



**SCHLICK Two-Substance Nozzle Model 930 S45 ABC**  
with patented ABC-Technology®  
(D4.1085/1 Version 1.0)

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## Safety-Technical Data Sheet

Important Information for Operators, Users and Fitters

**Introduction:** This nozzle has been developed using the latest state of technology and accomplishes the current national and international safety requirements. This nozzle offers a high degree of operational reliability, thanks to experience of many years in the field, research and development and to a permanent quality control provided in our company. **In normal operation the nozzle is safe.** Nevertheless and in particular if certain operational parameters are not met, there are some potential sources of danger to personnel, material and for the optimal sequence of the operation.

So, these operating instructions are comprising basic safety instructions which are to be observed with regard to the configuration, the operation and the assembling and disassembling of the nozzle. They have to be studied by the operator, user and fitter before assembling or disassembling the nozzle and have steadily to be at the disposal of the aforesaid persons.

### General safety requirements:

- The nozzles have to be used only as per their usage to the intended purpose. Any changes of the operational conditions are to be clarified with the manufacturer.
- A usage to the intended purpose includes also the observance of the various information and instructions of this safety-technical data sheet and of those given in the operating and assembling instructions, as well as the observance of all the regulations of the Employer's Liability Insurance Association.
- The operators have to be familiarized with the method of function and with the handling of the nozzle.
- Installation, configuration, putting-into-operation and disassembling or assembling are to be carried out only by experienced and skilled personnel.
- Operation of the nozzle only by experienced resp. authorized users.
- Conversions and changes of the nozzle to be made only by authorized skilled personnel and after having consulted the manufacturer. Each and every conversions or changes made by other persons or conversions and changes, which have not been agreed with the manufacturer, will lead to a complete exclusion of liability.
- Prior to every putting-into-operation, the following has to be carried out, resp. to be observed:
  - functional test
  - checking, that all the nozzle connections are fitted firmly and tightly
  - labour safety
- The nozzles are exposed to the following kinds of wear and tear:
  - Chemical
  - Thermal
  - mechanical
- Therefore, the nozzles have to be checked regularly and if necessary, to be replaced. **Operation of the nozzles only in a technical perfect condition.**



Do not ever direct the liquid jet or the spray towards persons or electrical appliances. Risk of injury by chemical additives, high pressures, solid agents, current strike. **ATTENTION: In case of media like gas, air or steam, the spray jet is hardly visible.**



The danger exists, that the spray jet will be inhaled. In particular when chemicals or other noxious substances are atomized, remedial measures are to be taken by appropriate steps and devices (e.g. exhaustion, suitable breathing protection). The working area has to be adequately identified by suitable warning symbols.



During the atomizing process, the temperature of the medium/the media to be atomised is to be taken into consideration. The risk of burns or frostbite exists – remedy: suitable protective clothing to be worn.



If media are atomized which are detrimental to health, appropriate protective clothing has to be worn during assembling or disassembling of the nozzle.

- For adjustment, assembling and disassembling of the nozzle, only suitable tools shall be used.  
**ATTENTION: For adjustment, assembling or disassembling of the nozzle, all the pipes have to be depressurized and emptied.**
- Before assembling, the connections have to be cleaned.

In case of a non-professional and/or material appropriate handling of the nozzle, any claim on guarantee is cancelled.

## Operating Instructions for SCHLICK Flat-Spray Two-Substance Nozzle Model 930 Form 7-1 S45 with patented ABC-Technology® (D4.1085/1 Version 1.0)

### Design characteristics:

The nozzle exhibited static charge. The design, construction and inspection of the nozzle has been carried out in accordance with Directive 2014/68/EU and the AD-2000 legislative body.

### Assembly of the connecting pipes:

- Before connecting the nozzle, the connecting pipes have to be cleaned or to be blown through.
- The propellant (compressed air, gas) has to be connected at "PA/AA" (connecting thread G 3/8" inside thread), the liquid inlet at "L", the liquid outlet at "LR" (both connecting thread G 1/4" inside thread) and the control air at "CA" (connecting thread G 1/8" inside thread).  
PA/AA= pattern air/atomizing air; L= liquid inlet; LR = liquid recirculation; CA= control air
- Make sure, that the pipes are connected completely tightly.

### Operating conditions:

#### Propellant:

The propellant atomizes the liquid at a minimum pressure of 0.3 bar (g). By increasing the pressure of the propellant at constant liquid throughput, the droplets of the spray are becoming finer and the spraying angle is becoming bigger (maximum about 60°). The angle of the flat spray can be influenced by changing the throttle, available with bores in various sizes, inside of the pattern-air channel. Normally a throttle with a bore of 2.5 mm is mounted.

Included in delivery:

throttle – bore 2.0 mm (Item-No.: 43382)

throttle – bore 3.0 mm (Item-No.: 43383)

If no throttle is used, then it corresponds to a bore size of 3.5 mm.

#### Setting of the flat spray:

The flat spray is created by the combined effect of the central pressure of the atomizing air and the lateral pressure of the pattern air, i.e. using a throttle with a bigger bore (at constant pre-pressure of the propellant) brings an increase of the atomizing angle, however, care should be taken of a uniform distribution of the liquid within the spray.

After loosening the cap nut for the air-cap, the direction of atomization is adjustable by turning the flat-spray cap by hand. After setting, the cap nut has to be re-tightened well. Throughput of compressed air under various pressures and with various bore sizes of the throttle: see performance diagram (page 17).



**ATTENTION:** To obtain an economical flow speed of the compressed air of 40 – 60 m/s, in the feeding pipes the following cross sections **per nozzle** have to be guaranteed :

30 – 35 mm<sup>2</sup> per nozzle

**NOTE:** For the adjustment of the parameters PA/AA in dependence on the bore diameter of the liquid insert and on the viscosity of the medium to be sprayed under various liquid throughputs: see attached leaflet "Ideal ABC Spray" (pages 6 - 8).

#### Liquid:

The liquid has to be supplied under pressure. On the liquid side, the throughput can be set within certain limits by varying the pressure of the liquid. Throughput of the liquid (water) per single nozzle under various pressures and bores in the liquid insert: see performance diagram (page 18).

#### Control Air (CA):

Under a pre-pressure of about 3.0 bar (g), the needle releases the orifice of the liquid insert. The needle closes by spring pressure and interrupts the liquid supply as soon as the control-air pressure drops under about 0.8 bar (g).

**Cleaning of the liquid insert during operation:**

The nozzle is equipped with a cleaning needle which is operated by the control air. If, during operation, contaminations at the outlet bore of the liquid insert should occur, they can be cleaned off by switching-off the control air, without having to switch the nozzle off. At this, the cleaning needle penetrates through the outlet bore of the liquid insert, the liquid outlet is interrupted for this short moment and the contaminations are pushed off. After switching-on the control air, the needle is lifted again and the liquid insert is released again.

**Switching-on and switching-off the nozzle arm:**

- When **switching-on**, first the propellant valve (PA/AA) has to be opened, then the valve for the control air (CA).
- When **switching-off**, first the valve for the control air (CA) has to be closed, then the valve for the propellant (PA/AA).

**Maintenance and cleaning of the nozzle:**

In appropriate cycles, depending on the spraying medium, the nozzle has to be checked for any damages, to be cleaned and to be greased slightly. As detergents, cleaning solvents, cleaning rags, plastic spatula, ultrasonic cleaner or similar means shall be used. No hard objects!

A nozzle cleaning set with suitable tools is available with item-no. 53066-2!

Wearing parts (e.g. O-rings and/or seals) have to be examined optically and exchanged if necessary, while cleaning the nozzle.

**Use only suitable tools!**

Before assembly, all movable parts (piston, needle), all the threads and all the O-rings have to be greased slightly with a suitable lubricant.

Suitable lubricants are available at SCHLICK! Ask for our advice.

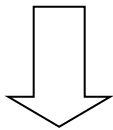
## Recommendation to find the “Ideal ABC-Spray” for a liquid with given throughput, viscosity and solid content

To make a momentary spray picture on a sheet of paper at 200 mm spray distance (see sketch on page 8) make the following procedure:

- Calibrate the liquid throughput (without air) for one nozzle with a special liquid bore by adjusting the velocity (rpm) of your peristaltic pump.
- Switch on the atomizing air (AA/PA).
- Start the peristaltic pump and switch on the control air (CA) immediately for 2 – 4 seconds.  
→ You will get the momentary real spray pattern, which would reach your tablet bed.

Now change the atomizing air (AA) and the pattern air (PA) in different steps of 0.5 bar (g).

For example:

Finer atomization! 	AA= 0.7 bar (g)
	AA= 1.0 bar (g)
	AA= 1,5 bar (g)
	AA= 2.0 bar (g)
	AA= 2.5 bar (g)

Our target is to achieve the condition when the ellipse shape is reached (no “round” pattern and no “horn” pattern).

A throttle with bore 2.5 mm is assembled inside the nozzle as standard. If a spray with over-humidification in the center is produced, use a throttle with bigger bore. An additional throttle with bore 3.0 mm belongs to the scope of supply of the nozzle. If no throttle is used, then it corresponds to a bore size of 3.5 mm.

If a “horn-pattern”-spray is produced, use a throttle with smaller bore. An additional throttle with bore 2.0 mm belongs to the scope of supply of the nozzle.

The ideal volumetric middle droplet size, in relation to the viscosity and solid content, is between 15 – 50 microns.

**No** big droplet spots on the paper! (especially around the ellipse area)

	Viscosity < 100 mPas	Viscosity > 100 mPas
Peristaltic pump calibrated 30 – 60 g/min	bore of liquid insert 0.8 – 1.0 mm	bore of liquid insert 1.0 – 1,2 mm
	Remark: Start the procedure at AA= 0.7 bar (g).....	
Peristaltic pump calibrated 60 – 120 g/min	bore of liquid insert 1.0 – 1.2 mm	bore of liquid insert 1.2 – 1.5 mm
	Remark: Start the procedure at AA= 1.0 bar (g).....	
Peristaltic pump calibrated 120 – 150 g/min	bore of liquid insert 1.2 – 1.5 mm	bore of liquid insert 1.5 – 1.8 mm
	Remark: Start the procedure at AA= 1.5 bar (g).....	
Peristaltic pump calibrated 150 – 180 g/min	bore of liquid insert 1.5 – 1.8 mm	bore of liquid insert 1.8 – 2.2 mm
	Remark: Start the procedure at AA= 2.0 bar (g).....	

The chosen bore size of the liquid insert is also influenced by the solid content of the liquid (pigments, talcum, polymers). Too small bore size at high solid content can block the liquid insert!

**The given values are only recommendations!**

**Important:**

Pulsing from the peristaltic pump is not only influenced by the throughput and bore size, also by:

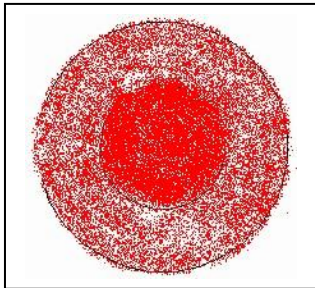
- the diameter of the flexible tube
- the length of the flexible tube
- the material and age of the flexible tube
- the number of roles of the peristaltic pump

**Complete interruptions of the flow caused by the pulsing of the peristaltic pump should be avoided!**

## Ideal Spray-Distance: 200 mm

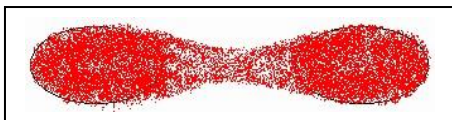
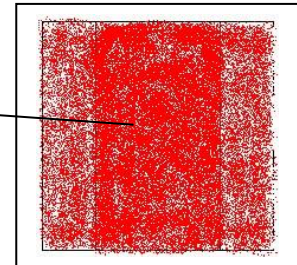
„Momentary Spray Pattern“

Paper pulled through the spray



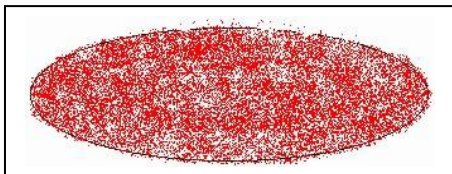
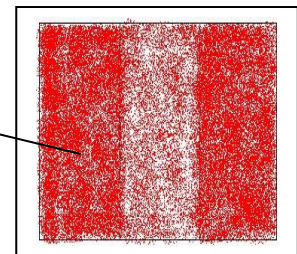
„Round Spray“

over-humidification in the center (high density of the volume flux)



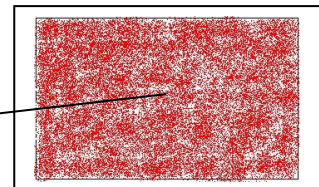
Extreme Flat-Spray  
„horn pattern“

edge jets



Ideal ABC-Spray  
„Ellipse“

Uniform droplet  
distribution



Try always to reach the ellipse shape in a distance of 200 mm!  
It is a balance of the forces and pressures between pattern air and atomizing air!



**Recommended accessories:**



SCHLICK-Lubricant Paraliq GTE 703; Item-Number 76738 (FDA approved, up to 150°C / 300°F)

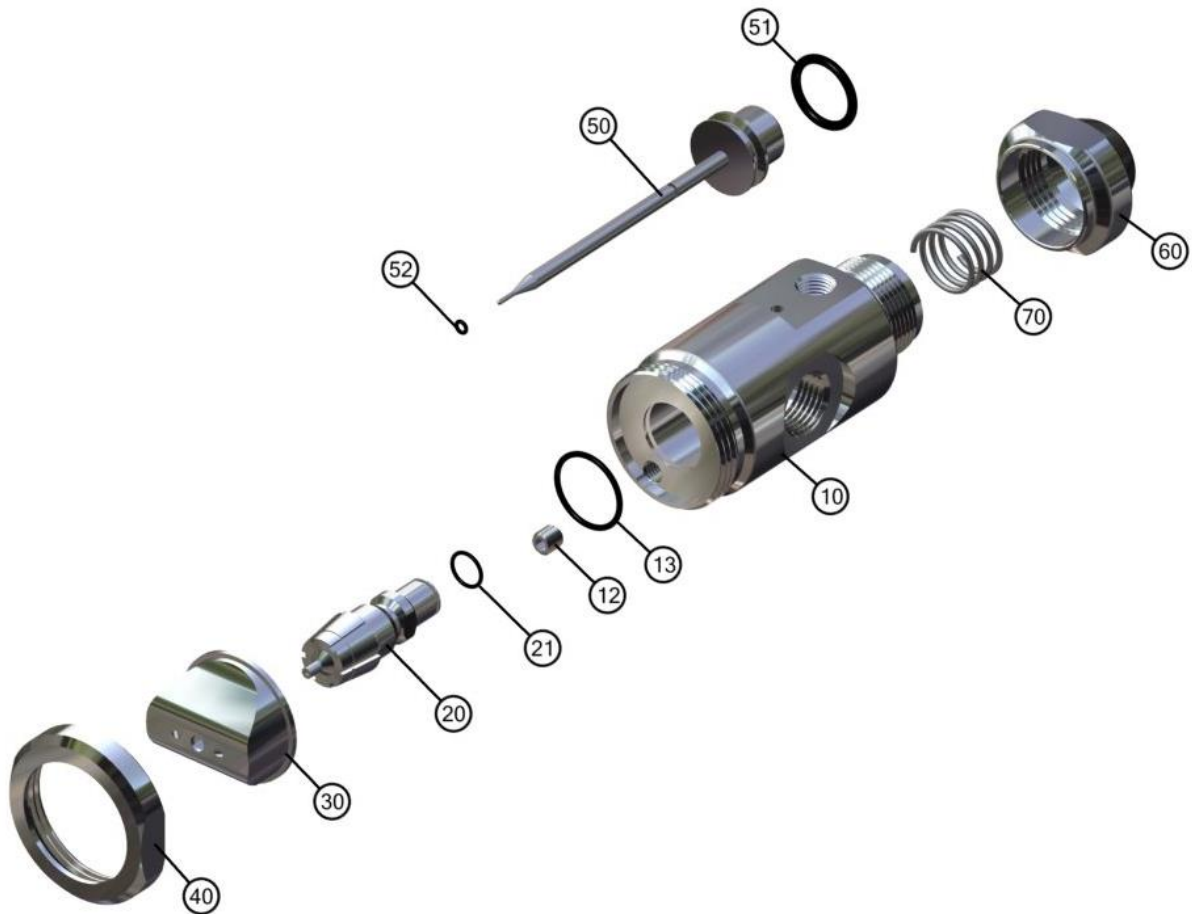


Lubricant OKS 250; Item-Number 54249 (up to 1400°C / 2550°F)



incl. special tool for gentle and nearly nondestructive disassembly of O-Rings

SCHLICK-Nozzle Cleaning Set; Item-Number 53066-2



ID	Quantity	Name
10	1	Nozzle Body
12	1	Throttle for Pattern Air; Bore 2.5 mm (= Standard)
12	1	Throttle for Pattern Air; Bore 2.0 mm
12	1	Throttle for Pattern Air; Bore 3.0 mm
13	1	O-Ring
20+21	1	Liquid Insert with O-Ring
21	1	O-Ring
30	1	ABC-Cap
40	1	Union Nut
50+51+52	1	Cleaning Needle with O-Rings
51	1	O-Ring
52	1	O-Ring
60	1	Sealing Cap
70	1	Pressure Spring

## Assembly Instructions for SCHLICK Flat-Spray Two-Substance Nozzle Model 930 Form 7-1 S45 with patented ABC-Technology® (D4.1085/1 Version 1.0)

### Disassembly:

**CAUTION!** If the nozzle shows any external pollution, it has to be cleaned unconditional before disassembly.  
(Recommendation: Use an Ultrasonic-Cleaner)


The Model 930/7-1 S 45 can be dismantled and reassembled without the requirements of any tools.

All threads are right-handed threads!

Figures in squared brackets represent the parts number of the detail drawing on page 10.



1. Unscrew sealing cap [60] by hand.

 **CAUTION: Sealing cap is under SPRING-PRESSURE!**



2. Remove spring [70] by hand.



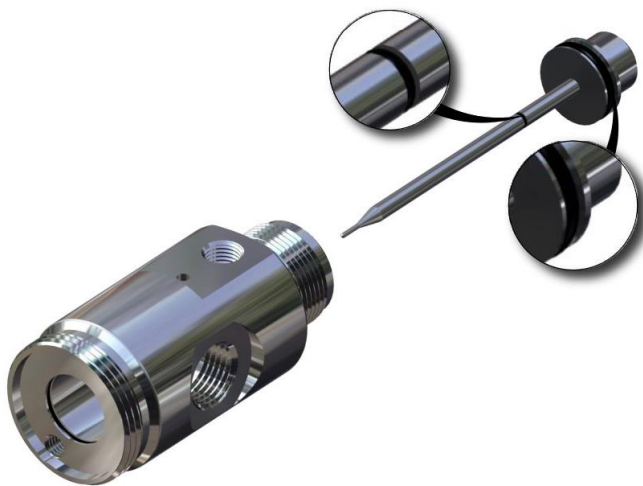
3. Unscrew union nut [40].



4. Remove flat spray cap [30] by hand.



5. Remove liquid insert [20] from nozzle body [10] by hand. Check the O-ring [21] of the liquid insert for any damages and replace it, if necessary.



6. Remove the needle [50], by pushing the needle upwards from the front of the body [10] by hand until the piston clears the back of the nozzle body, here the piston can be held and the complete assembly can be withdrawn by hand. Check the O-Rings [51 + 52] for any damages and replace them, if necessary.



7. Check the O-ring [13] of the nozzle body for any damages and replace it, if necessary.

**Use only suitable tools!**

For **re-assembly** of the nozzle the steps 1. – 7. have to be carried out in reversed order.

**Maintenance and cleaning of the nozzle:**

Do not clean the nozzle with any hard objects, use only plastic spatula, cleaning solvents, cleaning rags, ultrasonic cleaner etc. A nozzle cleaning set with suitable tools is available with item-no. 53066-2!

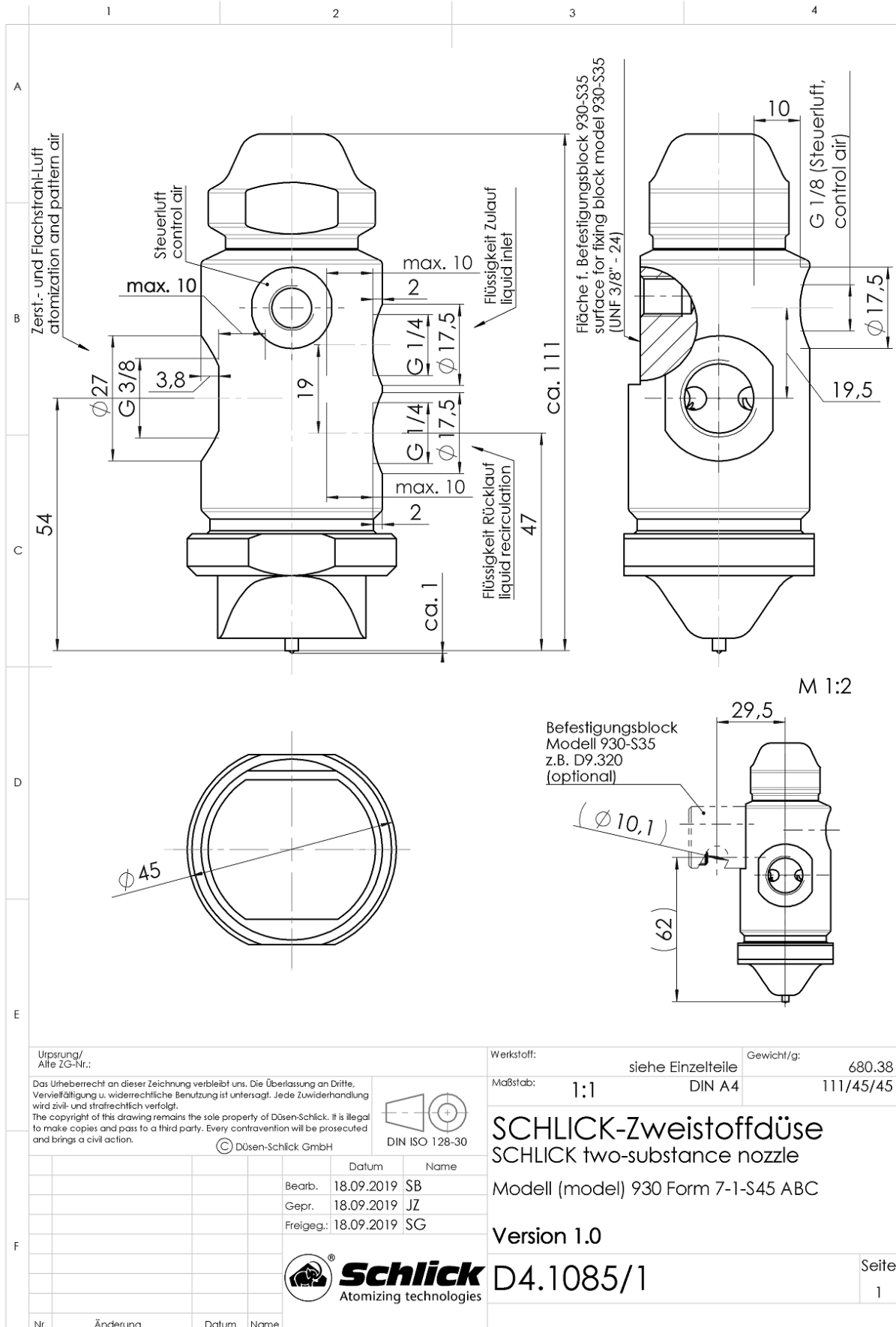
Movable parts (e.g. piston and needle), all O-Rings and all threads have to be lubricated slightly with suitable lubricants. Suitable lubricants are available at SCHLICK! Ask for our advice.

**Error-Checklist:**

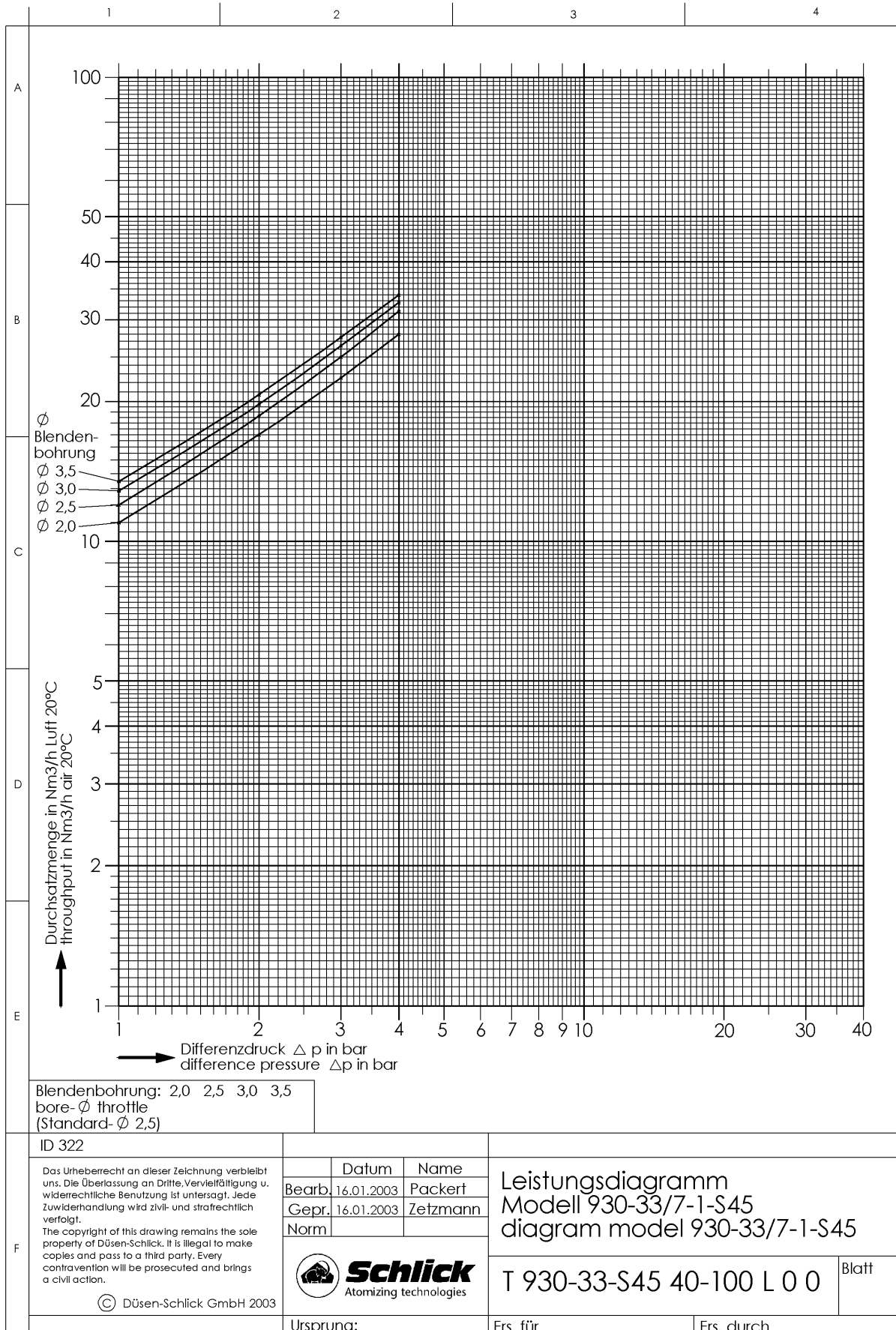
Problem	Reason	Elimination
Stringing and/or uneven spray pattern	Liquid insert and/or air cap polluted	Cleaning of the liquid insert and air cap
	Liquid insert and/or air cap damaged (scratches, deformation on the outlet-bores etc.)	Replace liquid insert and/or air cap
Sputtering spray pattern	O-Ring of the liquid insert damaged	Replace O-Ring
	O-Ring of the needle damaged	Replace O-Ring
Spray pattern is not rectangular to the axis of the ABC-air cap	Liquid insert polluted	Cleaning of the liquid insert
Asymmetrical spray pattern	Liquid insert polluted	Cleaning of the liquid insert
Cleaning needle does not open	No air pressure in the control air chamber	Check the control air distribution (min. pressure 3,0 bar (g) = 43 psi)
	O-Rings of the needle are swollen → wrong lubricant was used	Replace the O-Rings; use a suitable lubricant
Cleaning needle does not close	The control air line does not vent after closing the control air valve	Check the air bleed valve
	Needle – Spring is assembled in wrong sequence	Check position of the spring on the needle
	Spring is damaged	Replace spring
	Spring is missing	Fit new spring
	Cleaning needle is bent	Replace cleaning needle.
	Liquid insert and/or needle polluted	Cleaning of the liquid insert and air cap
	O-Rings of the needle are swollen → wrong lubricant was used	Replace the O-Rings; use a suitable lubricant
Sluggishness of the cleaning needle	O-Rings of the needle are swollen → wrong lubricant was used	Replace the O-Rings; use a suitable lubricant

Problem	Reason	Elimination
Liquid seepage, although the needle is closed	Liquid insert and/or needle polluted	Cleaning of the liquid insert and needle
	Sealing surface of the liquid insert and/or needle is damaged	Replace liquid insert and/or needle
Liquid in the control air chamber	O-Ring of the needle damaged	Replace O-Ring of the needle
Required liquid throughput can not be reached at given pump speed	Liquid insert polluted	Cleaning of the liquid insert
	Needle does not open completely → spring is offset	Open control air valve → turn sealing cap (approx. ½ revolution) anti clockwise and clockwise, the spring should slip into correct position
Intermittent spray (can also effect a clogging of the liquid insert)	Bore diameter of the liquid inserts too large	Use liquid inserts with smaller bore diameter (cleaning needle has to be changed as well)
	Too few rollers on pump head	Use a pump head with more rolls
	Inside diameter of the hose is too big for the number of the rollers of the pump head	Use a hose with smaller inside diameter
Intensive dust-film on the nozzle	Spray drying because of too high air throughputs	Reduce atomization air pressure



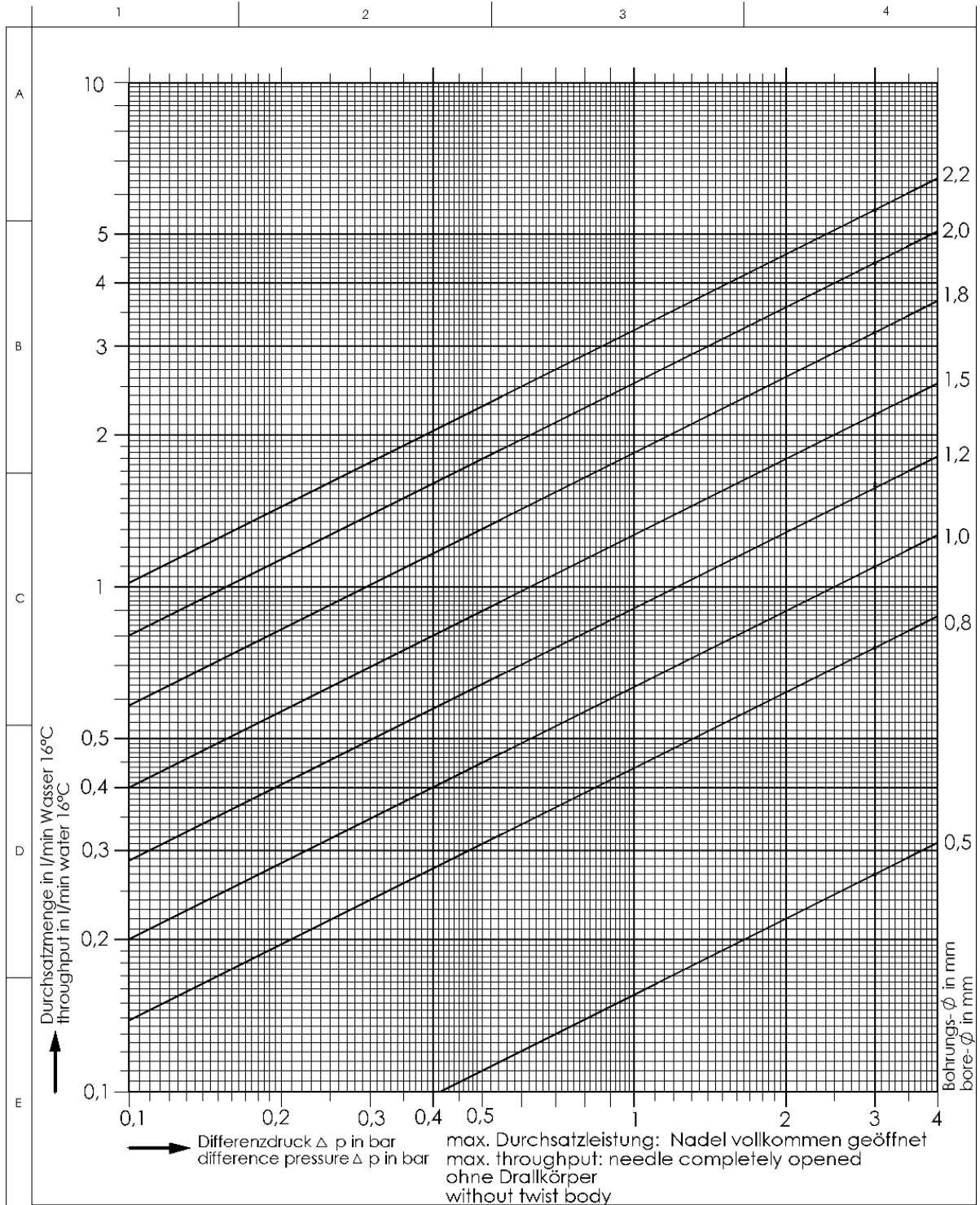






Blendenbohrung: 2,0 2,5 3,0 3,5  
bore-Ø throttle  
(Standard-Ø 2,5)

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