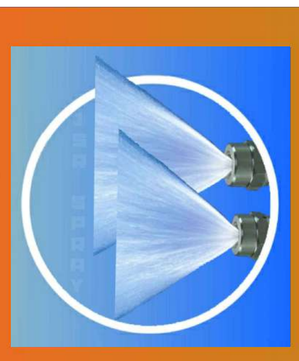
JSR SPRAY SYSTEMS (INDIA)



ATOMIZING SPRAY NOZZLES

APPLICATIONS

- Auto / Pan coater spray applications
- Granulation Process (RMG ,HSG & FBP)
- Film Coating Process
- Humidification
- Paper Moisturising
- Dust Controll
- Oll spray application

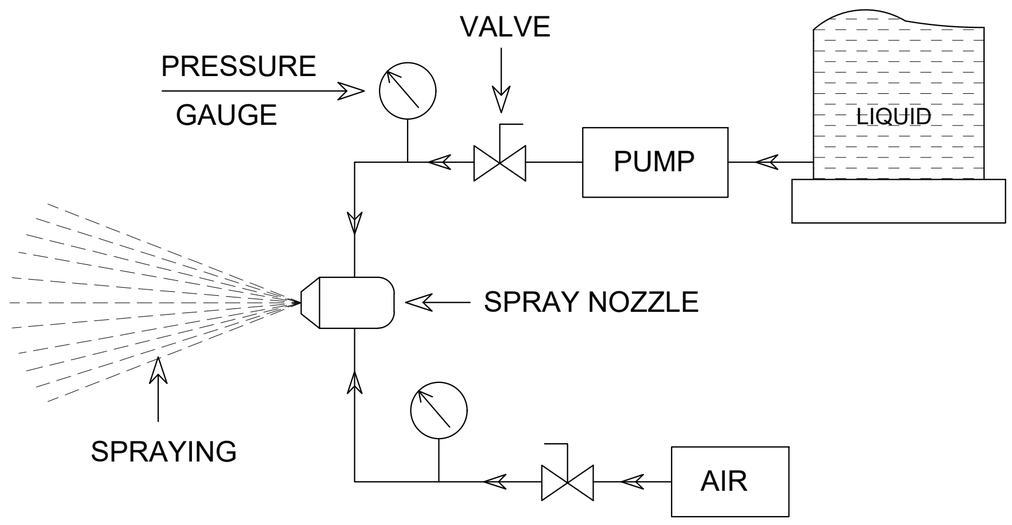
ATOMIZING SPRAY NOZZLES
INTRODUCTIONS , WORKING , DESIGN

In Atomizing spray nozzles, Pressurized air (or other gas) is used to impact upon the fluid being sprayed. The impact of the air causes the fluid to break apart into a fine spray. This means that the energy required for atomization is no longer dependent on fluid pressure because of which very fine sprays can be produced at low fluid pressures. The allows for very fine, low volume sprays to be delivered.

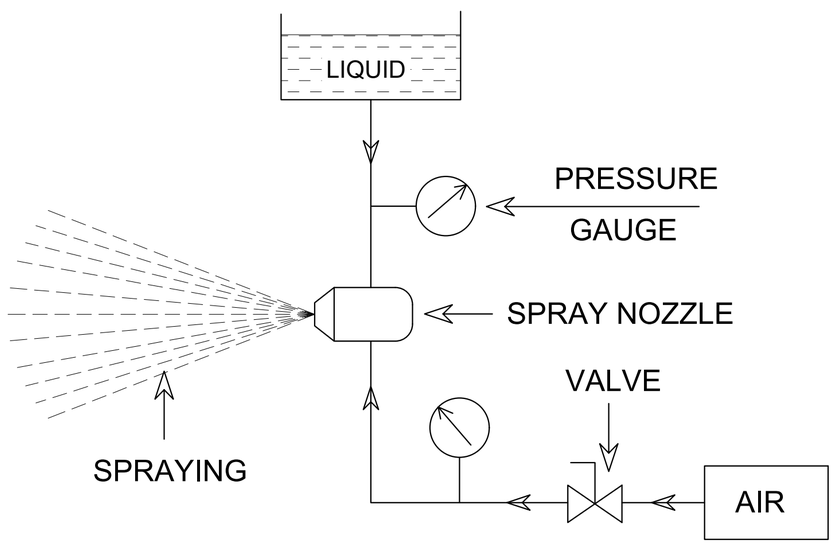
In Air atomizing nozzles, Liquid Feed is done by three methods :

1) Pressure method
2) Gravity Head method
3) Siphon method

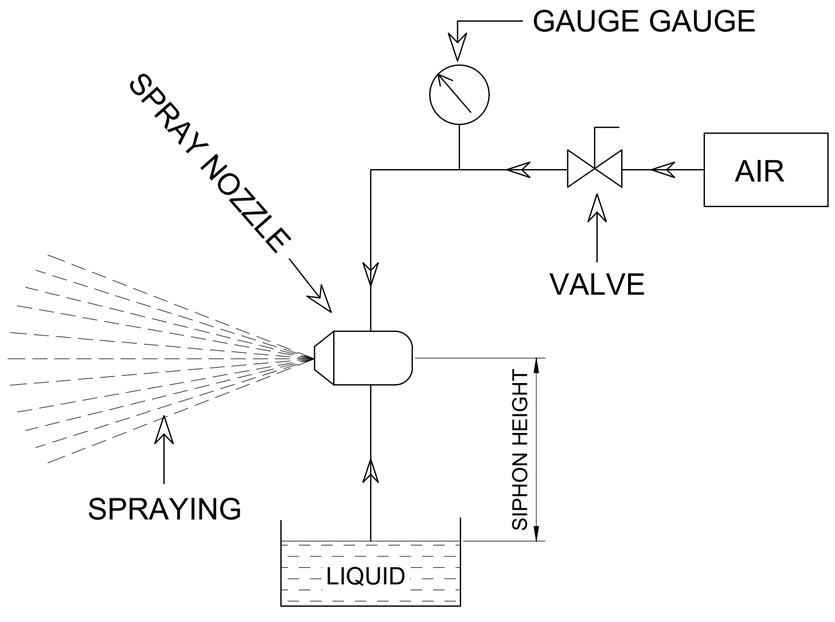
1) **Pressure method** : In this Method of liquid supply, The Liquid is feed by motor pump with desired water pressure to the spray nozzle .



2) Gravity Method : In this method of liquid supply, The liquid is feed by gravitational force ,and because of the gravity force there is a no need of motor pump or any other item for liquid feeding .



3) Siphon Method : In this method of liquid supply, The liquid is feed by the suction of liquid from a certain siphon height of liquid by pressurized Air ,This method is basically used where liquid tank and motor pump is not available for liquid feeding .

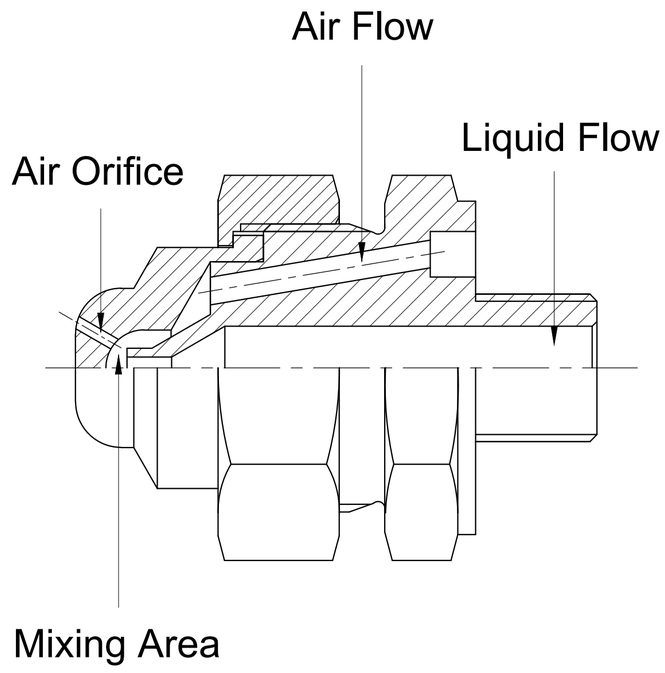


CHOOSING OF RIGHT ATOMIZING SPRAY NOZZLES

TYPES OF ATOMIZING SPRAY NOZZLES

Atomizing spray nozzles are changed by orifice size of the liquid nozzle, Type of Air Cap and types of orifice cleaning arrangement .

INTERNAL MIX ATOMIZING SPRAY NOZZLE



● Internal mixing

In This type of atomizing spray nozzles , The liquid and compressed Air are mixed inside the Spray nozzle to provide fine atomization . They can be used with liquid that have a viscosity up to 300 CP. In this type mixing, Pressurized Air and Liquid feed is necessary .

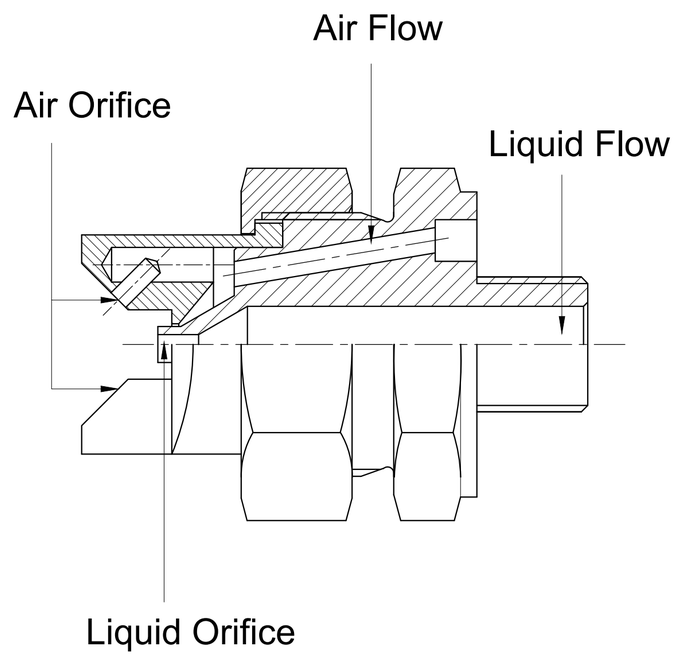
BENEFITS OF INTERNAL MIX OF ATOMIZING SPRAY NOZZLE

1. Ideal for creating fine mist for dust control and lubrication layer prior to packing .

2. Available in multiple patterns and volume flows.

3. All parts of spray nozzles consist of 316 Stainless steel for corrosion resistance and durability .

EXTERNAL MIX ATOMIZING SPRAY NOZZLE



● External mixing

In This type of Atomizing spray nozzles, Independent air and liquid control to create a precise volume flow.They can be used on liquids with a viscosity above 300 CP.

BENEFITS OF EXTERNAL MIX OF ATOMIZING SPRAY NOZZLE

1. Ideal for producing a high volume spray for heavy coatings or heavy particulate control .

2. Available in multiple patterns and volume flows.

3. All parts consists of type SS316 Stainless steel for corrosion resistance and durability .

APPLICATIONS	*TYPES OF NEEDLE*	*MATERIAL OF CONSTRUCTION*
1. Dust Control	1. Auto shutoff	1. SS 316 / 304
2. Granulation	2. Manual shutoff	2. SS 316L
3. Film Coating process	3. Quick cleaning Needle	3. BRASS
4. Paper moisturizing	4. Quick cleaning needle + Manual shutoff	4. AS PER CUSTOMER REQ.
5. Humidification		

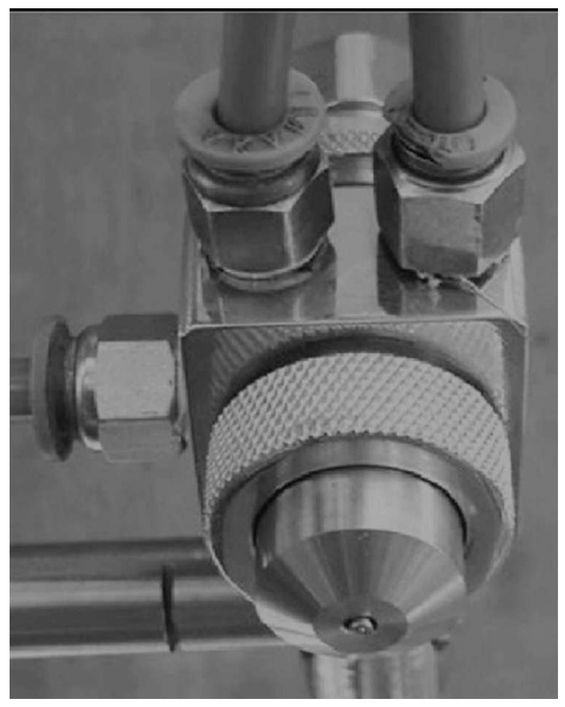
FILM COATING PROCESS

Fim coating Process is a process by which an essentially dry, outer layer of coating material is applied to the surface of a dosage form in order to confer specific benefits over uncoated variety.

Coatings may be applied to various oral dosage forms such as particles, powders, granules, crystals, pellets and tablets.

Over the course of time, coating processes have developed from the art of earlier years to those that are more technologically advanced and controlled such that compliance with good manufacturing practices is facilitated.

The development and availability of new coating materials, the recognition of the impact of applied coatings on subsequent release of drug(s) from dosage forms and the advancement in equipment design have all contributed to improved products.



● *Film coating spray gun*

Objective of Film Coating process

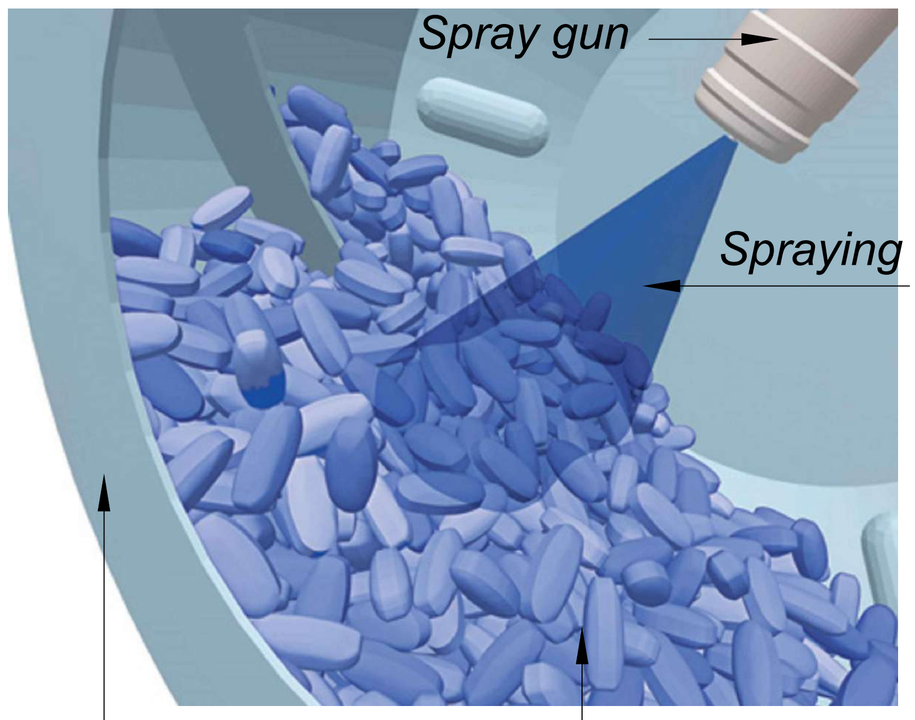
1. To mask the bitter taste and unpleasant odor of some drugs.

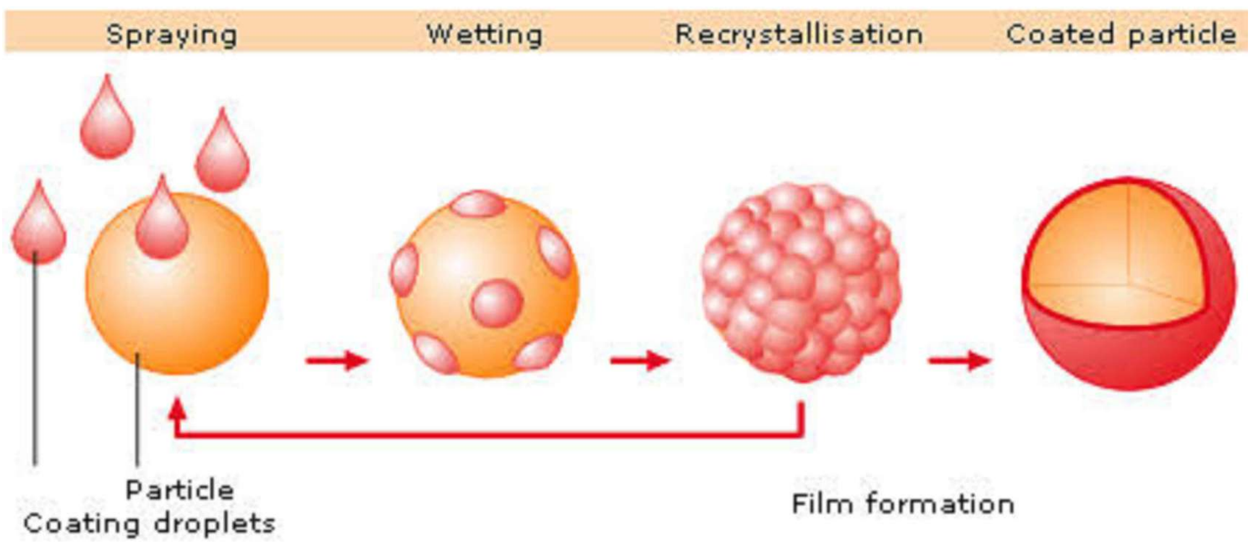
2. To improve product appearance for aesthetic or commercial purposes.

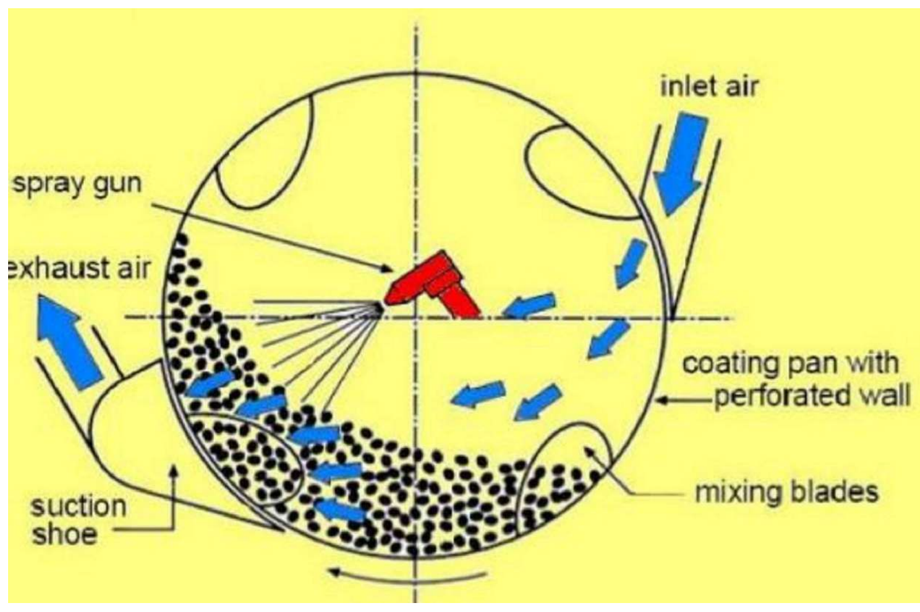
3. To prevent drug-induced irritation at a specific site within the gastrointestinal tract.

4. To protect the drug from the external environment (particularly air, moisture, and light) in order to improve stability **.**

5. To avoid inactivation of drug in the stomach e.g., enteric coating .







Result of bad coating

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

GRANULATION PROCESS

GRANULATION PROCESS WITH RMG AND HSG

It is also known as a Wet granulation process, In Rapid mixer granulator, the formation of granules occurs by rising, whirling, and tumbling motion of the material.

Dry mixing is done by adding all ingredients into the RMG by rotation of impeller and chopper at high speed .

During the addition of binder solutions to the powder impeller and chopper are operated at low speed .

After the formation of wet mass impeller and chopper are operated at high speed to form the granules of the required size .

Fluid Bed Processor

The Main Tower of Fluid Bed Processor are :

1. Gentle Drying

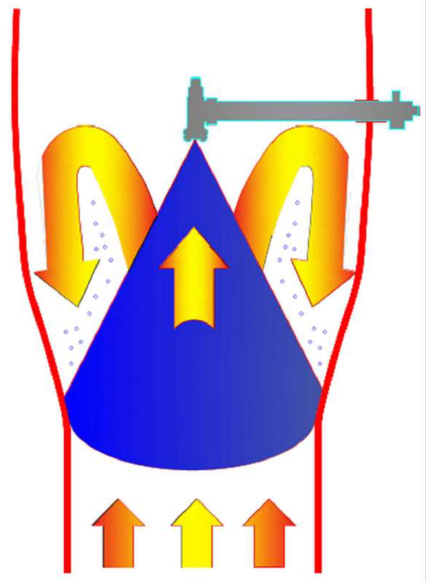
Fluidized bed processor's drying is an especially effective way of drying solids. During Fluidization the moisture is carried away by the drying air . The benefits : Excellent heat exchange, Ideal Drying time . The product is also dried gently .

2. Granulating

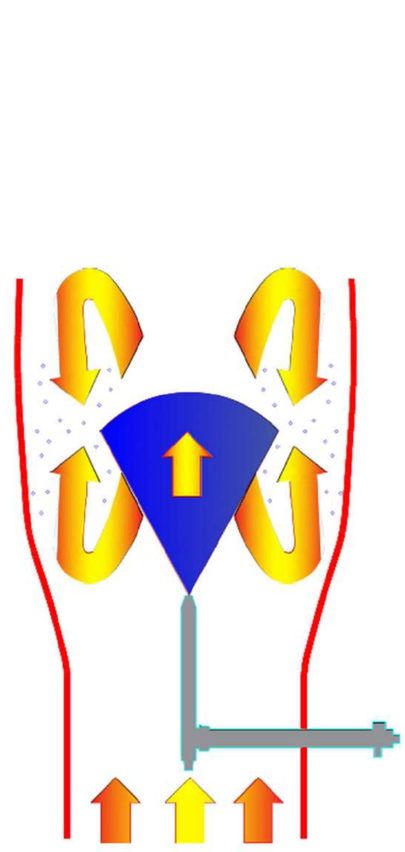
Granulating in the fluid bed is a modern method of creating granules from powder using liquid bridges. The granulation liquid used for spraying can either be aqueous or contain organic solvents . The most granules are dried at the end of the process, If necessary, Cooled, Fluid bed granules are loose and often porous, and are therefore extremely Soluble .

2. Direct Palletizing

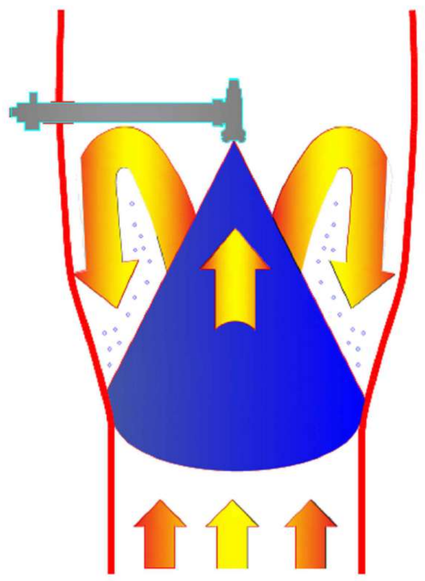
During the process of direct palletizing, active substances in the powder form and auxiliary material are directly transferred to pallets without the addition of a starter core . The centrifugal motion of the rotor or air distribution plate in fluid bed processor causes moistened powder to be rounded into even pallets. Active substances can be formulated into matrix pellets using different functional auxiliary material, with targeted release of the active ingredient .



● Top spraying



● Bottom spraying



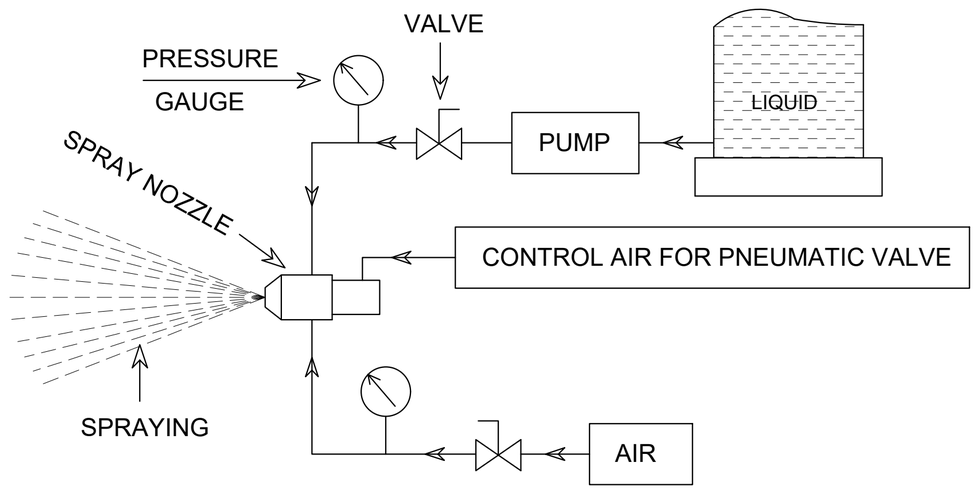
● Tangential spraying

ATOMIZING SPRAY NOZZLES

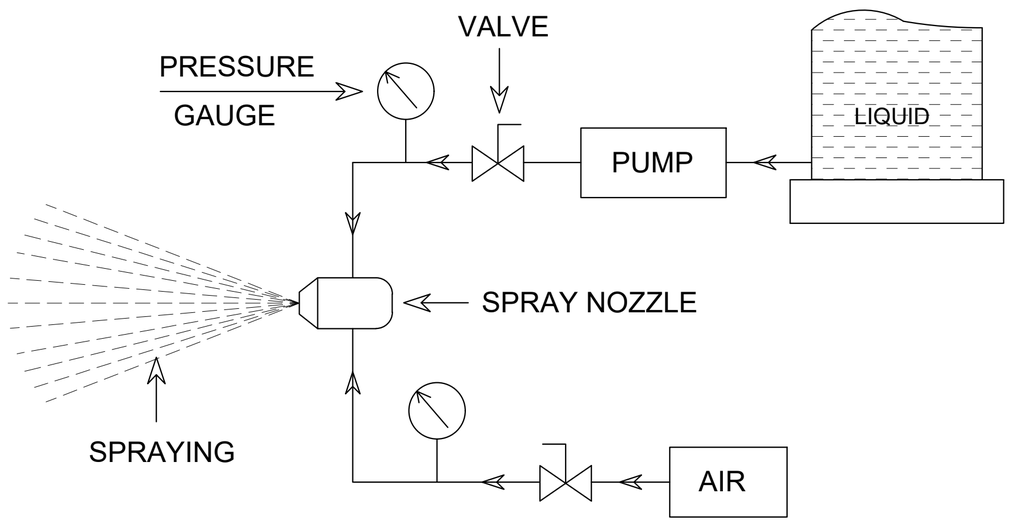
"ATOMIZING SPRAY NOZZLES" are unique twin fluids nozzles used where very large and high viscous quantities of liquid and pastes have to be turned to mist or fine atomized. highly atomized sprays can be obtained at comparatively low flow rates Liquid fed under pressure or by sucton.

APPLICATIONS :

1. Humidification
2. Film coating process
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

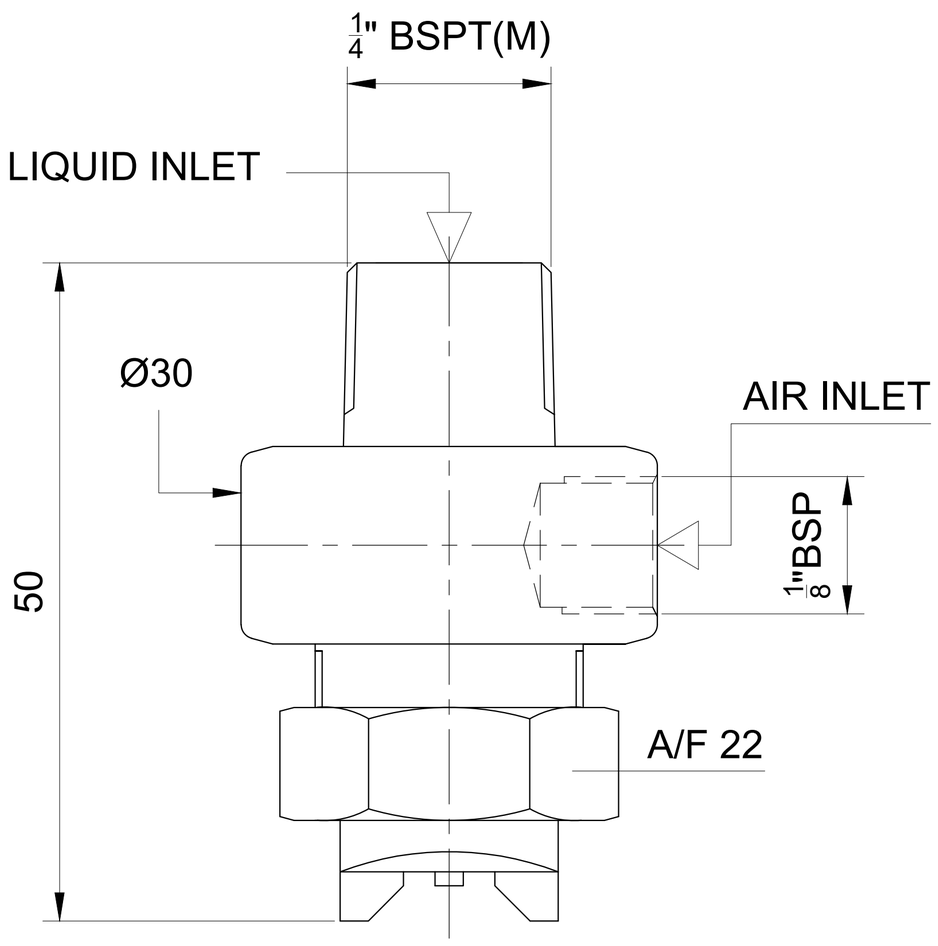
Flow Rate(lpm)@ 2 Bar	Spray Angle	Inlet Connection	Materials
0.05 To 7.0	20°,60°,120°	1/8" to 3/4" BSP/BSPT	SS - 316L, 316,304

ATOMIZING SPRAY NOZZLES

We Offer Atomizing spray nozzles to our client . . .

Design Features

- Quick assembly and maintenance
- Fine spray droplets
- Equally spray pattens, 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

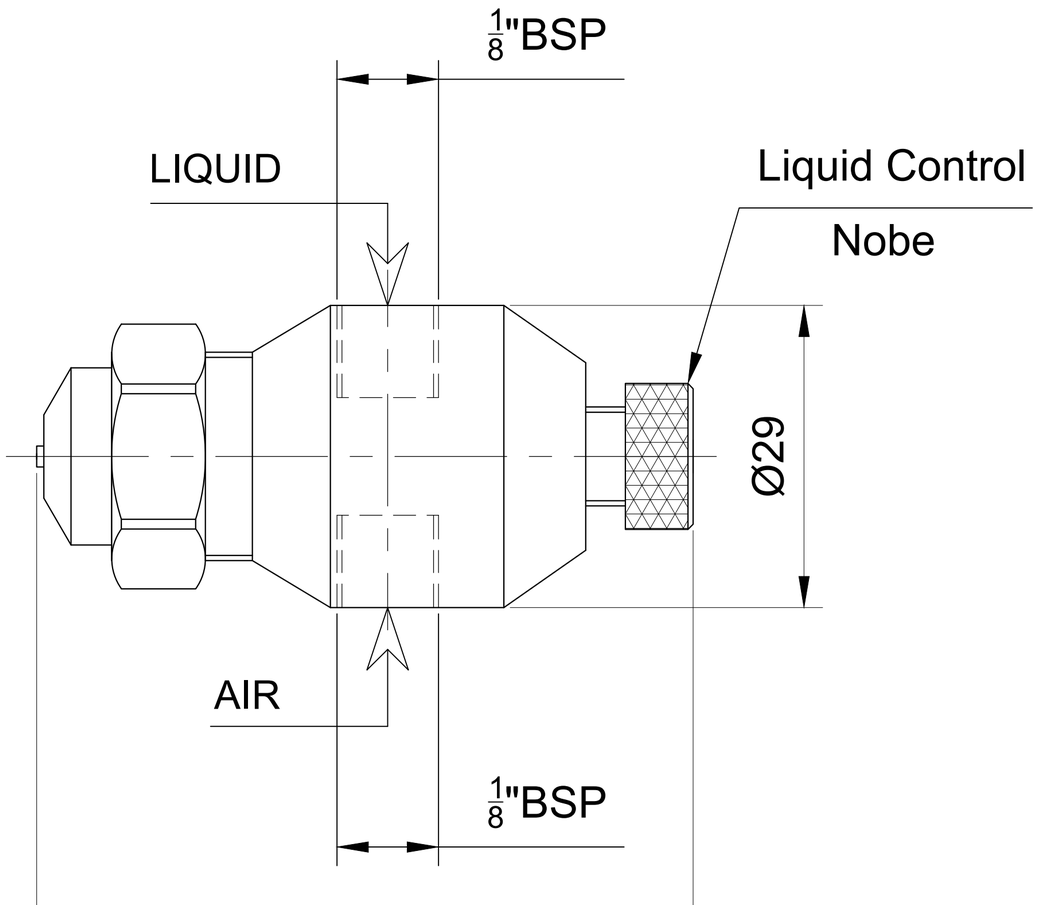
Model number	Orifice size	Operating Pressure	End Connection
N66.1	0.8 to 1.8mm	3 to 4 bar	Liquid - 1/4" BSPT(F) Air - 1/8" BSP(F)

ATOMIZING SPRAY NOZZLES

We Offer Atomizing spray nozzles to our client . . .

Design Features

- Quick assembly and maintenance
- Fine spray droplets
- Equally spray pattens, 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

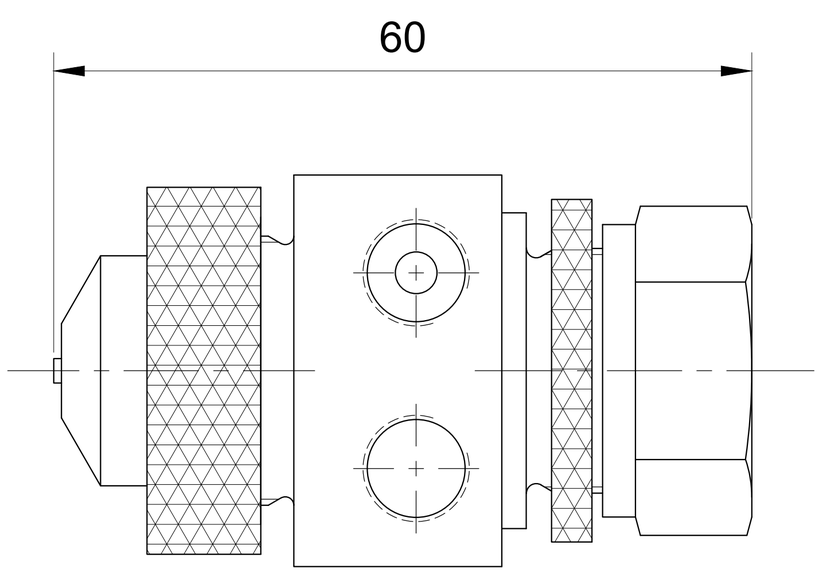
Model number	Orifice size	Operating Pressure	End Connection
N66.3	0.8 to 1.8mm	3 to 4 bar	Liquid - 1/8" BSP(F) Mist Air - 1/8" BSP(F) Cylinder Air - 1/8" BSP(F)

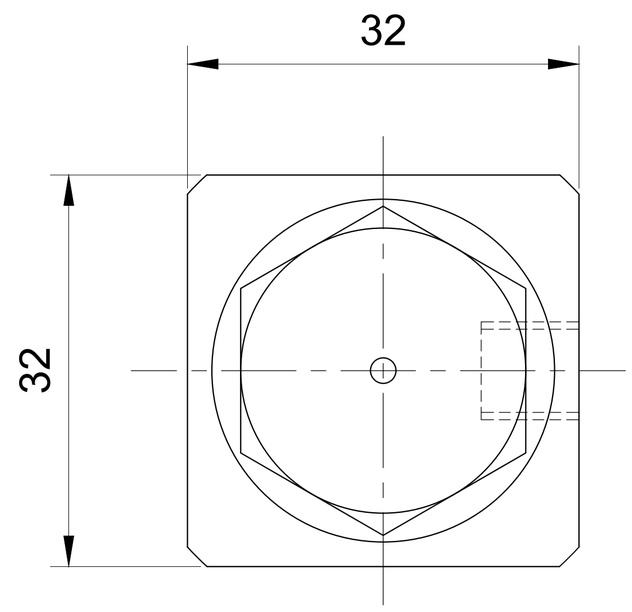
FILM COATING SPRAY GUN

We Offer Film coating spraygun to our client . . .

Design Features

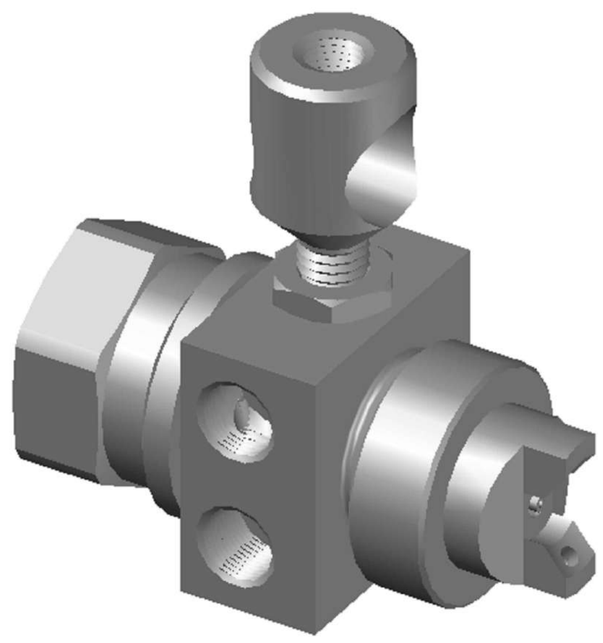
- Quick assembly and maintenance
- Fine spray droplets
- Equally spray pattens, Narrow full cone and Flat fan Pattern.
- Available in different orifices.
- Compact Design .
- Suitable for Tablet coating , Glue spray on Paper Applications .
- Material : SS 316
- Auto shut Off Design For Liquid Feeding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





FRONT VIEW

R.H.S. VIEW



TECHNICAL DATA SHEET

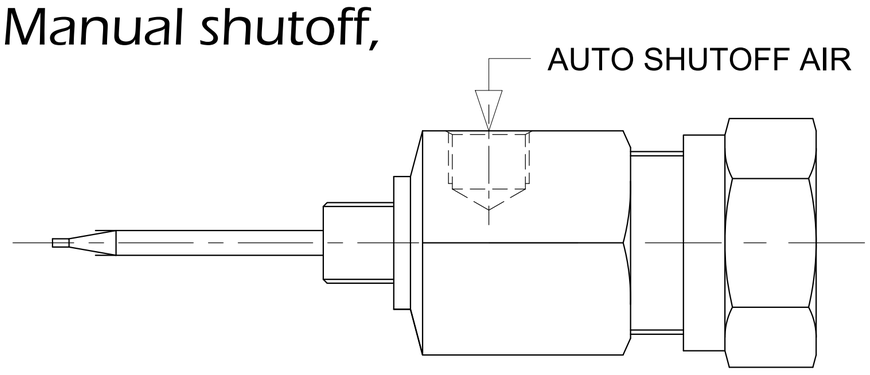
Model number	Orifice size	Operating Pressure	End Connection
N66.5	0.5 to 1.8mm	3 to 4 bar	Liquid - 1/8" BSP(F) Mist Air - 1/8" BSP(F) Cylinder Air - 1/8" BSP(F)

ATOMIZING SPRAY NOZZLES

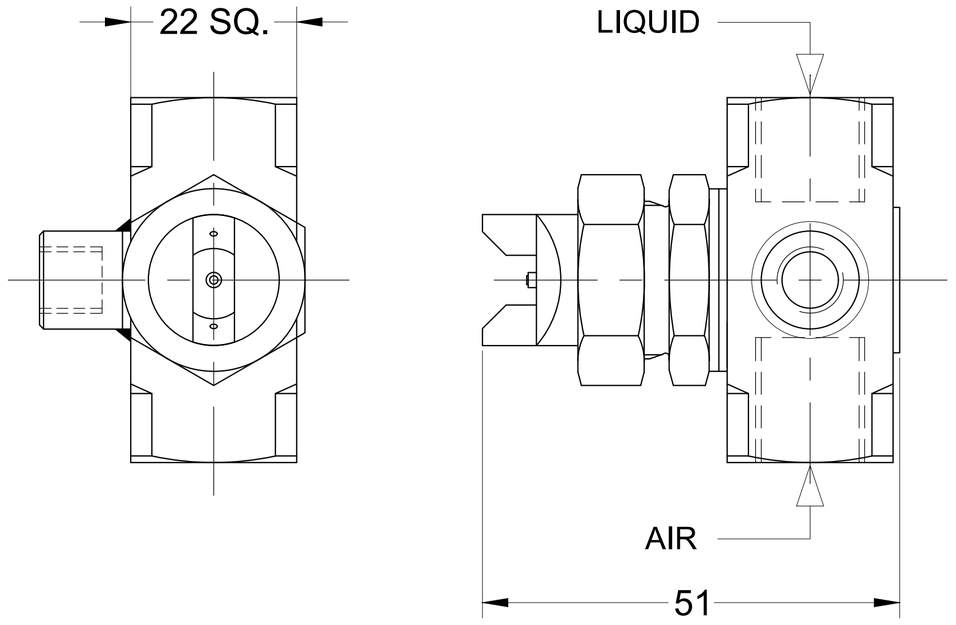
We Offer Atomizing spray nozzles to our client . . .

Design Features

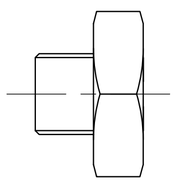
- Quick assembly and maintenance
- Fine spray droplets
- Equally spray pattens, Narrow full cone and Flat fan Pattern.
- Available in different orifices.
- Compact Design .
- Suitable for Tablet coating , Glue spray on Paper Applications .
- Material : SS 316, Brass Or As per customer requirement.
-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



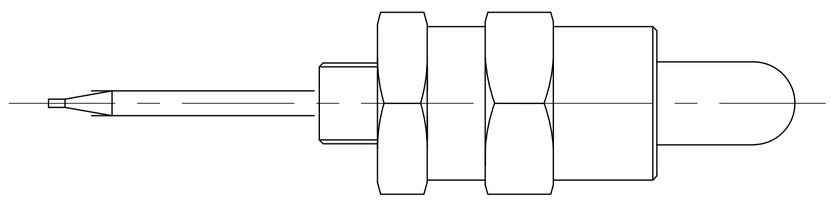
• AUTO SHUTOFF MODEL



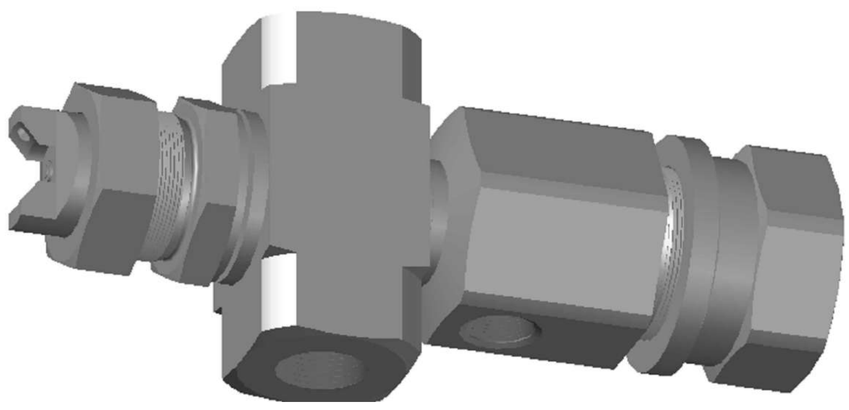
• COMMON ASSEMBLY

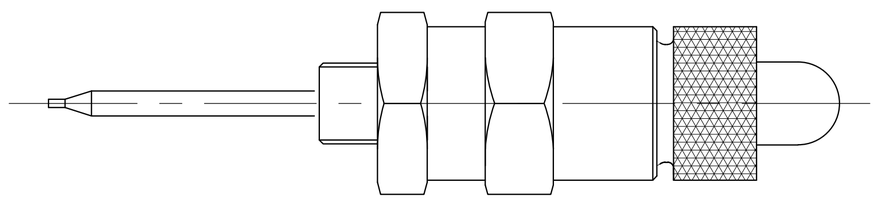


• BASIC DESIGN

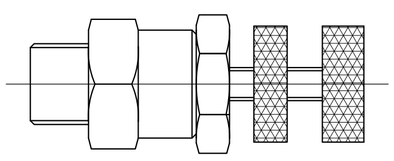


• QUICK CLEANING MODEL





•QUICK CLEANING + MANUAL SHUTOFF MODEL



• MANUAL SHUTOFF MODEL

TECHNICAL DATA SHEET

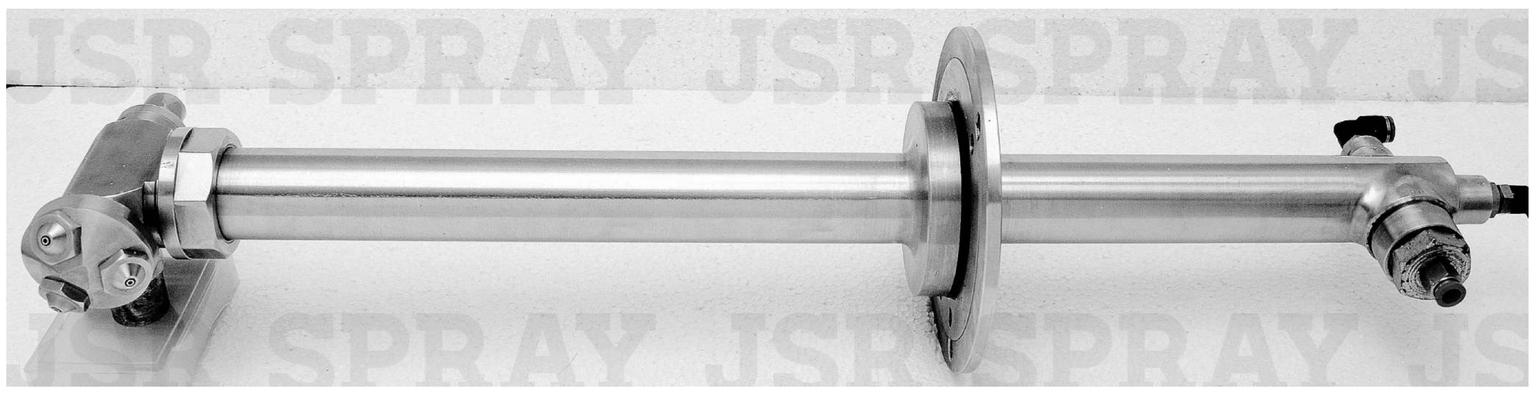
Model number	Orifice size	Operating Pressure	End Connection
N66.6	0.8 to 2.2mm	3 to 4 bar	Liquid - 1/4" BSP(F) Air - 1/4" BSP(F)

TOP SPRAY NOZZLES (FBP SPRAY GUN)

We Offer Top spray Gun to our client . . .

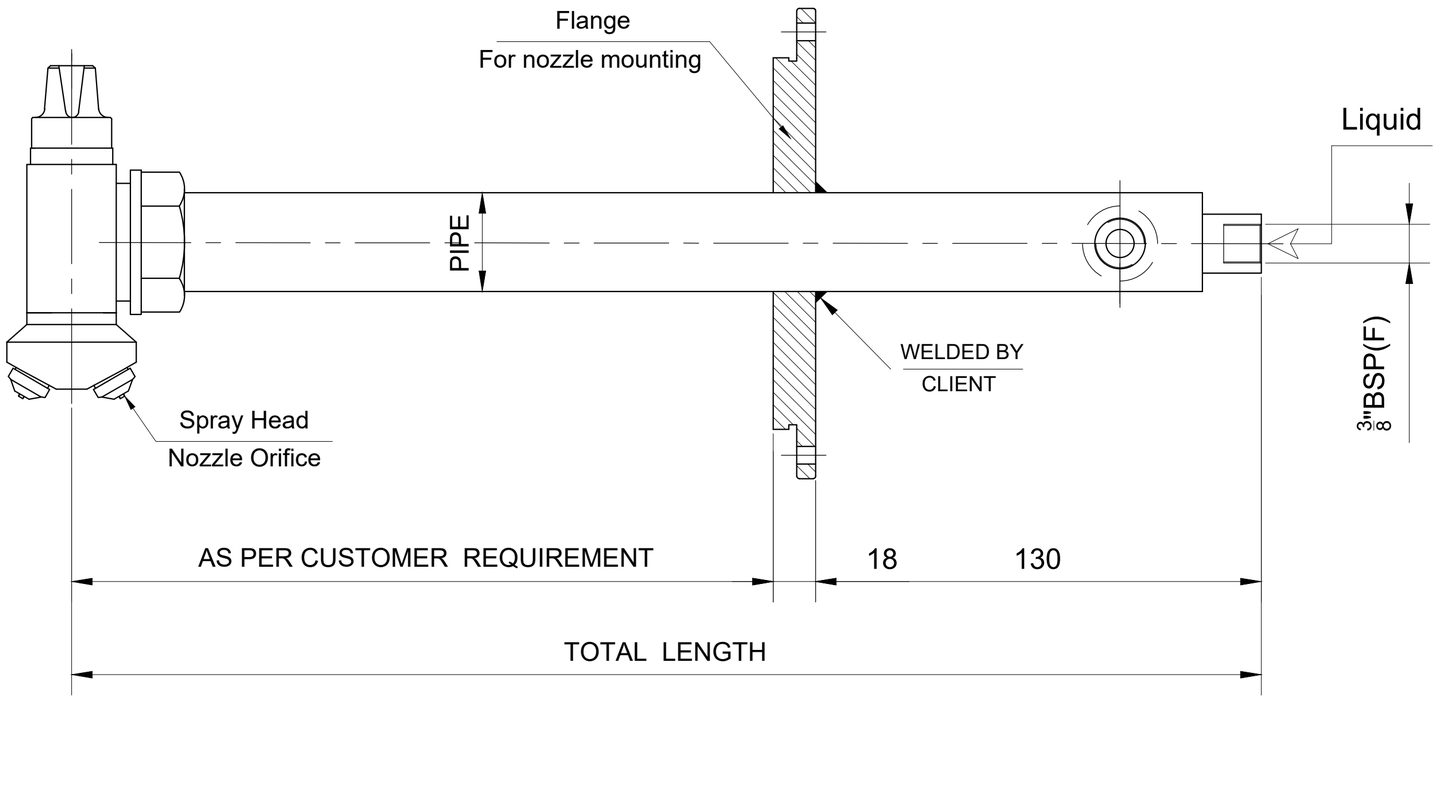
Design Features

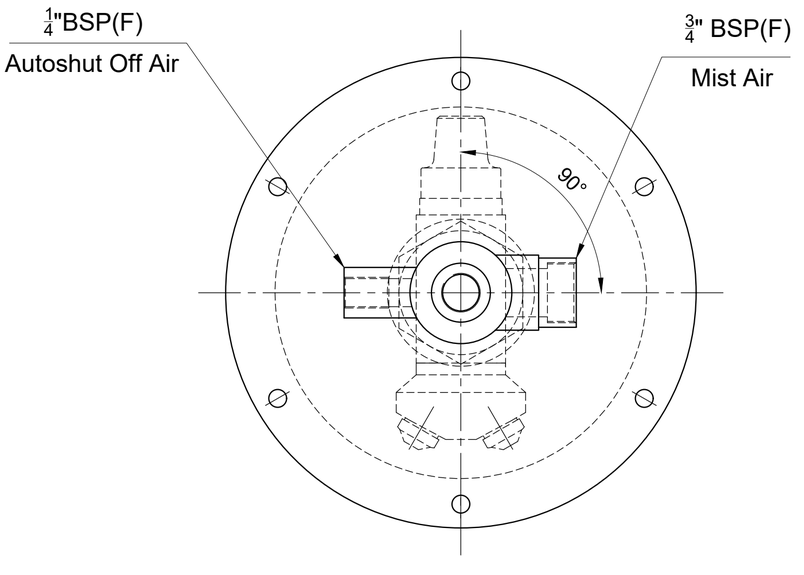
- Modular design for quick dessamble
- Fine spray droplets
- Equally spray pattens, wide cone (Top down spray)
- Available with anti-drip design
- Multi numbers of head (ie . 3 Nos , 5 nos & 7 nos)
- For Lab / production scale application
- Material : SS 316L stainless steel, FDA Approved Vitton O-Ring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





BOTTOM SPRAY GUN (FBP SPRAY GUN)

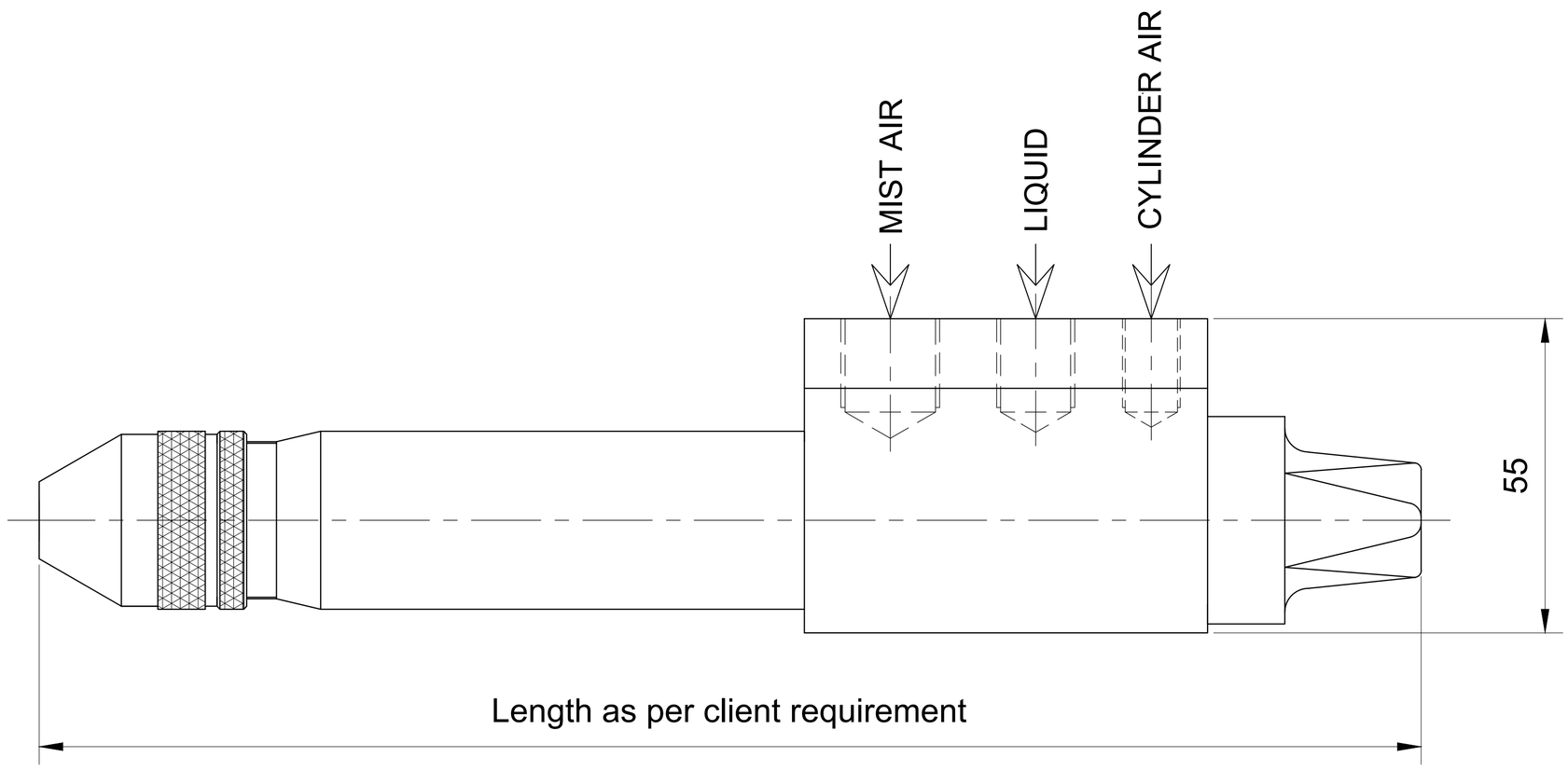
We Offer Botttom spray Gun to our client . . .

Design Features

- *Modular design for quick dessamble*
- *Fine spray droplets*
- *Equally spray pattens, Narrow full cone (Bottom-up spray)*
- *Available in different orifices*
- *Length should be keep as per client Requirement.*
- *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	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)

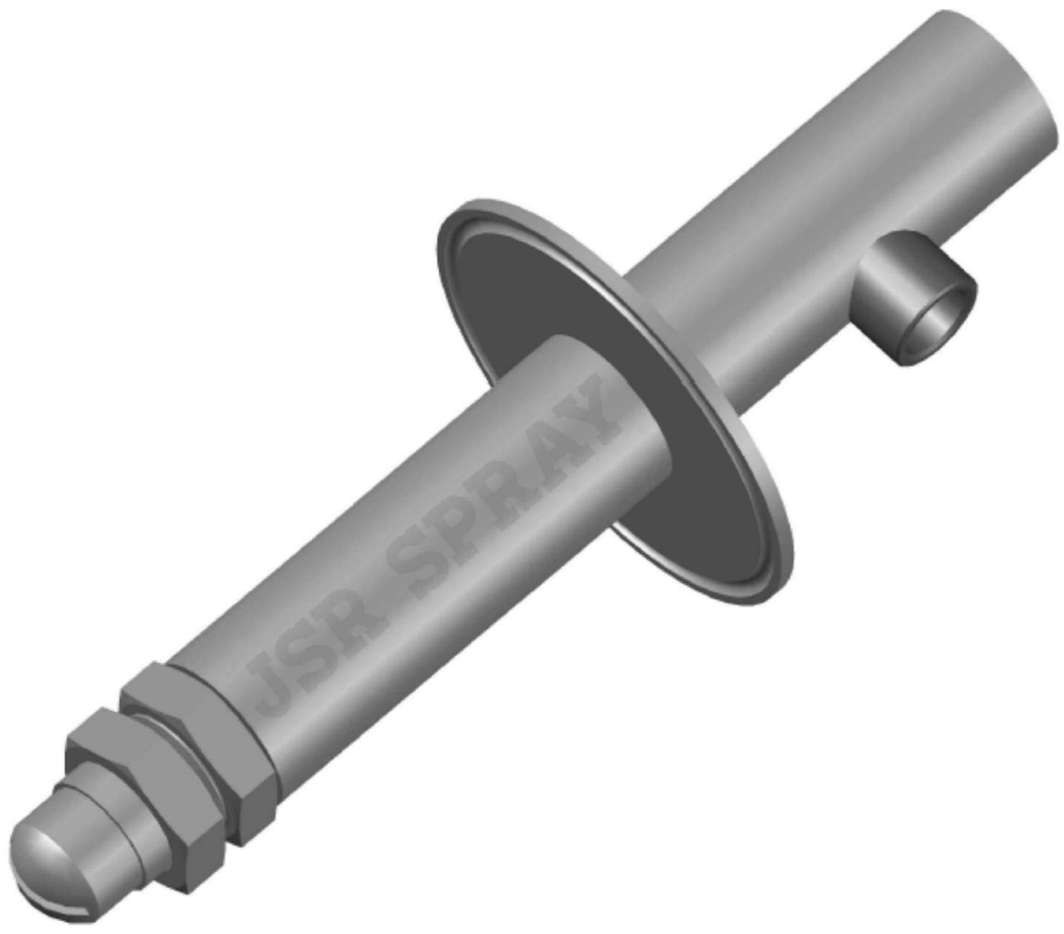


RMG BINDER SPRAY GUN

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

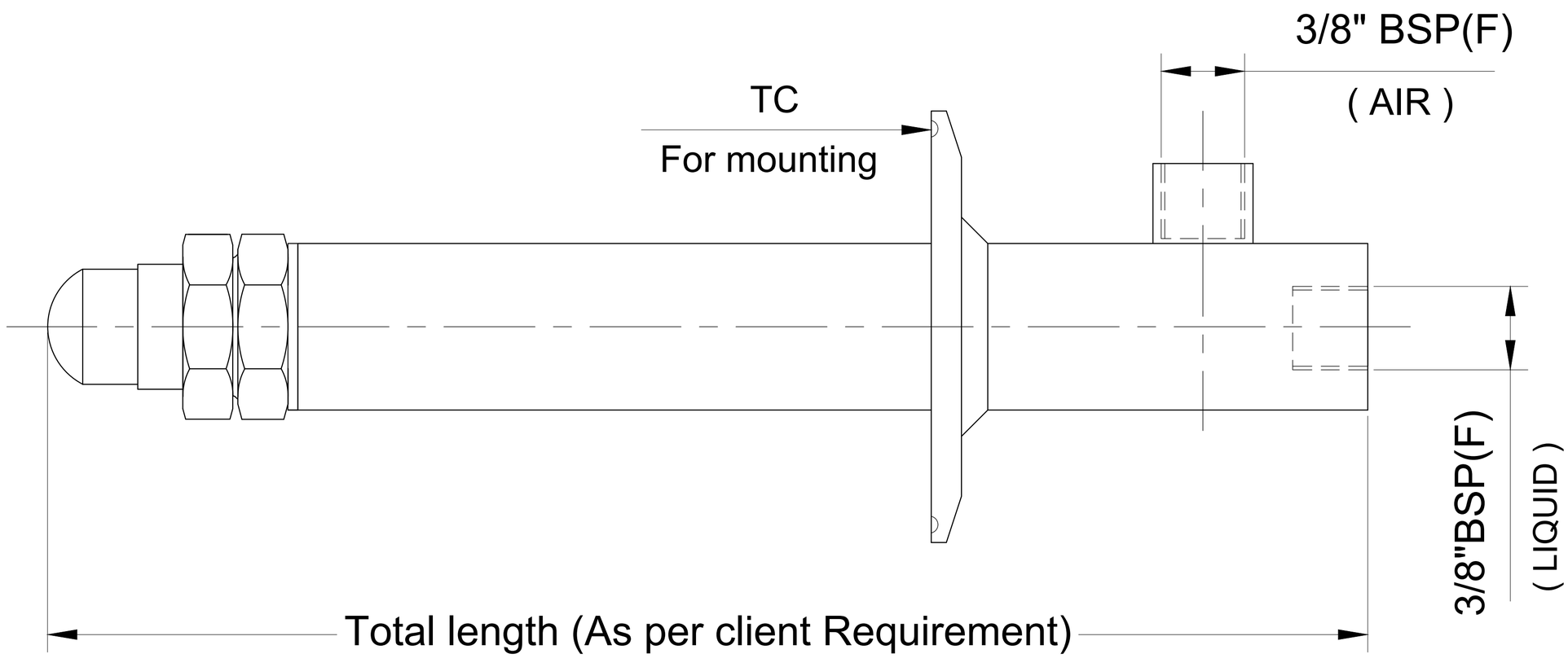
Design Features

- 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)

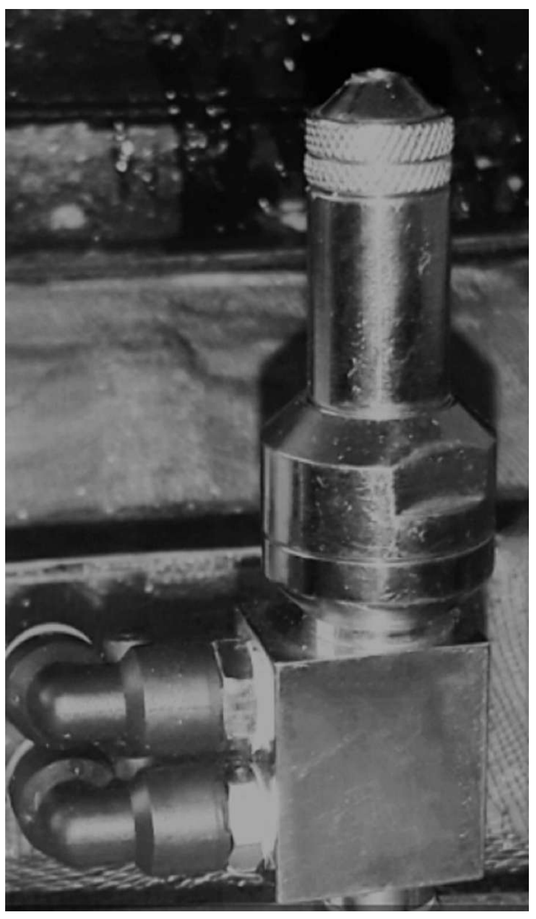


BOTTOM SPRAY GUN LAB MODEL

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

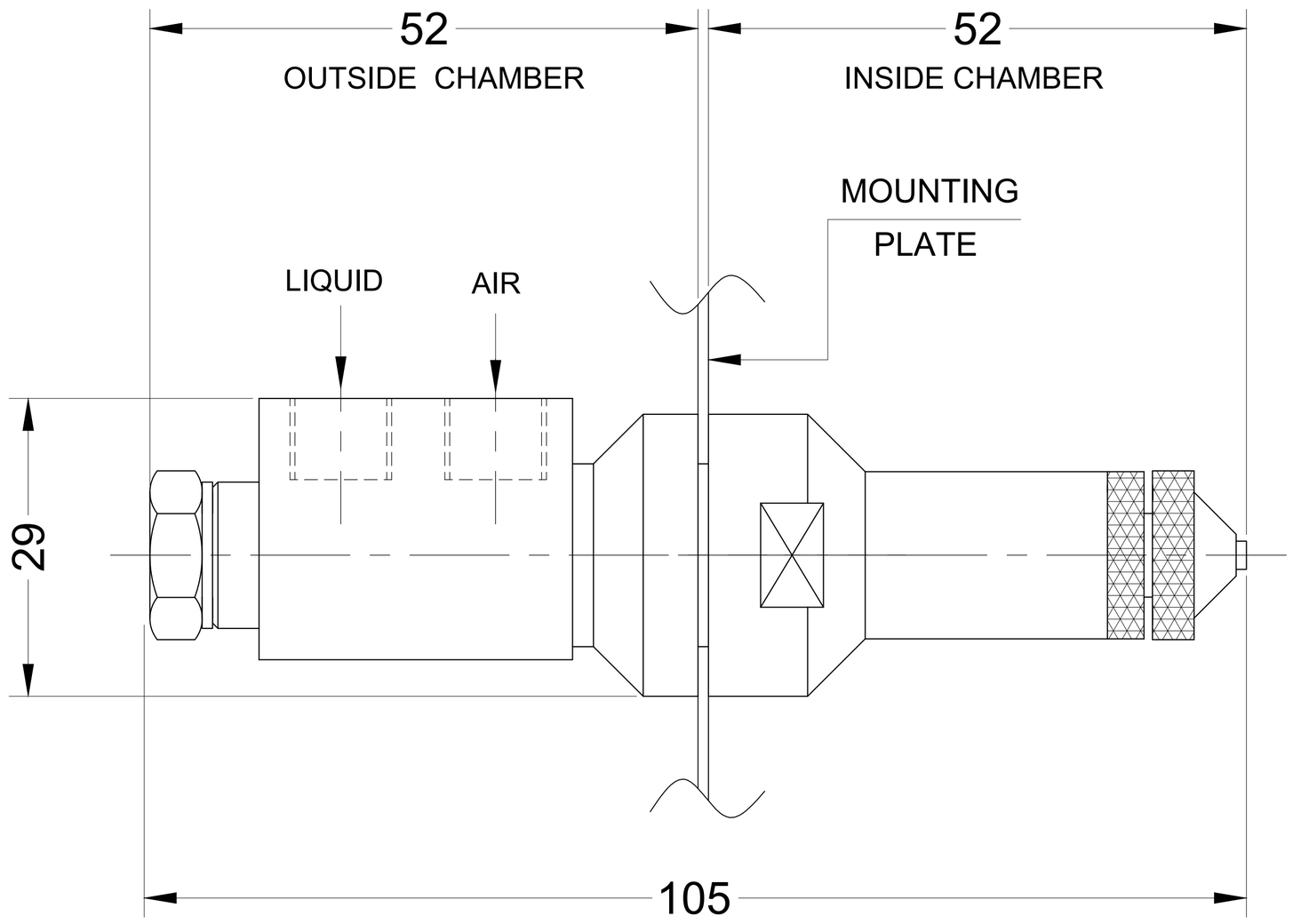
Design Features

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

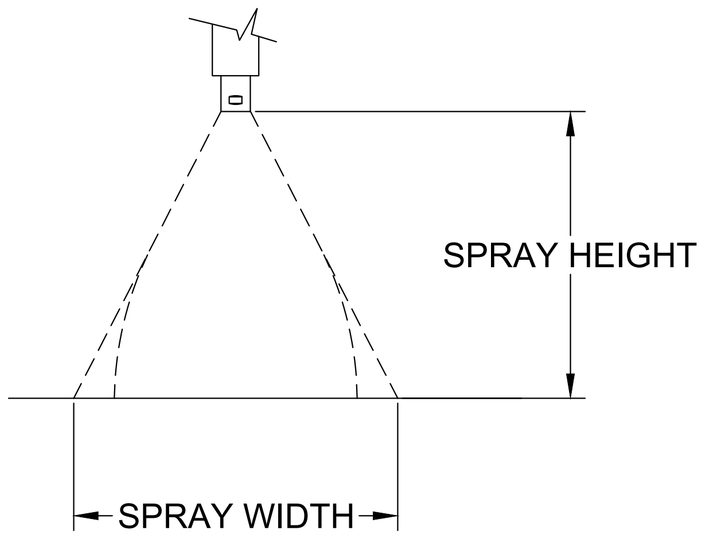


TECHNICAL DATA SHEET

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/m²	Kg/cm² =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/cm²	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	m³/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 m³/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	0076	4.546	0.273	1.201	1

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