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**ENGINEERING
YOUR SPRAY SOLUTION**



Precision Spray Nozzles for the Food and Beverage Industry



**Food and Beverage
Industry**

LECHLER – YOUR COMPETENT NOZZLE TECHNOLOGY PARTNER

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



Lechler develops and manufactures precision nozzles for various applications. For this we can fall back on all the experience of our 140-year history. The extensive knowledge of nozzles among our 700-strong workforce and a deep understanding of typical industry processes

mean that we have been at the forefront of innovation in nozzle technology for many years.

Today, Lechler manufactures nozzles in Germany, England, Hungary, India, China and the USA. But despite this international alignment, at our heart

we remain a Swabian family company with the typical passion for precision, innovation and the drive to always become that little bit better.

Other subsidiary companies plus more than 40 representative offices round off our global sales network.

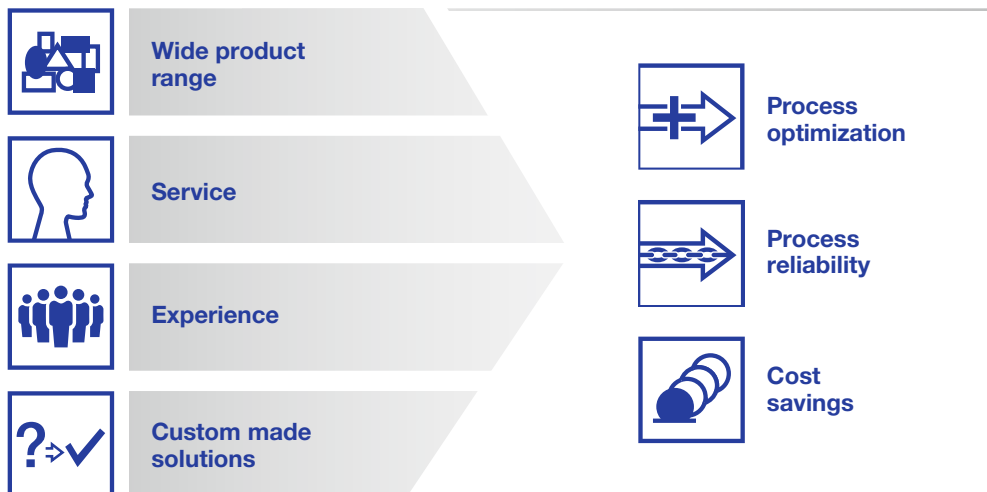


WIDE RANGE OF SERVICES FOR YOUR SUCCESS

ENGINEERING
YOUR SPRAY SOLUTION



**CUSTOMER
ADVANTAGES**



Nozzles for the food and beverage industry

In this brochure we have compiled for you an overview of our tried-and-tested nozzles for the food and beverage industry.

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

We will support you with our solutions right along the process chain:

-  **Disinfection and hygiene**
-  **Product provision**
-  **Product treatment**
-  **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.lechler.de.

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



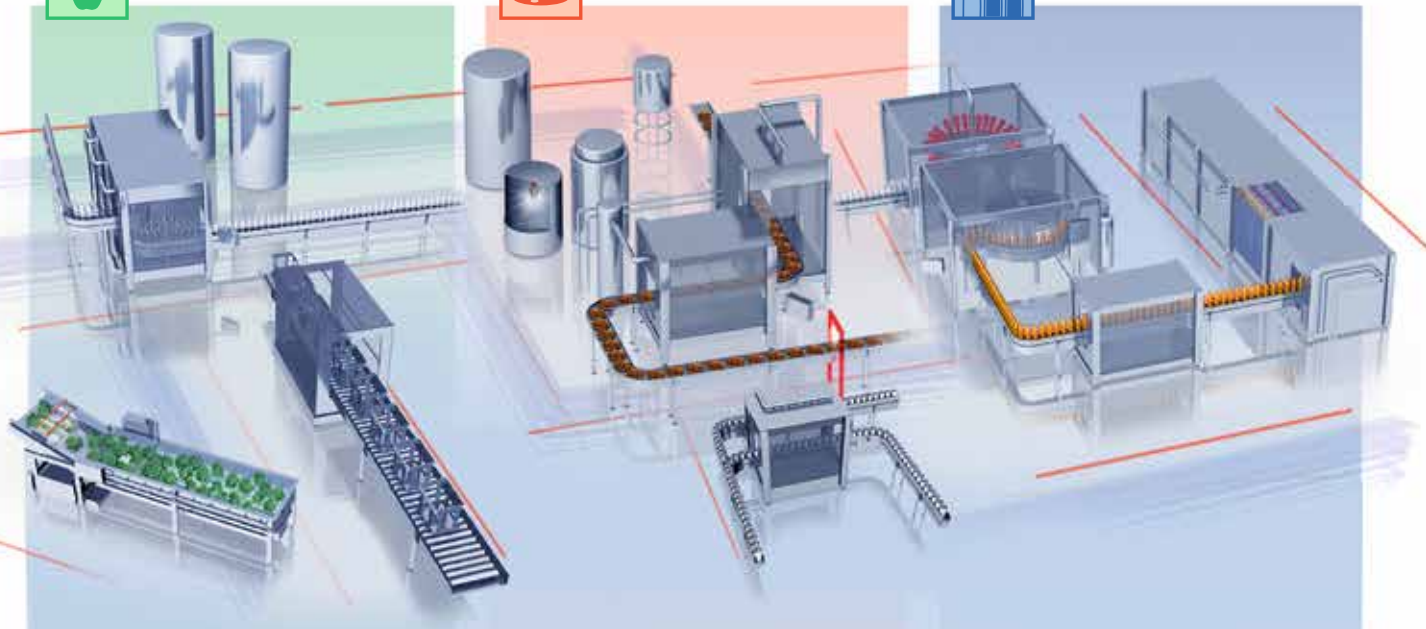
Product provision



Product treatment



Filling and packing



Tank cleaning/CIP

Belt lubrication

Belt cleaning

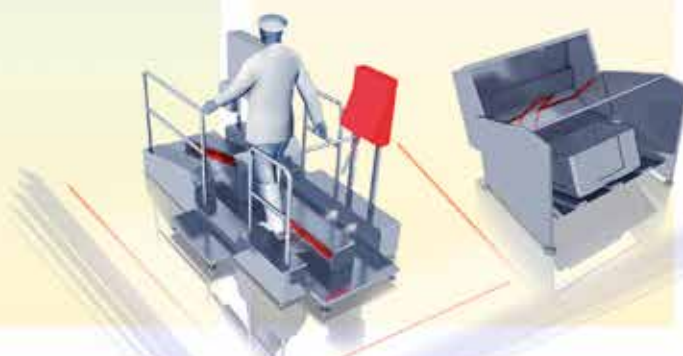
- Container washers
- Cleaning of fruit and vegetables
- Pretreatment of equipment
- Humidification
- Bottle and barrel cleaning
- Filter cleaning

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

- Filler cleaning
- Pasteurisation
- Sterilization
- Sorting cans and bottles
- Sorting with air
- Anti-scuffing
- PET bottle cooling



Disinfection and hygiene



- Disinfection
- Hand disinfection
- Boot disinfection
- Room disinfection
- Work sluices



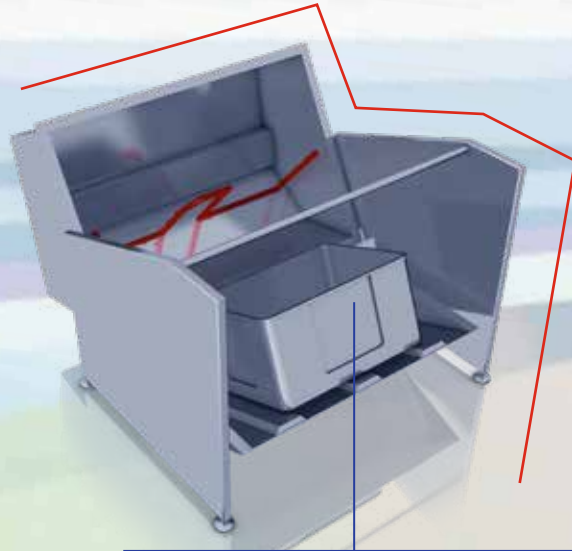
LECHLER NOZZLES FOR DISINFECTION AND HYGIENE APPLICATIONS



Hand disinfection

Hygiene sluices are a fundamental element of production that is as free from germs as possible.

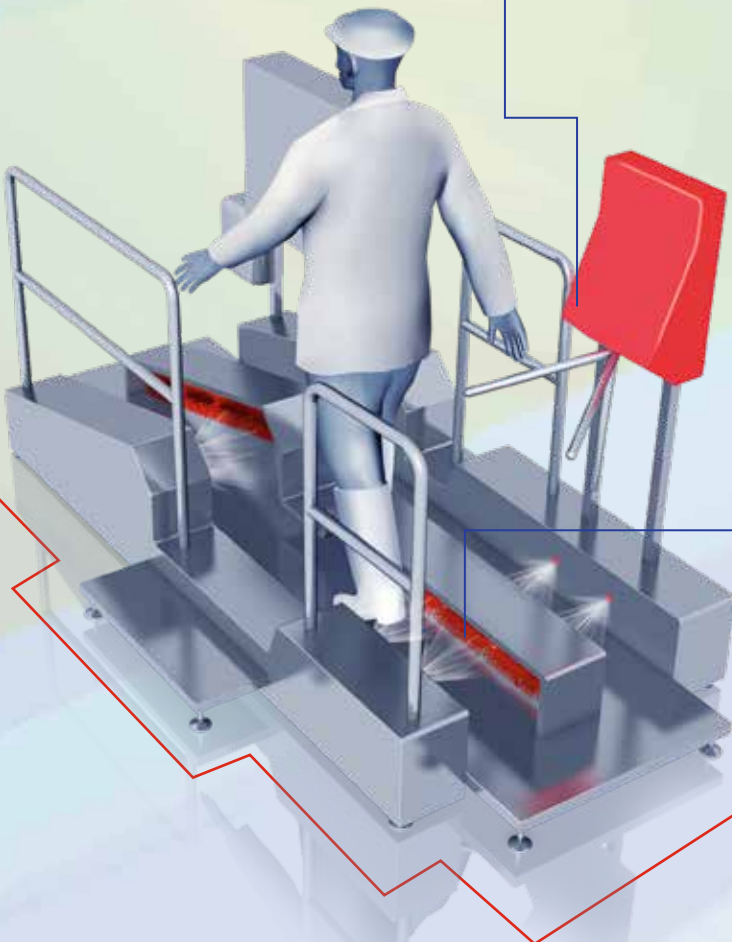
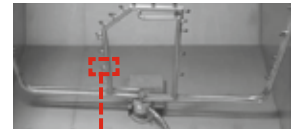
Hollow cone nozzles atomize disinfectants very finely and thereby ensure wide surface coverage and high disinfectant efficiency.



Work equipment disinfection

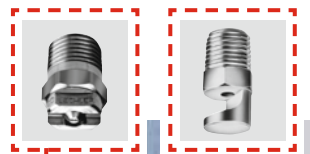
Short throughput times are needed when cleaning and disinfecting trolleys and containers for production.

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 tongue-type nozzles**.

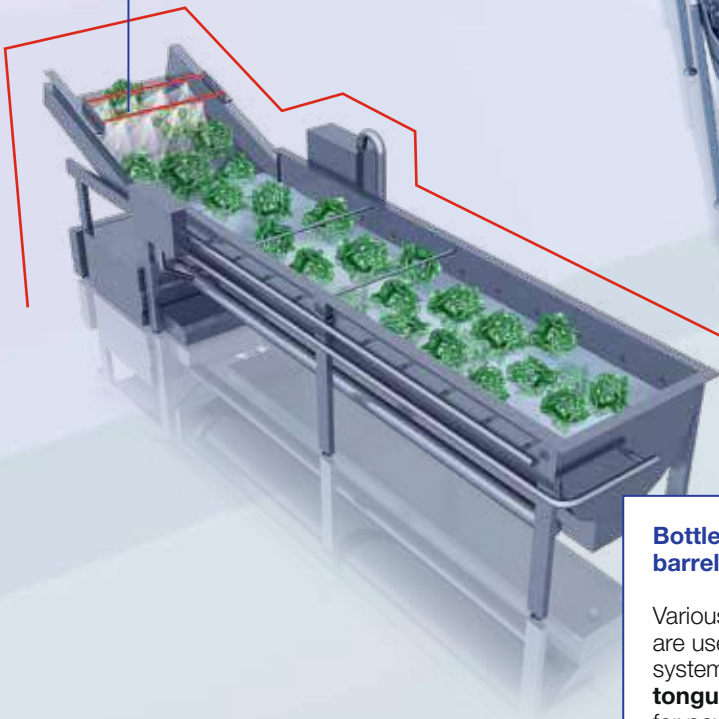
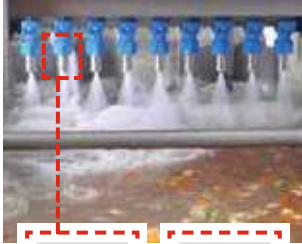




LECHLER NOZZLES FOR PRODUCT PROVISION APPLICATIONS

Cleaning of fruit and vegetables

Series 468 full cone nozzles with a 60° spray angle clean cut fruit and vegetables. Simple assembly via an eyelet clamp with bayonet quick release enables the quick exchange of nozzles.



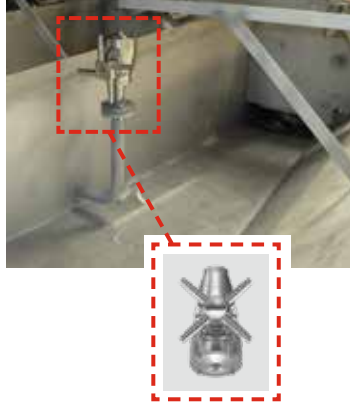
Bottle and barrel cleaning

Various types of nozzles are used in these systems. **Flat fan** and **tongue-type nozzles** for powerful cleaning of heavy soil. **Full cone nozzles** for rinsing and **tank cleaning nozzles** for cleaning the insides of barrels.



Machine cleaning and tank cleaning

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

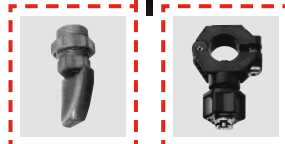


Other nozzle applications in the product provision field

- 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.
- Sorting procedures 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 for the latter is **flat fan nozzles**. **Tongue-type nozzles** produce a particularly powerful flat fan at low pressure.



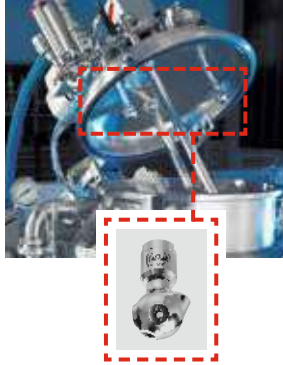


LECHLER NOZZLES FOR PRODUCT TREATMENT APPLICATIONS



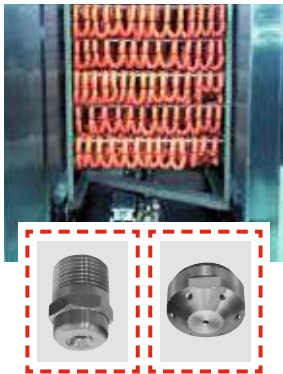
Tank cleaning

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



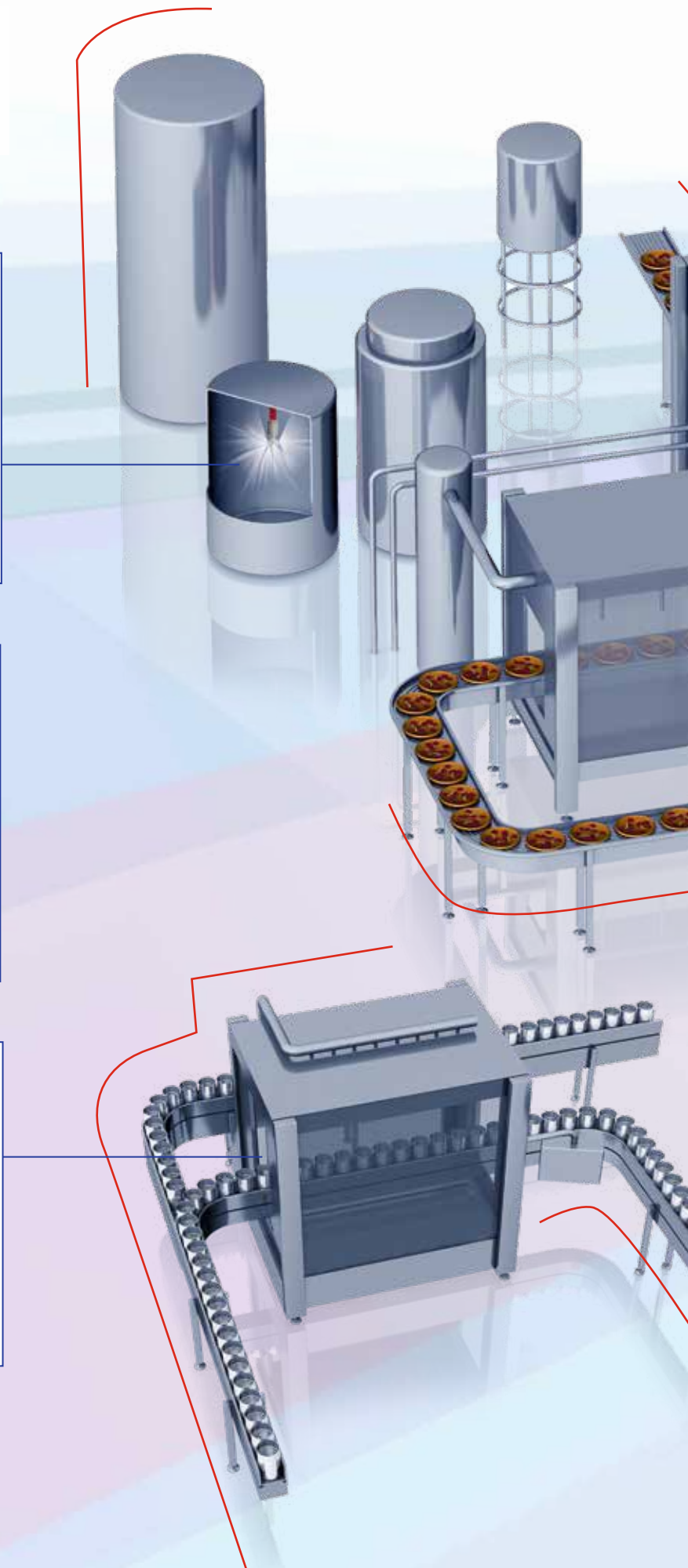
Sausage cooling

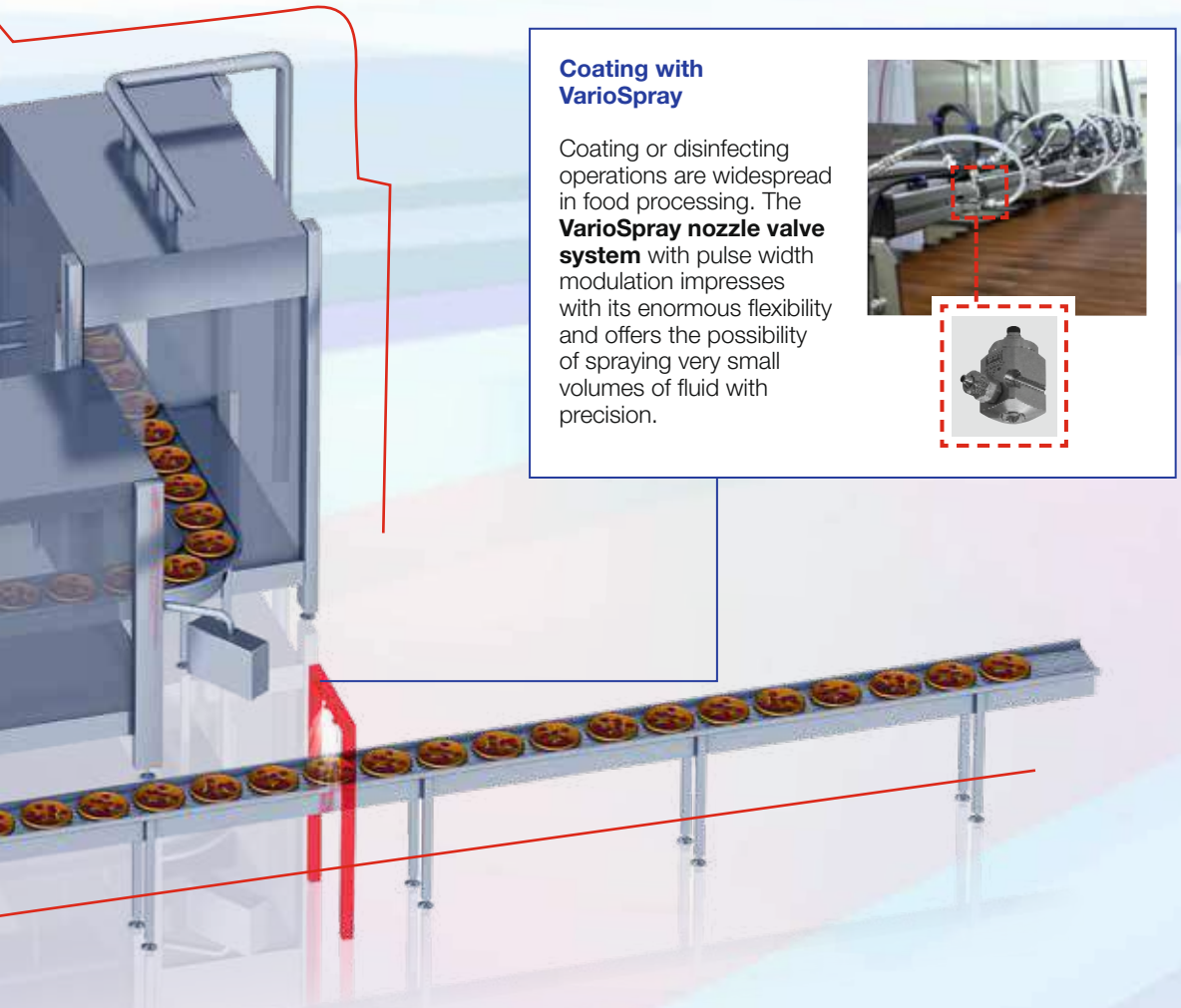
In the meat-processing industry, sausage products are cooled by means of sausage showers. **Full cone nozzles** or **cluster head nozzles** are frequently used for that.



Can cleaning

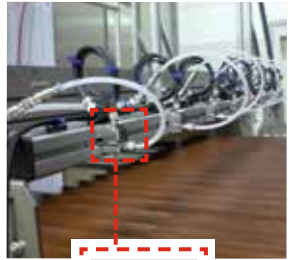
Before the foodstuffs are transferred, the cans must be disinfected on both the outside and inside. **Flat fan nozzles** and **full cone nozzles** can be used for this.





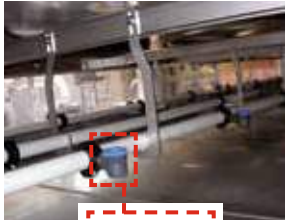

Coating with VarioSpray

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



Belt cooling

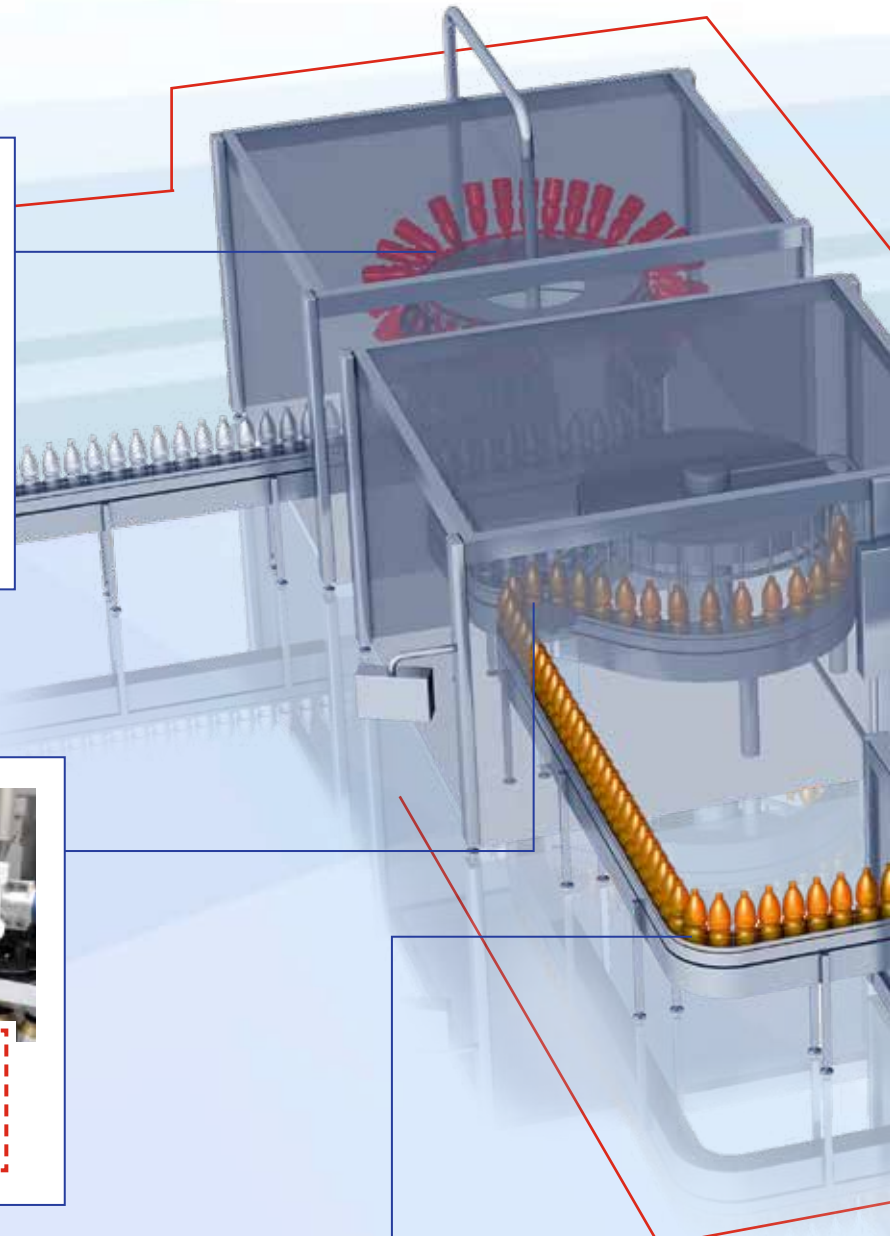
With belt cooling, the product (e.g. rissoles) is transported on a belt. The underside of the belt is sprayed with water or a coolant. Due to the fine droplets, **hollow cone nozzles** are often used for this process.

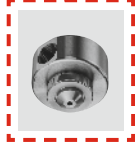
- Other nozzle applications in the product treatment field**
- Product cleaning
 - Dosing
 - Concentrating
 - Degassing of liquids
 - Release agent spray deposition
 - Spray drying
 - Blanching of vegetables
 - Sugar production
 - Tobacco processing



LECHLER NOZZLES FOR FILLING AND PACKING



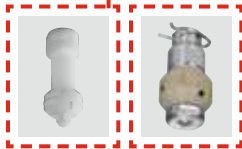
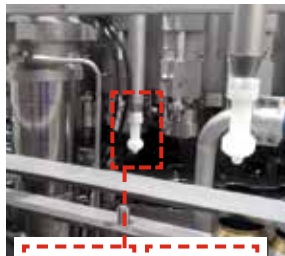
Sterilisation



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

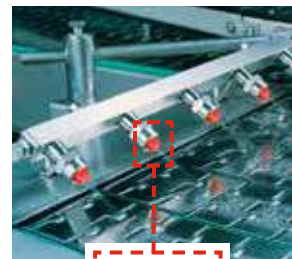
Filler cleaning

Filling machines are cleaned regularly via a permanently installed nozzle system. For this job, Lechler supplies various **rotating cleaning nozzles** and **hygienically designed nozzles** with FDA and EHEDG approval.



Belt lubrication

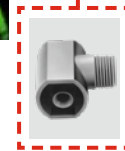
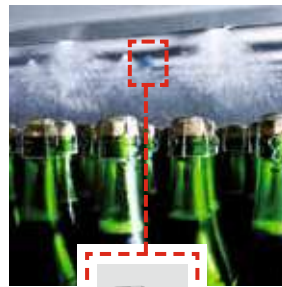
This term refers to spraying a soapy solution, known as the belt lubricant, onto the conveyor belt in order to reduce the friction coefficient. Special **series 652 xxx. 8H.03 flat fan nozzles** are used for this.



Pasteurisation

One of the final production stages is the targeted heating of the product in a pasteuriser.

The heat is transferred by means of **full cone or hollow cone nozzles** that apply a dense water film onto the packaging.



Other applications in the filling and packing field

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

Air nozzles

There are numerous applications in which **Lechler air nozzles**, such as the **Whisperblast® series**, are preferred due to the low level of noise produced compared to the standard **air nozzles**.

In the example on the right, **Whisperblast® nozzles** are being used for drying the seal so that the subsequent marking is not smudged.



WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

① The fundamentals of cleaning technology

Sinner's circle

Cost reduction by efficient cleaning processes

② Mechanical cleaning effects with Lechler rotating cleaning nozzles

Mechanical cleaning

Comparison of rotating cleaning nozzles and static spray balls

③ Influence of chemistry and temperature

Foam cleaning with nozzles

④ Impact

Surface and spray angle

Pressure

Flow rate

⑤ Spray angle, spraying distance, spraying behaviour

⑥ Viscosity

⑦ Droplet sizes

⑧ Liquid distribution

⑨ Temperature behaviour of nozzle materials

⑩ Narrowest cross section

⑪ Connections

⑫ Materials

⑬ Hygiene requirements

⑭ Nozzle wear, material certificates and ATEX

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 soil via 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 can be varied, provided that the total is 100 per cent. 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 that takes up a greater part of the Sinner's circle, while the other factors can end up being reduced.

Cost reduction by efficient cleaning processes

This is precisely where our nozzles and rotating cleaning nozzles come into play, having been specially 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.

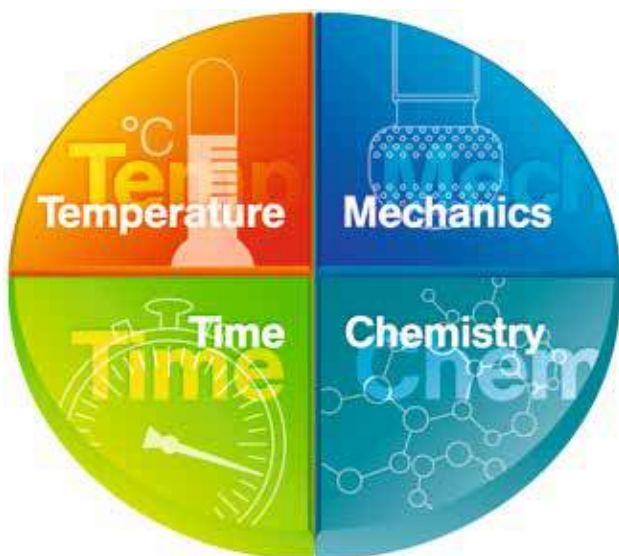


Figure 1: Sinner's circle with equal proportions of the temperature, time, chemistry and mechanical factors.

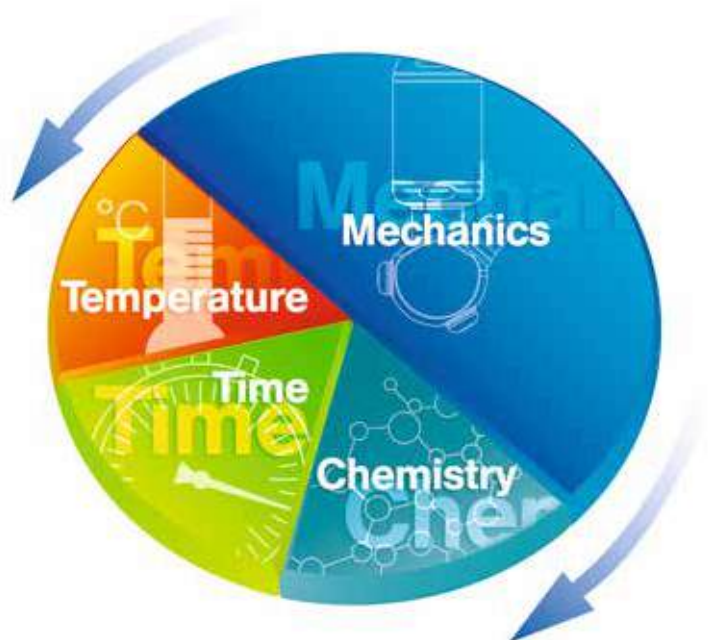


Figure 2: Lechler nozzles and rotating cleaning nozzles have high mechanical cleaning efficiency. This reduces the proportion of the other factors, as well as the resulting costs.

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

Mechanical cleaning

Rotating cleaning nozzles deliver the greatest impact when cleaning the surface area of the tank. To achieve this, large droplets must strike at high speed. This enables thick soil to be removed that cannot dissolve in the cleaning fluid. Important influencing factors are the distance between the nozzle and wall, and the operating pressure.

If one of them is too large, 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 tank wall also has a significant cleaning effect. If the formed film is thick enough, the resulting shear stresses can remove light to moderate soil. In that case, unsprayed patches are less of an issue than is the case during impact cleaning (see fig. 5).

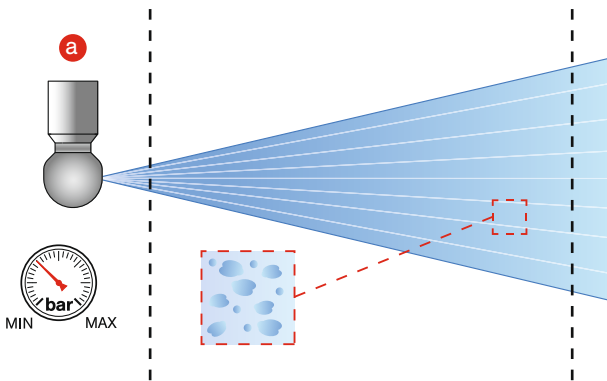


Figure 3: Rotating cleaning nozzles with recommended operating pressure

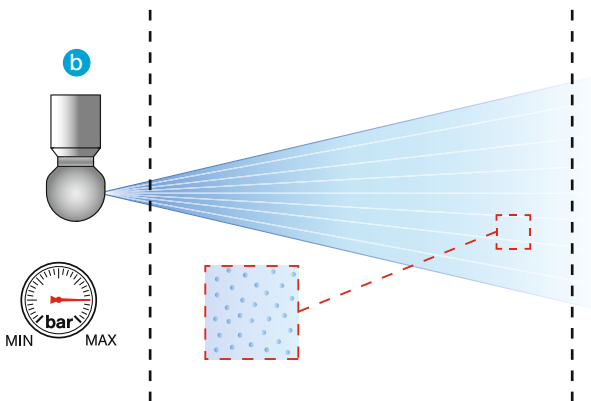


Figure 4: Rotating cleaning nozzles with operating pressure too high

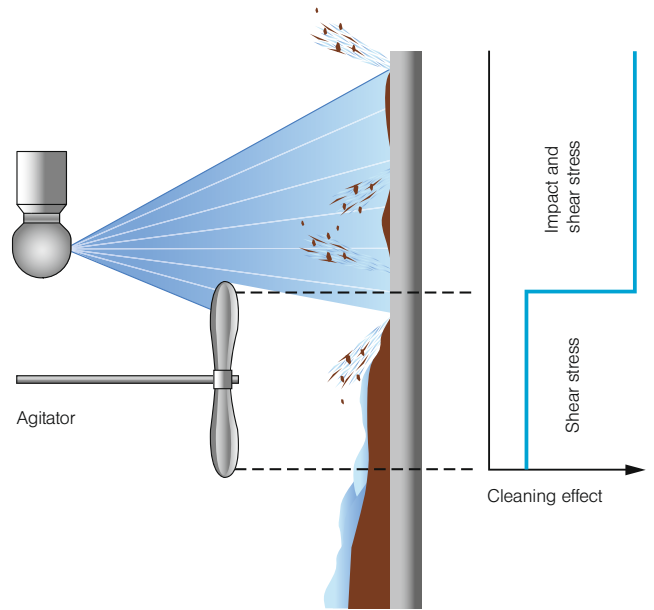


Figure 5: Cleaning mechanisms, impact and shear stress

Comparison of rotating cleaning nozzles and static spray balls

Due to their simple construction, static spray balls are economical and are likely to miss important areas. Whereas rotating cleaning nozzles spray the entire tank wall in a fan-like pattern, the

jets from 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 therefore significantly greater in comparison with rotating cleaning nozzles.

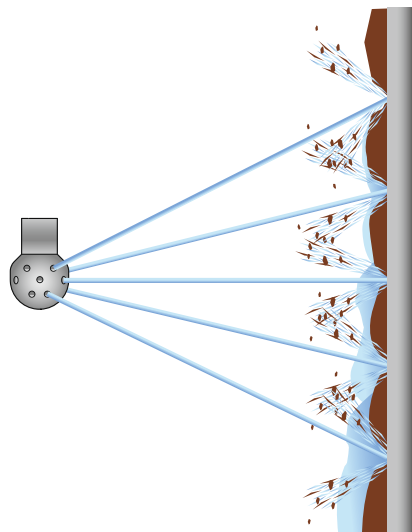


Figure 6: Cleaning with a static spray ball

WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

③ Influence of chemistry and temperature

The chemical cleaning effect takes part in almost all tank cleaning applications when the soil is dissolved in the cleaning medium or the bonding between soil and tank surface 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 more effective 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 evenly. Your end result for this application depends on the type of foam.

④ Impact

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

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

It can be controlled via the following parameters:

Surface and spray angle

The impact surface is the area where the droplet strikes. The smaller the surface area, 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 linear with the connected pressure. If you double the pressure while maintaining the same flow rate, you also double the impact.

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.

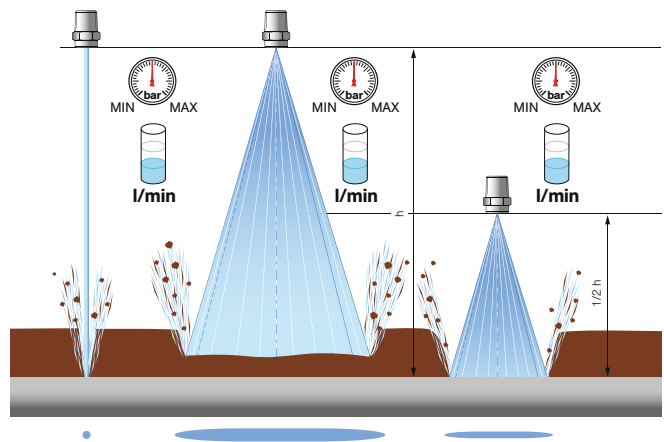


Figure 8: Comparison of the cleaning result of three nozzles with identical pressure and flow rate

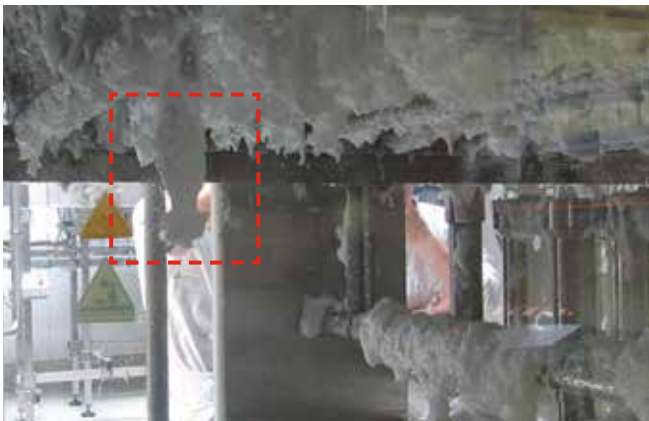


Figure 7: Foam cleaning with a Lechler PVDF MicroWhirly

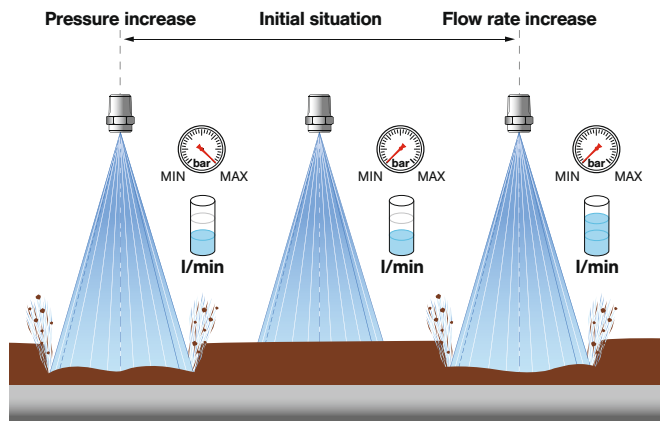


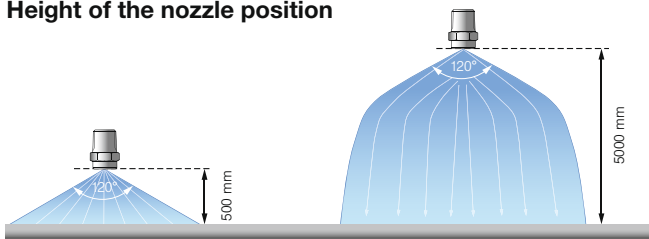
Figure 9: Comparison of the cleaning result of three nozzles with pressure or flow rate increase

⑤ Spray angle, spraying distance, spraying behaviour

Depending on the version and job, we supply single-fluid nozzles with differently stepped spray angles from 0° (solid stream nozzles) to 360° (tank-cleaning nozzles). The quoted spray angles apply close to the nozzle and in a still atmosphere. Gravity and air flows influence the spray pattern.

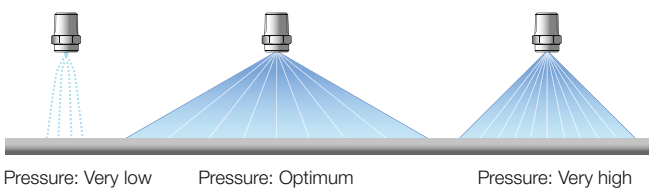
Depending on the version, single-fluid nozzles can spray the fluid as a hollow cone, solid stream or flat fan. The solid stream nozzle does not spray, but rather produces a closed jet that hits at a concentrated point. The jet only begins to break up after some distance. Twin-fluid nozzles have a narrow 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 delimited. Twin-fluid nozzles normally produce full cone or flat fan spray patterns.

Height of the nozzle position



The diagram above illustrates how height influences the spray pattern.

Changing the nozzle pressure



Spraying direction

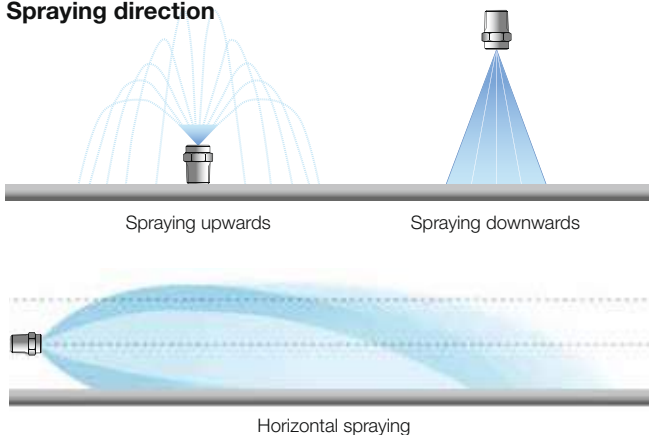


Figure 10: Spray patterns under different working conditions and installations

⑥ Viscosity

Increasing viscosity of the fluid can reduce the flow rate, changes the spray pattern (narrower spraying angle) and allows 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.

⑦ Droplet sizes

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 (m³/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 11: Atomization of gelatine with a Lechler ViscoMist twin-fluid nozzle



Figure 12: Droplet size measurement-nozzle

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.

WHAT YOU SHOULD KEEP IN MIND WHEN PLANNING

⑧ 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 whereas a single nozzle would produce a parabolic liquid distribution, several nozzles arranged next to each other allows an almost even distribution via overlapping.

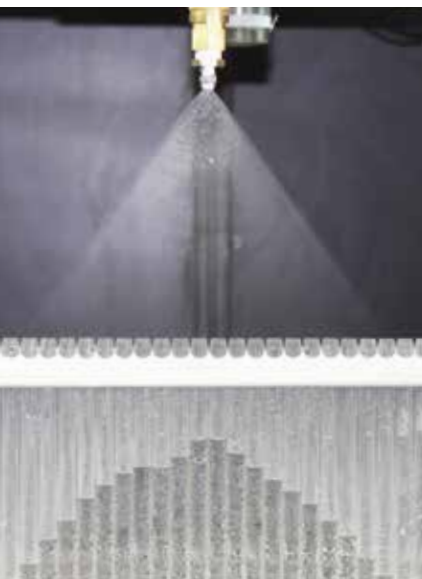


Figure 13: Liquid distribution measurement

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 fully 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.

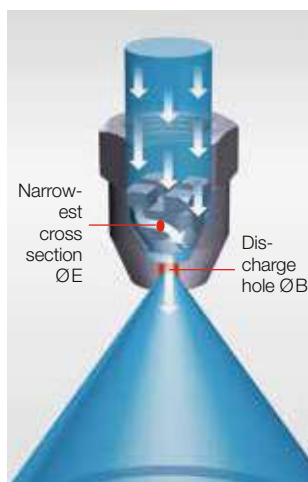
⑨ Temperature behaviour of nozzle materials

Applications with temperatures up to 140 °C are very common. These include for example most cleaning applications and sterilisation 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 scrutinised 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 therefore also be taken into account in high-pressure applications in particular. In addition, vibrations in the system can cause premature failure.

⑩ Narrowest cross section

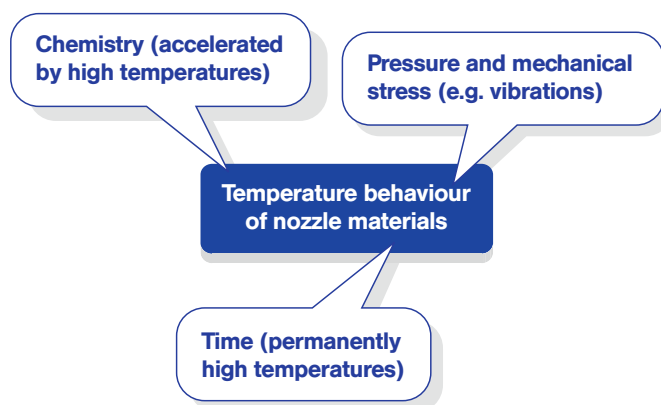
The risk of a nozzle blocking depends greatly on its narrowest cross section ($\varnothing E$). Experience has shown that for smooth operation, the maximum particle size in the fluid should not exceed one third of the narrowest cross section. Hollow cone and full cone nozzles with axial flow have an 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 tongue-type nozzles represent a special design that is less susceptible to blockages.



⑪ 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 these we supply flange solutions conforming 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.



12 Materials

Lechler tank and equipment cleaning nozzles are made of extremely high-grade materials that are designed to meet high requirements such as resistance to cleaning chemicals or temperature influences. The large choice of different materials – e.g. stainless steel 316L, PVDF, PEEK or PTFE – allows nozzle selection customized to the individual application and operating conditions. In addition, the materials used for the tank and equipment cleaning nozzles are perfectly matched to each other and are thus characterized by very low wear.

The product pages for the individual nozzles provide information on the materials available for the different nozzle types.

In addition to the requirements for material resistance and wear, the materials must also be food grade for use in the beverage, food and pharmaceutical industries. Depending on the application area, the materials must meet different demands.

A large number of the materials used for Lechler tank and equipment cleaning nozzles

comply with the requirements of the FDA or conform to (EC) 1935/2004.

Further information on conformity is provided on the product pages.



The FDA, the U.S. Food & Drug Administration, is a federal agency which monitors those two industries. Materials used in making Lechler products are compliant with the requirements of FDA regulation 21 CFR for use in food applications.



The regulation (EC) No. 1935/2004 of the European Parliament regulates general safety requirements to all food and beverage contact materials.

Within this regulation, it is additionally stipulated that plastics must comply with (EU) 10/2011.

The respective logo on the product pages indicates which requirements are met.

13 Hygiene requirements

Lechler's tank and equipment cleaning nozzles are designed so that they meet hygiene requirements.

This is reflected, for example, in the self-draining function, minimized dead space in the nozzles as well as an external design without unnecessary gaps and edges. At the same time, the nozzles are designed with the lowest possible surface roughness.

Lechler also offers specially certified nozzles for particular hygiene requirements. The »PTFE Whirly« and 527 series are 3A-certified, for example.



»3-A® Sanitary Symbol Council Administrative Council for Spray Cleaning Devices (78-01)«

The 3-A® council is an organization in the USA that defines criteria for the cleanability of

components in the dairy and food industry. Components and systems are examined to establish whether germs adhere to surfaces or existing soiling can be removed.

Components and systems are awarded a »3-A® certificate« only if they are easy to clean or if soil cannot be deposited in the first place.



European Hygienic Engineering and Design Group. The EHEDG also checks and certifies the hygienic design of components. Its procedure is similar to that of 3-A®. The »HygienicWhirly« series is EHEDG-certified.

The respective logo on the product pages indicates which requirements are met.

14 Nozzle wear, material certificates and ATEX

Nozzle Wear

Nozzle wear depends mainly on the operating conditions.

Like with all rotating parts, the bearing assembly is subjected to the highest amount of stress. The following operating conditions accelerate wear:

- Solids in the fluid and hard particles
- Use in a chemically aggressive environment
- Spraying of chemically aggressive substances
- Operating the nozzle above the recommended pressure range or temperature.

Material certificates

Material certificates in accordance with DIN EN 10204 can be issued on request for almost all Lechler tank and equipment cleaning nozzles.

ATEX



Lechler offers specially designed nozzle series for use in explosive atmospheres. The »MicroWhirly« and »Whirly« series have an ATEX approval that was issued by an external certification institute.



Rotating cleaning nozzle »PicoWhirly« Series 500.234



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

Material:
316L SS

Max. temperature:
200 °C

Recommended operating pressure:
3 bar

Installation:
Operation in every direction is possible

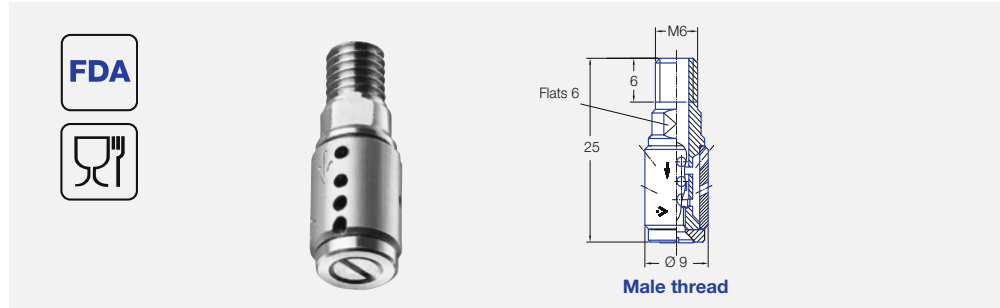
Filtration:
Line strainer with a mesh size of 0.3 mm/50 mesh

Bearing:
Kolsterised slide bearing



Function video

Scan the QR-code or go to:
www.lechler.com/picowhirly



| Spray angle | Ordering number Type | E Ø [mm] | V [l/min] | | | | Max. tank diameter [m] |
|-------------|-------------------------|----------------|------------------------------------|-----|-----|-----------------------------|---------------------------|
| | | | p [bar] (p _{max} = 5 bar) | | | | |
| | | | 1 | 2 | 3 | at 40 psi [US gal./ min] | |
| 300° | 500.234.G9.00 | 1.8 | 5.7 | 8.0 | 9.8 | 2.5 | 0.9 |

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.

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure has negative effects on the cleaning result and wear.



Rotating cleaning nozzle »MicroWhirly« Series 566



- Compact design
- Self rotating
- Effective flat jet nozzles

Material:
316L SS, PEEK

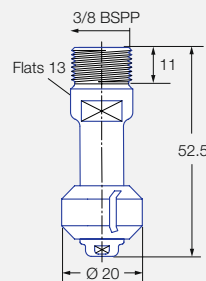
Max. temperature:
130 °C

Recommended operating pressure:
2 bar

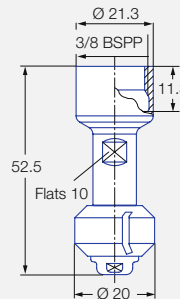
Installation:
Operation in every direction is possible

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

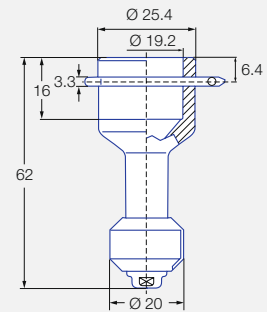
Bearing:
Slide bearing made of PEEK



Male thread



Female thread



Slip-on connection
ASME - BPE (OD-tube)



Function video

Scan the QR-code or go to:
www.lechler.com/microwhirly



ATEX version on request

| Spray angle | Ordering number | | | | E Ø [mm] | V [l/min] | | | | Max. tank diameter [m] |
|-------------|-----------------|---------------|-----------------|--------------|-------------|------------------------------------|----|----|--------------------------|------------------------|
| | Type | Connection | | | | p [bar] (p _{max} = 6 bar) | | | | |
| | | 3/8 BSPP male | 3/8 BSPP female | 3/4" Slip-on | | 1 | 2 | 3 | at 40 psi [US gal./ min] | |
| 180° | 566.873.1Y | AE | AF | TF | 1 | 12 | 15 | 18 | 5 | 1.6 |
| | 566.933.1Y | AE | AF | TF | 2.4 | 15 | 21 | 26 | 7 | 1.7 |
| 180° | 566.874.1Y | AE | AF | TF | 1 | 12 | 15 | 18 | 5 | 1.6 |
| | 566.934.1Y | AE | AF | TF | 2.4 | 15 | 21 | 26 | 7 | 1.7 |
| 360° | 566.879.1Y | AE | AF | TF | 1 | 12 | 15 | 18 | 5 | 1.6 |
| | 566.939.1Y | AE | AF | TF | 2.4 | 15 | 21 | 26 | 7 | 1.7 |

E = narrowest free cross section · NPT and weld-on 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 has negative effects on the cleaning result and wear.

Slip-on information: – R-clip made of 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 + AE = 566.873.1Y.AE



Rotating cleaning nozzle »PVDF MicroWhirly« Series 500.191



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

Material:
PVDF

Max. temperature:
90 °C

Recommended operating pressure:
2 bar

Installation:
Operation in every direction is possible

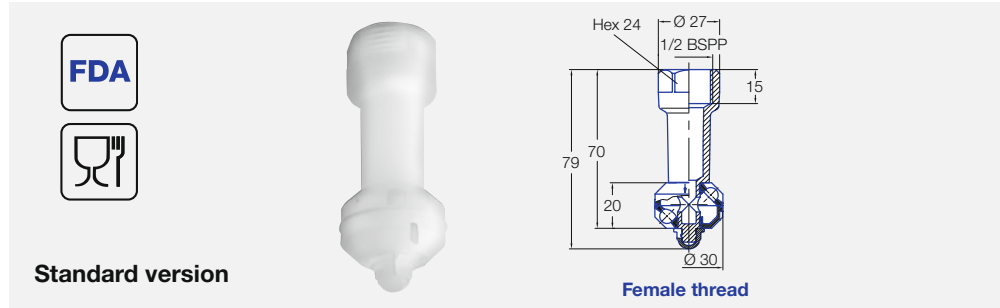
Filtration:
Line strainer with a mesh size of 0.3 mm/50 mesh

Bearing:
Slide bearing made of PVDF



Function video

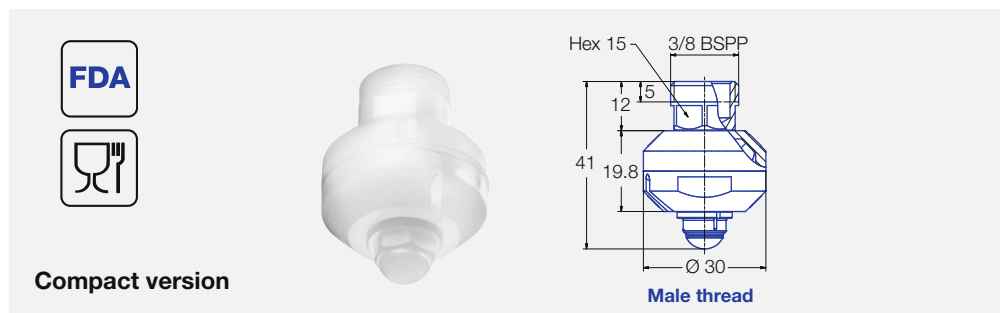
Scan the QR-code or go to:
www.lechler.com/pvdfmicrowhirly



| Spray angle | Ordering number Type | E Ø [mm] | Connection BSPP female | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|----------------------|----------|------------------------|------------------------------------|----|----|--------------------------|------------------------|
| | | | | p [bar] (p _{max} = 5 bar) | | | | |
| | | | | 1 | 2 | 3 | at 40 psi [US gal./ min] | |
| 180° | 500.191.5E.02 | 2.2 | 1/2" | 9 | 13 | 16 | 4 | 0.8 |
| 180° | 500.191.5E.01 | 2.2 | 1/2" | 9 | 13 | 16 | 4 | 0.8 |
| 270° | 500.191.5E.31 | 2.2 | 1/2" | 14 | 20 | 25 | 6 | 1.1 |
| 360° | 500.191.5E.00 | 2.2 | 1/2" | 14 | 20 | 25 | 6 | 1.1 |

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.



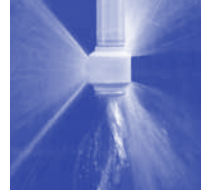
| Spray angle | Ordering number Type | E Ø [mm] | Connection BSPP male | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|----------------------|----------|----------------------|------------------------------------|----|----|--------------------------|------------------------|
| | | | | p [bar] (p _{max} = 5 bar) | | | | |
| | | | | 1 | 2 | 3 | at 40 psi [US gal./ min] | |
| 180° | 500.191.5E.21 | 2.2 | 3/8" | 9 | 13 | 16 | 4 | 0.8 |
| 360° | 500.191.5E.22 | 2.2 | 3/8" | 14 | 20 | 25 | 6 | 1.1 |

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.



Rotating cleaning nozzle »HygienicWhirly« Series 594/595



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

Materials:

316L SS, PEEK,
EHEDG-Version:
O-ring made of EPDM

Max. temperature:

100 °C,
short-term up to 140 °C

Recommended

operating pressure:

3 bar

Installation:

Operation in every direction
is possible

Filtration:

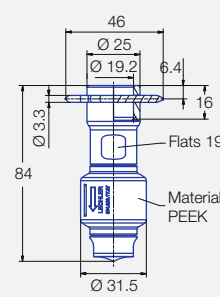
Line strainer with a mesh size
of 0.3 mm/50 mesh

Bearing:

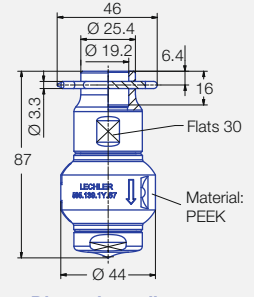
Slide bearing made of PEEK



EHEDG Version



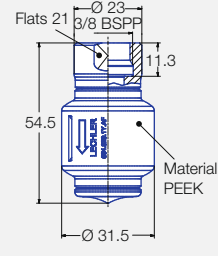
Dimensions slip-on
connection according to
ASME-BPE (OD-tube)
59X.XX9.1Y.67



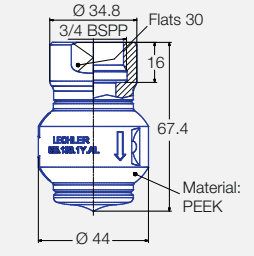
Dimensions slip-on
connection according to
ASME-BPE (OD-tube)
595.139.1Y.67



Standard Version



Female thread
59X.XX9.1Y.AF



Female thread
595.139.1Y.AL



Function video

Scan the QR-code or go to:
www.lechler.com/hygienicwhirly

| Spray angle | Ordering no. | | | | E Ø [mm] | V [l/min] | | | | | Max. tank diameter [m] |
|-------------|--------------|-----------------|-----------------|----------------------------|----------|------------------------------------|----|----|----|-------------------------|------------------------|
| | Type | Connection | | | | p [bar] (p _{max} = 5 bar) | | | | | |
| | | 3/8 BSPP female | 3/4 BSPP female | 3/4" Slip-on EHEDG version | | 0.5 | 1 | 2 | 3 | at 40 psi [US gal./min] | |
| 360° | 594.829.1Y | AF | - | 67 | 1.7 | 6 | 8 | 11 | 14 | 3 | 0.8 |
| | 594.879.1Y | AF | - | 67 | 2.5 | 8 | 11 | 15 | 18 | 5 | 1.2 |
| | 595.009.1Y | AF | - | 67 | 4.0 | 16 | 22 | 32 | 39 | 10 | 1.5 |
| | 595.049.1Y | AF | - | 67 | 4.2 | 20 | 28 | 40 | 49 | 12 | 2.0 |
| | 595.139.1Y | - | AL | 67 | 5.0 | 34 | 47 | 67 | 82 | 21 | 2.7 |

E = narrowest free cross section · NPT on request

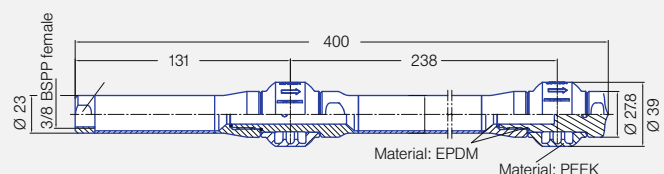
The maximum tank diameter shown above applies for the recommended operating pressure and is indicative only. The cleaning result is also affected by the type of soiling.

Slip-on information: – R-clip made of 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.
594.829.1Y + AF = 594.829.1Y.AF

Rotating lance



Available on request.



Rotating cleaning nozzle »NanoSpinner« Series 5NA



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

Materials:

316L SS, 440C SS

Max. temperature:

140 °C

Recommended operating pressure:

2 bar

Installation:

Operation in every direction is possible

Filtration:

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

Bearing:

Double ball bearing made of 440C SS



| Spray angle | Ordering number Type | E Ø [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|-------------------------|-------------|------------------------------------|----|----|-----------------------------|------------------------|
| | | | p [bar] (p _{max} = 5 bar) | | | | |
| | | | 1 | 2 | 3 | at 40 psi [US gal./ min] | |
| 360° | 5NA.879.1Y.AB | 0.5 | 11 | 15 | 18 | 5 | 1.4 |
| | 5NA.929.1Y.AB | 0.5 | 14 | 20 | 25 | 6 | 1.6 |

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.

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure has negative effects on the cleaning result and wear.



Function video

Scan the QR-code or go to:
www.lechler.com/nanospinner



**ATEX version
on request**



Rotating cleaning nozzle »MicroSpinner« Series 5MC



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

Materials:
316L SS, 440C SS

Max. temperature:
140 °C

Recommended operating pressure:
2 bar

Installation:
Operation in every direction is possible

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

Bearing:
Double ball bearing made of 440C SS

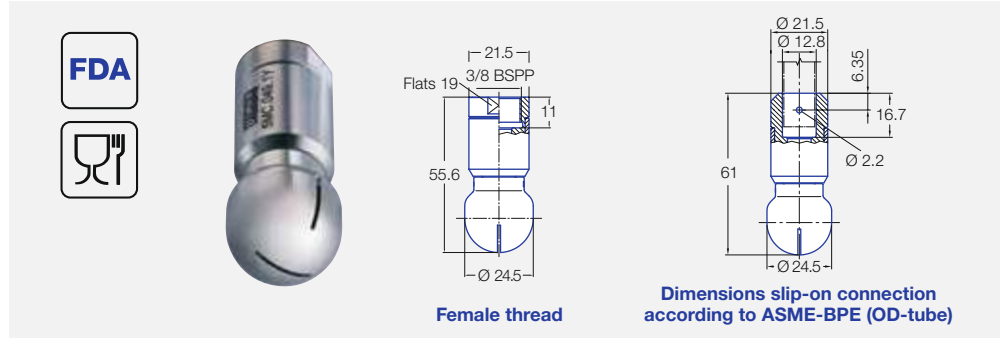


Function video

Scan the QR-code or go to:
www.lechler.com/spinner



ATEX version on request



| Spray angle | Ordering number | | | | | E Ø [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|-----------------|---------------|---------------------|-------------|-----------------|-------------|------------------------------------|----|----|----------------------------|------------------------|
| | Type | Mat. no. | | Connection | | | p [bar] (p _{max} = 5 bar) | | | | |
| | | 1Y 316L SS | 21 Hastelloy C22 | 3/8 BSPP | 1/2" Slip-on | | 1 | 2 | 3 | at 40 psi [US gal./min] | |
| 60° | 5MC.022 | ○ | ○ | AF | TF05 | 1.0 | 16 | 23 | 28 | 7 | - |
| | 5MC.042 | ○ | ○ | AF | TF05 | 3.0 | 28 | 40 | 49 | 12 | - |
| 180° | 5MC.004 | ○ | ○ | AF | TF05 | 0.8 | 22 | 32 | 39 | 10 | 1.8 |
| 360° | 5MC.049 | ○ | ○ | AF | TF05 | 0.9 | 28 | 39 | 48 | 12 | 1.8 |

E = narrowest free cross section
NPT, more slip-on sizes and weld-on versions 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 has negative effects on the cleaning result and wear.

Slip-on information: – R-clip made of 316L SS is included (Ordering no.: 095.013.1E.05.59).
– 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.
5MC.042.1Y + AF = 5MC.042.1Y.AF



Rotating cleaning nozzle »MiniSpinner« Series 5MI



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

Materials:
316L SS, 440C SS

Max. temperature:
140 °C

Recommended operating pressure:
2 bar

Installation:
Operation in every direction is possible

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

Bearing:
Double ball bearing made of 440C SS

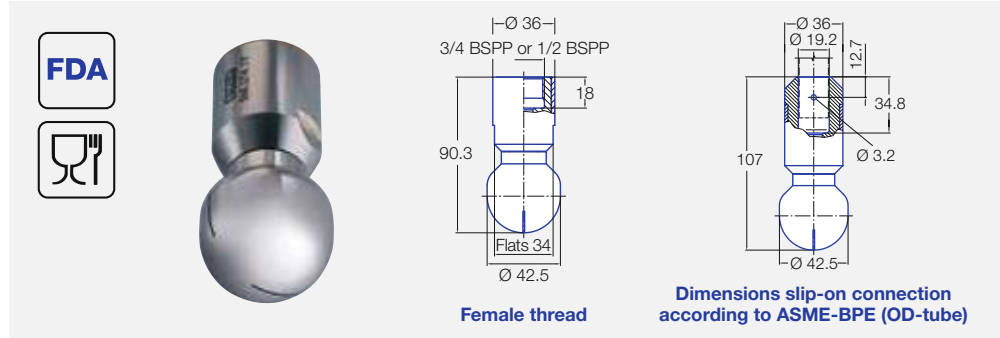


Function video

Scan the QR-code or go to:
www.lechler.com/spinner



ATEX version on request



| Spray angle | Ordering no. | | | | | E Ø [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|--------------|---------------|------------|----------|--------------|----------------|------------------------------------|-----|-----|-------------------------|------------------------|
| | Type | Mat. no. | Connection | | | | p [bar] (p _{max} = 5 bar) | | | | |
| | | 316L SS 1Y | 1/2 BSPP | 3/4 BSPP | 3/4" Slip-on | | 1 | 2 | 3 | at 40 psi [US gal./min] | |
| 60° | 5MI.162 | ○ | AH | - | TF07 | 2.6 | 45 | 63 | 77 | 20 | - |
| 180° | 5MI.113 | ○ | - | AL | TF07 | 1.0 | 47 | 67 | 82 | 21 | 2.6 |
| 180° | 5MI.114 | ○ | - | AL | TF07 | 1.0 | 47 | 67 | 82 | 21 | 2.6 |
| 360° | 5MI.054 | ○ | - | AL | TF07 | 0.5 | 21 | 30 | 37 | 9 | 1.8 |
| | 5MI.074 | ○ | - | AL | TF07 | 0.6 | 35 | 49 | 60 | 15 | 2.1 |
| | 5MI.014 | ○ | - | AL | TF07 | 0.9 | 49 | 69 | 85 | 21 | 2.3 |
| | 5MI.209 | ○ | - | AL | TF07 | 1.5 | 71 | 100 | 122 | 31 | 2.6 |

E = narrowest free cross section
NPT, more slip-on sizes and weld-on versions 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.

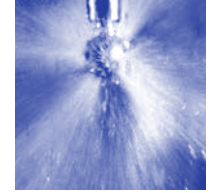
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure has negative effects on the cleaning result and wear.

Slip-on information: – R-clip made of 316L SS is included (Ordering no.: 095.022.1Y.50.60).
– 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 + Material no. + Connection = Ordering no.
5MI.162 + 1Y + AH = 5MI.162.1Y.AH



Rotating cleaning nozzle »Whirly« Series 569



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

Materials:

316L SS, PEEK, Rulon 641

Max. temperature:

140 °C

Recommended operating pressure:

2 bar

Installation:

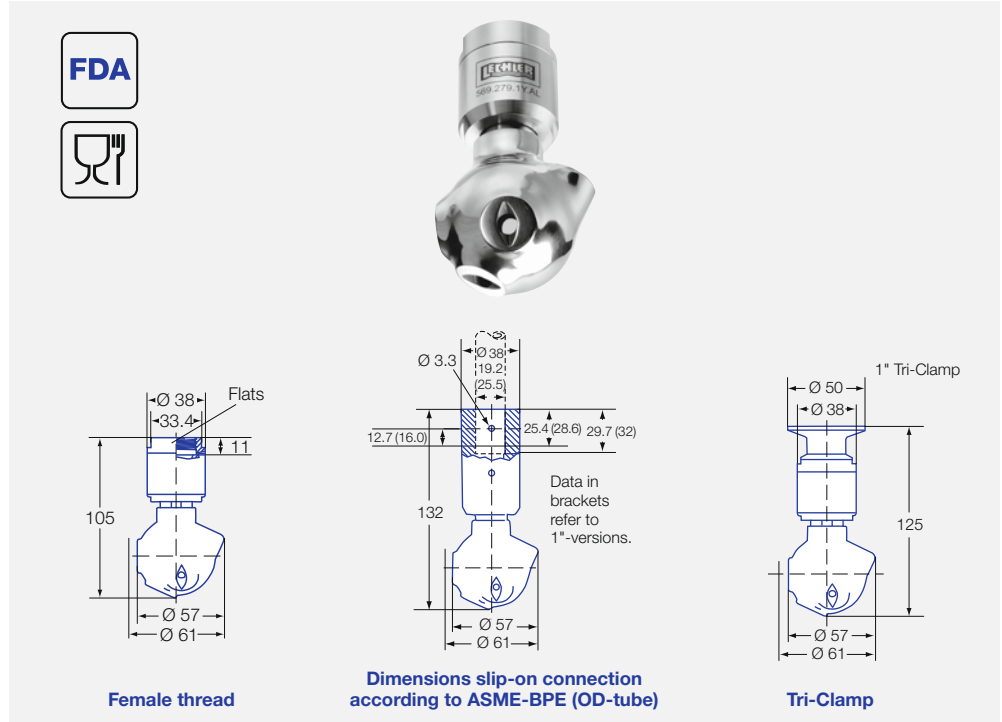
Operation in every direction is possible; in horizontal installation position no rotating until 2 bar

Filtration:

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

Bearing:

Double ball bearing made of stainless steel



Function video

Scan the QR-code or go to:
www.lechler.com/whirly



**ATEX version
on request**

| Spray angle | Ordering no. | | | | | E Ø [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|--------------|-----------------|--------------|------------|--------------|----------------|------------------------------------|-----|-----|-------------------------|------------------------|
| | Type | Connection | | | | | p [bar] (p _{max} = 6 bar) | | | | |
| | | 3/4 BSSP female | 3/4" Slip-on | 1" Slip-on | 1" Tri-Clamp | | 1 | 2 | 3 | at 40 psi [US gal./min] | |
| 270° | 569.055.1Y | AL | TF07 | TF10 | 10 | 3.6 | 36 | 48 | 62 | 15 | 1.8 |
| | 569.135.1Y | AL | TF07 | TF10 | 10 | 4.8 | 52 | 71 | 87 | 22 | 2.1 |
| | 569.195.1Y | AL | TF07 | TF10 | 10 | 5.6 | 69 | 97 | 119 | 30 | 2.6 |
| 270° | 569.056.1Y | AL | TF07 | TF10 | 10 | 3.6 | 36 | 48 | 62 | 15 | 1.8 |
| | 569.106.1Y | AL | TF07 | TF10 | 10 | 4.8 | 41 | 58 | 71 | 18 | 2.1 |
| | 569.196.1Y | AL | TF07 | TF10 | 10 | 5.6 | 69 | 97 | 119 | 30 | 2.6 |
| 360° | 569.059.1Y | AL | TF07 | TF10 | 10 | 3.2 | 36 | 48 | 62 | 15 | 1.8 |
| | 569.139.1Y | AL | TF07 | TF10 | 10 | 3.6 | 52 | 71 | 87 | 22 | 2.1 |
| | 569.199.1Y | AL | TF07 | TF10 | 10 | 4.8 | 69 | 97 | 119 | 30 | 2.6 |
| | 569.279.1Y | AL | TF07 | TF10 | 10 | 7.1 | 103 | 145 | 178 | 45 | 3.0 |

E = narrowest free cross section · NPT 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 has negative effects on the cleaning result and wear.

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

Example Type + Connection = Ordering no.
of ordering: 569.055.1Y + AL = 569.055.1Y.AL



Pop-up rotating cleaning nozzle »PopUp Whirly« Series 5P2



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

Materials:

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

Max. temperature:

140 °C

Recommended operating pressure:

2 bar,
opening pressure
approx. 1.0 bar,
closing pressure
approx. 0.5 bar

Installation:

Operation in every direction
is possible

Filtration:

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

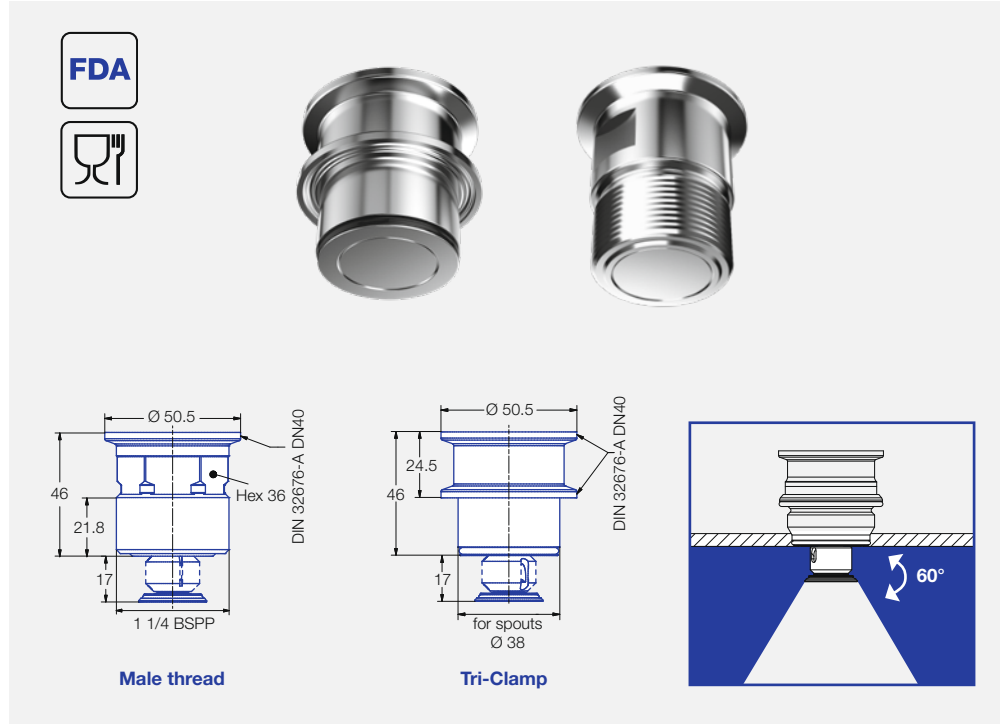
Bearing:

Slide bearing made of PEEK



Function video

Scan the QR-code or go to:
www.lechler.com/popupwhirly



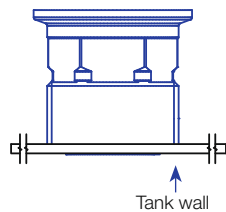
| Spray angle | Ordering no. | Tank connection | | E Ø [mm] | V [l/min] | | | | Max. tank diameter [m] |
|-------------|---------------|-----------------|-----------|----------------|------------------------------------|------|------|-----------------------------|------------------------|
| | | 1 1/4 BSPP | Tri-Clamp | | p [bar] (p _{max} = 6 bar) | | | | |
| | | | | | 1 | 2 | 3 | at 40 psi [US gal./ min] | |
| | 5P2.873.1Y.AP | ○ | - | 1.1 | 10.6 | 15.0 | 18.4 | 5 | 0.8 |
| | 5P2.873.1Y.00 | - | ○ | 1.1 | 10.6 | 15.0 | 18.4 | 5 | 0.8 |
| | 5P2.923.1Y.AP | ○ | - | 1.1 | 14.1 | 20.0 | 24.5 | 6 | 1.0 |
| | 5P2.923.1Y.00 | - | ○ | 1.1 | 14.1 | 20.0 | 24.5 | 6 | 1.0 |

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.

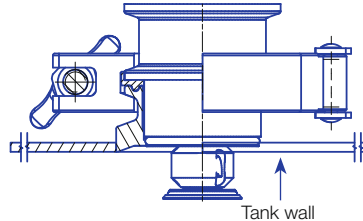
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure has negative effects on the cleaning result and wear.

Nozzle installation

Via thread in idle position



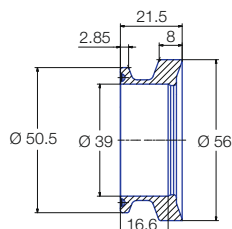
Via Tri-Clamp in operating position



Information on operation

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

Weld-in flange for Tri-Clamp-Version



Ordering number

050.020.1Y.01.00

Material

316L SS

Information

Gasket with a thickness of 2 mm must be used if the nozzle is installed with this weld-in flange.



Pop-up rotating cleaning nozzle »PopUp Whirly« Series 5P3



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

Materials:

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

Max. temperature:

140 °C

Recommended operating pressure:

2 bar,
opening pressure
approx. 0.9 bar,
closing pressure
approx. 0.5 bar

Installation:

Operation in every direction
is possible

Filtration:

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

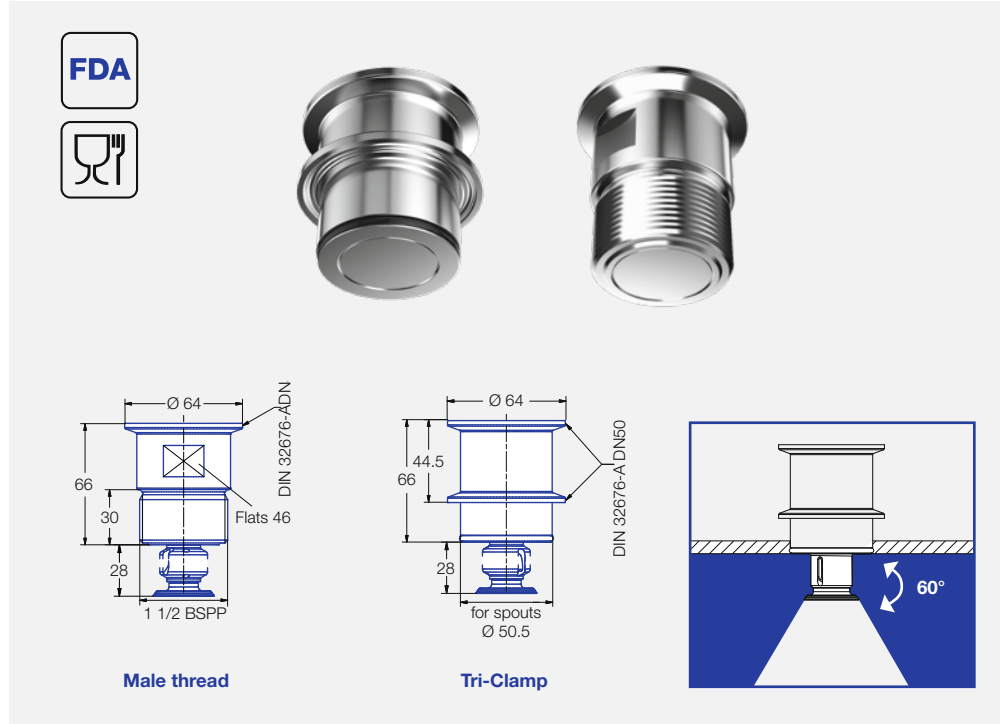
Bearing:

Slide bearing made of PEEK



Function video

Scan the QR-code or go to:
www.lechler.com/popupwhirly



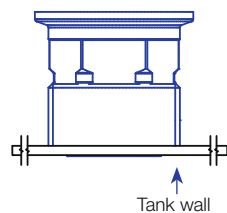
| Spray angle | Ordering no. | Tank connection | | E \varnothing [mm] | \dot{V} [l/min] | | | | Max. tank diameter [m] |
|-------------|---------------|-----------------|-----------|----------------------------|------------------------------|----|----|-----------------------------|------------------------|
| | | 1 1/2 BSPP | Tri-Clamp | | p [bar] ($p_{max} = 6$ bar) | | | | |
| | | | | | 1 | 2 | 3 | at 40 psi [US gal./ min] | |
| | 5P3.043.1Y.AR | ○ | - | 1.2 | 28.3 | 40 | 49 | 12 | 2.2 |
| | 5P3.043.1Y.00 | - | ○ | 1.2 | 28.3 | 40 | 49 | 12 | 2.2 |

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.

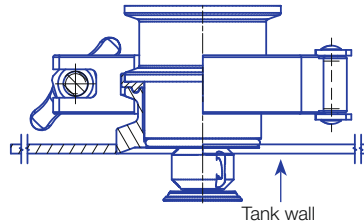
Operation with compressed air only for short-term usage. Operation above the recommended operating pressure has negative effects on the cleaning result and wear.

Nozzle installation

Via thread in idle position



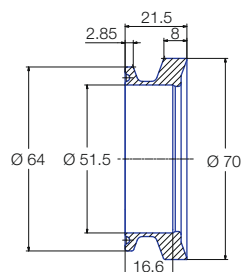
Via Tri-Clamp in operating position



Information on operation

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

Weld-in flange for Tri-Clamp-Version



Ordering number

050.020.1Y.01.01

Material

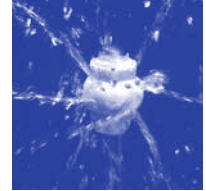
316L SS

Information

Gasket with a thickness of 2 mm must be used if the nozzle is installed with this weld-in flange.



Rotating cleaning nozzle »PTFE Whirly« Series 573/583



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

Materials:
PTFE

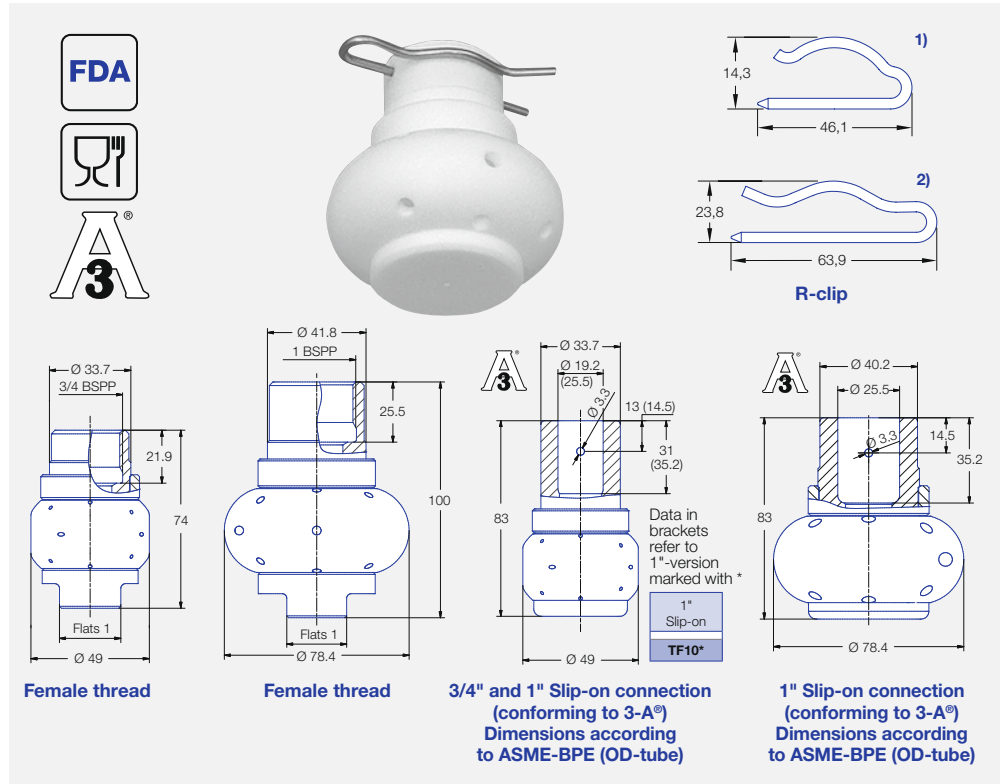
Max. temperature:
95 °C
(Versions for use with higher temperature (130 °C) on request)

Recommended operating pressure:
2 bar

Installation:
Operation in every direction is possible

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

Bearing:
Slide bearing made of PTFE



Function video

Scan the QR-code or go to:
www.lechler.com/ptfeworthy

Operation with compressed air only for short-term usage. Operation above the recommended operating pressure has negative effects on the cleaning result and wear.

Slip-on information:
– R-clip made of 316L SS is included (Ordering number:
R-clip 1: 095.022.1Y.50.88.E,
R-clip 2: 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.

| Spray angle | R-clip | Type | Ordering no. | | | | E Ø [mm] | V̇ [l/min] | | | | Dimensions for female thread version | | Max. tank diameter [m] |
|-------------|--------|------------|--------------|--------|--------------|------------|-------------|------------------------------------|-----|-----|-------------------------|--------------------------------------|----------------|------------------------|
| | | | Connection | | | | | p [bar] (p _{max} = 6 bar) | | | | Height H [mm] | Dia-mer D [mm] | |
| | | | 3/4 BSPP | 1 BSPP | 3/4" Slip-on | 1" Slip-on | | 1 | 2 | 3 | at 40 psi [US gal./min] | | | |
| 180° | 1) | 583.114.55 | AL | - | TF07 | TF10* | 2.1 | 47 | 67 | 82 | 21 | 74 | 49 | 2.5 |
| | 1) | 583.264.55 | AL | - | TF07 | TF10* | 3.3 | 103 | 145 | 178 | 45 | 74 | 49 | 2.8 |
| | 2) | 583.344.55 | - | AN | - | TF10 | 7.1 | 159 | 225 | 276 | 70 | 100 | 78.5 | 3.2 |
| 180° | 1) | 573.114.55 | AL | - | TF07 | TF10* | 2.1 | 47 | 67 | 82 | 21 | 74 | 49 | 2.5 |
| | 1) | 573.264.55 | AL | - | TF07 | TF10* | 3.3 | 103 | 145 | 178 | 45 | 74 | 49 | 2.8 |
| | 2) | 573.344.55 | - | AN | - | TF10 | 7.1 | 159 | 225 | 276 | 70 | 100 | 78.5 | 3.2 |
| 270° | 1) | 583.116.55 | AL | - | TF07 | TF10* | 2.4 | 47 | 67 | 82 | 21 | 74 | 49 | 2.5 |
| | 1) | 583.266.55 | AL | - | TF07 | TF10* | 3.4 | 103 | 145 | 178 | 45 | 74 | 49 | 2.8 |
| | 2) | 583.346.55 | - | AN | - | TF10 | 5.9 | 159 | 225 | 276 | 70 | 100 | 78.5 | 3.2 |
| 270° | 1) | 573.116.55 | AL | - | TF07 | TF10* | 2.4 | 47 | 67 | 82 | 21 | 74 | 49 | 2.5 |
| | 1) | 573.266.55 | AL | - | TF07 | TF10* | 3.4 | 103 | 145 | 178 | 45 | 74 | 49 | 2.8 |
| | 2) | 573.346.55 | - | AN | - | TF10 | 5.9 | 159 | 225 | 276 | 70 | 100 | 78.5 | 3.2 |
| 360° | 1) | 583.119.55 | AL | - | TF07 | TF10* | 1.8 | 41 | 58 | 71 | 18 | 74 | 49 | 2.4 |
| | 1) | 583.209.55 | AL | - | TF07 | TF10* | 3.5 | 71 | 100 | 122 | 31 | 74 | 49 | 2.5 |
| | 1) | 583.269.55 | AL | - | TF07 | TF10* | 4.8 | 103 | 145 | 178 | 45 | 74 | 49 | 2.8 |
| | 2) | 583.279.55 | - | AN | - | TF10 | 3.7 | 106 | 150 | 184 | 47 | 100 | 78.5 | 3.0 |
| | 2) | 583.349.55 | - | AN | - | TF10 | 5.6 | 159 | 225 | 276 | 70 | 100 | 78.5 | 3.2 |

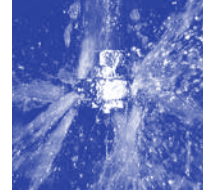
E = narrowest free cross section · NPT on request · * see drawing 3 for details

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

| | | | | | |
|---------------------|-------------|----------|-------------------|----------|---------------------|
| Example | Type | + | Connection | = | Ordering no. |
| of ordering: | 583.114.55 | + | AL | = | 583.114.55.AL |



Rotating cleaning nozzle »Gyro« Series 577



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

Max. tank diameter:
5.5 m

Materials:
316L SS, PTFE

Max. temperature:
90 °C

Recommended operating pressure:
3 bar

Installation:
Vertically facing downward

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

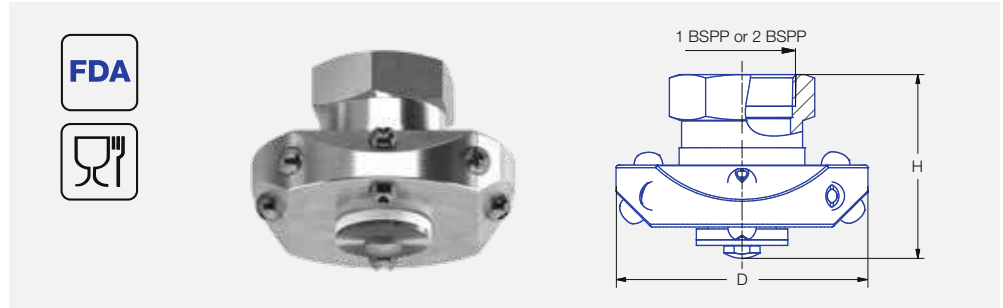
Bearing:
Slide bearing made of PTFE





Accessories:
Spare parts set consisting of: top seal, bottom seal, bolt, nut, sleeve, instructions for use



Function video

Scan the QR-code or go to:
www.lechler.com/gyro



| Spray angle | Ordering no. | | | V [l/min] | | | | | Dimensions | |
|---|--------------|------------|--------|------------------------------------|-----|-----|------|-------------------------|---------------|-----------------|
| | Type | Connection | | p [bar] (p _{max} = 5 bar) | | | | | Height H [mm] | Diameter D [mm] |
| | | 1 BSPP | 2 BSPP | 1 | 2 | 3 | 5 | at 40 psi [US gal./min] | | |
| 180°  | 577.283.1Y | AN | - | 115 | 163 | 200 | 258 | 50 | 72 | 118 |
| | 577.363.1Y | AN | - | 182 | 258 | 316 | 408 | 80 | 72 | 118 |
| | 577.403.1Y | - | AW | 228 | 322 | 394 | 509 | 100 | 103 | 156 |
| | 577.433.1Y | - | AW | 273 | 386 | 473 | 610 | 120 | 103 | 156 |
| | 577.523.1Y | - | AW | 452 | 639 | 783 | 1010 | 170 | 103 | 156 |
| 180°  | 577.284.1Y | AN | - | 115 | 163 | 200 | 258 | 50 | 72 | 118 |
| | 577.364.1Y | AN | - | 182 | 258 | 316 | 408 | 80 | 72 | 118 |
| | 577.404.1Y | - | AW | 228 | 322 | 394 | 509 | 100 | 103 | 156 |
| | 577.434.1Y | - | AW | 273 | 386 | 473 | 610 | 120 | 103 | 156 |
| | 577.494.1Y | - | AW | 380 | 538 | 659 | 851 | 170 | 103 | 156 |
| 270°  | 577.285.1Y | AN | - | 115 | 163 | 200 | 258 | 50 | 72 | 118 |
| | 577.365.1Y | AN | - | 182 | 258 | 316 | 408 | 80 | 72 | 118 |
| | 577.405.1Y | - | AW | 228 | 322 | 394 | 509 | 100 | 103 | 156 |
| | 577.435.1Y | - | AW | 273 | 386 | 473 | 610 | 120 | 103 | 156 |
| | 577.495.1Y | - | AW | 380 | 538 | 659 | 851 | 170 | 103 | 156 |
| 360°  | 577.289.1Y | AN | - | 115 | 163 | 200 | 258 | 50 | 72 | 118 |
| | 577.369.1Y | AN | - | 182 | 258 | 316 | 408 | 80 | 72 | 118 |
| | 577.409.1Y | - | AW | 228 | 322 | 394 | 509 | 100 | 103 | 156 |
| | 577.439.1Y | - | AW | 273 | 386 | 473 | 610 | 120 | 103 | 156 |
| | 577.499.1Y | - | AW | 380 | 538 | 659 | 851 | 170 | 103 | 156 |

NPT 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 has negative effects on the cleaning result and wear.

| | | | | | |
|----------------------|-------------------|----------|-------------------|----------|----------------------|
| Example | Type | + | Connection | = | Ordering no. |
| for Ordering: | 577.283.1Y | + | AN | = | 577.283.1Y.AN |



Rotating cleaning nozzle »XactClean® HP« Series 5S2/5S3



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

Materials:

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

Max. temperature:

95 °C

Recommended operating pressure: 5 bar

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 35



Function video

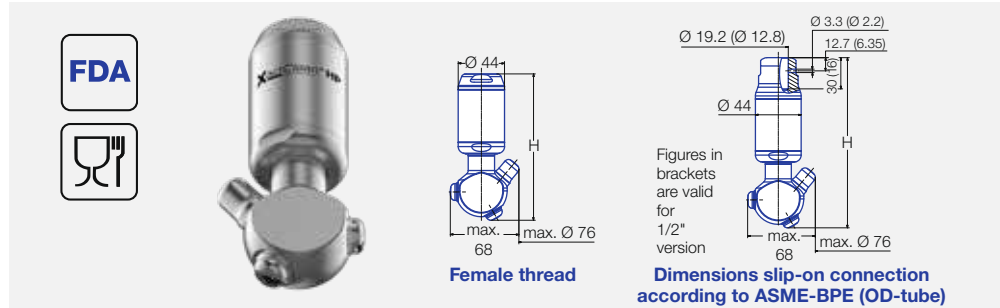
Scan the QR-code or go to:
www.lechler.com/xactcleanhp



**ATEX version
on request**

Nozzle dimensions [mm]

| Connection | Max. Height [H] |
|------------|-----------------|
| AF | 146 |
| AH | 149 |
| AL | 139 |
| AN | 139 |
| TF05 | 148 |
| TF07 | 164 |



| Strahlwinkel | Bestell-Nr. | | | | | | | E Ø [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|------------------|-------------|---------------|---------------|---------------|-------------|----------------------|----------------------|-------------|-------------------------------------|-----|-----|--------------------------|------------------------|
| | Type | Connection | | | | | | | p [bar] (p _{max} = 15 bar) | | | | |
| | | G 3/8 ISO 228 | G 1/2 ISO 228 | G 3/4 ISO 228 | G 1 ISO 228 | 1/2" Steckverbindung | 3/4" Steckverbindung | | 2 | 5 | 10 | bei 40 psi [US gal./min] | |
| 180° | 5S2.953.1Y | AF | AH | - | - | TF05 | - | 2.0 | 25 | 40 | 57 | 7.8 | 3.5 |
| | 5S3.053.1Y | - | AH | - | - | - | TF07 | 2.0 | 41 | 65 | 92 | 12.8 | 4.0 |
| | 5S3.113.1Y | - | AH | AL | - | - | TF07 | 2.0 | 60 | 94 | 133 | 18.4 | 6.0 |
| | 5S3.183.1Y | - | - | AL | - | - | TF07 | 2.0 | 89 | 141 | 199 | 27.7 | 7.0 |
| | 5S3.233.1Y | - | - | AL | - | - | TF07 | 2.0 | 111 | 175 | 248 | 34.3 | 7.5 |
| | 5S3.263.1Y | - | - | AL | AN | - | TF07 | 2.0 | 135 | 213 | 301 | 41.8 | 8.0 |
| 180° | 5S2.954.1Y | AF | AH | - | - | TF05 | - | 2.0 | 25 | 40 | 57 | 7.8 | 3.5 |
| | 5S3.054.1Y | - | AH | - | - | - | TF07 | 2.0 | 41 | 65 | 92 | 12.8 | 4.0 |
| | 5S3.114.1Y | - | AH | AL | - | - | TF07 | 2.0 | 60 | 94 | 133 | 18.4 | 6.0 |
| | 5S3.184.1Y | - | - | AL | - | - | TF07 | 2.0 | 89 | 141 | 199 | 27.7 | 7.0 |
| | 5S3.234.1Y | - | - | AL | - | - | TF07 | 2.0 | 111 | 175 | 248 | 34.3 | 7.5 |
| | 5S3.264.1Y | - | - | AL | AN | - | TF07 | 2.0 | 135 | 213 | 301 | 41.8 | 8.0 |
| 270° | 5S2.955.1Y | AF | AH | - | - | TF05 | - | 2.0 | 25 | 40 | 57 | 7.8 | 3.5 |
| | 5S3.055.1Y | - | AH | - | - | - | TF07 | 2.0 | 41 | 65 | 92 | 12.8 | 4.0 |
| | 5S3.115.1Y | - | AH | AL | - | - | TF07 | 2.0 | 60 | 94 | 133 | 18.4 | 6.0 |
| | 5S3.185.1Y | - | - | AL | - | - | TF07 | 2.0 | 89 | 141 | 199 | 27.7 | 7.0 |
| | 5S3.235.1Y | - | - | AL | - | - | TF07 | 2.0 | 111 | 175 | 248 | 34.3 | 7.5 |
| | 5S3.265.1Y | - | - | AL | AN | - | TF07 | 2.0 | 135 | 213 | 301 | 41.8 | 8.0 |
| 270° | 5S2.956.1Y | AF | AH | - | - | TF05 | - | 2.0 | 25 | 40 | 57 | 7.8 | 3.5 |
| | 5S3.056.1Y | - | AH | - | - | - | TF07 | 2.0 | 41 | 65 | 92 | 12.8 | 4.0 |
| | 5S3.116.1Y | - | AH | AL | - | - | TF07 | 2.0 | 60 | 94 | 133 | 18.4 | 6.0 |
| | 5S3.186.1Y | - | - | AL | - | - | TF07 | 2.0 | 89 | 141 | 199 | 27.7 | 7.0 |
| | 5S3.236.1Y | - | - | AL | - | - | TF07 | 2.0 | 111 | 175 | 248 | 34.3 | 7.5 |
| | 5S3.266.1Y | - | - | AL | AN | - | TF07 | 2.0 | 135 | 213 | 301 | 41.8 | 8.0 |
| 360° | 5S2.959.1Y | AF | AH | - | - | TF05 | - | 1.7 | 25 | 40 | 57 | 7.8 | 3.5 |
| | 5S3.059.1Y | - | AH | - | - | - | TF07 | 2.0 | 41 | 65 | 92 | 12.8 | 4.0 |
| | 5S3.119.1Y | - | AH | AL | - | - | TF07 | 2.0 | 60 | 94 | 133 | 18.4 | 6.0 |
| | 5S3.189.1Y | - | - | AL | - | - | TF07 | 2.0 | 89 | 141 | 199 | 27.7 | 7.0 |
| | 5S3.239.1Y | - | - | AL | - | - | TF07 | 2.0 | 111 | 175 | 248 | 34.3 | 7.5 |
| | 5S3.269.1Y | - | - | AL | AN | - | TF07 | 2.0 | 135 | 213 | 301 | 41.8 | 8.0 |

E = narrowest free cross section · NPT 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 has negative effects on the cleaning result and wear.

Slip-on information: – R-clip made of 316L SS is included (Ordering number: 095.022.1Y.50.60.E (TF07), 095.013.1E.05.59.0 (TF05)).
– Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and rotating cleaning nozzle.





Rotating cleaning nozzle »XactClean® HP+« Series 5S5



- Controlled rotation
- Powerful flat fan nozzles
- Very efficient tank cleaning nozzle, especially for larger tanks

Materials:

316L SS, 316 SS, PEEK, EPDM

Max. temperature:

95 °C

Recommended operating pressure:

3 bar

Installation:

Operation in every direction is possible

Filtration:

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

Bearing:

Double ball bearing

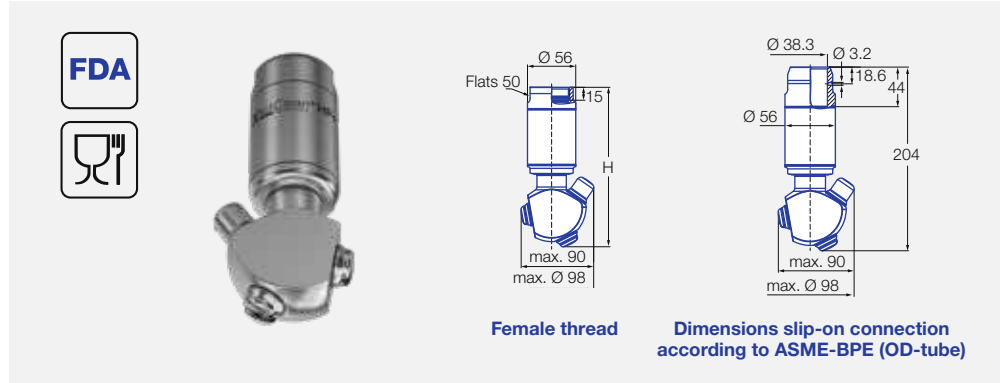
Rotation monitoring sensor:

Sensor compatible, Info: see page 35



Function video

Scan the QR-code or go to:
www.lechler.com/xactcleanhpplus



Nozzle dimensions [mm]

| Connection | Max. Height [H] |
|------------|-----------------|
| AN | 185 |
| AQ | 185 |
| AS | 187 |

| Spray angle | Ordering no. | Connection | | | | E Ø [mm] | V [l/min] | | | | Max. tank diameter [m] | |
|-------------|-------------------|------------|-----------|------------|-------------|-------------|----------------|-------------------------------------|-----|------|------------------------|--------------------------|
| | | Type | 1 BSPP | 1 1/4 BSPP | 1 1/2 BSPP | | 1 1/2" Slip-on | p [bar] (p _{max} = 10 bar) | | | | |
| | | | | | | | | 2 | 3 | 5 | | at 40 psi [US gal./ min] |
| 180° | 5S5.293.1Y | AN | - | - | TF15 | 3.0 | 165 | 202 | 261 | 51.2 | 9.0 | |
| | 5S5.323.1Y | AN | AQ | - | TF15 | 3.0 | 200 | 245 | 316 | 62.0 | 9.2 | |
| | 5S5.363.1Y | - | AQ | AS | TF15 | 3.0 | 250 | 306 | 395 | 77.6 | 9.4 | |
| 180° | 5S5.294.1Y | AN | - | - | TF15 | 3.0 | 165 | 202 | 261 | 51.2 | 9.0 | |
| | 5S5.324.1Y | AN | AQ | - | TF15 | 3.0 | 200 | 245 | 316 | 62.0 | 9.2 | |
| | 5S5.364.1Y | - | AQ | AS | TF15 | 3.0 | 250 | 306 | 395 | 77.6 | 9.4 | |
| 270° | 5S5.295.1Y | AN | - | - | TF15 | 3.0 | 165 | 202 | 261 | 51.2 | 9.0 | |
| | 5S5.325.1Y | AN | AQ | - | TF15 | 3.0 | 200 | 245 | 316 | 62.0 | 9.2 | |
| | 5S5.365.1Y | - | AQ | AS | TF15 | 3.0 | 250 | 306 | 395 | 77.6 | 9.4 | |
| 270° | 5S5.296.1Y | AN | - | - | TF15 | 3.0 | 165 | 202 | 261 | 51.2 | 9.0 | |
| | 5S5.326.1Y | AN | AQ | - | TF15 | 3.0 | 200 | 245 | 316 | 62.0 | 9.2 | |
| | 5S5.366.1Y | - | AQ | AS | TF15 | 3.0 | 250 | 306 | 395 | 77.6 | 9.4 | |
| 360° | 5S5.299.1Y | AN | - | - | TF15 | 3.0 | 165 | 202 | 261 | 51.2 | 9.0 | |
| | 5S5.329.1Y | AN | AQ | - | TF15 | 3.0 | 200 | 245 | 316 | 62.0 | 9.2 | |
| | 5S5.369.1Y | - | AQ | AS | TF15 | 3.0 | 250 | 306 | 395 | 77.6 | 9.4 | |
| | 5S5.399.1Y | - | AQ | AS | TF15 | 3.0 | 300 | 367 | 474 | 93.1 | 9.6 | |

E = narrowest free cross section · NPT 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 has negative effects on the cleaning result and wear.

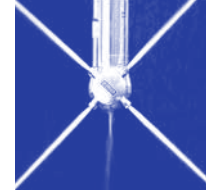
Slip-on information: – R-clip made of 316L SS is included (Ordering number: 095.013.1Y.06.45.0).
– Depending on diameter of the adapter the flow rate can increase due to leakage between connecting pipe and rotating cleaning nozzle.



High impact tank cleaning machine

»IntenseClean Hygienic«

Series 5TA



- Gear-controlled
- Particularly powerful solid jets
- Operating pressures up to 15 bar possible

Materials:

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

Max. temperature:

95 °C

Recommended operating pressure:

5 bar

Installation:

Operation in every direction possible

Filtration:

Line strainer with a mesh size of 0.2 mm/80 mesh

Bearing:

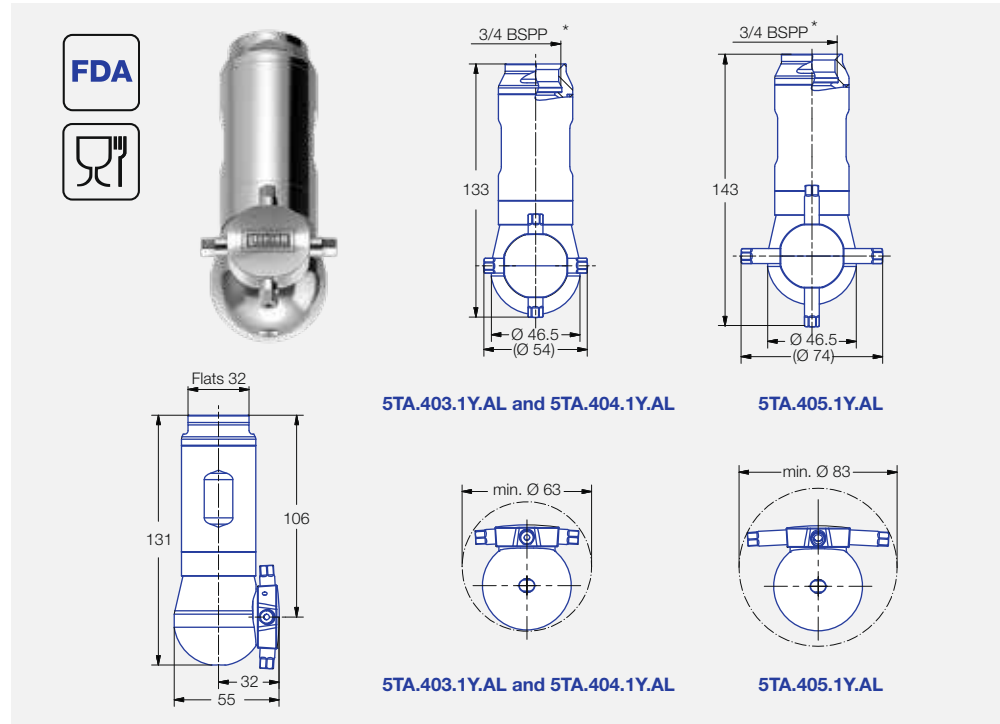
Ball bearing

Weight:

0.9 kg

Rotation monitoring sensor:

Sensor compatible, Info: see page 35



| Spray angle | Ordering no. Type | E Ø [mm] | Number. Ø Nozzles [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|----------------------|----------|------------------------|-------------------------------------|----|-----|-------------------------|------------------------|
| | | | | p [bar] (p _{max} = 15 bar) | | | | |
| | | | | 2 | 5 | 10 | at 40 psi [US gal./min] | |
| 360° | 5TA.403.1Y.AL | 1.5 | 4 x 3.0 | 24 | 39 | 55 | 7.7 | 12.0 |
| | 5TA.404.1Y.AL | 1.5 | 4 x 4.0 | 35 | 56 | 79 | 11.0 | 12.5 |
| | 5TA.405.1Y.AL | 1.5 | 4 x 5.0 | 50 | 79 | 111 | 15.5 | 13.0 |

E = narrowest free cross section · * Slip-on connection on request

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

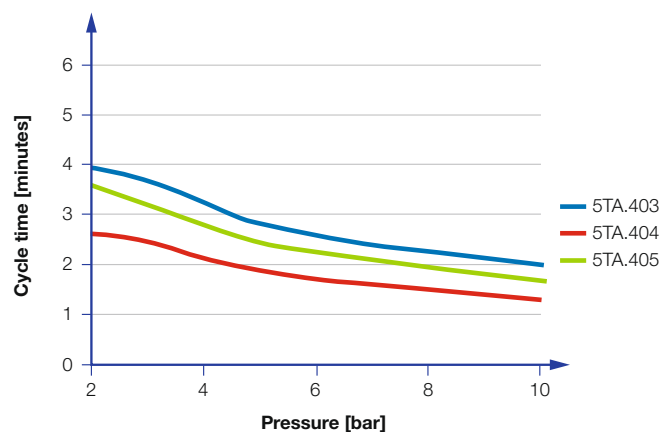


Function video

Scan the QR-code or go to:
www.lechler.com/intensecleanhygienic5ta



ATEX version on request



Cycle time depending on pressure of series 5TA



High impact tank cleaning machine

»IntenseClean Hygienic«

Series 5TB



- Gear-controlled
- Particularly powerful solid jets
- Operating pressures up to 25 bar possible

Materials:

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

Max. temperature:
95 °C

Recommended operating pressure:
5 bar

Installation:

Operation in every direction possible

Filtration:

Line strainer with a mesh size of 0.2 mm/80 mesh

Bearing:

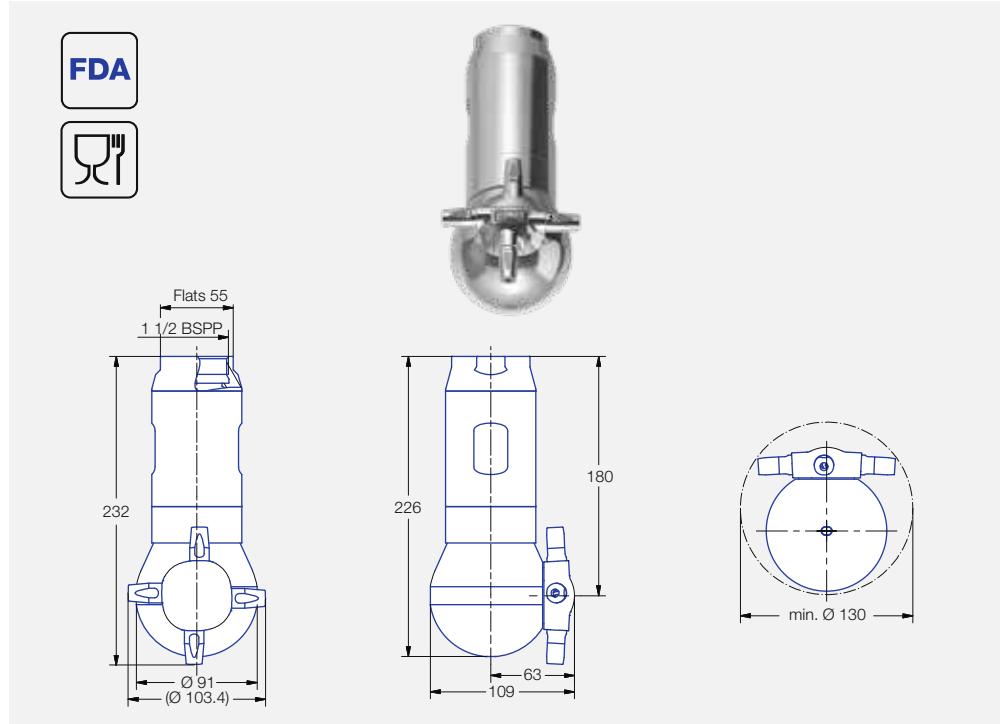
Ball bearing

Weight:

4.0 kg

Rotation monitoring sensor:

Sensor compatible,
Info: see page 35



| Spray angle | Ordering no. Type | E Ø [mm] | Number, Ø Nozzles [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|----------------------|----------|------------------------|-------------------------------------|-----|-----|-------------------------|------------------------|
| | | | | p [bar] (p _{max} = 25 bar) | | | | |
| | | | | 2 | 5 | 10 | at 40 psi [US gal./min] | |
| 360° | 5TB.406.1Y.AS | 6.0 | 4 x 6.0 | 107 | 169 | 239 | 33.1 | 14.0 |
| | 5TB.407.1Y.AS | 6.0 | 4 x 7.0 | 132 | 209 | 296 | 41.0 | 14.0 |
| | 5TB.408.1Y.AS | 6.0 | 4 x 8.0 | 150 | 238 | 336 | 46.7 | 15.0 |

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.

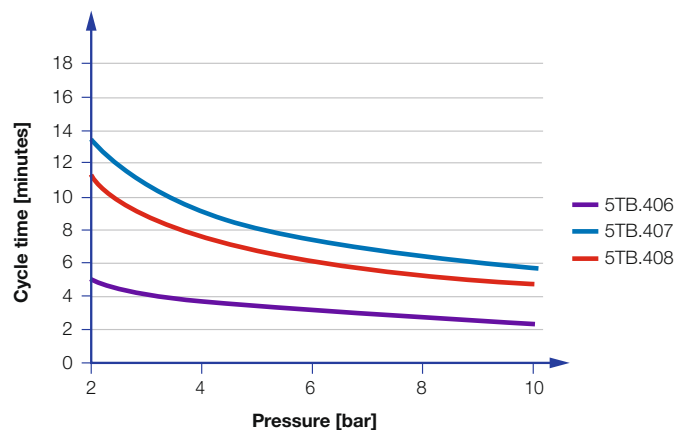


Function video

Scan the QR-code or go to:
www.lechler.com/intensecleanhygienic5tb



**ATEX version
on request**



Cycle time depending on pressure of series 5TB



High impact tank cleaning machine

»IntenseClean«

Series 5TM



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

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

Max. temperature:
95 °C

Recommended operating pressure:
5 bar

Installation:
Operation in every direction possible

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

Bearing:
Ball bearing

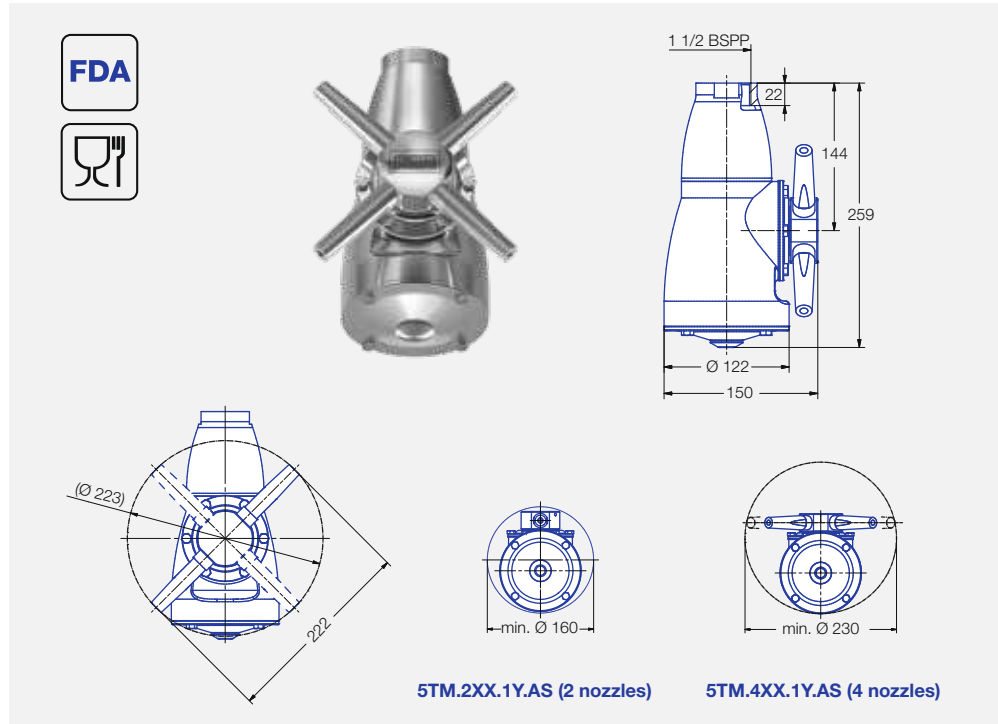
Weight:
7.5 kg

Rotation monitoring sensor:
Sensor compatible,
Info: see page 35



Function video

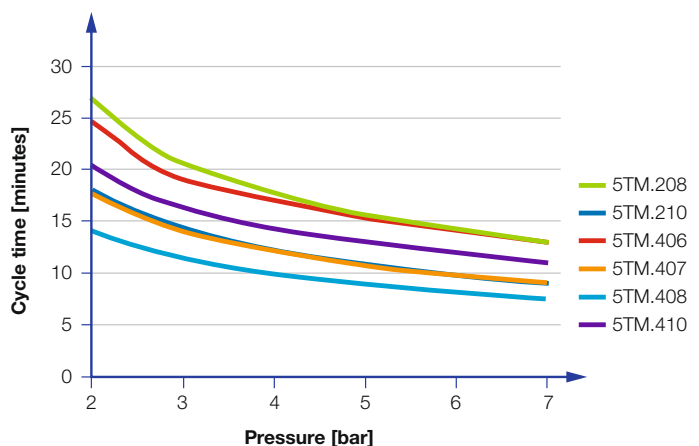
Scan the QR-code or go to:
www.lechler.com/intenseclean



| Spray angle | Ordering no. | E Ø [mm] | Number, Ø Nozzles [mm] | V̇ [l/min] | | | | Max. tank diameter [m] |
|-------------|---------------|----------|------------------------|------------------------------------|-----|-----|--------------------------|------------------------|
| | | | | p [bar] (p _{max} = 7 bar) | | | | |
| | | | | 2 | 3 | 5 | at 40 psi [US gal./ min] | |
| 360° | 5TM.208.1Y.AS | 8 | 2 x 8.0 | 125 | 153 | 198 | 39 | 24.0 |
| | 5TM.210.1Y.AS | 10 | 2 x 10.0 | 160 | 196 | 253 | 50 | 24.0 |
| | 5TM.406.1Y.AS | 6 | 4 x 6.0 | 140 | 171 | 221 | 43 | 18.0 |
| | 5TM.407.1Y.AS | 7 | 4 x 7.0 | 170 | 208 | 269 | 53 | 20.0 |
| | 5TM.408.1Y.AS | 8 | 4 x 8.0 | 200 | 245 | 316 | 62 | 22.0 |
| | 5TM.410.1Y.AS | 10 | 4 x 10.0 | 260 | 318 | 411 | 81 | 23.0 |

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.

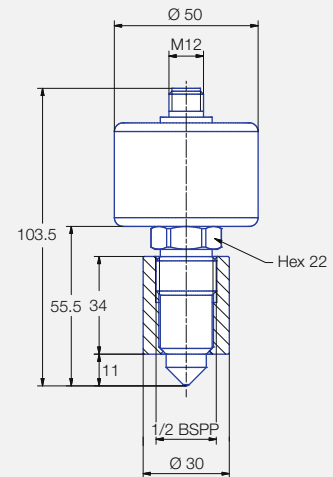


Cycle time depending on pressure of series 5TM



Rotation Monitoring Sensor

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



Electrical data

- Supply voltage: $U_b = 24\text{ V} \pm 20\%$ (18 to 32 VDC)
- Power requirements: $< 20\text{ mA}$
- Output signal: PNP, 50 mA short circuit protected, active

Operating conditions

- Ambient temperature: -10° up to $+60^\circ\text{C}$
- Process temperature: 0° up to $+100^\circ\text{C}$

Materials

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

Operating principle

- Capacitive

Advantages

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



Ordering data

Rotation monitoring sensor with weld-in sleeve
Cable set for first-time operation

Ordering no.

050.040.00.00.00.0
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

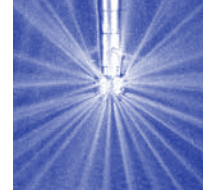


Weld-in mandrel

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



Static spray balls Series 527



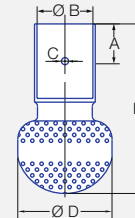
- Effective solid jets
- 3A[®] certification

Materials:
316L SS

Max. temperature:
200 °C

Recommended operating pressure:
1.5 bar

Installation:
Operation in every direction possible



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

| Spray angle | Ordering no. Type | E Ø [mm] | V [l/min] | | | | | Dimensions approx. [mm] | | | | | Max. tank diameter [m] |
|-------------|-------------------------|----------------|------------------------------------|-----|-----|-----|--------------------------------|----------------------------|-------------------------|------|-----|------|---------------------------|
| | | | p [bar] (p _{max} = 5 bar) | | | | | Height H [mm] | Dia- meter D [mm] | B | C | A | |
| | | | 1 | 2 | 3 | 5 | at 40 psi [US gal./ min] | | | | | | |
| 360° | 527.209.1Y.00.75 | 0.8 | 42 | 60 | 73 | 95 | 19 | 68 | 32 | 19.0 | 3.3 | 12.7 | 5.2 |
| | 527.289.1Y.01.50 | 1.1 | 120 | 170 | 208 | 269 | 50 | 116 | 65 | 38.3 | 4.9 | 25.4 | 6.0 |
| | 527.449.1Y.02.00 | 1.7 | 297 | 420 | 514 | 664 | 127 | 152 | 102 | 51.0 | 4.9 | 25.4 | 8.2 |

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.

Slip-on information: - R-clip 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.

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:

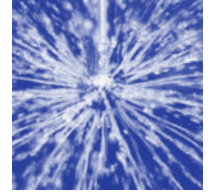
- No moving parts
- Self-draining
- Easy to inspect
- Proven use in hygienically sensitive environments

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 SS
R-clip: 316L SS

Max. temperature:
200 °C

Recommended operating pressure:
2 bar

Installation:

Operation in every direction possible

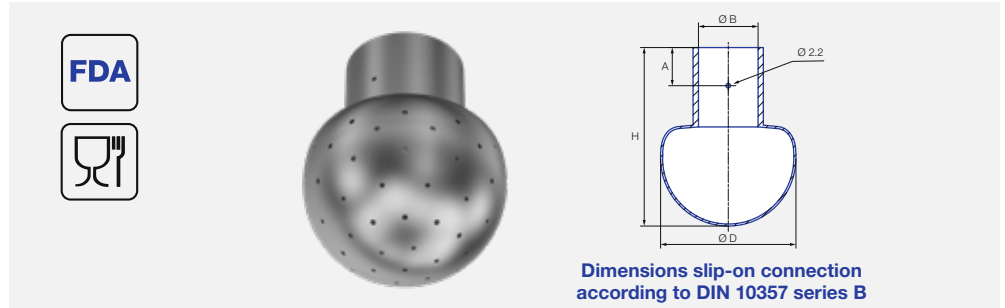
For additional spray balls please refer to our brochure "Precision Spray Nozzles for Tank and Equipment Cleaning"



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 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.



| Spray angle | Ordering no. Type | E Ø [mm] | V̇ [l/min] | | | | Dimensions [mm] | | | | | Max. tank diameter [m] |
|---------------------------|---------------------------|-------------|------------------------------------|-----|-------|--------------------------|-----------------|----------|------------------------|-------------------------|--------|------------------------|
| | | | p [bar] (p _{max} = 5 bar) | | | | Ø D | Height H | Con- nec- tion B | Distance to bore hole A | R-clip | |
| | | | 1 | 2 | 3 | at 40 psi [US gal./ min] | | | | | | |
| 360° | 5B2.879.1Y.D0.80.0 | 0.8 | 11 | 15 | 18 | 4.7 | 20 | 37 | 8.2 | 9 | 1 | 2.0 |
| | 5B3.089.1Y.D1.20.0 | 1.0 | 35 | 50 | 61 | 15.5 | 28 | 42 | 12.2 | 9 | 1 | 2.2 |
| | 5B3.139.1Y.D1.20.0 | 1.6 | 46 | 65 | 80 | 20.2 | 28 | 42 | 12.2 | 9 | 1 | 2.3 |
| | 5B3.209.1Y.D1.80.0 | 1.5 | 71 | 100 | 123 | 31.0 | 28 | 42 | 18.2 | 9 | 2 | 2.5 |
| | 5B3.309.1Y.D2.20.0 | 1.7 | 127 | 180 | 221 | 55.8 | 64 | 84 | 22.2 | 18 | 2 | 3.5 |
| | 5B3.379.1Y.D2.80.0 | 2.1 | 184 | 260 | 318 | 80.7 | 64 | 84 | 28.2 | 18 | 3 | 5.2 |
| | 5B3.389.1Y.D4.00.0 | 2.1 | 198 | 280 | 343 | 86.9 | 64 | 84 | 40.3 | 18 | 4 | 5.2 |
| | 5B3.409.1Y.D3.40.0 | 2.3 | 226 | 320 | 392 | 99.3 | 64 | 84 | 34.2 | 18 | 4 | 5.2 |
| | 5B3.449.1Y.D2.80.0 | 3.0 | 290 | 410 | 502 | 127.2 | 64 | 84 | 28.2 | 18 | 3 | 5.4 |
| | 5B3.489.1Y.D3.40.0 | 2.9 | 361 | 510 | 625 | 158.2 | 64 | 84 | 34.2 | 18 | 4 | 5.5 |
| 5B3.499.1Y.D4.00.0 | 2.8 | 382 | 540 | 661 | 167.5 | 64 | 84 | 40.3 | 18 | 4 | 5.5 | |
| 5B3.539.1Y.D5.20.0 | 3.2 | 474 | 670 | 821 | 207.8 | 90 | 111 | 52.3 | 25 | 5 | 5.6 | |
| 180° | 5B3.083.1Y.D1.80.0 | 1.2 | 35 | 50 | 61 | 15.5 | 28 | 42 | 18.2 | 9 | 2 | 2.2 |
| | 5B3.253.1Y.D2.20.0 | 1.8 | 92 | 130 | 159 | 40.3 | 64 | 84 | 22.2 | 18 | 2 | 3.0 |
| | 5B3.323.1Y.D2.80.0 | 2.3 | 141 | 200 | 245 | 62.0 | 64 | 84 | 28.2 | 18 | 3 | 3.5 |
| 5B3.463.1Y.D5.20.0 | 3.3 | 325 | 460 | 563 | 142.7 | 90 | 111 | 52.3 | 25 | 5 | 5.4 | |
| 180° | 5B3.114.1Y.D1.80.0 | 1.4 | 42 | 60 | 74 | 18.6 | 28 | 42 | 18.2 | 9 | 2 | 2.2 |
| | 5B3.274.1Y.D2.20.0 | 2.3 | 106 | 150 | 184 | 46.5 | 64 | 84 | 22.2 | 18 | 2 | 3.0 |
| | 5B3.394.1Y.D2.80.0 | 3.0 | 205 | 290 | 355 | 90.0 | 64 | 84 | 28.2 | 18 | 3 | 5.0 |
| | 5B3.444.1Y.D5.20.0 | 3.2 | 283 | 400 | 490 | 124.1 | 90 | 111 | 52.3 | 25 | 5 | 5.2 |

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
- 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.

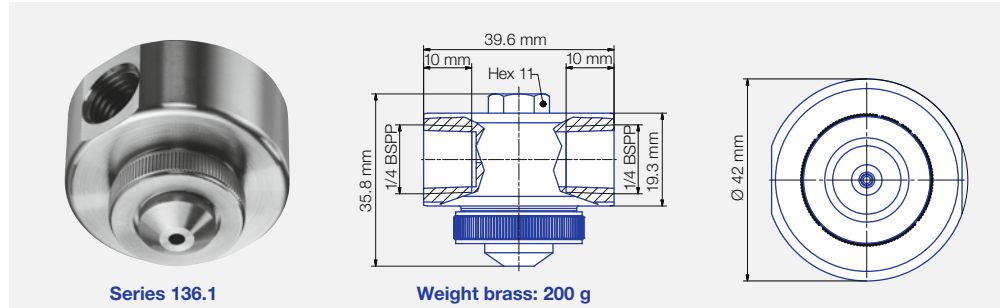


Pneumatic atomizing nozzles, **Full cone,** pressure principle, internal mixing **Series 136.1**

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

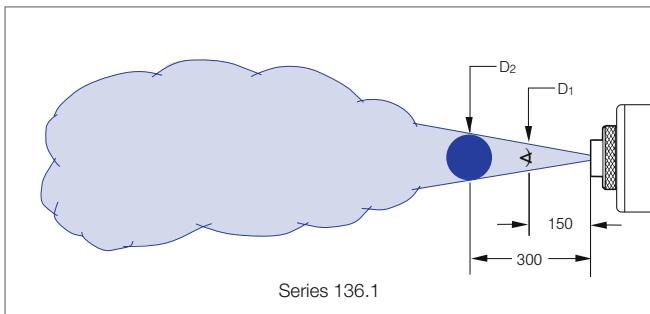
Applications:

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

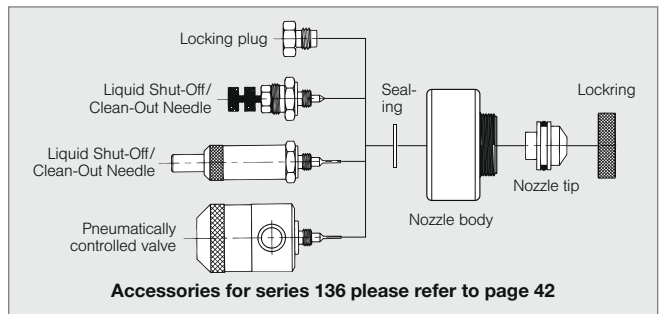


Series 136.1

Weight brass: 200 g



Series 136.1



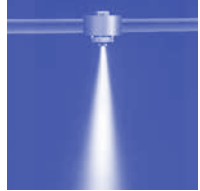
Accessories for series 136 please refer to page 42

| Spray angle | Ordering no. | | E Ø [mm] | Liquid pressure p [bar] | | | | | | | | | | | | Spray dimensions | | | | | |
|---------------|---------------|----------|-------------|-------------------------|-------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|------------------|---------------|---------------------|---------------------|---------------|----|
| | Type | Mat. no. | | 0.7 | | | 1.5 | | | 3.0 | | | 4.0 | | | p Air [bar] | p Water [bar] | D ₁ [mm] | D ₂ [mm] | | |
| | | 1Y | | 35 | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | | | | | V̇ Air [m³/h] | |
| 20° | 136.115.xx.A2 | ○ | ○ | 0.50 | 0.40 | 5.90 | 0.30 | 1.40 | 5.80 | 0.80 | 2.40 | 9.10 | 1.10 | 3.00 | 11.00 | 1.20 | 0.80 | 0.70 | 60 | 100 | |
| | | | | | 0.80 | 3.80 | 0.60 | 1.80 | 4.10 | 1.00 | 2.80 | 7.50 | 1.20 | 3.40 | 9.60 | 1.40 | 1.80 | 1.50 | 60 | 95 | |
| 1.20 | | 1.70 | 0.90 | | 2.20 | 2.20 | 1.40 | 3.20 | 5.90 | 1.50 | 3.80 | 8.20 | 1.60 | 2.60 | 2.00 | 60 | 100 | | | | |
| - | | - | - | | 2.60 | 1.20 | 1.70 | 3.60 | 4.40 | 1.80 | 4.20 | 6.80 | 1.90 | 3.20 | 3.00 | 55 | 95 | | | | |
| - | | - | - | | - | - | - | 4.00 | 2.90 | 2.10 | 4.60 | 5.50 | 2.20 | 4.40 | 4.00 | 55 | 100 | | | | |
| - | | - | - | | - | - | - | 4.40 | 2.00 | 2.50 | 5.00 | 4.10 | 2.50 | - | - | - | - | - | | | |
| - | | - | - | | - | - | - | 4.80 | 1.10 | 2.80 | 5.40 | 2.90 | 2.80 | - | - | - | - | - | | | |
| - | | - | - | | - | - | - | 5.20 | 0.40 | 3.00 | 5.80 | 2.10 | 3.10 | - | - | - | - | - | | | |
| 136.125.xx.A2 | | ○ | ○ | | 0.50 | 0.80 | 4.70 | 1.50 | 1.20 | 7.00 | 1.80 | 2.80 | 9.10 | 3.30 | 3.40 | 10.60 | 3.90 | 1.40 | 0.70 | 55 | 90 |
| | | | | | | 1.20 | 4.40 | 1.90 | 1.60 | 6.60 | 2.20 | 3.20 | 8.70 | 3.70 | 3.80 | 10.30 | 4.30 | 2.20 | 1.50 | 55 | 95 |
| | 1.60 | 4.00 | 2.30 | 2.00 | | 6.20 | 2.60 | 3.60 | 8.40 | 4.10 | 4.20 | 9.90 | 4.60 | 2.80 | 2.00 | 55 | 100 | | | | |
| | 2.00 | 3.50 | 2.60 | 2.40 | | 5.80 | 3.00 | 4.00 | 8.00 | 4.50 | 4.60 | 9.60 | 5.00 | 3.40 | 3.00 | 60 | 100 | | | | |
| | 2.40 | 3.00 | 3.00 | 2.80 | | 5.40 | 3.40 | 4.40 | 7.70 | 4.80 | 5.00 | 9.30 | 5.40 | 4.20 | 4.00 | 60 | 100 | | | | |
| | 2.80 | 2.70 | 3.20 | 3.20 | | 4.90 | 3.70 | 4.80 | 7.30 | 5.20 | 5.40 | 8.90 | 5.80 | - | - | - | - | | | | |
| | 3.20 | 2.00 | 3.70 | 3.60 | | 4.40 | 4.10 | 5.20 | 7.00 | 5.60 | 5.80 | 8.60 | 6.10 | - | - | - | - | | | | |
| | 3.60 | 1.60 | 4.10 | 4.00 | | 3.90 | 4.50 | 5.60 | 6.60 | 5.90 | - | - | - | - | - | - | - | | | | |
| | 4.00 | 1.30 | 4.50 | 4.40 | | 3.50 | 4.80 | 6.00 | 6.20 | 6.30 | - | - | - | - | - | - | - | | | | |
| | 4.40 | 1.00 | 4.90 | 4.80 | | 3.10 | 5.20 | - | - | - | - | - | - | - | - | - | - | | | | |
| 4.80 | 0.60 | 5.20 | 5.20 | 2.70 | 5.60 | - | - | - | - | - | - | - | - | - | - | | | | | | |
| - | - | - | 5.60 | 2.30 | 5.90 | - | - | - | - | - | - | - | - | - | - | | | | | | |
| - | - | - | 6.00 | 1.90 | 6.30 | - | - | - | - | - | - | - | - | - | - | | | | | | |


E = narrowest free cross section (water)

Continued on next page.

Example Type + Material no. (xx) = Ordering no.
for ordering: 136.115.xx.A2 + 1Y = 136.115.1Y.A2

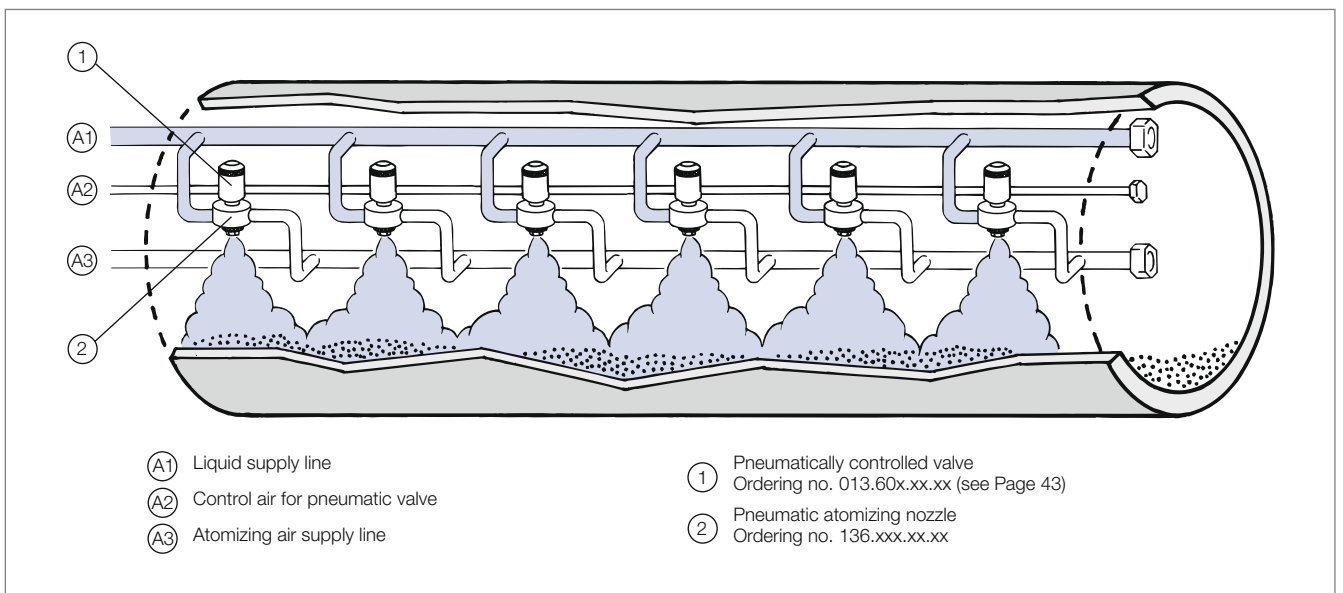


Pneumatic atomizing nozzles, **Full cone,** pressure principle, internal mixing **Series 136.1**

| Spray angle  | Ordering no. | | E Ø [mm] | Liquid pressure p [bar] | | | | | | | | | | | | Spray dimensions | | | | | |
|--|---------------|----------|----------------|-------------------------|-------------|----------------|-----------------|-------------|----------------|-----------------|-------------|----------------|-----------------|-------------|----------------|------------------|---------------|---------------------|---------------------|-----------------|---|
| | Type | Mat. no. | | 0.7 | | | 1.5 | | | 3.0 | | | 4.0 | | | p Air [bar] | p Water [bar] | D ₁ [mm] | D ₂ [mm] | | |
| | | 1Y | | 35 | p Air [bar] | V̇ Water [l/h] | V̇ n Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ n Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ n Air [m³/h] | p Air [bar] | V̇ Water [l/h] | | | | | V̇ n Air [m³/h] | |
| | | 316L SS | | Brass plated | | | | | | | | | | | | | | | | | |
| 20° | 136.134.xx.A2 | ○ | ○ | 0.7 | 1.20 | 13.20 | 2.70 | 2.00 | 19.40 | 3.90 | 3.00 | 28.30 | 5.20 | 3.80 | 32.60 | 6.20 | 1.80 | 0.70 | 55 | 95 | |
| | | | | | 1.60 | 12.40 | 3.30 | 2.40 | 18.10 | 4.40 | 3.40 | 27.50 | 5.70 | 4.20 | 32.00 | 6.80 | 2.80 | 1.50 | 60 | 105 | |
| | | | | | 2.00 | 11.80 | 3.90 | 2.80 | 17.30 | 4.90 | 3.80 | 26.70 | 6.30 | 4.60 | 31.30 | 7.30 | 3.80 | 2.00 | 60 | 105 | |
| | | | | | 2.40 | 11.40 | 4.40 | 3.20 | 16.70 | 5.50 | 4.20 | 25.90 | 6.80 | 5.00 | 30.60 | 7.80 | 5.20 | 3.00 | 65 | 110 | |
| | | | | | 2.80 | 11.10 | 4.90 | 3.60 | 16.10 | 6.00 | 4.60 | 25.00 | 7.30 | 5.40 | 29.90 | 8.40 | 6.00 | 4.00 | 65 | 110 | |
| | | | | | 3.20 | 10.80 | 5.50 | 4.00 | 15.60 | 6.50 | 5.00 | 24.20 | 7.80 | 5.80 | 29.30 | 8.90 | - | - | - | - | - |
| | | | | | 3.60 | 10.60 | 6.00 | 4.40 | 15.20 | 7.00 | 5.40 | 23.60 | 8.40 | - | - | - | - | - | - | - | - |
| | | | | | 4.00 | 10.40 | 6.50 | 4.80 | 15.00 | 7.60 | 5.80 | 23.10 | 8.90 | - | - | - | - | - | - | - | - |
| | | | | | 4.40 | 10.10 | 7.00 | 5.20 | 14.60 | 8.10 | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | 4.80 | 9.90 | 7.60 | 5.60 | 14.10 | 8.60 | - | - | - | - | - | - | - | - | - | - | - |
| | 5.20 | 9.50 | 8.10 | 6.00 | 13.80 | 9.10 | - | - | - | - | - | - | - | - | - | - | - | | | | |
| | 5.60 | 9.00 | 8.60 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | |
| | 6.00 | 8.50 | 9.20 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | | |
| | 136.142.xx.A2 | ○ | ○ | 2.5 | 1.40 | 24.20 | 5.10 | 1.60 | 53.40 | 4.70 | 3.20 | 70.80 | 8.00 | 3.80 | 93.20 | 9.20 | 0.80 | 0.70 | 60 | 100 | |
| | | | | | 1.80 | 20.40 | 6.30 | 2.00 | 42.60 | 5.90 | 3.60 | 62.50 | 9.20 | 4.20 | 83.10 | 10.10 | 1.60 | 1.50 | 65 | 105 | |
| | | | | | 2.20 | 20.00 | 7.20 | 2.40 | 35.30 | 7.20 | 4.00 | 55.70 | 10.60 | 4.60 | 75.30 | 11.30 | 3.00 | 2.00 | 60 | 105 | |
| | | | | | 2.60 | 19.30 | 8.20 | 2.80 | 30.40 | 8.40 | 4.40 | 49.30 | 11.70 | 5.00 | 69.00 | 12.50 | 4.00 | 3.00 | 65 | 110 | |
| | | | | | 3.00 | 17.60 | 9.30 | 3.20 | 28.60 | 9.50 | 4.80 | 44.60 | 12.90 | 5.40 | 63.40 | 13.70 | 6.00 | 4.00 | 65 | 110 | |
| | | | | | 3.40 | 16.50 | 10.40 | 3.60 | 28.20 | 10.50 | 5.20 | 41.90 | 14.10 | 5.80 | 57.50 | 14.90 | - | - | - | - | - |
| | | | | | 3.80 | 17.00 | 11.40 | 4.00 | 27.30 | 11.50 | 5.60 | 40.40 | 15.10 | - | - | - | - | - | - | - | - |
| 4.20 | | | | | 16.30 | 12.40 | 4.40 | 25.90 | 12.50 | 6.00 | 39.70 | 16.10 | - | - | - | - | - | - | - | - | |
| 4.60 | | | | | 15.10 | 13.30 | 4.80 | 24.30 | 13.50 | - | - | - | - | - | - | - | - | - | - | - | |
| 5.00 | | | | | 14.00 | 14.30 | 5.20 | 22.30 | 14.60 | - | - | - | - | - | - | - | - | - | - | - | |
| 5.40 | 13.10 | 15.30 | 5.60 | 21.80 | 15.70 | - | - | - | - | - | - | - | - | - | - | - | | | | | |
| 5.80 | 12.40 | 16.20 | 6.00 | 21.40 | 16.70 | - | - | - | - | - | - | - | - | - | - | - | | | | | |

E = narrowest free cross section (water)

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



Cereal dampening in a mixing drum

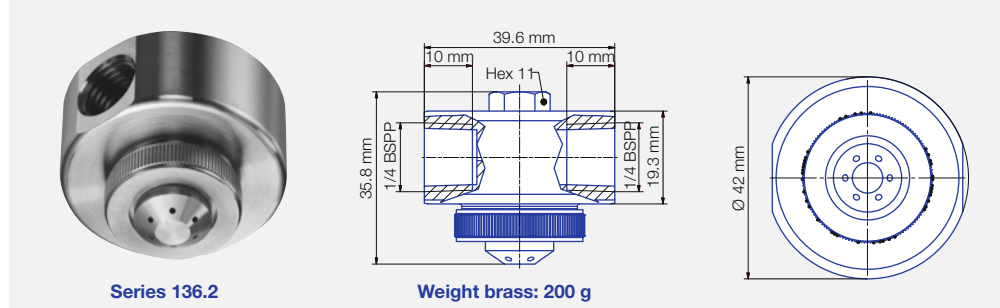


Pneumatic atomizing nozzles, **Full cone,** pressure principle, internal mixing **Series 136.2**

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

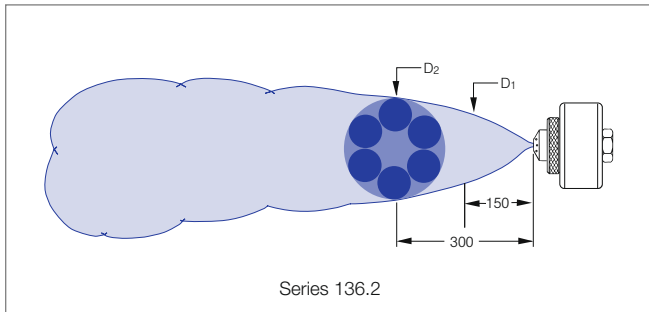
Applications:

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

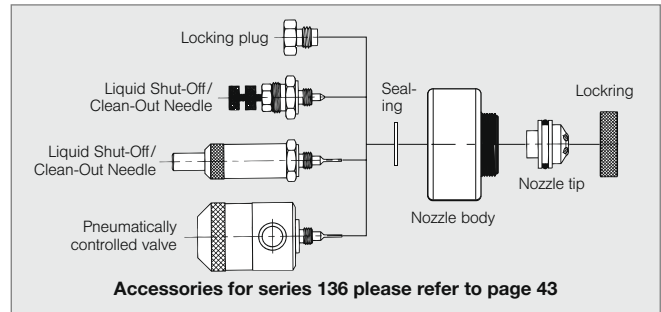


Series 136.2


Weight brass: 200 g



Series 136.2



Accessories for series 136 please refer to page 43

| Spray angle  | Ordering no. | | E Ø [mm] | Liquid pressure p [bar] | | | | | | | | | | | | Spray dimensions | | | | |
|--|---------------|----------|-------------|-------------------------|-------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|------------------|---------------|---------------------|---------------------|---------------|
| | Type | Mat. no. | | 0.7 | | | 1.5 | | | 3.0 | | | 4.0 | | | p Air [bar] | p Water [bar] | D ₁ [mm] | D ₂ [mm] | |
| | | 1Y | | 35 | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | | | | | V̇ Air [m³/h] |
| 60° | 136.215.xx.A2 | ○ | ○ | 0.5 | 1.00 | 3.00 | 1.30 | 1.60 | 5.80 | 1.70 | 2.80 | 8.50 | 2.40 | 3.80 | 9.40 | 3.10 | 1.00 | 0.70 | 200 | 330 |
| | | | | | 1.20 | 1.80 | 1.50 | 1.80 | 4.90 | 1.90 | 3.20 | 7.20 | 2.80 | 4.20 | 8.20 | 3.50 | 1.60 | 1.50 | 230 | 380 |
| | | 1.40 | 0.70 | | 1.80 | 2.00 | 3.80 | 2.10 | 3.60 | 5.70 | 3.20 | 4.60 | 6.90 | 3.90 | 2.40 | 2.00 | 230 | 385 | | |
| | | - | - | | - | 2.20 | 2.80 | 2.30 | 4.00 | 4.00 | 3.60 | 5.00 | 5.40 | 4.20 | 3.20 | 3.00 | 245 | 390 | | |
| | | - | - | | - | 2.40 | 1.70 | 2.50 | 4.40 | 2.20 | 4.10 | 5.40 | 3.80 | 4.70 | 4.20 | 4.00 | 250 | 410 | | |
| | | - | - | | - | 2.60 | 0.80 | 2.80 | 4.80 | 0.80 | 4.50 | 5.80 | 2.30 | 5.20 | - | - | - | - | - | - |
| | 136.222.xx.A2 | ○ | ○ | 1.0 | 0.80 | 17.50 | 2.80 | 1.60 | 25.90 | 4.00 | 3.00 | 40.40 | 5.80 | 3.80 | 54.90 | 6.40 | 0.80 | 0.70 | 250 | 450 |
| | | | | | 1.00 | 6.00 | 4.30 | 1.80 | 14.70 | 5.30 | 3.20 | 31.50 | 6.90 | 4.00 | 45.60 | 7.30 | 1.60 | 1.50 | 245 | 465 |
| | | - | - | | - | 2.00 | 6.70 | 6.70 | 3.40 | 22.20 | 8.20 | 4.20 | 37.60 | 8.50 | 2.30 | 2.00 | 245 | 465 | | |
| | | - | - | | - | 2.20 | 1.90 | 8.10 | 3.60 | 14.60 | 9.50 | 4.40 | 29.60 | 9.70 | 3.20 | 3.00 | 250 | 465 | | |
| | | - | - | | - | - | - | - | 3.80 | 8.50 | 11.00 | 4.60 | 21.60 | 11.20 | 4.20 | 4.00 | 245 | 465 | | |
| | | - | - | | - | - | - | - | 4.00 | 4.50 | 12.30 | 4.80 | 15.30 | 12.40 | - | - | - | - | - | - |
| 136.231.xx.A2 | ○ | ○ | 1.4 | 1.60 | 25.60 | 5.10 | 2.60 | 44.20 | 7.00 | 3.60 | 93.70 | 7.90 | 4.20 | 132.90 | 7.30 | 2.00 | 0.70 | 235 | 380 | |
| | | | | 2.00 | 17.80 | 6.20 | 3.00 | 33.00 | 8.20 | 4.00 | 78.30 | 9.30 | 4.60 | 117.20 | 9.00 | 2.60 | 1.50 | 245 | 415 | |
| | 2.40 | 11.30 | | 7.20 | 3.40 | 24.70 | 9.20 | 4.40 | 65.80 | 10.60 | 5.00 | 101.10 | 10.40 | 2.40 | 2.00 | 255 | 420 | | | |
| | 2.80 | 6.90 | | 8.10 | 3.80 | 18.10 | 10.20 | 4.80 | 54.90 | 11.90 | 5.40 | 87.90 | 11.80 | 3.60 | 3.00 | 255 | 425 | | | |
| | - | - | | - | 4.20 | 13.20 | 11.20 | 5.20 | 45.60 | 13.00 | 5.80 | 76.60 | 13.20 | 4.20 | 4.00 | 265 | 430 | | | |
| | - | - | | - | 4.60 | 9.30 | 12.00 | 5.60 | 38.00 | 14.10 | 6.00 | 71.20 | 13.80 | - | - | - | - | - | - | |

E = narrowest free cross section (water)

Example Type + Material no. (xx) = Ordering no.
for ordering: 136.215.xx.A2 + 1Y = 136.215.1Y.A2



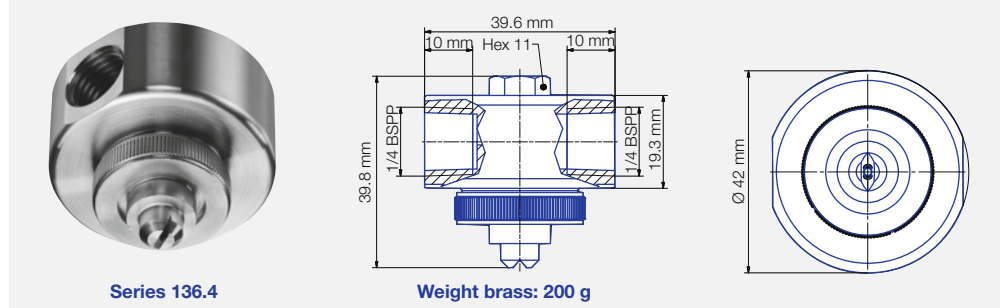
Pneumatic atomizing nozzles, **Flat fan,** pressure principle, internal mixing **Series 136.4**



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

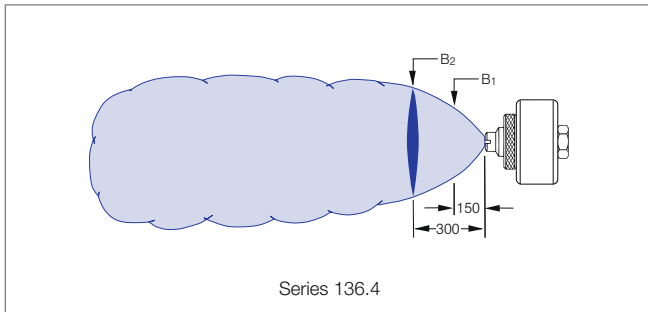
Applications:

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

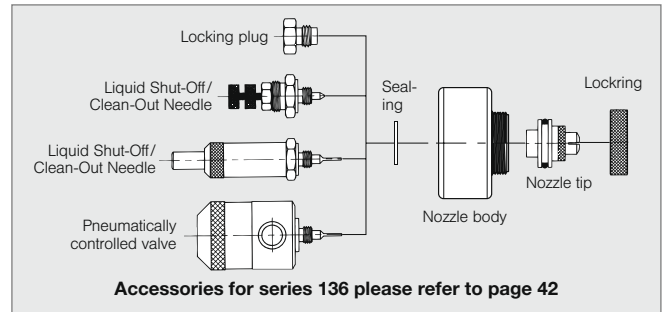


Series 136.4


Weight brass: 200 g



Series 136.4



Accessories for series 136 please refer to page 42

| Spray angle  | Ordering no. | | E Ø [mm] | Liquid pressure p [bar] | | | | | | | | | | | | Spray dimensions | | | | |
|--|---------------|----------|-------------|-------------------------|-------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|------------------|---------------|---------------------|---------------------|---------------|
| | Type | Mat. no. | | 0.7 | | | 1.5 | | | 3.0 | | | 4.0 | | | p Air [bar] | p Water [bar] | B ₁ [mm] | B ₂ [mm] | |
| | | 1Y | | 35 | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | | | | | V̇ Air [m³/h] |
| 45° | 136.414.xx.A2 | ○ | ○ | 0.7 | 1.00 | 7.70 | 1.30 | 1.40 | 14.30 | 1.50 | 2.20 | 22.40 | 2.00 | 3.00 | 25.10 | 2.50 | 1.40 | 0.70 | 85 | 125 |
| | | | | | 1.20 | 6.00 | 1.50 | 1.60 | 13.00 | 1.60 | 2.60 | 20.00 | 2.30 | 3.40 | 23.00 | 2.80 | 2.40 | 1.50 | 100 | 145 |
| | | 1.40 | 4.20 | | 1.70 | 1.80 | 11.60 | 1.80 | 3.00 | 17.70 | 2.60 | 3.80 | 20.90 | 3.10 | 3.20 | 2.00 | 105 | 155 | | |
| | | 1.60 | 2.70 | | 1.90 | 2.00 | 10.20 | 2.00 | 3.40 | 15.50 | 3.00 | 4.20 | 18.90 | 3.50 | 3.80 | 3.00 | 120 | 170 | | |
| | | 1.80 | 1.30 | | 2.10 | 2.20 | 8.90 | 2.20 | 3.80 | 13.30 | 3.40 | 4.60 | 16.90 | 3.80 | 4.60 | 4.00 | 130 | 210 | | |
| | | - | - | | - | 2.40 | 7.40 | 2.40 | 4.20 | 11.00 | 3.70 | 5.00 | 14.90 | 4.20 | - | - | - | - | - | - |
| | | - | - | | - | 2.60 | 5.90 | 2.60 | 4.60 | 8.80 | 4.10 | 5.40 | 12.80 | 4.60 | - | - | - | - | - | - |
| | | - | - | | - | 2.80 | 4.60 | 2.80 | 5.00 | 6.60 | 4.50 | 5.80 | 10.80 | 5.00 | - | - | - | - | - | - |
| | | - | - | | - | 3.00 | 3.20 | 3.00 | 5.40 | 4.30 | 4.90 | 6.00 | 9.80 | 5.20 | - | - | - | - | - | - |
| | | - | - | | - | 3.20 | 2.10 | 3.20 | 5.80 | 2.50 | 5.30 | - | - | - | - | - | - | - | - | - |
| | - | - | - | 3.40 | 1.10 | 3.40 | 6.00 | 1.60 | 5.50 | - | - | - | - | - | - | - | - | - | | |
| | 136.443.xx.A2 | ○ | ○ | 1.0 | 1.20 | 13.90 | 1.50 | 1.60 | 26.60 | 1.60 | 3.00 | 37.10 | 2.60 | 3.60 | 45.60 | 2.90 | 1.20 | 0.70 | 110 | 165 |
| | | | | | 1.40 | 11.90 | 1.70 | 1.80 | 24.30 | 1.80 | 3.40 | 33.10 | 3.00 | 4.00 | 41.90 | 3.30 | 2.00 | 1.50 | 115 | 190 |
| | | 1.60 | 9.50 | | 1.90 | 2.00 | 22.00 | 2.00 | 3.80 | 29.50 | 3.40 | 4.40 | 38.30 | 3.70 | 2.80 | 2.00 | 145 | 190 | | |
| | | 1.80 | 7.80 | | 2.10 | 2.20 | 19.90 | 2.20 | 4.20 | 26.20 | 3.80 | 4.80 | 35.00 | 4.00 | 3.80 | 3.00 | 150 | 210 | | |
| | | - | - | | - | 2.40 | 18.00 | 2.40 | 4.60 | 23.00 | 4.20 | 5.20 | 31.80 | 4.50 | 4.80 | 4.00 | 160 | 230 | - | - |
| | | - | - | | - | 2.60 | 16.20 | 2.60 | 5.00 | 20.20 | 4.60 | 5.60 | 29.00 | 4.90 | - | - | - | - | - | - |
| | | - | - | | - | 2.80 | 14.40 | 2.80 | 5.40 | 17.60 | 4.90 | 6.00 | 26.20 | 5.20 | - | - | - | - | - | - |
| | | - | - | | - | 3.00 | 12.80 | 3.00 | 5.80 | 14.90 | 5.30 | - | - | - | - | - | - | - | - | - |
| | | - | - | | - | 3.20 | 11.30 | 3.20 | 6.00 | 14.10 | 5.50 | - | - | - | - | - | - | - | - | - |
| - | | - | - | | 3.40 | 9.90 | 3.40 | - | - | - | - | - | - | - | - | - | - | - | - | |
| - | - | - | 3.60 | 8.80 | 3.60 | - | - | - | - | - | - | - | - | - | - | - | - | | | |

E = narrowest free cross section (water)


Continued on next page.

Example **Type** + **Material no. (xx)** = **Ordering no.**
for ordering: 136.414.xx.A2 + 1Y = 136.414.1Y.A2



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



| Spray angle  | Ordering no. | | | | E Ø [mm] | Liquid pressure p [bar] | | | | | | | | | | | | Spray dimensions | | | | | | |
|--|---------------|----------|------|-------------------------|----------------|-------------------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|---------------|-------------|----------------|---------------|------------------|---------------|------------------------|------------------------|------|-----|-----|
| | Type | Mat. no. | | 316L SS Brass plated | | 0.7 | | | 1.5 | | | 3.0 | | | 4.0 | | | p Air [bar] | p Water [bar] | B ₁ [mm] | B ₂ [mm] | | | |
| | | 1Y | 35 | | | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | p Air [bar] | V̇ Water [l/h] | V̇ Air [m³/h] | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| 45° | 136.462.xx.A2 | ○ | ○ | 1.5 | 1.20 | 19.00 | 2.60 | 2.00 | 22.00 | 2.00 | 3.00 | 61.80 | 4.00 | 3.80 | 76.10 | 4.60 | 1.20 | 0.70 | 120 | 140 | | | | |
| | | | | | 1.60 | 12.20 | 3.40 | 2.40 | 18.00 | 2.40 | 3.40 | 51.90 | 4.80 | 4.00 | 70.40 | 5.10 | 2.40 | 1.50 | 120 | 170 | | | | |
| | | | | | 2.00 | 9.40 | 4.10 | 2.80 | 14.40 | 2.80 | 3.80 | 44.60 | 5.80 | 4.20 | 65.60 | 5.50 | 3.20 | 2.00 | 120 | 175 | | | | |
| | | | | | 2.40 | 7.10 | 4.80 | 3.20 | 11.30 | 3.20 | 4.20 | 39.00 | 6.60 | 4.40 | 61.30 | 5.90 | 3.80 | 3.00 | 140 | 205 | | | | |
| | | | | | 2.80 | 5.70 | 5.40 | 3.60 | 8.80 | 3.60 | 4.60 | 33.40 | 7.40 | 4.60 | 57.30 | 6.40 | 6.00 | 4.00 | 145 | 205 | | | | |
| | | | | | 3.20 | 5.00 | 6.00 | 4.00 | 8.10 | 3.90 | 5.00 | 29.40 | 8.10 | 4.80 | 54.10 | 6.70 | | | | | | | | |
| | | | | | 3.60 | 3.60 | 6.60 | 4.40 | 6.20 | 4.30 | 5.40 | 25.50 | 8.90 | 5.00 | 51.30 | 7.20 | | | | | | | | |
| | | | | | 4.00 | 3.20 | 7.20 | 4.80 | 4.60 | 4.60 | 5.80 | 22.00 | 9.60 | 5.20 | 49.30 | 7.70 | | | | | | | | |
| | | | | | 4.40 | 2.20 | 7.80 | 5.20 | 3.20 | 4.90 | 6.00 | 20.60 | 9.90 | 5.40 | 46.50 | 8.20 | | | | | | | | |
| | | | | | - | - | - | 5.60 | 1.60 | 5.30 | - | - | - | 5.60 | 43.70 | 8.60 | | | | | | | | |
| | | | | | - | - | - | 5.80 | 0.80 | 5.40 | - | - | - | 5.80 | 41.30 | 8.90 | | | | | | | | |
| | | | | | - | - | - | - | - | - | - | - | - | 6.00 | 39.00 | 9.30 | | | | | | | | |
| 60° | 136.425.xx.A2 | ○ | ○ | 0.5 | 0.80 | 6.50 | 1.20 | 1.40 | 9.40 | 1.70 | 2.40 | 13.20 | 2.50 | 2.40 | 16.10 | 2.50 | 1.20 | 0.70 | 155 | 195 | | | | |
| | | | | | 1.20 | 5.50 | 1.60 | 1.80 | 8.70 | 2.10 | 2.60 | 12.90 | 2.70 | 2.80 | 15.50 | 2.90 | 2.20 | 1.50 | 165 | 255 | | | | |
| | | | | | 1.60 | 4.70 | 1.90 | 2.20 | 7.90 | 2.40 | 3.00 | 12.30 | 3.00 | 3.20 | 15.00 | 3.20 | 3.00 | 2.00 | 170 | 265 | | | | |
| | | | | | 2.00 | 4.00 | 2.30 | 2.60 | 7.20 | 2.70 | 3.40 | 11.80 | 3.40 | 3.60 | 14.50 | 3.50 | 3.40 | 3.00 | 200 | 330 | | | | |
| | | | | | 2.40 | 3.20 | 2.60 | 3.00 | 6.40 | 3.10 | 3.80 | 11.10 | 3.70 | 4.00 | 13.90 | 3.80 | 5.60 | 4.00 | 200 | 330 | | | | |
| | | | | | 2.80 | 2.60 | 2.90 | 3.40 | 5.70 | 3.40 | 4.20 | 10.40 | 4.00 | 4.40 | 13.40 | 4.10 | | | | | | | | |
| | | | | | 3.00 | 2.20 | 3.10 | 3.80 | 5.10 | 3.70 | 4.60 | 9.80 | 4.30 | 4.80 | 12.80 | 4.50 | | | | | | | | |
| | | | | | - | - | - | 4.00 | 4.80 | 3.90 | 5.00 | 9.20 | 4.60 | 5.20 | 12.20 | 4.80 | | | | | | | | |
| | | | | | - | - | - | 4.40 | 4.20 | 4.20 | 5.40 | 8.60 | 5.00 | 5.60 | 11.70 | 5.10 | | | | | | | | |
| | | | | | - | - | - | 4.80 | 3.60 | 4.50 | 5.80 | 8.10 | 5.30 | 6.00 | 11.20 | 5.40 | | | | | | | | |
| | | | | | - | - | - | 5.20 | 2.80 | 4.80 | 6.00 | 7.80 | 5.40 | - | - | - | | | | | | | | |
| | | | | | - | - | - | 5.60 | 2.20 | 5.10 | - | - | - | - | - | - | | | | | | | | |
| | - | - | - | 6.00 | 1.60 | 5.50 | - | - | - | - | - | - | | | | | | | | | | | | |
| | 136.452.xx.A2 | ○ | ○ | 1.5 | 1.00 | 18.80 | 3.90 | 1.80 | 31.00 | 5.30 | 3.20 | 50.10 | 7.70 | 3.80 | 70.70 | 8.20 | 1.00 | 0.70 | 130 | 185 | | | | |
| | | | | | 1.40 | 8.60 | 5.70 | 2.00 | 25.40 | 6.30 | 3.60 | 39.50 | 9.40 | 4.20 | 58.60 | 9.60 | 1.80 | 1.50 | 150 | 240 | | | | |
| | | | | | 1.80 | 7.40 | 7.00 | 2.20 | 20.10 | 7.20 | 4.00 | 31.30 | 11.20 | 4.60 | 48.60 | 11.20 | 2.60 | 2.00 | 155 | 245 | | | | |
| | | | | | 2.20 | 4.10 | 8.40 | 2.40 | 15.50 | 8.00 | 4.40 | 24.00 | 12.90 | 5.00 | 41.20 | 13.10 | 3.60 | 3.00 | 175 | 280 | | | | |
| | | | | | 2.60 | 1.00 | 9.80 | 2.60 | 12.40 | 8.90 | 4.80 | 17.70 | 14.50 | 5.40 | 33.60 | 14.80 | 5.00 | 4.00 | 180 | 285 | | | | |
| | | | | | 2.80 | 0.10 | 10.30 | 2.80 | 10.40 | 9.60 | 5.20 | 13.40 | 16.00 | 5.80 | 27.50 | 16.40 | | | | | | | | |
| | | | | | - | - | - | - | - | - | - | 5.60 | 10.60 | 17.50 | 6.00 | 24.40 | 17.20 | | | | | | | |
| | | | | | - | - | - | - | - | - | - | 6.00 | 8.60 | 18.80 | - | - | - | | | | | | | |
| | | | | | 136.433.xx.A2 | ○ | ○ | 0.4 | 1.00 | 11.60 | 2.00 | 1.80 | 18.30 | 2.80 | 3.00 | 31.00 | 3.70 | 3.80 | 37.50 | 4.40 | 1.40 | 0.70 | 150 | 210 |
| | | | | | | | | | 1.20 | 8.10 | 2.40 | 2.00 | 15.30 | 3.20 | 3.40 | 25.40 | 4.40 | 4.20 | 32.40 | 5.00 | 2.20 | 1.50 | 185 | 255 |
| | | | | | | | | | 1.40 | 5.30 | 2.80 | 2.20 | 12.20 | 3.60 | 3.80 | 20.60 | 5.10 | 4.60 | 27.70 | 5.70 | 3.00 | 2.00 | 205 | 300 |
| 1.60 | | | | | | | | | 3.70 | 3.20 | 2.40 | 9.80 | 4.00 | 4.20 | 16.30 | 5.90 | 5.00 | 23.40 | 6.50 | 3.80 | 4.00 | 300 | 485 | |
| - | - | - | 2.60 | 7.60 | | | | | 4.30 | 4.60 | 12.50 | 6.60 | 5.40 | 19.40 | 7.20 | 5.20 | 4.00 | 260 | 395 | | | | | |
| - | - | - | 2.80 | 5.90 | | | | | 4.70 | 5.00 | 9.30 | 7.30 | 5.80 | 15.90 | 7.90 | | | | | | | | | |
| - | - | - | 3.00 | 4.40 | | | | | 5.00 | 5.40 | 6.50 | 8.00 | 6.00 | 14.20 | 8.30 | | | | | | | | | |

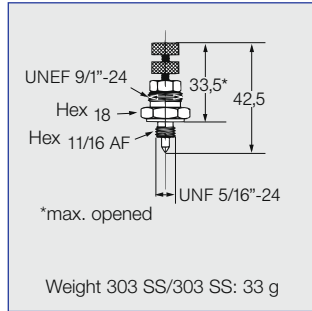
E = narrowest free cross section (water)

Example Type + Material no. (xx) = Ordering no.
for ordering: 136.462.xx.A2 + 1Y = 136.462.1Y.A2



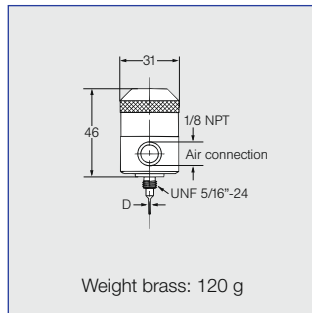
Accessories for pneumatic atomizing nozzles Series 136

Regulating device and shutting-off needle:



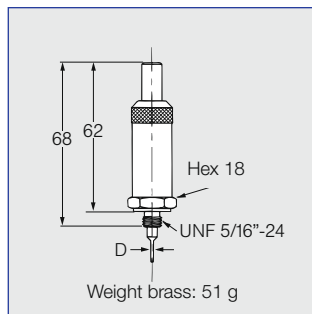
| Ordering no. | | Type | Mat. no. | For all nozzles of the series 136 |
|----------------|--|------|----------|-----------------------------------|
| | | | | |
| | | | 16 | |
| | | | 303 SS | |
| 015.600 | | | ○ | |

Pneumatically controlled valve Opening pressure 2.1 bar, max. 180 cycles/min.



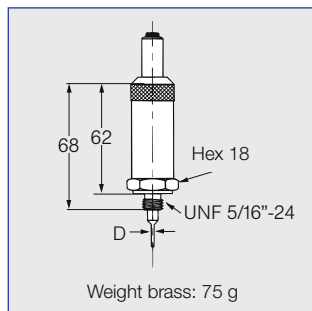
| Ordering no. | | Type | Mat. no. | | For nozzles | Needle diameter D [mm] |
|----------------------|--|------|----------|--------------|-------------|------------------------|
| | | | 303 SS | Brass plated | | |
| | | | 16 | 35 | | |
| 013.601.xx.10 | | ○ | ○ | | 136. xx1 | 2.1 |
| 013.602.xx.10 | | ○ | ○ | | 136. xx2 | 1.2 |
| 013.604.xx.10 | | ○ | ○ | | 136. xx4 | 0.6 |

Quick-cleaning device



| Ordering no. | | Type | Mat. no. | | For nozzles | Needle diameter D [mm] |
|----------------------|--|------|----------|--------------|-------------|------------------------|
| | | | 303 SS | Brass plated | | |
| | | | 16 | 35 | | |
| 013.601.xx.20 | | ○ | ○ | | 136. xx1 | 2.1 |
| 013.602.xx.20 | | ○ | ○ | | 136. xx2 | 1.2 |
| 013.604.xx.20 | | ○ | ○ | | 136. xx4 | 0.6 |

Regulating device with quick-cleaning needle



| Ordering no. | | Type | Mat. no. | | For nozzles | Needle diameter D [mm] |
|----------------------|--|------|----------|--------------|-------------|------------------------|
| | | | 303 SS | Brass plated | | |
| | | | 16 | 35 | | |
| 013.601.xx.20 | | ○ | ○ | | 136. xx1 | 2.1 |
| 013.602.xx.20 | | ○ | ○ | | 136. xx2 | 1.2 |
| 013.604.xx.20 | | ○ | ○ | | 136. xx4 | 0.6 |

Example Type + Material no. (xx) = Ordering no.
for ordering: 013.601.xx.10 + 16 = 013.601.16.10



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

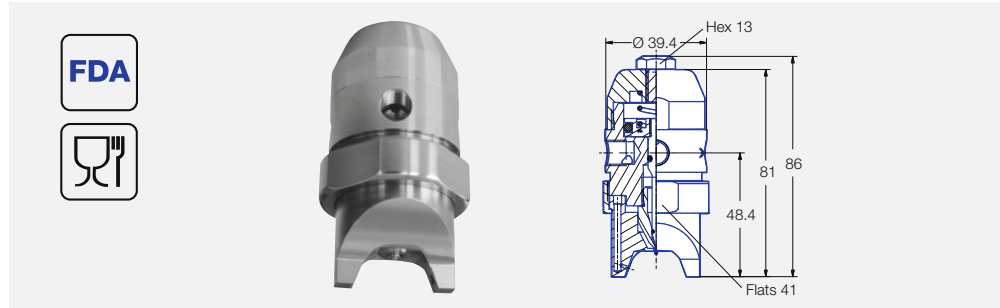


The ViscoMist™ series offers independent regulation of both atomizing air and fan air, which provides the user with infinite control over the viscous fluid's spray pattern and droplet size.

The ViscoMist™ nozzle features a standard 'Liquid Shut-Off/ Clean-Out Needle' function. This design element activates and deactivates the liquid supply, while simultaneously removing excess fluid from the fluid nozzle preventing clogging. This feature is especially vital when the viscous liquids are being applied in continuous process environments.

The modular design of the ViscoMist™ allows maximum flexibility to meet the exact spray requirements.

Interchangeable air caps and various flow capacities are available to suit any spraying application needs.



One nozzle – three spray characters

- – Solid stream
- Full cone
- Flat fan
- Independent regulation of liquid, atomizing air and fan air
- Fluid circulation possible (Nozzle body with 5 connections)

Outside mixing to spray viscous liquids, for example:

- Coating
- Moisturising
- Lubrication
- Glazing
- Sanitising

Fluid cap options

Ø 0.38 mm to 2.54 mm

Valve position

Normally closed, fail-safe with loss of air

Signal air pressure

Min. 2 bar
Max. 3 bar

Cycles per minute (short term)

180 cycles/min

Material

1Y (316L SS)

Ports

01 (1/8" NPT (F))
11 (1/8 BSPP (F))

Flow rate range

- Water: 7.8 to 307 l/h, at 2 bar
- Air: 7.5 to 32 m³/h i.N., at 2 bar

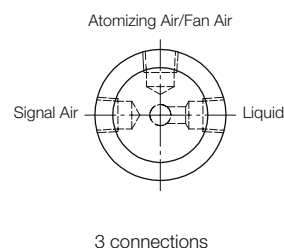


Atomizing air/Fan air/Signal air

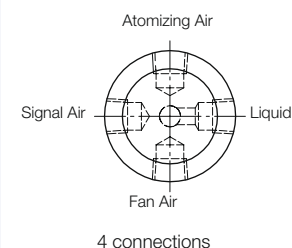
The atomizing air causes the liquid to atomize at the nozzle orifice. The spray character can be adjusted with the fan air to suit the application. The signal air activates the nozzle.

Nozzle body configurations

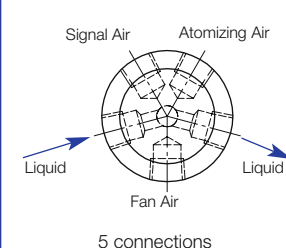
Nozzle body configuration 2



Nozzle body configuration 4



Nozzle body configuration 5





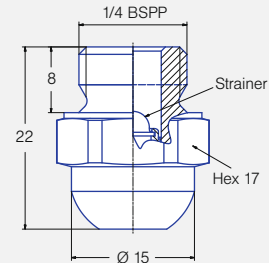
Axial-flow hollow cone nozzles Series 220




Extremely fine, fog-like hollow cone spray.

Applications:

Disinfection, humidification, cooling.



| Spray angle | Ordering no. | | | | B Ø [mm] | E Ø [mm] | Mesh size [mm] | V̇ [l/min] | | | | | | | | Spray diameter D at p = 5 bar  H = 100 mm |
|-------------|--------------|----------------|----------------|------|----------|----------|----------------|------------|-------|-------|-------|-------|-------|-------|-------|--|
| | Type | Mat. no. | | Code | | | | p [bar] | | | | | | | | |
| | | 11 430F SS* | 1Y 316L SS* | | | | | 2.0 | 3.0 | 5.0 | 7.0 | 10.0 | 20.0 | 50.0 | 100.0 | |
| 60° | 220.004 | ○ | ○ | AC | 0.10 | 0.10 | 0.04 | - | - | 0.013 | 0.015 | 0.018 | 0.026 | 0.041 | 0.058 | 100 |
| | 220.014 | ○ | ○ | AC | 0.15 | 0.15 | 0.04 | - | 0.015 | 0.019 | 0.022 | 0.027 | 0.038 | 0.060 | 0.085 | 100 |
| | 220.054 | ○ | ○ | AC | 0.20 | 0.15 | 0.04 | 0.017 | 0.021 | 0.027 | 0.032 | 0.038 | 0.054 | 0.085 | 0.121 | 100 |
| 80° | 220.085 | ○ | ○ | AC | 0.25 | 0.25 | 0.10 | 0.025 | 0.031 | 0.040 | 0.047 | 0.057 | 0.080 | 0.126 | 0.179 | 140 |
| | 220.125 | ○ | ○ | AC | 0.35 | 0.35 | 0.10 | 0.039 | 0.048 | 0.062 | 0.073 | 0.088 | 0.124 | 0.196 | 0.277 | 140 |
| | 220.145 | ○ | ○ | AC | 0.40 | 0.40 | 0.10 | 0.052 | 0.064 | 0.082 | 0.097 | 0.116 | 0.164 | 0.259 | 0.367 | 140 |
| | 220.165 | ○ | ○ | AC | 0.45 | 0.45 | 0.10 | 0.065 | 0.080 | 0.103 | 0.122 | 0.146 | 0.206 | 0.326 | 0.461 | 140 |
| | 220.185 | ○ | ○ | AC | 0.55 | 0.35 | 0.20 | 0.082 | 0.101 | 0.130 | 0.154 | 0.184 | 0.260 | 0.411 | 0.581 | 140 |
| | 220.205 | ○ | ○ | AC | 0.60 | 0.35 | 0.20 | 0.106 | 0.130 | 0.168 | 0.199 | 0.238 | 0.336 | 0.531 | 0.751 | 140 |
| | 220.245 | ○ | ○ | AC | 0.70 | 0.50 | 0.20 | 0.165 | 0.202 | 0.261 | 0.309 | 0.369 | 0.522 | 0.825 | 1.167 | 140 |
| 220.285 | ○ | ○ | AC | 0.90 | 0.55 | 0.20 | 0.247 | 0.302 | 0.390 | 0.461 | 0.552 | 0.780 | 1.233 | 1.744 | 140 | |

B = bore diameter · E = narrowest free cross section

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

Example Type + Material-no. + Code = Ordering no.
for ordering: 220.004 + 1Y + AC = 220.004.1Y.AC

*** 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: $\dot{V}_2 = \dot{V}_1 \cdot \sqrt{\frac{p_2}{p_1}}$



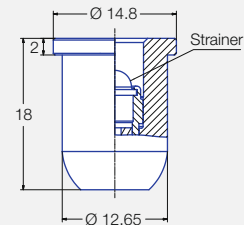
Axial-flow hollow cone nozzles for retaining nut Series 226





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

Applications:

Disinfection, humidification, cooling.



| Spray angle  | Ordering no. | | B Ø [mm] | E Ø [mm] | Mesh size [mm] | V̇ [l/min] | | | | | | | | Spray diameter D at p = 5 bar  H = 100 mm |
|--|--------------|---------------|----------------|----------------|----------------------|------------|-------|-------|-------|-------|-------|-------|-------|---|
| | Type | Mat. no. | | | | p [bar] | | | | | | | | |
| | | 16 303 SS* | | | | 2.0 | 3.0 | 5.0 | 7.0 | 10.0 | 20.0 | 50.0 | 100.0 | |
| 60° | 226.004 | ○ | 0.10 | 0.10 | 0.04 | - | - | 0.013 | 0.015 | 0.018 | 0.026 | 0.041 | 0.058 | 100 |
| | 226.014 | ○ | 0.15 | 0.15 | 0.04 | - | 0.015 | 0.019 | 0.022 | 0.027 | 0.038 | 0.060 | 0.085 | 100 |
| | 226.054 | ○ | 0.20 | 0.15 | 0.04 | 0.017 | 0.021 | 0.027 | 0.032 | 0.038 | 0.054 | 0.085 | 0.121 | 100 |
| 80° | 226.085 | ○ | 0.25 | 0.25 | 0.10 | 0.025 | 0.031 | 0.040 | 0.047 | 0.057 | 0.080 | 0.126 | 0.179 | 140 |
| | 226.125 | ○ | 0.35 | 0.35 | 0.10 | 0.039 | 0.048 | 0.062 | 0.073 | 0.088 | 0.124 | 0.196 | 0.277 | 140 |
| | 226.145 | ○ | 0.40 | 0.40 | 0.10 | 0.052 | 0.064 | 0.082 | 0.097 | 0.116 | 0.164 | 0.259 | 0.367 | 140 |
| | 226.165 | ○ | 0.45 | 0.45 | 0.10 | 0.065 | 0.080 | 0.103 | 0.122 | 0.146 | 0.206 | 0.326 | 0.461 | 140 |
| | 226.185 | ○ | 0.55 | 0.35 | 0.20 | 0.082 | 0.101 | 0.130 | 0.154 | 0.184 | 0.260 | 0.411 | 0.581 | 140 |
| | 226.205 | ○ | 0.60 | 0.35 | 0.20 | 0.106 | 0.130 | 0.168 | 0.199 | 0.238 | 0.336 | 0.531 | 0.751 | 140 |
| | 226.245 | ○ | 0.70 | 0.50 | 0.20 | 0.165 | 0.202 | 0.261 | 0.309 | 0.369 | 0.522 | 0.825 | 1.167 | 140 |
| | 226.285 | ○ | 0.90 | 0.55 | 0.20 | 0.247 | 0.302 | 0.390 | 0.461 | 0.552 | 0.780 | 1.233 | 1.744 | 140 |

B = bore diameter · E = narrowest free cross section

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

Example for ordering: Type **226.004** + Material-no. **16** = Ordering no. **226.004.16**

*** Materials**

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



Axial-flow hollow cone nozzles Series 214/216



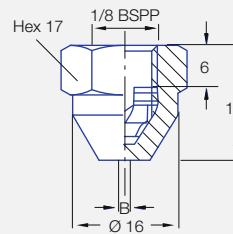
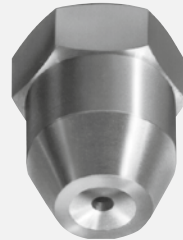
Fine, uniform hollow cone spray.

Applications:

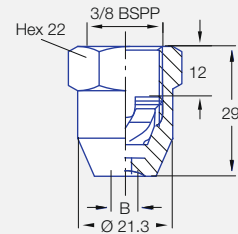
Cooling and cleaning of air and gas, dust control, spraying onto filters, spray drying, desuperheating.





(Mat. no. 17)



Series 214
Weight brass: 27 g



Series 216
Weight brass: 60 g

| Spray angle  | Ordering no. | | G | B Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | | Spray diameter D at p = 3 bar  H = 250 mm | |
|--|--------------|----------------|---|-------------|-------------|-------------|------|------|------|-------|-------|-------|--|------|
| | Type | Mat. no. | | | | p [bar] | | | | | | | | |
| | | 17 316Ti SS | | | | 30 Brass | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 10.0 | | 20.0 |
| 60° | 214.184 | ○ | ○ | 1/8 | 0.50 | 0.50 | - | - | 0.08 | 0.10 | 0.13 | 0.18 | 0.25 | 200 |
| | | ○ | ○ | | | | - | 0.23 | 0.32 | 0.39 | 0.51 | 0.72 | 1.01 | |
| 80° | 214.245 | ○ | ○ | 1/8 | 1.00 | 0.50 | - | - | 0.16 | 0.20 | 0.25 | 0.36 | 0.51 | 450 |
| | | ○ | ○ | | | | - | 0.23 | 0.32 | 0.39 | 0.51 | 0.72 | 1.01 | |
| 60° | 216.324 | ○ | ○ | 3/8 | 1.00 | 1.00 | - | 0.28 | 0.40 | 0.49 | 0.63 | 0.89 | 1.26 | 200 |
| | | ○ | ○ | | | | - | 0.45 | 0.63 | 0.77 | 1.00 | 1.41 | 1.99 | |
| | | ○ | ○ | | | | - | 0.71 | 1.00 | 1.22 | 1.58 | 2.24 | 3.16 | |
| 90° | 216.496 | ○ | ○ | 3/8 | 3.00 | 2.00 | - | 1.20 | 1.70 | 2.08 | 2.69 | 3.80 | 5.38 | 500 |
| | | ○ | ○ | | | | - | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 7.91 | |
| | | ○ | ○ | | | | 2.00 | 2.83 | 4.00 | 4.90 | 6.32 | 8.94 | 12.65 | |
| | | ○ | ○ | | | | 2.50 | 3.54 | 5.00 | 6.12 | 7.91 | 11.18 | 15.81 | |
| | | ○ | ○ | | | | 3.15 | 4.45 | 6.30 | 7.72 | 9.96 | 14.09 | 19.92 | |
| | | ○ | ○ | | | | 4.30 | 6.00 | 8.50 | 10.40 | 13.40 | 19.00 | 26.90 | |

B = bore diameter · E = narrowest free cross section

| | | | | | |
|---------------------|-------------|----------|---------------------|----------|---------------------|
| Example | Type | + | Material no. | = | Ordering no. |
| for ordering | 214.184 | + | 17 | = | 214.184.17 |



Tangential-flow hollow cone nozzles

Plastic version

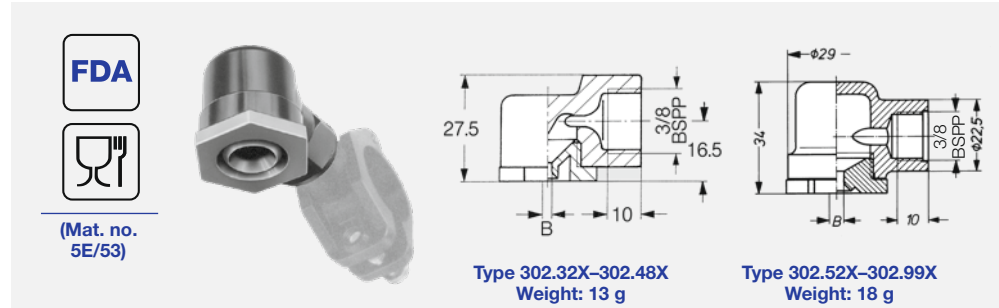
Series 302





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

Applications:

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



| Spray angle  | Ordering no. | | | | B Ø [mm] | E Ø [mm] | V [l/min] | | | | | | Spray diameter D at p = 2 bar  | |
|--|--------------|----------|----|-------|----------------|----------------|-----------|-------|-------|-------|-------|-------|--|---------------|
| | Type | Mat. no. | | | | | p [bar] | | | | | | H = 250 mm | H = 500 mm |
| | | 5E | 51 | 53 | | | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 10.0 | | |
| | | PVDF | PA | PP | | | | | | | | | | |
| 60° | 302.364 | - | ○ | ○ | 1.30 | 1.30 | 0.31 | 0.45 | 0.63 | 0.77 | 1.00 | 1.41 | 200 | 350 |
| | 302.464 | - | ○ | ○ | 1.95 | 1.95 | 0.70 | 0.99 | 1.40 | 1.71 | 2.21 | 3.13 | 300 | 560 |
| 90° | 302.326 | ○ | ○ | - | 1.05 | 1.05 | 0.20 | 0.28 | 0.40 | 0.49 | 0.63 | 0.89 | 400 | 700 |
| | 302.366 | ○ | ○ | - | 1.30 | 1.30 | 0.31 | 0.45 | 0.63 | 0.77 | 1.00 | 1.41 | 400 | 880 |
| | 302.406 | ○ | ○ | ○ | 1.55 | 1.55 | 0.50 | 0.71 | 1.00 | 1.22 | 1.58 | 2.24 | 400 | 880 |
| | 302.486 | - | ○ | ○ | 2.10 | 2.10 | 0.80 | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 400 | 880 |
| | 302.526 | - | ○ | ○ | 5.00 | 2.00 | 1.00 | 1.41 | 2.00 | 2.45 | 3.16 | 4.47 | 400 | 880 |
| | 302.566 | - | ○ | ○ | 5.00 | 2.40 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 400 | 880 |
| | 302.606 | - | ○ | ○ | 5.00 | 3.20 | 1.57 | 2.23 | 3.15 | 3.86 | 4.98 | 7.04 | 450 | 950 |
| | 302.686 | - | ○ | - | 7.50 | 3.40 | 2.50 | 3.45 | 5.00 | 6.12 | 7.91 | 11.18 | 500 | 1050 |
| | 302.766 | - | ○ | - | 9.00 | 4.30 | 4.00 | 5.66 | 8.00 | 9.80 | 12.65 | 17.89 | 500 | 1050 |
| | 302.846 | - | ○ | ○ | 11.00 | 5.20 | 6.25 | 8.84 | 12.50 | 15.31 | 19.67 | 27.95 | 550 | 1130 |
| | 302.886 | ○ | ○ | ○ | 11.00 | 6.40 | 8.00 | 11.31 | 16.00 | 19.60 | 25.30 | 35.78 | 550 | 1130 |
| 302.966 | - | ○ | - | 11.00 | 8.60 | 12.50 | 17.68 | 25.00 | 30.62 | 39.53 | 55.90 | 550 | 1130 | |
| 130° | 302.328 | ○ | - | - | 1.35 | 0.80 | 0.20 | 0.28 | 0.40 | 0.49 | 0.63 | 0.89 | 700 | 1380 |
| | 302.368 | ○ | ○ | - | 1.85 | 1.10 | 0.31 | 0.45 | 0.63 | 0.77 | 1.00 | 1.41 | 700 | 1380 |
| | 302.408 | ○ | ○ | - | 3.65 | 1.30 | 0.50 | 0.71 | 1.00 | 1.22 | 1.58 | 2.24 | 700 | 1380 |
| | 302.488 | - | ○ | ○ | 5.20 | 1.60 | 0.80 | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 700 | 1380 |
| | 302.528 | - | ○ | - | 5.00 | 2.00 | 1.00 | 1.41 | 2.00 | 2.45 | 3.16 | 4.47 | 700 | 1380 |
| | 302.568 | - | ○ | - | 5.00 | 2.40 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 780 | 1520 |
| | 302.608 | ○ | ○ | ○ | 5.00 | 3.20 | 1.57 | 2.23 | 3.15 | 3.86 | 4.98 | 7.04 | 780 | 1520 |
| | 302.648 | - | ○ | - | 7.50 | 3.00 | 2.00 | 2.83 | 4.00 | 4.90 | 6.32 | 8.94 | 950 | 1850 |
| | 302.688 | - | ○ | - | 7.50 | 3.40 | 2.50 | 3.54 | 5.00 | 6.12 | 7.91 | 11.18 | 950 | 1850 |
| | 302.728 | - | ○ | - | 7.50 | 4.10 | 3.15 | 4.45 | 6.30 | 7.72 | 9.96 | 14.09 | 950 | 1850 |
| | 302.768 | - | ○ | - | 9.00 | 4.30 | 4.00 | 5.66 | 8.00 | 9.80 | 12.65 | 17.89 | 950 | 1850 |
| | 302.848 | - | ○ | - | 11.00 | 5.20 | 6.25 | 8.84 | 12.50 | 15.31 | 19.76 | 27.95 | 950 | 1850 |
| | 302.888 | - | ○ | ○ | 11.00 | 6.40 | 8.00 | 11.31 | 16.00 | 19.60 | 25.30 | 35.78 | 950 | 1850 |
| | 302.968 | ○ | ○ | - | 11.00 | 8.60 | 12.50 | 17.68 | 25.00 | 30.62 | 39.53 | 55.90 | 950 | 1850 |

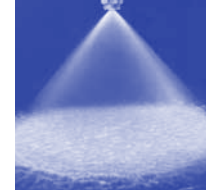
B = bore diameter · E = narrowest free cross section

Example for ordering
 Type 302.364 + Material no. 51 = Ordering no. 302.364. 51



Axial-flow full cone nozzles Series 490/491

Patented



Non-clogging nozzle design with a very stable spray angle, particularly even liquid distribution and large free cross sections.

Applications:

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



(Mat. no. 17)



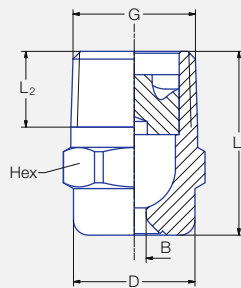
Series 490



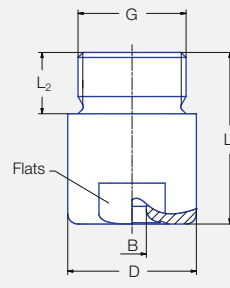
Series 491

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.



Code CA-CG



Code AK-AM

| Code | Dimensions [mm] | | | | | Weight |
|-----------|-----------------|----------------|----------------|------|-----------|--------|
| | G | L ₁ | L ₂ | D | Hex/Flats | |
| CA | 1/8 BSPT | 18.0 | 6.5 | 10.0 | 11 | 13 g |
| CC | 1/4 BSPT | 22.0 | 10.0 | 13.0 | 14 | 16 g |
| CE | 3/8 BSPT | 24.5 | 10.0 | 16.0 | 17 | 30 g |
| CE | 3/8 BSPT | 30.0 | 10.0 | 16.0 | 17 | 50 g |
| CG | 1/2 BSPT | 32.5 | 13.0 | 21.0 | 22 | 60 g |
| CG | 1/2 BSPT | 43.5 | 13.0 | 21.0 | 22 | 85 g |
| AK | 3/4 BSPP | 42.0 | 15.0 | 32.0 | 27 | 190 g |
| AM | 1 BSPP | 56.0 | 17.0 | 40.0 | 36 | 350 g |

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

| Spray angle | Type | Ordering no. | | | | | | | B Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | | Spray diameter D at p=2 bar | |
|-------------|----------------|--------------|----|-----------|-----------|------------|-----------|----------|----------|----------|------------|------|-------|-------|-------|-------|-------|-----------------------------|------------|
| | | Mat. no. | | Code | | | | | | | p [bar] | | | | | | | at p=2 bar | |
| | | 1Y | 30 | 1/8 BSPT | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | 3/4 BSPP | | | 1 BSPP | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 7.0 | 10.0 | H = 200 mm |
| 45° | 490.403 | ○ | ○ | CA | - | - | - | - | 1.25 | 1.25 | 0.57 | 0.76 | 1.00 | 1.18 | 1.44 | 1.65 | 1.90 | 160 | 400 |
| | 490.523 | ○ | ○ | CA | - | - | - | - | 1.70 | 1.70 | 1.15 | 1.52 | 2.00 | 2.35 | 2.89 | 3.30 | 3.81 | 160 | 400 |
| | 490.603 | ○ | ○ | - | CC | CE* | - | - | 2.00 | 2.00 | 1.81 | 2.39 | 3.15 | 3.70 | 4.54 | 5.20 | 6.00 | 160 | 400 |
| | 490.643 | ○ | ○ | - | CC | CE* | - | - | 2.45 | 2.45 | 2.30 | 3.03 | 4.00 | 4.70 | 5.77 | 6.60 | 7.61 | 160 | 400 |
| | 490.683 | - | ○ | - | - | CE | - | - | 2.55 | 2.55 | 2.87 | 3.79 | 5.00 | 5.88 | 7.21 | 8.25 | 9.52 | 160 | 400 |
| | 490.703 | - | ○ | - | - | CE | - | - | 2.65 | 2.65 | 3.22 | 4.24 | 5.60 | 6.59 | 8.08 | 9.24 | 10.66 | 160 | 400 |
| | 490.723 | ○ | ○ | - | - | CE | - | - | 2.85 | 2.85 | 3.62 | 4.77 | 6.30 | 7.41 | 9.09 | 10.40 | 11.99 | 160 | 400 |
| | 490.783 | - | ○ | - | - | - | CG | - | 3.45 | 3.45 | 5.17 | 6.82 | 9.00 | 10.58 | 12.98 | 14.85 | 17.12 | 160 | 400 |
| | 490.843 | - | ○ | - | - | - | CG | - | 3.80 | 3.80 | 7.18 | 9.47 | 12.50 | 14.70 | 18.03 | 20.63 | 23.80 | 160 | 400 |
| 60° | 490.404 | ○ | ○ | CA | - | - | - | - | 1.15 | 1.15 | 0.57 | 0.76 | 1.00 | 1.18 | 1.44 | 1.65 | 1.90 | 220 | 560 |
| | 490.444 | ○ | - | CA | - | - | - | - | 1.25 | 1.25 | 0.72 | 0.95 | 1.25 | 1.47 | 1.80 | 2.06 | 2.38 | 220 | 560 |
| | 490.484 | ○ | ○ | CA | - | - | - | - | 1.45 | 1.45 | 0.92 | 1.21 | 1.60 | 1.88 | 2.31 | 2.64 | 3.05 | 220 | 560 |
| | 490.524 | ○ | ○ | CA | - | - | - | - | 1.60 | 1.60 | 1.15 | 1.52 | 2.00 | 2.35 | 2.89 | 3.30 | 3.81 | 220 | 560 |
| | 490.564 | ○ | ○ | CA | - | - | - | - | 1.80 | 1.80 | 1.44 | 1.89 | 2.50 | 2.94 | 3.61 | 4.13 | 4.76 | 220 | 560 |
| | 490.604 | ○ | ○ | CA | CC | CE | - | - | 2.05 | 2.05 | 1.81 | 2.39 | 3.15 | 3.70 | 4.54 | 5.20 | 6.00 | 220 | 560 |

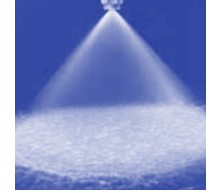
*Only available in material 30 · B = bore diameter · E = narrowest free cross section

Continued on next page.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0.4}$ (≤ 10 bar)



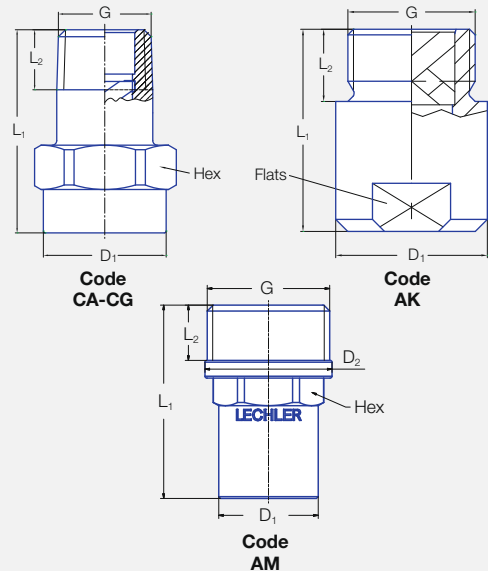
Axial-flow full cone nozzles Series 460/461



Very uniform spray pattern.

Applications:

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



| Code | Dimensions [mm] | | | | | |
|-----------|-----------------|----------------|----------------|----------------|----------------|-----------|
| | G | L ₁ | L ₂ | D ₁ | D ₂ | Hex/Flats |
| CA | 1/8 BSPT | 22.0 | 6.5 | 13.0 | - | 14 |
| CC | 1/4 BSPT | 22.0 | 9.7 | 13.0 | - | 14 |
| CE | 3/8 BSPT | 30.0 | 10.0 | 17.0 | - | 17 |
| CG | 1/2 BSPT | 43.5 | 13.2 | 22.0 | - | 22 |
| AK | 3/4 BSPP | 42.0 | 15.0 | 31.5 | - | 27 |
| AM | 1 BSPP | 52.5 | 15.0 | 27.0 | 34.5 | 27 |

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

| Spray angle | Ordering no. | | | | | | | | B Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | | Spray diameter D at p=2 bar | |
|-------------|--------------|----------------|-------|----------|----------|----------|----------|----------|-------------|-------------|------------|-------|-------|-------|------------|------------|--------|-----------------------------|-----|
| | Type | Mat. no. 5E | Code | | | | | p [bar] | | | | | | | H = 200 mm | H = 500 mm | | | |
| | | | PV/DF | 1/8 BSPT | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | 3/4 BSPP | | | 1 BSPP | 0.5 | 1.0 | 2.0 | | | 3.0 | 5.0 | 7.0 |
| 60° | 460.524 | ○ | CA | - | - | - | - | - | 1.60 | 1.60 | 1.00 | 1.41 | 2.00 | 2.45 | 2.83 | 3.16 | 4.47 | 220 | 560 |
| | 460.644 | ○ | - | CC | - | - | - | - | 2.40 | 1.90 | 2.30 | 3.03 | 4.00 | 4.70 | 5.77 | 6.60 | 7.61 | 220 | 560 |
| | 460.724 | ○ | - | CC | - | - | - | - | 2.80 | 2.10 | 3.15 | 4.45 | 6.30 | 7.72 | 8.91 | 9.96 | 14.09 | 220 | 560 |
| | 460.964 | ○ | - | - | - | - | - | AK | - | 5.80 | 4.90 | 14.36 | 18.95 | 25.00 | 29.40 | 36.07 | 41.26 | 47.59 | 220 |
| 90° | 460.326 | ○ | CA | - | - | - | - | - | 0.80 | 0.55 | 0.23 | 0.30 | 0.40 | 0.47 | 0.58 | 0.66 | 0.76 | 380 | 860 |
| | 460.406 | ○ | CA | - | - | - | - | - | 1.20 | 0.85 | 0.57 | 0.76 | 1.00 | 1.18 | 1.44 | 1.65 | 1.90 | 380 | 860 |
| | 460.486 | ○ | CA | - | - | - | - | - | 1.45 | 1.20 | 0.92 | 1.21 | 1.60 | 1.88 | 2.31 | 2.64 | 3.05 | 380 | 860 |
| | 460.526 | ○ | CA | - | - | - | - | - | 1.65 | 1.30 | 1.15 | 1.52 | 2.00 | 2.35 | 2.89 | 3.30 | 3.81 | 380 | 860 |
| | 460.606 | ○ | CA | - | CE | - | - | - | 2.05 | 1.45 | 1.81 | 2.39 | 3.15 | 3.70 | 4.54 | 5.20 | 6.00 | 380 | 860 |
| | 460.646 | ○ | - | CC | - | - | - | - | 2.30 | 1.80 | 2.30 | 3.03 | 4.00 | 4.70 | 5.77 | 6.60 | 7.61 | 390 | 960 |
| | 460.726 | ○ | - | - | CE | - | - | - | 2.95 | 2.00 | 3.62 | 4.77 | 6.30 | 7.41 | 9.09 | 10.40 | 11.99 | 390 | 960 |
| | 460.746 | ○ | - | - | CE | - | - | - | 3.30 | 1.90 | 4.08 | 5.38 | 7.10 | 8.35 | 10.24 | 11.72 | 13.52 | 390 | 960 |
| | 460.766 | ○ | - | - | CE | - | - | - | 3.30 | 2.40 | 4.59 | 6.06 | 8.00 | 9.41 | 11.54 | 13.20 | 15.22 | 390 | 960 |
| | 460.806 | ○ | - | - | CE | - | - | - | 3.70 | 2.70 | 5.74 | 7.58 | 10.00 | 11.76 | 14.43 | 16.51 | 19.04 | 390 | 960 |
| | 460.846 | ○ | - | - | CE | - | - | - | 4.05 | 3.20 | 7.18 | 9.47 | 12.50 | 14.70 | 18.03 | 20.63 | 23.80 | 390 | 960 |
| | 460.886 | ○ | - | - | - | CG | - | - | 4.70 | 3.10 | 9.19 | 12.13 | 16.00 | 18.82 | 23.08 | 26.41 | 30.46 | 390 | 960 |
| | 460.966 | ○ | - | - | - | CG | - | - | 5.80 | 3.80 | 14.36 | 18.95 | 25.00 | 29.40 | 36.07 | 41.26 | 47.59 | 390 | 960 |
| | 461.006 | ○ | - | - | - | CG | - | - | 6.40 | 3.80 | 18.09 | 23.87 | 31.50 | 37.05 | 45.45 | 51.99 | 59.97 | 390 | 960 |
| | 461.046 | ○ | - | - | - | - | CK* | - | 7.20 | 5.30 | 22.97 | 30.31 | 40.00 | 47.04 | 57.71 | 66.02 | 76.15 | 390 | 960 |
| | 461.086 | ○ | - | - | - | - | AM | - | 8.40 | 5.00 | 25.00 | 35.36 | 50.00 | 61.24 | 70.71 | 79.06 | 111.80 | 390 | 860 |

Example Type + Material no. + Code = Ordering no.
for ordering: 460.644 + 5E + CC = 460.644.5E.CC

B = bore diameter
E = narrowest free cross section
* Connection 3/4 BSPT



Continued on next page.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \left(\frac{p_2}{p_1}\right)^{0.4}$
(≤ 10 bar)



Axial-flow full cone nozzles Series 460/461



| Spray angle  | Ordering no. | | | | | | | B Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | | Spray diameter D at p=2 bar  | |
|--|--------------|-------------|----------|----------|----------|----------|----------|----------------|----------------|------------|-------|-------|-------|-------|-------|-------|--|------------------|
| | Type | Mat. no. | Code | | | | | | | p [bar] | | | | | | | H = 200 mm | H = 500 mm |
| | | 5E | 1/8 BSPT | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | 3/4 BSPT | | | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 7.0 | 10.0 | | |
| 120° | 460.368 | ○ | CA | - | - | - | - | 0.95 | 0.45 | 0.32 | 0.45 | 0.63 | 0.77 | 0.89 | 1.00 | 1.41 | 680 | 1220 |
| | 460.408 | ○ | CA | - | - | - | - | 1.20 | 0.85 | 0.57 | 0.76 | 1.00 | 1.18 | 1.44 | 1.65 | 1.90 | 680 | 1220 |
| | 460.488 | ○ | CA | - | - | - | - | 1.50 | 1.00 | 0.92 | 1.21 | 1.60 | 1.88 | 2.31 | 2.64 | 3.05 | 680 | 1220 |
| | 460.528 | ○ | CA | - | - | - | - | 1.65 | 1.20 | 1.15 | 1.52 | 2.00 | 2.35 | 2.89 | 3.30 | 3.81 | 680 | 1220 |
| | 460.608 | ○ | CA | - | - | - | - | 2.10 | 1.40 | 1.81 | 2.39 | 3.5 | 3.70 | 4.54 | 5.20 | 6.00 | 680 | 1220 |
| | 460.648 | ○ | - | CC | CE | - | - | 2.45 | 1.60 | 2.30 | 3.03 | 4.00 | 4.70 | 5.77 | 6.60 | 7.61 | 680 | 1330 |
| | 460.728 | ○ | - | - | CE | - | - | 3.10 | 1.90 | 3.62 | 4.77 | 6.30 | 7.41 | 9.09 | 10.40 | 11.99 | 680 | 1330 |
| | 460.748 | ○ | - | - | CE | - | - | 3.30 | 1.90 | 4.08 | 5.38 | 7.10 | 8.35 | 10.24 | 11.72 | 13.52 | 680 | 1330 |
| | 460.768 | ○ | - | - | CE | - | - | 3.50 | 1.90 | 4.59 | 6.44 | 8.00 | 9.41 | 11.54 | 13.20 | 15.22 | 680 | 1330 |
| | 460.808 | ○ | - | - | CE | - | - | 3.80 | 2.40 | 5.74 | 7.58 | 10.00 | 11.76 | 14.43 | 16.51 | 19.04 | 680 | 1330 |
| | 460.848 | ○ | - | - | CE | - | - | 4.20 | 2.70 | 7.18 | 9.47 | 12.50 | 14.70 | 18.03 | 20.63 | 23.80 | 680 | 1330 |
| | 460.888 | ○ | - | - | - | CG | - | 4.60 | 3.10 | 9.19 | 12.13 | 16.00 | 18.82 | 23.08 | 26.41 | 30.46 | 680 | 1330 |
| | 460.968 | ○ | - | - | - | CG | - | 5.90 | 4.10 | 14.36 | 18.95 | 25.00 | 29.40 | 36.07 | 41.26 | 47.59 | 680 | 1330 |
| | 461.048 | ⊗ | - | - | - | - | CK* | 7.60 | 4.90 | 22.97 | 30.31 | 40.00 | 47.04 | 57.71 | 66.02 | 76.15 | 680 | 1330 |

B = bore diameter · E = narrowest free cross section

⊗ material PP (material no. 53)

* Connection 3/4 BSPT

Example Type + Material no. + Code = Ordering no.
for ordering: 460.408 + 5E + CA = 460.408.5E.CA



Tangential-flow full cone nozzles Series 422/423



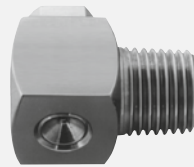
Tangentially arranged liquid supply. Without swirl inserts. Non-clogging. Stable spray angle. Uniform spray.

Applications:

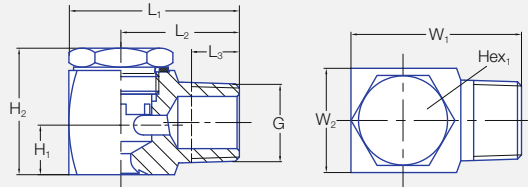
Cleaning and washing process, cooling of gaseous fluids and solids, surface spraying, spraying onto mats in air washers, improving on chemical reactions, continuous casting, foam control.



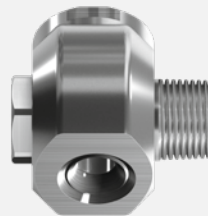
(Mat. no. 1Y)



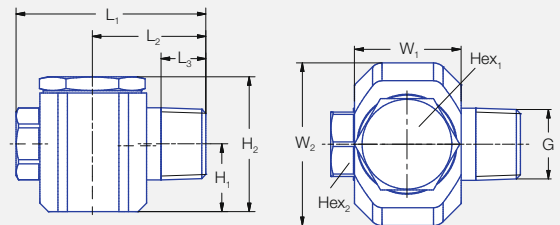
1/4" - 3/8" version



Material: 316L SS/Brass




1/2" - 1" version



Material: 316L SS/Brass

| Dimensions [mm] | | | | | | | | | | Weight 316L SS |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|-------------------|
| G | L ₁ | L ₂ | L ₃ | H ₁ | H ₂ | W ₁ | W ₂ | Hex ₁ | Hex ₂ | |
| 1/4 BSPT | 28.0 | 20.0 | 9.7 | 8.0 | 21.0 | 15.6 | 16.0 | 11 | - | 44 g |
| 3/8 BSPT | 36.0 | 25.0 | 10.1 | 11.0 | 26.7 | 23.2 | 22.0 | 19 | - | 101 g |
| 1/2 BSPT | 56.0 | 33.5 | 13.2 | 20.0 | 40.0 | 32.0 | 48.0 | 27 | 19 | 370 g |
| 3/4 BSPT | 65.5 | 38.5 | 14.5 | 23.5 | 57.0 | 40.0 | 63.0 | 36 | 27 | 830 g |
| 1 BSPT | 85.0 | 48.5 | 16.8 | 27.3 | 66.0 | 55.0 | 78.0 | 41 | 36 | 1581 g |

| Spray angle  | Ordering no. | | | | | | | | B Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | Spray diameter D at p = 1-10 bar | |
|--|--------------|-------------|---------------|----------|----------|----------|----------|---------|----------|----------|------------|-------|-------|------------|------------|-------|----------------------------------|------|
| | Type | Mat.no. | | Code | | | | p [bar] | | | | | | H = 200 mm | H = 500 mm | | | |
| | | 30 Brass | 1Y 316L SS | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | 3/4 BSPT | 1 BSPT | | | 0.5 | 1.0 | 2.0 | | | 3.0 | 5.0 | 10.0 |
| 60° | 422.644 | ○ | ○ | - | CE | - | - | - | 3.00 | 3.00 | 2.00 | 2.83 | 4.00 | 4.90 | 6.32 | 8.94 | 225 | 510 |
| 90° | 422.406 | ○ | ○ | CC | - | - | - | - | 1.50 | 1.45 | 0.50 | 0.71 | 1.00 | 1.22 | 1.58 | 2.24 | 380 | 860 |
| | 422.486 | - | ○ | CC | - | - | - | - | 1.90 | 1.80 | 0.80 | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 380 | 860 |
| | 422.566 | ○ | ○ | CC | - | - | - | - | 2.30 | 2.20 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 380 | 860 |
| | 422.606 | ○ | ○ | - | CE | - | - | - | 2.60 | 2.50 | 1.57 | 2.23 | 3.15 | 3.86 | 4.98 | 7.04 | 380 | 860 |
| | 422.646 | ○ | ○ | - | CE | - | - | - | 3.00 | 2.90 | 2.00 | 2.83 | 4.00 | 4.90 | 6.32 | 8.94 | 390 | 960 |
| | 422.726 | ○ | - | - | CE | - | - | - | 3.70 | 3.60 | 3.15 | 4.45 | 6.30 | 7.72 | 9.96 | 14.09 | 390 | 960 |
| | 422.766 | - | ○ | - | CE | - | - | - | 4.15 | 4.10 | 4.00 | 5.66 | 8.00 | 9.80 | 12.65 | 17.89 | 390 | 960 |
| | 422.806 | ○ | - | - | CE | - | - | - | 4.65 | 4.60 | 5.00 | 7.07 | 10.00 | 12.25 | 15.81 | 22.36 | 390 | 960 |
| | 422.846 | ○ | ○ | - | CE | - | - | - | 5.20 | 5.10 | 6.25 | 8.84 | 12.50 | 15.31 | 19.76 | 27.95 | 390 | 960 |
| | 422.886 | ○ | ○ | - | CE | - | - | - | 5.80 | 5.70 | 8.00 | 11.31 | 16.00 | 19.60 | 25.30 | 35.78 | 390 | 960 |
| 422.966 | - | ○ | - | - | CG | - | - | 8.00 | 8.00 | 12.50 | 17.68 | 25.00 | 30.62 | 39.53 | 55.90 | 390 | 960 | |

B = bore diameter · E = narrowest free cross section

Continued on next page.

Example Type + Material-no. + Code = Ordering no.
for ordering: 422.644 + 30 + CE = 422.644.30.CE

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$



Tangential-flow full cone nozzles

Series 422/423



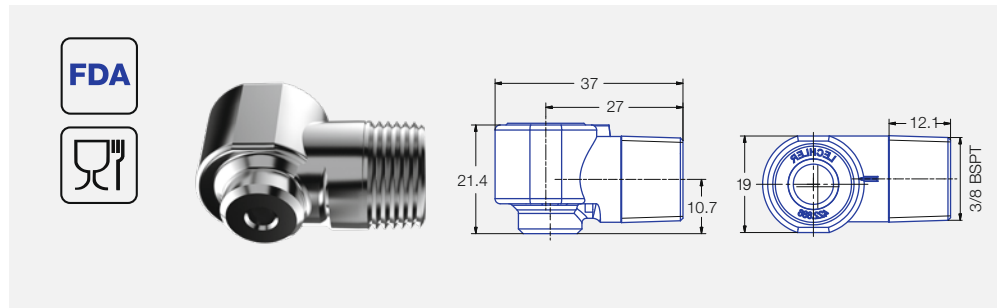
| Spray angle | Ordering no. | | | | | | | | B Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | Spray diameter D at p = 1-10 bar | |
|-------------|--------------|-------------|---------------|----------|----------|----------|----------|---------|----------|----------|------------|-------|--------|------------|------------|--------|----------------------------------|------|
| | Type | Mat.no. | | Code | | | | p [bar] | | | | | | H = 200 mm | H = 500 mm | | | |
| | | 30 Brass | 1Y 316L SS | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | 3/4 BSPT | 1 BSPT | | | 0.5 | 1.0 | 2.0 | | | 3.0 | 5.0 | 10.0 |
| 120° | 422.488 | ○ | - | CC | - | - | - | - | 1.90 | 1.80 | 0.80 | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 680 | 1220 |
| | 422.568 | ○ | ○ | CC | - | - | - | - | 2.30 | 2.20 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 680 | 1220 |
| | 422.608 | ○ | - | CE | - | - | - | - | 2.60 | 2.50 | 1.57 | 2.23 | 3.15 | 3.86 | 4.98 | 7.04 | 680 | 1600 |
| | 422.728 | ○ | ○ | CE | - | - | - | - | 3.70 | 3.60 | 3.15 | 4.45 | 6.30 | 7.72 | 9.96 | 14.09 | 680 | 1600 |
| | 422.808 | - | ○ | CE | - | - | - | - | 4.65 | 4.60 | 5.00 | 7.07 | 10.00 | 12.25 | 15.81 | 22.36 | 680 | 1600 |
| | 422.848 | ○ | ○ | CE | - | - | - | - | 5.20 | 5.10 | 6.25 | 8.84 | 12.50 | 15.31 | 19.76 | 27.95 | 680 | 1600 |
| | 422.888 | ○ | ○ | CE | - | - | - | - | 5.80 | 5.70 | 8.00 | 11.31 | 16.00 | 19.60 | 25.30 | 35.78 | 680 | 1600 |
| | 422.928 | - | ○ | - | CG | - | - | - | 7.30 | 7.30 | 10.00 | 14.14 | 20.00 | 24.49 | 31.62 | 44.72 | 680 | 1600 |
| | 422.968 | ○ | ○ | - | CG | - | - | - | 8.00 | 8.00 | 12.50 | 17.68 | 25.00 | 30.62 | 39.53 | 55.90 | 680 | 1600 |
| | 423.008 | - | ○ | - | CG | - | - | - | 8.70 | 8.70 | 15.75 | 22.27 | 31.50 | 38.88 | 49.81 | 70.44 | 680 | 1600 |
| | 423.128 | - | ○ | - | - | - | - | CK | 12.70 | 12.30 | 31.50 | 44.55 | 63.00 | 77.16 | 99.61 | 140.87 | 680 | 1600 |
| | 423.208 | - | ○ | - | - | - | - | CM | 19.00 | 16.00 | 50.00 | 70.71 | 100.00 | 122.47 | 158.11 | 223.61 | 680 | 1600 |

B = bore diameter · E = narrowest free cross section

Cost-efficient design thanks to metal injection molding. Tangentially arranged liquid supply. Without swirl inserts. Non-clogging. Stable spray angle. Uniform spray.

Applications:

Pasteurization, 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.



| Spray angle | Ordering no. | | | B Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | Spray diameter D at p = 1-10 bar | |
|-------------|--------------|---------------|----------|----------|----------|------------|-------|-------|-------|-------|-------|----------------------------------|------------|
| | Type | Mat.no. | Code | | | p [bar] | | | | | | H = 200 mm | H = 500 mm |
| | | 1Y 316L SS | 3/8 BSPT | | | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 10.0 | | |
| 90° | 422.886 | ○ | 87 | 5.80 | 5.70 | 8.00 | 11.31 | 16.00 | 19.60 | 25.30 | 35.78 | 390 | 960 |

B = bore diameter · E = narrowest free cross section

Example for ordering: Type + Material-no. + Code = Ordering no.
422.886 + 1Y + 87 = 422.886.1Y.87



Tangential-flow full cone nozzles

Plastic version

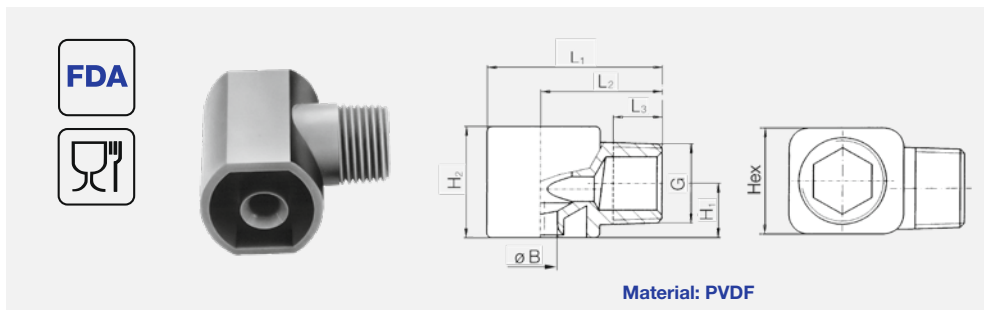
Series 422/423



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

Applications:

Cleaning and washing processes, surface spraying, bottle cleaning, keg cleaning, sausage showers, foam control, degassing, pasteurization.



| Dimensions [mm] | | | | | | | Weight |
|-----------------|----------------|----------------|----------------|----------------|----------------|------|--------|
| G | L ₁ | L ₂ | L ₃ | H ₁ | H ₂ | Hex | |
| 1/4 BSPT | 28.0 | 20.0 | 9.8 | 8.0 | 16.0 | 16.0 | 7 g |
| 3/8 BSPT | 36.0 | 25.0 | 10.1 | 11.2 | 23.0 | 22.0 | 16 g |
| 1/2 BSPT | 49.5 | 33.5 | 13.2 | 19.2 | 38.0 | 32.0 | 40 g |
| 3/4 BSPT | 58.5 | 38.5 | 18.5 | 24.5 | 50.0 | 41.0 | 50 g |

| Spray angle | Ordering no. | | | | | | B ∅ [mm] | E ∅ [mm] | V̇ [l/min] | | | | | | Spray diameter D at p = 1-10 bar | |
|----------------|----------------|----------|-----------|-----------|-----------|-----------|-------------|-------------|------------|-------|-------|-------|--------|--------|--|------------|
| | Type | Mat. no. | Code | | | | | | p [bar] | | | | | | | |
| | | 5E | PVDF | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | | | 3/4 BSPT | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 10.0 | H = 200 mm |
| 60° | 422.724 | ○ | - | CE | - | - | 3.60 | 3.60 | 3.15 | 4.45 | 6.30 | 7.72 | 9.96 | 14.09 | 225 | 510 |
| 90° | 422.406 | ○ | CC | - | - | - | 1.50 | 1.45 | 0.50 | 0.71 | 1.00 | 1.22 | 1.58 | 2.24 | 380 | 860 |
| | 422.566 | ○ | CC | - | - | - | 2.30 | 2.20 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 380 | 860 |
| | 422.606 | ○ | - | CE | - | - | 2.60 | 2.50 | 1.57 | 2.23 | 3.15 | 3.86 | 4.98 | 7.04 | 380 | 860 |
| | 422.646 | ○ | - | CE | - | - | 3.00 | 2.90 | 2.00 | 2.83 | 4.00 | 4.90 | 6.32 | 8.94 | 390 | 960 |
| | 422.726 | ○ | - | CE | - | - | 3.70 | 3.60 | 3.15 | 4.45 | 6.30 | 7.72 | 9.96 | 14.09 | 390 | 960 |
| | 422.806 | ○ | - | CE | - | - | 4.65 | 4.60 | 5.00 | 7.07 | 10.00 | 12.25 | 15.81 | 22.36 | 390 | 960 |
| | 422.846 | ○ | - | CE | - | - | 5.20 | 5.10 | 6.25 | 8.84 | 12.50 | 15.31 | 19.76 | 27.95 | 390 | 960 |
| | 422.886 | ○ | - | CE | - | - | 5.85 | 5.85 | 8.00 | 11.31 | 16.00 | 19.60 | 25.30 | 35.78 | 390 | 960 |
| | 422.926 | ○ | - | - | CG | - | 7.30 | 7.30 | 10.00 | 14.14 | 20.00 | 24.49 | 31.62 | 44.72 | 390 | 960 |
| | 422.966 | ○ | - | - | CG | - | 8.00 | 8.00 | 12.50 | 17.68 | 25.00 | 30.62 | 39.53 | 55.90 | 390 | 960 |
| 423.006 | ○ | - | - | CG | - | 8.70 | 8.70 | 15.75 | 22.27 | 31.50 | 38.58 | 49.81 | 70.44 | 390 | 960 | |
| 423.126 | ○ | - | - | - | CK | 12.00 | 12.00 | 31.50 | 44.55 | 63.00 | 77.16 | 99.61 | 140.87 | 390 | 960 | |
| 120° | 422.408 | ○ | CC | - | - | - | 1.50 | 1.45 | 0.50 | 0.71 | 1.00 | 1.22 | 1.58 | 2.24 | 680 | 1220 |
| | 422.448 | ○ | CC | - | - | - | 1.65 | 1.60 | 0.62 | 0.88 | 1.25 | 1.53 | 1.98 | 2.80 | 680 | 1220 |
| | 422.488 | ○ | CC | - | - | - | 1.90 | 1.80 | 0.80 | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 680 | 1220 |
| | 422.568 | ○ | CC | - | - | - | 2.30 | 2.20 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 680 | 1220 |
| | 422.728 | ○ | - | CE | - | - | 3.70 | 3.60 | 3.15 | 4.45 | 6.30 | 7.72 | 9.96 | 14.09 | 680 | 1600 |
| | 422.888 | ○ | - | CE | - | - | 5.80 | 5.70 | 8.00 | 11.31 | 16.00 | 19.60 | 25.30 | 35.78 | 680 | 1600 |
| | 422.968 | ○ | - | - | CG | - | 8.00 | 8.00 | 12.50 | 17.68 | 25.00 | 30.62 | 39.53 | 55.90 | 680 | 1600 |
| | 423.008 | ○ | - | - | CG | - | 8.70 | 8.70 | 15.75 | 22.27 | 31.50 | 38.58 | 49.81 | 70.44 | 680 | 1600 |
| | 423.128 | ○ | - | - | - | CK | 12.70 | 12.30 | 31.50 | 44.55 | 63.00 | 77.16 | 99.61 | 140.87 | 680 | 1600 |

B = bore diameter · E = narrowest free cross section

Example of ordering: Type + Material-no. + Code = Ordering no.
 422.724 + 5E + CE = 422.724.5E.CE

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 \cdot \sqrt{\frac{p_2}{p_1}}$



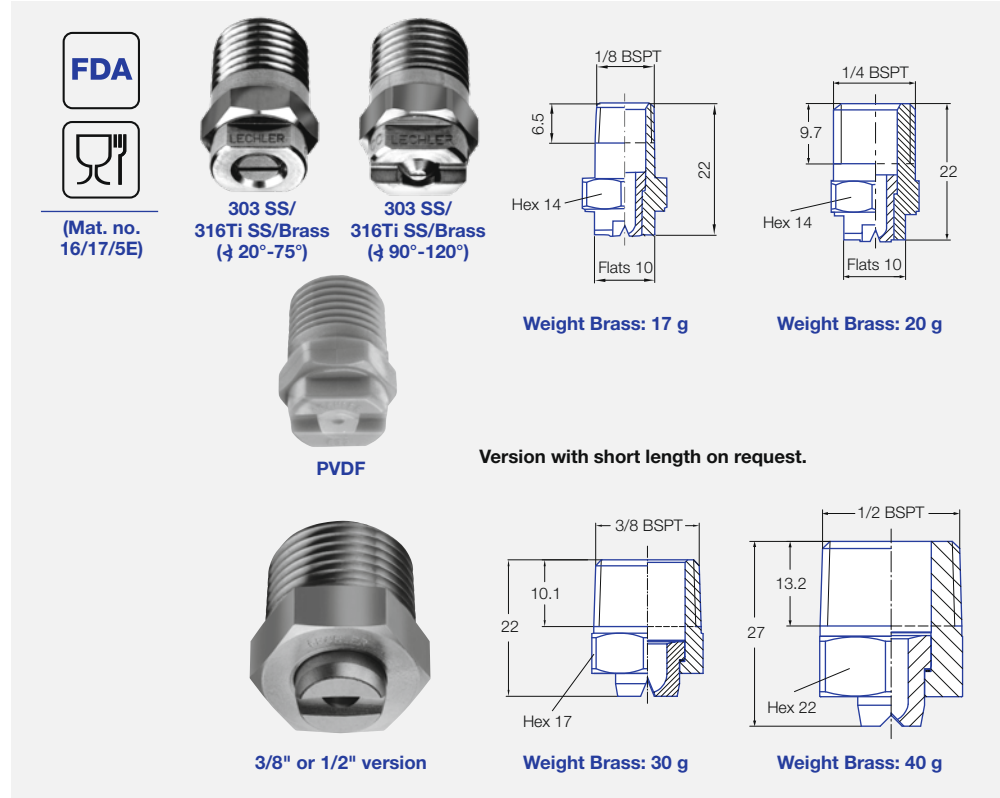
Flat fan nozzles Series 632/633



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

Applications:

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



| Spray angle | Ordering no. | | | | | | | | A Ø [mm] | E Ø [mm] | V [l/min] | | | | | | | | Spray width B at p=2 bar | | |
|-------------|--------------|-----------------|-----------------|----|----|------|----|---|----------|----------|-----------|-------|-------|-------|-------|-------|-------|-------|--------------------------|------------|--|
| | Type | Mat. no. | | | | Code | | | | | p [bar] | | | | | | | | H = 200 mm | H = 500 mm | |
| | | 16 ¹ | 17 ² | 30 | 5E | CA | CC | - | | | - | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | 7.0 | 10.0 | | | |
| 20° | 632.301 | ○ | ○ | ○ | ○ | CA | CC | - | - | 0.70 | 0.60 | 0.16* | 0.23* | 0.32 | 0.39 | 0.51 | 0.60 | 0.72 | 65 | 120 | |
| | 632.361 | ○ | ○ | ○ | ○ | CA | CC | - | - | 1.00 | 0.80 | 0.31* | 0.44* | 0.63 | 0.77 | 1.00 | 1.18 | 1.40 | 70 | 130 | |
| | 632.441 | ○ | ○ | ○ | ○ | CA | CC | - | - | 1.35 | 1.10 | 0.62* | 0.88 | 1.25 | 1.53 | 1.98 | 2.34 | 2.80 | 75 | 145 | |
| | 632.481 | ○ | ○ | ○ | ○ | CA | CC | - | - | 1.50 | 1.20 | 0.80* | 1.13 | 1.60 | 1.96 | 2.53 | 2.99 | 3.58 | 75 | 150 | |
| 30° | 632.302 | ○ | ○ | ○ | ○ | CA | CC | - | - | 0.60 | 0.50 | 0.16* | 0.23* | 0.32 | 0.39 | 0.51 | 0.60 | 0.72 | 120 | 235 | |
| | 632.362 | ○ | ○ | ○ | ○ | CA | CC | - | - | 1.00 | 0.70 | 0.31* | 0.44* | 0.63 | 0.77 | 1.00 | 1.18 | 1.40 | 120 | 235 | |
| | 632.402 | ○ | ○ | ○ | ○ | CA | CC | - | - | 1.20 | 0.90 | 0.50* | 0.71 | 1.00 | 1.23 | 1.58 | 1.87 | 2.24 | 120 | 235 | |
| | 632.482 | ○ | ○ | ○ | ○ | CA | CC | - | - | 1.50 | 1.10 | 0.80* | 1.13 | 1.60 | 1.96 | 2.53 | 2.99 | 3.58 | 120 | 235 | |
| | 632.562 | ○ | ○ | ○ | ○ | CA | CC | - | - | 2.00 | 1.50 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 4.68 | 5.59 | 120 | 235 | |
| | 632.642 | ○ | ○ | ○ | - | - | CC | - | - | 2.50 | 1.80 | 2.00 | 2.83 | 4.00 | 4.90 | 6.33 | 7.48 | 8.94 | 120 | 240 | |
| | 632.722 | ○ | ○ | ○ | - | - | CC | - | - | 3.00 | 2.40 | 3.15 | 4.46 | 6.30 | 7.72 | 9.96 | 11.79 | 14.09 | 125 | 240 | |
| | 632.762 | ○ | ○ | ○ | - | - | CC | - | - | 3.50 | 2.70 | 4.00 | 5.66 | 8.00 | 9.80 | 12.65 | 14.97 | 17.89 | 125 | 240 | |
| | 632.802 | ○ | ○ | ○ | - | - | CC | - | - | 4.00 | 3.10 | 5.00 | 7.07 | 10.00 | 12.25 | 15.81 | 18.71 | 22.36 | 130 | 250 | |

¹We reserve the right to deliver 303 SS or 304 SS under the material no. 16.

²We reserve the right to deliver 316Ti SS or 316L SS under the material no. 17.

A = equivalent bore diameter · E = narrowest free cross section

* Differing spray pattern

Subject to technical modifications.

Continued on next page.

| | | | | | | | |
|----------------|-------------|----------|---------------------|----------|-------------|----------|---------------------|
| Example | Type | + | Material-no. | + | Code | = | Ordering no. |
| for ordering: | 632.301 | + | 16 | + | CA | = | 632.301.16.CC |



Flat fan nozzles for retaining nut Series 652





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

Applications:

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



| Spray angle  | Ordering no. | | | | | A Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | | | Spray width B at p=2 bar  | |
|--|--------------|--------------|---|-------------|------------|-------------|-------------|------------|-------|-------|--------------------------------|-------|-------|-------|-----|---|------------------|
| | Type | Mat. no. | | | | | | p [bar] | | | | | | | | H = 250 mm | H = 500 mm |
| | | 16 303 SS | 17 ¹ 316Ti SS/ 316L SS | 30 Brass | 5E PVDF | | | 0.5 | 1.0 | 2.0 | [US gal./ min] at 40 psi | 3.0 | 5.0 | 10.0 | | | |
| 20° | 652.301 | ○ | ○ | ○ | ○ | 0.70 | 0.60 | 0.16* | 0.23* | 0.32 | 0.10 | 0.39 | 0.51 | 0.72 | 65 | 125 | |
| | 652.361 | ○ | ○ | ○ | ○ | 1.00 | 0.80 | 0.31* | 0.44* | 0.63 | 0.20 | 0.77 | 1.00 | 1.40 | 65 | 125 | |
| | 652.441 | ○ | ○ | ○ | ○ | 1.35 | 1.10 | 0.62* | 0.88 | 1.25 | 0.39 | 1.53 | 1.98 | 2.80 | 65 | 125 | |
| | 652.481 | ○ | ○ | ○ | ○ | 1.50 | 1.20 | 0.80* | 1.13 | 1.60 | 0.50 | 1.96 | 2.53 | 3.58 | 65 | 125 | |
| 30° | 652.302 | ○ | ○ | ○ | ○ | 0.60 | 0.50 | 0.16* | 0.23* | 0.32 | 0.10 | 0.39 | 0.51 | 0.72 | 115 | 230 | |
| | 652.362 | ○ | ○ | ○ | ○ | 1.00 | 0.70 | 0.31* | 0.44* | 0.63 | 0.20 | 0.77 | 1.00 | 1.40 | 115 | 230 | |
| | 652.402 | ○ | ○ | ○ | ○ | 1.20 | 0.90 | 0.50* | 0.71 | 1.00 | 0.31 | 1.23 | 1.58 | 2.24 | 115 | 230 | |
| | 652.482 | ○ | ○ | ○ | ○ | 1.50 | 1.10 | 0.80* | 1.13 | 1.60 | 0.50 | 1.96 | 2.53 | 3.58 | 115 | 230 | |
| | 652.562 | ○ | ○ | ○ | ○ | 2.00 | 1.50 | 1.25 | 1.77 | 2.50 | 0.78 | 3.06 | 3.95 | 5.59 | 115 | 230 | |
| | 652.642 | ○ | ○ | ○ | - | 2.50 | 1.80 | 2.00 | 2.83 | 4.00 | 1.24 | 4.90 | 6.33 | 8.94 | 120 | 230 | |
| | 652.722 | ○ | ○ | ○ | - | 3.00 | 2.40 | 3.15 | 4.46 | 6.30 | 1.95 | 7.72 | 9.96 | 14.09 | 120 | 235 | |
| | 652.762 | ○ | ○ | ○ | - | 3.50 | 2.70 | 4.00 | 5.66 | 8.00 | 2.48 | 9.80 | 12.65 | 17.89 | 120 | 235 | |
| | 652.802 | ○ | ○ | ○ | - | 4.00 | 3.10 | 5.00 | 7.07 | 10.00 | 3.10 | 12.25 | 15.81 | 22.36 | 120 | 240 | |
| 45° | 652.303 | ○ | ○ | ○ | - | 0.70 | 0.50 | 0.16* | 0.23* | 0.32 | 0.10 | 0.39 | 0.51 | 0.72 | 180 | 340 | |
| | 652.363 | ○ | ○ | ○ | ○ | 1.00 | 0.60 | 0.31* | 0.44* | 0.63 | 0.20 | 0.77 | 1.00 | 1.40 | 185 | 340 | |
| | 652.403 | ○ | ○ | ○ | ○ | 1.20 | 0.90 | 0.50* | 0.71 | 1.00 | 0.31 | 1.23 | 1.58 | 2.24 | 185 | 340 | |
| | 652.483 | ○ | ○ | ○ | ○ | 1.50 | 1.10 | 0.80* | 1.13 | 1.60 | 0.50 | 1.96 | 2.53 | 3.58 | 185 | 340 | |
| | 652.563 | ○ | ○ | ○ | ○ | 2.00 | 1.40 | 1.25 | 1.77 | 2.50 | 0.78 | 3.06 | 3.95 | 5.59 | 185 | 340 | |
| | 652.643 | ○ | ○ | ○ | ○ | 2.50 | 1.80 | 2.00 | 2.83 | 4.00 | 1.24 | 4.90 | 6.33 | 8.94 | 185 | 345 | |
| | 652.723 | ○ | ○ | ○ | - | 3.00 | 2.40 | 3.15 | 4.46 | 6.30 | 1.95 | 7.72 | 9.96 | 14.09 | 190 | 355 | |
| | 652.763 | ○ | ○ | ○ | - | 3.50 | 2.60 | 4.00 | 5.66 | 8.00 | 2.48 | 9.80 | 12.65 | 17.89 | 190 | 355 | |
| | 652.803 | ○ | ○ | ○ | - | 4.00 | 3.00 | 5.00 | 7.07 | 10.00 | 3.10 | 12.25 | 15.81 | 22.36 | 195 | 360 | |
| 60° | 652.304 | ○ | ○ | ○ | ○ | 0.70 | 0.40 | 0.16* | 0.23* | 0.32 | 0.10 | 0.39 | 0.51 | 0.72 | 275 | 525 | |
| | 652.334 | ○ | ○ | ○ | ○ | 0.90 | 0.50 | 0.22* | 0.32* | 0.45 | 0.14 | 0.55 | 0.71 | 1.01 | 275 | 525 | |
| | 652.364 | ○ | ○ | ○ | ○ | 1.00 | 0.60 | 0.31* | 0.44* | 0.63 | 0.20 | 0.77 | 1.00 | 1.40 | 275 | 525 | |
| | 652.404 | ○ | ○ | ○ | ○ | 1.20 | 0.80 | 0.50* | 0.71 | 1.00 | 0.31 | 1.23 | 1.58 | 2.24 | 275 | 525 | |
| | 652.444 | ○ | ○ | ○ | ○ | 1.35 | 0.90 | 0.62* | 0.88 | 1.25 | 0.39 | 1.53 | 1.98 | 2.80 | 280 | 530 | |
| | 652.484 | ○ | ○ | ○ | ○ | 1.50 | 1.00 | 0.80* | 1.13 | 1.60 | 0.50 | 1.96 | 2.53 | 3.58 | 280 | 530 | |
| | 652.514 | ○ | ○ | ○ | ○ | 1.65 | 1.10 | 0.95* | 1.34 | 1.90 | 0.59 | 2.33 | 3.00 | 4.25 | 280 | 530 | |
| | 652.564 | ○ | ○ | ○ | ○ | 2.00 | 1.30 | 1.25 | 1.77 | 2.50 | 0.78 | 3.06 | 3.95 | 5.59 | 280 | 525 | |
| | 652.604 | ○ | ○ | ○ | ○ | 2.20 | 1.50 | 1.58 | 2.23 | 3.15 | 0.98 | 3.86 | 4.98 | 7.04 | 280 | 520 | |
| | 652.644 | ○ | ○ | ○ | ○ | 2.50 | 1.60 | 2.00 | 2.83 | 4.00 | 1.24 | 4.90 | 6.33 | 8.94 | 275 | 520 | |
| | 652.674 | ○ | ○ | ○ | ○ | 2.70 | 1.80 | 2.38 | 3.36 | 4.75 | 1.47 | 5.82 | 7.51 | 10.62 | 275 | 520 | |
| | 652.724 | ○ | ○ | ○ | ○ | 3.00 | 2.10 | 3.15 | 4.46 | 6.30 | 1.95 | 7.72 | 9.96 | 14.09 | 275 | 520 | |
| | 652.764 | ○ | ○ | ○ | - | 3.50 | 2.30 | 4.00 | 5.66 | 8.00 | 2.48 | 9.80 | 12.65 | 17.89 | 270 | 515 | |
| | 652.804 | ○ | ○ | ○ | ○ | 4.00 | 2.60 | 5.00 | 7.07 | 10.00 | 3.10 | 12.25 | 15.81 | 22.36 | 270 | 510 | |
| | 652.844 | ○ | ○ | - | ○ | 4.50 | 3.00 | 6.25 | 8.84 | 12.50 | 3.88 | 15.31 | 19.76 | 27.95 | 270 | 510 | |
| | 652.884 | ○ | - | ○ | - | 5.00 | 3.40 | 8.00 | 11.31 | 16.00 | 4.96 | 19.60 | 25.30 | 35.78 | 270 | 505 | |

¹ We reserve the right to deliver 316Ti SS or 316L SS under the material no. 17.

A = equivalent bore diameter · E = narrowest free cross section ·

* Differing spray pattern

Continued on next page.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 \cdot \sqrt{\frac{p_2}{p_1}}$



Flat fan nozzles for retaining nut

Series 652



| Spray angle | Ordering no. | | | | | A Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | | | | Spray width B at p=2 bar | |
|-------------|--------------|--------------|---|-------------|------------|----------|----------|------------|-------|-------|-------------------------|-------|-------|-------|------------|------------|--------------------------|--|
| | Type | Mat. no. | | | | | | p [bar] | | | | | | | | | | |
| | | 16 303 SS | 17 ¹ 316Ti SS/ 316L SS | 30 Brass | 5E PVDF | | | 0.5 | 1.0 | 2.0 | [US gal./min] at 40 psi | 3.0 | 5.0 | 10.0 | H = 250 mm | H = 500 mm | | |
| 75° | 652.145 | ○ | - | ○ | - | 0.20 | 0.12 | - | 0.04* | 0.05 | 0.02 | 0.06 | 0.08 | 0.11 | 285 | 550 | | |
| | 652.165 | ○ | - | ○ | - | 0.20 | 0.14 | - | 0.05* | 0.07 | 0.02 | 0.08 | 0.10 | 0.15 | 285 | 555 | | |
| | 652.185 | ○ | - | ○ | - | 0.20 | 0.16 | - | 0.06* | 0.08 | 0.02 | 0.10 | 0.13 | 0.18 | 290 | 560 | | |
| | 652.215 | ○ | - | ○ | - | 0.40 | 0.20 | - | 0.08* | 0.11 | 0.03 | 0.14 | 0.18 | 0.25 | 290 | 560 | | |
| | 652.245 | ○ | - | ○ | - | 0.50 | 0.30 | - | 0.12* | 0.16 | 0.05 | 0.20 | 0.26 | 0.36 | 290 | 560 | | |
| | 652.275 | ○ | - | ○ | - | 0.60 | 0.30 | 0.11* | 0.16* | 0.22 | 0.07 | 0.27 | 0.35 | 0.49 | 290 | 560 | | |
| 90° | 652.216 | ○ | - | ○ | - | 0.40 | 0.20 | 0.06* | 0.08* | 0.11 | 0.03 | 0.14 | 0.18 | 0.25 | 380 | 760 | | |
| | 652.246 | ○ | - | ○ | - | 0.50 | 0.30 | 0.08* | 0.12* | 0.16 | 0.05 | 0.20 | 0.26 | 0.36 | 380 | 760 | | |
| | 652.276 | ○ | - | ○ | - | 0.60 | 0.30 | 0.11* | 0.16* | 0.22 | 0.07 | 0.27 | 0.35 | 0.49 | 450 | 795 | | |
| | 652.306 | ○ | ○ | ○ | ○ | 0.70 | 0.40 | 0.16* | 0.23* | 0.32 | 0.10 | 0.39 | 0.51 | 0.72 | 450 | 795 | | |
| | 652.336 | ○ | ○ | ○ | ○ | 0.90 | 0.50 | 0.22* | 0.32* | 0.45 | 0.14 | 0.55 | 0.71 | 1.01 | 450 | 795 | | |
| | 652.366 | ○ | ○ | ○ | ○ | 1.00 | 0.50 | 0.31* | 0.44* | 0.63 | 0.20 | 0.77 | 1.00 | 1.41 | 450 | 795 | | |
| | 652.406 | ○ | ○ | ○ | ○ | 1.20 | 0.70 | 0.50* | 0.71 | 1.00 | 0.31 | 1.23 | 1.58 | 2.24 | 450 | 800 | | |
| | 652.446 | ○ | ○ | ○ | ○ | 1.35 | 0.80 | 0.62* | 0.88 | 1.25 | 0.39 | 1.53 | 1.98 | 2.80 | 450 | 800 | | |
| | 652.486 | ○ | ○ | ○ | ○ | 1.50 | 0.80 | 0.80* | 1.13 | 1.60 | 0.50 | 1.96 | 2.53 | 3.58 | 450 | 800 | | |
| | 652.516 | ○ | ○ | ○ | ○ | 1.65 | 0.90 | 0.95* | 1.34 | 1.90 | 0.59 | 2.33 | 3.00 | 4.25 | 450 | 800 | | |
| | 652.566 | ○ | ○ | ○ | ○ | 2.00 | 1.10 | 1.25 | 1.77 | 2.50 | 0.78 | 3.06 | 3.95 | 5.59 | 450 | 805 | | |
| | 652.606 | ○ | ○ | ○ | ○ | 2.20 | 1.20 | 1.58 | 2.23 | 3.15 | 0.98 | 3.86 | 4.98 | 7.04 | 450 | 805 | | |
| | 652.646 | ○ | ○ | ○ | ○ | 2.50 | 1.30 | 2.00 | 2.83 | 4.00 | 1.24 | 4.90 | 6.33 | 8.94 | 450 | 805 | | |
| | 652.676 | ○ | ○ | ○ | ○ | 2.70 | 1.40 | 2.38 | 3.36 | 4.75 | 1.47 | 5.82 | 7.51 | 10.62 | 450 | 810 | | |
| | 652.726 | ○ | ○ | ○ | ○ | 3.00 | 1.70 | 3.15 | 4.46 | 6.30 | 1.95 | 7.72 | 9.96 | 14.09 | 450 | 810 | | |
| | 652.766 | ○ | ○ | ○ | - | 3.50 | 1.90 | 4.00 | 5.66 | 8.00 | 2.48 | 9.80 | 12.65 | 17.89 | 450 | 815 | | |
| | 652.806 | ○ | ○ | ○ | ○ | 4.00 | 2.40 | 5.00 | 7.07 | 10.00 | 3.10 | 12.25 | 15.81 | 22.36 | 450 | 820 | | |
| | 652.846 | - | - | ○ | ○ | 4.50 | 2.40 | 6.25 | 8.84 | 12.50 | 3.88 | 15.31 | 19.76 | 27.95 | 450 | 820 | | |
| 652.886 | ○ | - | ○ | ○ | 5.00 | 3.10 | 8.00 | 11.31 | 16.00 | 4.96 | 19.60 | 25.30 | 35.78 | 450 | 835 | | | |
| 120° | 652.187 | ○ | - | ○ | - | 0.35 | 0.20 | - | 0.06* | 0.08 | 0.02 | 0.10 | 0.13 | 0.18 | 640 | 1220 | | |
| | 652.217 | ○ | - | ○ | - | 0.40 | 0.20 | - | 0.08* | 0.11 | 0.03 | 0.14 | 0.18 | 0.25 | 650 | 1230 | | |
| | 652.247 | ○ | - | ○ | - | 0.50 | 0.20 | - | 0.12* | 0.16 | 0.05 | 0.20 | 0.26 | 0.36 | 655 | 1245 | | |
| | 652.277 | ○ | - | ○ | - | 0.60 | 0.30 | - | 0.16* | 0.22 | 0.07 | 0.27 | 0.35 | 0.49 | 655 | 1250 | | |
| | 652.307 | ○ | - | ○ | ○ | 0.70 | 0.30 | 0.16* | 0.23* | 0.32 | 0.10 | 0.39 | 0.51 | 0.72 | 660 | 1260 | | |
| | 652.337 | ○ | ○ | ○ | ○ | 0.90 | 0.40 | 0.22* | 0.32* | 0.45 | 0.14 | 0.55 | 0.71 | 1.01 | 660 | 1260 | | |
| | 652.367 | ○ | ○ | ○ | ○ | 1.00 | 0.50 | 0.31* | 0.44* | 0.63 | 0.20 | 0.77 | 1.00 | 1.41 | 660 | 1265 | | |
| | 652.407 | ○ | ○ | ○ | ○ | 1.20 | 0.60 | 0.50* | 0.71 | 1.00 | 0.31 | 1.23 | 1.58 | 2.24 | 660 | 1270 | | |
| | 652.447 | ○ | ○ | ○ | ○ | 1.35 | 0.60 | 0.62* | 0.88 | 1.25 | 0.39 | 1.53 | 1.98 | 2.80 | 665 | 1270 | | |
| | 652.487 | ○ | ○ | ○ | ○ | 1.50 | 0.60 | 0.80* | 1.13 | 1.60 | 0.50 | 1.96 | 2.53 | 3.58 | 665 | 1270 | | |
| | 652.517 | ○ | ○ | ○ | ○ | 1.65 | 0.90 | 0.95* | 1.34 | 1.90 | 0.59 | 2.33 | 3.00 | 4.25 | 670 | 1275 | | |
| | 652.567 | ○ | ○ | ○ | ○ | 2.00 | 0.90 | 1.25 | 1.77 | 2.50 | 0.78 | 3.06 | 3.95 | 5.59 | 670 | 1280 | | |
| | 652.607 | ○ | ○ | ○ | ○ | 2.20 | 1.10 | 1.58 | 2.23 | 3.15 | 0.98 | 3.86 | 4.98 | 7.04 | 675 | 1285 | | |
| | 652.647 | ○ | ○ | ○ | - | 2.50 | 1.30 | 2.00 | 2.83 | 4.00 | 1.24 | 4.90 | 6.33 | 8.94 | 680 | 1295 | | |
| | 652.677 | ○ | ○ | ○ | - | 2.70 | 1.40 | 2.38 | 3.36 | 4.75 | 1.47 | 5.82 | 7.51 | 10.62 | 685 | 1300 | | |
| | 652.727 | ○ | ○ | ○ | ○ | 3.00 | 1.60 | 3.15 | 4.46 | 6.30 | 1.95 | 7.72 | 9.96 | 14.09 | 695 | 1315 | | |
| | 652.767 | ○ | ○ | ○ | - | 3.50 | 1.70 | 4.00 | 5.66 | 8.00 | 2.48 | 9.80 | 12.65 | 17.89 | 705 | 1330 | | |
| | 652.807 | ○ | - | ○ | - | 4.00 | 2.00 | 5.00 | 7.07 | 10.00 | 3.10 | 12.25 | 15.81 | 22.36 | 705 | 1330 | | |
| | 652.847 | - | - | - | ○ | 4.50 | 2.30 | 6.25 | 8.84 | 12.50 | 3.88 | 15.31 | 19.76 | 27.95 | 800 | 1460 | | |
| | 652.887 | - | - | - | ○ | 5.00 | 2.60 | 8.00 | 11.31 | 16.00 | 4.96 | 19.60 | 25.30 | 35.78 | 800 | 1460 | | |

¹ We reserve the right to deliver 316Ti SS or 316L SS under the material no. 17.

A = equivalent bore diameter · E = narrowest free cross section ·

* Differing spray pattern

Subject to technical modifications.

| | | | | | |
|---------------------|-------------|----------|---------------------|----------|---------------------|
| Example | Type | + | Material no. | = | Ordering no. |
| of ordering: | 652.145 | + | 16 | = | 652.145.16.CA |



Flat fan nozzles for belt lubrication Series 652



**Especially low flow rates.
Parabolic liquid distribution.**

Applications:

Belt lubrication, moistening, spraying of food products, moisturization of rollers, oiling, lubrication of metal sheets.

Operating pressure range:
1 to 5 bar

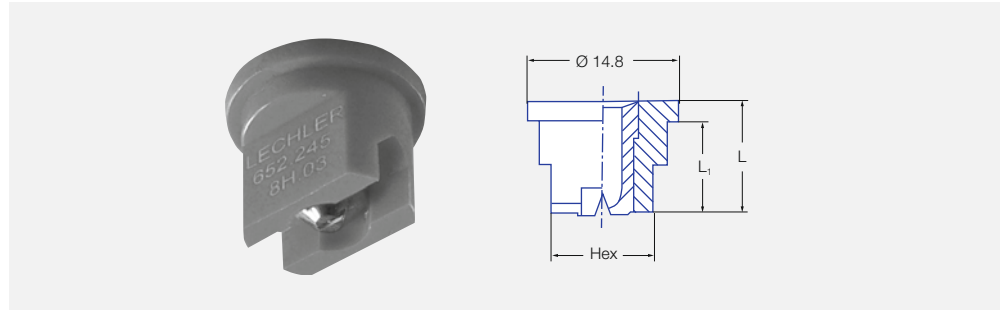
Recommended operating pressure:
3 bar

Viscosity:

The nozzles can be operated with viscous media, e. g. transmission fluid (max. approx. 200 mPas). However the spray angle decreases.

Return valve with filter:

- Prevents dripping and saves medium
- Size of filter mesh: 0.08 mm (200 mesh)
- **095.016.53.11.00**
Opening pressure: approx. 0.5 bar
Closing pressure: approx. 0.3 bar
- **095.016.53.14.63**
Opening pressure: approx. 2.8 bar
Closing pressure: approx. 1.6 bar

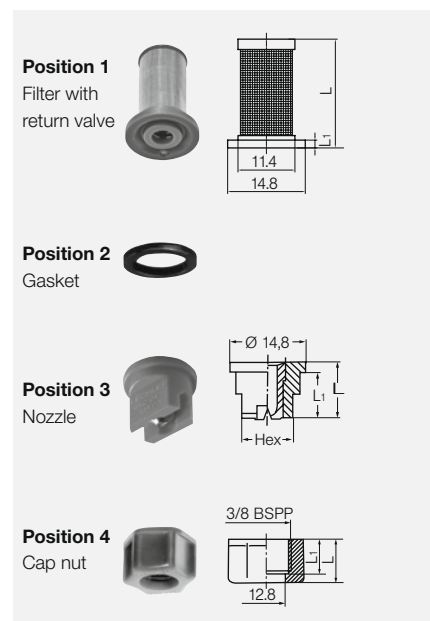


| Spray angle | Type | Ordering no. | | | Colour | E Ø [mm] | V̇ [l/min] | | | |
|-------------|----------------|--------------|--------------------------|--------------|--------|----------|------------|------|------|------|
| | | Mat. no. | | | | | p [bar] | | | |
| | | 16 303 SS | 8H.03* POM/ 303 SS | 56.03 POM | | | 1.0 | 2.0 | 3.0 | 5.0 |
| 75° | 652.145 | ○ | ○ | ○ | green | 0.12 | 0.04** | 0.05 | 0.06 | 0.08 |
| | 652.165 | ○ | ○ | - | black | 0.14 | 0.05** | 0.07 | 0.08 | 0.10 |
| | 652.185 | ○ | ○ | ○ | red | 0.16 | 0.06** | 0.08 | 0.10 | 0.13 |
| | 652.215 | ○ | ○ | - | blue | 0.20 | 0.08** | 0.11 | 0.14 | 0.18 |
| | 652.245 | ○ | ○ | - | orange | 0.30 | 0.12** | 0.16 | 0.20 | 0.26 |
| 120° | 652.275 | ○ | ○ | - | brown | 0.30 | 0.16** | 0.22 | 0.27 | 0.35 |
| | 652.187 | ○ | ○ | - | grey | 0.20 | 0.06** | 0.08 | 0.10 | 0.13 |
| | 652.247 | ○ | ○ | - | black | 0.20 | 0.12** | 0.16 | 0.20 | 0.26 |
| | 652.277 | ○ | ○ | - | black | 0.30 | 0.16** | 0.22 | 0.27 | 0.35 |

E = narrowest free cross section
* Housing POM, nozzle insert 303 SS
** Differing spray pattern.
Subject to technical modifications.

| Pos. | Name | Ordering no. | Material | Colour | Dimensions [mm] | | | Filter mesh [mm] |
|------|--------------------------|------------------------------|-------------|--------|-----------------|----------------|----|------------------|
| | | | | | L | L ₁ | SW | |
| 1 | Filter with return valve | 095.016.53.11.00 | PP | blue | 21 | 1.5 | - | 0.08 |
| | | 095.016.53.14.63 | PP | green | 21 | 1.5 | - | 0.08 |
| 2 | Gasket | 065.240.55 | PTFE | - | - | - | - | - |
| | | 065.240.72 | EWP 210 | - | - | - | - | - |
| 3 | Nozzle | Ordering no. see flow tables | 303 SS | - | 11 | 9 | 10 | - |
| | | | POM/303 SS* | - | 12 | 10 | 8 | - |
| 4 | Cap nut | 065.200.16 | 303 SS | - | 13 | 10 | 22 | - |
| | | 065.200.56 | POM | black | 14.5 | 11.5 | 22 | - |

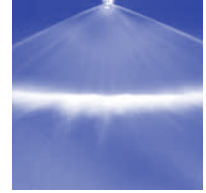
* Housing POM, Nozzle insert 303 SS
** Size of mesh



Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$



Tongue-type nozzles Series 686



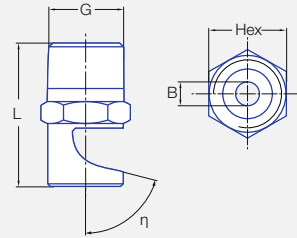
Wide flat fan with a sharply delimited jet pattern. Particularly clog-proof.

Applications:


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



(Mat. no. 16/5E)



Weight Brass: 18 g

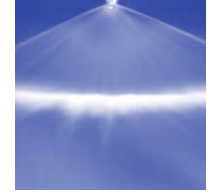
| Spray angle | η | Ordering no. | | | | | | | | B Ø [mm] | V̇ [l/min] | | | Dimensions | | | | | | | | Spray width B at p=2 bar  H = 250 mm |
|-------------|-----|--------------|--------------|-------------|------------|----------|----------|----------|----------|----------|------------|-------|-------|------------|-------|-------|-------|----------|-------|-------|-------|---|
| | | Type | Mat. no. | | | Code G | | | | | p [bar] | | | L [mm] | | | | Hex [mm] | | | | |
| | | | 16 303 SS | 30 Brass | 5E PVDF | 1/8 BSPT | 1/4 BSPT | 3/8 BSPT | 1/2 BSPT | | 1.0 | 2.0 | 5.0 | R 1/8 | R 1/4 | R 3/8 | R 1/2 | R 1/8 | R 1/4 | R 3/8 | R 1/2 | |
| 90° | 75° | 686.366 | - | ○ | - | CA | - | - | - | 0.80 | 0.45 | 0.63 | 1.00 | 22 | - | - | - | 11 | - | - | - | 520 |
| | 75° | 686.406 | ○ | ○ | - | CA | - | - | - | 1.00 | 0.71 | 1.00 | 1.58 | 23 | - | - | - | 11 | - | - | - | 525 |
| | 40° | 686.686 | ○ | ○ | - | - | CC | - | - | 2.40 | 3.54 | 5.00 | 7.91 | - | 29 | - | - | - | 14 | - | - | 530 |
| | 40° | 686.726 | - | ○ | - | CA | - | - | - | 2.70 | 4.45 | 6.30 | 9.96 | 26 | - | - | - | 11 | - | - | - | 530 |
| | 40° | 686.806 | ○ | ○ | - | - | CC | - | - | 3.40 | 7.07 | 10.00 | 15.81 | - | 34 | - | - | - | 14 | - | - | 530 |
| | 40° | 686.886 | ○ | - | - | - | CC | - | - | 4.20 | 11.31 | 16.00 | 25.30 | - | 36 | - | - | - | 17 | - | - | 530 |
| | 40° | 686.926 | ○ | - | - | - | - | CE | - | 4.70 | 14.14 | 20.00 | 31.62 | - | - | - | 39 | - | - | - | 17 | - |
| 140° | 75° | 686.368 | ○ | ○ | - | CA | - | - | - | 0.80 | 0.45 | 0.63 | 1.00 | 23 | - | - | - | 11 | - | - | - | 1360 |
| | | 686.408 | ○ | ○ | - | CA | - | - | - | 1.00 | 0.71 | 1.00 | 1.58 | 23 | - | - | - | 11 | - | - | - | 1370 |
| | | 686.448 | ○ | ○ | - | - | CC | - | - | 1.20 | 0.88 | 1.25 | 1.98 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.488 | ○ | ○ | - | CA | CC | - | - | 1.30 | 1.13 | 1.60 | 2.53 | 23 | 28 | - | - | 11 | 14 | - | - | 1370 |
| | | 686.528 | ○ | ○ | - | CA | CC | - | - | 1.50 | 1.41 | 2.00 | 3.16 | 23 | 28 | - | - | 11 | 14 | - | - | 1370 |
| | | 686.568 | ○ | ○ | ○* | CA | CC | - | - | 1.70 | 1.77 | 2.50 | 3.59 | 23 | 28 | - | - | 11 | 14 | - | - | 1370 |
| | | 686.608 | ○ | ○ | - | CA | CC | - | - | 1.90 | 2.23 | 3.15 | 4.98 | 23 | 28 | - | - | 11 | 14 | - | - | 1370 |
| | | 686.648 | ○ | ○ | - | - | CC | - | - | 2.20 | 2.83 | 4.00 | 6.32 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.688 | ○ | ○ | - | CA | CC | - | - | 2.40 | 3.54 | 5.00 | 7.91 | 23 | 28 | - | - | 11 | 14 | - | - | 1370 |
| | | 686.728 | ○ | ○ | - | CA | CC | - | - | 2.70 | 4.45 | 6.30 | 9.96 | 23 | 28 | - | - | 11 | 14 | - | - | 1370 |
| | | 686.768 | ○ | ○ | - | - | CC | - | - | 3.00 | 5.66 | 8.00 | 12.65 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.808 | ○ | ○ | - | CA | CC | - | - | 3.40 | 7.07 | 10.00 | 15.81 | 23 | 28 | - | - | 11 | 14 | - | - | 1370 |
| | | 686.828 | ○ | ○ | - | - | CC | - | - | 3.60 | 7.92 | 11.20 | 17.71 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.848 | ○ | ○ | - | - | CC | - | - | 3.80 | 8.80 | 12.50 | 19.76 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.868 | ○ | ○ | - | - | CC | - | - | 4.00 | 9.90 | 14.00 | 22.14 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.888 | ○ | ○ | - | - | CC | - | - | 4.20 | 11.31 | 16.00 | 25.30 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.908 | ○ | ○ | - | - | CC | - | - | 4.50 | 12.73 | 18.00 | 28.46 | - | 28 | - | - | - | 14 | - | - | 1370 |
| | | 686.928 | ○ | - | - | - | - | CE | CG | 4.70 | 14.14 | 20.00 | 31.62 | - | - | - | 32 | - | - | - | 17 | - |
| 686.968 | - | ○ | - | - | - | - | CG | 5.30 | 17.68 | 25.00 | 39.53 | - | - | - | 32 | 40 | - | - | 17 | 22 | 1370 | |
| 686.988 | ○ | - | - | - | - | CE | CG | 5.60 | 19.80 | 28.00 | 44.27 | - | - | - | 32 | 40 | - | - | 17 | 22 | 1370 | |

B = bore diameter
Can also be used for air or saturated steam.
* Only available with code CA

Example Type + Material no. + Code = Ordering no.
of ordering: 686.366 + 30 + CA = 686.366.30.CA



Tongue-type nozzles 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:

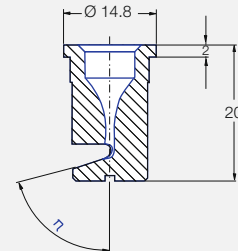
Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.



(Mat. no. 16/5E)



Series 684



Weight: 3 g

| Spray angle | η | Ordering no. | | | | Colour** | B Ø [mm] | V̇ [l/min] | | | L [mm] | Spray width B at p=2 bar H = 250 mm |
|-------------|-----|--------------|----------|------|------------|----------|----------|------------|-------|----|--------|--|
| | | Type | Mat. no. | | p [bar] | | | | | | | |
| | | | 56 | 5E | 1.0 | | | 2.0 | 5.0 | | | |
| | | | POM | PVDF | | | | | | | | |
| 140° | 75° | 684.348 | ○ | - | green | 0.7 | 0.35* | 0.50 | 0.79 | 20 | 1360 | |
| | 75° | 684.368 | ○ | ○ | yellow | 0.8 | 0.45* | 0.63 | 1.00 | 20 | 1360 | |
| | 75° | 684.408 | ○ | - | blue | 1.0 | 0.71 | 1.00 | 1.58 | 20 | 1370 | |
| | 75° | 684.448 | ○ | - | red | 1.2 | 0.88 | 1.25 | 1.98 | 20 | 1370 | |
| | 75° | 684.488 | ○ | ○ | brown | 1.3 | 1.13 | 1.60 | 2.53 | 20 | 1370 | |
| | 75° | 684.528 | ○ | - | grey | 1.5 | 1.41 | 2.00 | 3.16 | 20 | 1370 | |
| | 75° | 684.568 | ○ | ○ | white | 1.7 | 1.77 | 2.50 | 3.95 | 19 | 1370 | |
| | 75° | 684.608 | ○ | - | light blue | 1.9 | 2.23 | 3.15 | 4.98 | 19 | 1370 | |
| | 75° | 684.688 | ○ | - | green | 2.4 | 3.54 | 5.00 | 7.91 | 17 | 1370 | |
| | 75° | 684.728 | ○ | ○ | black | 2.7 | 4.45 | 6.30 | 9.96 | 17 | 1370 | |
| | 75° | 684.808 | ○ | - | purple | 3.4 | 7.07 | 10.00 | 15.81 | 16 | 1370 | |

B = bore diameter · * Differing spray pattern. · ** Material PVDF generally blue

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

Applications:

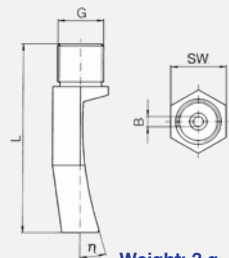
Foam control in storage tanks, crate washers, cleaning and washing processes requiring powerful and concentrated water jets.



(Mat. no. 16/5E)



Lock nut for type 689.003
095.011.16.00.15 (303 SS)
095.011.5E.00.15 (PVDF)



Series 688/689

Weight: 3 g

| Spray angle | η | Ordering no. | | | | | | B Ø [mm] | V̇ [l/min] | | | | Dimensions | | Weight | Spray width B at p=2 bar H = 250 mm H = 500 mm | |
|-------------|-----|--------------|----------|------|----------|----------|---------|----------|------------|-------|--------|----------|------------|--------|--------|---|--|
| | | Type | Mat. no. | | Code G | | p [bar] | | | | L [mm] | Hex [mm] | | | | | |
| | | | 16 | 5E | 3/8 BSPT | 3/4 BSPP | 0.5 | | 1.0 | 2.0 | | | 5.0 | | | | |
| | | | 303 SS | PVDF | 3/8 BSPT | 3/4 BSPP | | | | | | | | | | | |
| 45° | 35° | 688.763 | ○ | - | CE | - | 3.0 | 4.00 | 5.66 | 8.00 | 12.65 | 43 | 19 | 114 g | 220 | 440 | |
| | 30° | 688.843 | ○ | - | CE | - | 3.8 | 6.25 | 8.84 | 12.50 | 19.76 | 50 | 19 | 133 g | 220 | 440 | |
| | 29° | 689.923 | ○ | - | CE | - | 4.8 | 10.00 | 14.14 | 20.00 | 31.62 | 59 | 22 | 247 g | 220 | 440 | |
| | 35° | 689.003 | ○ | ○ | - | 90 | 6.0 | 15.75 | 22.27 | 31.50 | 49.81 | 80 | 32/24 | 306/33 | 250 | 490 | |

B = bore diameter

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 \cdot \sqrt{\frac{p_2}{p_1}}$



High pressure flat fan nozzles Series 602/608/652



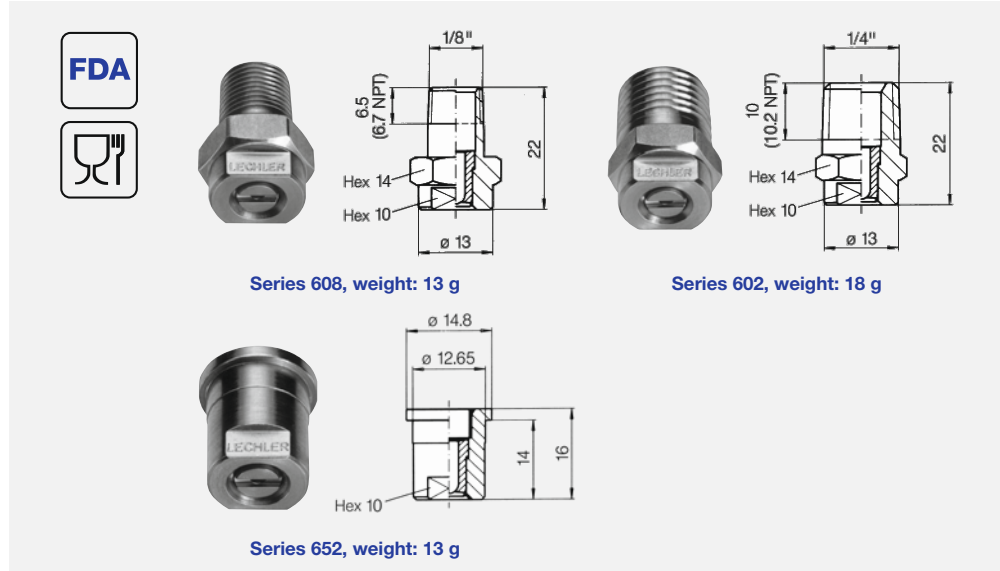
Sharp uniform flat fan with an extremely narrow jet depth.

Applications:

High pressure cleaners, steam jet cleaners.

Materials:

Nozzle body: 303 SS
Insert: hardened stainless steel 420F



| US gal/min. at 40 psi | Nozzle-Code | | | Flow rate code | | | | A Ø [mm] | V [l/min] | | | | | | |
|-----------------------|-------------|-----|-----|----------------|-----|-----|-----|----------|-----------|-------|-------|-------|-------|-------|-------|
| | Connection | | | Spray angle | | | | | p [bar] | | | | | | |
| | 1/8 | 1/4 | nut | 20° | 30° | 45° | 60° | | 40 | 60 | 80 | 100 | 120 | 150 | 200 |
| 02 | 608 | 602 | 652 | 361 | 362 | 363 | 364 | 1.00 | 2.88 | 3.53 | 4.08 | 4.56 | 5.00 | 5.58 | 6.45 |
| 021 | 608 | 602 | 652 | 371 | 372 | 373 | 374 | 1.02 | 3.03 | 3.71 | 4.28 | 4.79 | 5.25 | 5.87 | 6.77 |
| 025 | 608 | 602 | 652 | 381 | 382 | 383 | 384 | 1.10 | 3.60 | 4.42 | 5.10 | 5.70 | 6.24 | 6.98 | 8.06 |
| 028 | 608 | 602 | 652 | 391 | 392 | 393 | 394 | 1.16 | 4.04 | 4.94 | 5.71 | 6.38 | 6.99 | 7.81 | 9.02 |
| 03 | 608 | 602 | 652 | 401 | 402 | 403 | 404 | 1.18 | 4.32 | 5.29 | 6.11 | 6.83 | 7.48 | 8.37 | 9.66 |
| 034 | 608 | 602 | 652 | 411 | 412 | 413 | 414 | 1.30 | 4.90 | 6.00 | 6.93 | 7.75 | 8.49 | 9.49 | 10.96 |
| 038 | 608 | 602 | 652 | 441 | 442 | 443 | - | 1.33 | 5.48 | 6.72 | 7.75 | 8.67 | 9.50 | 10.62 | 12.26 |
| 04 | 608 | 602 | 652 | 451 | 452 | 453 | 454 | 1.35 | 5.77 | 7.06 | 8.16 | 9.12 | 9.99 | 11.17 | 12.90 |
| 043 | 608 | 602 | 652 | 461 | 462 | - | - | 1.38 | 6.20 | 7.59 | 8.77 | 9.80 | 10.74 | 12.00 | 13.86 |
| 045 | 608 | 602 | 652 | 471 | 472 | 473 | 474 | 1.40 | 6.49 | 7.95 | 9.18 | 10.26 | 11.24 | 12.57 | 14.51 |
| 05 | 608 | 602 | 652 | 481 | 482 | 483 | 484 | 1.55 | 7.21 | 8.83 | 10.20 | 11.40 | 12.49 | 13.96 | 16.12 |
| 055 | 608 | 602 | 652 | 501 | 502 | 503 | 504 | 1.60 | 7.93 | 9.71 | 11.22 | 12.54 | 13.74 | 15.36 | 17.73 |
| 06 | 608 | 602 | 652 | 521 | 522 | 523 | 524 | 1.72 | 8.65 | 10.60 | 12.24 | 13.68 | 14.99 | 16.75 | 19.35 |
| 065 | 608 | 602 | 652 | 531 | 532 | 533 | 534 | 1.75 | 9.37 | 11.48 | 13.26 | 14.82 | 16.23 | 18.15 | 20.96 |
| 07 | 608 | 602 | 652 | 541 | 542 | 543 | 544 | 1.80 | 10.09 | 12.36 | 14.28 | 15.96 | 17.48 | 19.55 | 22.57 |
| 075 | 608 | 602 | 652 | 551 | 552 | 553 | 554 | 1.90 | 10.81 | 13.25 | 15.29 | 17.10 | 18.73 | 20.94 | 24.18 |
| 08 | 608 | 602 | 652 | 571 | 572 | 573 | 574 | 2.05 | 11.54 | 14.13 | 16.31 | 18.24 | 19.98 | 22.34 | 25.80 |
| 087 | 608 | 602 | 652 | 581 | 582 | 583 | 584 | 2.06 | 12.54 | 15.36 | 17.74 | 19.83 | 21.72 | 24.29 | 28.04 |
| 09 | 608 | 602 | 652 | 591 | 592 | 593 | 594 | 2.10 | 12.98 | 15.89 | 18.35 | 20.52 | 22.48 | 25.13 | 29.02 |
| 10 | 608 | 602 | 652 | 601 | 602 | 603 | 604 | 2.30 | 14.41 | 17.65 | 20.38 | 22.79 | 24.97 | 27.91 | 32.23 |
| 11 | - | 602 | 652 | 621 | 622 | 623 | 624 | 2.40 | 15.86 | 19.42 | 22.42 | 25.07 | 27.46 | 30.70 | 35.45 |
| 125 | - | 602 | 652 | 641 | 642 | 643 | 644 | 2.50 | 18.02 | 22.07 | 25.48 | 28.49 | 31.21 | 34.89 | 40.29 |
| 131 | - | 602 | 652 | 651 | 652 | 653 | 654 | 2.55 | 18.89 | 23.13 | 26.71 | 29.86 | 32.71 | 36.57 | 42.23 |
| 139 | - | 602 | 652 | 661 | 662 | 663 | 664 | 2.65 | 20.04 | 24.54 | 28.34 | 31.68 | 34.70 | 38.80 | 44.80 |
| 15 | - | 602 | 652 | 671 | 672 | 673 | 674 | 2.70 | 21.62 | 26.48 | 30.58 | 34.19 | 37.45 | 41.87 | 48.35 |
| 175 | - | 602 | 652 | 701 | 702 | 703 | 704 | 3.00 | 25.23 | 30.90 | 35.68 | 39.89 | 43.70 | 48.86 | 56.41 |
| 20 | - | 602 | 652 | - | - | 723 | 724 | 3.05 | 28.83 | 35.31 | 40.78 | 45.59 | 49.94 | 55.84 | 64.47 |
| 25 | - | 602 | 652 | - | - | 763 | 764 | 3.50 | 36.04 | 44.14 | 50.97 | 56.99 | 62.43 | 69.80 | 80.60 |
| 30 | - | 602 | 652 | - | - | 793 | - | 3.90 | 43.25 | 52.97 | 61.16 | 68.38 | 74.91 | 83.75 | 96.70 |

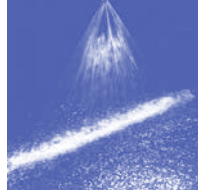
A = equivalent bore diameter

| Connection Code | Connection | p _{max} * [bar] |
|-----------------|------------|--------------------------|
| A3.00 | BSPT | ca. 700 |
| A3.07 | NPT | ca. 700 |
| A3.29 | Lock nut | ca. 300 |

* Only valid for operation at constant pressure

Example for ordering: Nozzle code **602** + Flow rate code **361** + Connection code **A3.00** = Ordering no. **602.361.A3.00**
(Flat fan 20°; 4.56 l/min. at 100 bar; 1/4 NPT)

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$



Easy-Clip nozzle system

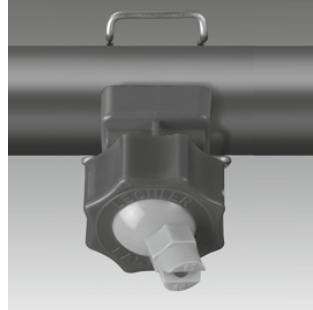
Quick and easy assembly with clamp. No tools required. Allround swivelling by 30°. Easy adjustment and cleaning.

Applications:

Degreasing, phosphating in surface treatment.

Materials:

Clamp: 301 SS
 Sealing: EPDM
 Cylinder pin, screw and screw unit: 316 SS.
 Body, ball retainer cap: PP, reinforced.
 Nozzle, ball joint: PP



Sets

Existing of

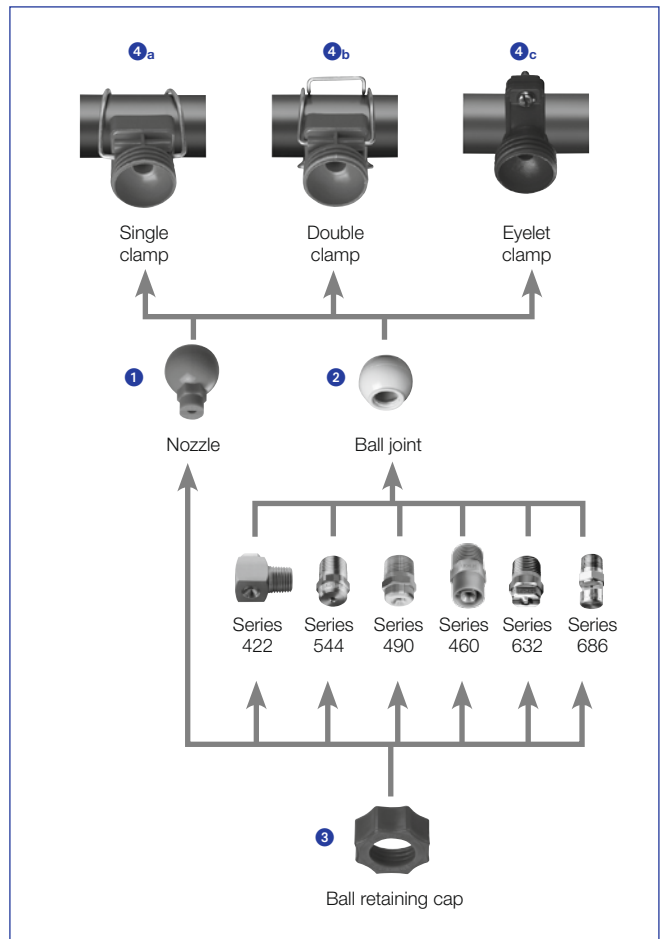
- Nozzle
- Single clamp for 1 1/4" pipe
- Ball retainer cap

| Ordering no. | Nozzle colour | | V̇ [l/min] | | | | |
|---------------|---------------|-----|------------|-------|-------|-------|-------|
| | | | p [bar] | | | | |
| | | | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 |
| 676.724.53.31 | grey | 60° | 3.15 | 4.45 | 5.45 | 6.30 | 7.04 |
| 676.764.53.31 | brown | 60° | 4.00 | 5.66 | 6.93 | 8.00 | 8.94 |
| 676.804.53.31 | lilac | 60° | 5.00 | 7.07 | 8.66 | 10.00 | 11.18 |
| 676.844.53.31 | yellow | 60° | 6.25 | 8.84 | 10.83 | 12.50 | 13.98 |
| 676.884.53.31 | red | 60° | 8.00 | 11.31 | 13.85 | 16.00 | 17.89 |
| 676.904.53.31 | blue | 60° | 9.10 | 12.87 | 15.76 | 18.20 | 20.35 |
| 676.924.53.31 | green | 60° | 10.00 | 14.14 | 17.32 | 20.00 | 22.36 |

Existing of

- Ball joint
- Single clamp for 1 1/4" pipe
- Ball retainer cap

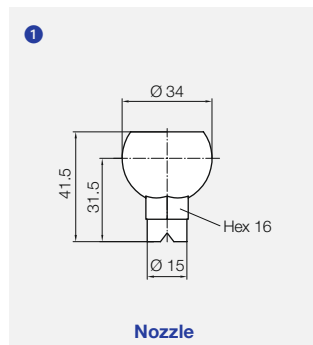
| Ordering no. | Ball colour | Nozzle connection | For nozzle series |
|---------------|-------------|-------------------|------------------------------|
| 092.081.53.AB | beige | 1/8 BSPP | 460, 490, 632, 686, 544 |
| 092.081.53.AD | beige | 1/4 BSPP | 422, 460, 490, 544, 632, 686 |
| 092.081.53.AF | beige | 3/8 BSPP | 422, 460, 490, 632, 686, 688 |
| 092.081.53.AH | beige | 1/2 BSPP | 422, 460, 490, 632, 686 |



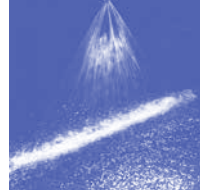
Components

1 Nozzle

| Ordering no. | Nozzle colour | | V̇ [l/min] | | | | |
|------------------|---------------|-----|--------------|-------|-------|-------|-------|
| | | | p [bar] | | | | |
| | | | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 |
| 676.724.53.30.01 | grey | 60° | 3.15 | 4.45 | 5.45 | 6.30 | 7.04 |
| 676.764.53.30.01 | brown | 60° | 4.00 | 5.66 | 6.93 | 8.00 | 8.94 |
| 676.804.53.30.01 | lilac | 60° | 5.00 | 7.07 | 8.66 | 10.00 | 11.18 |
| 676.844.53.30.01 | yellow | 60° | 6.25 | 8.84 | 10.83 | 12.50 | 13.98 |
| 676.884.53.30.01 | red | 60° | 8.00 | 11.31 | 13.85 | 16.00 | 17.89 |
| 676.904.53.30.01 | blue | 60° | 9.10 | 12.87 | 15.67 | 18.20 | 20.35 |
| 676.924.53.30.01 | green | 60° | 10.00 | 14.14 | 17.32 | 20.00 | 22.36 |
| 092.080.53.00.01 | grey | | Blind nozzle | | | | |



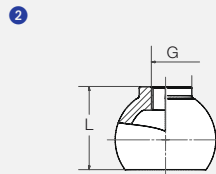
Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$



Easy-Clip nozzle system

2 Ball joint

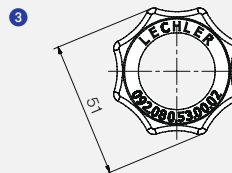
| Ordering no. | Colour | Nozzle connection | L [mm] | For nozzle series |
|------------------|--------|-------------------|--------|------------------------------|
| 092.080.53.AB.01 | beige | 1/8 BSPP | 28.4 | 460, 490, 544, 632, 686 |
| 092.080.53.AD.01 | beige | 1/4 BSPP | 32.4 | 422, 460, 490, 544, 632, 686 |
| 092.080.53.AF.01 | beige | 3/8 BSPP | 31.4 | 422, 460, 490, 632, 686, 688 |
| 092.080.53.AH.01 | beige | 1/2 BSPP | 33.0 | 422, 460, 490, 632, 686 |



Ball joint

3 Ball retainer cap

| Ordering no. |
|------------------|
| 092.080.53.00.02 |

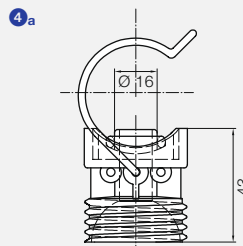


Ball retainer cap

4a Single clamp

| Ordering no. | Spigot-Ø Br | Recommended bore-Ø | For Pipe-Ø |
|---------------|-------------|--------------------|-----------------------|
| 092.080.53.00 | 16.3 mm | 16.5-17.0 mm | 1" (32.0-34.5 mm) |
| 092.081.53.00 | 16.3 mm | 16.5-17.0 mm | 1 1/4" (40.0-43.0 mm) |
| 092.082.53.00 | 16.3 mm | 16.5-17.0 mm | 1 1/2" (46.0-49.0 mm) |
| 092.083.53.00 | 16.3 mm | 16.5-17.0 mm | 2" (58.0-62.0 mm) |

Other spigot-Ø (13.8/19.0 mm) on request.

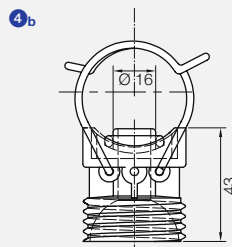


Single clamp

4b Double clamp

| Ordering no. | Spigot-Ø Br | Recommended bore-Ø | For Pipe-Ø |
|---------------|-------------|--------------------|-----------------------|
| 092.090.53.00 | 16.3 mm | 16.5-17.0 mm | 1" (32.0-34.5 mm) |
| 092.091.53.00 | 16.3 mm | 16.5-17.0 mm | 1 1/4" (40.0-43.0 mm) |
| 092.092.53.00 | 16.3 mm | 16.5-17.0 mm | 1 1/2" (46.0-49.0 mm) |
| 092.093.53.00 | 16.3 mm | 16.5-17.0 mm | 2" (58.0-62.0 mm) |

Other spigot-Ø (13.8/19.0 mm) on request.

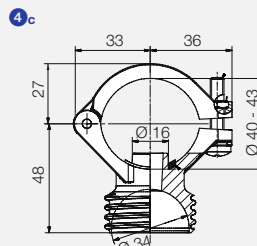


Double clamp

4c Eyelet clamp

| Ordering no. | Spigot-Ø Br | Recommended bore-Ø | For Pipe-Ø |
|------------------|-------------|--------------------|-----------------------|
| 090.023.53.43.10 | 16 mm | 16.5-17.0 mm | 1" (32.0-34.5 mm) |
| 090.033.53.43.10 | 16 mm | 16.5-17.0 mm | 1 1/4" (40.0-43.0 mm) |
| 090.043.53.43.10 | 16 mm | 16.5-17.0 mm | 1 1/2" (46.0-49.0 mm) |

Other bore diameter (13.8/20.0 mm) on request.



Eyelet clamp 1 1/4"



Flat fan nozzles with ball joint Series 676



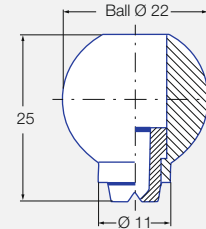
Swivelling nozzle for precise adjusting of jet direction. No gaskets necessary. Long, unproblematic service life.

Applications:


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



(Mat. no. 16)



Allround swivelling by 30°
Weight brass: 45 g

| Spray angle  | Ordering no. | | A Ø [mm] | E Ø [mm] | V̇ [l/min] | | | | | | Spray width B at p=2 bar | | |
|--|--------------|----------|----------|----------|-------------------------------------|-------|-------|-------|-------|-------|--------------------------|------------|------|
| | Type | Mat. no. | | | p [bar] (p _{max} = 30 bar) | | | | | | H = 250 mm | H = 500 mm | |
| | | 16 | | | 30 | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | | | 10.0 |
| 45° | 676.303 | ○ | ○ | 0.70 | 0.50 | 0.16* | 0.23* | 0.32 | 0.39 | 0.51 | 0.72 | 150 | 270 |
| | 676.363 | ○ | ○ | 1.00 | 0.60 | 0.31* | 0.44* | 0.63 | 0.77 | 1.00 | 1.40 | 155 | 280 |
| | 676.403 | ○ | ○ | 1.20 | 0.90 | 0.50* | 0.71 | 1.00 | 1.23 | 1.58 | 2.24 | 175 | 320 |
| | 676.483 | ○ | ○ | 1.50 | 1.10 | 0.80 | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 180 | 340 |
| | 676.563 | ○ | ○ | 2.00 | 1.40 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 185 | 355 |
| | 676.643 | ○ | ○ | 2.50 | 1.80 | 2.00 | 2.83 | 4.00 | 4.90 | 6.33 | 8.94 | 195 | 370 |
| | 676.723 | ○ | ○ | 3.00 | 2.40 | 3.15 | 4.46 | 6.30 | 7.72 | 9.96 | 14.09 | 200 | 375 |
| | 676.763 | ○ | ○ | 3.50 | 2.60 | 4.00 | 5.66 | 8.00 | 9.80 | 12.65 | 17.89 | 200 | 380 |
| 676.803 | ○ | ○ | 4.00 | 3.00 | 5.00 | 7.07 | 10.00 | 12.25 | 15.81 | 22.36 | 205 | 385 | |
| 60° | 676.304 | ○ | ○ | 0.70 | 0.40 | 0.16* | 0.23* | 0.32 | 0.39 | 0.51 | 0.72 | 215 | 425 |
| | 676.334 | ○ | ○ | 0.90 | 0.50 | 0.22* | 0.32* | 0.45 | 0.55 | 0.71 | 1.01 | 220 | 440 |
| | 676.364 | ○ | ○ | 1.00 | 0.60 | 0.31* | 0.44* | 0.63 | 0.77 | 1.00 | 1.40 | 230 | 460 |
| | 676.404 | ○ | ○ | 1.20 | 0.80 | 0.50* | 0.71 | 1.00 | 1.23 | 1.58 | 2.24 | 245 | 485 |
| | 676.444 | ○ | ○ | 1.35 | 0.90 | 0.62* | 0.88 | 1.25 | 1.53 | 1.98 | 2.80 | 255 | 495 |
| | 676.484 | ○ | ○ | 1.50 | 1.00 | 0.80* | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 260 | 510 |
| | 676.514 | ○ | ○ | 1.65 | 1.10 | 0.95* | 1.34 | 1.90 | 2.33 | 3.00 | 4.25 | 270 | 520 |
| | 676.564 | ○ | ○ | 2.00 | 1.30 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 280 | 535 |
| | 676.604 | ○ | ○ | 2.20 | 1.50 | 1.58 | 2.23 | 3.15 | 3.86 | 4.98 | 7.04 | 290 | 550 |
| | 676.644 | ○ | ○ | 2.50 | 1.60 | 2.00 | 2.83 | 4.00 | 4.90 | 6.33 | 8.94 | 295 | 565 |
| | 676.674 | ○ | ○ | 2.70 | 1.80 | 2.38 | 3.36 | 4.75 | 5.82 | 7.51 | 10.62 | 300 | 575 |
| | 676.724 | ○ | ○ | 3.00 | 2.10 | 3.15 | 4.46 | 6.30 | 7.72 | 9.96 | 14.09 | 305 | 590 |
| 676.764 | ○ | ○ | 3.50 | 2.30 | 4.00 | 5.66 | 8.00 | 9.80 | 12.65 | 17.89 | 310 | 595 | |
| 90° | 676.216 | ○ | ○ | 0.40 | 0.20 | - | 0.08* | 0.11 | 0.14 | 0.18 | 0.25 | 370 | 700 |
| | 676.276 | ○ | ○ | 0.60 | 0.30 | 0.11* | 0.16* | 0.22 | 0.27 | 0.35 | 0.49 | 375 | 720 |
| | 676.306 | ○ | ○ | 0.70 | 0.40 | 0.16* | 0.23* | 0.32 | 0.39 | 0.51 | 0.72 | 380 | 740 |
| | 676.336 | ○ | ○ | 0.90 | 0.50 | 0.22* | 0.32* | 0.45 | 0.55 | 0.71 | 1.01 | 415 | 800 |
| | 676.366 | ○ | ○ | 1.00 | 0.50 | 0.31* | 0.44* | 0.63 | 0.77 | 1.00 | 1.40 | 420 | 810 |
| | 676.406 | ○ | ○ | 1.20 | 0.70 | 0.50* | 0.71 | 1.00 | 1.23 | 1.58 | 2.24 | 430 | 820 |
| | 676.446 | ○ | ○ | 1.35 | 0.80 | 0.62* | 0.88 | 1.25 | 1.53 | 1.98 | 2.80 | 435 | 830 |
| | 676.486 | ○ | ○ | 1.50 | 0.80 | 0.80* | 1.13 | 1.60 | 1.96 | 2.53 | 3.58 | 440 | 835 |
| | 676.516 | ○ | ○ | 1.65 | 0.90 | 0.95* | 1.34 | 1.90 | 2.33 | 3.00 | 4.25 | 440 | 840 |
| | 676.566 | ○ | ○ | 2.00 | 1.10 | 1.25 | 1.77 | 2.50 | 3.06 | 3.95 | 5.59 | 445 | 850 |
| | 676.606 | ○ | ○ | 2.20 | 1.20 | 1.58 | 2.23 | 3.15 | 3.86 | 4.98 | 7.04 | 450 | 860 |
| | 676.646 | ○ | ○ | 2.50 | 1.30 | 2.00 | 2.83 | 4.00 | 4.90 | 6.33 | 8.94 | 455 | 865 |
| | 676.676 | ○ | ○ | 2.70 | 1.40 | 2.38 | 3.36 | 4.75 | 5.82 | 7.51 | 10.62 | 465 | 875 |
| | 676.726 | ○ | ○ | 3.00 | 1.70 | 3.15 | 4.46 | 6.30 | 7.72 | 9.96 | 14.09 | 470 | 885 |

A = equivalent bore diameter · E = narrowest free cross section
* Differing spray pattern



Continued on next page.

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$



Flat fan nozzles with ball joint Series 676



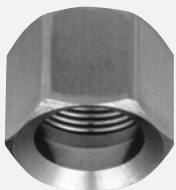
| Spray angle  | Ordering no. | | A Ø [mm] | E Ø [mm] | V [l/min] | | | | | | Spray width B at p=2 bar  | | |
|--|--------------|----------|----------|----------|-------------------------------------|-------|-------|------|-------|-------|---|------------|------|
| | Type | Mat. no. | | | p [bar] (p _{max} = 30 bar) | | | | | | H = 250 mm | H = 500 mm | |
| | | 16 | | | 30 | 0.5 | 1.0 | 2.0 | 3.0 | 5.0 | | | 10.0 |
| 120° | 676.187 | ○ | ○ | 0,35 | 0,20 | - | 0,06* | 0,08 | 0,10 | 0,13 | 0,18 | 630 | 1200 |
| | 676.217 | ○ | ○ | 0,40 | 0,20 | - | 0,08* | 0,11 | 0,14 | 0,18 | 0,25 | 640 | 1210 |
| | 676.247 | ○ | ○ | 0,50 | 0,20 | - | 0,12* | 0,16 | 0,20 | 0,26 | 0,36 | 650 | 1230 |
| | 676.277 | ○ | ○ | 0,60 | 0,30 | - | 0,16* | 0,22 | 0,27 | 0,35 | 0,49 | 660 | 1250 |
| | 676.307 | ○ | ○ | 0,70 | 0,30 | 0,16* | 0,23* | 0,32 | 0,39 | 0,51 | 0,72 | 660 | 1250 |
| | 676.337 | ○ | ○ | 0,90 | 0,40 | 0,22* | 0,32* | 0,45 | 0,55 | 0,71 | 1,01 | 670 | 1270 |
| | 676.367 | ○ | ○ | 1,00 | 0,50 | 0,31* | 0,44* | 0,63 | 0,77 | 1,00 | 1,40 | 670 | 1270 |
| | 676.407 | ○ | ○ | 1,20 | 0,60 | 0,50* | 0,71 | 1,00 | 1,23 | 1,58 | 2,24 | 670 | 1270 |
| | 676.447 | ○ | ○ | 1,35 | 0,60 | 0,62* | 0,88 | 1,25 | 1,53 | 1,98 | 2,80 | 675 | 1270 |
| | 676.487 | ○ | ○ | 1,50 | 0,60 | 0,80* | 1,13 | 1,60 | 1,96 | 2,53 | 3,58 | 680 | 1275 |
| | 676.517 | ○ | ○ | 1,65 | 0,90 | 0,95* | 1,34 | 1,90 | 2,33 | 3,00 | 4,25 | 685 | 1280 |
| | 676.567 | ○ | ○ | 2,00 | 0,90 | 1,25 | 1,77 | 2,50 | 3,06 | 3,95 | 5,59 | 690 | 1285 |
| | 676.607 | ○ | ○ | 2,20 | 1,10 | 1,58 | 2,23 | 3,15 | 3,86 | 4,98 | 7,04 | 700 | 1300 |
| | 676.647 | ○ | ○ | 2,50 | 1,30 | 2,00 | 2,83 | 4,00 | 4,90 | 6,33 | 8,94 | 700 | 1300 |
| | 676.677 | ○ | ○ | 2,70 | 1,40 | 2,38 | 3,36 | 4,75 | 5,82 | 7,51 | 10,62 | 720 | 1330 |
| | 676.727 | ○ | ○ | 3,00 | 1,60 | 3,15 | 4,46 | 6,30 | 7,72 | 9,96 | 14,09 | 740 | 1360 |
| 676.767 | ○ | ○ | 3,50 | 1,70 | 4,00 | 5,66 | 8,00 | 9,80 | 12,65 | 17,89 | 760 | 1400 | |

A = equivalent bore diameter · E = narrowest free cross section
* Differing spray pattern

Example for ordering: Type **676.145** + Material-no. **16** = Ordering no. **676.145.16**

Accessories

Retaining nut
092.020.16.00.02
Material: 303 SS
092.020.30.00.02
Material: Brass



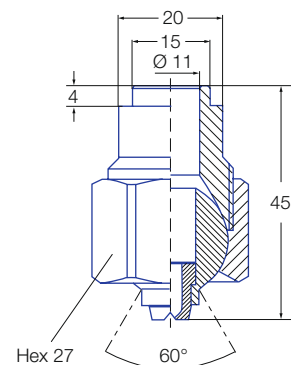
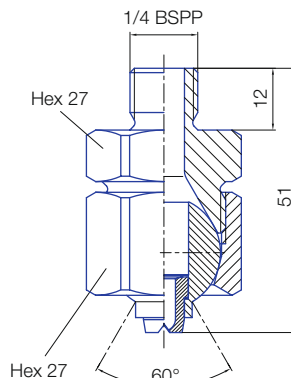
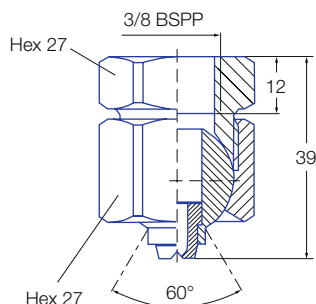
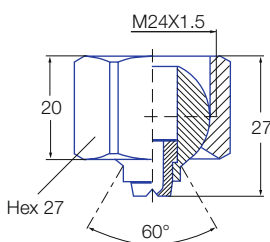
Socket
092.020.16.AF.03
Material: 303 SS
092.020.30.AF.03
Material: Brass

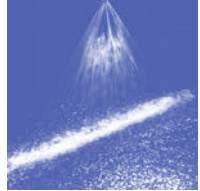


Retaining nipple
092.024.16.AC.03
Material: 303 SS
092.024.30.AC.03
Material: Brass



Welding nipple
092.020.17.00.04
Material: 316Ti SS





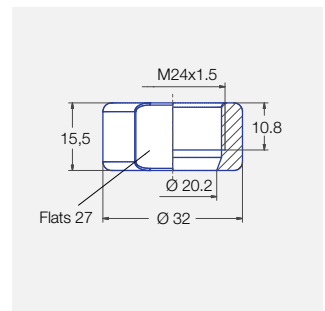
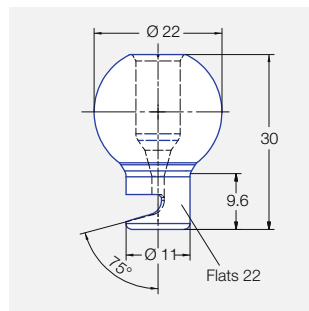
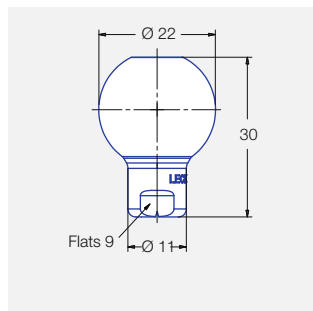
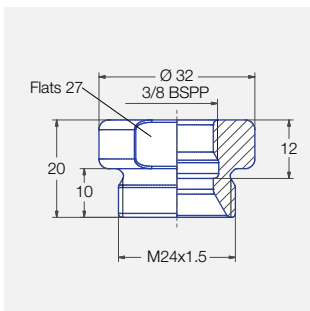
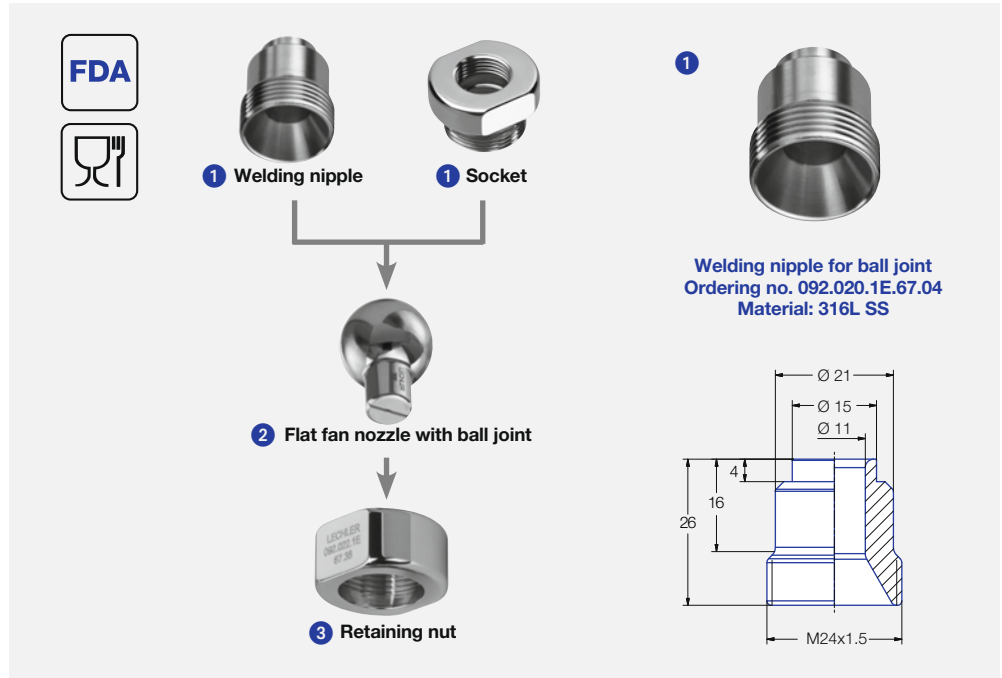
Nozzles and accessories in Hygienic Design

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 SS or 316Ti SS and the seals are made of FDA approved EPDM.

Applications:

Aseptic filling, suitable for high hygienic demands.

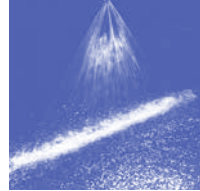


| Spray angle | Ordering no. | Ṃ [l/min] at 2 bar |
|-------------|----------------------|--------------------|
| 20° | 676.641.17.67 | 4.00 |
| 30° | 676.402.17.67 | 1.00 |
| | 676.562.17.67 | 2.50 |
| | 676.722.17.67 | 6.30 |
| | 676.802.17.67 | 10.00 |
| 45° | 676.763.17.67 | 8.00 |
| | 676.883.17.67 | 16.00 |

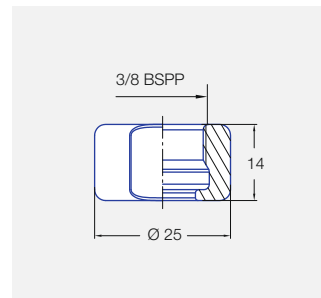
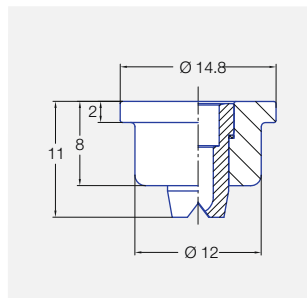
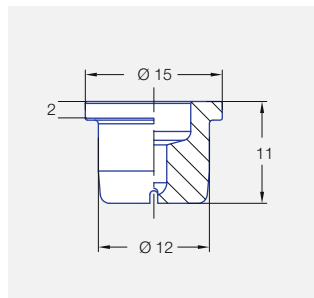
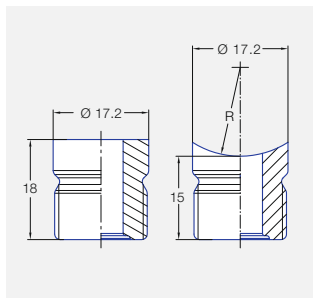
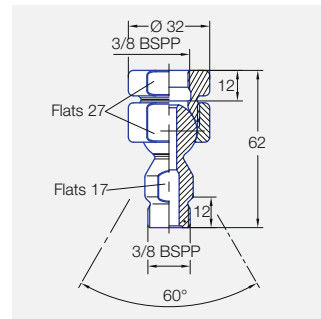
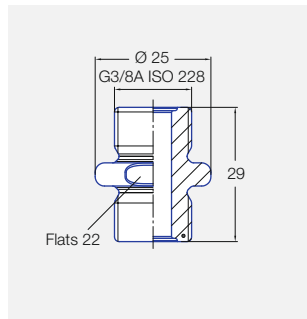
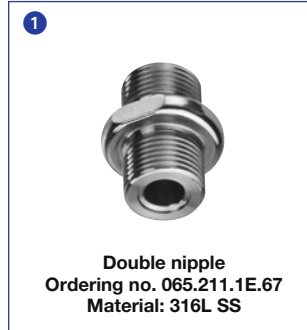
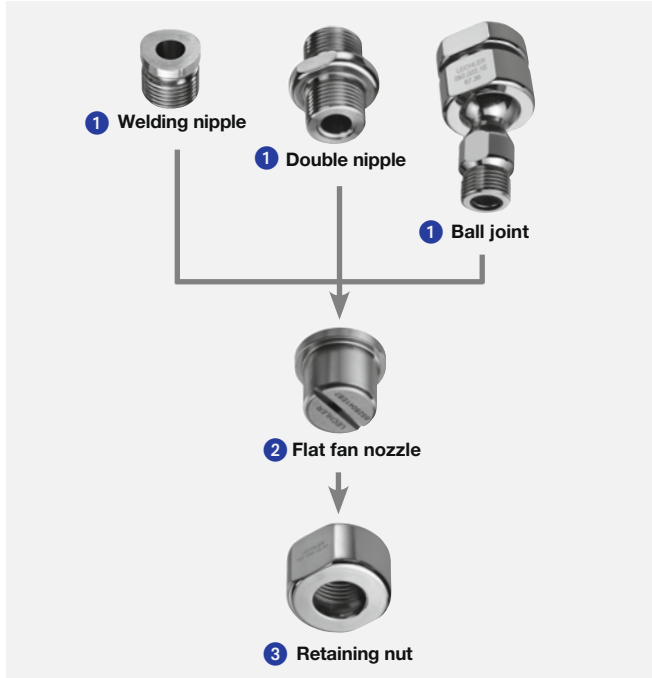
| Spray angle | Ordering no. | Ṃ [l/min] at 2 bar |
|-------------|----------------------|--------------------|
| 60° | 676.514.17.67 | 1.90 |
| | 676.764.17.67 | 8.00 |
| 90° | 676.366.17.67 | 0.60 |
| | 676.646.17.67 | 4.00 |
| 120° | 676.647.17.67 | 4.00 |
| | 676.767.17.67 | 8.00 |
| 140° | 6ZK.648.1E.67 | 4.00 |

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

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$



Nozzles and accessories in Hygienic Design



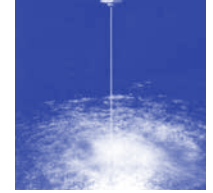
| Ordering no. | Radius [mm] |
|------------------|-------------|
| 065.210.1E.67.00 | no radius |
| 065.217.1E.67.10 | 10 |
| 065.217.1E.67.13 | 12.5 |
| 065.217.1E.67.16 | 16 |
| 065.217.1E.67.20 | 20 |
| 065.217.1E.67.31 | 31 |

| Spray angle | Ordering no. | \dot{V} [l/min] at 2 bar |
|-------------|---------------|----------------------------|
| 60° | 652.604.1E.67 | 3.10 |
| | 652.924.1E.67 | 20.00 |

| Spray angle | Ordering no. | \dot{V} [l/min] at 2 bar |
|---------------|---------------|----------------------------|
| 60° | 652.484.17.87 | 1.60 |
| | 652.514.17.87 | 1.90 |
| | 652.544.17.87 | 2.20 |
| | 652.564.17.87 | 2.50 |
| | 652.604.17.87 | 3.10 |
| | 652.644.17.87 | 4.00 |
| | 652.674.17.87 | 4.70 |
| | 652.724.17.87 | 6.30 |
| 652.764.17.87 | 8.00 | |



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



Punctiform, extremely tight, non-dispersing solid stream. Highest impact.

Applications:

High-pressure cleaning, cutting and separating.

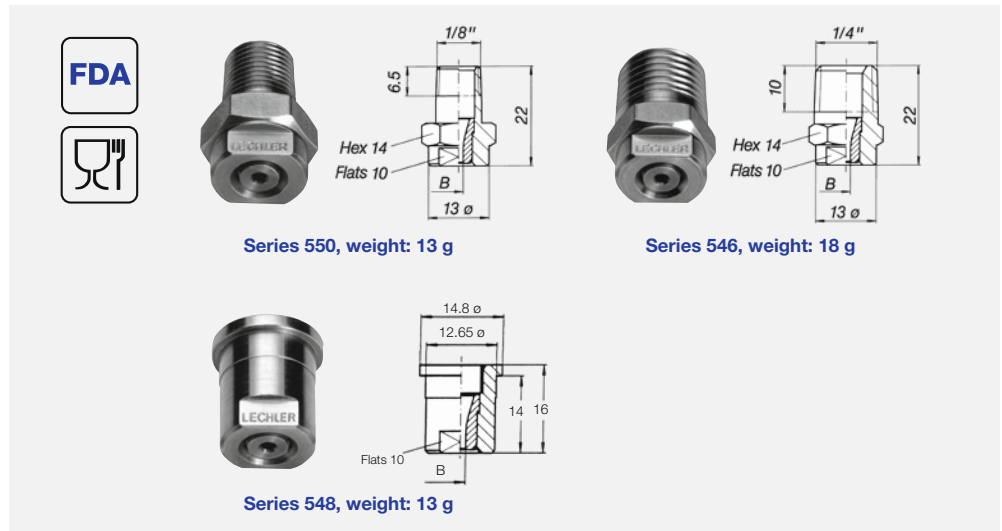
Materials:

Nozzle body:
303 SS

Insert:
Hardened stainless steel
420F

| Connection Code | Connection | p _{max} * [bar] |
|-----------------|------------|--------------------------|
| A3. 00 | BSPT | ca. 700 |
| A3. 07 | NPT | ca. 700 |
| A3. 29 | Lock nut | ca. 300 |

* Only valid for operation at constant pressure



| US gal/min. at 40 psi | Nozzle-Code | | | Flow rate code | B Ø [mm] | V̇ [l/min] | | | | | | | |
|-----------------------|-------------|-----|---------------|----------------|----------|------------|-------|-------|-------|-------|-------|-------|--------|
| | Connection | | | | | p [bar] | | | | | | | |
| | 1/8 | 1/4 | Retaining nut | | | 40 | 60 | 80 | 100 | 120 | 150 | 200 | 300 |
| 01 | 550 | 546 | 548 | 300 | 0.60 | 1.44 | 1.77 | 2.04 | 2.28 | 2.50 | 2.79 | 3.22 | 3.95 |
| 02 | 550 | 546 | 548 | 360 | 0.84 | 2.88 | 3.53 | 4.08 | 4.56 | 5.00 | 5.58 | 6.45 | 7.90 |
| 025 | 550 | 546 | 548 | 380 | 0.94 | 3.60 | 4.42 | 5.10 | 5.70 | 6.24 | 6.98 | 8.06 | 9.87 |
| 027 | 550 | 546 | 548 | 390 | 0.99 | 3.89 | 4.76 | 5.50 | 6.15 | 6.74 | 7.53 | 8.70 | 10.65 |
| 03 | 550 | 546 | 548 | 400 | 1.03 | 4.33 | 5.30 | 6.12 | 6.84 | 7.49 | 8.38 | 9.67 | 11.85 |
| 034 | 550 | 546 | 548 | 410 | 1.07 | 4.90 | 6.00 | 6.93 | 7.75 | 8.49 | 9.49 | 10.96 | 13.42 |
| 035 | 550 | 546 | 548 | 420 | 1.11 | 5.05 | 6.18 | 7.14 | 7.98 | 8.74 | 9.77 | 11.29 | 13.82 |
| 038 | 550 | 546 | 548 | 440 | 1.15 | 5.48 | 6.71 | 7.75 | 8.66 | 9.49 | 10.61 | 12.25 | 15.00 |
| 04 | 550 | 546 | 548 | 450 | 1.19 | 5.77 | 7.06 | 8.16 | 9.12 | 9.99 | 11.17 | 12.90 | 15.80 |
| 045 | 550 | 546 | 548 | 470 | 1.26 | 6.49 | 7.95 | 9.18 | 10.26 | 11.24 | 12.57 | 14.51 | 17.77 |
| 05 | 550 | 546 | 548 | 480 | 1.33 | 7.21 | 8.83 | 10.20 | 11.40 | 12.49 | 13.96 | 16.12 | 19.75 |
| 055 | 550 | 546 | 548 | 500 | 1.39 | 7.93 | 9.71 | 11.22 | 12.54 | 13.74 | 15.36 | 17.73 | 21.72 |
| 06 | 550 | 546 | 548 | 520 | 1.46 | 8.65 | 10.60 | 12.24 | 13.68 | 14.99 | 16.75 | 19.35 | 23.69 |
| 065 | 550 | 546 | 548 | 530 | 1.51 | 9.37 | 11.48 | 13.26 | 14.82 | 16.23 | 18.15 | 20.96 | 25.67 |
| 070 | 550 | 546 | 548 | 540 | 1.58 | 10.09 | 12.36 | 14.28 | 15.96 | 17.48 | 19.55 | 22.57 | 27.64 |
| 074 | 550 | 546 | 548 | 550 | 1.62 | 10.67 | 13.07 | 15.09 | 16.87 | 18.48 | 20.66 | 23.86 | 29.22 |
| 08 | 550 | 546 | 548 | 570 | 1.69 | 11.54 | 14.13 | 16.31 | 18.24 | 19.98 | 22.34 | 25.80 | 31.59 |
| 087 | 550 | 546 | 548 | 580 | 1.76 | 12.54 | 15.36 | 17.74 | 19.83 | 21.72 | 24.29 | 28.04 | 34.35 |
| 089 | 550 | 546 | 548 | 590 | 1.78 | 12.83 | 15.72 | 18.15 | 20.29 | 22.23 | 24.85 | 28.69 | 35.14 |
| 10 | 550 | 546 | 548 | 600 | 1.88 | 14.41 | 17.65 | 20.38 | 22.79 | 24.97 | 27.91 | 32.23 | 39.47 |
| 11 | 550 | 546 | 548 | 620 | 1.97 | 15.86 | 19.42 | 22.42 | 25.07 | 27.46 | 30.70 | 35.45 | 43.42 |
| 124 | 550 | 546 | 548 | 640 | 2.09 | 17.87 | 21.89 | 25.28 | 28.26 | 30.96 | 34.61 | 39.97 | 48.95 |
| 131 | 550 | 546 | 548 | 650 | 2.15 | 18.89 | 23.13 | 26.71 | 29.86 | 32.71 | 36.57 | 42.23 | 51.72 |
| 139 | 550 | 546 | 548 | 660 | 2.22 | 20.04 | 24.54 | 28.34 | 31.68 | 34.70 | 38.80 | 44.80 | 54.87 |
| 15 | 550 | 546 | 548 | 670 | 2.30 | 21.62 | 26.48 | 30.58 | 34.19 | 37.45 | 41.87 | 48.35 | 59.22 |
| 165 | 550 | 546 | 548 | 690 | 2.41 | 23.79 | 29.13 | 33.64 | 37.61 | 41.20 | 46.06 | 53.19 | 65.14 |
| 174 | 550 | 546 | 548 | 700 | 2.48 | 25.08 | 30.72 | 35.47 | 39.66 | 43.45 | 48.57 | 56.09 | 68.69 |
| 183 | 550 | 546 | 548 | 710 | 2.55 | 26.38 | 32.31 | 37.31 | 41.71 | 45.69 | 51.08 | 58.99 | 72.24 |
| 20 | 550 | 546 | 548 | 720 | 2.66 | 28.83 | 35.31 | 40.78 | 45.59 | 49.94 | 55.84 | 64.47 | 78.96 |
| 218 | 550 | 546 | 548 | 740 | 2.77 | 31.43 | 38.49 | 44.44 | 49.69 | 54.43 | 60.86 | 70.27 | 86.07 |
| 25 | 550 | 546 | 548 | 760 | 2.96 | 36.04 | 44.14 | 50.97 | 56.99 | 62.43 | 69.80 | 80.60 | 98.71 |
| 294 | 550 | 546 | 548 | 790 | 3.22 | 42.38 | 51.91 | 59.94 | 67.01 | 73.41 | 82.07 | 94.77 | 116.06 |
| 310 | 550 | 546 | 548 | 800 | 3.30 | 44.69 | 54.73 | 63.20 | 70.66 | 77.40 | 86.54 | 99.93 | 122.39 |

A = equivalent bore diameter

| | | | | | | | |
|-----------------------------|--------------------|----------|-----------------------|----------|------------------------|----------|---|
| Example of ordering: | Nozzle Code | + | Flow rate code | + | Connection code | = | Ordering no. |
| | 550 | | 360 | | A3.07 | | 550.360.A3.07 (Solid stream; 4.56 l/min. at 100 bar; 1/8 NPT) |

Conversion formula for the above series: $\dot{V}_2 = \dot{V}_1 * \sqrt{\frac{p_2}{p_1}}$





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

Particularly
silent!


**Highly efficient air stream,
acting upon areas.
Reduced noise levels.
Low air consumption.**

Applications:

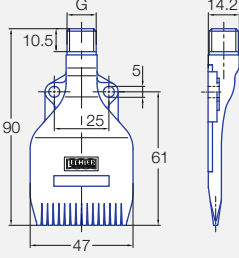
Blowing off and blowing out,
cleaning, drying, cooling,
sorting with air.


OSHA^{*}
* Complies with OSHA requirements on noise level



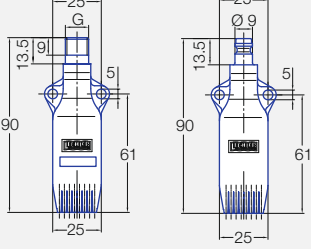
600.130 (POM or PP)



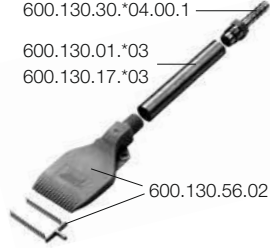
**Weight: 23 g · Tmax POM: 50 °C
Weight: 15 g · Tmax PP: 60 °C**



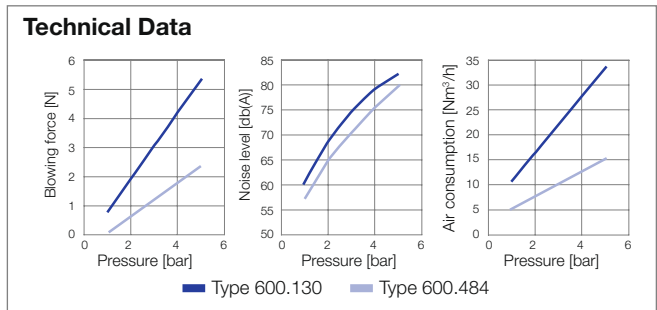
600.484.56 (POM)



Weight: 16 g · Tmax: 50 °C

600.130.30.*04.00.1
600.130.01.*03
600.130.17.*03
600.130.56.02
600.130.56.01 with accessories
*01 = 1.0711/17 = 316Ti SS/30 = Brass



Item 600.130.56.01 does not meet FDA/(EC) No. 1935/2004 requirements.

**Socket
Ordering no.
095.016.30.14.23.0**

Material: Brass

For connection of series 600.130 with compressed air guns.

| Type | Ordering no. | | | | | |
|--|--------------|-----|----------|---------|------------|------------------------|
| | Mat. no. | | Code | | | |
| | S2 | 56 | | | | Quick connect coupling |
| | PP | POM | 1/4 BSPP | 1/4 NPT | M12 x 1.25 | NW 5 |
| 600.130 | ○ | ○ | AC | BC | - | - |
| 600.130 with cover strip | - | ○ | 02 | - | - | - |
| 600.130 with cover strip, Hose barb (D = 8 mm) and Extension tube (L = 85 mm) | - | ○ | 01 | - | - | - |
| 600.484 | - | ○ | AC | BC | HG | 00 |



Ball joints see page 77

Example of ordering: Type 600.130 + Mat. no. 56 + Code AC = Ordering no. 600.130.56.AC



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

**Particularly
silent!**

Metallic versions for higher temperatures. Highly efficient air stream, acting upon areas. Reduced noise levels. Low air consumption.

Applications:

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

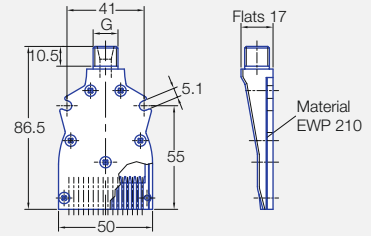


(Mat. no. 1Y)



Complies with OSHA requirements on noise level only

600.283.42 (Aluminum)

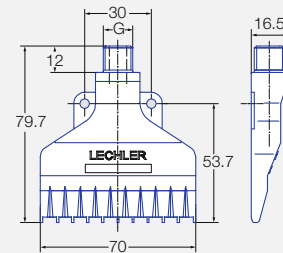


Weight: 60 g · Tmax: 200 °C



Complies with OSHA requirements

600.493.1Y (316L SS)

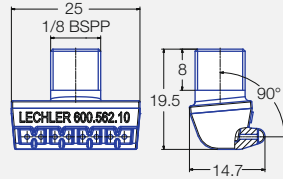


Weight: 126 g · Tmax: 550 °C



Complies with OSHA requirements

600.562.1Y.10 (316L SS)



Weight: 17 g · Tmax: 550 °C

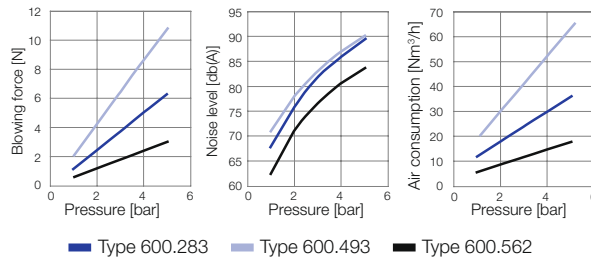


**Socket
Ordering no.
095.016.30.14.23.0**

Material: Brass

For connection with compressed air guns for the following series:
– 600.283
– 600.493

Technical data



Ball joints see page 77

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



| Type | Ordering no. | | | | |
|---------------|----------------|-----------------------|----------|----------|---------|
| | Mat. no. | | Code | | |
| | 42 Aluminum | 1Y Stainless steel | 1/8 BSPP | 1/4 BSPP | 1/4 NPT |
| 600.283 | ○ | - | - | AC | BC |
| 600.493 | - | ○ | - | AC | BC |
| 600.562.1Y.10 | - | ○ | ○ | - | - |

Example of ordering: Type 600.283 + Mat. no. 42 + Code AC = Ordering no. 600.283.42.AC





Multi-channel round jet nozzles for air Series 600. 326/600.388


Particularly
silent!

Powerful air jet, producing punctiform impact patterns. Low noise level. Low air consumption.


Applications:

Targeted blowing out and blowing off with compressed air guns.


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



600.326.5K (ABS)
Tmax: 50 °C



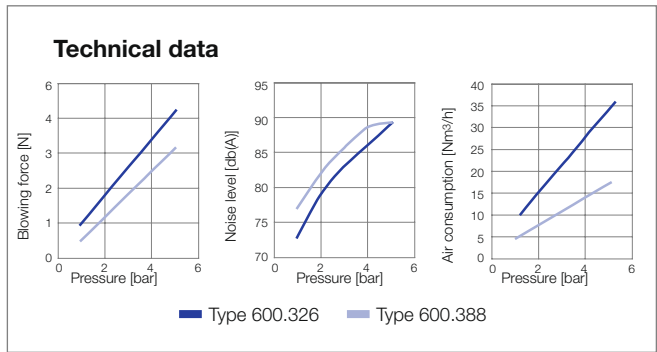
600.326.3W (Zinc)
Tmax: 90 °C



600.388.30 (Brass, POM)
Tmax: 50 °C

Mini-round jet nozzle. Compact design.

Applications:
Especially for blowing out pocket holes.



Ball joints see page 77

| Ordering no. | | Connection thread G | Weight |
|--|-----------|---------------------|--------|
| Type | Code | | |
| 600.326.5K (Material: ABS) | AC | 1/4 BSPP | 9 g |
| | HG | M 12 x 1.25 | |
| 600.326.3W (Material: Zinc) | AC | 1/4 BSPP | 47 g |
| | HG | M 12 x 1.25 | |
| 600.388.30 (Material: Brass/POM) | AA | 1/8 BSPP | 12 g |
| | HG | M 12 x 1.25 | |

Example of ordering: Type + Code = Ordering no.
600.326.5K + AC = 600.326.5K.AC

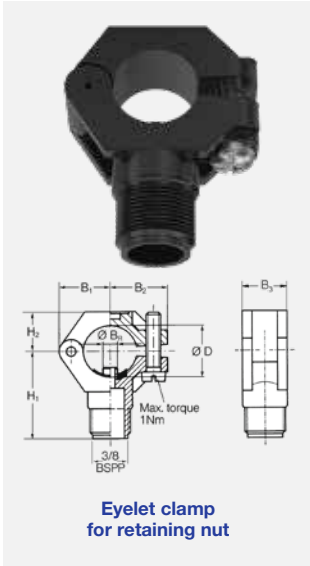


Accessories

Eyelet clamps/Retaining nuts



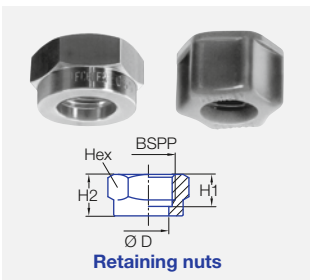
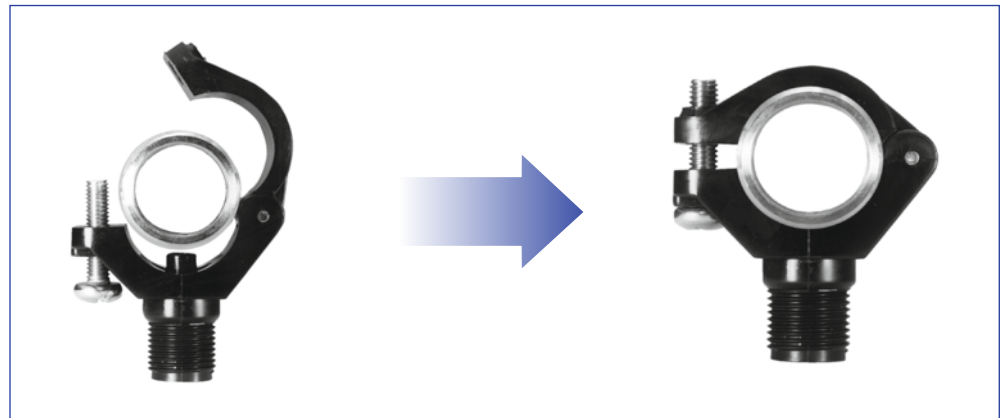
(Mat. no. 16/17/5E)



| For Series | Ordering no. | | | Screw | Dimensions [mm] | | | | | | | | | | Weight (Polyamid) | |
|--|--------------|--------------|----|-------|-----------------|--------|--------|--------------------|---------------------|----------------|----------------|----------------|------|------|-------------------|------|
| | Type | Material no. | | | BSPP | Pipe Ø | D Ø | B ₁ * Ø | B ₂ ** Ø | B ₃ | H ₁ | H ₂ | | | | |
| | | 51 | 53 | | | | | | | | | | 5E | | | |
| 2TR/216/302/308/350 468/548/679/684/652 | 090.053 | ○ | ○ | ○ | Material 304 SS | 3/8 | 3/8" | 16.5-18.0 | 6.0 | 6.2-6.4 | 19.0 | 22.0 | 18.5 | 34.5 | 14.5 | 20 g |
| | 090.003 | ○ | ○ | ○ | | 3/8 | 1/2" | 20-22.0 | 6.0 | 6.2-6.4 | 21.2 | 23.8 | 18.5 | 36.5 | 16.5 | 20 g |
| | 090.013 | ○ | ○ | ○ | | 3/8 | 3/4" | 25-27.5 | 7.6 | 7.8-8.0 | 24.5 | 26.5 | 22.0 | 39.5 | 17.5 | 25 g |
| | 090.023 | ○ | ○ | ○ | | 3/8 | 1" | 32-34.5 | 10.6 | 10.8-11.0 | 30.0 | 31.0 | 22.0 | 44.0 | 21.0 | 32 g |
| | 090.033 | ○ | ○ | ○ | | 3/8 | 1 1/4" | 40-43.0 | 12.6 | 12.8-13.0 | 34.0 | 35.5 | 25.0 | 48.0 | 25.0 | 38 g |

* BR Ø = Spigot diameter

** B Ø = Recommended bore diameter



| For Series | Ordering no. | | | | | | Dimensions [mm] | | | | | Weight (Brass) |
|-------------------------------------|--------------|--------------|-----------------|----|----|----|-----------------|----------------|----------------|------|-----|----------------|
| | Type | Material no. | | | | | BSPP | H ₁ | H ₂ | D Ø | Hex | |
| | | 16 | 17 ¹ | 1Y | 30 | 56 | | | | | | |
| 2TR/468/ 548/652/660/ 679/684 | 065.200 | ○ | ○ | - | ○ | - | 3/8 | 13.0 | 10.0 | 12.8 | 22 | 25 g |
| | 065.200 | - | - | - | - | ○ | 3/8 | 14.5 | 11.5 | 12.8 | 22 | 25 g |
| | 069.000 | ○ | - | ○ | ○ | - | UNF 11/16-16 | 14.3 | 8.7 | 13.1 | 21 | 25 g |
| 656/657 664/665 | 065.600 | ○ | ○ | - | ○ | - | 3/4 | 16.0 | 13.0 | 20.1 | 32 | 60 g |

¹ We reserve the right to deliver 316Ti SS or 316L SS under the material no. 17.

Example for ordering: Type 090.053 + Material no. 51 = Ordering no. 090.053.51



Accessories Sockets/Nipples



(Mat. no. 1Y/17)

| For Series | Ordering no. | | | | | Dimensions [mm] | | | | | | | Weight (Brass) | |
|---|---|----------------|---------|----------|-------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------|
| | Type | Material no. | | | | | G ₁ | G ₂ | H ₁ | H ₂ | D ₁ | D ₂ | | Hex |
| | | 02 | 1Y | 17 | 30 | 53 | | | | | | | | |
| | | Steel | 316L SS | 316Ti SS | Brass | Polypropylene | | | | | | | | |
| <p>Sockets</p> | For all nozzles with 1/8 male thread. | 040.270 | - | ○ | - | ○ | - | 1/8 BSPP | 20 | 10 | 13.8 | - | 14 | 20 g |
| | For all nozzles with 1/4 male thread. | 061.220 | - | ○ | - | ○ | - | 1/4 BSPP | 20 | 10 | 16.8 | - | 17 | 25 g |
| | For all nozzles with 3/8 male thread. | 040.271 | - | ○ | - | ○ | - | 3/8 BSPP | 20 | 10 | 21.5 | - | 22 | 25 g |
| | | 040.271 | - | - | - | - | ○ | 3/8 BSPP | 20 | 10 | 24.5 | - | 22 | 25 g |
| <p>Sockets with radius (R = 10/13/16/20/25 or 31 mm)</p> | For all nozzles with 1/4 male thread. | 040.228.xx.yy* | - | ○ | - | - | 1/4 BSPP | - | 18 | 2 | 17 | - | - | 16 g |
| <p>Nipple Other nipple lengths on request.</p> | 2TR/216/302 308/350/548/ 656/657 468/679 /684/652 | 065.210 | ○ | - | ○ | ○ | 3/8 BSPP | - | 18 | 10 | 17.2 | 11.5 | - | 20 g |
| | 306/307 502/503 656/657 | 065.610 | ○ | - | ○ | - | ○ | 3/4 BSPP | - | 27 | 14 | 28 | 18 | - |
| <p>Nipple with radius (R = 10/13/16/20/25 or 31 mm)</p> | 2TR/216/302/308/350 548/468/679/684/652 | 065.217.xx.yy* | - | - | ○ | - | 3/8 BSPP | - | 15 | 10 | 17.2 | 11.5 | - | 20 g |
| <p>Double nipples</p> | 216/302/308 350/548/468 679/684/652 | 065.215' | - | - | ○ | ○ | 3/8 BSPP | 1/4 BSPP | 25 | 10 | 10 | 7 | 22 | 30 g |
| | | 065.211 | - | - | ○ | ○ | 3/8 BSPP | 3/8 BSPP | 25 | 10 | 11.5 | - | 22 | 25 g |
| | | 065.611 | - | - | ○ | ○ | - | 3/4 BSPP | 3/4 BSPP | 35 | 14 | 18 | - | 32 |

* Replace **xx** by material no. and **yy** by radius R.

¹ Not to be used with non-return valve or filter.

Example **Type** + **Material no.** = **Ordering no.**
for ordering: 040. 270 + 1Y = 040. 270. 1Y

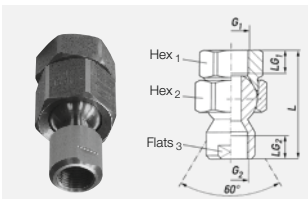


Accessories Ball joints

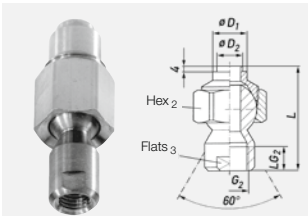


(Mat. no. 16)

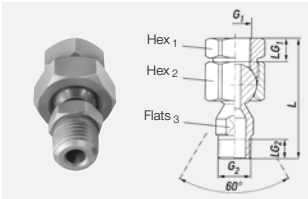
Allround swivelling action of 30°.
No sealings, no wear.
Long service life even after many adjustments.
P_{max}: 25 bar.



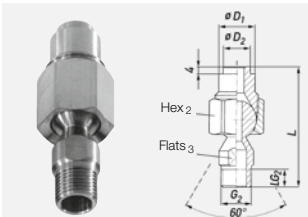
Ball joint with thread connection



Ball joint with welding connection



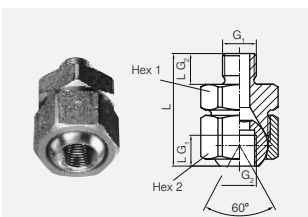
Ball joint with thread connection



Ball joint with welding connection

| For Series | Ordering no. | | | | Dimensions [mm] | | | | | | | | | | | Weight (Brass) |
|--|--------------|---------------------------|--------------|-------------|-----------------|----------------|----------------|------------------------|------------------------|-----------------|-----------------|------|------------------|------------------|------------------|----------------|
| | Type | Material no. | | | Code | D ₁ | D ₂ | G ₁ BSPP | G ₂ BSPP | L _{G1} | L _{G2} | L | Hex ₁ | Hex ₂ | Hex ₃ | |
| | | 16 303 SS/ 316Ti SS | 16 303 SS | 30 Brass | | | | | | | | | | | | |
| For all nozzles with 1/4 male thread. | 092.020 | - | ○ | ○ | AD | - | - | 1/4 | 1/4 | 12.0 | 11.5 | 60.3 | 27 | 27 | 17 | 190 g |
| | 092.021 | - | ○ | ○ | AF | - | - | 3/8 | 1/4 | 12.0 | 11.5 | 58.3 | 27 | 27 | 17 | 170 g |
| For all nozzles with 3/8 male thread. | 092.030 | - | ○ | ○ | AF | - | - | 3/8 | 3/8 | 12.0 | 12.0 | 56.7 | 27 | 30 | 19 | 160 g |
| For all nozzles with 1/4 male thread. | 092.020 | ○ | - | - | SD | 20.0 | 15.0 | - | 1/4 | - | 11.5 | 64.3 | - | 27 | 17 | 150 g |
| | 092.030 | ○ | - | - | SF | 22.0 | 15.0 | - | 3/8 | - | 12.0 | 58.7 | - | 30 | 19 | 150 g |
| 2TR/216/302/308/350 548/468/679/684/652 | 092.022 | - | ○ | ○ | AD | - | - | 1/4 | 3/8 | 12.0 | 10.0 | 63.8 | 27 | 27 | 17 | 135 g |
| | 092.022 | - | ○ | ○ | AF | - | - | 3/8 | 3/8 | 12.0 | 10.0 | 61.8 | 27 | 27 | 17 | 165 g |
| 2TR/216/302/308/350 548/468/679/684/652 | 092.022 | ○ | - | - | SE | 20.0 | 15.0 | - | 3/8 | - | 10.0 | 67.8 | - | 27 | 17 | 155 g |

Compact ball joints for narrow installation conditions



Ball joint with thread connection

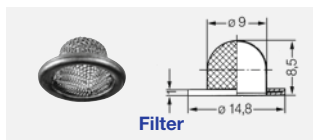
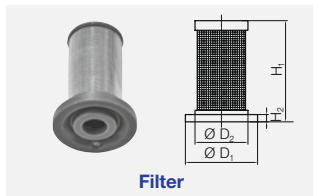
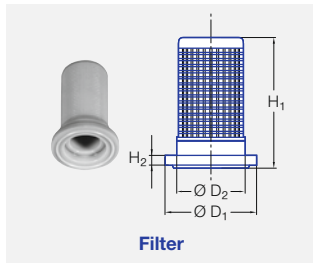
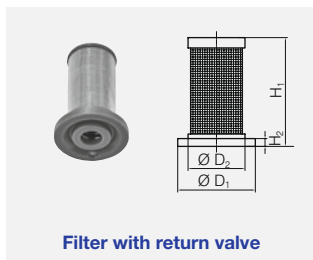
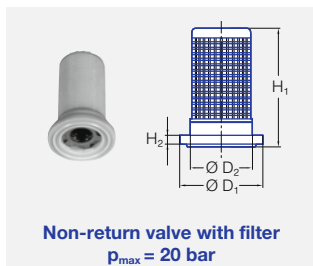
| | | | | | | | | | | | | | | | | |
|--------------------------------------|---------|---|---|---|----|---|---|-----|-----|------|------|------|----|----|---|-------|
| For all nozzles with 1/8 male thread | 092.010 | - | ○ | ○ | AA | - | - | 1/8 | 1/8 | 8.0 | 8.0 | 29.3 | 22 | 24 | - | 70 g |
| For all nozzles with 1/4 male thread | 092.024 | - | ○ | ○ | AC | - | - | 1/4 | 1/4 | 12.0 | 12.0 | 44 | 27 | 27 | - | 140 g |
| For all nozzles with 3/8 male thread | 092.030 | - | ○ | ○ | AE | - | - | 3/8 | 3/8 | 12.0 | 12.0 | 44 | 27 | 30 | - | 160 g |

Example Type + Material no. + Code = Ordering no.
for ordering: 092.020 + 16 + AD = 092.020.16.AD



Accessories

Non-return valves/filters



| For nozzle size | Ordering no. | | | | Colour | Opening pressure [bar] | Closing pressure [bar] | Mesh size [mm] | Dimensions [mm] | | | | Weight |
|-----------------|---|--------------|--------------------|------------------------|------------|------------------------|------------------------|----------------|-----------------|-----|------|------|--------|
| | Type | Material no. | | | | | | | | | | | |
| | | 56 POM | 53 Polypropylen | 26 Monel/ Copper | | | | | | | | | |
| xxx.32x-xxx.44x | 065.265 Ball 420 SS Spring 301 SS | ○ | - | - | blue | 0.5-1.0 | 0.4-0.9 | 0.25 | 21.5 | 2.0 | 14.8 | 11.0 | 2 g |
| xxx.48x-xxx.56x | 065.266 Ball 420 SS Spring 301 SS | ○ | - | - | red | 0.4-0.5 | 0.35-0.45 | 0.65 | 21.5 | 2.0 | 14.8 | 11.0 | 2 g |
| xxx.14x-xxx.36x | 095.016.53.11.00 Ball 304 SS Spring 301 SS | - | ○ | - | blue | approx. 0.5 | approx. 0.3 | 0.08 | 21.0 | 1.6 | 15.0 | 11.0 | 2 g |
| xxx.14x-xxx.36x | 095.016.53.14.63 Ball 304 SS Spring 301 SS | - | ○ | - | green | approx. 2.8 | approx. 1.6 | 0.08 | 21.0 | 1.6 | 15.0 | 11.0 | 2 g |
| xxx.32x-xxx.44x | 065.257 | ○ | - | - | blue | - | - | 0.25 | 21.5 | 2.0 | 14.8 | 11.0 | 2 g |
| xxx.48x-xxx.56x | 065.256 | ○ | - | - | red | - | - | 0.65 | 21.5 | 2.0 | 14.8 | 11.0 | 2 g |
| xxx.14x-xxx.36x | 095.016.53.15.62 | - | ○ | - | light pink | - | - | 0.08 | 21.0 | 1.6 | 15.0 | 11.0 | 1 g |
| xxx.32x-xxx.44x | 065.252 | - | - | ○ | - | - | - | 0.50 | 8.5 | 1.0 | 14.8 | 9.0 | 1 g |

Example for ordering: Type **065.265** + Material no. **56** = Ordering no. **065.265.56**



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 minuscule 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.



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

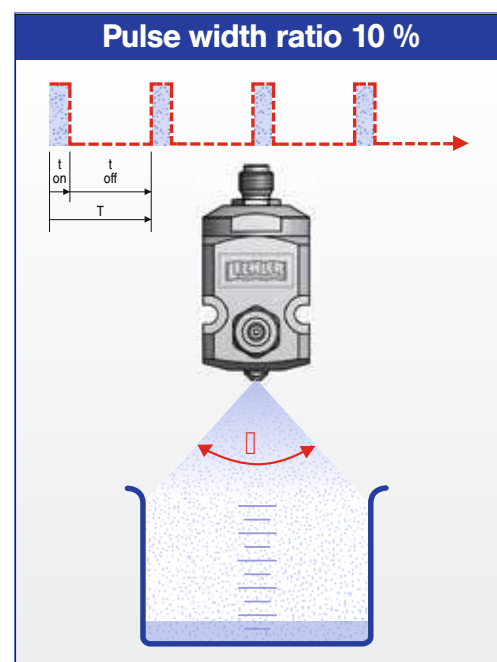
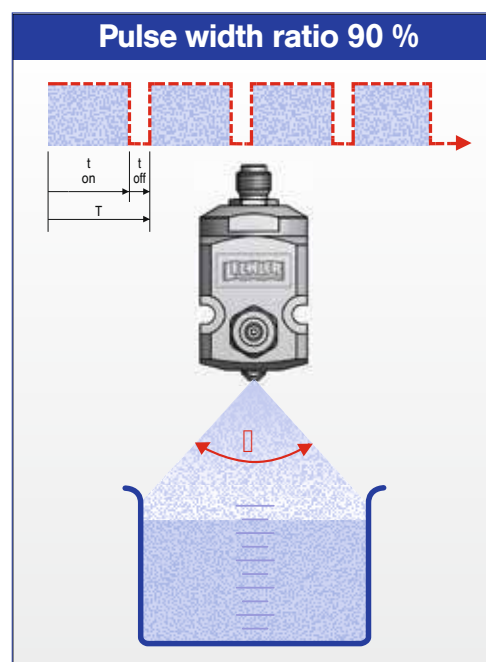
- Simple adjustment of the pulse width and cycle frequency
- Flushing function
- Modular design and modular system
- Start/stop signal (e.g. via light barrier)
- Individual valve control for VarioSpray HP

What is pulse width modulation?

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

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

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



Product features

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 to 100 Hz for VarioSpray II

- Flexible belt speeds

- ⇒ Increased productivity
- ⇒ Shorter production time

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

- Wide range of flow rates covered by one nozzle

- ⇒ More flexible production

Continuously variable flow rate

- Flexible adjustment of the volume applied for different products

- ⇒ Shorter product change-over times

Different flow rates have no influence on spraying parameters

- Constant spray angle
- Uniform droplet size

- ⇒ Constant process parameters

Flow rate is not regulated by pressure

- No high pressure required
- Simple setup

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

No atomization air

- No aerosol formation
- Reduced loss of liquid

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

Food-compliant

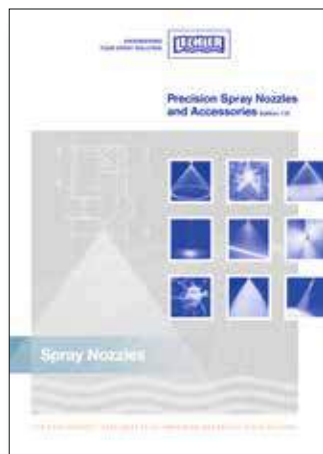
- Spraying/humidification of foods


- ⇒ Compliance with legal requirements

YOU WILL FIND OTHER NOZZLES FOR USE IN THE FOOD AND BEVERAGE INDUSTRY IN OUR STANDARD CATALOGUE ...

The catalogue "Precision Spray Nozzles and Accessories" is a sought-after manual of nozzle technology.

It contains valuable working aids and extensive technical information on Lechler products and ordering instructions.

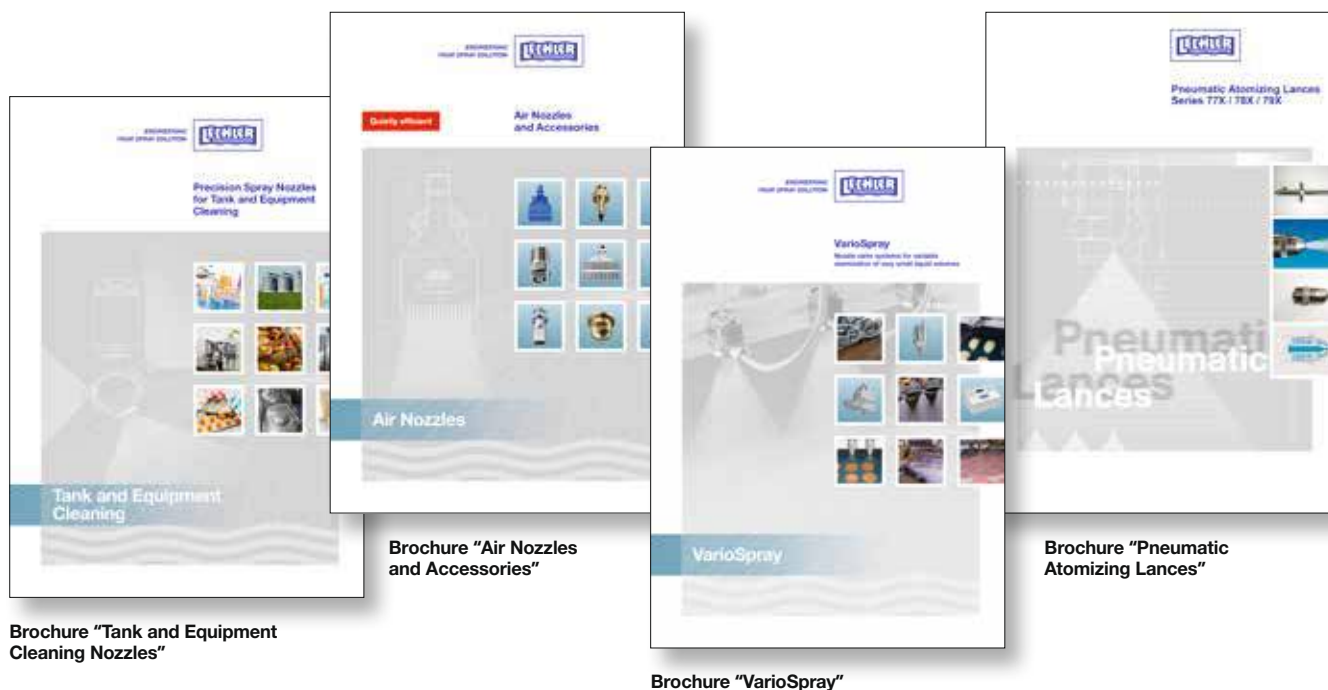


| Pneumatic atomizing nozzles | Series | Spray-pattern supply | Mode of liquid | Mixing of Fluids |  | \dot{V} Water [l/h] | Application/Construction | Catalogue Page |
|---|--------|---|--------------------------------|---|---|-----------------------|---|----------------|
|  | 166 | Full cone or Flat fan | Pressure principle | inside or outside | 20° 45° 60° 80° | 0.10 – 132.90 | Humidification of air, cooling, disinfection (e.g. bottles), coating, dosing, release agent applications. | 1.20-1.25 |
| Flat fan nozzles | Series |  | \dot{V} [l/min] at p = 2 bar | Connection | Application/Construction | Catalogue Page | | |
|  | 610 | 20° 30° 45° 60° 75° 90° 120° | 0.05 – 4.00 | 1/8 BSPP | Cleaning (e.g. surfaces, filters, belts), crate washers, lubricating, coating. Compact design, suited for narrow installation conditions. | 4.10 | | |
|  | 612 | 20° 30° 45° 60° 75° 90° 120° | 0.05 – 16.00 | 1/4 BSPP | Cleaning (e.g. surfaces, filters, belts), crate washers, lubricating, coating. Compact design, suited for narrow installation conditions. | 4.12 | | |
| Solid stream nozzle | Series | \dot{V} [l/min] | Connection | Application/Construction | Catalogue Page | | | |
|  | 544 | 0.04 – 10.00 | 1/8 BSPT 1/4 BSPT | Cleaning installations. Optimized flow technology. Highest jet power. Solid stream jet. | 5.4 | | | |

... AND IN OUR SPECIAL BROCHURES

We have a collection of information, included in individual subject brochures, covering special nozzles that are also of particular interest to food and beverage.

All documents can be downloaded from our website at www.lechler.com. We would also be happy to send you the brochures.



Brochure "Tank and Equipment Cleaning Nozzles"

Brochure "Air Nozzles and Accessories"

Brochure "VarioSpray"

Brochure "Pneumatic Atomizing Lances"

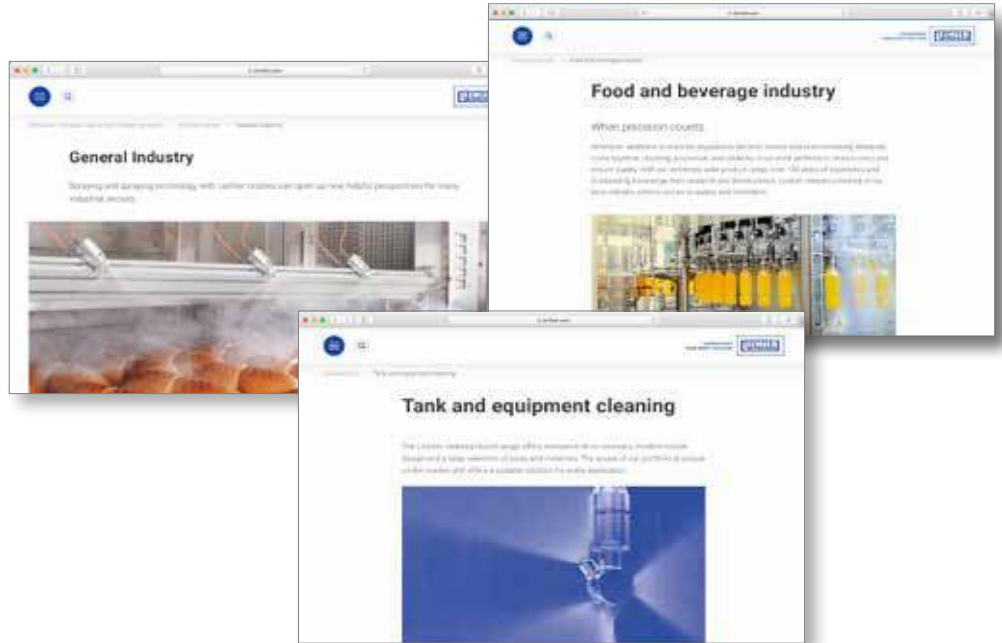
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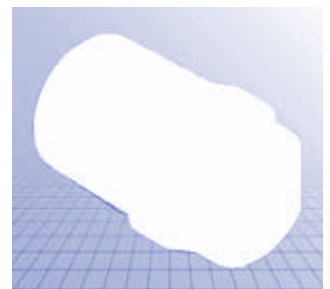
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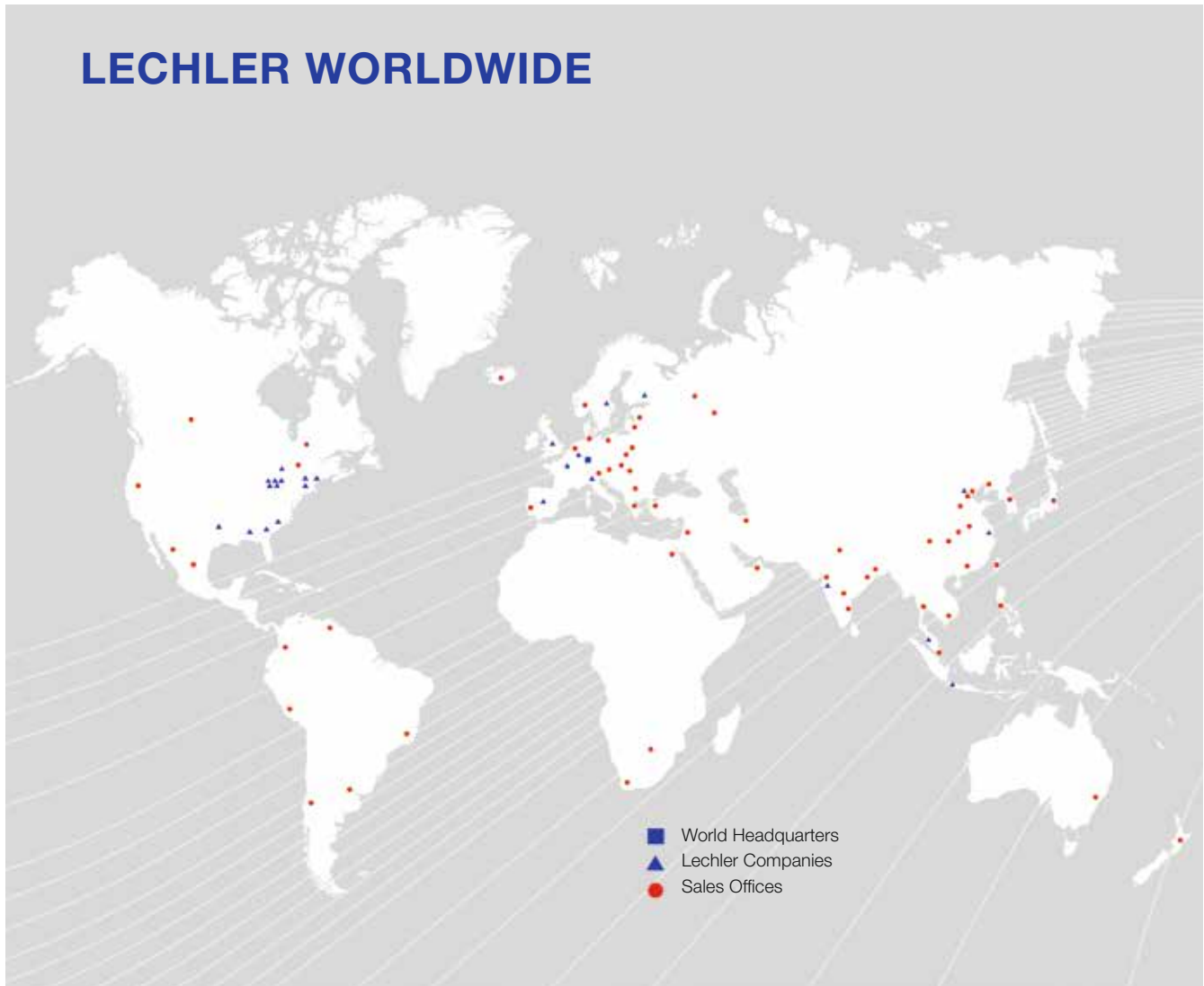
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- Calculation of pipe diameters

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P.O. Box 13 23 · 72544 Metzingen, Germany · Phone: +49 7123 962-0 · Fax: +49 7123 962-301 · info@lechler.de · www.lechler.com

ASEAN: Lechler Spray Technology Sdn. Bhd. · No. 23, Jalan Teknologi 3/3A · Taman Sains Selangor 1 · Kota Damansara, PJU 5 · 47810 Petaling Jaya · Malaysia · info@lechler.com.my

Belgium: Lechler S.A./N.V. · Avenue Mercator 6 · 1300 Wavre · Phone: +32 10 225022 · Fax: +32 10 243901 · info@lechler.be

China: 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

Finland: Lechler Oy · Jäspilänkatu 18 · 04250 Kerava · Phone: +358 207 856880 · Fax: +358 207 856881 · info@lechler.fi

France: Lechler France, SAS · Bât. CAP2 · 66-72, Rue Marceau · 93558 Montreuil · Phone: +33 1 49882600 · Fax: +33 1 49882609 · info@lechler.fr

Great Britain: Lechler Ltd. · 1 Fell Street, Newhall · Sheffield, S9 2TP · Phone: +44 114 2492020 · Fax: +44 114 2493600 · info@lechler.com

India: Lechler (India) Pvt. Ltd. · Plot B-2 · Main Road · Wagle Industrial Estate · Thane (W) · 400604 · Phone: +91 22 40634444 · Fax: +91 22 40634497 · lechler@lechlerindia.com

Italy: Lechler Spray Technology S.r.l. · Via Don Dossetti 2 · 20080 Carpiano (MI) · Phone: +39 02 98859027 · Fax: +39 02 9815647 · info@lechleritalia.com

Spain: Lechler S.A. · Avda. Pirineos 7 · Oficina B7, Edificio Inbisa I · 28700 San Sebastián de los Reyes, Madrid · Phone: +34 91 6586346 · Fax: +34 91 6586347 · info@lechler.es

Sweden: Lechler AB · Kungsängsvägen 31 B · 753 23 Uppsala · Phone: +46 18 167030 · Fax: +46 18 167031 · info@lechler.se

USA: Lechler Inc. · 445 Kautz Road · St. Charles, IL, 60174 · Phone: +1 630 3776611 · Fax: +1 630 3776657 · info@lechlerUSA.com