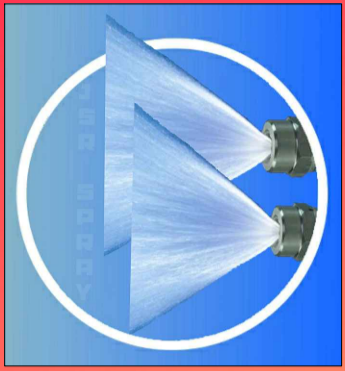


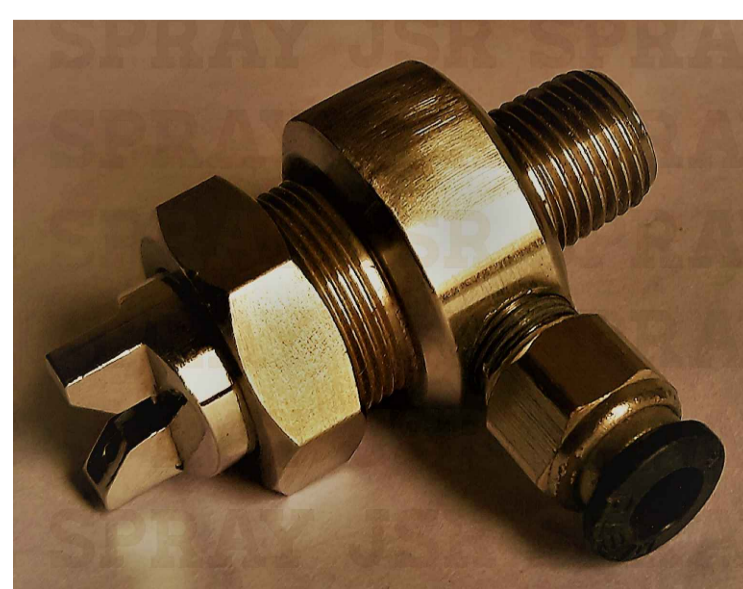
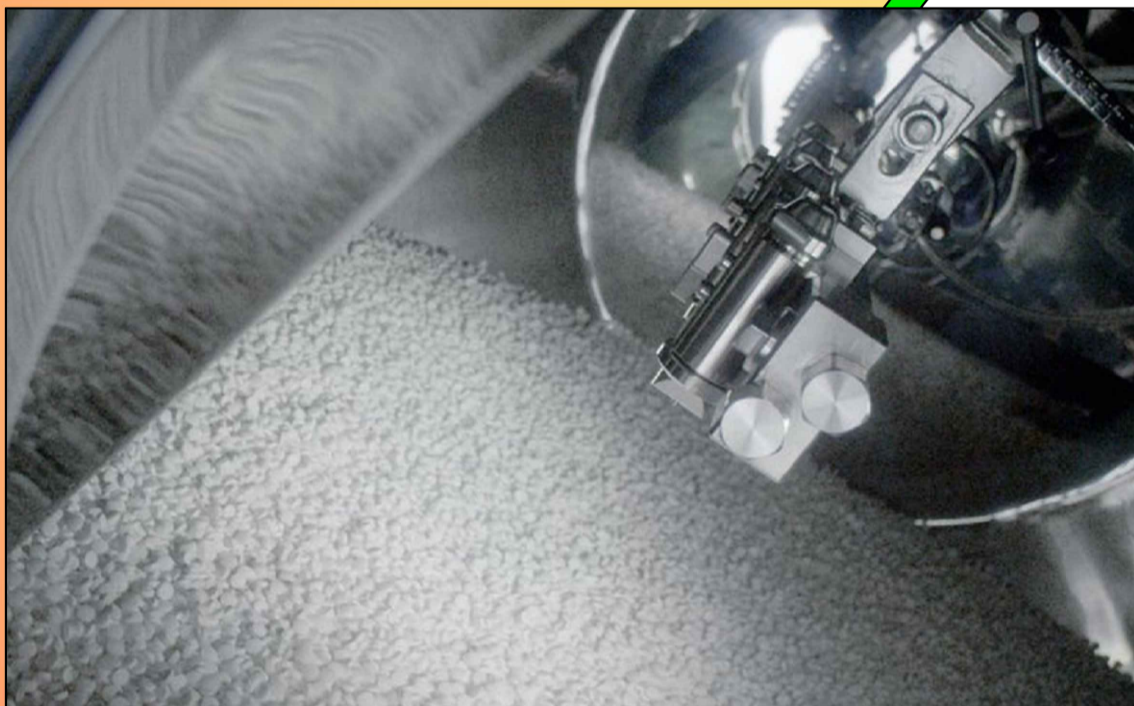
JSR SPRAY SYSTEMS (INDIA)



AIR ATOMIZING NOZZLES

APPLICATIONS

- 👉 Tablet coating
- 👉 Thin Film Coating
- 👉 Humidification
- 👉 Paper Moisturising
- 👉 Dust Suppression



AIR ATOMIZING NOZZLES

INTRODUCTION, DESIGN AND FEATURES

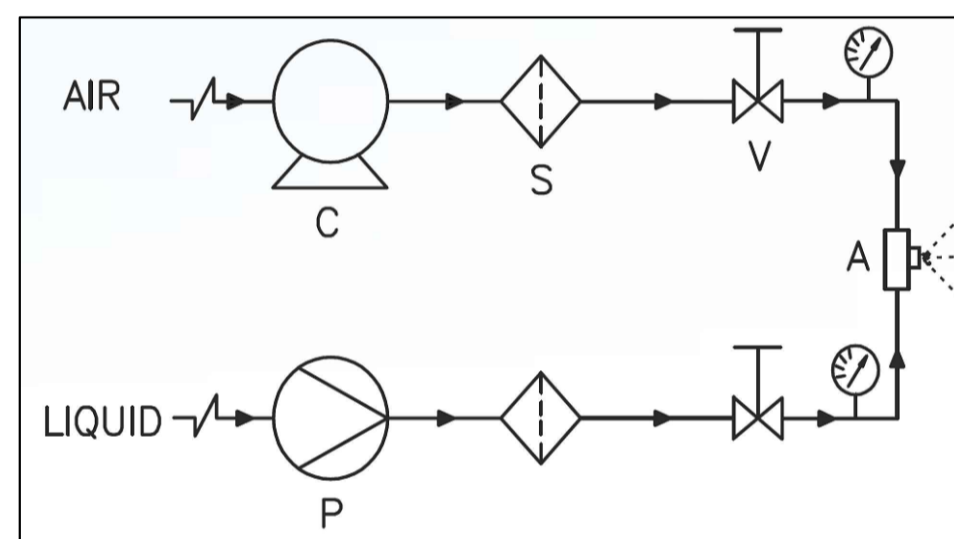
JSR Air atomizing spray nozzles produces fine mist spray with the help of compressed air, liquid breaks into small droplets as air provides shearing effects on liquid droplets. Various spray patterns are available, they are categorized into Flat and Round spray patterns. The droplet size can be adjusted by flow adjustment of compressed air. Air atomizing nozzles are divided into two types Internal and External mix air atomizing nozzles. Those are available in various metals.



An Air atomizing nozzles can work on three Principle as Below :

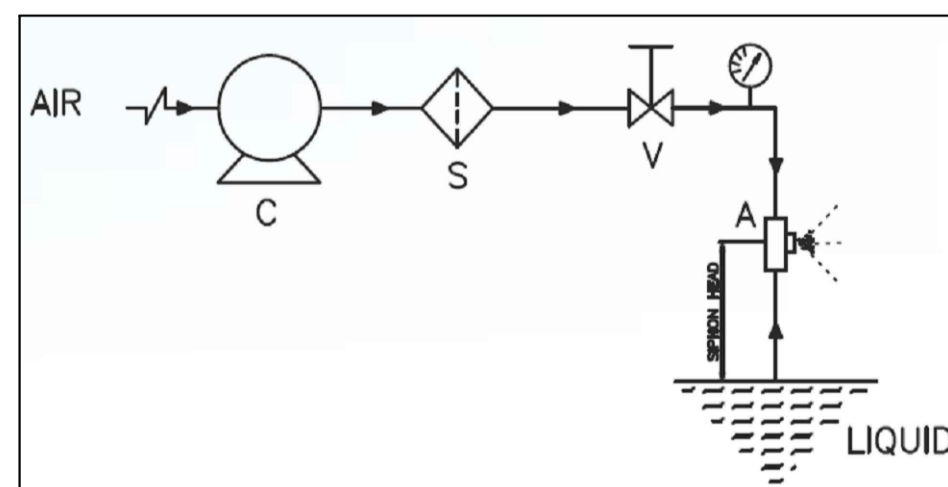
- 1) Pressure principle
- 2) Siphon principle
- 3) Gravity Head principle

1) **Pressure principle** : The liquid supplied in pressurized form with help of pump or pressurized container, Separate Compressed air is needed .



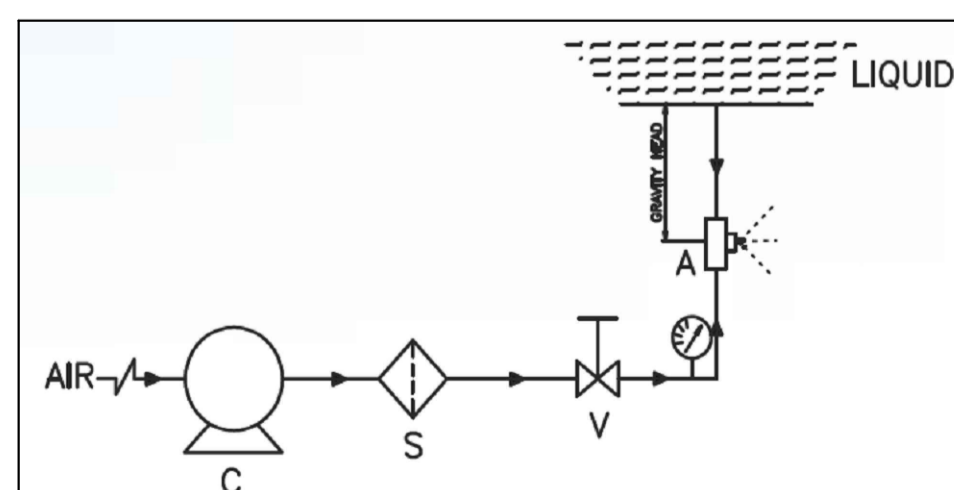
● Pressure principle

2) **Siphon Principle** : Siphon principle is utilized to lift Liquid from certain height from spray nozzles, Suitable where pump or pressurized container of liquid is not required .



● Siphon principle

2) **Gravity Head Principle** : Gravitational head of liquid is utilized to feed liquid to the spray nozzle, Suitable where pump or pressurized container of liquid is not available .



● Gravity head principle

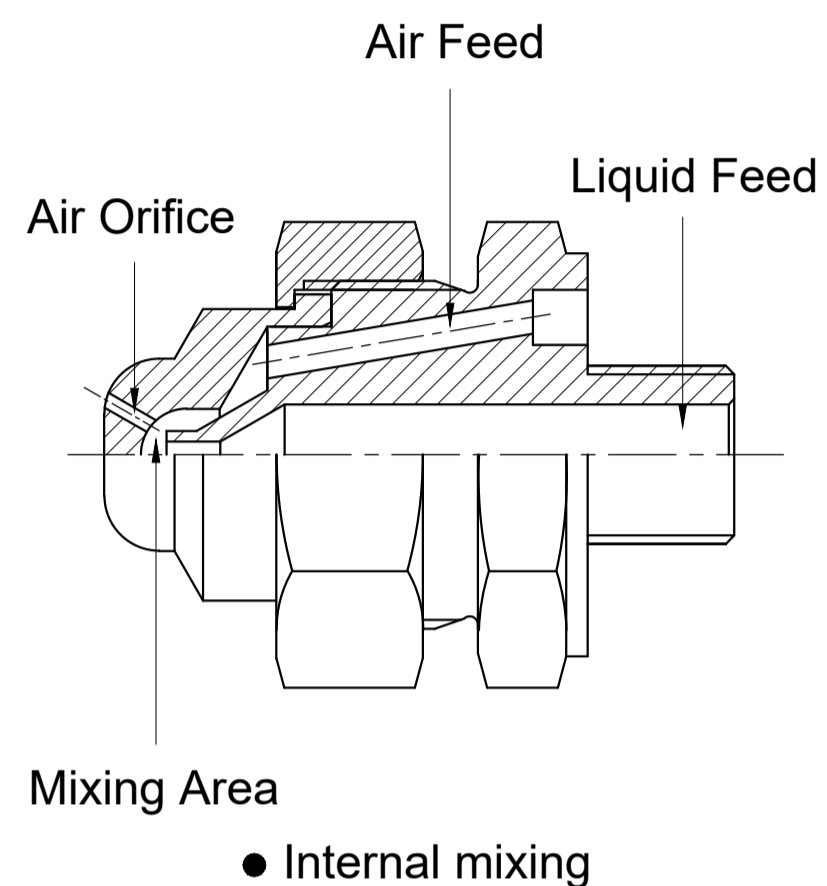
SELECTION OF ATOMIZING SPRAY NOZZLES

CHOICE OF NOZZLES

Each spray set-up consist of an air cap and liquid nozzle which provided a specify spray pattern capacity and coverage Performance .

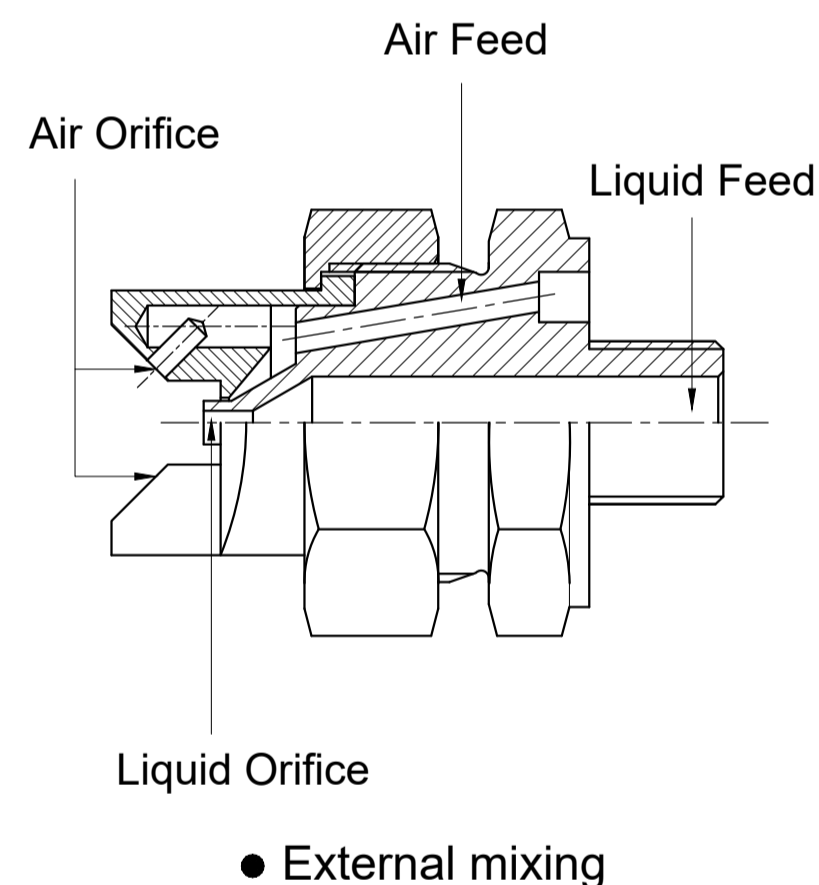
INTERNAL TYPE OF FLUID MIXING

Liquid and air streams meet with in nozzle and are mixed together and expelled through the same orifice . This internal mixing means the stream are not independent, a change in air flow will effect the liquid flow . This means precise metering of the liquid more difficult than with an External mixing set - up . The Internal mixing setup are able to provide finest atomization of any of the mixing set-up , But they are generally not suitable for use with liquids which have a viscosity that is above 200 Centripose .



EXTERNAL TYPE OF FLUID MIXING

The air and liquid streams exist the nozzle independently and are combined and mixed out side the spray nozzle . Because there is no connection between the air and liquid lines with in the nozzles, The air and liquid flow rates can be controlled independently, allowing precise metering of the liquid . The atomization in most cases there set-up do not atomize as finely as Internal mixing set-up .



External mixing set-up may be used with liquid having a viscosity above 200 centripose and for abrasive suspensions . **JSR SPRAY** Provide Engineering guidance for spraying high viscosity liquids.

APPLICATIONS

1. Dust suppression
2. Tablet coating
3. Thin film Coating
4. Paper moisturising
5. Humidification

TYPES OF NEEDLE

1. Auto shutoff
2. Manual shutoff
3. Quick cleaning Needle
4. Quick cleaning needle + Manual shutoff

MATERIAL OF CONSTRUCTION

1. SS 316 / 304
2. SS 316L
3. BRASS
4. AS PER CUSTOMER REQ.

TABLET COATING PROCESS

It is the process to apply coating material on external surfaces of tablets to enhance its efficiency and properties .

Now a Days many pharmaceuticals dosage mediums are produced with coating, either on the external surfaces of tablets or on material dispensed with in gelatine Capsule .

Coating serves a number of purposes right from protecting stomach lining from aggressive drugs to protecting the tablets from stomach acids . It is also helps in maintaining the shape of the tablets and thus can offer a delayed release of the medication .

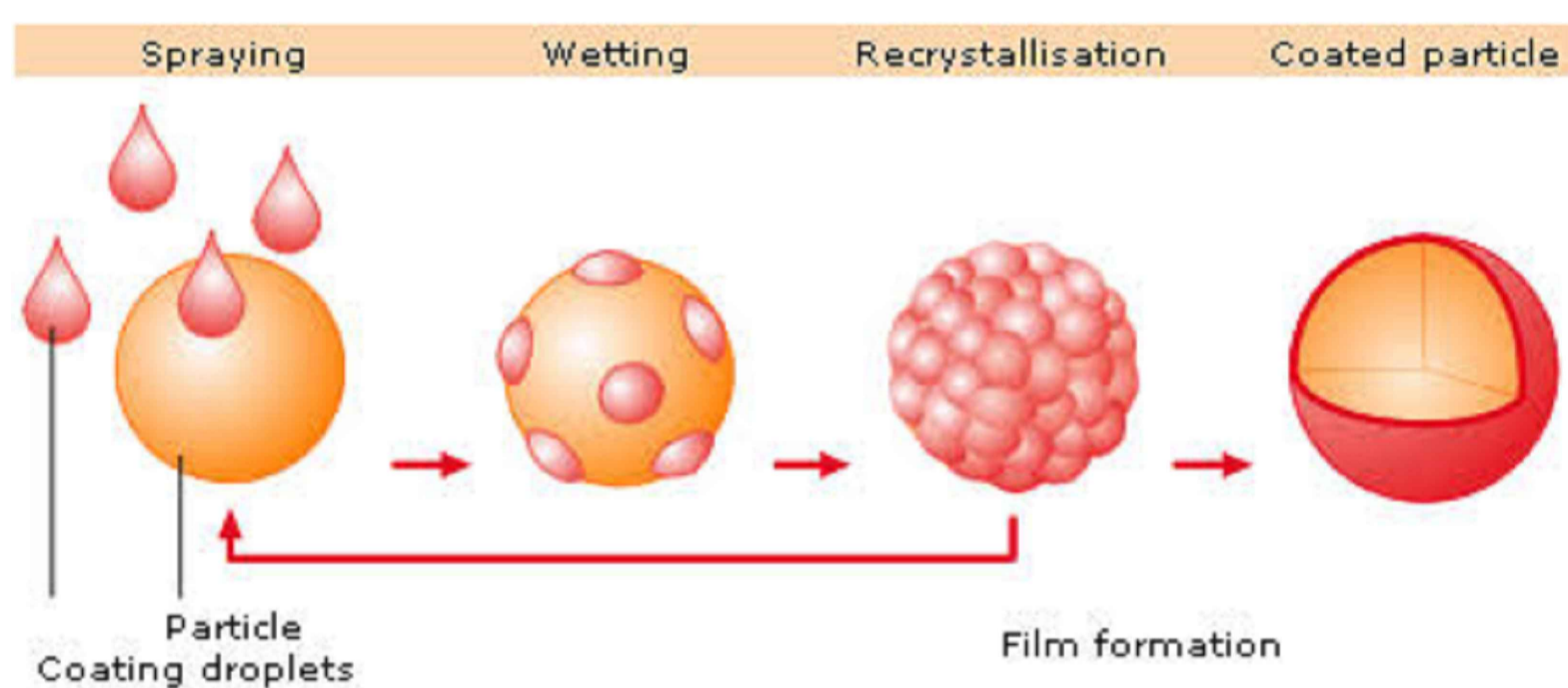
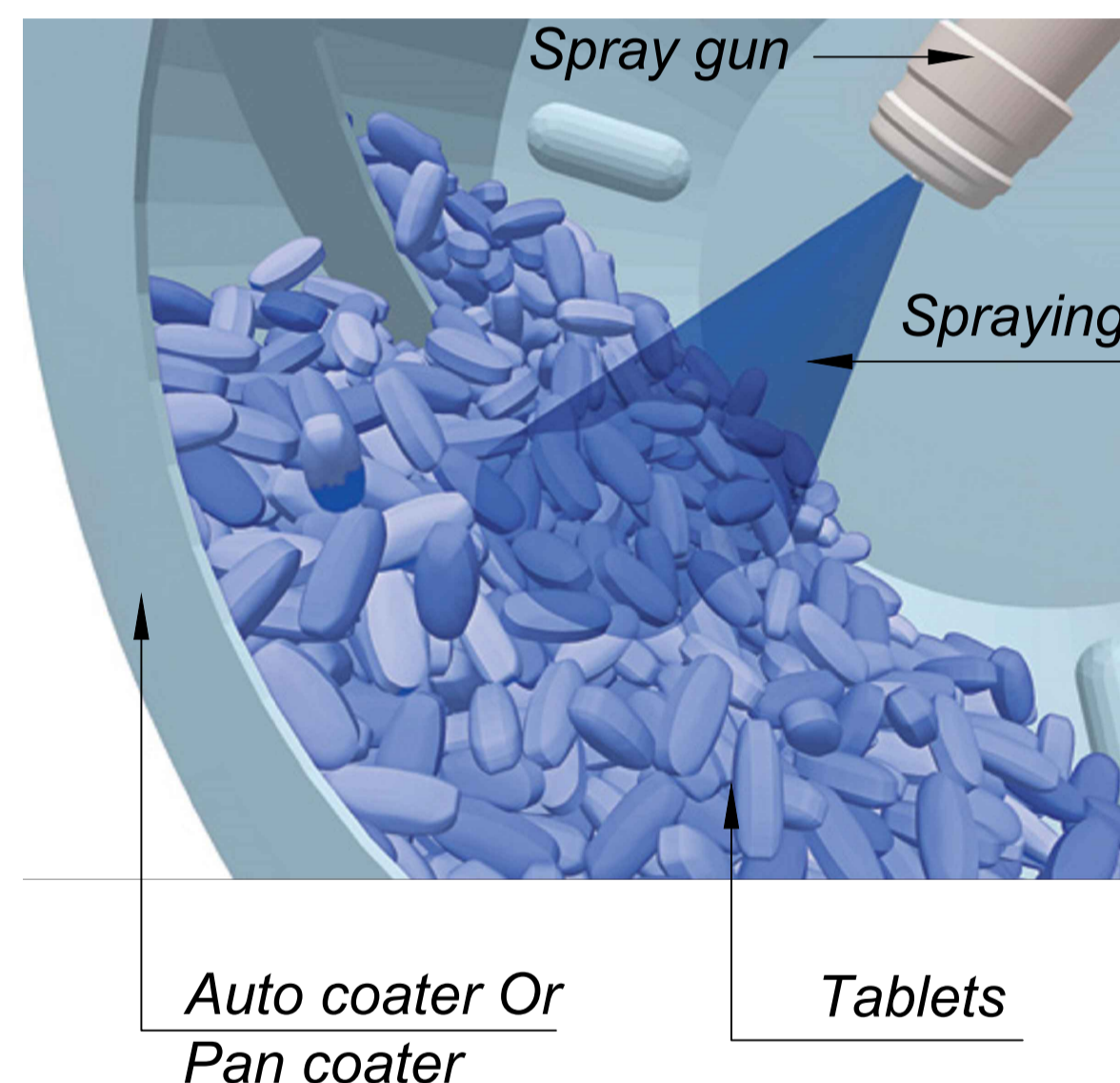
But for good result, a better coating medium is required, and the same can be full filled by tablet coating spray nozzles .



● Tablet coating spray gun

General purposes of tablet coating

- Physical and chemical protection from environment .
- To control the release of drug with enteric coating .
- Covers unpleasant taste, colour and odour .
- Provide way to identify the drug and improves appearance .
- It protect drug from gastric surrounding of stomach.



Result of bad coating

1. Sticking or picking
2. Roughness
3. Twinning
4. Peeling
5. Cracking



GRANULATION / COATING / DRYING

GRANULATION WITH RMG / HSG

It is also known as wet granulation process . The material is loaded bowl having agitator and chopper and mixed rigorously then binder material is sprayed from top and granules are formed .

Good quality granules are foundation for good quality tablets.

Various liquid binders are used for wet granulation.

Spraying binder over bulk material could reduce wet granulation cycle time and increase productivity .



FLUID BED PROCESSOR

Fluid bed Process consist of following application

1. Drying

It is the Process of extracting moisture from solid bulk material by making it fluidized with high flow blow of air, so moisture is removed homogeneously and all over surface of every single particle .

2. Granulation / Agglomeration

Power Particle of bulk material bonded by liquid fine spray. Liquid could be water or an organic solvent and the powder material will be mixed together . Agglomerate has less strength of particle bond .

3. Coating

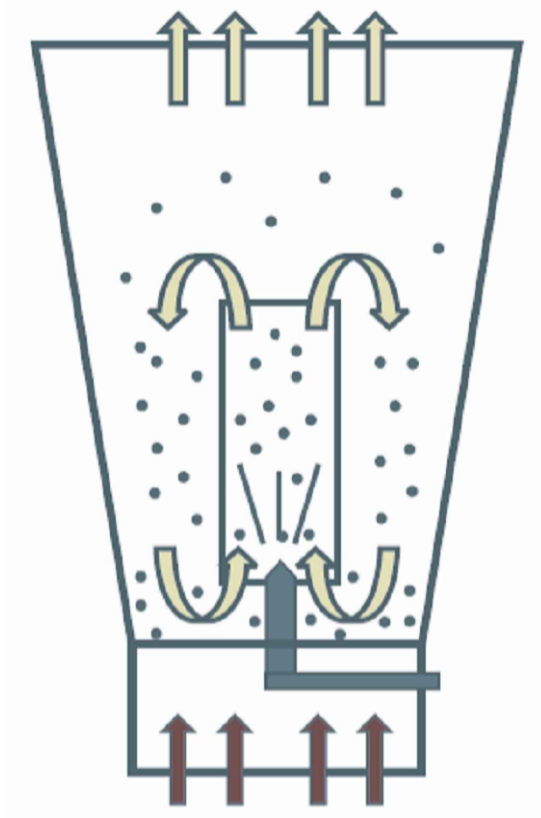
Fluidized particles are coated with spray of coating material which enhances . coating film must be very uniform over the particle surface .

4. Tangential coating

Centrifugal motion is used for making spherical pellets, at the same time particles are bonded by binder liquid. layering also can be done in the same way .



Top spraying



Bottom spraying



Tangential spraying

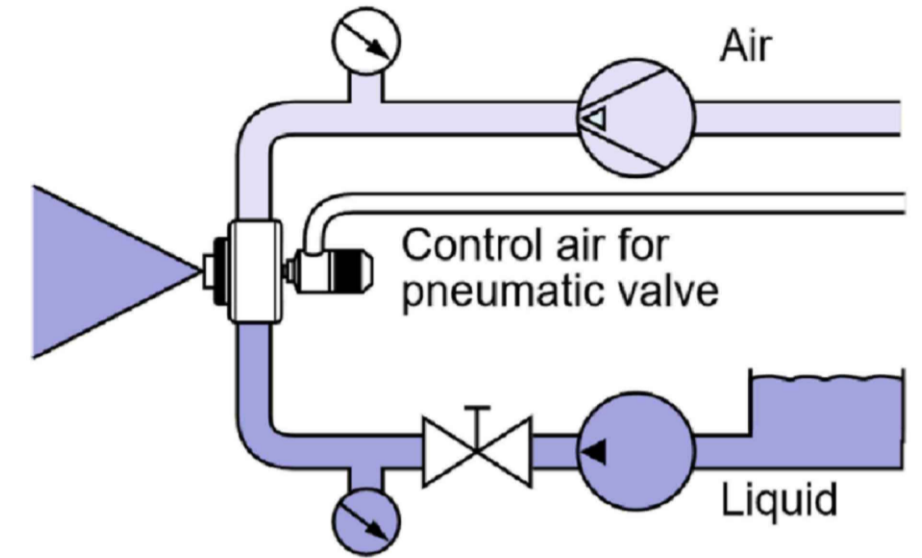


AIR ATOMIZING NOZZLES

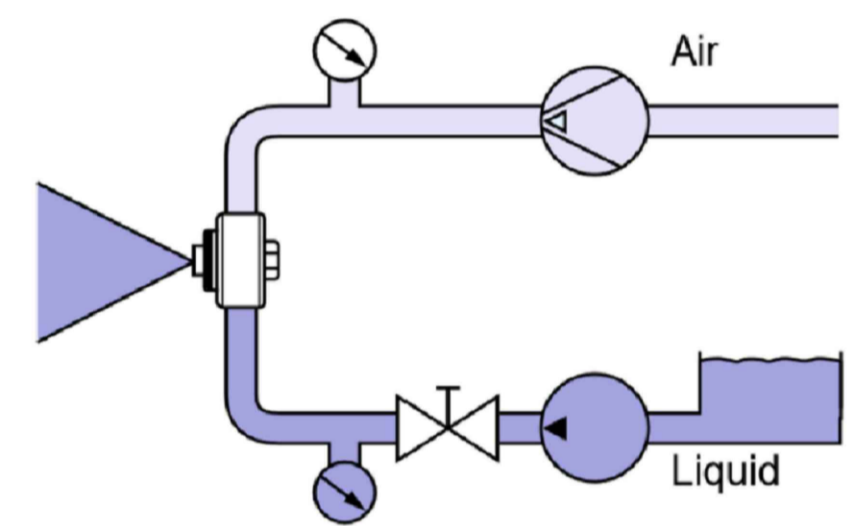
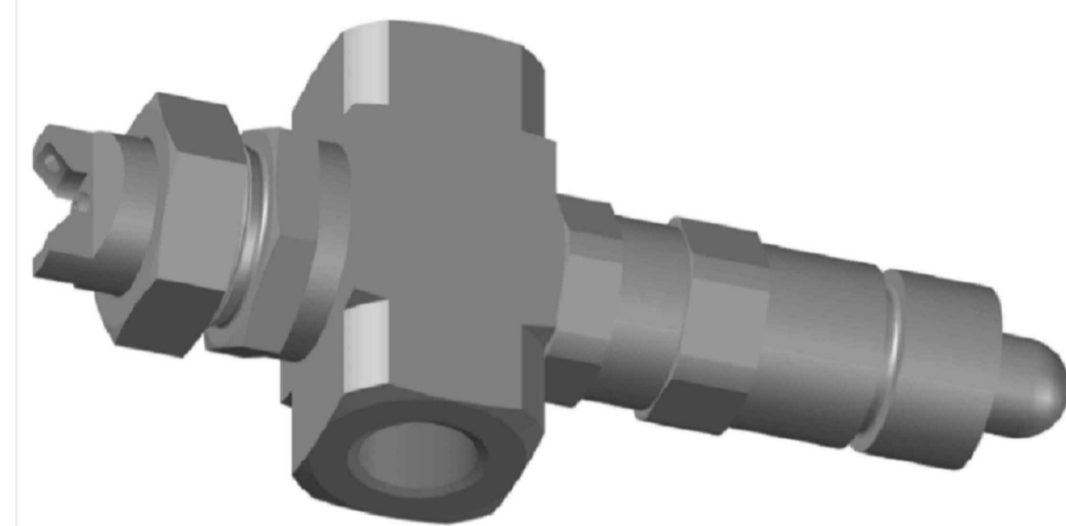
"AIR ATOMIZING NOZZLES" are unique twin fluids nozzles used where very large and high viscous quantities of liquid and pastes have to be turned to mist or fine atomized. highly atomized sprays can be obtained at comparatively low flow rates. Liquid fed under pressure or by suction.

APPLICATIONS :

1. Humidification
2. Tablet Coating
3. Cooling
4. Process Engineering
5. Web Dampening
6. Gas Cooling
7. Blowing Off of liquid
8. Billet and bloom caster for higher steel grades.



CYLINDER OPERATED AIR ATOMIZING NOZZLES



BASIC DESIGN AIR ATOMIZING NOZZLES

TECHNICAL DATA SHEET

Flow Rate(lpm)@ 2 Bar	Spray Angle	Inlet Connection	Materials
0.05 To 7.0	20°,60°,120°	1/8" to 3/4" BSP/BSPT	SS - 316L, 316,304

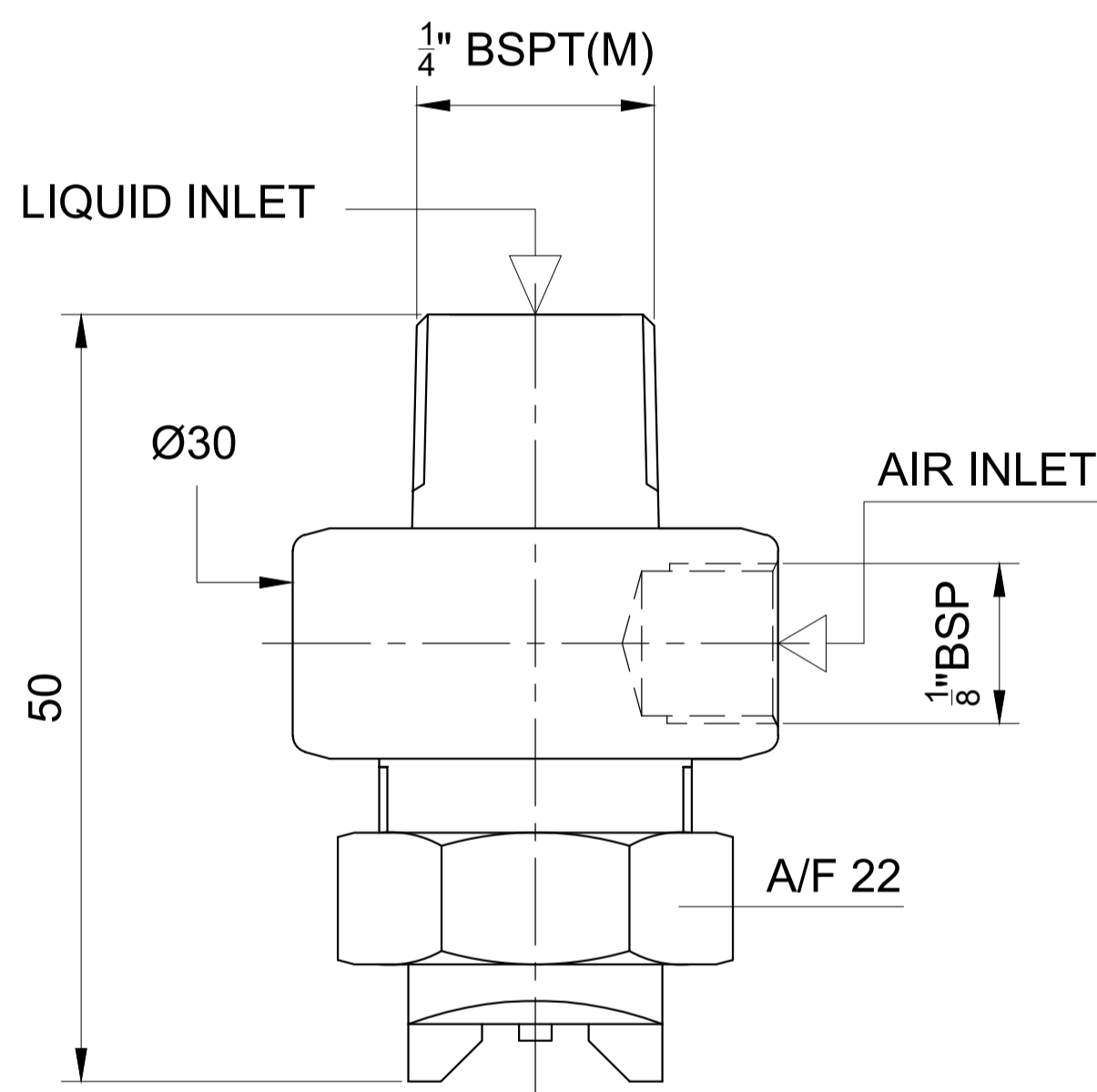


AIR ATOMIZING NOZZLES

We Offer Air atomizing nozzles to our client . . .

Design Features

- Quick assembly and maintenance
- Fine spray droplets
- Equally spray patterns, Narrow full cone and Flat fan Pattern.
- Available in different orifices.
- Compact Design .
- Suitable for Dust control, Humidification, moisturing and many more applications.
- Material : SS 316 or As per customer requirement .
- Basic Design for Liquid Feeding.



- Spray Nozzle

TECHNICAL DATA SHEET

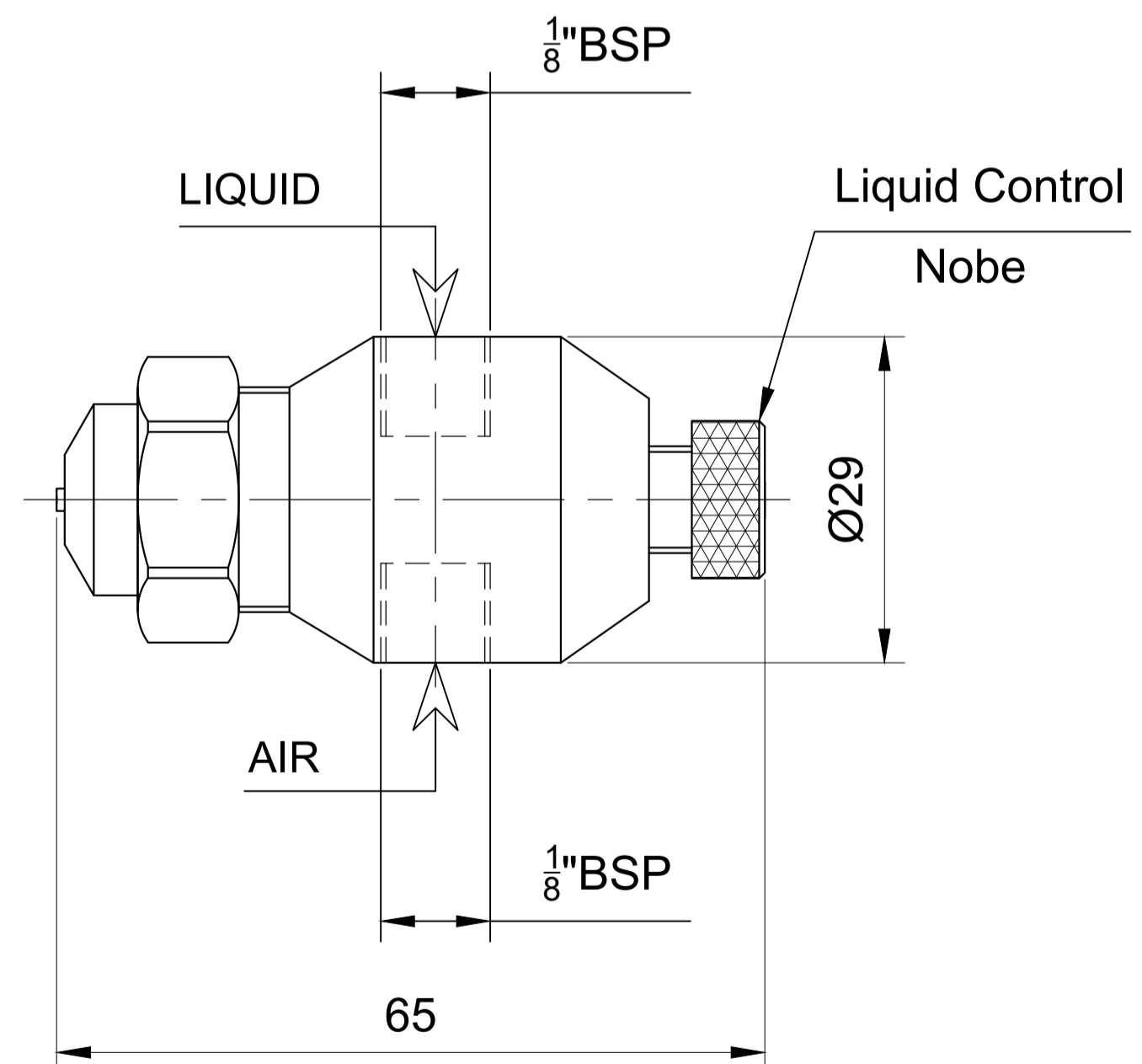
Model number	Orifice size	Operating Pressure	End Connection
N66.1	0.8 to 1.8mm	3 to 4 bar	Liquid - 1/4" BSPT(F) Air - 1/8" BSP(F)

AIR ATOMIZING NOZZLES

We Offer Air atomizing nozzles to our client . . .

Design Features

- Quick assembly and maintenance
- Fine spray droplets
- Equally spray patterns, Narrow full cone and Flat fan Pattern.
- Available in different orifices.
- Compact Design .
- Suitable for Tablet coating , Glue spray on Paper Applications .
- Material : SS 316, Brass Or As per customer requirement.
- Manual shut Off Design For Liquid Feeding .



TECHNICAL DATA SHEET

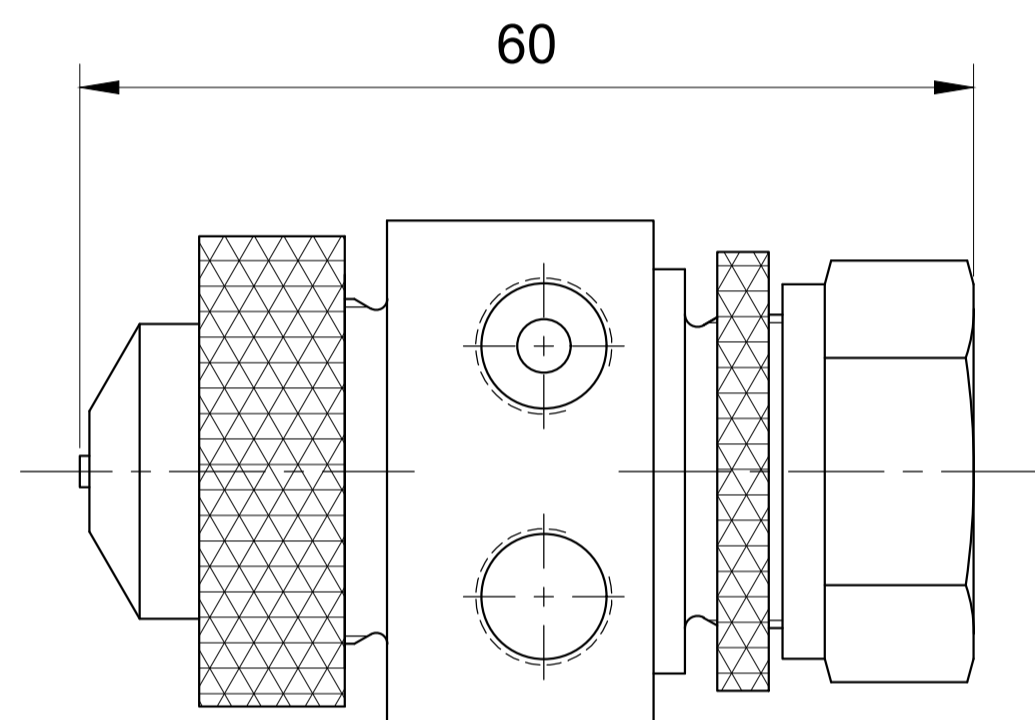
Model number	Orifice size	Operating Pressure	End Connection
N66.3	0.8 to 1.8mm	3 to 4 bar	Liquid - 1/8" BSP(F) Mist Air - 1/8" BSP(F) Cylinder Air - 1/8" BSP(F)

TABLET COATING SPRAY GUN

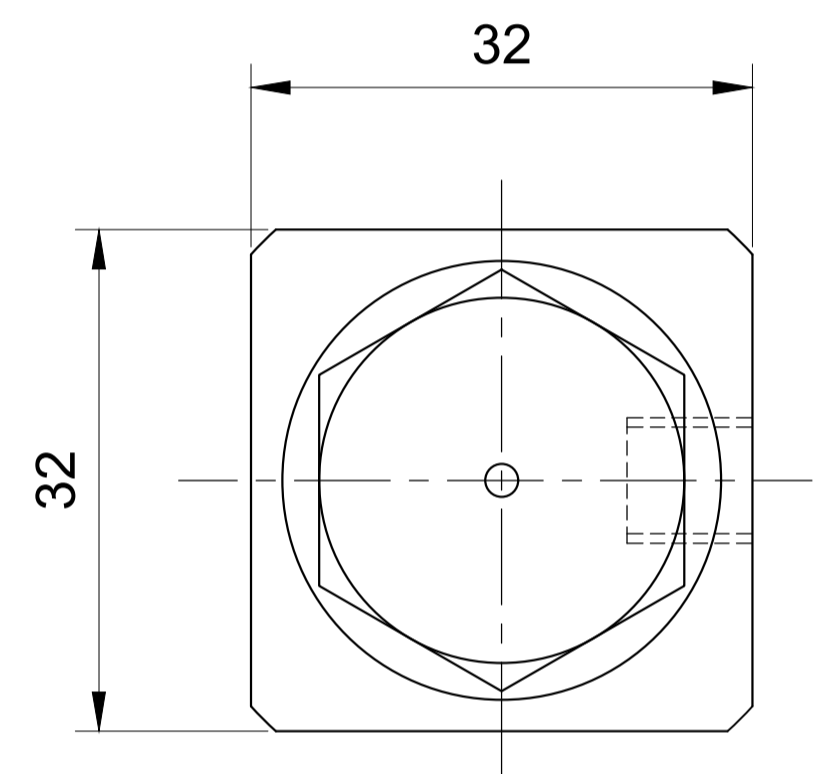
We Offer Air atomizing nozzles to our client . . .

Design Features

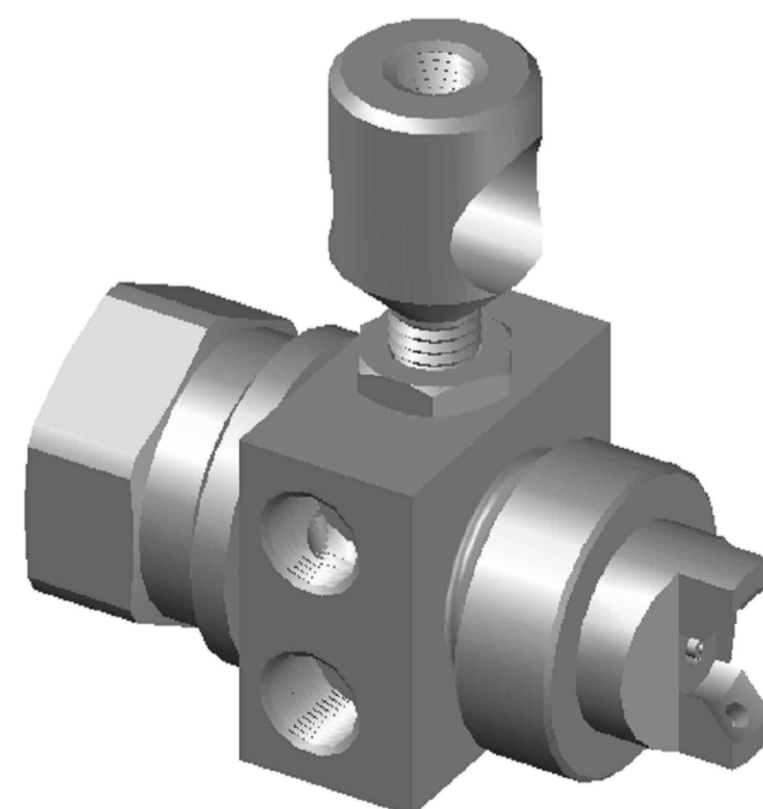
- Quick assembly and maintenance
- Fine spray droplets
- Equally spray patters, Narrow full cone and Flat fan Pattern.
- Available in different orifices.
- Compact Design .
- Suitable for Tablet coating , Glue spray on Paper Applications .
- Material : SS 316
- Auto shut Off Design For Liquid Feeding .



FRONT VIEW



R.H.S. VIEW



TECHNICAL DATA SHEET

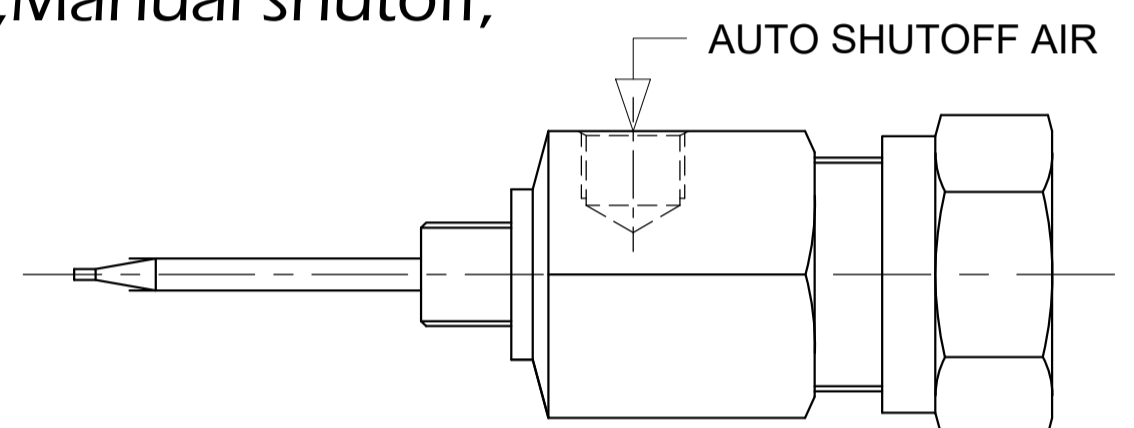
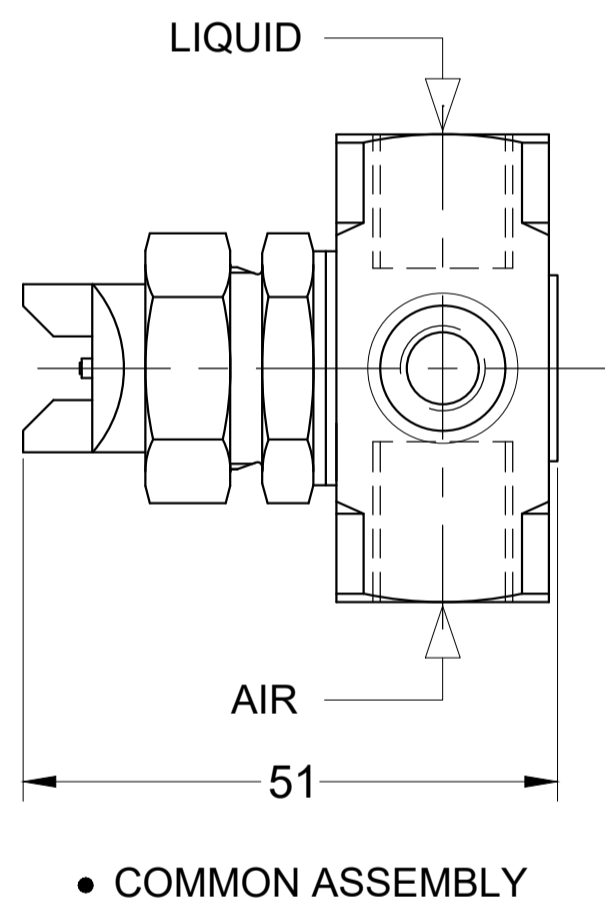
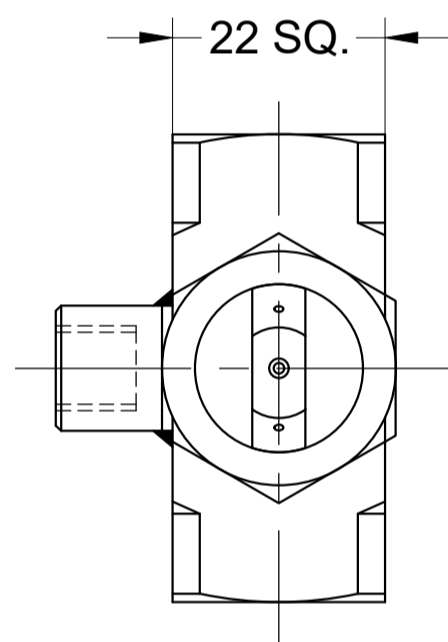
Model number	Orifice size	Operating Pressure	End Connection
N66.5	0.5 to 1.8mm	3 to 4 bar	Liquid - 1/8" BSP(F) Mist Air - 1/8" BSP(F) Cylinder Air - 1/8" BSP(F)

AIR ATOMIZING NOZZLES

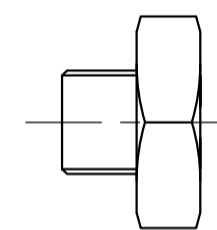
We Offer Air atomizing nozzles to our client . . .

Design Features

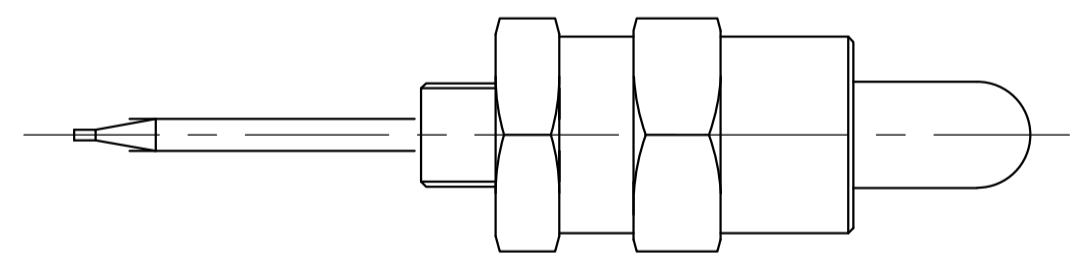
- Quick assembly and maintenance
- Fine spray droplets
- Equally spray patterns, Narrow full cone and Flat fan Pattern.
- Available in different orifices.
- Compact Design .
- Suitable for Tablet coating , Glue spray on Paper Applications .
- Material : SS 316, Brass Or As per customer requirement.
- Available in Basic Design, Quick cleaning design, Manual shutoff, Q.C. + Manual Shutoff and Auto shutoff Design .



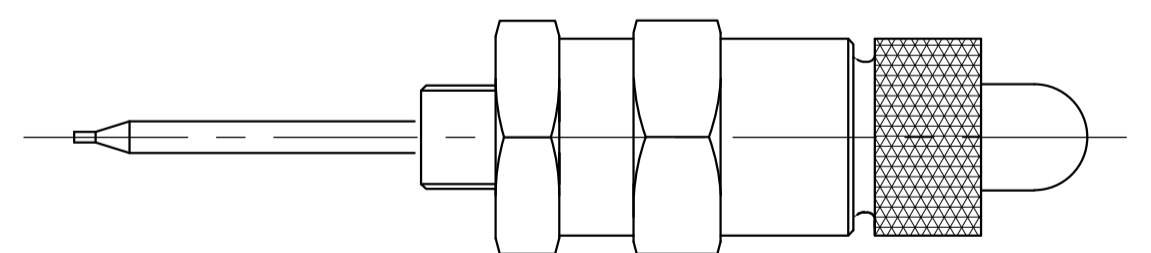
• AUTO SHUTOFF MODEL



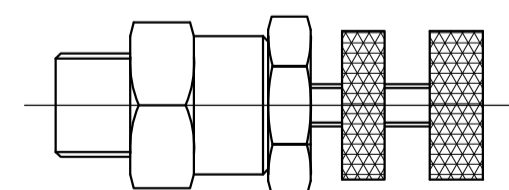
• BASIC DESIGN



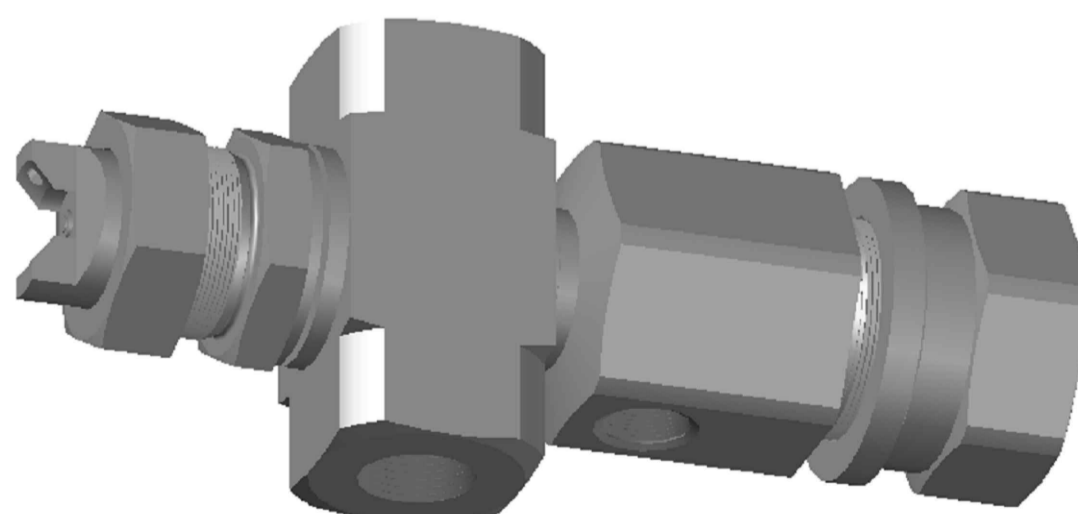
• QUICK CLEANING MODEL



• QUICK CLEANING + MANUAL SHUTOFF MODEL



• MANUAL SHUTOFF MODEL



TECHNICAL DATA SHEET

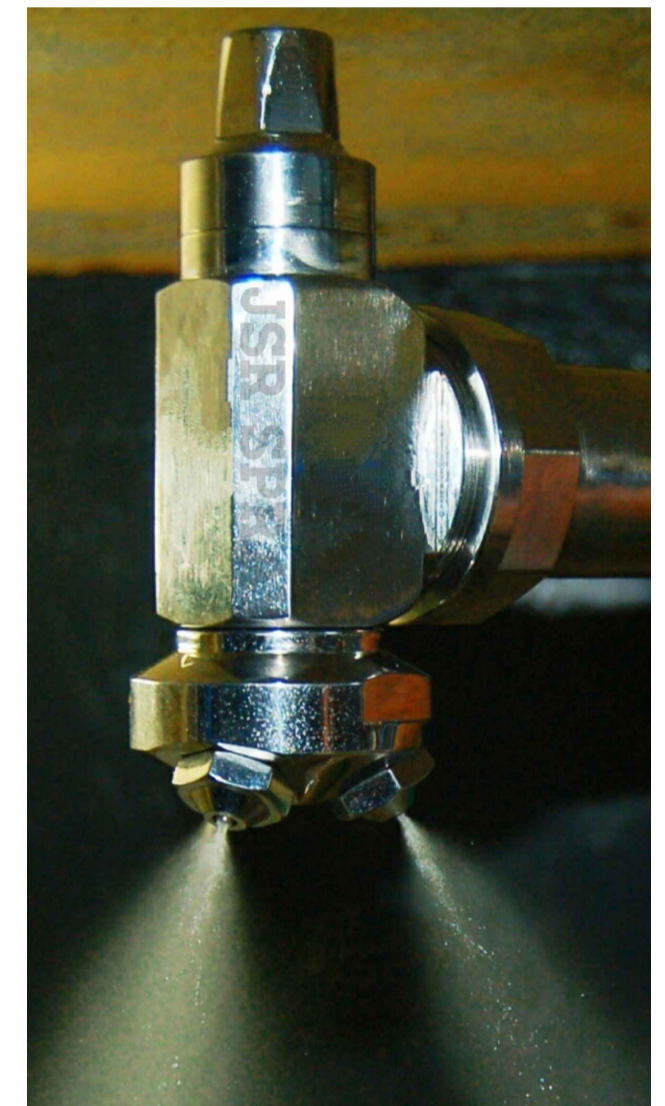
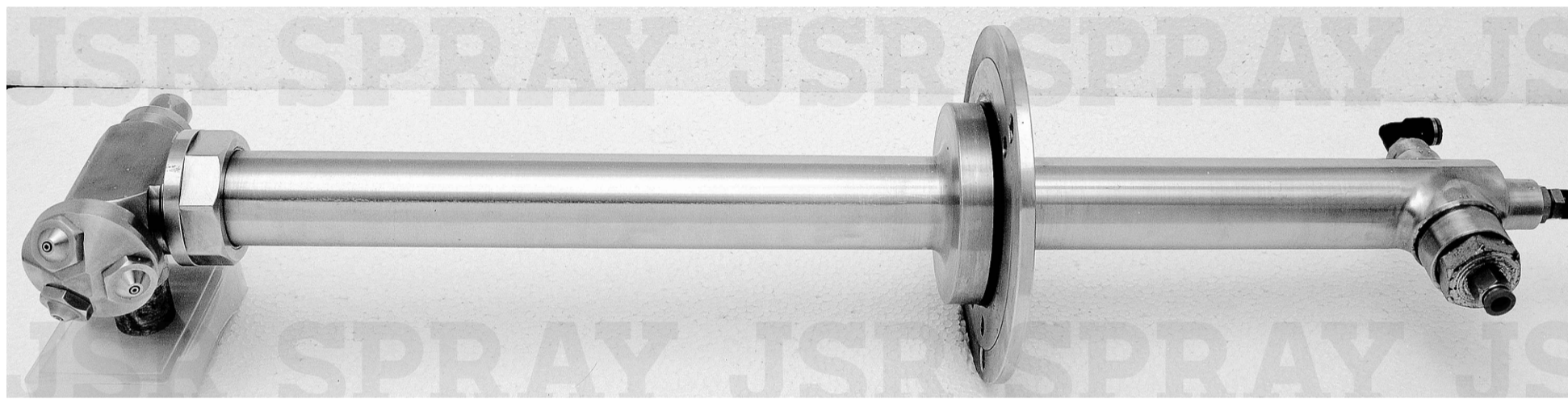
Model number	Orifice size	Operating Pressure	End Connection
N66.6	0.8 to 2.2mm	3 to 4 bar	Liquid - 1/4" BSP(F) Air - 1/4" BSP(F)

TOP SPRAY NOZZLES (FBP & FBD SPRAY GUN)

We Offer Top spray Gun to our client . . .

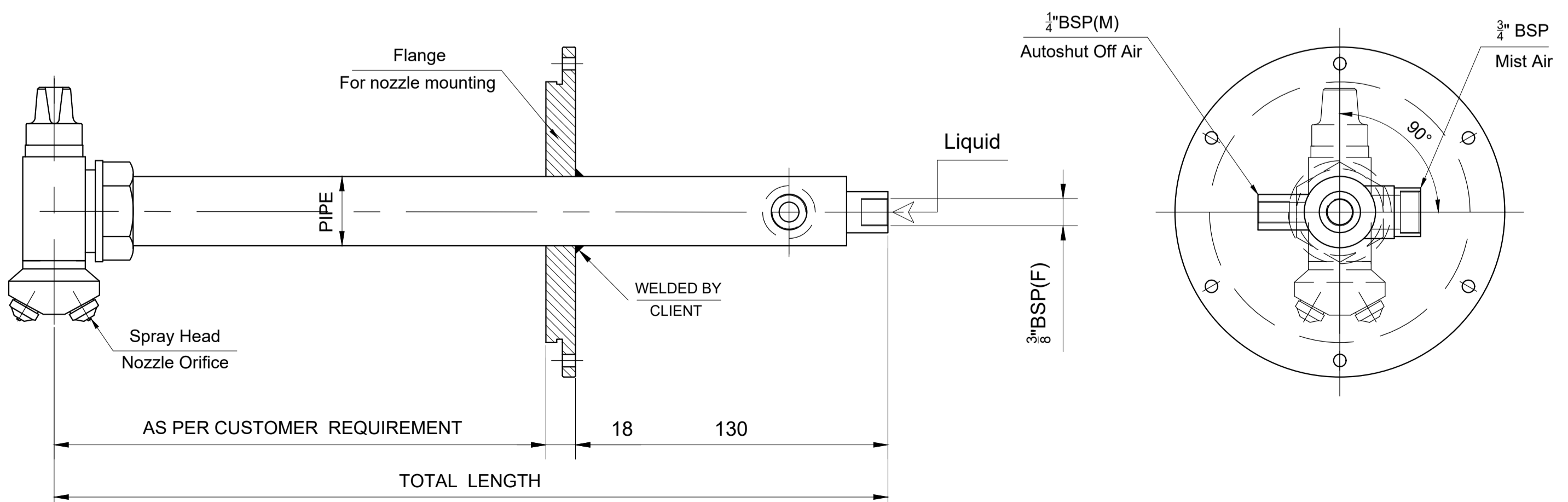
Design Features

- Modular design for quick desamble
- Fine spray droplets
- Equally spray patters, wide cone (Top down spray)
- Available with anti-drip design
- Multi numbers of head (ie . 3 Nos , 5 nos & 7 nos)
- For Lab / production scale application
- Material : SS 316L stainless steel, FDA Approved Vitton O-Ring & Gaskets



TECHNICAL DATA SHEET

Model number	Orifice size	Operating Pressure	Nos. of Head	End Connection
N66.9 & N66.21	0.5 to 2.0mm	3 to 4 bar	3, 5, 7, 9, 11	As per customer requirement OR Flange mounted



BOTTOM SPRAY GUN

We Offer Bottom spray Gun to our client . . .

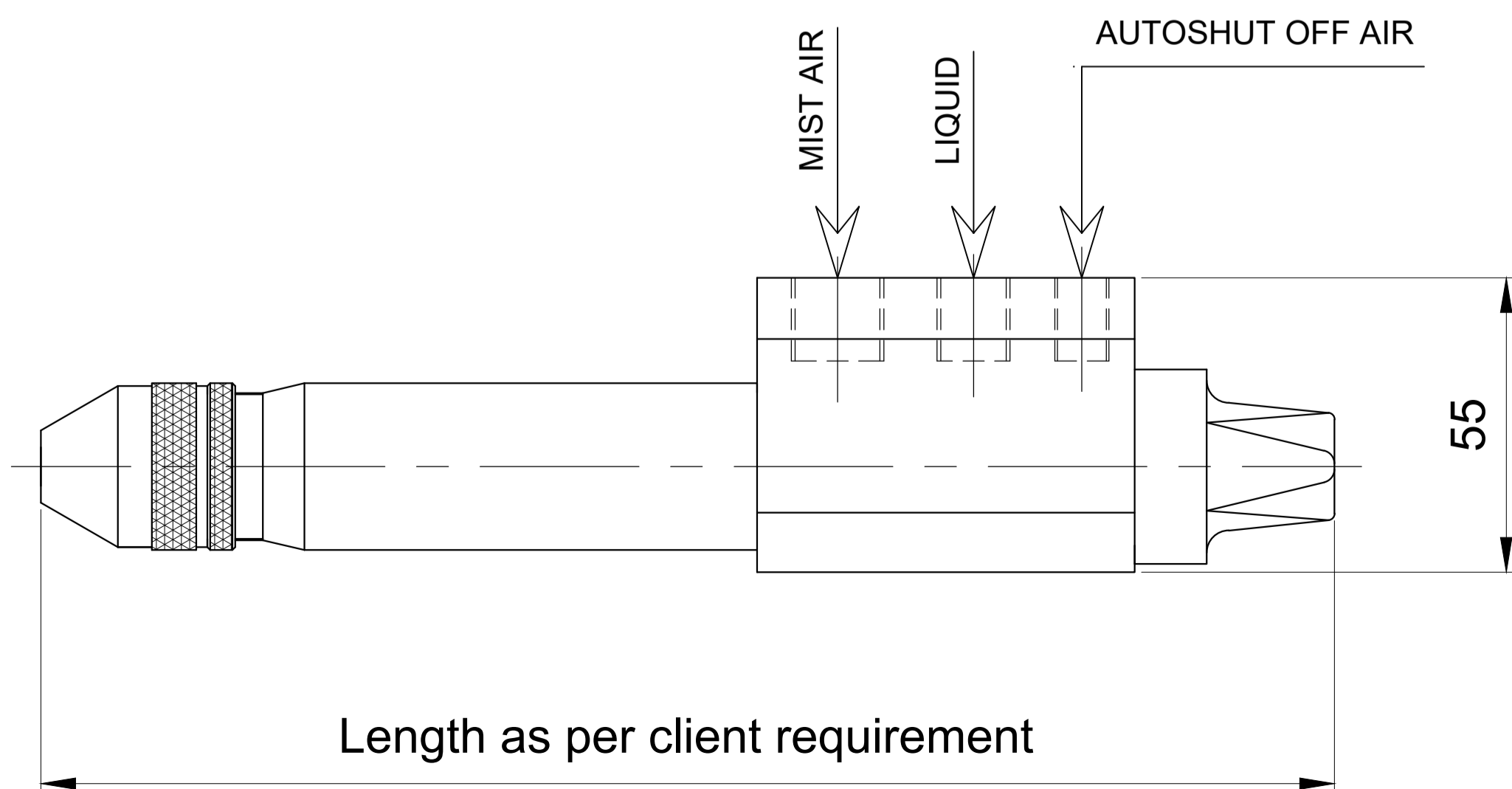
Design Features

- Modular design for quick desassembly
- Fine spray droplets
- Equally spray patterns, Narrow full cone (Bottom-up spray)
- Available in different orifices
- Length should be kept as per client Requirement.
- For Lab / production scale application .
- Material : SS 316L stainless steel, FDA Approved Viton O-Ring & Gaskets .



TECHNICAL DATA SHEET

Model number	Orifice size	Operating Pressure	End Connection
N66.18	0.5 to 2.0mm	3 to 4 bar	Autoshut off air - 1/8" BSP(F) Liquid - 1/4" BSP(F) Mist Air - 3/8" BSP(F)

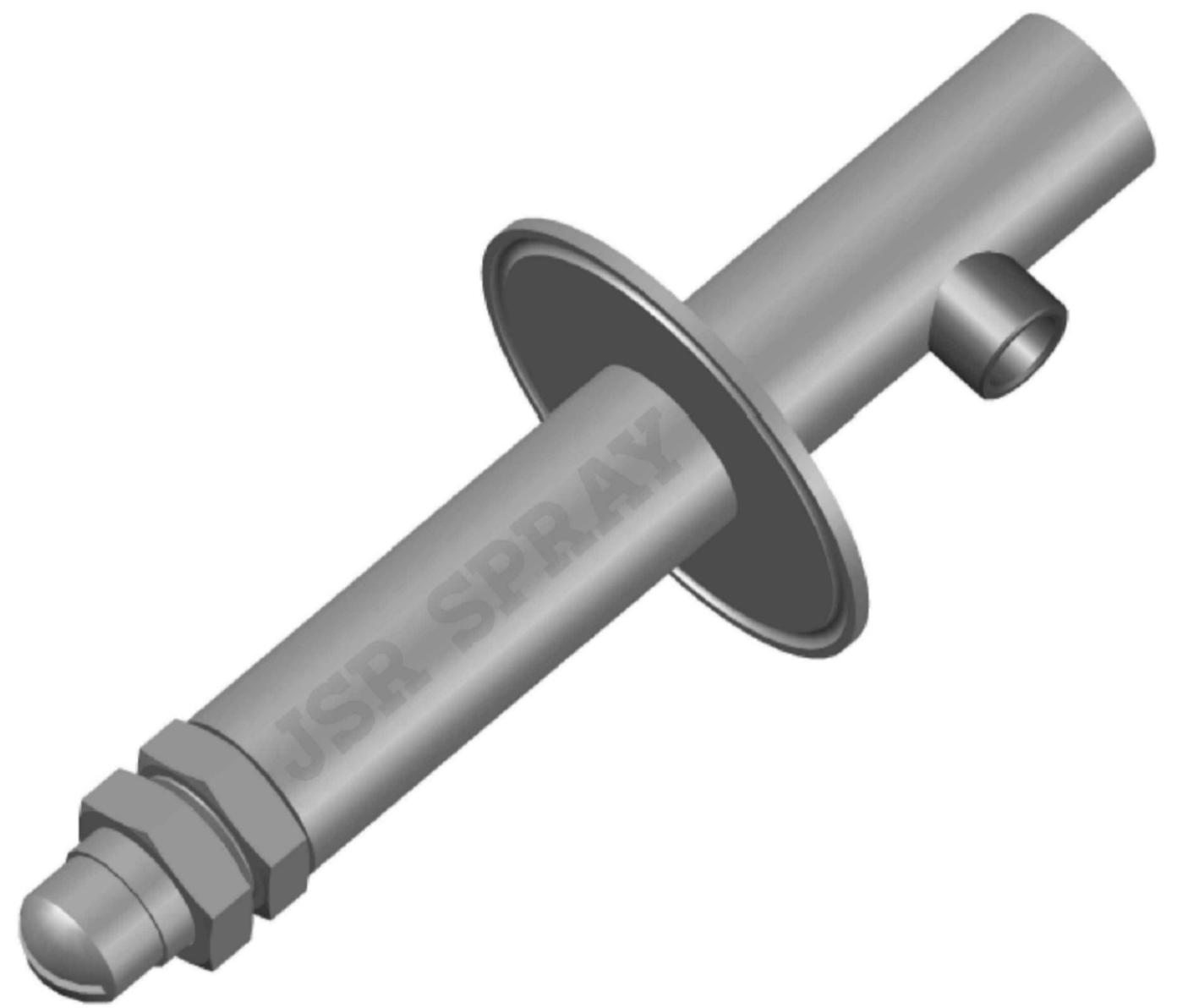


RMG BINDER SPRAY GUN

RMG Binder nozzle are designed for large scale, Medium scale, and lab scale Rapid mixer Granulator and high - shear Granulator for wet granulation .

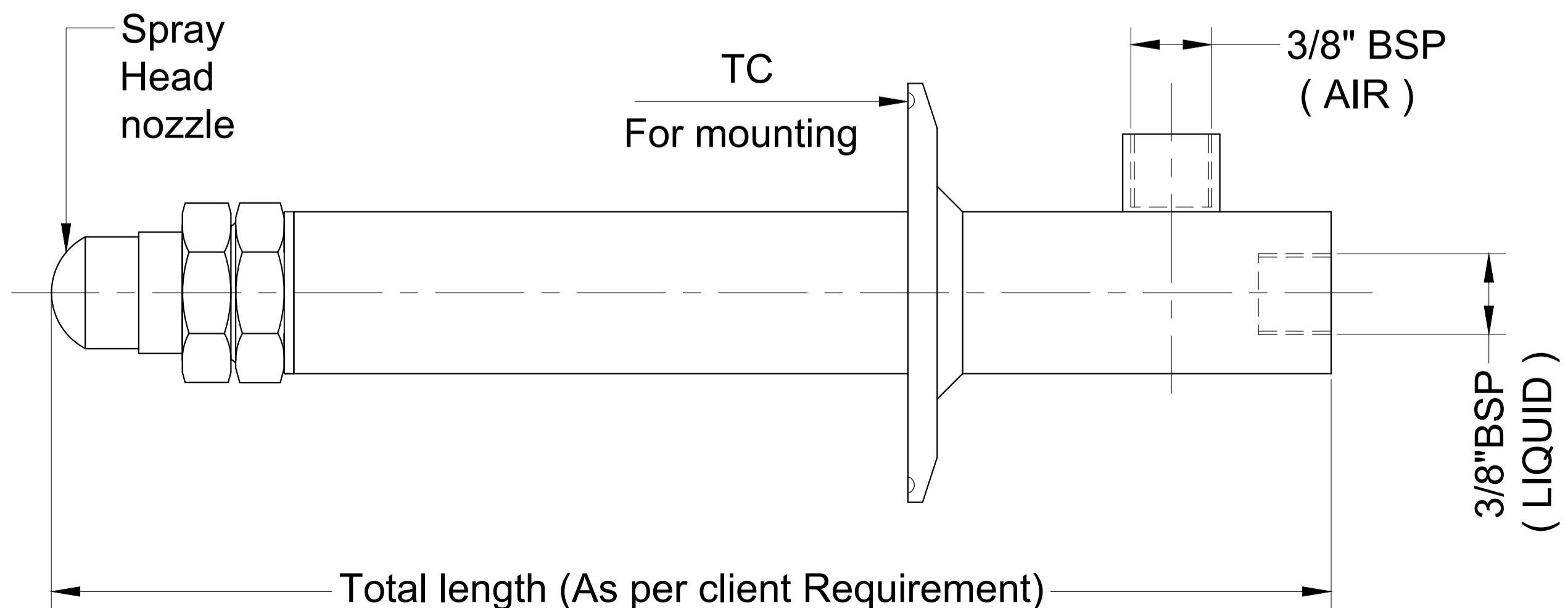
Design Features

- Anti clogging lance Design
- Fine Spray droplets
- 90° Flat fan Spray Pattern
- Material : SS 316 Stainless steel
- Clog free design
- Available in various spray angles
- Easy for maintenance



TECHNICAL DATA SHEET

Model number	Orifice size	Operating Pressure	End Connection
N66.14	2.5 - 3MM FLAT	3 to 4 bar	Liquid - 3/8" BSP(F) Air - 3/8" BSP(F)



BOTTOM SPRAY GUN LAB MODEL

We Offer Bottom spray Gun (Lab Model) to our client . . .

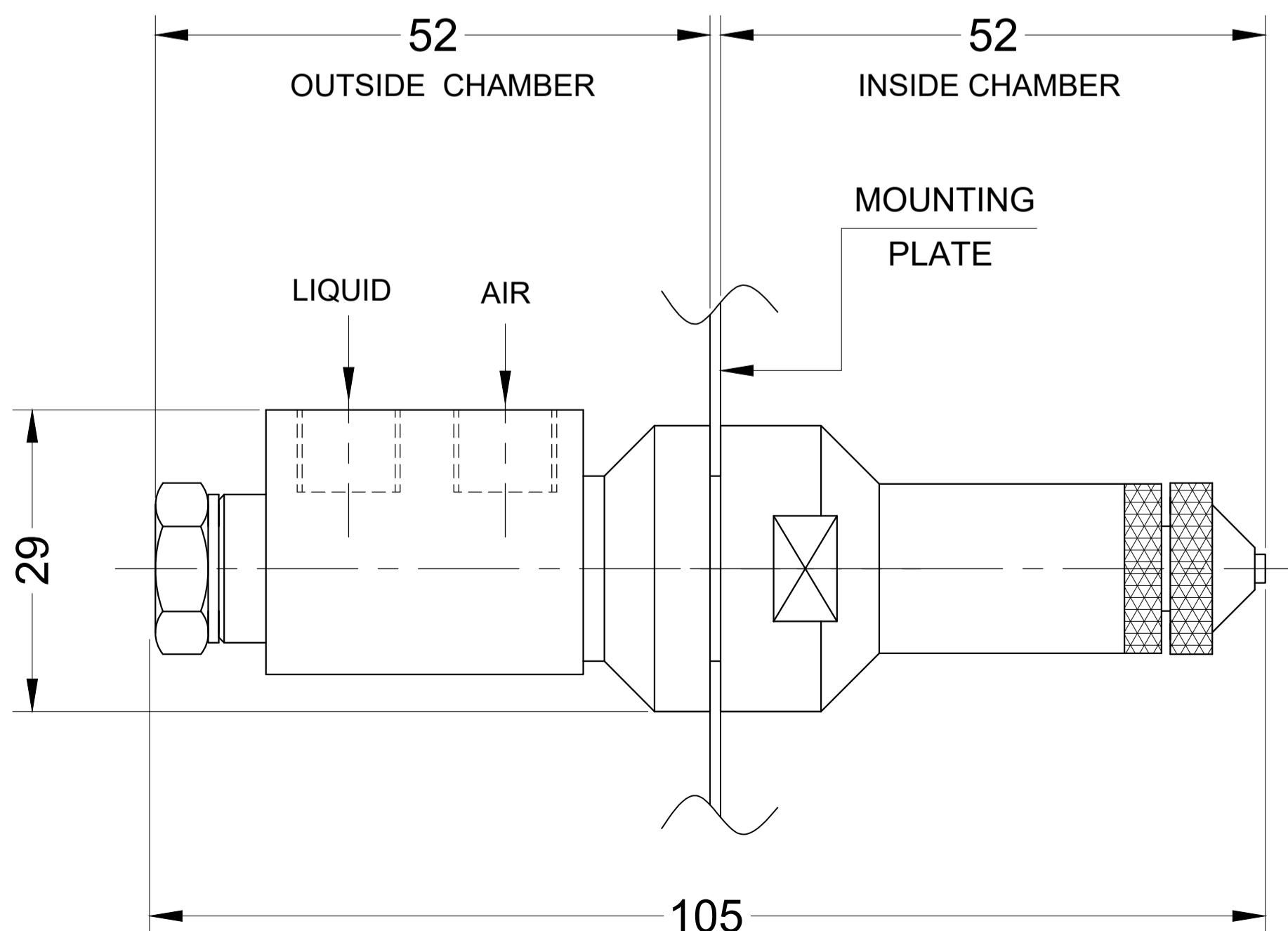
Design Features

- Compact Design
- Fine Spray droplets
- 20° Full cone Spray Pattern
- Material : SS 316 Stainless steel
- Easily Assembled parts
- Clog free Design
- Easy For maintenance

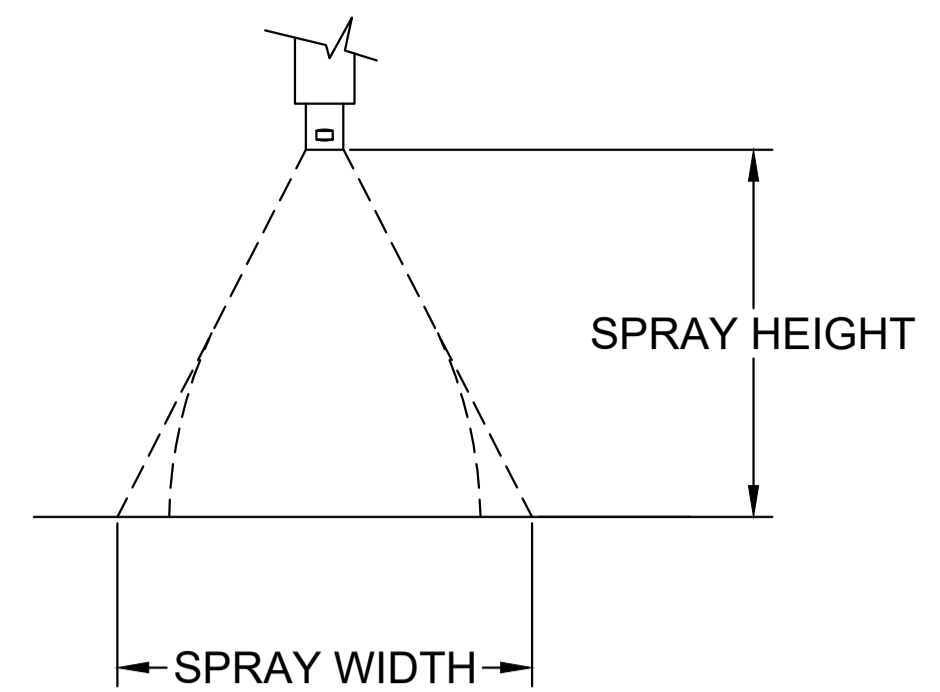


TECHNICAL DATA SHEET

Model number	Orifice size	Operating Pressure	End Connection
N66.17	1 to 2.0mm	3 to 4 bar	Liquid - 1/8" BSP(F) Air - 1/8" BSP(F)



SPRAY ANGLE INFORMATION



The table shows theoretical spray patterns as calculated from the include spray and the distance from the nozzle orifice, These values are based on the assumption that the spray angle remains the same throughout entire spray distance, In actual practice the calculated spray angle does not hold for Long spray distance .

Theoretical Spray width (in mm) at various height from nozzle orifice

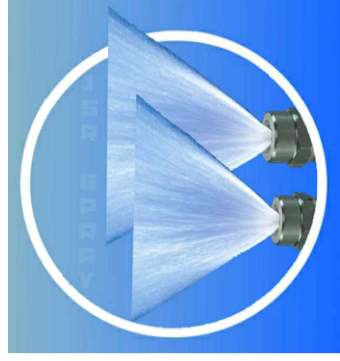
Spray Angle	50	100	150	200	300	400	500	600	700	800	900	1000
5°	4	9	13	18	22	26	35	44	52	61	70	87
10°	9	18	26	35	44	53	70	88	105	123	140	175
15°	13	26	40	53	66	79	105	132	158	184	211	263
20°	18	35	53	71	88	106	141	176	212	247	282	353
25°	22	44	67	89	111	133	171	222	266	310	355	443
30°	27	54	80	107	134	161	214	268	322	375	429	536
35°	32	63	95	126	153	189	252	315	378	441	505	631
40°	36	73	109	146	182	218	291	364	437	510	582	728
45°	41	83	124	166	207	249	331	414	497	580	663	828
50°	47	93	140	187	233	280	373	466	560	653	746	833
55°	52	104	156	208	260	312	417	521	625	729	833	1040
60°	58	106	173	231	289	346	462	577	693	808	924	1150
65°	64	127	191	255	319	382	510	637	765	892	1020	1270
70°	70	140	210	280	350	420	560	700	840	980	1120	1400
75°	77	154	230	307	384	460	614	767	921	1070	1230	1530
80°	84	168	252	336	420	504	671	839	1010	1180	1340	1680
85°	92	183	275	367	458	550	733	916	1100	1280	1470	1830
90°	100	200	300	400	500	600	800	1000	1200	1400	1600	2000
95°	109	218	327	437	546	655	873	1090	1310	1530	1750	2180
100°	119	238	358	477	596	715	953	1190	1430	1670	1910	2380
110°	143	286	429	571	714	857	1140	1430	1710	2000	2290	2860
120°	173	346	520	693	866	1040	1390	1730	2080	2430		
130°	215	429	643	858	1070	1290	1720	2150	2570	2920		

Pressure Conversion Chart

Unit	Bar	Pascal [pa]=N/m ²	Kg/cm ² =1 at	psi	lb/sq.ft
1 bar	1	100000	1.02	14.5	2089
1 Pascal	1x10 ⁻⁵	1	1.02x10 ⁻⁵	14.5x10 ⁻⁵	0.0209
1at= Kg/cm ²	0.9807	98070	1	1422	2048
1 psi	0.06895	6895	0.07031	1	144
1 lb/sq.ft.	0.479x10 ⁻³	47.9	0.4882x10 ⁻³	6.94x10 ⁻³	1

Volume flow Rate Conversion chart

Unit	l/s	l/min	m ³ /hr	US-gal / min	IMP-gal / min
1 l/s	1	60	3.6	15.85	13.2
1 l/min	0.01667	1	0.06	0.2642	0.22
1 m ³ /hr	0.28	16.67	1	4.4	3.66
1 US-gal/min	0.0631	3.785	0.227	1	0.8327
1 IMP-gal/min	0.076	4.546	0.273	1.201	1



JSR SPRAY SYSTEMS (INDIA)

MFG . & DESIGNERS OF INDUSTRIAL SPRAY NOZZLES
& SPRAY SYSTEMS

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