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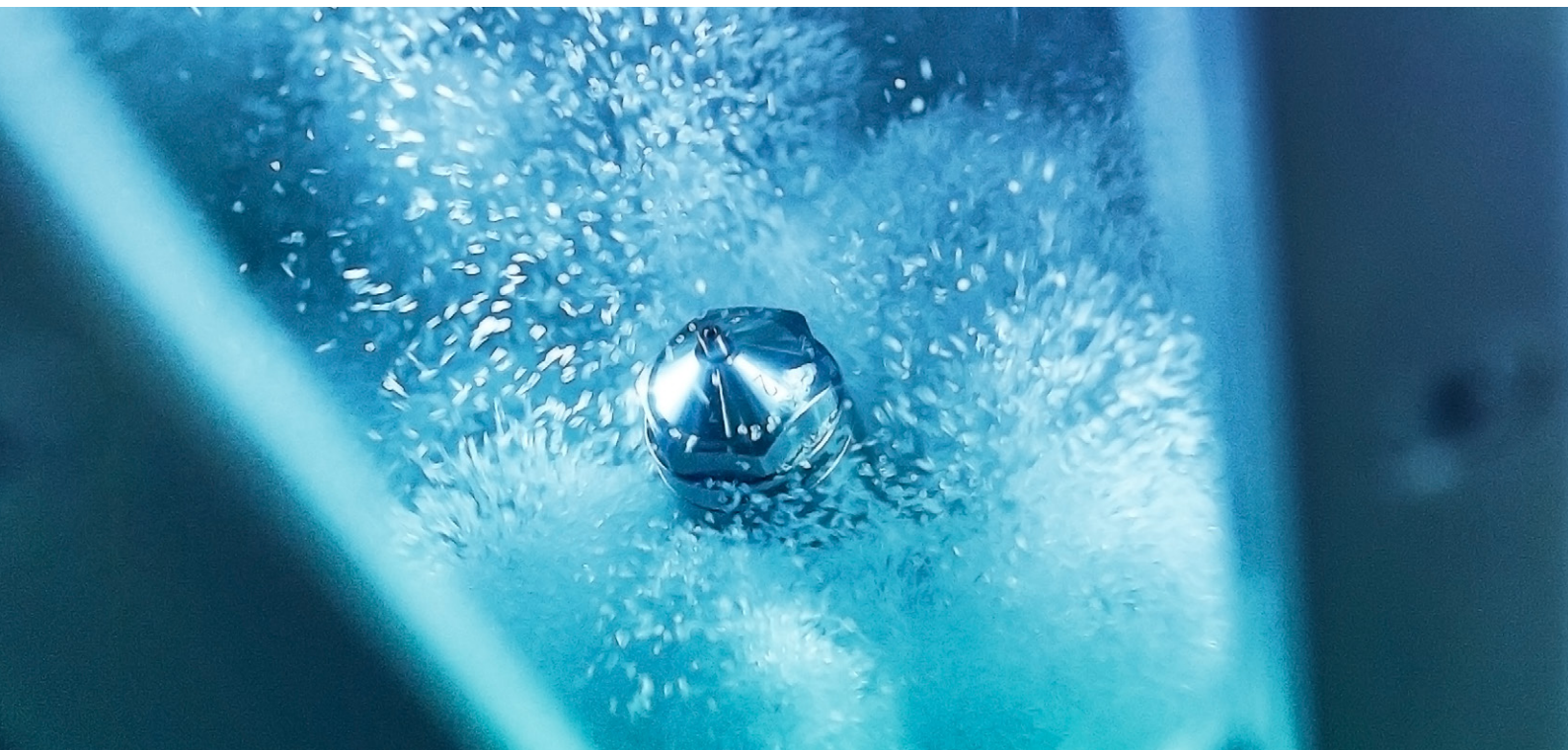
Living for Solutions:
Solutions for all fluidised bed processes



SCHLICK nozzles ensure movement

The basic principle of fluidised bed technology

The basic principle is (apparently) simple. A static bulk of solid particles is fed in at sufficient speed by a stream of gas and broken up, causing individual particles to float: the solid particles seem to 'flow', giving the appearance of liquid. This process is thus referred to as fluidisation (giving the name 'fluidised bed'). The large contact area between the solid content and the fluidisation gas encourages heat and mass transfer processes, not just between the particles and the gas but between the individual particles as well.



Sophisticated processes such as agglomeration, coating or granulation help to create something entirely new, such as enhanced product features or new formulations. The chosen fluidised bed process has a significant impact on the properties of the product. The targeted injection of liquid and thus the perfect use of two-substance nozzles play an important role in this. This is the case for processing in batches or for mass production in continuous systems, whether for systems with top or bottom spray technology. SCHLICK provides tried-and-tested solutions for the requirements of the pharmaceutical and food sectors as well as for industry.



Top spray:
Ideal for improving product
handling

Top and bottom spray

Different spraying techniques are used in the fluidised bed depending on the application and technical context. Top spray coating is where the liquid is sprayed from above to fully coat the fluidised particles. Bottom spray coating, on the other hand, uses nozzles in the fluidised bed distributor plate to spray from below. Combining bottom spray with a draft tube (Wurster method) allows the product to be moved in a controlled manner, producing a very even coating.

Bottom spray:
The ideal solution for high product
uniformity



Pharma spray-units. Perfectly connected.

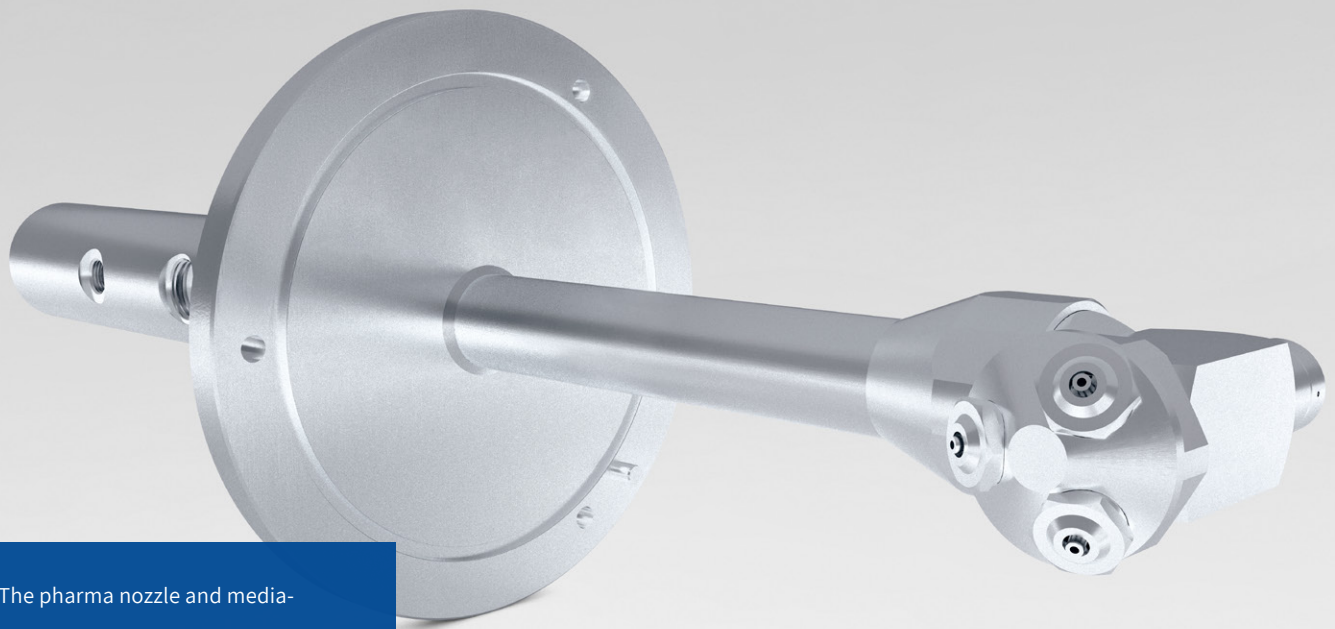
The media-connector forms a perfect connection with the pharma nozzle and offers the highest possible level of protection for the supply unit. This combination is particularly needed when it comes to coating, agglomerating or drying in large drums or in hard-to-reach work areas.



Pharma spray-unit

Increasingly more applications in the pharmaceutical industry are requiring spray systems that comprise a special media-connector and the nozzle itself.

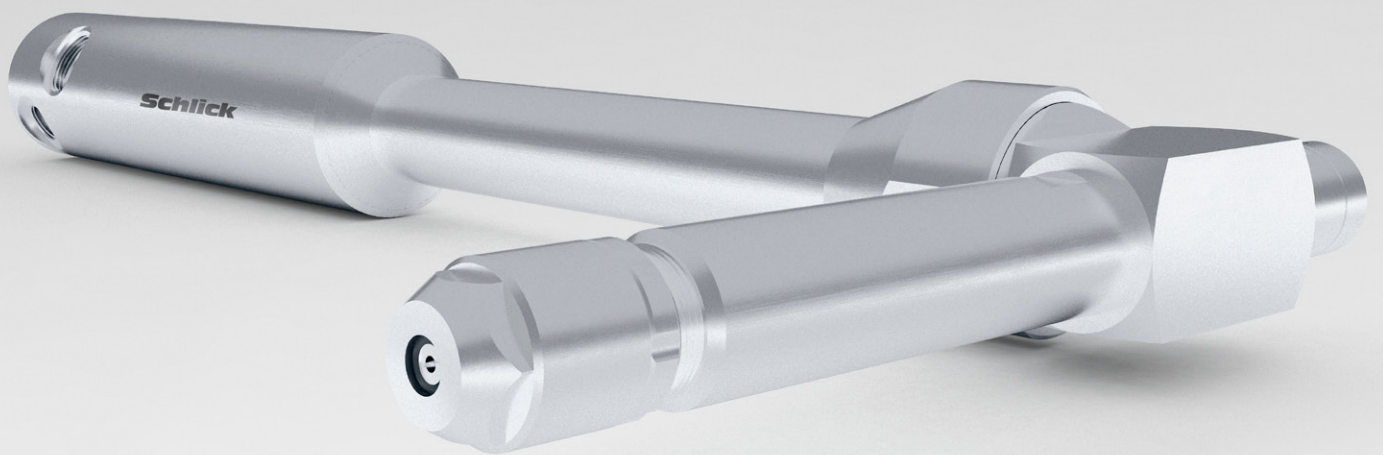
For this requirement, SCHLICK developed the pharma spray-unit.



The pharma nozzle and media-connector form a safe and stable unit. Individually customised for the relevant application.

The pharma nozzle and media-connector are firmly connected. For example, via a screw thread, clamp connection or push-in connectors, or even using customised solutions. Pipe lengths for the media-connector made of acid-resistant stainless steel are produced precisely according to the customer's requirements. Owing to processing specifications, lengths of up to two meters or greater are possible. Inconvenient installation and adjustment errors are a thing of the past, as the nozzle is securely connected to the media-connector.

Depending on customer requirements, pressure nozzles, two-substance nozzles or nozzle heads are used.





Convenient.

Specially-designed supply units for pressure and two-substance nozzles.

Versatile.

Designs can be adapted to all nozzle designs.

Safe.

Includes customised protective supply pipe, also available with casing pipe.

Customised.

Customer-specific designs for all sectors and applications.

Functional.

No bothersome conventional hose feed lines.

Tested.

Comprehensive quality management system (QMS), including for individual configurations.

Schlick

Our basic nozzle models for the fluidised bed



Categorie	Two-substance nozzle	Two-substance nozzle	Two-substance nozzle
Type	Laboratory nozzle	Production nozzle	Production nozzle
Model	970	940	0/2 - 0/5
Process			
Agglomeration	■	■	■
Coating	■	■	■
Granulation	■	■	■
Process engineering			
Top spray	■	■	■
Bottom spray	■	■	■
Spray specifications			
Spray angle	10° - 40° * max. 70° **	10° - 40° * max. 70° **	10° - 40°
Droplet size	10 - 50 µm	10 - 150 µm	10 - 150 µm
Capacity	min. (S8): 0.028 l/h max. (S4): 30.0 l/h	0.05 - 2.0 l/min	0.1 - 10.0 l/min
Spray pattern	Circular full-cones* / oval flat spray **	Circular full-cones* / oval flat spray**	Circular full-cones
Characteristics	Atomises very small quantities of liquid, suction or compression principle, modular system, available with ABC-Technology	Very fine atomisation, suction or compression principle, modular system, wide range of models	Lance model with shaft, modular system, wide range of models

* with standard air cap / ** with flat air cap

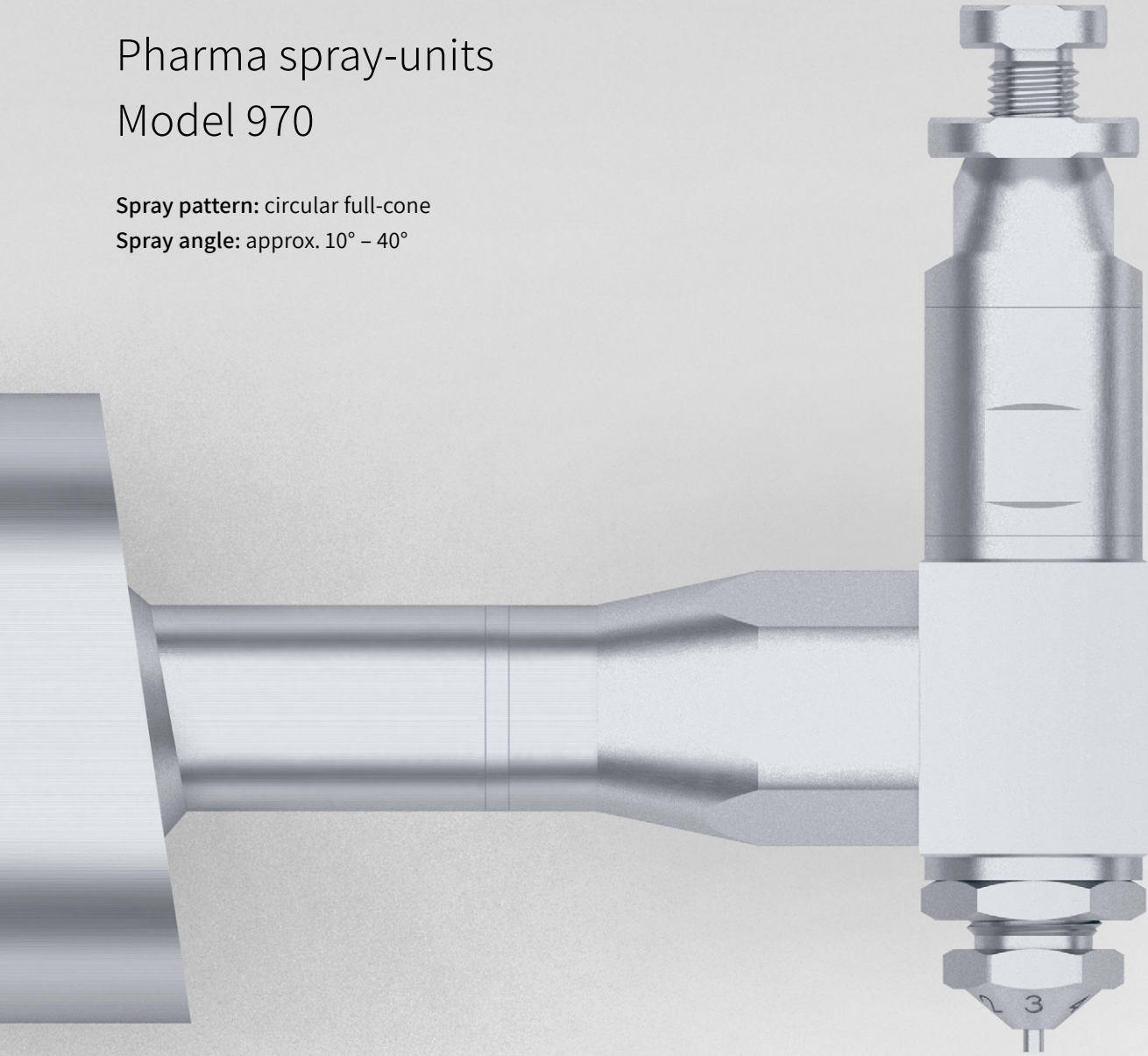
Our basic nozzle models for the fluidised bed

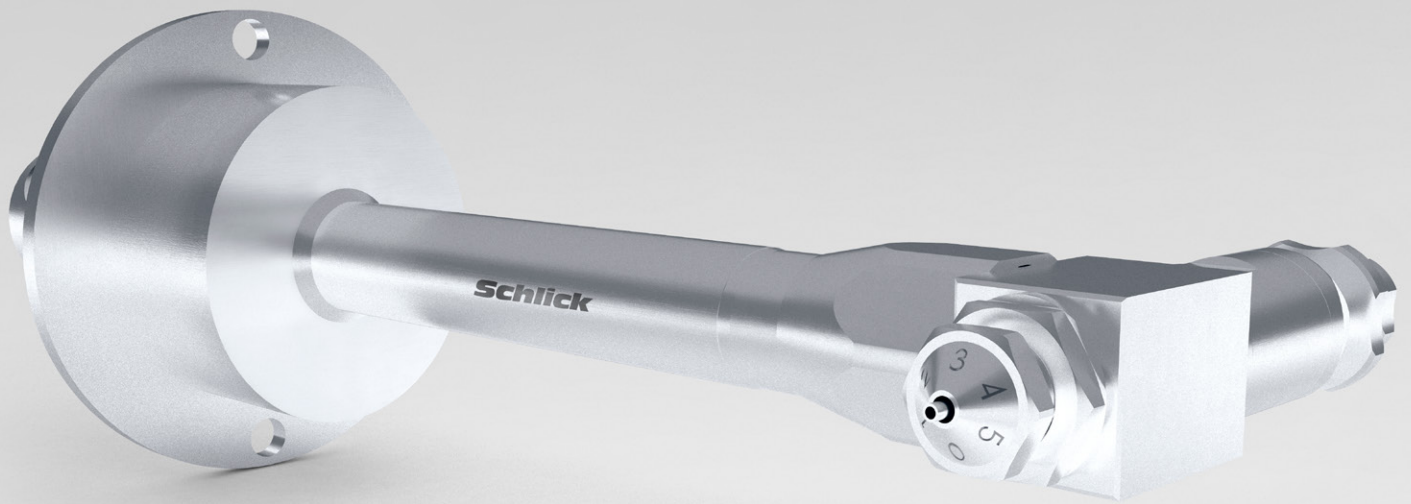


Categorie	Two-substance nozzle	Three-/four-substance nozzle
Type	Production nozzle	Production nozzle
Model	937	946-0/56
Process		
Agglomeration	■	■
Coating		■
Granulation	■	■
Process engineering		
Top spray	■	■
Bottom spray		
Spray specifications		
Spray angle	30° – 120°	10° – 40°
Droplet size	10 – 150 µm	10 – 150 µm
Capacity	Dependent on application	0.05 – 40.0 l/min
Spray pattern	Several circular full-cones	Circular full-cones
Characteristics	External multi-head mixing system for producing a wider spray cone, large surface coverage, nozzle heads have 3, 6 or 7 heads as standard	Very fine atomisation, simultaneous mixing of several liquids, modular system, wide range of models

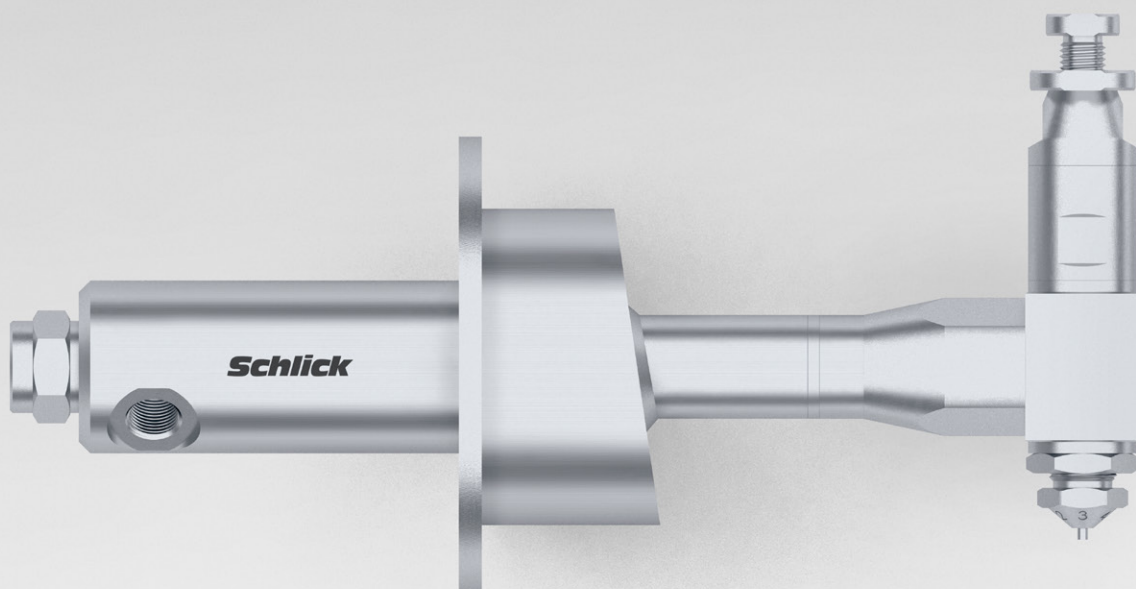
Pharma spray-units Model 970

Spray pattern: circular full-cone
Spray angle: approx. 10° – 40°





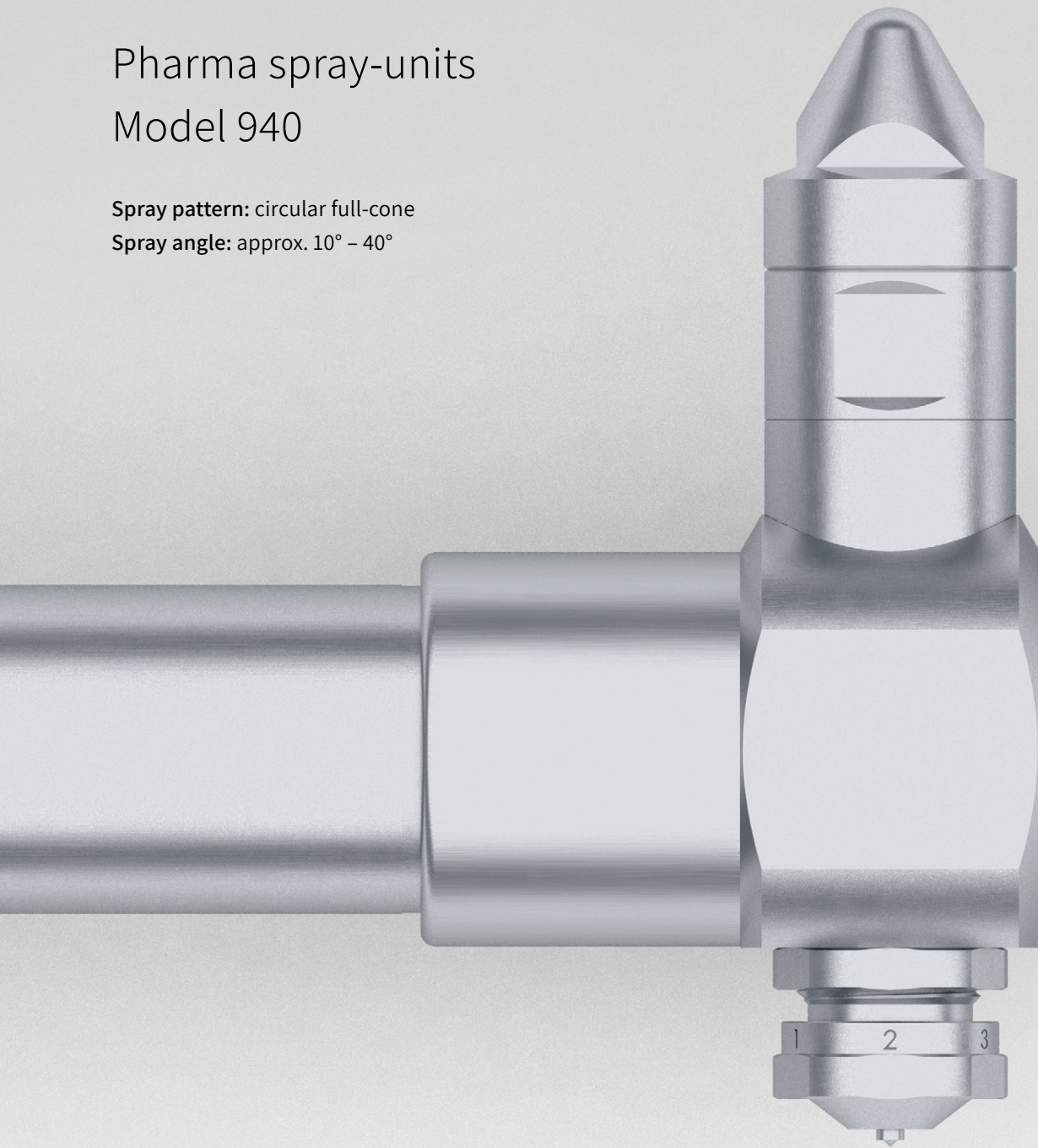
The **SCHLICK model 970** is a high-precision two-substance nozzle: The air cap with scale enables the precision adjustment of the air flow rate for the atomization medium. The SCHLICK model 970 is manufactured as a modular construction. This means that it can easily be rebuilt into other designs. Replacement parts are available for all individual parts, with reproducible results ensured. This, combined with the **media-connector** (supply unit), forms the **SCHLICK pharma spray-unit**. The unit is firmly connected using screw threads, clamp connections or push-in connectors. Customised solutions are also available. Pharma spray-units are manufactured with pipe lengths of up to two metres or more.



Pharma spray-units Model 940

Spray pattern: circular full-cone

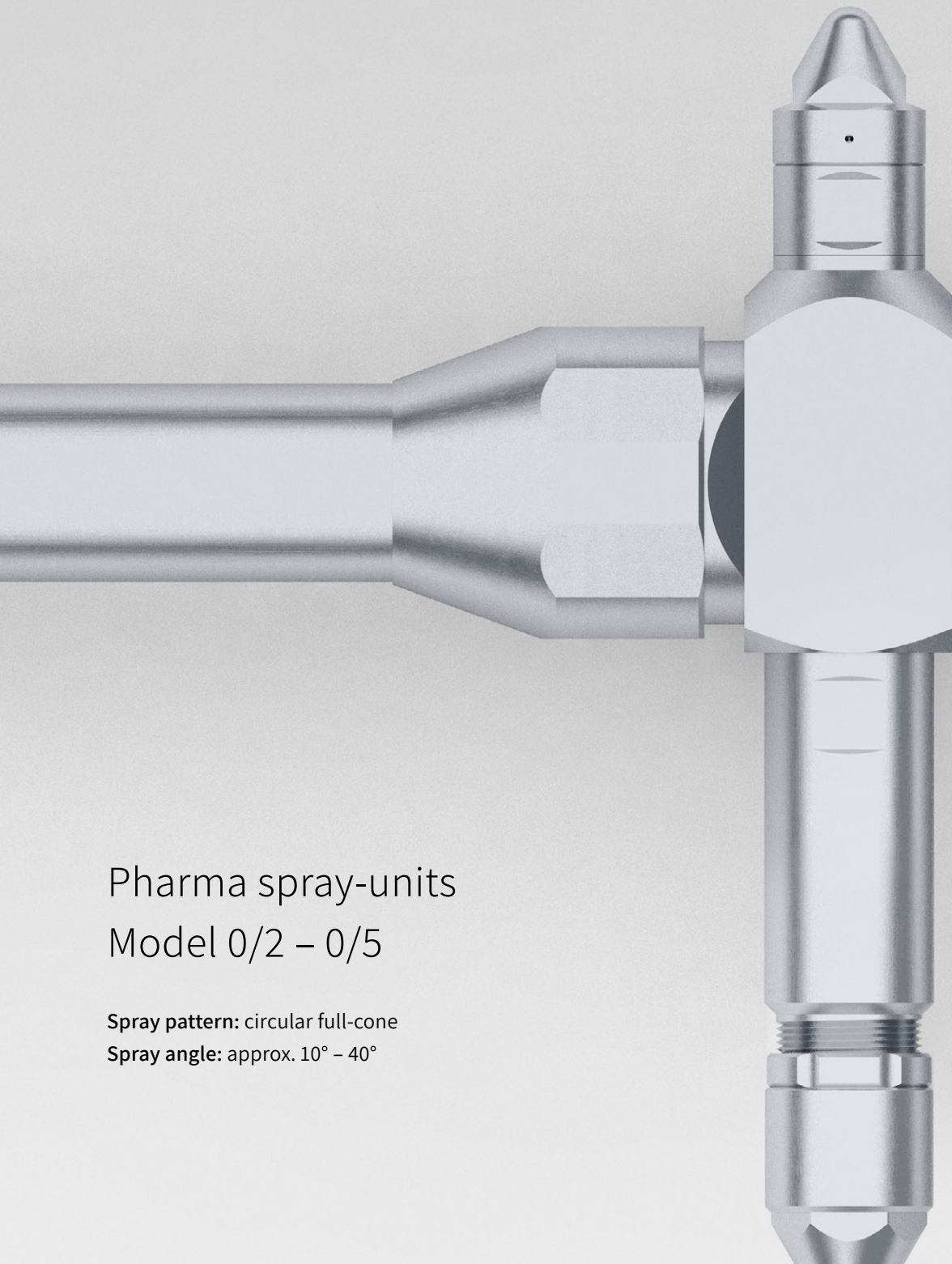
Spray angle: approx. 10° – 40°





The **SCHLICK module system range 940** provides completely homogeneous and reproducible spray results with a regular spray angle of 10 – 40°. The SCHLICK model 940 is manufactured as a modular construction. This means that it can easily be rebuilt into other designs. Replacement parts are available for all individual parts, with reproducible results ensured. This, combined with the **media-connector** (supply unit), forms the **SCHLICK pharma spray-unit**. Supply unit lengths are made from acid-resistant stainless steel as standard, produced according to the customer's exact requirements and securely connected to the pharma nozzle.

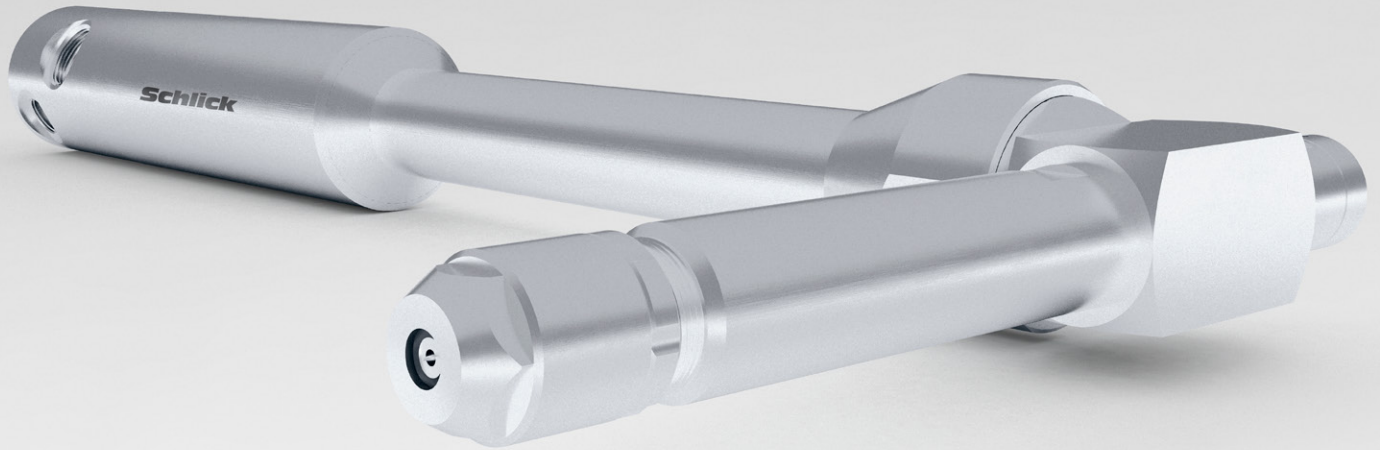




Pharma spray-units
Model 0/2 – 0/5

Spray pattern: circular full-cone

Spray angle: approx. 10° – 40°



Two-substance nozzles from the 0/2 – 0/5 model series are tried-and-tested spray nozzles in a shaft design for production scale applications. The range is available with individual shaft lengths as standard. Two-substance nozzles as lance models also allow very fine atomisation of large liquid quantities. Replacement parts are available for all individual parts and reproducible results are ensured. Designed for hard-to-reach work areas, the 0/2 – 0/5 pharma nozzles are firmly connected to the media-connector, forming the SCHLICK pharma spray-unit. They are available in a wide range of designs and are manufactured or adapted for the desired application.

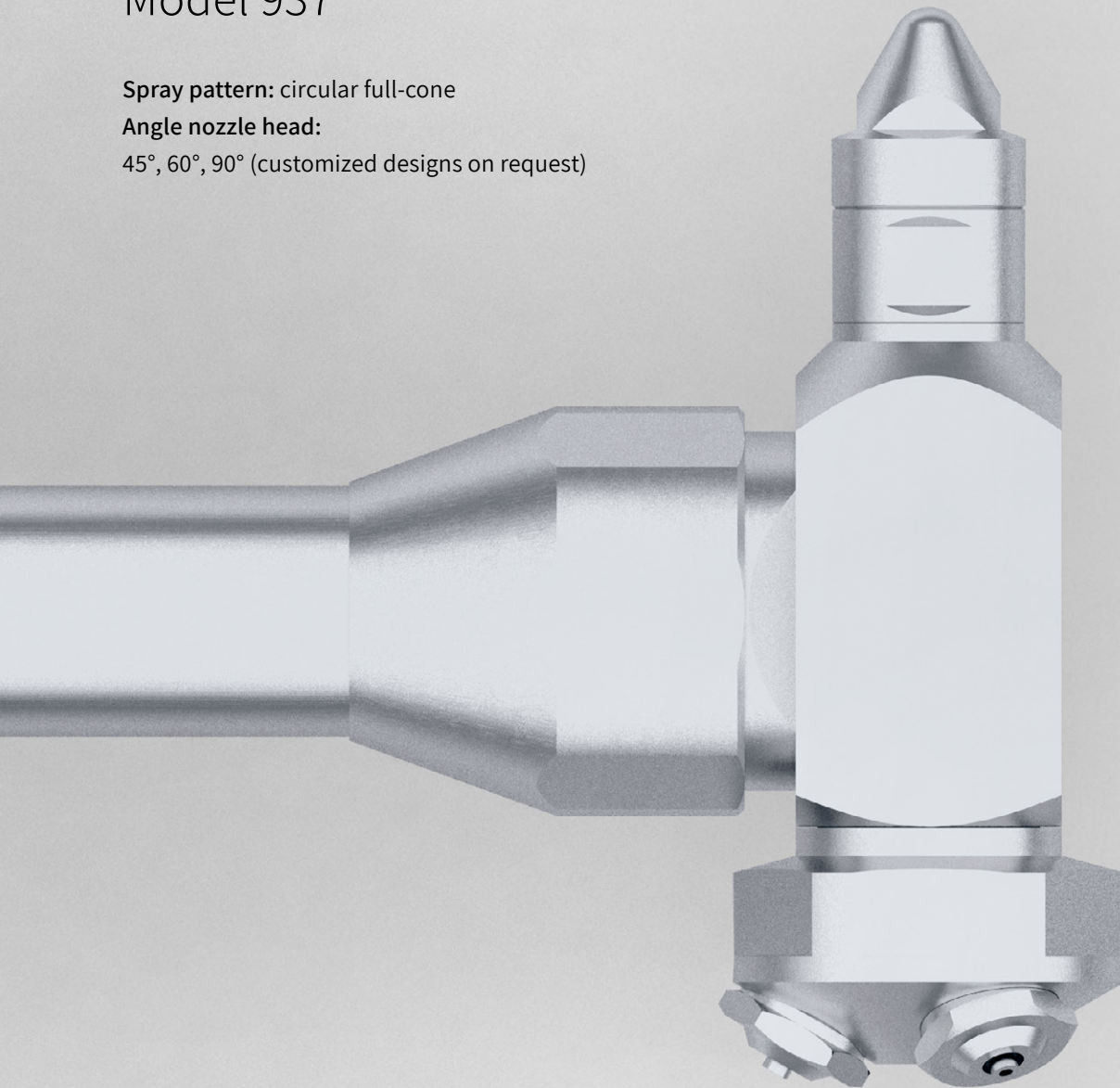


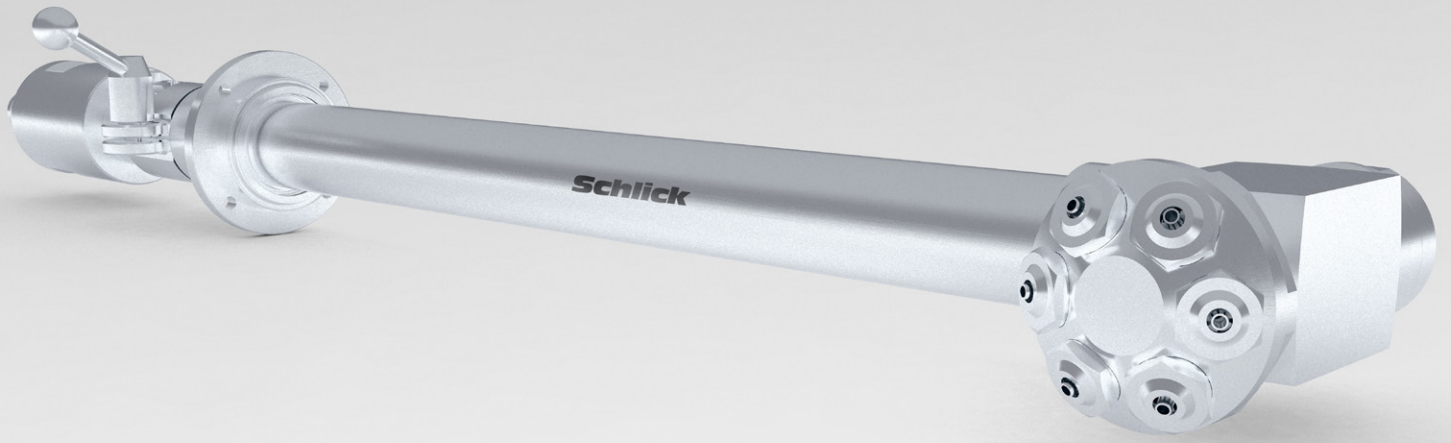
Pharma spray-units Model 937

Spray pattern: circular full-cone

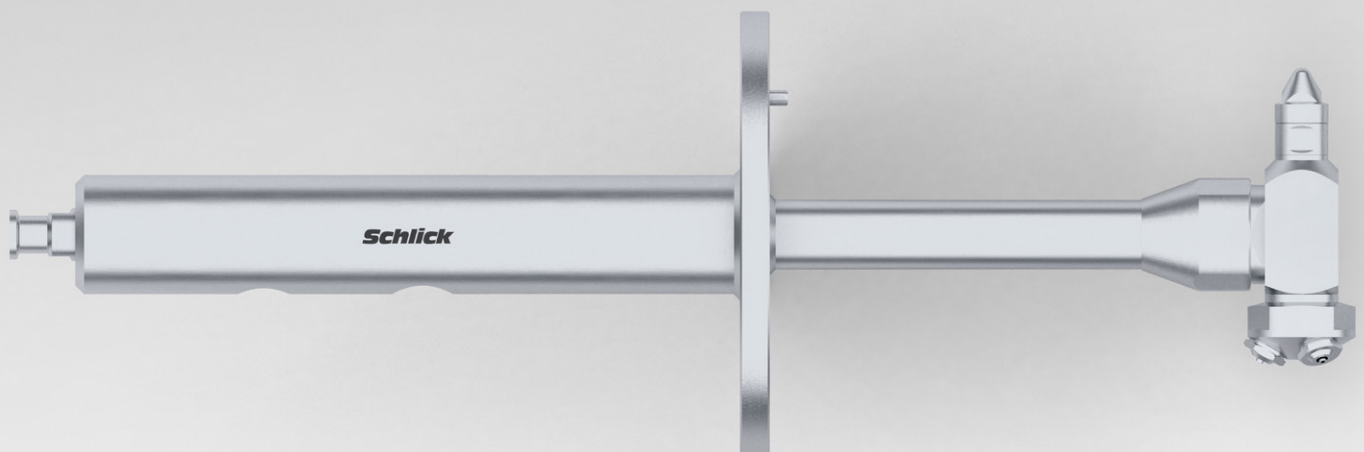
Angle nozzle head:

45°, 60°, 90° (customized designs on request)





The **module system range 937** guarantees extremely homogeneous spray behaviour for maximum surface coverage. Nozzle heads with differing spray angles enable a wide range of applications. Nozzles have three or six heads as standard. The **SCHLICK pharma spray-unit** consists of the perfect combination of the pharma nozzle 937 and the **media-connector**. It is primarily used in large fluidised bed systems or in hard-to-reach work areas for sophisticated processes such as agglomeration, coating or drying.



Three and four-substance nozzles – the details

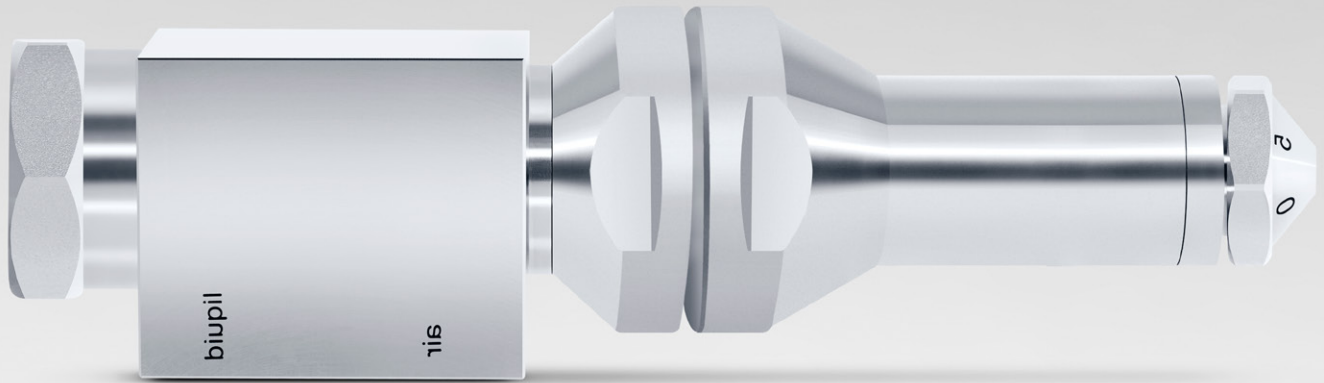
SCHLICK multi-substance nozzles allow very fine atomisation of several liquids with one nozzle and only one atomising medium (air, gas or steam). Reactions between the various liquids inside the nozzle are ruled out, as the media have no contact until they mix externally when leave the nozzle's orifice. The droplet size can be individually set from the ratio of the drive media mass to the liquid mass. A liquid control range of 1:10 is achievable.

Spray pattern:
circular full-cone

Spray angle: 10° – 40°

Capacity: 0.05 – 40.0 l/min





Two-media nozzle model 970 form 0 S3
with shaft and screw thread for installation
through container walls or in flanges.

Custom variations and individual designs

Many of our customers require custom solutions and bespoke adjustments, which can only be achieved through close consultation with expert advisers and engineers. No matter what their requirements, our customers know that they can rely on our expertise. With our fast and flexible approach, we will work to find a solution that meets your exact requirements and develop innovative technologies to realise your goals. Our approach is based on two key pillars: a high level of vertical integration and extensive experience in the development and optimisation of spray technology systems. More than 90,000 designs and solutions pay testament to our success.

Two-substance nozzle model 0/41 with a heating
or cooling jacket. Variable shaft length as per
customer specifications and requirements.



Process technologies

Agglomeration

A powder's fine particles are fused together using a binding agent to form larger groups of particles, which makes them easier to process. Equally, for many substances it is sometimes only possible to achieve good solubility by increasing particle porosity through agglomeration or instantisation. Substances created through agglomeration ensure a good flow of material and lower dust levels in the surrounding area.

Coating

Fluidised beds are used to coat particles that are considerably finer than those treated inside coating drums. The process has been specially adapted for the application of protective films which are specifically used, e.g. to release active agents, to act as a gastro-resistant layer, to mask tastes, to improve the product's appearance or even to improve its shelf life and storage stability.

Granulation

Spray granulation refers to the drying of fluids which results in the simultaneous formation of granulate. In fluidised beds this process is used to obtain compact and almost circular granulate with outstanding physical properties. Compared to agglomeration, the granulate created here is harder and thicker. The continuous fluidised bed spray granulation process is suitable for all applications which require a homogeneous, dust-free granulate with a high bulk density.

Process technologies in comparison

Agglomeration

- improves flowability
- lowers risk of separation
- reduces percentage of fine dust
- improved tabletisation
- instantisation

Coating

- improves flowability
- lowers risk of separation
- reduces percentage of fine dust
- increases bulk density
- lowers hygroscopicity
- functional coating

Granulation

- dust-free
- good fluidity
- good dosing control
- good dispersibility
- good solubility
- low abrasion
- compact structure
- low hygroscopicity
- high bulk density
- compact surface
- narrow grain size distribution

Your application. Our nozzle.
Our promise: Living for solutions.

Consultation, engineering, production and testing.

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The ideal solution for your application.

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