	-	BC	Round WHISPERBLAST	5.3	8.8	12.4	16.0	19.5	0.10	100 psi	200
600. 388	○	-	-	BA	-	MiniBlast	3.0	4.6	6.2	7.8	9.4	0.14	100 psi	120

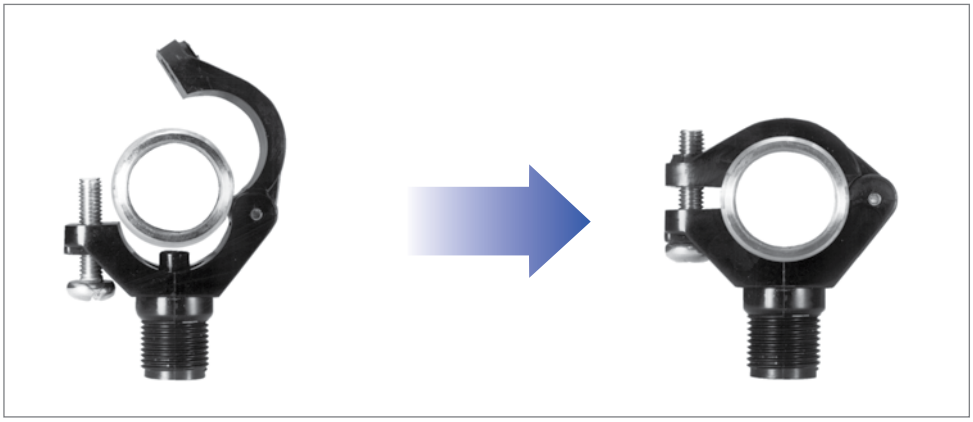
Example for ordering:	Type	+	Material no.	+	Conn.	=	Ordering no.
	600. 326	+	5K	+	BC	=	600. 326. 5K. BC

Accessories
Eyelet clamps / Retaining nuts



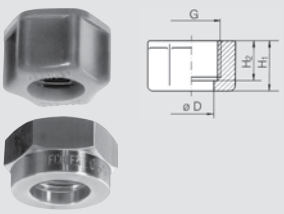
Eyelet clamp
for retaining nut

For series	Ordering no. Type	Material no. Nylon 51	PP 53	PVDF 5E	Screw (Material)	Dimensions (in.) Pipe ø	Drill hole diameter	B_R ø	B_1	B_2	B_3	H_1	H_2	Weight (Nylon)
2TR 302 468 652 679 684	**090. 053**	○	○	○	304 SS	3/8"	1/4"	.25	.75	.87	.73	1.36	.57	.05
	090. 003	○	○	○		1/2"	1/4"	.25	.84	.94	.73	1.44	.65	.05
	090. 013	○	○	○		3/4"	5/16"	.31	.96	1.05	.87	1.56	.69	.06
	090. 023	○	○	○		1"	7/16"	.43	1.18	1.22	.87	1.73	.83	.07
	090. 033	○	○	○		1 1/4"	1/2"	.51	1.34	1.40	.99	1.89	.99	.09



Example for ordering:	Type	+	Material no.	=	Ordering no.
	090. 053	+	51	=	090. 053. 51

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

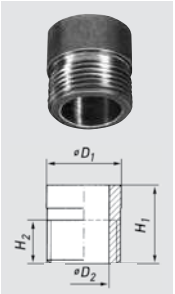


Retaining nuts

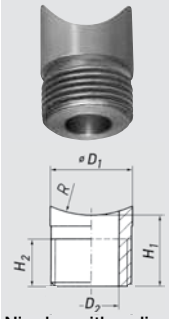
For series	Ordering no. Type	Material no. 303 SS 16	316SS 17	316L SS 1Y	Brass 30	POM 56	PVDF 5E	Dimensions (in.) For thread	H_1	H_2	D	Hex	Weight (Brass) lb.
2TR 468 548* 652 660 679 684	**065. 200**	○	○	-	○	○	○	3/8" BSPP	.57	.40	.50	.87	.06
	069. 000	○	-	○	○	-	-	11/16"-16	.57	.40	.50	.87	.06
656/664	**065. 600**	○	○	-	○	-	○	3/4" BSPP	.63	.51	.79	1.26	.13

Example for ordering:	Type	+	Material no.	=	Ordering no.
	065. 200	+	17	=	065. 200. 17

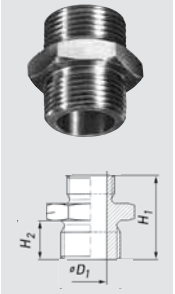
Nipples



Nipples



Nipples with radius
(R=10/13/16/20/25 or 31 mm)



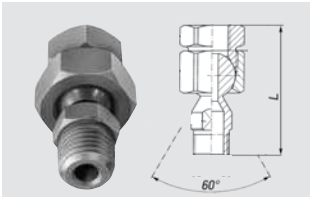
Double nipples

For series	Ordering no. Type	Material no. Steel 02	316 SS 17	Brass 30	PP 53	Dimensions (in.) Inlet	Outlet	H_1	H_2	D_1	D_2	R	HEX	Weight (Brass) lb.
2TR 468 652 679 684	**065. 210. xx. 00**	○	○	○	○	-	3/8" Male BSPP	.71	.39	.68	.45	-	-	.04
656 657	**065. 610. xx. 00**	○	○	-	○	-	3/4" Male BSPP	1.06	.55	1.10	.71	-	-	.13
2TR 468 652 679 684	**065. 217. xx. 10**	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.39	-	.04
	065. 217. xx. 13	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.51	-	.04
	065. 217. xx. 16	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.63	-	.04
	065. 217. xx. 20	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.79	-	.04
	065. 217. xx. 25	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	.98	-	.04
	065. 217. xx. 31	-	○	-	-	-	3/8" Male BSPP	.71	.39	.68	.45	1.22	-	.04
2TR 468 652 679 684	**065. 215. xx. 11**	-	○	○	-	1/4" Male NPT	3/8" Male BSPP	1.44	.39	-	-	-	11/16	.06
	065. 215. xx. 12	-	○	○	-	3/8" Male NPT	3/8" Male BSPP	1.38	.39	-	-	-	11/16	.06
	065. 211. xx. 15	-	○	○	-	1/2" Male NPT	3/8" Male BSPP	1.38	.39	-	-	-	7/8	.06
	065. 221. xx. 11	-	○	○	-	1/2" Male NPT	3/8" Male BSPP	1.25	.39	-	-	-	11/16	.06
	065. 211. xx. 11	-	○	○	-	1/8 Male NPT	11/16"-16	1.38	.39	-	-	-	11/16	.06
	065. 215. xx. 10	-	○	○	-	1/4" Male NPT	11/16"-16	1.44	.39	-	-	-	11/16	.06
	065. 211. xx. 10	-	○	○	-	3/8" Male NPT	11/16"-16	1.25	.39	-	-	-	11/16	.06
	065. 211. xx. 14	-	○	○	-	1/2" Male NPT	11/16"-16	1.38	.39	-	-	-	7/8	.06
	065. 221. xx. 10	-	○	○	-	1/4" Female NPT	11/16"-16	1.25	.39	-	-	-	11/16	.06
	065. 220. xx. 10	-	○	○	-	3/8" Female NPT	11/16"-16	1.25	.39	-	-	-	7/8	.06
656 657 664 665	**065. 611. xx. BK**	-	○	○	-	3/4" Male NPT	3/4" Male BSPP	1.65	.55	.71	-	-	1-1/4	.20

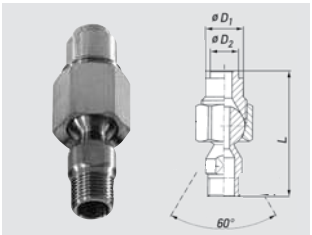
Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	065. 215. xx. 11	+	**17**	=	**065. 215. 17. 11**

Accessories
Ball joints

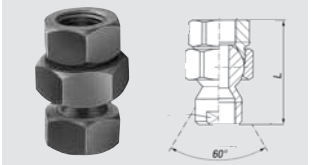
Ball joints



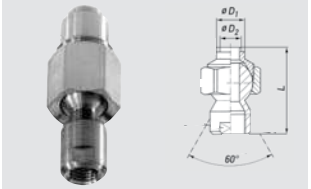
Ball joint with thread connection, female-male



Ball joint with welding connection, male threads



Ball joint with thread connection, female-female



Ball joint with welding connection, female threads

For series	Ordering no. Type	Material no. 303 SS/316 SS 16	303 SS 16	Brass 30	Dimensions (in.) Inlet	Outlet	D_1	D_2	Largest HEX	L	Weight (Brass) lb.
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**	○	-	-	-	3/8" Male BSPP	.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**	-	○	○	-	1/4" Female BSPP	.79	.59	1-1/16	2.53	.33
	091. 030. xx. SF	-	○	○	-	3/8" Female BSPP	.87	.59	1-3/16	2.31	.33

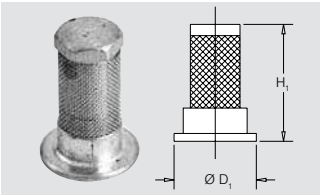
Example for ordering:	Type	+	Material no. (xx)	=	Ordering no.
	092. 010. xx. BB. BB	+	**16**	=	**092. 010. 16. BB. BB**

Strainers for Bayonet

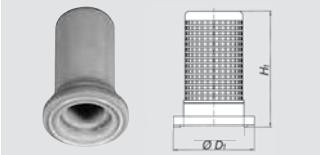
Strainer with gasket

For nozzle size	Ordering no.	Material	Strainer mesh	Color	Dimensions (in.) H_1	H_2	D_1	D_2	Weight (lb.)
xxx.32x-xxx.44x	**065. 268. 7J**	Santoprene	25	Blue	.85	.10	.71	.44	.004
xxx.48x-xxx.56x	**065. 269. 7J**	Santoprene	65	Red	.85	.10	.71	.44	.004

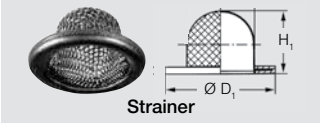
Strainers



Strainer Check Valve



Strainer



Strainer

Valve option	Ordering no. Type	Material no. Monel 26	Brass 30	POM 56	Color	Opening pressure (psi)	Mesh size (mm)	Dimensions (in.) Mesh opening	H_1	D_1	Weight (Brass) lb.
With check valve	**065. 265**	-	-	○	Blue	8	50	.011	.81	.58	.004
	065. 266	-	-	○	Red	8	24	.026	.81	.58	.004
No check valve	**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 for ordering: **Type 065. 260 + Material no. 30 = Ordering no. 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.

FDA compliant

VarioSpray HP
High Performance

VarioSpray II

Suitable control units for each nozzle system

Control unit VarioSpray HP

Control unit VarioSpray II

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

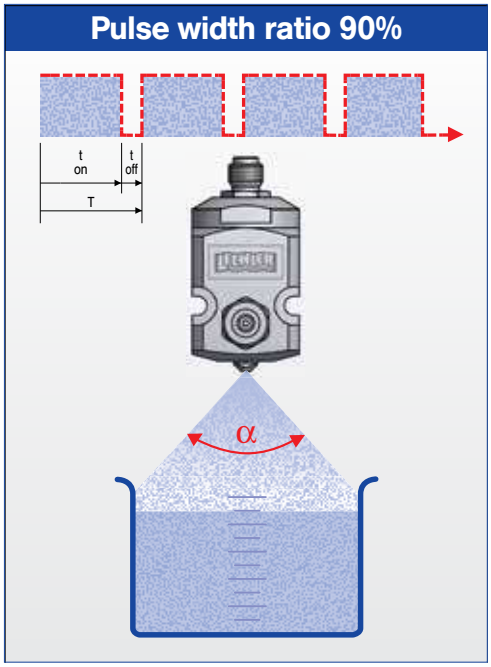
Product features	Your benefit
Minimum flow rates – Liquid saving – No expensive, complex twin-fluid system	➲ Reduced costs ➲ Greater efficiency
Cycle frequency up to 200 Hz for VarioSpray HP, up to100 Hz for VarioSpray II - Flexible belt speeds	➲ Increased productivity ➲ Shorter production time
High 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

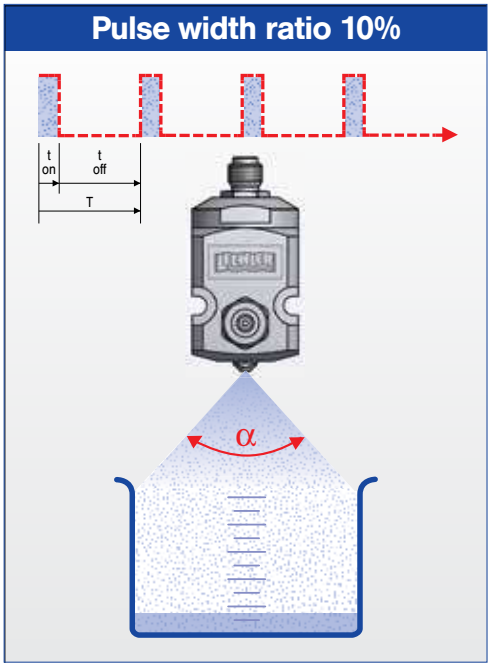
What is pulse width modulation?

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 ton 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.





lgium: Lechler S.A./N.V. · Avenue Mercatorlaan, 6 · 1300 Wavre · Phone: +32 10 225022 · Fax: +32 10 243901 · info@lechler.be
ina: Lechler Intl. Trad. Co. Ltd. · Beijing · Rm. 418 Landmark Tower · No. 8 Dong San Huan Bei Lu · Phone: +86 10 84537968, Fax: +86 10 84537458 · info@lechler.com.cn
land: Lechler Oy · Jäspilänkatu 18 · 04250 Kerava · Phone: +358 207 856880 · Fax: +358 207 856881 · info@lechler.fi
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ASEAN: Lechler Spray Technology Sdn. Bhd. · 22, Jln. Astaka 4B/KU2 · Bdr. Bukit Raja · 41050 Klang · Malaysia · Phone +603 3359 1118 · info@lechler.com.my
Belgium: Lechler S.A./N.V. · Avenue Newton 4 · 1300 Wavre · Phone +32 10 225022 · info@lechler.be
China: Lechler Nozzle Systems (Changzhou) Co., Ltd. · No.99 Decheng Rd, Jintan, Changzhou, JS 213200, P.R.C · Phone +86 519-6822 8088 · info@lechler.com.cn
Finland: Lechler Oy · Ansatie 6 a C 3 krs · 01740 Vantaa · Phone +358 207 856880 · info@lechler.fi
France: Lechler France SAS · Parc de la Haute Maison · 6, Allée Képler, Bâtiment C2 · 77420 Champs-sur-Marne · Phone +33 1 49882600 · info@lechler.fr
Germany: Lechler GmbH · PO Box 13 23 · 72544 Metzingen · Phone: +49 7123 962-0 · Fax: (49) 7123 962-444 · info@lechler.de
Great Britain: Lechler Ltd. · 1 Fell Street, Newhall · Sheffield, S9 2TP · Phone +44 114 2492020 · info@lechler.com
India: Lechler (India) Pvt. Ltd. · Plot B-2 · Main Road · Wagle Industrial Estate Thane · 400604 Maharashtra · Phone +91 22 40634444 · lechler@lechlerindia.com
Italy: Lechler Spray Technology S.r.l. · Via Don Dossetti, 2 · 20080 Carpiano (Mi) · Phone +39 2 98859027 · info@lechleritalia.com
Russia: Lechler Rus · OOO, 108811, Moscow, Settlement Moskowskiy, Kiewskoe Chaussee km 22 · Object 4, Bld. 2, Block G, Floor 6, Office 601/G · info@lechler-rus.ru
Spain: Lechler, S.A. · C / Isla de Hierro, 7 – Oficina 1.3 · 28703 San Sebastián de los Reyes (Madrid) · Phone +34 91 6586346 · info@lechler.es
Sweden: Lechler AB · Hävertgatan 29 · 252 423 Helsingborg · Phone +46 18 167030 · info@lechler.se
USA: Lechler Inc. · 445 Kautz Road · St. Charles, IL 60174 · Phone +1 630 3776611 · info@lechlerusa.com

Edition 02/25 EN PDF ·