

High Performance  
and Overqualified  
Spray Nozzles for  
Surface Technology



Surface Technology

## ADVANCED SURFACE TECHNOLOGY AS A RESULT OF NOZZLE TECHNOLOGY IMPROVEMENTS

**MITSUDA**  
Spray Nozzle

Through our continuously developing engineering research, Mitsuda is offering high technology nozzle and spraying options that provides increasing product and surface impact quality. For all sectors working through surface treatments such as coloring, drying, rinsing, descaling... the best results can be achieved through using the best fit nozzles designed for the required application.

Mitsuda provides perfect solutions to users through its wide range of products and 35 years' experience in surface technology applications. Our experienced team guide you to get highest working performance through adapting continuously developing nozzle and spraying technology.



Mitsuda has established successful partnerships that are still ongoing through many fairs world wide. The new technological era of virtual fair platforms also enable Mitsuda to present its engineering studies in the nozzle technology improvements.





SURFACE TECHNOLOGY

Pre-Treatment and Painting Systems



Automotive Industry



Food Industry



Pharmaceutical Industry  
Electronic



Content

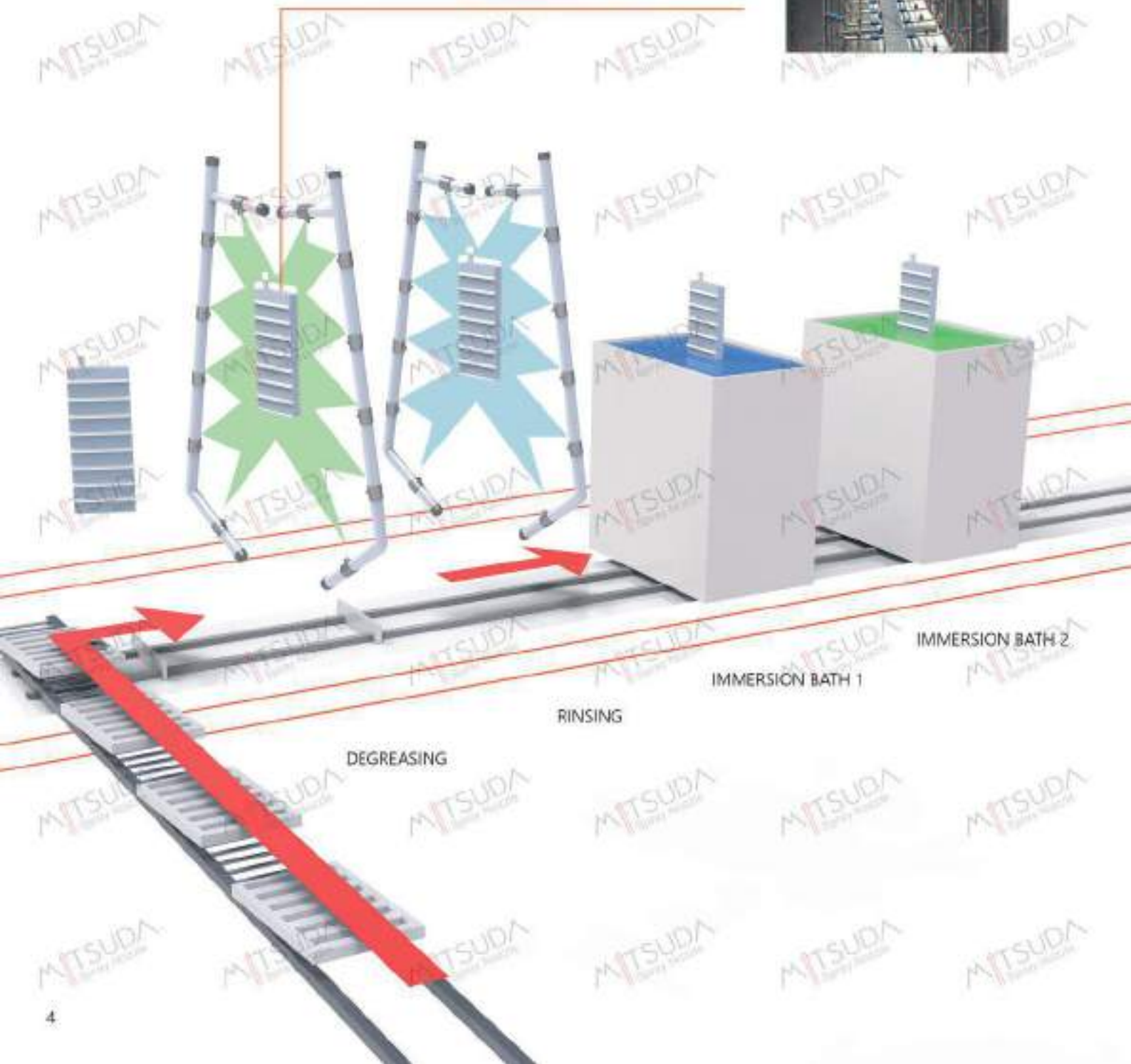
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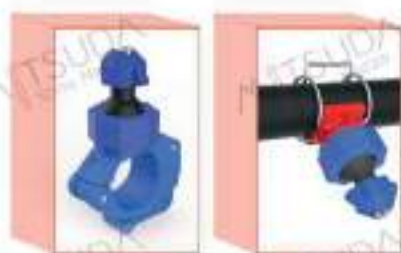
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## Water Jet Cleaning Nozzles

Flat Fan Nozzles and tongue- type with eyelet clamps are the primary nozzle types in water jet cleaning processes. The components are subjected to wide range of fluids such as aqueous alkalis, deionized water...

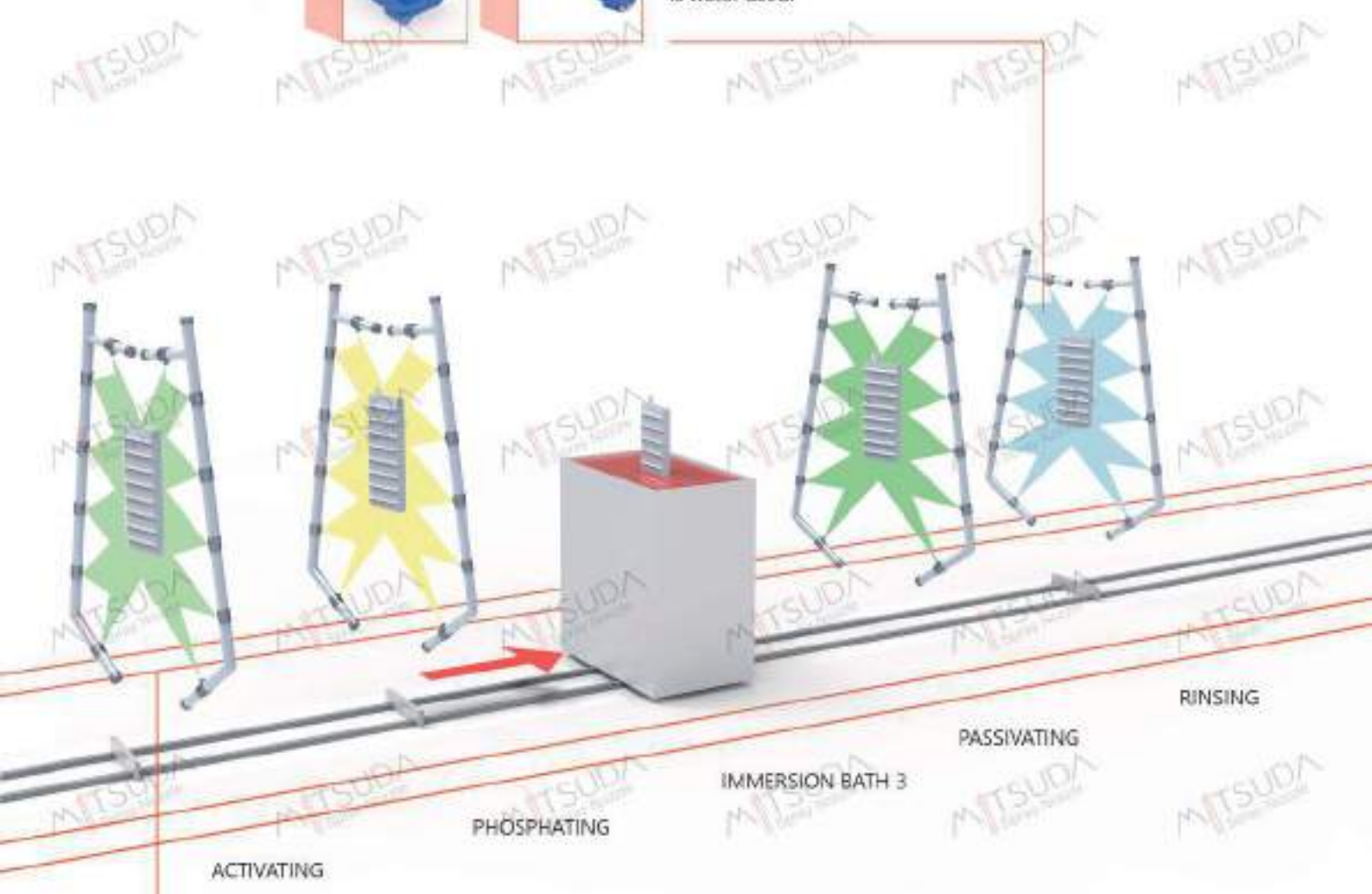






### Nozzles used for the Rinsing Zone

The components are entered into a rinsing zone at the end of the painting line where paint particles are thoroughly washed off. This is achieved step by step until deionized water is used.



### Nozzles and installation options for Pre-treatment

Mitsuda offers wide range of nozzles and installation options for this application. (Please check MEMORY SPRAY, Easy-Clip, spacers and end caps for pipe installation).





## Nozzles for the Pre-wash

Pre-wash is applied to soften the soil. **Flat fan nozzles** or **tongue-type nozzles** are the mostly used nozzles through their wide spray angles with a low flow rate.



## Nozzles for the main wash

High impact flat fan nozzles or tongue-type nozzles are used for the main wash. The spray angle should be 30 to 45 degrees. Through their sharp jet, tongue-type nozzles are suitable for low pressure. **High pressure flat fan nozzles** are different from low pressure nozzles through their hardened mouthpiece which enables them to have a longer service life.



## Nozzles for sill and wheel washing

The area where soil is mostly found can be cleaned through a high spray impact. Mitsuda offers **high-pressure nozzles** designed with a narrow spray angle to best achieve this application.







### Nozzles for Rinsing

Rinsing is the previous stage before drying. This application requires small droplets which can be obtained through **Flat fan nozzles**. Flat fan nozzles use an extremely low flow rate and can be connected easily through aid of a bayonet cap and a ball joint.



### Nozzles for applying wax

To apply wax evenly, a specified nozzle adjustment is needed. Mitsuda's **conjunction with a retaining nut and eyelet clamp** is the best solution for this application through disturbing the water perfect evenly.



### Alignment of low-pressure flat fan nozzles

Mitsuda **flat fan nozzles** provides a linear impact through providing an even droplet. To achieve this, the nozzles should also be aligned nearly 5 -15 degree to the pipe's longitudinal axis.

### Nozzles for cooling, lubrication, chip removal



To get maximum effect for cooling and lubrication, spray nozzles should be correctly positioned. Nozzles could be aligned through using a ball joint. Tank cleaning nozzles operates for chip removal through cleaning the interior machine in CNC machining centers.

### Nozzles for Surface Pre-Treatment



Flat fan nozzles efficiently work in many pre-treatment processes of automobile industry. The MEMORY SPRAY and Easy-Clip nozzles are the commonly used nozzle systems in that area.



### Nozzles for Leak Testing

Our full cone and flat fan nozzles are commonly used in this application through spraying from all sides in different rain intensity setting from gently rain to heavy rain. Thus, cars are successfully checked whether they are well sealed against rain and moisture.



### Nozzles used in washing installations

Mitsuda presents different ranges of flat fan nozzles for this application. High pressure nozzles and tongue-type nozzles are some of them. The best cleaning outcome and low water consumption can be achieved through selecting the correct nozzle type. Mitsuda supports to install perfect nozzle systems through its wide range of products and 35 years experience in surface technology application.





## The criteria for Nozzle Selection:

### 1- Impact

- | Impact surface and jet shape
- | Spraying distance
- | Pressure
- | Flow Rate
- | Spray depth

### 2- Spray angle and spraying behaviour

### 3- Liquid distribution

### 4- Droplet sizes

### 5- Factors affecting the temperature behaviour of nozzles materials

### 6- Material and wear

To determine the appropriate nozzles for you, the following criteria should be taken into consideration.

### 1- Impact

When a liquid jet applied on a surface, the force of impact has the key role in surface technology. The impact is calculated as the ratio of force to the surface.

The impact can be changed according to following parameters.

#### Impact surface and spray angle

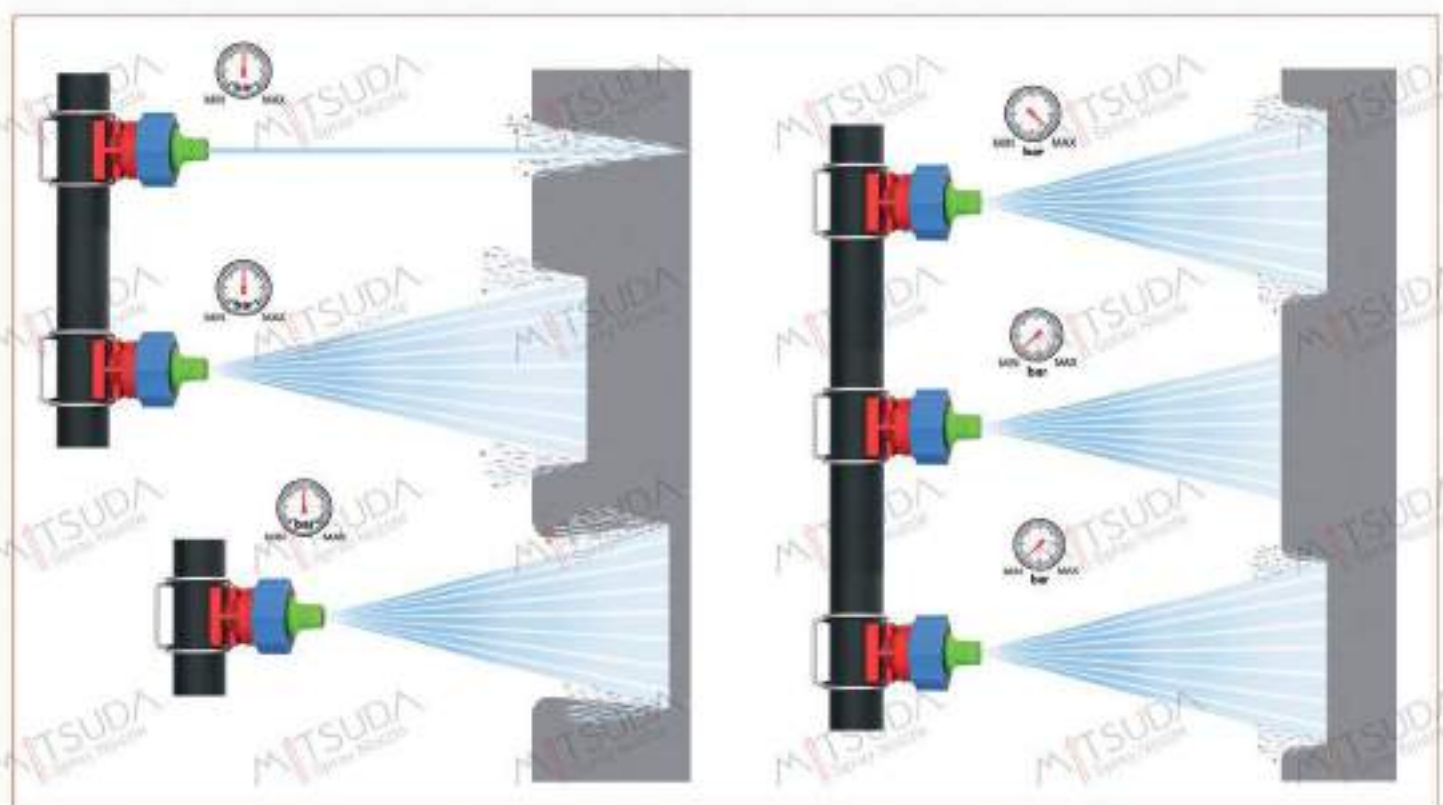
The impact surface means the area that the droplet strikes. The smaller surface area leads to get higher impact values. Examples for the nozzles with high impact are flat fan nozzles and solid stream nozzles.

#### Pressure

Increased connected pressure leads to an increased spray impact. If the pressure is doubled while keeping the flow rate same, the impact is doubled.

#### Flow Rate

If the flow rate is increased through using a larger nozzle, the impact is increased (in case of keeping the order parameters such as spray angle pressure medium same).



## Spray Depth

When using flat fan nozzles, the impact changes according to spray quality. For instance, through Mitsuda high pressure flat fan nozzles or a high flow quality, a narrower spray depth can be ensured. If other variables kept same (flow rate, pressure, medium, spray angle), a narrower spray depth leads to a higher impact.



- Through using a flat fan nozzle, doubling the distance leads to a quadrupling of the sprayed surface area.
- For atomization nozzles, if the distance is increased, the sprayed surface area also enlarges. This results in decreased impact on the surface.
- Regarding flat fan nozzles, if spraying distance is doubled, the sprayed surface area quadruples. As a result, the impact decreases four-fold.

## 2-Spray angle and spraying systems

There are different types of single-fluid nozzles with spray angles from 0 degree (solid jet nozzles) to 360 degree (tank cleaning nozzles). According to its type, single-fluid nozzles may spray liquid as a flat fan, full cone or hollow cone.

The solid jet nozzle provides a closed jet impact which hits a focalized point. The jet impact breaks up after some distance available. Twin-fluid nozzles have a narrow spray angle of nearly 20 degree because of the high speed where the compressible medium available. If the distance from the nozzles enlarges, the spraying becomes less sharply. Twin-fluid nozzles produce flat fan or full cone spraying in general, but some different spray patterns might also be provided.

Distance	Area	Impact
h	A	1
1.5 x h	2.25 x A	1/2.25
2 x h	4 x A	1/4
3 x h	9 x A	1/9
4 x h	16 x A	1/16



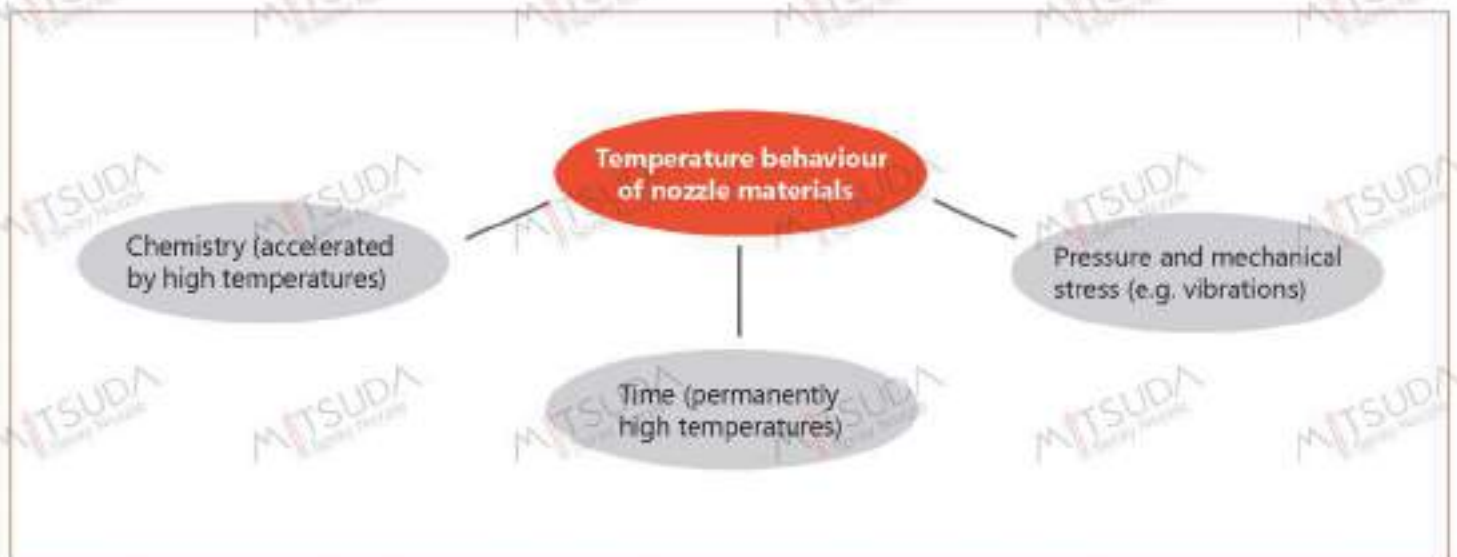


### 3- Distribution of Liquid

Regarding coating processes, homogenous distribution of the liquid is required. To ensure an even distribution of the liquid, nozzles must be aligned next to each other as one nozzle by itself provides a parabolic distribution. An overlapping nozzle adjustment achieves an almost even liquid distribution.

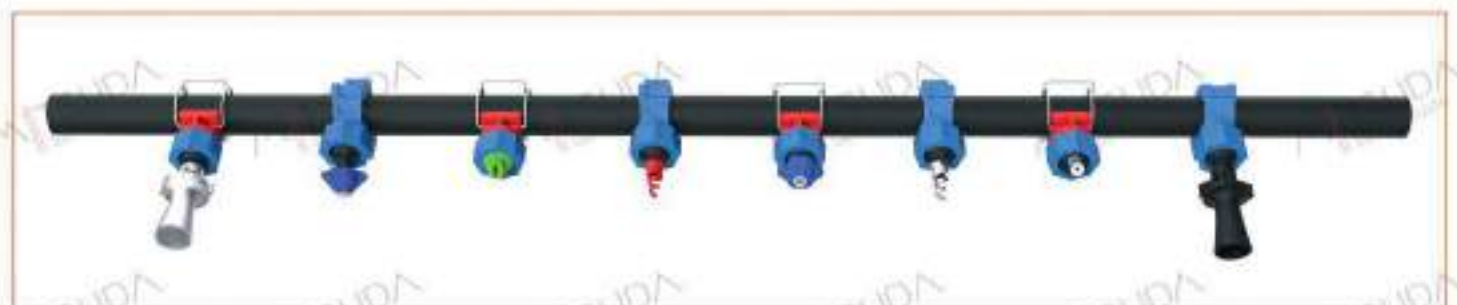
### 4- Droplet sizes

Twin-fluid nozzles may provide thin to very thin droplets based on flow rate ratio of the used compressible medium to the atomized liquid, if ratio increases, the atomization becomes thinner. For single-fluid nozzles, the droplet field changes according to nozzle design, flow rate and pressure. If pressure increases, the atomization becomes thinner up to a certain level. Hollow cone nozzles, if pressure and flow rate kept same, produce thin to very thin droplets. While Full cone nozzles produce coarser droplet spectrum, flat fan nozzles produce the coarsest spectrum. The nozzles with lower flow rate produce thinner droplet spectrum according to nozzles with higher flow rate.



### 5- The use of nozzle materials according to different temperatures

Applications that require temperatures up to 140 degree are more common. Cleaning and sterilization applications are within this spectrum. Material data sheets shows temperature information that suitable for the used nozzle material. The basic agents that effect the suitability of a nozzle material at higher temperatures are pressure, chemistry, time and the associated mechanical stress. Chemical applications might require higher temperatures. For all materials, high temperatures lead to decrease in strength values. So, for applications that require high pressure, the mechanical stress type must be focused on.



## 6- Nozzle Wear

The factors that affect the nozzle wear are the used nozzle material and using conditions. Material abrasion caused the wearing of a nozzle's liquid outflow opening.

The below factors cause more wearing of the nozzles:

- 1 Using the nozzle above the optional range of pressure.
- 1 Hard particles and solids in the liquid.
- 1 Using hard chemical substances.

In case of using nozzle in an improper environment such as radiation, high temperature, the nozzle body can also wear.

The factors affecting the nozzle wear can be seen on below diagram.



### Indication of nozzle wearing

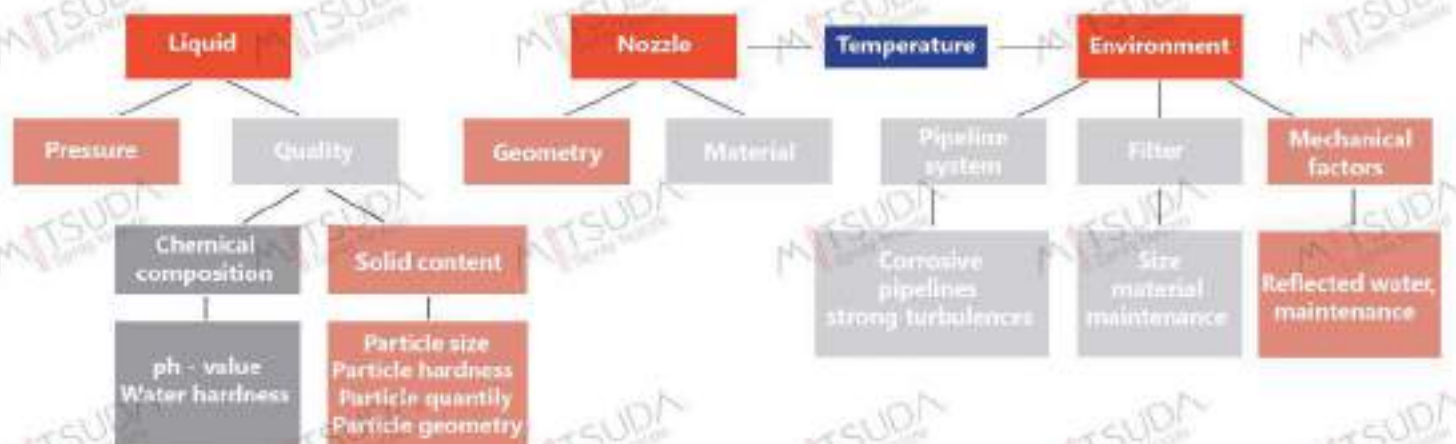
A high increase in flow rate indicates the wearing of nozzles. The reason of increasing flow rate is the more liquid discharge because of material abrasion. This causes more freshwater consumption.

### Material wearing

In general, material wear is caused by the atomization of liquid with hard particles and solids. If those particles are harder than nozzle's material, the ratio of wearing significantly increases. The table presents different materials and their average Vickers hardness.

Nozzle Material	Vickers hardness (HV)
Aluminium	80
Brass	80-150
Titanium (grade 1 to 4)	125-210
Hestelloy	200-250
Stainless-steel	220-270
Stainless steel (hardened)	360-390
Carbide	1000-2300
Ceramic	1500-2700
Sapphire/ruby	2300

- Corrosive wear
- Abrasive wear
- Temperature
- Corrosive and abrasive wear





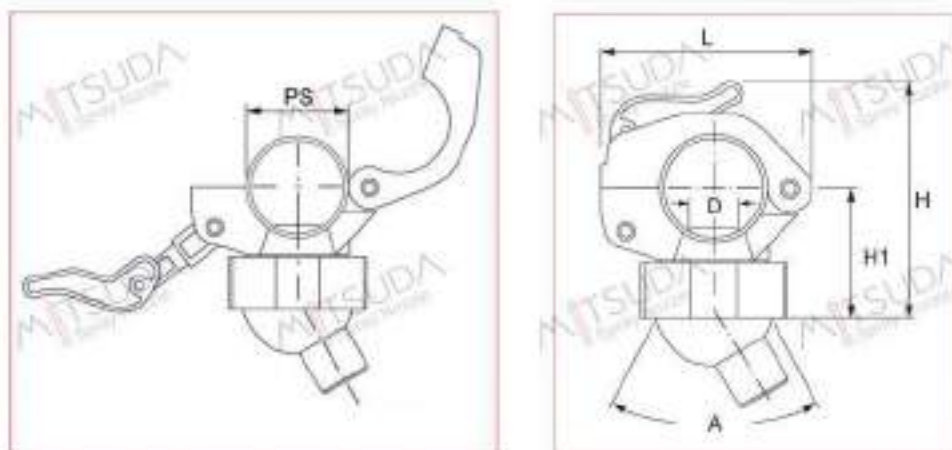
# Nozzle Systems for Surface Technology

## Easy-Clip & MEMORY SPRAY



**Rotating nozzle clamps**

To apply those clamps on your pipes, a drill hole needed through which nozzle clamp inserted and linked via a screwdriver. The clamp body is made of PP mixed with 30% fiberglass. Bolts and screws are made of stainless steel AISI 316. Rotating nozzle clamps are long wearing and can be easily installed. You may get optimum performance also at high temperature.

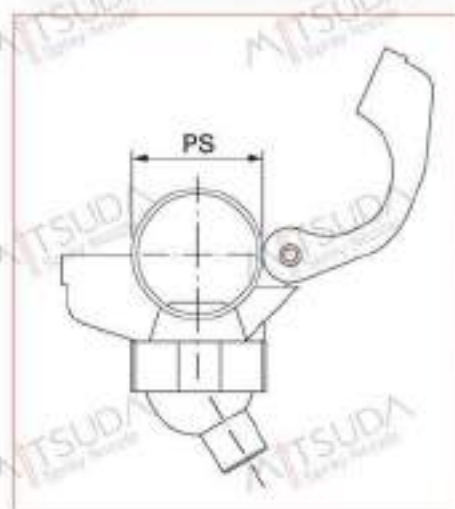
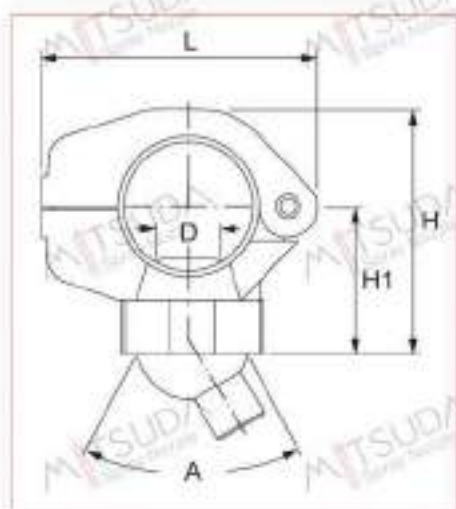


Code	PS	PD	D	H	H1	L	A	W
	inch	mm	mm	mm	mm	mm	deg	g
M067.631.xx.40.00	1-1/4"	42/43	20,0	93	41	84	40°	87
M067.631.xx.50.00	1-1/2"	48/49	20,0	96	44	95	40°	97





# SCREWED LOCKED



Code	PS	PD	D	H	H1	L	A	W
	inch	mm	mm	mm	mm	mm	deg	g
M.090.033.xx.40.10	1-1/4"	41/13	20,0	83	54	84	40°	85
M.090.033.xx.43.10		41/13	17,0	83	54	84	40°	85
M.090.043.xx.40.10	1-1/2"	46/49	20,0	90	57	90	40°	88
M.090.043.xx.43.10		46/49	17,0	90	57	90	40°	88



# Nozzle System for Surface Technology

## MEMORY SPRAY nozzle system

### MEMORY SPRAY nozzle system

To maintain installed spraying direction, the "memory effect" is the best tool through which nozzle alignment can be handled without any specific tools. Specially, pressure resistant pipe connector, Treatments: Phosphating in surface treatment, clearing, degreasing.

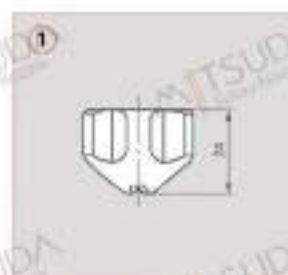


Type	Ordering no.	Material				Flow rate [l/min] bei p [bar]					Weight [g]				
		BF Housing PP Insert: 307 SS	8R Housing PP Insert: 1143 SS	EB Housing PP Insert: 307 SS	53 Polysulfone PP	1.0	1.5	2.0	2.5	3.0	PP/303 SS	PP/316L SS	PP/ceramic	PP	
① Flat fan nozzle	30° M7.576.642.xx.40	○	○	-	-	1.6	2.83	3.46	4.00	4.47	6.33	15	15	-	-
	30° M7.576.722.xx.40	○	○	-	-	2.1	4.46	5.46	6.30	7.04	9.96	15	15	-	-
	30° M7.576.762.xx.40	○	○	-	-	2.3	5.66	6.93	8.00	8.94	12.65	15	15	-	-
	30° M7.576.802.xx.40	○	○	-	-	2.6	7.07	8.66	10.00	11.18	15.81	15	15	-	-
	30° M7.576.842.xx.40	○	○	-	-	3.0	8.84	10.82	12.50	13.97	19.76	15	15	-	-
	30° M7.576.882.xx.40	○	○	-	-	3.4	11.31	13.86	16.00	17.89	25.30	15	15	10	8
	30° M7.576.922.xx.40	○	○	-	-	4.1	14.14	17.32	20.00	22.36	31.62	15	15	10	8
	30° M7.576.962.xx.40	○	○	-	-	4.2	17.68	21.65	25.00	27.95	39.53	15	15	10	8
	30° M7.577.002.xx.40	○	-	-	-	4.7	22.27	27.82	31.50	35.22	49.81	15	-	-	-
① Flat fan nozzle	60° M7.576.644.xx.40	-	-	-	-	1.6	2.83	3.46	4.00	4.47	6.33	15	15	-	-
	60° M7.576.724.xx.40	-	-	-	-	2.1	4.46	5.46	6.30	7.04	9.96	15	15	-	-
	60° M7.576.764.xx.40	-	-	-	-	2.3	5.66	6.93	8.00	8.94	12.65	15	15	-	-
	60° M7.576.804.xx.40	-	-	-	-	2.6	7.07	8.66	10.00	11.18	15.81	15	15	-	-
	60° M7.576.844.xx.40	-	-	-	-	3.0	8.84	10.82	12.50	13.97	19.76	15	15	-	-
	60° M7.576.884.xx.40	-	-	-	-	3.4	11.31	13.86	16.00	17.89	25.30	15	15	10	8
	60° M7.576.924.xx.40	-	-	-	-	4.1	14.14	17.32	20.00	22.36	31.62	15	15	10	8
	60° M7.576.964.xx.40	-	-	-	-	4.2	17.68	21.65	25.00	27.95	39.53	15	15	10	8
	60° M7.577.004.xx.40	-	-	-	-	4.7	22.27	27.82	31.50	35.22	49.81	15	15	10	8
	60° M7.577.044.xx.40	-	-	-	-	5.5	28.28	34.64	40.00	44.72	63.25	15	15	-	-
60° M7.577.084.xx.40	-	-	-	-	6.2	35.36	43.30	50.00	55.90	79.06	15	15	-	-	





Type	η	Ordering no.	Material				Flow rate [l/min] bei p [bar]					Weight [g]				
			8F	8R	E8	53	1.0	1.5	2.0	2.5	5.0	PP/303 SS	PP/316L SS	PP/ceramic	PP	
			Housing: PP Insert: ABS	Housing: PP Insert: PEEK	Housing: PP Insert: Inconel	Housing: PP Insert: Hastelloy										
1 Flat fan nozzle	90°	M7.676.646.xx.40	●	○	-	-	1.6	2.83	3.46	4.00	4.47	6.33	15	15	-	-
	90°	M7.676.726.xx.40	●	○	-	-	2.1	4.46	5.46	6.30	7.04	9.96	15	15	-	-
	90°	M7.676.766.xx.40	●	○	-	-	2.3	5.66	6.93	8.00	8.94	12.65	15	15	-	-
	90°	M7.676.806.xx.40	●	○	-	-	2.6	7.07	8.66	10.00	11.18	15.81	15	15	-	-
	90°	M7.676.846.xx.40	●	○	-	-	3.0	8.84	10.82	12.50	13.97	19.76	15	15	-	-
	90°	M7.676.886.xx.40	●	○	-	-	3.4	11.31	13.86	16.00	17.89	25.30	15	15	-	-
	90°	M7.676.926.xx.40	●	○	-	-	4.1	14.14	17.32	20.00	22.36	31.62	15	15	-	-
	90°	M7.676.966.xx.40	●	○	-	-	4.2	17.68	21.65	25.00	27.95	39.53	15	15	-	-
1 Flat fan nozzle	120°	M7.676.647.xx.40	●	○	-	-	1.6	2.83	3.46	4.00	4.47	6.33	15	15	-	-
	120°	M7.676.727.xx.40	●	○	-	-	2.1	4.46	5.46	6.30	7.04	9.96	15	15	-	-
	120°	M7.676.767.xx.40	●	○	-	-	2.3	5.66	6.93	8.00	8.94	12.65	15	15	-	-
	120°	M7.676.807.xx.40	●	○	-	-	2.6	7.07	8.66	10.00	11.18	15.81	15	15	-	-
	120°	M7.676.847.xx.40	●	○	-	-	3.0	8.84	10.82	12.50	13.97	19.76	15	15	-	-
	120°	M7.676.887.xx.40	●	○	-	-	3.4	11.31	13.86	16.00	17.89	25.30	15	15	-	-
	120°	M7.676.927.xx.40	●	○	-	-	4.1	14.14	17.32	20.00	22.36	31.62	15	15	-	-
	120°	M7.676.967.xx.40	●	○	-	-	4.2	17.68	21.65	25.00	27.95	39.53	15	15	-	-
Blind nozzle	-	M7.067.630.8F.40.01	○	-	-	-	-	-	-	-	-	15	-	-	-	



Type	η	Ordering no.	Material		Flow rate [l/min] at p [bar]					Weight			
			BR	5E	1.0	1.5	2.0	2.5	5.0	PP/316L SS	PVDF		
			Housing: PP Insert: ABS	Housing: PP Insert: PEEK									
1a Tongue type nozzle	90°	35°	M7.676.803.XX.41	○	-	3.4	7.07	8.66	10.00	11.18	15.81	25	-
	90°	35°	M7.676.874.XX.41	○	-	4.2	10.61	12.99	15.00	16.17	23.72	25	-
	90°	35°	M7.676.924.XX.41	○	-	4.7	14.14	17.32	20.00	22.36	31.62	25	-
	90°	40°	M7.677.005.XX.41	○	○	6.0	22.27	27.28	31.50	35.22	49.81	25	11



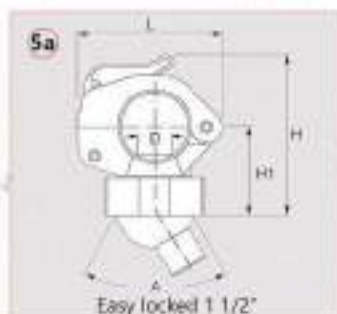
Example for Ordering: M7.676.646.xx.40 + 8R = M7.676.646.8R.40



	Type	Ordering No.	Material		Spigot	Recommended bore	For pipe	Weight [g]
			53	6M				
2a	Ball retainer cap	M.092.080.xx.00.02	○	-				18
2b	Ball retainer cap	M.067.600.xx.40	○	-				18
3	Ball bayonet base	M.067.630.xx.40	○	-				12
4	Ball seat for eyelet clamp no.	M.067.631.xx.40.22	-	○	13.8 mm	14.0-14.3 mm	1 1/4" (40.0-43.0 mm)	9
		M.067.631.xx.40.02	-	○	16.0 mm	16.5-17.0 mm	1 1/4" (40.0-43.0 mm)	11
		M.067.631.xx.40.00.0	M.067.631.xx.40.12	-	○	19.8 mm	20.3-20.8 mm	1 1/4" (40.0-43.0 mm)
Ball seat for eyelet clamp no.	M.067.631.xx.50.22	-	○	13.8 mm	14.0-14.3 mm	1 1/4" (46.0-49.0 mm)	9	
	M.067.631.xx.50.02	-	○	16.0 mm	16.5-17.0 mm	1 1/4" (46.0-49.0 mm)	11	
	M.067.631.xx.50.00.0	M.067.631.xx.50.12	-	○	19.8 mm	20.3-20.8 mm	1 1/4" (46.0-49.0 mm)	13
5a	Easy Locked	M.067.631.xx.40.00	○	-	-	-	1 1/4" (40.0-43.0 mm)	31
		M.067.631.xx.50.00	○	-	-	-	1 1/2" (46.0-49.0 mm)	33
5b	Screwed Locked	M.090.023.xx.44.10	○	-	13.8 mm	14.0-14.3 mm	1" (32.0-34.5 mm)	48
		M.090.023.xx.43.10	○	-	16.0 mm	16.5-17.0 mm	1" (32.0-34.5 mm)	48
		M.090.033.xx.44.10	○	-	13.8 mm	14.0-14.3 mm	1 1/4" (40.0-43.0 mm)	50
		M.090.033.xx.43.10	○	-	16.0 mm	16.5-17.0 mm	1 1/4" (40.0-43.0 mm)	50
		M.090.033.xx.40.10	○	-	20.0 mm	20.5-21.0 mm	1 1/4" (40.0-43.0 mm)	50
		M.090.043.xx.44.10	○	-	13.8 mm	14.0-14.3 mm	1 1/2" (46.0-49.0 mm)	52
		M.090.043.xx.43.10	○	-	16.0 mm	16.5-17.0 mm	1 1/2" (46.0-49.0 mm)	52
M.090.043.xx.40.10	○	-	20.0 mm	20.5-21.0 mm	1 1/2" (46.0-49.0 mm)	52		
5c	Single clamp	M.092.080.xx.00	○	-	16.3 mm	16.5-17.0 mm	1" (32.0-34.5 mm)	36
		M.092.081.xx.00	○	-	16.3 mm	16.5-17.0 mm	1 1/4" (40.0-43.0 mm)	38
		M.092.082.xx.00	○	-	16.3 mm	16.5-17.0 mm	1 1/2" (46.0-49.0 mm)	40
		M.092.083.xx.00	○	-	16.3 mm	16.5-17.0 mm	2" (58.0-62.0 mm)	42



Example for ordering: **Type** M.092.080.xx.02.00 + **Material-no.** 53 = **Ordering no.** M.092.080.53.00.02





Easy installation with clamp  
 Easy alignment and cleaning  
 Without using extra tools  
 Allow rotating by 30 degree.  
 Treatments:  
 Phosphating in surface treatment,  
 cleaning, degreasing.

Materials:  
 Clamp: Stainless steel 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 1/4" pipe
- Ball retainer cap

Ordering no.	Nozzle colour	$\Delta$	$\dot{V}$ [l/min]				
			p [bar]				
			0.5	1.0	1.5	2.0	2.5
M1.676.724.53.31	grey	60°	3.15	4.45	5.45	6.30	7.09
M1.676.764.53.31	brown	60°	4.00	5.66	6.93	8.00	8.94
M1.676.804.53.31	lilac	60°	5.00	7.07	8.66	10.00	11.18
M1.676.844.53.31	yellow	60°	6.25	8.84	10.83	12.50	13.98
M1.676.884.53.31	red	60°	8.00	11.31	13.85	16.00	17.89
M1.676.904.53.31	blue	60°	9.10	12.87	15.76	18.20	20.35
M1.676.924.53.31	green	60°	10.00	14.14	17.32	20.00	22.36

### Existing of

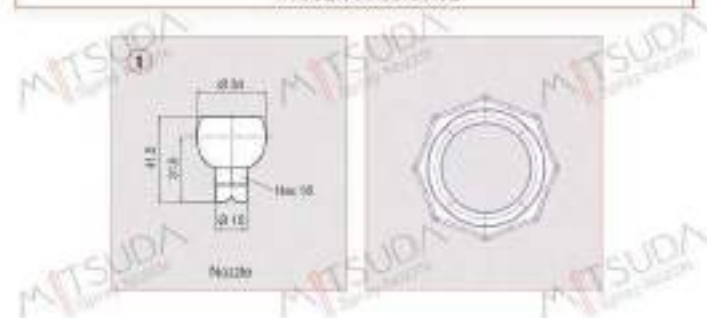
- Ball joint
- Single clamp for 1/4" pipe
- Ball retainer cap

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

## Components

### 1 Nozzle

Ordering no.	Colour	$\Delta$	$\dot{V}$ [l/min]				
			p [bar]				
			0.5	1.0	1.5	2.0	2.5
M1.676.724.53.30.01	grey	60°	3.15	4.45	5.45	6.30	7.04
M1.676.764.53.00.01	brown	60°	4.00	5.66	6.93	8.00	8.94
M1.676.804.53.00.01	lilac	60°	5.00	7.07	8.66	10.00	11.18
M1.676.844.53.00.01	yellow	60°	6.25	8.84	10.83	12.50	13.98
M1.676.884.53.00.01	red	60°	8.00	11.31	13.85	16.00	17.89
M1.676.904.53.00.01	blue	60°	9.10	12.87	15.67	18.20	20.35
M1.676.924.53.00.01	green	60°	10.00	14.14	17.32	20.00	22.36
M1.092.080.53.00.01	grey		Blind nozzle				



## 2 Ball joint

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



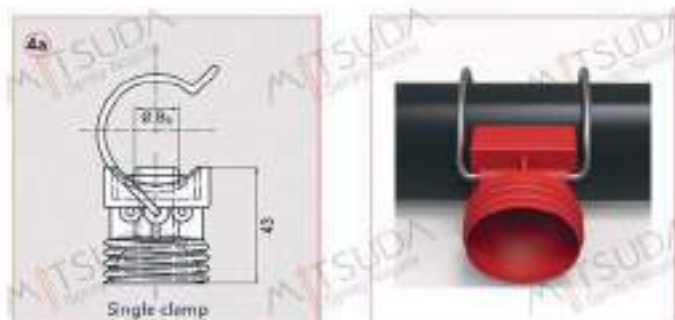
## 3 Ball retainer cap

Ordering no.
M.092.080.53.00.02



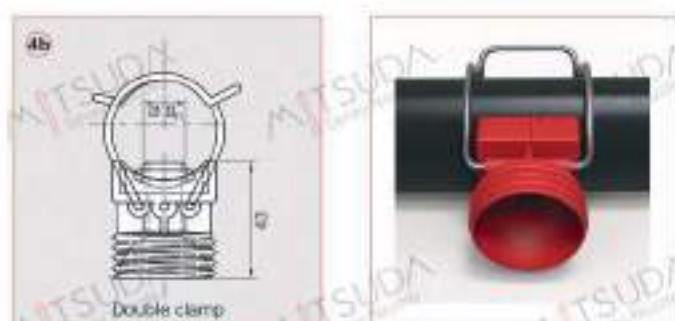
## 4a Single clamp

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



## 4b Double clamp

Ordering no.	Spigot-Ø Bn	Recommended bore-Ø	For pipe-Ø
M.092.090.53.00	16.3 mm	16.5-17.0 mm	1" (32.0-34.5 mm)
M.092.091.53.00	16.3 mm	16.5-17.0 mm	1 1/4" (40.0-43.0 mm)
M.092.092.53.00	16.3 mm	16.5-17.0 mm	1 1/2" (46.0-49.0 mm)
M.092.093.53.00	16.3 mm	16.5-17.0 mm	2" (58.0-62.0 mm)
M.092.090.52.00	14.2 mm	14.5-15.0 mm	1" (32.0-34.5 mm)
M.092.091.52.00	14.2 mm	14.5-15.0 mm	1 1/4" (40.0-43.0 mm)
M.092.092.52.00	14.2 mm	14.5-15.0 mm	1 1/2" (46.0-49.0 mm)
M.092.093.52.00	14.2 mm	14.5-15.0 mm	2" (58.0-62.0 mm)
M.092.090.54.00	20.3 mm	20.5-21.0 mm	1" (32.0-34.5 mm)
M.092.091.54.00	20.3 mm	20.5-21.0 mm	1 1/4" (40.0-43.0 mm)
M.092.092.54.00	20.3 mm	20.5-21.0 mm	1 1/2" (46.0-49.0 mm)
M.092.093.54.00	20.3 mm	20.5-21.0 mm	2" (58.0-62.0 mm)

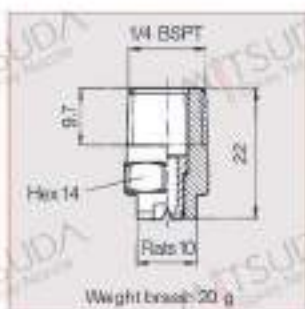
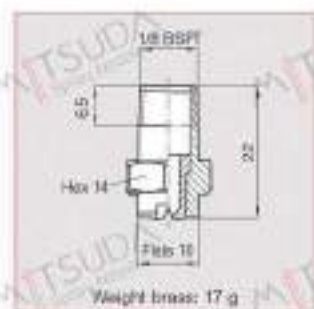


## 4c Screwed Locked

Ordering no.	Spigot-Ø Bc	Recommended bore-Ø	For pipe-Ø
M.090.023.53.43.10	16 mm	16.5-17.0 mm	1" (32.0-34.5 mm)
M.090.033.53.43.10	16 mm	16.5-17.0 mm	1 1/4" (40.0-43.0 mm)
M.090.043.53.43.10	16 mm	16.5-17.0 mm	1 1/4" (40.0-43.0 mm)

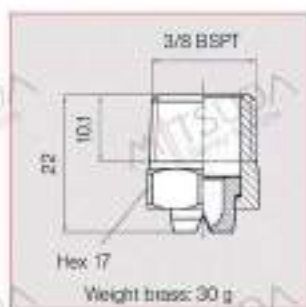






Mitsuda Flat fan nozzles are designed with very narrow spray depth, high precision spray angle and precise flow rate. These features enable the series appropriate for all complicated cleaning tasks. Thanks to parabolic distribution of liquid, spraying pipes with those nozzles ensure an even liquid distribution. Series with conical self-sealing thread connection.

Applications: Surface treatment, coating, belt cleaning, filter cleaning, lubricating.



Spray angle	Ordering no.								A Ø [mm]	E Ø [mm]	V [l/min]								Spray width B at p=2 bar	
	Type	Material no.			Code						p [bar]								Diagram	
		303SS/316SS	316TiSS/316L SS	Brass	PVDF	1/8 BSPT	1/4 BSPT	3/8 BSPT			1/2 BSPT	0.5	1.0	2.0	3.0	5.0	7.0	10.0	H=250 mm	H=500 mm
20°	M2.632.301	○	○	○	○	CA	CC	-	-	0.70	0.60	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	65	120
	M2.632.361	○	○	○	○	CA	CC	-	-	1.00	0.80	0.31*	0.44*	0.63	0.77	1.00	1.18	1.40	70	130
	M2.632.441	○	○	○	○	CA	CC	-	-	1.35	1.10	0.62*	0.88	1.25	1.53	1.98	2.34	2.80	75	145
	M2.632.481	○	○	○	○	CA	CC	-	-	1.50	1.20	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	75	150
30°	M2.632.302	○	○	○	○	CA	CC	-	-	0.60	0.50	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	120	235
	M2.632.362	○	○	○	○	CA	CC	-	-	1.00	0.70	0.31*	0.44*	0.63	0.77	1.00	1.18	1.40	120	235
	M2.632.402	○	○	○	○	CA	CC	-	-	1.20	0.90	0.62*	0.71	1.00	1.23	1.58	1.87	2.24	120	235
	M2.632.482	○	○	○	○	CA	CC	-	-	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	120	235
	M2.632.562	○	○	○	○	CA	CC	-	-	2.00	1.50	1.25	1.17	2.50	3.06	3.95	4.68	5.59	120	235
	M2.632.642	○	○	○	-	-	CC	-	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	120	240
	M2.632.722	○	○	○	-	-	CC	-	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	125	240
	M2.632.762	○	○	○	-	-	CC	-	-	3.50	2.70	4.00	5.66	8.00	9.80	12.65	14.97	17.89	125	240
	M2.632.802	○	○	○	-	-	CC	-	-	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	130	250

Example for ordering: Type + Material no. + Code = Ordering no.  
 M2.632.301 + 16 + CA = M2.632.301.16.CA



Spray Angle	Ordering no.								A ∅ [mm]	E ∅ [mm]	V [l/min]								Spray width B at p = 2 bar		
	Type	Material no.				Code					p [bar]										
		16	17	30	SE							0.5	1.0	2.0	3.0	5.0	7.0	10.0	250 mm	500 mm	
45°	M2.632.303	○	○	○	-	CA	CC	-	-	0.70	0.50	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	150	270	
	M2.632.363	○	○	○	○	CA	CC	-	-	1.00	0.60	0.31*	0.44*	0.63	0.77	1.00	1.18	1.40	155	280	
	M2.632.403	○	○	○	○	CA	CC	-	-	1.20	0.90	0.50*	0.71	1.00	1.23	1.58	1.87	2.24	175	320	
	M2.632.483	○	○	○	○	CA	CC	-	-	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	180	340	
	M2.632.563	○	○	○	○	CA	CC	-	-	2.00	1.40	1.25	1.77	2.50	3.06	3.95	4.68	5.59	185	355	
	M2.632.643	○	○	○	○	CA	CC	CE	-	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	195	370
	M2.632.673	○	○	○	-	-	CC	CE	-	-	2.70	2.00	2.83	3.36	4.75	5.82	7.51	8.89	10.62	200	375
	M2.632.723	○	○	○	-	-	CC	CE	-	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	200	375
	M2.632.763	○	○	○	-	-	CC	CE	-	-	3.50	2.60	4.00	5.66	8.00	9.80	12.65	14.97	17.89	200	380
	M2.632.803	○	○	○	-	-	CC	-	CG	-	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	205	385
	M2.632.843	○	○	○	-	-	CC	-	CG	-	4.50	3.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	205	385
	M2.632.883	○	○	○	-	-	CC	-	CG	-	5.00	3.80	8.00	11.31	16.00	19.60	25.30	29.39	35.78	220	440
	M2.632.923	○	○	○	-	-	CC	-	CG	-	5.50	4.20	10.00	14.14	20.00	24.50	31.62	37.42	44.72	220	440
M2.632.963	○	○	○	-	-	CC	-	CG	-	6.00	4.40	12.50	17.68	25.00	30.62	39.53	46.77	55.90	220	440	
60°	M2.632.304	○	○	○	○	CA	CC	-	-	0.70	0.40	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	215	425	
	M2.632.334	○	○	○	○	CA	CC	-	-	0.90	0.50	0.22*	0.32*	0.45	0.55	0.71	0.84	1.01	220	440	
	M2.632.364	○	○	○	○	CA	CC	-	-	1.00	0.60	0.31*	0.44*	0.63	0.77	1.00	1.18	1.40	230	460	
	M2.632.404	○	○	○	○	CA	CC	-	-	1.20	0.80	0.50*	0.71	1.00	1.23	1.58	1.87	2.24	245	485	
	M2.632.444	○	○	○	○	CA	CC	-	-	1.35	0.90	0.62*	0.88	1.25	1.53	1.98	2.34	2.80	255	495	
	M2.632.484	○	○	○	○	CA	CC	-	-	1.50	1.00	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	260	510	
	M2.632.514	○	○	○	○	CA	CC	-	-	1.65	1.10	0.95*	1.34	1.90	2.33	3.00	3.56	4.25	270	520	
	M2.632.564	○	○	○	○	CA	CC	-	-	2.00	1.30	1.25	1.77	2.50	3.06	3.95	4.68	5.59	280	535	
	M2.632.604	○	○	○	○	CA	CC	-	-	2.20	1.50	1.58	2.23	3.15	3.86	4.98	5.89	7.04	290	550	
	M2.632.644	○	○	○	○	-	CC	-	-	2.50	1.60	2.00	2.83	4.00	4.90	6.33	7.48	8.94	295	565	
	M2.632.674	○	○	○	○	-	CC	CE	-	-	2.70	1.80	2.38	3.36	4.75	5.82	7.51	8.89	10.62	300	575
	M2.632.724	○	○	○	○	-	CC	CE	-	-	3.00	2.10	3.15	4.46	6.30	7.72	9.96	11.79	14.09	305	590
	M2.632.764	○	○	○	-	-	CC	CE	-	-	3.50	2.30	4.00	5.66	8.00	9.80	12.65	14.97	17.89	310	595
	M2.632.804	○	○	○	○	-	CC	CE	CG	-	4.00	2.60	5.00	7.07	10.00	12.25	15.81	18.71	22.36	310	595
	M2.632.844	○	○	○	○	-	CC	-	CG	-	4.50	3.00	6.25	8.84	12.50	15.31	19.76	23.39	27.95	310	590
	M2.632.884	○	○	○	○	-	CC	-	CG	-	5.00	3.40	8.00	11.31	16.00	19.60	25.30	29.39	35.78	300	570
	M2.632.924	○	○	○	-	-	-	-	CG	-	5.50	4.10	10.00	14.14	20.00	24.50	31.62	37.42	44.72	330	630
M2.632.964	○	○	○	-	-	-	-	CG	-	6.00	4.20	12.50	17.68	25.00	30.62	39.53	46.77	55.90	330	630	
M2.633.004	○	○	-	-	-	-	-	CG	-	7.00	4.80	15.75	22.27	31.50	38.57	49.80	58.92	70.43	330	630	
M2.633.044	○	○	-	-	-	-	-	CG	-	8.00	5.50	20.00	28.28	40.00	48.99	63.25	74.82	89.44	340	640	
M2.633.084	○	○	-	-	-	-	-	CG	-	9.00	6.80	25.00	35.36	50.00	61.24	79.06	93.54	111.80	340	640	
75°	M2.632.145	○	-	○	-	CA	CC	-	-	0.20	0.12	-	0.04*	0.05	0.06	0.08	0.09	0.11	280	550	
	M2.632.165	○	-	○	-	CA	CC	-	-	0.20	0.14	-	0.05*	0.07	0.08	0.10	0.12	0.15	290	560	
	M2.632.185	○	-	○	-	CA	CC	-	-	0.20	0.16	-	0.06*	0.08	0.10	0.13	0.15	0.18	300	575	
	M2.632.215	○	-	○	-	CA	CC	-	-	0.40	0.20	-	0.08*	0.11	0.14	0.18	0.21	0.25	300	580	
	M2.632.245	○	-	○	-	CA	CC	-	-	0.50	0.30	-	0.12*	0.16	0.20	0.26	0.30	0.36	310	585	
	M2.632.275	○	-	○	-	CA	CC	-	-	0.60	0.30	0.11*	0.16*	0.22	0.27	0.35	0.41	0.49	310	590	

Example    Type    + Material no. + Code = Ordering no.  
for ordering: M2.632.303 + 16                    + CA = M2.632.303.16.CA

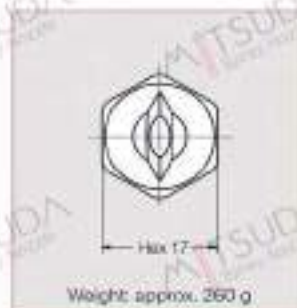
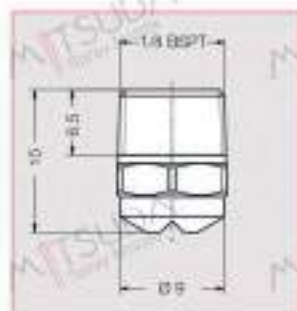


Spray Angle	Ordering no.								A ∅ (mm)	E ∅ (mm)	V [l/min]							Spray width B at p = 2 bar			
	Type	Material no.				Code					p [bar]							250 mm	500 mm		
		16	17	30	SE	CA	CC	CE			CG	0.5	1.0	2.0	3.0	5.0	7.0			10.0	
		303 SS/304 SS	316Ti SS/ 316L SS	Brass	PVDF																1/8 BSPT
90°	M2.632.216	○	○	○	○	-	CA	CC	-	-	0.40	0.20	-	0.08*	0.11	0.14	0.18	0.21	0.25	370	700
	M2.632.276	○	○	○	○	-	CA	CC	-	-	0.60	0.30	0.11*	0.16*	0.22	0.27	0.35	0.41	0.49	375	720
	M2.632.306	○	○	○	○	-	CA	CC	-	-	0.70	0.40	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	380	740
	M2.632.336	○	○	○	○	-	CA	CC	-	-	0.90	0.50	0.22*	0.32*	0.45	0.55	0.71	0.84	1.01	415	800
	M2.632.366	○	○	○	○	-	CA	CC	-	-	1.00	0.50	0.31*	0.44*	0.63	0.77	1.00	1.18	1.41	420	810
	M2.632.406	○	○	○	○	-	CA	CC	-	-	1.20	0.70	0.50*	0.71	1.00	1.23	1.63	1.87	2.24	430	820
	M2.632.446	○	○	○	○	-	CA	CC	-	-	1.35	0.80	0.62*	0.88	1.25	1.53	1.98	2.34	2.80	435	830
	M2.632.486	○	○	○	○	-	CA	CC	-	-	1.50	0.80	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	440	835
	M2.632.516	○	○	○	○	-	CA	CC	-	-	1.65	0.90	0.95*	1.34	1.90	2.33	3.00	3.56	4.25	440	840
	M2.632.566	○	○	○	○	-	CA	CC	-	-	2.00	1.10	1.25	1.77	2.50	3.06	3.95	4.68	5.59	445	850
	M2.632.606	○	○	○	○	-	CA	CC	-	-	2.20	1.20	1.58	2.23	3.15	3.86	4.98	5.89	7.04	450	860
	M2.632.646	○	○	○	○	-	-	CC	CE	-	2.50	1.30	2.00	2.83	4.00	4.90	6.33	7.48	8.94	455	865
	M2.632.676	○	○	○	○	-	-	CC	CE	-	2.70	1.40	2.38	3.36	4.75	5.82	7.51	8.89	10.62	465	875
	M2.632.726	○	○	○	○	-	-	CC	CE	-	3.00	1.70	3.15	4.46	6.30	7.72	9.96	11.79	14.09	470	885
	M2.632.766	○	○	○	○	-	-	CC	CE	-	3.50	1.90	4.00	5.66	8.00	9.80	12.65	14.97	17.89	475	890
	M2.632.806	○	○	○	○	-	-	CC	CG	-	4.00	2.40	5.00	7.07	10.00	12.25	15.81	18.71	22.36	480	900
	M2.632.846	○	○	○	○	-	-	CC	CG	-	4.50	2.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	480	900
	M2.632.886	○	○	○	○	-	-	CC	CG	-	5.00	3.10	8.00	11.31	16.00	19.60	25.30	29.93	35.78	480	910
M2.632.926	○	○	○	○	-	-	-	CG	-	5.50	3.60	10.00	14.14	20.00	24.50	31.62	37.42	44.72	525	1020	
M2.632.966	○	○	○	○	-	-	-	CG	-	6.00	3.90	12.50	17.68	25.00	30.62	39.53	46.77	55.90	525	1020	
120°	M2.632.187	○	-	○	-	-	CA	CC	-	-	0.35	0.20	-	0.06*	0.08	0.10	0.13	0.15	0.18	630	1200
	M2.632.217	○	-	○	-	-	CA	CC	-	-	0.40	0.20	-	0.08*	0.11	0.14	0.18	0.21	0.25	640	1210
	M2.632.247	○	-	○	-	-	CA	CC	-	-	0.50	0.20	-	0.12*	0.16	0.20	0.26	0.30	0.36	650	1230
	M2.632.277	○	-	○	-	-	CA	CC	-	-	0.60	0.30	-	0.16*	0.22	0.27	0.35	0.41	0.49	660	1250
	M2.632.307	○	○	○	○	-	CA	CC	-	-	0.70	0.30	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	660	1250
	M2.632.337	○	○	○	○	-	CA	CC	-	-	0.90	0.40	0.22*	0.32*	0.45	0.55	0.71	0.84	1.01	670	1270
	M2.632.367	○	○	○	○	-	CA	CC	-	-	1.00	0.50	0.31*	0.44*	0.63	0.77	1.00	1.18	1.41	670	1270
	M2.632.407	○	○	○	○	-	CA	CC	-	-	1.20	0.60	0.50*	0.88	1.00	1.23	1.58	1.87	2.24	670	1270
	M2.632.447	○	○	○	○	-	CA	CC	-	-	1.35	0.60	0.62*	1.13	1.25	1.53	1.98	2.34	2.80	675	1270
	M2.632.487	○	○	○	○	-	CA	CC	-	-	1.50	0.60	0.80*	1.34	1.60	1.96	2.53	2.99	3.58	680	1275
	M2.632.517	○	○	○	○	-	CA	CC	-	-	1.65	0.90	0.95*	1.77	1.90	2.33	3.00	3.56	4.25	685	1280
	M2.632.567	○	○	○	○	-	CA	CC	-	-	2.00	0.90	1.25	2.23	2.50	3.06	3.95	4.68	5.59	690	1285
	M2.632.607	○	○	○	○	-	CA	CC	-	-	2.20	1.10	1.58	2.83	3.15	3.86	4.98	5.89	7.04	700	1300
	M2.632.647	○	○	○	○	-	-	CC	CE	-	2.50	1.30	2.00	3.36	4.00	4.90	6.33	7.48	8.94	700	1300
	M2.632.677	○	○	○	○	-	-	CC	CE	-	2.70	1.40	2.38	4.46	4.75	5.82	7.51	8.89	10.62	720	1330
	M2.632.727	○	○	○	○	-	-	CC	CE	-	3.00	1.60	3.15	5.66	6.30	7.72	9.96	11.79	14.09	740	1360
	M2.632.767	○	○	○	○	-	-	CC	CE	-	3.50	1.70	4.00	7.07	8.00	9.80	12.65	14.97	17.89	760	1400
	M2.632.807	○	○	○	○	-	-	CC	CG	-	4.00	2.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	790	1450
	M2.632.847	○	○	○	○	-	-	CC	CG	-	4.50	2.30	6.25	8.84	12.50	15.31	19.76	23.39	27.95	790	1450
	M2.632.887	○	○	○	○	-	-	-	CG	-	5.00	2.60	8.00	11.31	16.00	19.90	25.30	29.93	35.78	800	1460
	M2.632.927	○	○	○	○	-	-	-	CG	-	5.50	2.90	10.00	14.14	20.00	24.50	31.62	37.42	44.72	800	1460

Example Type + Material no. + Code = Ordering no.  
for ordering: M2.632.216 + 16 + CA = M2.632.216.16.CA



This series provides cost efficiency in standard cleaning and rinsing applications. Series with uniform flat fan, conical, self-sealing thread connection. It can be used with spray pipes. Manufactured upon order for quantities 250 or more. Applications: Standard cleaning and rinsing treatments.



Spray angle $\Delta$	Ordering no.				A Ø [mm]	E Ø [mm]	$\dot{V}$ [l/min]								Spray width B at p = 2 bar	
	Type	Mat no.	Code				p [bar]									
			1C	1/8 BSPT			1/4 BSPT	3/8 BSPT	0.5	1.0	2.0	3.0	5.0	7.0	10.0	H=250mm
45°	M8.650.483	○	CA	CC	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	180	340	
	M8.650.563	○	CA	CC	2.00	1.40	1.25	1.77	2.50	3.06	3.95	4.68	5.59	185	355	
	M8.650.603	○	CA	CC	2.20	1.60	1.58	2.23	3.15	3.86	4.98	5.89	7.04	195	370	
	M8.650.643	○	CA	CC	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	195	370	
	M8.650.673	○	CA	CC	2.70	2.00	2.83	3.36	4.75	5.82	7.51	8.89	10.62	200	375	
	M8.650.723	○	CA	CC	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	200	375	
	M8.650.763	○	CA	CC	3.50	2.60	4.00	5.66	8.00	9.80	12.65	14.97	17.89	200	380	
	M8.650.803	○	-	CC	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	205	385	
	M8.650.843	○	-	CC	4.50	3.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	205	385	
	M8.650.883	○	-	CC	5.00	3.80	8.00	11.31	16.00	19.60	25.30	29.93	35.78	220	440	
	M8.650.923	○	-	CC	5.50	4.20	10.00	14.14	20.00	24.50	31.62	37.42	44.72	220	440	
	M8.650.963	○	-	-	CE	6.00	4.40	12.50	17.68	25.00	30.62	39.53	46.77	55.90	220	440
	M8.650.993	○	-	-	CE	6.50	4.80	15.00	21.21	30.00	36.74	47.43	56.12	67.08	220	440
	M8.651.003	○	-	-	CE	7.00	5.20	15.75	22.27	31.50	38.57	49.80	58.92	70.43	220	440
	M8.651.043	○	-	-	CE	8.00	5.90	20.00	28.28	40.00	48.99	63.25	74.83	89.44	220	440

Example Type + Material no. + Code = Ordering no.  
for ordering: M8.650.483 + 1C + CA = M8.650.483.1C.CA



Spray angle	Ordering no.					A ∅ [mm]	E ∅ [mm]	V̇ [l/min]							Spray width B at p = 2 bar	
	Type	Mat no.	Code					p [bar]								
			1C	1/8 BSPT	1/4 BSPT			3/8 BSPT	0.5	1.0	2.0	3.0	5.0	7.0	10.0	H=250 mm
45°	M8.650.484	○	CA	CC	-	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	260	510
	M8.650.564	○	CA	CC	-	2.00	1.40	1.25	1.77	2.50	3.06	3.95	4.68	5.59	280	535
	M8.650.604	○	CA	CC	-	2.20	1.60	1.58	2.23	3.15	3.86	4.98	5.89	7.04	290	550
	M8.650.644	○	CA	CC	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	295	565
	M8.650.674	○	CA	CC	-	2.70	2.00	2.83	3.36	4.75	5.82	7.51	8.89	10.62	300	575
	M8.650.724	○	CA	CC	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	305	590
	M8.650.764	○	CA	CC	-	3.50	2.60	4.00	5.66	8.00	9.80	12.65	14.97	17.89	310	595
	M8.650.804	○	-	CC	-	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	310	595
	M8.650.844	○	-	CC	CE	4.50	3.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	310	590
	M8.650.884	○	-	CC	CE	5.00	3.80	8.00	11.31	16.00	19.60	25.30	29.93	35.78	300	570
	M8.650.924	○	-	CC	CE	5.50	4.20	10.00	14.14	20.00	24.50	31.62	37.42	44.72	330	630
	M8.650.964	○	-	-	CE	6.00	4.40	12.50	17.68	25.00	30.62	39.53	46.77	55.90	330	630
	M8.650.994	○	-	-	CE	6.50	4.80	15.00	21.21	30.00	36.74	47.43	56.12	67.08	330	630
	M8.651.004	○	-	-	CE	7.00	5.20	15.75	22.27	31.50	38.57	49.80	58.92	70.43	330	630
M8.651.044	○	-	-	CE	8.00	5.90	20.00	28.28	40.00	48.99	63.25	74.83	89.44	340	640	
90°	M8.650.486	○	CA	CC	-	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	440	835
	M8.650.566	○	CA	CC	-	2.00	1.40	1.25	1.77	2.50	3.06	3.95	4.68	5.59	445	850
	M8.650.606	○	CA	CC	-	2.20	1.60	1.58	2.23	3.15	3.86	4.98	5.89	7.04	450	860
	M8.650.646	○	CA	CC	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	455	865
	M8.650.676	○	CA	CC	-	2.70	2.00	2.83	3.36	4.75	5.82	7.51	8.89	10.62	465	875
	M8.650.726	○	CA	CC	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	470	885
	M8.650.766	○	CA	CC	-	3.50	2.60	4.00	5.66	8.00	9.80	12.65	14.97	17.89	475	890
	M8.650.806	○	-	CC	-	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	480	900
	M8.650.846	○	-	CC	CE	4.50	3.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	480	900
	M8.650.886	○	-	CC	CE	5.00	3.80	8.00	11.31	16.00	19.60	25.30	29.93	35.78	480	910
	M8.650.926	○	-	CC	CE	5.50	4.20	10.00	14.14	20.00	24.50	31.62	37.42	44.72	525	1020
	M8.650.966	○	-	-	CE	6.00	4.40	12.50	17.68	25.00	30.62	39.53	46.77	55.90	525	1020
	M8.650.996	○	-	-	CE	6.50	4.80	15.00	21.21	30.00	36.74	47.43	56.12	67.08	525	1020
	M8.651.006	○	-	-	CE	7.00	5.20	15.75	22.27	31.50	38.57	49.80	58.92	70.43	525	1020
M8.651.046	○	-	-	CE	8.00	5.90	20.00	28.28	40.00	48.99	63.25	74.83	89.44	525	1020	
120°	M8.650.487	○	CA	CC	-	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	680	1275
	M8.650.567	○	CA	CC	-	2.00	1.40	1.25	1.77	2.50	3.06	3.95	4.68	5.59	690	1285
	M8.650.607	○	CA	CC	-	2.20	1.60	1.58	2.23	3.15	3.86	4.98	5.89	7.04	700	1300
	M8.650.647	○	CA	CC	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	700	1300
	M8.650.677	○	CA	CC	-	2.70	2.00	2.83	3.36	4.75	5.82	7.51	8.89	10.62	720	1330
	M8.650.727	○	CA	CC	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	11.79	14.09	740	1360
	M8.650.767	○	CA	CC	-	3.50	2.60	4.00	5.66	8.00	9.80	12.65	14.97	17.89	760	1400
	M8.650.807	○	-	CC	-	4.00	3.00	5.00	7.07	10.00	12.25	15.81	18.71	22.36	790	1450
	M8.650.847	○	-	CC	CE	4.50	3.40	6.25	8.84	12.50	15.31	19.76	23.39	27.95	790	1450
	M8.650.887	○	-	CC	CE	5.00	3.80	8.00	11.31	16.00	19.60	25.30	29.93	35.78	800	1460
	M8.650.927	○	-	CC	CE	5.50	4.20	10.00	14.14	20.00	24.50	31.62	37.42	44.72	800	1460
	M8.650.967	○	-	-	CE	6.00	4.40	12.50	17.68	25.00	30.62	39.53	46.77	55.90	800	1460
	M8.650.997	○	-	-	CE	6.50	4.80	15.00	21.21	30.00	36.74	47.43	56.12	67.08	800	1460
	M8.651.007	○	-	-	CE	7.00	5.20	15.75	22.27	31.50	38.57	49.80	58.92	70.43	800	1460
M8.651.047	○	-	-	CE	8.00	5.90	20.00	28.28	40.00	48.99	63.25	74.83	89.44	800	1460	





Alignment with retaining nut  
Simple nozzle changing and jet alignment  
Even and parabolic liquid distribution  
Spraying pipes with those nozzles ensure an even liquid distribution.  
Applications: Surface treatment, coating, belt cleaning, filter cleaning, lubricating.

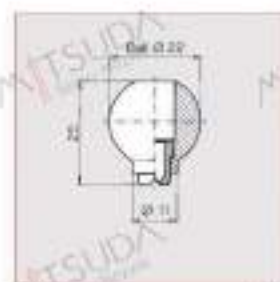
Spray angle	Ordering no.				A Ø [mm]	E Ø [mm]	Q̇ [l/min]						Spray width B at p = 2 bar		
	Type	Material no.					p [bar]								
		16 303 SS	17 316Ti SS/ 316L SS	30 Brass			5E PVDF	0.5	1.0	2.0	3.0	5.0			10.0
20°	M9.652.301	○	○	○	○	0.70	0.60	0.16*	0.23*	0.32	0.39	0.51	0.72	65	125
	M9.652.361	○	○	○	○	1.00	0.80	0.31*	0.44*	0.63	0.77	1.00	1.40	65	125
	M9.652.441	○	○	○	○	1.35	1.10	0.62*	0.88	1.25	1.53	1.98	2.80	65	125
	M9.652.481	○	○	○	○	1.50	1.20	0.80*	1.13	1.60	1.96	2.53	3.58	65	125
30°	M9.652.302	○	○	○	○	0.60	0.50	0.16*	0.23*	0.32	0.39	0.51	0.72	115	230
	M9.652.362	○	○	○	○	1.00	0.70	0.31*	0.44*	0.63	0.77	1.00	1.40	115	230
	M9.652.402	○	○	○	○	1.20	0.90	0.50*	0.71	1.00	1.23	1.58	2.24	115	230
	M9.652.482	○	○	○	○	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	3.58	115	230
	M9.652.562	○	○	○	○	2.00	1.50	1.25	1.77	2.50	3.06	3.95	5.59	115	230
	M9.652.642	○	○	○	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	8.94	120	230
	M9.652.722	○	○	○	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	14.09	120	235
	M9.652.762	○	○	○	-	3.50	2.70	4.00	5.66	8.00	9.80	12.65	17.89	120	235
	M9.652.802	○	○	○	-	4.00	3.10	5.00	7.07	10.00	12.25	15.81	22.36	120	240
45°	M9.652.303	○	○	○	-	0.70	0.50	0.16*	0.23*	0.32	0.39	0.51	0.72	115	230
	M9.652.363	○	○	○	○	1.00	0.70	0.31*	0.44*	0.63	0.77	1.00	1.40	115	230
	M9.652.403	○	○	○	○	1.20	0.90	0.50*	0.71	1.00	1.23	1.58	2.24	115	230
	M9.652.483	○	○	○	○	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	3.58	115	230
	M9.652.563	○	○	○	○	2.00	1.50	1.25	1.77	2.50	3.06	3.95	5.59	115	230
	M9.652.643	○	○	○	-	2.50	1.80	2.00	2.83	4.00	4.90	6.33	8.94	120	230
	M9.652.723	○	○	○	-	3.00	2.40	3.15	4.46	6.30	7.72	9.96	14.09	120	235
	M9.652.763	○	○	○	-	3.50	2.70	4.00	5.66	8.00	9.80	12.65	17.89	120	235
	M9.652.803	○	○	○	-	4.00	3.10	5.00	7.07	10.00	12.25	15.81	22.36	120	240
60°	M9.652.304	○	○	○	○	0.70	0.40	0.16*	0.23*	0.32	0.39	0.51	0.72	275	525
	M9.652.334	○	○	○	○	0.90	0.50	0.22*	0.32*	0.45	0.55	0.71	1.01	275	525
	M9.652.364	○	○	○	○	1.00	0.60	0.31*	0.44*	0.63	0.77	1.00	1.40	275	525
	M9.652.404	○	○	○	○	1.20	0.80	0.50*	0.71	1.00	1.23	1.58	2.24	275	525
	M9.652.444	○	○	○	○	1.35	0.90	0.62*	0.88	1.25	1.53	1.98	2.80	280	530
	M9.652.484	○	○	○	○	1.50	1.00	0.80*	1.13	1.60	1.96	2.53	3.58	280	530
	M9.652.514	○	○	○	○	1.65	1.10	0.95*	1.34	1.90	2.33	3.00	4.25	280	530
	M9.652.564	○	○	○	○	2.00	1.30	1.25	1.77	2.50	3.06	3.95	5.59	280	525
	M9.652.604	○	○	○	○	2.20	1.50	1.58	2.23	3.15	3.86	4.98	7.04	280	520
	M9.652.644	○	○	○	○	2.50	1.60	2.00	2.83	4.00	4.90	6.33	8.94	275	520
	M9.652.674	○	○	○	○	2.70	1.80	2.38	3.36	4.75	5.82	7.51	10.62	275	520
	M9.652.724	○	○	○	○	3.00	2.10	3.15	4.46	6.30	7.72	9.96	14.09	275	520
	M9.652.764	○	○	○	-	3.50	2.30	4.00	5.66	8.00	9.80	12.65	17.86	270	515
	M9.652.804	○	○	○	○	4.00	2.60	5.00	7.07	10.00	12.25	15.81	22.36	270	510
	M9.652.844	○	-	-	○	4.50	3.00	6.25	8.84	12.50	15.31	19.76	27.95	270	510
	M9.652.884	○	-	-	-	5.00	3.40	8.00	11.31	16.00	19.60	25.30	35.78	270	505







Rotating nozzle for precise adjustment of jet direction.  
 Long service life  
 Applications:  
 Lubricating, cooling, cleaning.

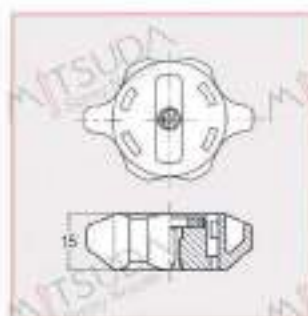


Spray angle	Ordering no.		A Ø (mm)	E Ø (mm)	Q̇ (l/min)						Spray width B at p = 2 bar		
	Type	Material no			p (bar) (p <sub>max</sub> = 30 bar)								
		16 303 SS			30 Brass	0.5	1.0	2.0	3.0	5.0	10.0	H=250 mm	H=500 mm
45°	M10.676.303	○	○	0.70	0.50	0.16*	0.23*	0.32	0.39	0.51	0.72	150	270
	M10.676.363	○	○	1.00	0.60	0.31*	0.44*	0.63	0.77	1.00	1.40	155	280
	M10.676.403	○	○	1.20	0.90	0.50*	0.71	1.00	1.23	1.58	2.24	175	320
	M10.676.483	○	○	1.50	1.10	0.80	1.13	1.60	1.96	2.53	3.58	180	340
	M10.676.563	○	○	2.00	1.40	1.25	1.77	2.50	3.06	3.95	5.59	185	355
	M10.676.643	○	○	2.50	1.80	2.00	2.83	4.00	4.90	6.33	8.94	195	370
	M10.676.723	○	○	3.00	2.40	3.15	4.46	6.30	7.72	9.96	14.09	200	375
	M10.676.763	○	○	3.50	2.60	4.00	5.66	8.00	9.80	12.65	17.89	200	380
M10.676.803	○	○	4.00	3.00	5.00	7.07	10.00	12.25	15.81	22.36	205	385	
60°	M10.676.304	○	○	0.70	0.40	0.16*	0.23*	0.32	0.39	0.51	0.72	215	425
	M10.676.334	○	○	0.90	0.50	0.22*	0.32*	0.45	0.55	0.71	1.01	220	440
	M10.676.364	○	○	1.00	0.60	0.31*	0.44*	0.63	0.77	1.00	1.40	230	460
	M10.676.404	○	○	1.20	0.80	0.50*	0.71	1.00	1.23	1.58	2.24	245	485
	M10.676.444	○	○	1.35	0.90	0.62*	0.88	1.25	1.53	1.98	2.80	255	495
	M10.676.484	○	○	1.50	1.00	0.80*	1.13	1.60	1.96	2.53	3.58	260	510
	M10.676.514	○	○	1.65	1.10	0.95*	1.34	1.90	2.33	3.00	4.25	270	520
	M10.676.564	○	○	2.00	1.30	1.25	1.77	2.50	3.06	3.95	5.59	280	535
	M10.676.604	○	○	2.20	1.50	1.58	2.23	3.15	3.86	4.98	7.04	290	550
	M10.676.644	○	○	2.50	1.60	2.00	2.83	4.00	4.90	6.33	8.94	295	565
	M10.676.674	○	○	2.70	1.80	2.38	3.36	4.75	5.82	7.51	10.62	300	575
	M10.676.724	○	○	3.00	2.10	3.15	4.46	6.30	7.72	9.96	14.09	305	590
M10.676.764	○	○	3.50	2.30	4.00	5.66	8.00	9.80	12.65	17.89	310	595	
90°	M10.676.216	○	○	0.40	0.20	-	0.08*	0.11	0.14	0.18	0.25	370	700
	M10.676.276	○	○	0.60	0.30	0.11*	0.16*	0.22	0.27	0.35	0.49	375	720
	M10.676.306	○	○	0.70	0.40	0.16*	0.23*	0.32	0.39	0.51	0.72	380	740
	M10.676.336	○	○	0.90	0.50	0.22*	0.32*	0.45	0.55	0.71	1.01	415	800
	M10.676.366	○	○	1.00	0.50	0.31*	0.44*	0.63	0.77	1.00	1.40	420	810
	M10.676.406	○	○	1.20	0.70	0.50*	0.71	1.00	1.23	1.58	2.24	430	820
	M10.676.446	○	○	1.35	0.80	0.62*	0.88	1.25	1.53	1.98	2.80	435	830
	M10.676.486	○	○	1.50	0.80	0.80*	1.13	1.60	1.96	2.53	3.58	440	835
	M10.676.516	○	○	1.65	0.90	0.95*	1.34	1.90	2.33	3.00	4.25	440	840
	M10.676.566	○	○	2.00	1.10	1.25	1.77	2.50	3.06	3.95	5.59	445	850
	M10.676.606	○	○	2.20	1.20	1.58	2.23	3.15	3.86	4.98	7.04	450	860
	M10.676.646	○	○	2.50	1.30	2.00	2.83	4.00	4.90	6.33	8.94	455	865
	M10.676.676	○	○	2.70	1.40	2.38	3.36	4.75	5.82	7.51	10.62	465	875
	M10.676.726	○	○	3.00	1.70	3.15	4.46	6.30	7.72	9.96	14.09	470	885





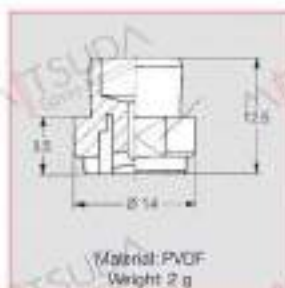
Simple assembly with bayonet quick release cap.  
 Adjusted spray direction  
 Even liquid distribution  
 Applications: Surface treatment, coating, belt cleaning, filter cleaning, lubricating.



Spray angle	Ordering no.		A Ø (mm)	E Ø (mm)	V̇ [l/min]							Spray width B at p = 2 bar	
	Type	Mat. no SE			p [bar]							H=250 mm   H=500 mm	
					0.5	1.0	2.0	3.0	5.0	10.0			
45°	M11.646.363	○	1.00	0.60	0.31*	0.44*	0.63	0.77	1.00	1.18	1.40	185	340
	M11.646.403	○	1.20	0.90	0.50*	0.71	1.00	1.23	1.58	1.87	2.24	185	340
	M11.646.483	○	1.50	1.10	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	185	340
	M11.646.563	○	2.00	1.40	1.20	1.77	2.50	3.06	3.95	4.68	5.59	185	340
	M11.646.643	○	2.50	1.80	2.00	2.83	4.00	4.90	6.33	7.48	8.94	185	345
60°	M11.646.304	○	0.70	0.40	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	245	490
	M11.646.334	○	0.90	0.50	0.22*	0.32*	0.45	0.55	0.71	0.84	1.01	250	495
	M11.646.364	○	1.00	0.60	0.31*	0.44*	0.63	0.77	1.00	1.18	1.40	255	500
	M11.646.404	○	1.20	0.80	0.50*	0.71	1.00	1.23	1.58	1.87	2.24	260	510
	M11.646.444	○	1.35	0.90	0.62	0.88	1.25	1.53	1.98	2.34	2.80	260	510
	M11.646.484	○	1.50	1.00	0.80	1.13	1.60	1.96	2.53	2.99	3.58	270	525
	M11.646.514	○	1.65	1.10	0.95	1.34	1.90	2.33	3.00	3.56	4.25	260	510
	M11.646.554	○	2.00	1.30	1.25	1.77	2.50	3.06	3.95	4.68	5.59	260	505
	M11.646.604	○	2.20	1.50	1.58	2.23	3.15	3.86	4.98	5.89	7.04	265	505
90°	M11.646.306	○	0.70	0.40	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	425	840
	M11.646.336	○	0.90	0.50	0.22*	0.32*	0.45	0.55	0.71	0.84	1.01	425	840
	M11.646.366	○	1.00	0.50	0.31*	0.44*	0.63	0.77	1.00	1.18	1.41	425	840
	M11.646.406	○	1.20	0.70	0.50*	0.71	1.00	1.23	1.58	1.87	2.24	425	835
	M11.646.446	○	1.35	0.80	0.62*	0.88	1.25	1.53	1.98	2.34	2.80	425	835
	M11.646.486	○	1.50	0.80	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	425	830
	M11.646.516	○	1.65	0.90	0.95*	1.34	1.90	2.33	3.00	3.56	4.25	425	830
	M11.646.566	○	2.00	1.10	1.25	1.77	2.50	3.06	3.95	4.68	5.59	425	825
	M11.646.606	○	2.20	1.20	1.58	2.23	3.15	3.86	4.98	5.89	7.04	425	820
120°	M11.646.307	○	0.70	0.30	0.16*	0.23*	0.32	0.39	0.51	0.60	0.72	625	1175
	M11.646.337	○	0.90	0.40	0.22*	0.32*	0.45	0.55	0.71	0.84	1.01	630	1180
	M11.646.367	○	1.00	0.50	0.31*	0.44*	0.63	0.77	1.00	1.18	1.41	635	1190
	M11.646.407	○	1.20	0.30	0.50*	0.71	1.00	1.23	1.58	1.87	2.24	640	1195
	M11.646.447	○	1.35	0.60	0.62*	0.88	1.25	1.53	1.98	2.34	2.80	645	1200
	M11.646.487	○	1.50	0.60	0.80*	1.13	1.60	1.96	2.53	2.99	3.58	650	1200
	M11.646.517	○	1.65	0.90	0.95*	1.34	1.90	2.33	3.00	3.56	4.25	650	1205
	M11.646.567	○	2.00	0.90	1.25	1.77	2.50	3.06	3.95	4.68	5.59	655	1210
	M11.646.607	○	2.20	1.10	1.58	2.23	3.15	3.86	4.98	5.89	7.04	660	1215

Example      Type + Material no. = Ordering no.  
 for ordering: M11.646.36 + SE                      = M11.646.363.SE





Spray angle $\Delta$	Ordering no.		A $\varnothing$ [mm]	E $\varnothing$ [mm]	$\dot{V}$ [l/min]						Spray width $\delta$ at p = 2 bar	
	Type	Mat. no. 5E.03			p[bar] $P_{max}=2$ bar							
					0.5	1.0	2.0	3.0	5.0	10.0	H=250 mm	H=500 mm
90°	M12.612.366	○	1.0	0.5	0.24	0.31	0.37	0.44	0.55	0.63	505	980
	M12.612.486	○	1.5	0.6	0.62	0.80	0.95	1.13	1.39	1.60	525	1020
120°	M12.612.487	○	1.5	0.6	0.62	0.80	0.95	1.13	1.39	1.60	800	1460
	M12.612.647	○	2.5	1.2	1.55	2.00	2.37	2.83	3.46	4.00	800	1460

Example      Type    + Material no.    = Ordering no.  
 for ordering: M12.612.366 + 5E.03      = M12.612.366.5E.03





US gal/min. at 40 psi	Nozzle code			Flow rate code				A Ø [mm]	V̇ [l/min]						
	Connection			Spray angle					p [bar]						
	1/8	1/4	Nut	20°	30°	45°	60°		40	60	80	100	120	150	200
02	MH.608	MH.602	MH.652	361	362	363	364	1.00	2.88	3.53	4.08	4.56	5.00	5.58	5.00
021	MH.608	MH.602	MH.652	371	372	373	374	1.02	3.03	3.71	4.28	4.79	5.25	5.87	6.77
025	MH.608	MH.602	MH.652	381	382	383	384	1.10	3.60	4.42	5.10	5.70	6.24	6.98	8.06
028	MH.608	MH.602	MH.652	391	392	393	394	1.16	4.04	4.94	5.71	6.38	6.99	7.81	9.02
03	MH.608	MH.602	MH.652	401	402	403	404	1.18	4.32	5.29	6.11	6.83	7.48	8.37	9.66
034	MH.608	MH.602	MH.652	411	412	413	414	1.30	4.90	6.00	6.93	7.75	8.49	9.49	10.96
038	MH.608	MH.602	MH.652	441	442	443	-	1.33	5.48	6.72	7.75	8.67	9.50	10.62	12.26
04	MH.608	MH.602	MH.652	451	452	453	454	1.35	5.77	7.06	8.16	9.12	9.99	11.17	12.90
043	MH.608	MH.602	MH.652	461	462	-	-	1.38	6.20	7.59	8.77	9.80	10.74	12.00	13.86
045	MH.608	MH.602	MH.652	471	472	473	474	1.40	6.49	7.95	9.18	10.26	11.24	12.57	14.51
05	MH.608	MH.602	MH.652	481	482	483	484	1.55	7.21	8.83	10.20	11.40	12.49	13.96	16.12
055	MH.608	MH.602	MH.652	501	502	503	504	1.60	7.93	9.71	11.22	12.54	13.74	15.36	17.73
06	MH.608	MH.602	MH.652	521	522	523	524	1.72	8.85	10.60	12.24	13.68	14.99	16.75	19.35
065	MH.608	MH.602	MH.652	531	532	533	534	1.75	9.37	11.48	13.26	14.82	16.23	18.15	20.96
07	MH.608	MH.602	MH.652	541	542	543	544	1.80	10.09	12.36	14.28	15.96	17.48	19.55	22.57
075	MH.608	MH.602	MH.652	551	552	553	554	1.90	10.81	13.25	15.29	17.10	18.73	20.94	24.16
08	MH.608	MH.602	MH.652	571	572	573	574	2.05	11.54	14.13	16.31	18.24	19.98	22.34	25.80
087	MH.608	MH.602	MH.652	581	582	583	584	2.06	12.54	15.36	17.74	19.83	21.72	24.29	28.04
09	MH.608	MH.602	MH.652	591	592	593	594	2.10	12.98	15.89	18.35	20.52	22.48	25.13	29.02
10	MH.608	MH.602	MH.652	601	602	603	604	2.30	14.41	17.65	20.38	22.79	24.97	27.91	32.23
11	-	MH.602	MH.652	621	622	623	624	2.40	15.86	19.42	22.42	25.07	27.46	30.70	35.45
125	-	MH.602	MH.652	641	642	643	644	2.50	18.02	22.07	25.48	28.49	31.21	34.89	40.29
131	-	MH.602	MH.652	651	652	653	654	2.55	18.89	23.13	26.71	29.86	32.71	36.57	42.23
139	-	MH.602	MH.652	661	662	663	664	2.65	20.04	24.54	28.34	31.68	34.70	38.80	44.80
15	-	MH.602	MH.652	671	672	673	674	2.70	21.62	26.48	30.58	34.19	37.45	41.87	48.35
175	-	MH.602	MH.652	701	702	703	704	3.00	25.53	30.90	35.68	39.89	43.70	48.86	56.41
20	-	MH.602	MH.652	-	-	723	724	3.05	28.83	35.31	40.78	45.59	49.94	55.84	64.47
25	-	MH.602	MH.652	-	-	763	764	3.50	36.04	44.14	50.97	56.99	62.43	69.80	80.60
30	-	MH.602	MH.652	-	-	793	-	3.90	43.25	52.97	61.16	68.38	74.91	83.75	96.70

Connection code	Connection	P <sub>max</sub> [bar]
A3.00	BSPT	approx.700
A3.07	NPT	approx.700
A3.29	Retaining nut	approx.300

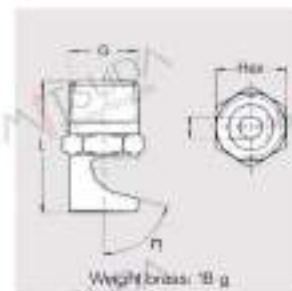
Example for ordering: Nozzle code + Flow rate code + Connection code = Ordering no.  
 MH.602 + 361 + A3.07 = MH.608.361.A3.07  
 (Flat fan 20°, 4.52 l/min.at 100 bar; 1/4 NPT)








Wide flat fan with a sharply surrounded spray pattern.  
 Non clogging design.  
 Applications: Cleaning and washing applications requiring strong water jet, foam control in drain treatment facilities and storage tanks.



Spray angle	$\Delta \eta$	Ordering no.							B Ø [mm]	V̇ [l/min]			Dimensions								Spray width B at p = 2 bar  H=250 mm		
		Type	Material no.			Code G				p [bar]			L [mm]				Hex [mm]						
			16	30	5E	1/8 BSPT	1/4 BSPT	3/8 BSPT		1/2 BSPT	1.0	2.0	5.0	R	R	R	R	R	R	R		R	
		303 SS	Brass	PVDF	1/8									1/4	3/8	1/2	1/8	1/4	3/8	1/2			
90°	75°	M3.686.366	-	○	-	CA	-	-	-	0.80	0.45	0.63	1.00	22	-	-	-	11	-	-	-	520	
	75°	M3.686.406	○	○	-	CA	-	-	-	1.00	0.71	1.00	1.58	23	-	-	-	11	-	-	-	525	
	40°	M3.686.686	○	○	-	CC	-	-	-	2.40	3.54	5.00	7.91	-	29	-	-	-	14	-	-	530	
	40°	M3.686.726	-	○	-	CA	-	-	-	2.70	4.45	6.30	9.96	26	-	-	-	11	-	-	-	530	
	40°	M3.686.806	○	○	-	CC	-	-	-	3.40	7.07	10.00	15.81	-	34	-	-	-	14	-	-	530	
	40°	M3.686.886	○	-	-	CC	-	-	-	4.20	11.31	16.00	25.30	-	36	-	-	-	17	-	-	-	530
	40°	M3.686.926	○	-	-	-	CE	-	-	4.70	14.14	20.00	31.62	-	-	39	-	-	-	17	-	-	530
120°	75°	M3.686.368	○	○	-	CA	-	-	-	0.80	0.45	0.63	1.00	23	-	-	-	11	14	-	-	1360	
	75°	M3.686.408	○	○	-	CA	-	-	-	1.00	0.71	1.00	1.58	23	-	-	-	11	14	-	-	1370	
	75°	M3.686.448	○	○	-	CC	-	-	-	1.20	0.88	1.25	1.98	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.408	○	○	-	CA	CC	-	-	1.30	1.13	1.60	2.53	23	28	-	-	11	14	-	-	1370	
	75°	M3.686.528	○	○	-	CA	CC	-	-	1.50	1.41	2.00	3.16	23	28	-	-	11	14	-	-	1370	
	75°	M3.686.568	○	○	○*	CA	CC	-	-	1.70	1.77	2.50	3.59	23	28	-	-	11	14	-	-	1370	
	75°	M3.686.608	○	○	-	CA	CC	CE	-	1.90	2.23	3.15	4.98	23	28	-	-	11	14	-	-	1370	
	75°	M3.686.648	○	○	-	CC	-	-	-	2.20	2.83	4.00	6.32	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.688	○	○	-	CA	CC	-	-	2.40	3.54	5.00	7.91	23	28	-	-	11	14	-	-	1370	
	75°	M3.686.728	○	○	-	CA	CC	-	-	2.70	4.45	6.30	9.96	23	28	-	-	11	14	-	-	1370	
	75°	M3.686.768	○	○	-	CC	-	-	-	3.00	5.66	8.00	12.65	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.808	○	○	-	CA	CC	-	-	3.40	7.07	10.00	15.81	23	28	-	-	11	14	-	-	1370	
	75°	M3.686.828	○	○	-	CC	CE	-	-	3.60	7.92	11.20	17.71	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.848	○	○	-	CC	-	-	-	3.80	8.80	12.50	19.75	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.868	○	○	-	CC	-	-	-	4.00	9.90	14.00	22.14	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.888	○	○	-	CC	-	-	-	4.20	11.31	16.00	25.30	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.908	○	○	-	CC	-	-	-	4.50	12.73	18.00	28.45	-	28	-	-	-	14	-	-	1370	
	75°	M3.686.928	○	-	-	-	CE	-	-	4.70	14.14	20.00	31.62	-	-	32	-	-	-	17	-	-	1370
	75°	M3.686.968	-	○	-	-	CG	-	-	5.30	17.68	25.00	39.53	-	-	32	40	-	-	17	22	-	1370
	75°	M3.686.988	○	-	-	-	CE	CG	-	5.60	19.80	28.00	44.27	-	-	32	40	-	-	17	22	-	1370

Example for ordering: Type + Material no. + Code = Ordering no.  
 M3.686.366 + 30 + CA = M3.686.366.30.CA







Spray angle $\Delta$	$\eta$	Ordering no.						B $\phi$ [mm]	$\dot{V}$ [l/min]				Dimensions		Weight	Spray width B at p = 2 bar		
		Type	Material no.			Code G			p [bar]				L [mm]	Hex [mm]		H=250 [mm]	H=500 [mm]	
			16	30	5E				0.5	1.0	2.0	5.0						
		303 SS	Brass	PVDF	1/4 BSPT	3/8 BSPT	3/4 BSPT											
45°	36°	MK12.688.603	○	-	-	CC	-	1.9	1.57	2.23	3.15	4.98	31	114	50	220	440	
	36°	MK12.688.723	○	-	-	CE	-	2.7	3.15	4.45	6.30	9.96	44	17	107	220	440	
	35°	MK12.688.763	○	-	-	CE	-	3.0	4.00	5.66	8.00	12.65	43	19	120	220	440	
	30°	MK12.688.843	○	○	-	CE	-	3.8	6.25	8.84	12.50	19.76	50	19	140	220	440	
	27°	MK12.688.883	○	-	-	CE	-	4.3	8.00	11.31	16.00	25.30	67	22	240	220	440	
	29°	MK12.688.923	○	○	-	CE	-	4.8	10.00	14.14	20.00	31.62	59	22	260	220	440	
	29°	MK12.688.943	○	-	-	CE	-	4.9	11.20	15.84	22.40	35.41	62	22	300	220	440	
	29°	MK12.688.963	○	-	-	CE	-	5.4	12.50	17.68	25.00	39.53	74	22	432	220	440	
	35°	MK13.689.003	○	-	○	-	-	90	6.0	15.75	22.27	31.50	49.81	80	32/24	306/33	250	490
	21°	MK13.689.043	○	○	-	CE	-	6.9	20.00	28.28	40.00	63.25	67	24	630	250	490	
	18°	MK13.689.083	○	○	-	CE	-	7.6	25.00	35.36	50.00	79.06	74	24	625	250	490	
	18°	MK13.689.123	○	○	-	CE	-	8.6	31.50	44.55	63.00	99.61	79	24	610	250	490	

Example for ordering: Type + Material no. + Code = Ordering no.  
 MK12.688.603 + 16 + CC = MK12.688.603.16.CC



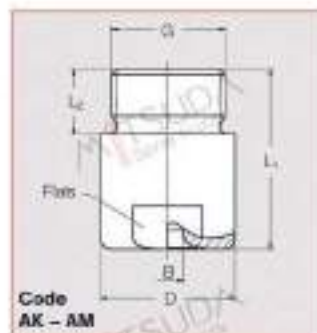
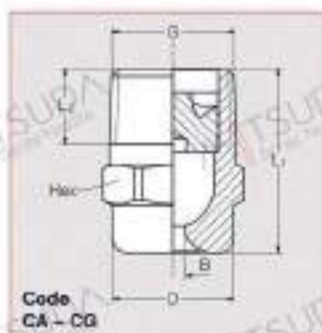


Spray angle $\Delta$	Ordering no.								B $\varnothing$ [mm]	E $\varnothing$ [mm]	$\dot{V}$ [l/min]							Spray diameter D at p=2 bar			
	Type	Mat. no.		Code							p [bar]							H=200 mm	H=500 mm		
		1Y	30	316L SS	Brass	1/8 BSPT	1/4 BSPT	3/8 BSPT			1/2 BSPT	3/4 BSPP	1 BSPP	0.5	1.0	2.0	3.0			5.0	7.0
45°	M4.490.403	○	○	○	○	CA	-	-	-	-	1.25	1.25	0.57	0.76	1.00	1.18	1.44	1.65	1.90	160	400
	M4.490.523	○	○	○	○	CA	-	-	-	-	1.70	1.70	1.15	1.52	2.00	2.35	2.89	3.30	3.81	160	400
	M4.490.603	○	○	○	○	-	CC	CE	-	-	2.00	2.00	1.81	2.39	3.15	3.70	4.54	5.20	6.00	160	400
	M4.490.643	○	○	○	○	-	CC	CE*	-	-	2.45	2.45	2.30	3.03	4.00	4.70	5.77	6.60	7.61	160	400
	M4.490.683	-	○	○	○	-	-	CE*	-	-	2.55	2.55	2.87	3.79	5.00	5.88	7.21	8.25	9.52	160	400
	M4.490.703	-	○	○	○	-	-	CE	-	-	2.65	2.65	3.22	4.24	5.60	6.59	8.08	9.24	10.66	160	400
	M4.490.723	○	○	○	○	-	-	CE	-	-	2.85	2.85	3.62	4.77	6.30	7.41	9.09	10.40	11.99	160	400
	M4.490.783	-	○	○	○	-	-	-	CG	-	3.45	3.45	5.17	6.82	9.00	10.58	12.98	14.85	17.12	160	400
M4.490.843	-	○	○	○	-	-	-	CG	-	3.80	3.80	7.18	9.47	12.50	14.70	18.03	20.63	23.80	160	400	
60°	M4.490.404	○	○	○	○	CA	-	-	-	-	1.15	1.15	0.57	0.76	1.00	1.18	1.44	1.65	1.90	220	560
	M4.490.444	○	○	○	○	CA	-	-	-	-	1.25	1.25	0.72	0.95	1.25	1.47	1.80	2.06	2.38	220	560
	M4.490.484	○	○	○	○	CA	-	-	-	-	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05	220	560
	M4.490.524	○	○	○	○	CA	-	-	-	-	1.60	1.60	1.15	1.52	2.00	2.35	2.89	3.30	3.81	220	560
	M4.490.564	○	○	○	○	CA	-	-	-	-	1.80	1.80	1.44	1.89	2.50	2.94	3.61	4.13	4.76	220	560
	M4.490.604	○	○	○	○	CA	CC	CE*	-	-	2.05	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00	220	560
	M4.490.644	○	○	○	○	-	CC	CE	-	-	2.30	2.30	2.30	3.03	4.00	4.70	5.77	6.60	7.61	220	560
	M4.490.684	○	○	○	○	-	CC	CE	-	-	2.60	2.60	2.87	3.79	5.00	5.88	7.21	8.25	9.52	220	560
	M4.490.724	○	○	○	○	-	CC	CE	-	-	2.95	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99	220	560
	M4.490.764	○	○	○	○	-	-	CE	-	-	3.25	3.25	4.59	6.06	8.00	9.41	11.54	13.20	15.22	220	560
	M4.490.804	○	○	○	○	-	-	CE	-	-	3.70	3.70	5.74	7.38	10.00	11.76	14.43	16.51	19.02	220	560
	M4.490.844	○	○	○	○	-	-	-	CG	-	4.05	4.05	7.18	9.47	12.50	14.70	18.03	20.63	23.80	220	560
	M4.490.884	○	○	○	○	-	-	-	CG	-	4.65	4.65	9.19	12.13	16.00	18.82	23.03	26.41	30.46	220	560
	M4.490.924	○	○	○	○	-	-	-	-	AK	5.20	5.20	11.49	15.16	20.00	23.52	28.85	33.01	38.07	220	560
	M4.490.964	○	○	○	○	-	-	-	-	AK	5.80	5.80	14.39	18.95	25.00	29.40	36.07	41.26	47.59	220	560
	M4.491.044	○	○	○	○	-	-	-	-	AM	7.25	7.25	22.97	30.31	40.00	47.04	57.71	66.02	76.15	220	560
M4.491.084	○	○	○	○	-	-	-	-	AM	8.15	8.15	28.72	37.89	50.00	58.80	72.14	82.53	95.18	220	560	

This series provides a non-clogging nozzle design. Stable spray angle, exceptionally even liquid distribution, and large free cross sections. Applications: Cleaning and washing applications, container cleaning, degassing, container cleaning.



Series M4.490/491 takes part within the axial-flow full cone nozzles. These nozzle series are used instead of M4.460/461 that still available on request.



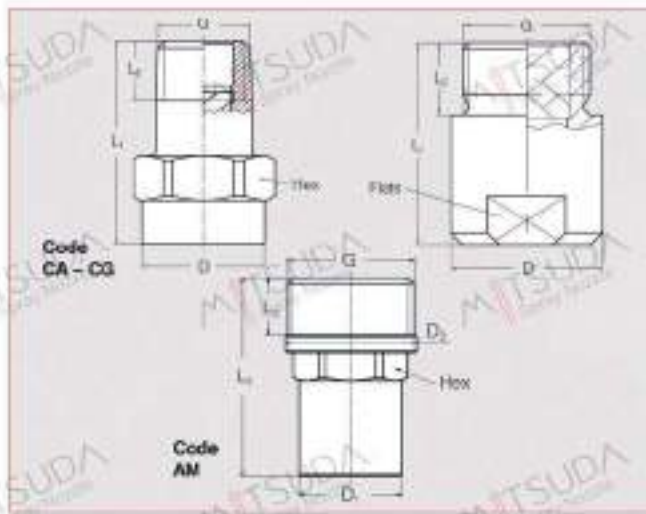
Code	Dimensions [mm]				Hex/Flats	Weight brass
	G	L <sub>1</sub>	L <sub>2</sub>	D		
CA	1/8 BSPT	18.0	6.5	10.0	11	13 g
CC	1/4 BSPT	22.0	10.0	13.0	14	16 g
CE	3/8 BSPT	24.5	10.0	16.0	17	30 g
CE	3/8 BSPT	30.0	10.0	16.0	17	50 g
CG	1/2 BSPT	32.5	13.0	21.0	22	60 g
CG	1/2 BSPT	43.5	13.0	21.0	22	85 g
AK	3/4 BSPP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



Spray angle $\Delta$	Ordering no.								B $\varnothing$ [mm]	E $\varnothing$ [mm]	$\dot{V}$ [l/min]								Spray diameter D at p=2 bar	
	Type	Mat. no.		Code				p [bar]								H=200 mm	H=500 mm			
		1Y	30	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT	3/4 BSPP			BSPP	0.5	1.0	2.0	3.0			5.0	7.0	10.0
90	M4.490.406	○	○	CA	-	-	-	-	1.20	1.20	0.57	0.76	1.00	1.18	1.44	1.65	1.90	380	400	
	M4.490.446	○	○	CA	-	-	-	-	1.30	1.30	0.72	0.95	1.25	1.47	1.80	2.06	2.38	160	400	
	M4.490.486	○	○	CA	-	-	-	-	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05	160	400	
	M4.490.526	○	○	CA	-	-	-	-	1.70	1.55	1.15	1.52	2.00	2.35	2.89	3.30	3.81	160	400	
	M4.490.566	○	○	CA	-	-	-	-	1.90	1.90	1.44	1.89	2.50	2.94	3.61	4.13	4.76	160	400	
	M4.490.606	○	○	CA	-	CE	-	-	2.10	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00	160	400	
	M4.490.646	○	○	-	CC	CE	-	-	2.40	2.40	2.30	3.03	4.00	4.70	5.77	6.60	7.61	160	400	
	M4.490.686	○	○	-	CC	CE	CG	-	2.70	2.70	2.67	3.79	5.00	5.88	7.21	8.25	9.52	160	400	
	M4.490.726	○	○	-	CC	CE	CG	-	3.20	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99	160	400	
	M4.490.746	○	○	-	-	CE	-	-	3.15	3.15	4.08	5.38	7.10	8.35	10.24	11.72	13.52	160	400	
	M4.490.766	○	○	-	-	CE	-	-	3.40	3.40	4.59	6.06	8.00	9.41	11.54	13.20	15.22	160	400	
	M4.490.806	○	○	-	-	CE	-	-	3.90	3.90	5.74	7.58	10.00	11.76	14.43	16.51	19.04	160	400	
	M4.490.846	○	○	-	-	CE	-	-	4.65	4.00	7.18	9.47	12.50	14.70	18.03	20.63	23.80	160	400	
	M4.490.886	○	○	-	-	-	CG	-	5.45	4.50	9.19	12.13	16.00	18.82	23.08	26.41	30.46	160	400	
	M4.490.926	○	○	-	-	-	CG	-	5.90	4.50	11.49	15.16	20.00	23.52	28.85	33.01	38.07	160	400	
	M4.490.966	○	○	-	-	-	CG	AK	6.55	4.85	14.36	18.95	25.00	29.40	36.07	41.26	47.59	160	400	
	M4.491.006	○	○	-	-	-	-	AK	7.55	5.50	18.09	23.87	31.50	37.05	45.45	51.99	59.97	160	400	
	M4.491.046	○	○	-	-	-	-	AK	8.60	6.60	22.97	30.31	40.00	47.04	57.71	66.02	76.15	160	400	
	M4.491.086	○	○	-	-	-	-	-	AK	9.45	7.25	28.72	37.89	50.00	58.80	72.14	82.53	95.18	160	400
	M4.491.126	○	○	-	-	-	-	-	AK	10.40	8.00	36.18	47.75	63.00	74.09	90.89	103.98	119.93	160	400
M4.491.146	○	○	-	-	-	-	-	AK	11.00	7.50	40.78	53.81	71.00	83.50	102.43	117.19	135.16	160	400	
120	M4.490.368	○	○	CA	-	-	-	-	0.85	0.65	0.36	0.48	0.63	0.74	0.91	1.04	1.20	680	1220	
	M4.490.408	○	○	CA	-	-	-	-	1.20	1.20	0.57	0.76	1.00	1.18	1.44	1.65	1.90	680	1220	
	M4.490.448	○	○	CA	-	-	-	-	1.30	1.30	0.72	0.95	1.25	1.47	1.80	2.06	2.38	680	1220	
	M4.490.488	○	○	CA	-	-	-	-	1.45	1.45	0.92	1.21	1.60	1.88	2.31	2.64	3.05	680	1220	
	M4.490.528	○	○	CA	-	-	-	-	1.70	1.70	1.15	1.52	2.00	2.35	2.89	3.30	3.81	680	1220	
	M4.490.568	○	○	CA	-	CE	-	-	1.90	1.90	1.44	1.89	2.50	2.94	3.61	4.13	4.76	680	1220	
	M4.490.608	○	○	-	CC	CE	-	-	2.10	2.05	1.81	2.39	3.15	3.70	4.54	5.20	6.00	680	1330	
	M4.490.648	○	○	-	CC	CE	CG	-	2.40	2.40	2.30	3.03	4.00	4.70	5.77	6.60	7.61	680	1330	
	M4.490.688	○	○	-	CC	CE	CG	-	2.75	2.75	2.67	3.79	5.00	5.88	7.21	8.25	9.52	680	1330	
	M4.490.728	○	○	-	-	CE	-	-	3.20	2.80	3.62	4.77	6.30	7.41	9.09	10.40	11.99	680	1330	
	M4.490.748	○	○	-	-	CE	-	-	3.20	3.20	4.08	5.38	7.10	8.35	10.24	11.72	13.52	680	1330	
	M4.490.768	○	○	-	-	CE	-	-	3.45	3.45	4.59	6.44	8.00	9.41	11.54	13.20	15.22	680	1330	
	M4.490.808	○	○	-	-	CE	-	-	3.90	3.90	5.74	7.58	10.00	11.76	14.43	16.51	19.04	680	1330	
	M4.490.848	○	○	-	-	-	CG	-	4.70	4.00	7.18	9.47	12.50	14.70	18.03	20.63	23.80	680	1330	
	M4.490.888	○	○	-	-	-	CG	-	5.10	4.50	9.19	12.13	16.00	18.82	23.08	26.41	30.46	680	1330	
	M4.490.928	○	○	-	-	-	CG	-	5.80	4.75	11.49	15.16	20.00	23.52	28.85	33.01	38.07	680	1330	
	M4.490.968	○	○	-	-	-	-	AK	6.65	4.85	14.36	18.95	25.00	29.40	36.07	41.26	47.59	680	1330	
	M4.491.048	○	○	-	-	-	-	AK	9.20	5.85	22.97	30.31	40.00	47.04	57.71	66.02	76.15	680	1330	
	M4.491.128	○	○	-	-	-	-	AM	10.60	7.75	36.18	47.75	63.00	74.09	90.89	103.98	119.93	680	1330	
	M4.491.148	○	○	-	-	-	-	AM	11.40	7.65	40.78	53.81	71.00	83.50	102.43	117.19	135.16	680	1330	

Example Type + Material no. + Code = Ordering no.  
 for ordering: M4.490.406 + 1Y + CA = M4.490.406.1Y.CA





Code	Dimensions [mm]					Hex/ Flats
	G	L <sub>1</sub>	L <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	
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 BSP1	30.0	10.0	17.0	-	17
CG	1/2 BSP1	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

Spray angle Δ	Ordering no.							B ∅ [mm]	E ∅ [mm]	V̇ [l/min]							Spray diameter D at p=2 bar	
	Type	Mat. no. SE	Code							p [bar]							H=200 mm	H=500 mm
			PVDF	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		
60°	M46.460.524	○	CA	-	-	-	-	1.60	1.60	1.00	1.41	2.00	2.45	2.83	3.16	4.47	220	560
	M46.460.644	○	-	CC	-	-	-	2.40	1.90	2.30	3.03	4.00	4.70	5.77	6.60	7.61	220	560
	M46.460.724	○	-	CC	-	-	-	2.80	2.10	3.15	4.45	6.30	7.72	8.91	9.96	14.09	220	560
	M46.460.964	○	-	-	-	-	AK	5.80	4.90	14.36	18.95	25.00	29.40	36.07	41.26	47.59	220	560
90°	M46.460.326	○	CA	-	-	-	-	0.80	0.55	0.23	0.30	0.40	0.47	0.58	0.66	0.76	380	860
	M46.460.406	○	CA	-	-	-	-	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90	380	860
	M46.460.486	○	CA	-	-	-	-	1.45	1.20	0.92	1.21	1.60	1.88	2.31	2.64	3.05	380	860
	M46.460.526	○	CA	-	-	-	-	1.65	1.30	1.15	1.52	2.00	2.35	2.89	3.30	3.81	380	860
	M46.460.606	○	CA	-	CE	-	-	2.05	1.45	1.81	2.39	3.15	3.70	4.54	5.20	6.00	380	860
	M46.460.646	○	-	CC	-	-	-	2.30	1.80	2.30	3.03	4.00	4.70	5.77	6.60	7.61	390	960
	M46.460.726	○	-	-	CE	-	-	2.95	2.00	3.62	4.77	6.30	7.41	9.09	10.40	11.99	390	960
	M46.460.746	○	-	-	CE	-	-	3.30	1.90	4.08	5.38	7.10	8.35	10.24	11.72	13.52	390	960
	M46.460.766	○	-	-	CE	-	-	3.30	2.40	4.59	6.06	8.00	9.41	11.54	13.20	15.22	390	960
	M46.460.806	○	-	-	CE	-	-	3.70	2.70	5.74	7.58	10.00	11.76	14.43	16.51	19.04	390	960
	M46.460.846	○	-	-	CE	-	-	4.05	3.20	7.18	9.47	12.50	14.70	18.03	20.63	23.80	390	960
	M46.460.886	○	-	-	CE	CG	-	4.70	3.10	9.19	12.13	16.00	18.82	23.08	26.41	30.46	390	960
	M46.460.926	○	-	-	-	CG	-	5.10	2.80	10.00	14.14	20.00	24.49	28.28	31.62	44.72	390	960
	M46.460.956	○	-	-	-	CG	-	5.10	2.80	10.00	14.14	20.00	24.49	28.28	31.62	44.72	390	960
	M46.460.966	○	-	-	-	CG	-	5.80	3.80	14.36	18.95	25.00	29.40	36.07	41.26	47.59	390	960
	M46.461.006	○	-	-	-	CG	-	6.40	3.80	18.09	23.87	31.50	37.05	45.45	51.99	59.97	390	960
	M46.461.046	○	-	-	-	CK*	-	7.20	5.30	22.97	30.31	40.00	47.04	57.71	66.02	76.15	390	960
	M46.461.068	○	-	-	-	AM	-	8.40	5.00	25.00	35.36	50.00	61.24	70.71	79.06	111.80	390	960

Example      Type    + Material no.    + Code = Ordering no.  
for ordering: M46.460.644    + SE                    + CC                = M46.460.644.5E.CC



Spray angle 120°	Ordering no.							B ∅ [mm]	E ∅ [mm]	V̇ [l/min]							Spray diameter D at p=2 bar	
	Type	Mat. no. SE	Code							p [bar]								
			PVDF	1/8 BSPT	1/4 BSPT	3/8 BSPT	1/2 BSPT			3/4 BSPT	1 BSPT	0.5	1.0	2.0	3.0	5.0	7.0	10.0
	M46.460.368	○	CA	-	-	-	-	0.95	0.45	0.32	0.45	0.63	0.77	0.89	1.00	1.41	680	1220
	M46.460.408	○	CA	-	-	-	-	1.20	0.85	0.57	0.76	1.00	1.18	1.44	1.65	1.90	680	1220
	M46.460.488	○	CA	-	-	-	-	1.50	1.00	0.92	1.21	1.60	1.88	2.31	2.64	3.05	680	1220
	M46.460.528	○	CA	-	-	-	-	1.65	1.20	1.15	1.52	2.00	2.35	2.89	3.20	3.81	680	1220
	M46.460.608	○	CA	-	-	-	-	2.10	1.40	1.81	2.39	3.15	3.70	4.54	5.20	6.00	680	1220
	M46.460.648	○	-	CC	-	-	-	2.45	1.60	2.30	3.03	4.00	4.70	5.77	6.60	7.61	680	1330
	M46.460.728	○	-	-	CE	-	-	3.10	1.90	3.62	4.77	6.30	7.41	9.09	10.40	11.99	680	1330
	M46.460.748	○	-	-	CE	-	-	3.30	1.90	4.08	5.38	7.10	8.35	10.24	11.72	13.52	680	1330
	M46.460.768	○	-	-	CE	-	-	3.50	1.90	4.59	6.44	8.00	9.41	11.54	13.20	15.22	680	1330
	M46.460.808	○	-	-	CE	-	-	3.80	2.40	5.74	7.58	10.00	11.76	14.43	16.51	19.04	680	1330
	M46.460.848	○	-	-	CE	-	-	4.20	2.70	7.18	9.47	12.50	14.70	18.03	20.63	23.80	680	1330
	M46.460.888	○	-	-	-	CG	-	4.60	3.10	9.94	12.13	16.00	18.82	23.08	26.41	30.46	680	1330
	M46.460.968	○	-	-	-	CG	-	5.90	4.10	14.36	18.95	25.00	29.40	36.07	41.26	47.59	680	1330
	M46.461.048	○	-	-	-	-	CK*	7.60	4.90	22.97	30.31	40.00	47.04	57.71	66.02	76.15	680	1330

Example    Type    + Material no.    + Code    = Ordering no.  
 for ordering: M46.460.408 + SE                    + CA    = M46.460.408.5E.CA





US gal/min. at 40 psi	Nozzle code			Flow rate code	B Ø (mm)	Q [l/min]							
	Connection		Retaining nut			p [bar]							
	1/8	1/4				40	60	80	100	120	150	200	300
01	MS.550	MS.546	MS.548	MS.300	0.60	1.44	1.77	2.04	2.28	2.50	2.79	3.22	3.95
02	MS.550	MS.546	MS.548	MS.360	0.84	2.86	3.53	4.08	4.56	5.00	5.58	6.45	7.90
025	MS.550	MS.546	MS.548	MS.380	0.94	3.60	4.42	5.10	5.70	6.24	6.98	8.06	9.87
027	MS.550	MS.546	MS.548	MS.390	0.99	3.89	4.76	5.50	6.15	6.74	7.53	8.70	10.65
03	MS.550	MS.546	MS.548	MS.400	1.03	4.33	5.30	6.12	6.84	7.49	8.38	9.67	11.85
034	MS.550	MS.546	MS.548	MS.410	1.07	4.90	6.00	6.93	7.75	8.49	9.49	10.96	13.42
035	MS.550	MS.546	MS.548	MS.420	1.11	5.05	6.18	7.14	7.98	8.74	9.77	11.29	13.82
038	MS.550	MS.546	MS.548	MS.440	1.15	5.48	6.71	7.75	8.66	9.49	10.61	12.25	15.00
04	MS.550	MS.546	MS.548	MS.450	1.19	5.77	7.06	8.16	9.12	9.99	11.17	12.90	15.80
045	MS.550	MS.546	MS.548	MS.470	1.25	6.49	7.95	9.18	10.26	11.24	12.57	14.51	17.77
05	MS.550	MS.546	MS.548	MS.480	1.33	7.21	8.83	10.20	11.40	12.49	13.96	16.12	19.75
055	MS.550	MS.546	MS.548	MS.500	1.39	7.93	9.71	11.22	12.54	13.74	15.36	17.73	21.72
06	MS.550	MS.546	MS.548	MS.520	1.46	8.65	10.60	12.24	13.68	14.99	16.75	19.35	23.69
065	MS.550	MS.546	MS.548	MS.530	1.51	9.37	11.48	13.26	14.82	16.23	18.15	20.96	25.67
070	MS.550	MS.546	MS.548	MS.540	1.58	10.09	12.36	14.28	15.96	17.48	19.55	22.57	27.64
074	MS.550	MS.546	MS.548	MS.550	1.62	10.67	13.07	15.09	16.87	18.48	20.66	23.86	29.22
08	MS.550	MS.546	MS.548	MS.570	1.69	11.54	14.13	16.31	18.24	19.98	22.34	25.80	31.59
087	MS.550	MS.546	MS.548	MS.580	1.76	12.54	15.36	17.74	19.83	21.72	24.29	28.04	34.35
089	MS.550	MS.546	MS.548	MS.590	1.78	12.83	15.72	18.15	20.29	22.23	24.85	28.69	35.14
10	MS.550	MS.546	MS.548	MS.600	1.88	14.41	17.65	20.38	22.79	24.97	27.91	32.23	39.47
11	MS.550	MS.546	MS.548	MS.620	1.97	15.86	19.42	22.42	25.07	27.46	30.70	35.45	43.42
124	MS.550	MS.546	MS.548	MS.640	2.09	17.87	21.89	25.28	28.26	30.96	34.61	39.97	48.95
131	MS.550	MS.546	MS.548	MS.650	2.15	18.89	23.13	26.71	29.86	32.71	36.57	42.23	51.72
139	MS.550	MS.546	MS.548	MS.660	2.22	20.04	24.54	28.34	31.68	34.70	38.80	44.80	54.87
15	MS.550	MS.546	MS.548	MS.670	2.30	21.62	26.48	30.58	34.19	37.45	41.87	48.35	59.22
165	MS.550	MS.546	MS.548	MS.690	2.41	23.79	29.13	33.64	37.61	41.20	46.06	53.19	65.14
174	MS.550	MS.546	MS.548	MS.700	2.48	25.08	30.72	35.47	39.66	43.45	48.57	56.09	68.69
183	MS.550	MS.546	MS.548	MS.710	2.55	26.38	32.31	37.31	41.71	45.69	51.08	58.99	72.24
20	MS.550	MS.546	MS.548	MS.720	2.66	28.83	35.31	40.78	45.59	49.94	55.84	64.47	78.96
218	MS.550	MS.546	MS.548	MS.740	2.77	31.43	38.49	44.44	49.69	54.43	60.86	70.27	86.07
25	MS.550	MS.546	MS.548	MS.760	2.96	36.04	44.14	50.97	56.99	62.43	69.80	80.60	98.71
294	MS.550	MS.546	MS.548	MS.790	3.22	42.38	51.91	59.94	67.01	73.41	82.07	94.77	116.06
310	MS.550	MS.546	MS.548	MS.800	3.30	44.69	54.73	63.20	70.66	77.40	86.54	99.93	122.39

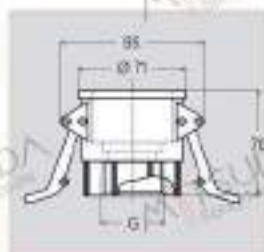
Connection code	Connection	P <sub>max</sub> [bar]
A3.00	BSPT	approx. 700
A1.07	NPT	approx. 700
A3.29	Retaining nut	approx. 300

Example for ordering: Nozzle code + Flow rate code + Connection code = Ordering no.  
 MS.550 + MS.360 + A3.07 = MS.550.360.A3.07  
 (Solid stream; 4.52 l/min. at 100 bar; 1/8 NPT)





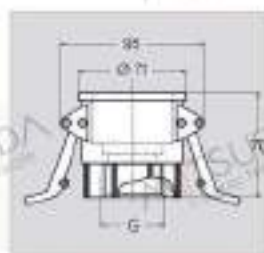
## Quick Coupling



Ordering no.	Material	G	Colour
MC.092.300.53.32.D0	PP	1 1/4 BSPT	Blue
MC.092.301.53.40.D0	PP	1 1/2 NPT	Purple



Ordering no.	Material	G	Colour
MC.092.300.53.32.A0	PP	1 1/4 BSPT	Blue
MC.092.301.53.40.A0	PP	1 1/2 NPT	Purple



Ordering no.	Material	G	Colour
MC.092.300.53.32.DA	PP	1 1/4 BSPT	Blue
MC.092.301.53.40.DA	PP	1 1/2 NPT	Purple

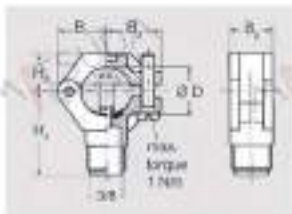


Ordering no.	Material	G	Colour
MC.092.300.53.32.SS	SS	1 1/4 BSPT	SS
MC.092.301.53.40.SS	SS	1 1/2 NPT	SS

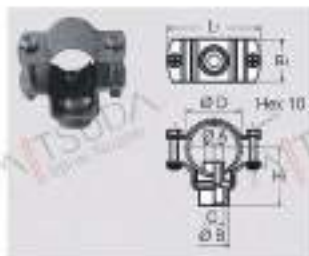
## Pipe spacer



Ordering no.	Material	G	Dimensions (mm)		Colour
			L	ØD	
MR.092.400.53.25.00	PP/301 SS	1" (32.0-34.5 mm)	75	25	Blue
MR.092.400.53.32.00	PP/301 SS	1 1/4" (40.0-43.0 mm)	79	32	Blue
MR.092.400.53.40.00	PP/301 SS	1 1/2" (46.0-49.0 mm)	83	40	Blue
MR.092.400.53.50.00	PP/301 SS	2" (58.0-62.0 mm)	89	50	Blue



Retaining nuts



For series	Ordering no.				Screw (Material)	Dimensions [mm]						Weight (Polyamide)				
	Type	Material no.				BSPP	Pipe Ø	D Ø	B <sub>1</sub> Ø	B <sup>**</sup> Ø	B <sub>1</sub>		B <sub>2</sub>	B <sub>3</sub>	H <sub>1</sub>	H <sub>2</sub>
		Polyamide	Polypropylene	PVDF												
302/684/652	M.090.053	○	○	○	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
	M.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
	M.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
	M.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
	M.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

For Series	Ordering no.					BSPP	Dimensions [mm]				Weight (Brass)
	16	17	30	56	5E		H <sub>1</sub>	H <sub>2</sub>	D	Hex	
652/660/684	M.065.200	○	○	○	-	3/8	13.0	10.0	12.8	22	25 g
	M.065.200	-	-	-	○	3/8	14.5	11.5	12.8	22	

For series	Ordering no.				Dimensions						
	Type	Female thread (C)			Pipe D	D	L <sub>1</sub>	B <sub>1</sub>	H <sub>1</sub>	A Ø	B Ø
		1/8"	1/4"	3/8"							
All nozzles with 1/8", 1/4" or 3/8" male thread	M.090.000.16	AB	AD	-	1/2"	20-22.0	52	30	32	7	18
	M.090.010.16	AB	AD	-	3/4"	25-27.5	56	25	34.5	7	18
	M.090.020.16	-	AD	AF	1"	32-34.5	58	30	39	7	18
	M.090.030.16	-	AD	AF	1 1/4"	40-43.0	70	37	46.5	17.5	25.4

For series	Ordering no.				Screw (Material)	Pipe Ø	D Ø [mm]	Dimensions [mm]						Weight		
	Type	Material no.						Code	H <sub>1</sub>	H <sub>2</sub>	B <sub>1</sub> Ø	B <sup>**</sup> Ø	B <sub>1</sub>		B <sub>2</sub>	B <sub>3</sub>
		Polyamide	Polypropylene	PVDF												
302 bayonet 422 bayonet/2TR 468/548/646 652/679/684	M.090.003	○	○	○	-	1/2"	20-22.0	49.5	16.5	6.0	6.2-6.4	21.2	23.8	18.5	22 g	
	M.090.013	○	○	○	-	3/4"	25-27.5	52.5	17.5	7.6	7.8-8.0	24.5	26.5	22.0	26 g	
	M.090.023	○	○	○	-	1"	32-34.5	57.0	21.0	10.6	10.8-10.0	30.0	31.0	22.0	32 g	

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





**Threaded**

Size	A	Q	Kg
1"	140.0	53.0	
1 1/4"	160.0	63.0	
1 1/2"	170.0	63.0	
2"	192.0	76.0	
2 1/2"	220.0	91.0	



**Welded**

Size	A	Q	Kg
1"	72.0	53.0	
1 1/2"	85.0	63.0	
2"	87.0	91.0	
2 1/2"	102.0	100.0	



**Rotary**

Nozzle Model	Join NPT Or BSP1 (Female)	A (mm)	B (mm)	C (mm)	Hexagon (mm)	Net Weight (kg)
21400	3/4 inch	127	105	42	44.5	0.45
18250	3/4 inch	132	100	55	44.5	0.68

**Technical Parameter**

Size	Pressure (bar)	Cleaning radius(m)	Fluxation m <sup>3</sup> /h
1" 1.5"	2	1.25	12
2"	2	1.5	38
2.5"	2	2.0	38

**Technical Parameter**

Size	Pressure (bar)	Cleaning radius(m)	Fluxation m <sup>3</sup> /h
1"	2.5	1.0 1.3	17/10
1 1/4" 1 1/2"	2.5	1.3 1.8	23/17
2"	3.5	2.0 3.0	55/38
2 1/2"	3.5	3.0 3.5	58/41

Nozzle Order Number	Capacity (L/min)					
	1 bar	1.5 bar	2 bar	2.5 bar	3 bar	4 bar
21400 HSS10-SS	28	28	32	36	39	46
21400 HSS18-SS	41	50	58	65	71	82
18250 HSS21-SS	48	59	68	76	83	96
18250 HSS45-SS	103	126	145	162	178	205



Size	A	H	Pressure (bar)	Cleaning radius(m)	Fluxation m <sup>3</sup> /h	Kg
1"	118.0	165.0	1.5 2.0	2.0 3.0	23	
1 1/2"	142.0	189.0	1.8 2.5	2.5 3.0	38	
2"	145.0	191.0	2.5 3.0	3.5 4.0	60	

Nozzle Order NO.	Performance Data of Tankjet 19250 tank cleaning nozzle					
	Flow (L/min)					
	1.5 bar	3 bar	4 bar	5 bar	6 bar	8 bar
19250.STCN5-316SS	14	19.7	23	25	28	32
19250.STCN5.7-316SS	15.9	22	26	29	32	37
19250.STCN7-316SS	19.5	28	32	36	39	45
19250.STCN8-316SS	22	32	36	41	45	52
19250.STCN10-316SS	28	39	46	51	56	64



## Bayonet quick-release system



For series	Ordering no.	Material	Colour
	652	M.065. 202. 56. 00	POM
M.065. 202. 53. 00		Polypropylene	grey
M.065. 202. 5E. 00		PVDF	blue
548/684	M.065. 202. 56. 11	POM	black
	M.065. 202. 53. 11	Polypropylene	grey

Ordering no.	Material	Colour
M.065. 202. 56. 40	POM	beige
M.065. 202. 53. 40	Polypropylene	grey

## Bayonet-Nipple



For series	Ordering no.	Material	Twist angle to the pipe axis	
			Angle	Direction
646/652/684	M. 095 .016. 50. 10. 85	PVC	0°	
	M. 095 .016. 53. 08. 05	PP	10°	right
	M. 095 .016. 53. 09. 29	PP	10°	left
	M. 095 .016. 53. 09. 99	PP	35°	right
	M. 095 .016. 53. 09. 98	PP	35°	left
	M. 095 .016. 53. 07. 36	PP	45°	right
	M. 095 .016. 53. 09. 30	PP	45°	left
	M. 095 .016. 53. 10. 87	PP	55°	right
	M. 095 .016. 53. 10. 88	PP	55°	left



For series	Ordering no.	Material	Connection
652 684	M. 090. 075. 53. 00	PP	1/4 NPT



**Ball joint for bayonet quick-release system**



For series	Ordering no.			Colour
	Type	Mat no.	Code	
		5E		
For all nozzle with 1/8" or 1/4" male thread.		PVDF	1/8 BSPP	blue
	M.092.150	○	AB AD	

T	P <sub>max</sub>		For series	Ordering no.	Material	Colour
65°C	10 bar					
80°C	8 bar					
100°C	4 bar					

	M.092.150.5E.00	PVDF	blue
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**Compact ball joints for narrow installation conditions**



For series	Ordering no.			Dimensions (mm)						Weight (Brass)		
	Type	Material no.		Code	G <sub>1</sub>		G <sub>2</sub>		Hex <sub>1</sub>		Hex <sub>2</sub>	
		16	30		BSPP	BSPP	L <sub>01</sub>	L <sub>02</sub>				
For all nozzle for all nozzles with 3/8" fits with 1/4" male thread	M.092.010	303 SS	Brass	AA	1/8	1/8	8.0	8.0	29.3	22	22	70 g
	M.092.024			AC	1/4	1/4	12.0	12.0	44	27	27	140 g
	M.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: M.092.010      + 16      + CA      = M.092.010.16.AA

**Design Features**

**Easy nozzle replacement**

Easy dismantling nozzle design, the nozzle and spray head can be quickly dismantled that you can rotate the spray head by 90 degree to install it or split it from nozzle by hand,

**Auto orienting spray head**

There is an interior block, which can keep nozzle in right position without manual adjustment. Therefore, it can avoid quality problem caused by wrong orientation of nozzle.

**Anti-corrosion and wearable**

Easy split nozzle; Made of Glass Fiber PP (25%), Carbon Fiber PP (40%) and PVDF, featured high intensity, wearability and anticorrosion, Suitable for washing and rinsing of corrosive, such as phosphate, acid & solvent; Max temperature for Glass Fiber PP is 82 C; Max temperature for Carbon Fiber is 120 C; While PVDF is high pure without pigment which can keep high purity is processing, and the max temperature is 148 C under 7 kg pressure.

**Widely capacity choice**

Available sizes: 1/8, 1/4" and 3/8" ; Absolutely windtight between nozzle and spray head with a interior O-shaped NBR windtight circle; Easy Split Nozzle: Special appearance of spray head for grasp; Available spray head shapes: MQC flat fan, MQB full cone and MQA hollow cone; and various capacities angles are available.

**Performance Data**



Easy-dismantling Flat Fan Spray Tip

Nozzle type (Spraying angle under 3 bar pressure)					Capacity (L/min)								
50°	65°	80°	90°	110°	0.3 bar	1 bar	2 bar	3 bar	4 bar	5 bar	6 bar	7 bar	14 bar
MQC5001	MQC6501	MQC8001	MQC9501	MQC11001	0.12	0.23	0.32	0.39	0.46	0.51	0.56	0.60	0.85
MQC5002	MQC6502	MQC8002	MQC9502	MQC11002	0.25	0.45	0.64	0.79	0.91	1.0	1.1	1.2	1.7
MQC5003	MQC6503	MQC8003	MQC9503	MQC11003	0.37	0.69	0.97	1.2	1.4	1.5	1.7	1.8	2.6
MQC5004	MQC6504	MQC8004	MQC9504	MQC11004	0.50	0.92	1.3	1.6	1.8	2.0	2.2	2.4	3.4
MQC5005	MQC6505	MQC8005	MQC9505	MQC11005	0.62	1.1	1.6	2.0	2.3	2.5	2.8	3.0	4.3
MQC5006	MQC6506	MQC8006	MQC9506	MQC11006	0.75	1.3	1.9	2.4	2.7	3.1	3.3	3.6	5.1
MQC5008	MQC6508	MQC8008	MQC9508	MQC11008	1.0	1.8	2.6	3.2	3.6	4.1	4.5	4.8	6.8
MQC5010	MQC6510	MQC8010	MQC9510	MQC11010	1.2	2.3	3.2	3.9	4.6	5.1	5.8	6.0	8.5
MQC5015	MQC6515	MQC8015	MQC9515	MQC11015	1.9	3.4	4.8	5.9	6.8	7.6	8.4	9.0	12.8
MQC5020	MQC6520	MQC8020	MQC9520	MQC11020	2.5	4.6	6.5	7.9	9.1	10.2	11.2	12.1	17.1
MQC5030	MQC6530	MQC8030	MQC9530	MQC11030	3.7	6.8	9.7	11.8	13.7	15.3	16.7	18.1	26



Easy-dismantling Full Cone Spray Tip

Nozzle type	Capacity (L/min)						Spray angle						
	0.5 bar	0.7 bar	1.5 bar	2 bar	3 bar	4 bar	5 bar	6 bar	7 bar	10 bar	0.5 bar	1.5 bar	6 bar
MQB1	0.25	0.38	0.54	0.62	0.74	0.85	0.94	1.0	1.1	1.3	38°	53°	
MQB2	0.65	0.76	1.0	1.2	1.5	1.7	1.9	2.0	2.2	2.6	43°	50°	46°
MQB3	0.98	1.1	1.6	1.9	2.2	2.5	2.8	3.1	3.3	3.9	52°	65°	59°
MQB3.5	1.1	1.3	1.9	2.2	2.6	3.0	3.3	3.6	3.9	4.5	43°	50°	46°
MQB5	1.6	1.9	2.7	3.1	3.7	4.2	4.7	5.1	5.5	6.5	52°	65°	59°
MQB3.5	2.1	2.5	3.5	4.0	4.8	5.5	6.1	6.7	7.1	8.4	45°	50°	46°
MQB10	3.3	3.8	5.4	6.2	7.4	8.5	9.4	10.2	11.0	13.0	58°	67°	61°





Hollow cone

Nozzle type	Capacity (L/min)						Spray angle						
	0.2 bar	0.5 bar	1 bar	1.5 bar	2 bar	3 bar	4 bar	5 bar	6 bar	7 bar	0.5 bar	1.5 bar	6 bar
MQA0.A	-	0.16	0.23	0.28	0.32	0.39	0.46	0.51	1.56	0.60	-	58°	69°
MQA1	-	0.32	1.46	0.56	0.64	0.79	0.91	1.0	1.1	1.2	-	65°	76°
MQA2	-	0.64	0.91	1.1	1.6	1.6	1.8	2.0	2.2	2.4	53°	70°	80°
MQA3	-	0.97	1.4	1.7	1.9	2.4	2.7	3.1	3.3	3.6	55°	79°	80°
MQA5	-	1.6	2.3	2.8	3.2	3.9	4.6	5.1	5.6	6.0	70°	75°	79°
MQA8	1.6	2.6	3.6	4.5	5.2	6.3	7.3	8.2	8.9	9.6	65°	72°	74°
MQA10	2.0	3.2	4.6	5.6	6.4	7.9	9.1	10.2	11.2	12.1	70°	76°	75°
MQA15	3.1	4.8	6.8	8.4	9.7	11.8	13.7	15.3	16.7	18.1	70°	72°	75°
MQA5W	-	1.6	2.3	2.8	3.2	3.9	4.6	5.1	5.6	6.0	125°	112°	98°
MQA8W	1.6	2.6	3.6	4.5	5.2	6.3	7.3	8.2	8.9	9.6	112°	100°	87°
MQA10W	2.0	3.2	4.6	5.6	6.4	7.9	9.1	10.2	11.2	12.1	111°	97°	89°
MQA15W	3.1	4.8	6.8	8.4	9.7	11.8	13.7	15.3	16.7	18.1	110°	98°	90°

Common Application

- PCB
- Wash & Rinse
- Phosphatization for metal parts
- Cooling
- Moistening
- Chemical Manufacture
- Dust removing

Ordering info

Nozzle type	Nozzle Inlet Conn. (inch)
MQJ1 / 8	1/8
MQJ1 / 4	1/4
MQJB1 / 4	1/4 (angle fitting)
MQJ3 / 8	3/8

Please mark our nozzle model and spray tip model  
 For example:  
 Nozzle Model: MQJ1/4-PP  
 Spray tip model: MQB5-PP  
 Complete nozzle model MQJ1/4-PP+MQB-PP



**MITSUDA**  
Spray Nozzle

## Spiral Nozzles



## Spiral Nozzle Series



# Spiral Nozzles

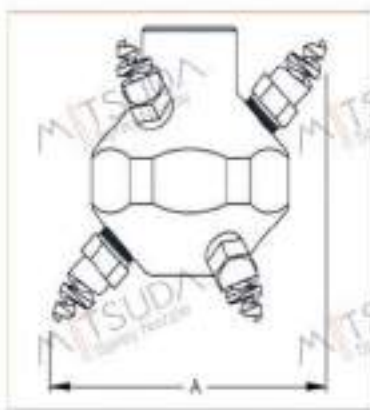


## DESIGN FEATURES

Nozzles placed on the cluster are Mitsuda MT series spiral nozzles designed with dog resistant features. They can be combined with all other Mitsuda nozzles according to required process through female connection.

## SPRAY CHARACTERISTICS

Multidirectional coverage through six nozzles placed on the cluster in perfect angles. Flow rates from 4.2 to 157 gmp (Other required flow rates can also be supplied if needed). Please check tables for approximate dimensions.



### LEM Coverage Chart

When Spraying at 40 - 50 PSI

Female Pipe Size	Nozzle Number	Scrubbing Diameter	Rinsing Diameter
3/4	MTLEM 6	1.6	3.1
	MTLEM 8	2.1	6.1
	MTLEM 10	4.6	9.1
1	MTLEM 12	6.6	13.1
	MTLEM 14	6.9	13.6
	MTLEM 16	7.3	14.6
	MTLEM 18	8.1	16.1

Dimensions are approximate. Check with MITSUDA for critical dimension applications.

### MTLEM Coverage Chart

Spherical, 360° Spray Angle, 3/4" and 1" Pipe Sizes

Female Pipe Size	Nozzle Number	K Factor	GALLONS PER MINUTE @ PSI							Minimum Entrance Open (in) A	Weight	
			10 PSI	20 PSI	30 PSI	40 PSI	60 PSI	80 PSI	100 PSI		Metal	Plas.
3/4	MTLEM 6	1.34	4.21	5.95	7.28	8.41	10.3	12.0	13.4	4.51	2.26	6.01
	MTLEM 8	2.54	8.01	11.4	14.0	16.1	19.6	22.7	25.4			
	MTLEM 10	3.96	12.6	17.8	21.6	25.1	30.6	35.5	39.6			
1	MTLEM 12	5.70	18.1	25.6	31.3	36.1	44.1	51.0	57.0	9.26	4.13	11.1
	MTLEM 14	7.69	24.4	34.5	42.2	48.7	59.5	68.8	76.9			
	MTLEM 16	9.97	31.6	44.6	54.7	63.1	77.2	89.2	99.7			
	MTLEM 20	15.8	49.6	70.1	85.8	99.1	121	141	158			

# Spiral Nozzles

MS.TW

MITSUDA  
Spray Nozzle



### DESIGN FEATURES

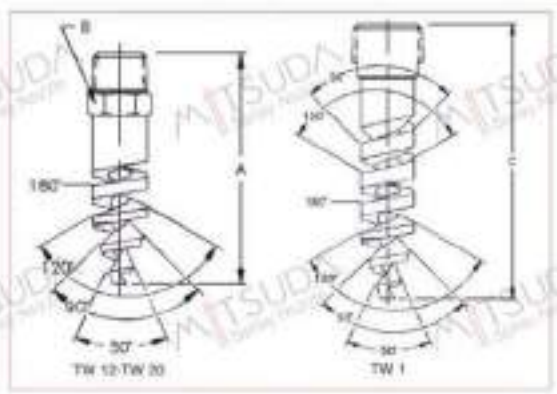
- Tank Washing Nozzle
- Spiral design
- Clog resistant
- Designed for more energy saving
- Placing on small holes.

### SPRAY CHARACTERISTICS

- Easy maintenance
- Designed to spray in opposite directions
- Flow rates from 11.4 to 260 l/min.

**Tank Washing TW Coverage Chart**  
When spraying at 2 - 3 bar

Pipe Size	Nozzle Number	Sucrubbing Diameter(mm)	Rinsing Diameter(mm)
3/8	MS.TW12	381	761
	MS.TW14	481	1201
	MS.TW16	611	1501
	MS.TW20	911	2301
1	MS.TW1	2401	6101



**Tank Washing TW Flow Rates and Dimensions**  
TW 180° and 270° Spray Angles 3/8 1" Sizes, BSP or NPT

Male Pipe Size	Nozzle Number	Available Spray Angles	K Factor	LITERS PER MINUTE					Approx.(mm)		Metal Only Dim.(mm)			Weight (g) Metal	
				0.7 bar	1 bar	2 bar	3 bar	4 bar	5 bar	Orifice Dia	Free Pass Dia.	A	B		C
3/8	MS.TW12	180 270	13.8	11.5	13.8	19.4	23.8	27.4	30.7	4.84	3.31	73.1	17.6	49.7	
	MS.TW14	180 270	18.6	15.5	18.6	26.2	32.1	37.0	41.4	5.60	3.31				
	MS.TW16	180 270	24.3	20.3	24.3	34.3	41.9	48.4	54.1	6.36	3.31				
	MS.TW20	180 270	37.7	31.6	37.7	53.3	65.2	75.3	84.2	7.88	3.31				
1	MS.TW1	270	117	97.3	117	165	202	233	261	14.3	5.09			146.2	299



# Spiral Nozzles

## MS.TF

MITSUDA  
Spray Nozzle

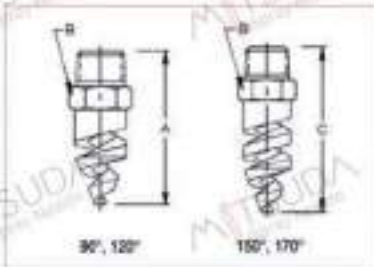


### DESIGN FEATURES

- Clog resistant
- More Energy saving
- Designed without any internal parts
- Designed to provide more fluid discharge velocity
- Male connection.

### SPRAY CHARACTERISTICS

- Full cone spraying
- Spray angles from 50° to 180°
- Flow rates from 0.5 to 3220 gmp (For higher flow rates please contact with our team).



Full Cone 60°(NN)

Full Cone 90°(FCN)

Full Cone 150° 170°

Male Pipe Size	Nozzle Number	Available Spray Angles	K Factor	GALLONS PER MINUTE @ PSI																Approx. (in.)		Dim. (in.) for Metal Only*			Wt. (oz.)	
				5 PSI	10 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI	Free Orit. Dia.	Pass Dia.	A	B	C	60° 120° Metal Plus.	90° 170° Metal Plus.					
1/8	MS.TF6	60° 90° 120° 150° 170°	0.222	0.496	0.71	1.00	1.23	1.41	1.58	1.72	1.99	2.22	3.12	4.44	0.10	0.10	1.70	1.57	1.70	1.01	0.21					
	MS.TF8	60° 90° 120° 150° 170°	0.412	0.920	1.31	1.85	2.27	2.61	2.92	3.19	3.69	4.12	5.82	8.23	0.14	0.14	1.70	1.57	2.20							
1/4	MS.TF6	60° 90° 120° 150° 170°	0.222	0.496	0.71	1.00	1.23	1.41	1.58	1.72	1.99	2.22	3.14	4.44	0.10	0.10	1.89	1.57	1.89							
	MS.TF8	60° 90° 120° 150° 170°	0.412	0.920	1.31	1.85	2.27	2.61	2.92	3.19	3.69	4.12	5.82	8.23	0.14	0.14	1.89	1.57	2.39	1.57	0.21					
	MS.TF10	60° 90° 120° 150° 170°	0.533	1.42	2.01	2.84	3.48	4.01	4.48	4.91	5.67	6.33	8.95	12.7	0.17	0.14	1.89	1.57	2.39							
3/8	MS.TF6	60° 90° 120°	0.222	0.496	0.71	1.00	1.22	1.41	1.58	1.72	1.99	2.22	3.14	4.44	0.20	0.10										
	MS.TF8	60° 90° 120°	0.412	0.920	1.31	1.85	2.25	2.61	2.92	3.19	3.69	4.12	5.82	8.23	0.20	0.14										
	MS.TF10	60° 90° 120°	0.632	1.42	2.01	2.84	3.46	4.01	4.48	4.91	5.67	6.33	8.95	12.7	0.20	0.14										
	MS.TF12	60° 90° 120° 150° 170°	0.949	2.12	3.01	4.25	5.20	6.02	6.72	7.36	8.50	9.50	13.5	19.1	0.20	0.14	1.89	0.70	2.39	1.64	0.26					
	MS.TF14	60° 90° 120° 150° 170°	1.28	2.87	4.06	5.74	7.01	8.11	9.07	9.93	11.6	12.9	18.2	25.7	0.23	0.14										
	MS.TF16	60° 90° 120° 150° 170°	1.69	3.76	5.31	7.51	9.18	10.7	12.0	13.1	15.1	16.9	21.8	33.6	0.26	0.14										
MS.TF20	60° 90° 120° 150° 170°	2.62	5.84	8.26	11.8	14.3	16.6	18.5	20.3	23.4	26.2	37.0	52.3	0.32	0.14											
1/2	MS.TF24	60° 90° 120° 150° 170°	3.82	8.53	12.2	17.1	20.9	24.2	27.0	29.6	34.2	38.2	54.0	76.3	0.39	0.20	2.51	0.89	3.07	3.01	0.51					
	MS.TF28	60° 90° 120° 150° 170°	5.23	11.8	16.6	23.4	28.6	33.1	37.0	40.5	46.8	52.3	73.9	105	0.45	0.20										
3/4	MS.TF32	60° 90° 120° 150° 170°	6.65	14.9	21.1	29.8	36.4	42.1	47.1	51.5	59.5	66.5	94.0	134	0.51	0.20	2.76	1.14	3.51	5.51	0.89					
1	MS.TF40	60° 90° 120° 150° 170°	10.7	23.8	33.6	47.5	58.0	67.1	75.0	82.2	94.9	107	151	213	0.64	0.26	3.64	1.39	4.39	8.51	2.51					
	MS.TF48	60° 90° 120° 150° 170°	15.1	33.7	47.6	67.3	82.3	95.1	107	117	135	151	213	301	0.76	0.26										
1 1/2	MS.TF56	60° 90° 120° 150° 170°	20.5	45.7	64.6	91.3	112	130	145	159	188	205	289	409	0.89	0.32				5.39						
	MS.TF64	60° 90° 120° 150° 170°	26.8	59.8	84.6	121	146	170	190	208	240	268	379	535	1.01	0.32	4.39	2.01	5.39	22.3	4.26					
	MS.TF72	60° 90° 120° 150° 170°	30.5	68.0	96.1	137	166	192	216	236	273	305	430	608	1.14	0.32				5.64						
2	MS.TF88	60° 90° 120° 150° 170°	44.4	99.0	141	200	242	281	314	344	397	444	627	886	1.39	0.45	5.64	2.51	5.89	46.1	8.01					
	MS.TF96	60° 90° 120° 150° 170°	56.0	125	178	252	306	355	396	434	501	560	792	1121	1.51	0.45	6.89	2.51	7.01	54.1	9.01					
3	MS.TF112	60° 90° 120° 150° 170°	81.1	181	260	365	443	513	573	628	725	811	1151	1621	1.76	0.57										
	MS.TF128	60° 90° 120° 150° 170°	108	239	337	482	588	680	759	832	961	1071	1511	2151	2.01	0.57	8.64	3.51	9.26	115	20.1					
4	MS.TF160	60° 90° 120°	167	372	526	744	909	1051	1171	1291	1481	1661	2351	3321	2.51	0.64	10.2	4.51		170	27.1					



# Spiral Nozzles

# MS.ST

**MITSUDA**  
Spray Nozzle

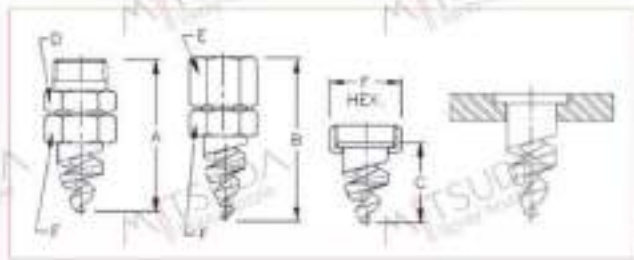


## DESIGN FEATURES

- Designed with Cobalt Alloy 6 or RBSC ceramic parts against wearing
- Clog resistant
- More energy saving
- Designed without any internal parts
- Both male and female connections.

## SPRAY CHARACTERISTICS

- Full cone spraying (Hollow Cone available upon request)
- Perfect atomization
- Spray angles from 50° to 180°
- Flow rates from 0.5 to 3220 gmp (For higher flow rates please contact with our team).



Full Cone 120° (FFN)



Full Cone 90° (FCN)



### LEM Coverage Chart

Spherical, 360 Spray Angle, 3/4" and 1" Pipe Sizes

3-piece Male or Female Pipe Size	2-piece Female Pipe Size	Nozzle Number	K Factor	GALLONS PER MINUTE @ PSI												Approx. (in.)		Approximate Dimensions (in.)						Wt. (lbs.) Male	
				5 PSI	10 PSI	15 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI	Orifice Dia.	Pass Dia.	A	B	C	D	E	F		
1/4		MS.ST6	0.222	0.496	0.701	0.858	0.991	1.22	1.41	1.58	1.72	1.99	2.22	3.14	4.44	0.10	0.10	2.57	2.57			0.70	0.70	0.82	0.20
		MS.ST9	0.412	0.920	1.31	1.60	1.85	2.26	2.61	2.92	3.19	3.69	4.12	5.82	8.23	0.14	0.14	2.57	2.57			0.70	0.70	0.82	
		MS.ST10	0.633	1.42	2.01	2.46	2.84	3.47	4.01	4.48	4.91	5.67	6.33	8.95	12.7	0.17	0.14	2.57	2.57			0.70	0.70	0.82	
3/8		MS.ST12	0.950	2.13	3.01	3.68	4.25	5.21	6.01	6.72	7.36	8.50	9.50	13.5	19.1	0.20	0.14	2.95	2.95			0.95	0.95	1.14	1.14
		MS.ST14	1.29	2.87	4.06	4.97	5.74	7.02	8.11	9.07	9.93	11.6	12.9	18.2	25.7	0.23	0.14	2.89	2.89			0.95	0.95	1.14	
		MS.ST16	1.69	3.76	5.31	6.50	7.51	9.19	10.7	12.0	13.1	15.1	16.9	23.8	33.6	0.26	0.14	3.00	3.00			0.95	0.95	1.14	
		MS.ST20	2.62	5.84	8.26	10.2	11.8	14.3	16.6	18.5	20.3	23.4	26.2	37.0	52.3	0.32	0.14	2.89	2.89			0.95	0.95	1.14	
3/4		MS.ST24	3.82	8.53	12.2	14.9	17.1	21.0	24.2	27.0	30.0	34.2	38.2	54.0	76.3	0.39	0.20	3.57	3.57			1.39	1.39	1.51	0.63
		MS.ST28	5.23	11.8	16.6	20.3	23.4	28.7	33.1	37.0	40.5	46.8	52.3	73.9	105	0.45	0.20	3.54	3.54			1.39	1.39	1.51	
		MS.S132	6.65	14.9	21.1	25.8	29.8	36.5	42.1	47.1	51.5	59.5	66.5	94.0	134	0.51	0.20	3.51	3.51			1.39	1.39	1.51	
1		MS.ST40	10.7	23.8	33.6	41.2	47.5	58.1	67.1	78.0	82.2	94.9	107	151	213	0.64	0.26	4.51	4.51			1.89	1.76	2.01	1.26
		MS.ST48	15.1	33.7	47.6	58.3	67.3	82.3	95.1	107	117	135	151	213	301	0.76	0.26	4.51	4.51			1.89	1.76	2.01	
1 1/2		MS.ST56	20.5	45.7	64.6	79.1	91.3	113	130	145	159	183	205	268	409	0.89	0.32	5.76	5.76			1.95	2.14	2.20	1.76
		MS.S164	26.8	59.9	84.6	104	121	147	170	190	208	240	268	378	535	1.01	0.32	5.76	5.76			1.95	2.14	2.20	
		MS.S172	30.5	68.0	96.1	119	137	167	193	216	236	273	305	429	608	1.13	0.32	5.76	5.76			1.95	2.14	2.20	
2	2 1/2 3	MS.ST88	44.4	100	141	172	199	243	261	314	344	397	443	627	886	1.38	0.45	7.64	6.32	4.57	3.01	3.51	3.51	5.01	5.01
		MS.ST96	56.0	125	178	217	251	307	355	396	434	501	560	792	1121	1.51	0.45	9.01	7.39	5.64	3.64	4.01	4.01	7.01	
3	3	MS.ST112	81.1	182	257	315	363	444	513	573	628	725	811	1151	1621	1.76	0.57	10.4				3.64	4.01	4.01	9.01
		MS.ST126	108	240	340	415	481	589	680	780	832	961	1071	1511	2151	2.01	0.57	10.8			7.29	3.64	4.01	4.01	
4	4	MS.ST160	167	372	525	644	743	910	1051	1171	1291	1481	1661	2350	3321	2.51	0.64	12.0			8.26	4.57	5.01	5.01	14.1



# Spiral Nozzles

# MS.N

**MITSUDA**  
Spray Nozzle

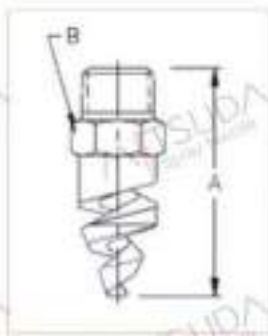


## DESIGN FEATURES

- Clog resistant
- Designed without any internal parts
- Fits pipe sizes 1/2", 1" and 1-1/2" Male connection

## SPRAY CHARACTERISTICS

- Two spraying cones with wide and narrower angles
- Full cone spraying
- Spray angles from 90° to 120°
- Flow rates from 3.0 to 534 gmp



Full Cone 90°



Full Cone 120° (W)

### N Flow Rates and Dimensions

Full Cone, Medium 90° and Wide 120° (W) 1/2" to 1 1/2" Pipe Sizes

Male Pipe Size	Nozzle Number	K Factor	GALLONS PER MINUTE @ PSI									Approx. (mm) Orifice Dia.	Approx. (mm) Free Pass Dia.	Approximate Dimensions (Inches)	Weight (g) Metal
			10 PSI	20 PSI	30 PSI	40 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI				
1/2	MS.N1	0.950	3.01	4.25	5.21	6.01	7.36	8.50	9.50	13.5	19.1	0.20	0.14	251 251	3.01
	MS.N2	0.69	5.31	7.51	9.19	10.7	13.1	15.1	16.8	23.8	33.6	0.26	0.14		
	MS.N3	2.62	8.26	11.8	14.4	16.6	20.3	23.4	26.2	37.0	52.3	0.32	0.14		
	MS.N4	3.82	12.2	17.1	21.0	24.2	29.6	34.2	38.2	54.0	76.3	0.39	0.20		
	MS.N5	5.23	16.6	23.4	28.9	33.1	40.5	46.8	52.3	73.9	105	0.44	0.20		
	MS.N6	6.65	21.1	29.8	36.5	42.1	51.5	59.4	66.5	94.0	134	0.51	0.20		
1	MS.N6	6.65	21.1	29.8	36.5	42.1	51.5	59.5	66.5	94.0	134	0.51	0.20	364 364	8.51
	MS.N7	10.7	33.6	47.5	58.1	67.1	82.2	94.9	107	151	213	0.63	0.26		
	MS.N8	15.1	47.6	67.3	82.4	95.1	117	135	151	213	301	0.76	0.26		
1 1/2	MS.N9	20.5	64.5	91.3	113	130	159	183	205	289	409	0.89	0.32	439 439	27.1
	MS.N10	26.8	84.5	121	147	170	208	240	267	379	535	1.01	0.32		

# Spiral Nozzles

# MS.TFXPW

**MITSUDA**  
Spray Nozzle

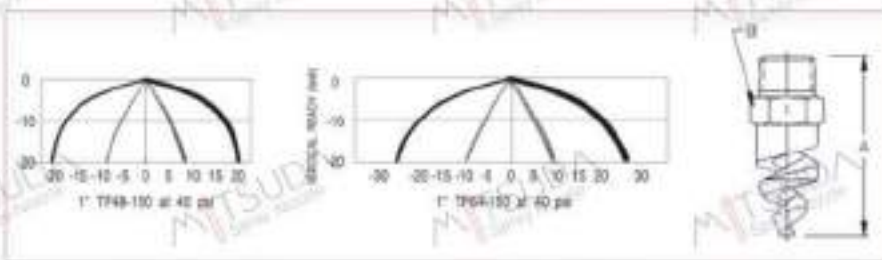


## DESIGN FEATURES

Designed with two-sided spiral nozzle to obtain wide coverage  
One piece without any internal parts also provides wide free passage.

## SPRAY CHARACTERISTICS

Full cone spraying  
Spray angle of 150°  
Flow rates from 33.6 to 534 gmp.



Full Cone 150°

### MS.TFXPW Flow Rates and Dimensions

Full Cone, 150 Wide Spray Angle, 1" & 1-1/2" Pipe Size

Female Pipe Size	Nozzle Number	K Factor	Flow Rate (gmp)												Approx Free Pass Dia. (in.)	Approx Orifice Dia. (in.)	Approx Dim. (in)		Wt. (lbs.)
			5 PSI	10 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI	A			B		
1	MSTF48XPW	15.1	33.7	47.6	67.3	82.4	95.1	107	117	135	151	213	301	0.51	0.76	6.51	2.26	2.07	
1 1/2	MSTF64XPW	26.8	59.8	84.6	121	147	170	190	208	240	268	379	535	0.51	1.01	6.76	2.51	2.45	





### DESIGN FEATURES

- Clog resistant
- Designed without any internal parts
- Fits pipe sizes 1/2", 1" and 1-1/2" Male connection.

### SPRAY CHARACTERISTICS

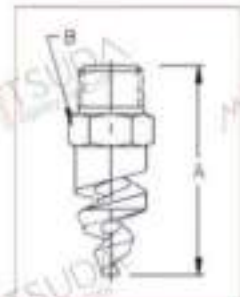
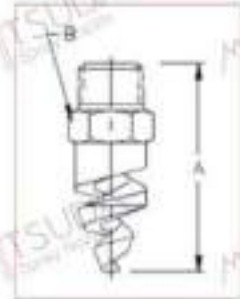
- Full cone spraying
- Spray angles of 90° & 120°
- Flow rates from 96.7 to 1720 l/min
- Two cones with wide and narrow angles to achieve full cone spraying.



Full Cone 120°



Full Cone 90°



### MS.TFXPW Flow Rates and Dimensions

Full Cone, 150 Wide Spray Angle, 1" & 1-1/2" Pipe Size

Female Pipe Size	Nozzle Number	K Factor	LITERS PER MINUTE @ BAR								Approx (mm)		Approximate Dimensions (mm)		W (g) Metal
			0.5 bar	0.7 bar	1 bar	2 bar	3 bar	5 bar	10 bar	20 bar	Orifice Dia.	Free Pass Dia.			
1/2	MSN1	13.8	9.68	11.5	13.8	19.4	23.8	30.7	43.3	61.2	4.77	3.19	63.6	22.5	86
	MSN2	24.3	17.2	20.3	24.3	34.3	41.7	54.0	76.5	109	6.39	3.19			
	MSN3	37.7	26.7	31.6	37.7	53.3	65.2	84.2	120	169	7.95	3.19			
	MSN4	55.0	38.9	46.1	55.0	77.8	95.2	124	175	247	9.54	4.77			
	MSN5	75.2	53.3	63.0	75.3	107	131	169	239	337	11.2	4.77			
	MSN6	95.8	67.8	80.2	95.8	136	167	215	304	429	12.8	4.77			
1	MSN6	95.8	67.8	80.2	95.8	136	167	215	304	429	12.8	4.77	92.3	35.2	242
	MSN7	154	109	129	154	217	265	342	484	684	16.0	6.36			
1 1/2	MSN8	217	154	182	217	307	376	485	686	960	19.2	6.36	112	50.9	766
	MSN9	295	209	247	295	417	510	658	931	1321	22.3	7.95			
	MSN10	386	273	323	386	546	666	862	1221	1721	25.5	7.95			

# Spiral Nozzles

# MS.TF29-180

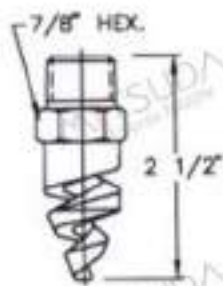


## DESIGN FEATURES

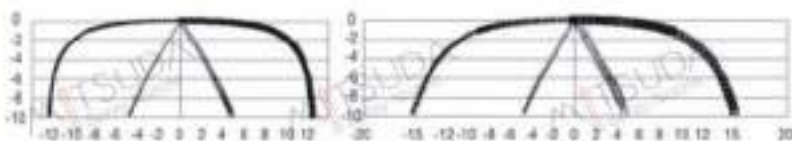
- Designed with two-turn spiral nozzle to obtain very wide coverage
- Designed without any internal parts
- Recommended as an appropriate nozzle type if there is a narrow distance between nozzle and material.

## SPRAY CHARACTERISTICS

- Ultrawide coverage
- Perfect atomization
- Spray angles of 180°
- Flow rates from 3.80 to 110 gmp.



Full Cone 180°



### MS.TF29-180 Flow Rates and Dimensions

Extra-wide Spray Angle, 1/2" Pipe Size

Male Pipe Size	Nozzle Number	K Factor	GALLONS PER MINUTE @ PSI											Approx Free Pass. & Orifice Dia. (in.)	Wt. (lbs)
			10 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI			
1/2	MS.TF29-180-16	1.21	3.81	5.38	6.59	7.61	8.51	9.32	10.8	12.1	17.1	24.1	0.204	0.15	
	MS.TF29-180-18	1.91	6.01	8.50	10.5	12.1	13.5	14.8	17.1	19.1	26.9	38.0	0.251	0.15	
	MS.TF29-180-21	2.30	7.26	10.4	12.7	14.6	16.3	17.9	20.6	23.0	32.5	46.0	0.282	0.23	
	MS.TF29-180-24	3.01	9.51	13.5	16.6	19.1	21.3	23.4	27.0	30.1	42.6	60.2	0.329	0.19	
	MS.TF29-180-28	3.92	12.5	17.6	21.5	24.8	27.7	30.4	35.0	39.2	55.3	78.2	0.376	0.17	
	MS.TF29-180-32	5.51	17.5	24.7	30.2	34.9	39.0	42.7	49.3	55.1	77.9	111	0.439	0.15	



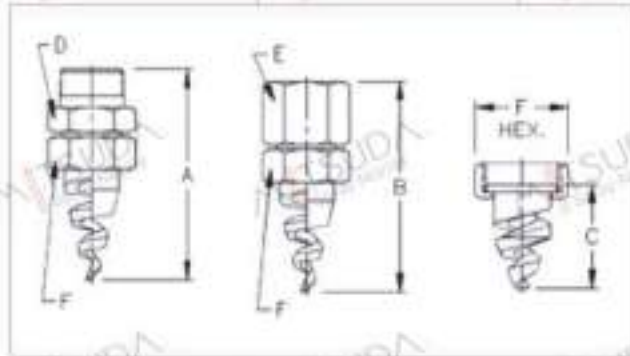


### DESIGN FEATURES

- Tank Washing Nozzle
- Designed for more energy saving
- Designed with Cobalt Alloy 6 or RBSC ceramic parts against wearing
- Both male and female connections
- Wide free-passage design

### SPRAY CHARACTERISTICS

- Full cone spraying
- Spray angles of 90° & 120°
- Flow rates from 2.12 to 3220 gmp



Full Cone 120° (XP)



Full Cone 90° (XPN)



### MS.STXP Flow Rates & Dimensions

Flow Cone, 90° (XPN) and 120° (XP) Spray Angles 3/8" to 4" Pipe Sizes

3-piece Male or Female Pipe Size	** 2-piece Female Pipe Sizes	Nozzle Number	K Factor	GALLONS PER MINUTE @ PSI												Approx. (in.) Orifice & Free Pass. Dia.	Approximate Dimensions (in.)						Wt. (lbs.) Metal Male Fern.	
				5 PSI	10 PSI	15 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI		A	B	C	D	E	F		
3/8		MS.ST12	0.950	2.13	3.01	3.68	4.25	5.21	6.01	6.72	7.36	8.50	9.50	13.5	19.1	0.20	3.95	3.40	2.14	1.39	1.39	1.51	0.6	0.6
		MS.ST14	1.21	2.87	4.06	4.97	5.74	7.02	8.11	9.07	9.93	11.6	12.9	18.2	25.7	0.23	3.95	3.40	2.12	1.39	1.39	1.51		
		MS.ST16	1.69	3.76	5.31	6.50	7.51	9.19	10.7	12.0	13.1	15.1	16.9	23.8	33.6	0.26	3.95	3.40	2.13	1.39	1.39	1.51		
		MS.ST20	2.62	5.84	8.26	10.2	11.8	14.4	16.6	18.5	20.3	23.4	26.2	37.0	52.3	0.32	3.95	3.40	2.13	1.39	1.39	1.51		
3/4		MS.ST24	3.82	8.53	12.2	14.9	17.1	21.0	24.2	27.0	30.0	34.2	38.2	54.0	76.3	0.39	4.57	3.82	2.69	1.20	1.20	1.75	1.2	1.2
		MS.ST28	5.23	11.8	16.6	20.3	23.4	28.7	33.1	37.0	40.5	46.8	52.3	73.9	105	0.45	4.57	3.82	2.69	1.20	1.20	1.75	1.2	1.2
		MS.ST32	6.64	14.9	21.1	25.8	29.8	36.5	42.1	47.1	51.5	59.5	66.5	94.0	134	0.51	5.15	5.13	4.23	1.51	1.51	2.20	2.1	2.1
1		MS.ST40	10.7	23.8	33.8	41.1	47.5	58.1	67.1	75.0	82.2	94.9	107	151	213	0.64	6.32	5.31	4.06	1.89	1.89	2.76	3.1	2.7
		MS.ST48	15.1	33.7	47.6	58.3	67.3	82.4	95.1	107	117	136	151	213	301	0.76	7.45	6.45	5.37	1.89	1.89	2.76		
1 1/2	1 1/2	MS.ST56	20.5	46.7	64.6	79.1	91.3	113	130	145	159	183	205	288	409	0.89	8.57	7.26	5.51	3.01	3.01	3.51	6.1	3.5
		MS.ST64	26.8	59.9	84.6	104	121	147	170	190	208	240	268	379	535	1.01	8.57	7.26	5.72	3.01	3.01	3.51		
		MS.ST72	30.5	68.0	96.1	119	137	167	193	216	236	273	305	430	608	1.14	8.89	7.64	5.74	3.01	3.01	3.51		
2	2	MS.ST88	44.4	99.1	141	172	199	243	281	314	344	397	444	627	886	1.39	11.9	8.01	6.39	3.64	3.64	4.01	8.1	4.1
		MS.ST96	58.0	126	178	217	251	307	355	396	434	501	563	792	1123	1.51	11.5	10.3	8.61	3.64	3.64	4.01		
3	3	MS.ST112	81.1	182	257	315	363	444	513	573	628	725	811	1151	1621	1.76	12.0	11.9	8.57	3.64	4.01	4.01	11	6.0
		MS.ST128	108	240	340	415	481	589	680	760	830	961	1071	1510	2151	2.01	12.7	11.9	8.57	3.64	4.01	4.01		
4	4	MS.ST160	167	372	526	644	743	910	1051	1171	1291	1481	1661	2351	3321	2.51	13.1	13.1	10.1	5.01	5.01	5.01	12	11

# Spiral Nozzles



## DESIGN FEATURES

- More energy saving
- Male connection
- Extra wide free passage design
- Clog resistant

## SPRAY CHARACTERISTICS

- Full cone spraying
- Spray angles of 90° & 120°\*
- Flow rates from 3 to 3220 gmp



PTFE



Plastic



Metal



Full Cone 90° (XPN)



Full Cone 120° (XP)

### MS.TFXP Flow Rates and Dimensions

Full Cone, 90° (XPN) and 120° (XP) Spray Angles, 3/8" to 4" Pipe Sizes

Male Pipe Size	Nozzle Number	K Factor	GALLONS PER MINUTE @ PSI												Approx. Free Pass. & Orifice Dia. (in.)	Approximate Dimensions (in.) for Metal Only		Wt. (lbs.)	
			10 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI	80 PSI	100 PSI	200 PSI	400 PSI	A	B		Metal	Plac.		
3/8	MS.TF12	0.950	3.01	4.25	5.21	6.01	6.72	7.36	8.50	9.50	13.5	19.1	0.20	2.89	2.89	0.21	0.05		
	MS.TF14	1.29	4.06	5.74	7.02	8.11	9.07	9.93	11.6	12.9	18.2	25.7	0.23	2.89	2.89				
	MS.TF18	1.69	5.31	7.51	9.3	10.7	12.0	13.1	15.1	16.9	23.8	33.6	0.26	2.76	2.76				
	MS.TF20	2.62	8.26	11.8	14.4	16.6	18.5	20.3	23.4	26.2	37.0	52.3	0.32	3.13	3.13				
1/2	MS.TF24	3.82	12.2	17.1	21.0	24.2	27.0	29.6	34.2	38.2	54.0	76.3	0.39	3.48	3.48	0.41	0.07		
	MS.TF28	5.23	16.6	23.4	28.7	33.1	37.0	40.5	46.8	52.3	73.9	105	0.45	3.51	3.51				
3/4	MS.TF32	6.65	21.1	29.8	36.5	42.1	47.1	51.5	59.5	66.5	94.0	134	0.51	5.39	5.39	1.57	0.23		
1	MS.TF40	10.7	33.6	47.5	58.1	67.1	75.0	82.2	94.9	107	151	213	0.64	5.26	5.26	1.57	0.26		
	MS.TF48	15.1	47.6	67.3	82.4	95.1	107	117	135	151	213	301	0.76	6.64	6.64	2.07	0.48		
1 1/2	MS.TF56	20.5	64.6	91.2	113	130	145	159	183	205	269	409	0.89	6.98	6.98	4.01	0.60		
	MS.TF64	26.8	84.6	121	147	169	190	208	240	268	379	535	1.01	6.95	6.95	2.45	0.54		
	MS.TF72	30.5	96.1	137	167	193	216	236	273	305	430	608	1.14	7.42	7.42	2.82	0.54		
2	MS.TF88	44.4	141	199	243	281	314	344	397	444	527	886	1.39	10.6	10.6	5.13	1.26		
	MS.TF96	56.0	178	251	307	355	396	434	501	560	792	1121	1.51	11.1	11.1	6.32	1.26		
3	MS.TF112	81.1	257	363	444	513	573	628	725	811	1152	1621	1.76**	12.0	12.0	8.38	1.38		
	MS.TF128	108	340	481	589	680	760	830	961	1071	1511	2151	2.04**	11.8	11.8	9.76	1.51		
4	MS.TF160	167	526	743	910	1051	1171	1291	1481	1661	2351	3321	2.50**	12.1	12.1	15.7	1.88		



# Spiral Nozzles

# MS.TF



### Common Applications

Exhaust gas filtration  
 Gas cooling  
 Clog resistant  
 More Energy saving  
 Male connection

Washing and rinsing  
 Fireproofing and fire extinguishment  
 Designed without any internal parts  
 Designed to provide more fluid discharge velocity

### Spray Angle Visual:



Full Cone 60°(NN)



Full Cone 90°(FCN)



Full Cone 150°/ 170°



pipe connection BSPT (out)	Spray angle (0.7 bar)					Capacity Size	orifice size (mm)	Diameter of nozzle without back (mm)	Capacity (L/min)				
	60°	90°	120°	150°	170°				0.7 bar	1.5 bar	3 bar	7 bar	25 bar **
1/4		○	○			13	3.2	3.2	4.9	7.3	10.3	15.7	30
3/8	○	○	○		○	30	4.8	3.2	11.4	16.7	24	36	68
1/2		○	○			82	7.9	3.2	31	46	65	99	187
				○		120	9.5	4.8	45	67	95	145	270
3/4		○	○			164	11.1	4.8	62	92	129	198	370
1		○	○			210	12.7	4.8	80	117	166	255	480
1-1/2		○	○			340	15.9	6.4	130	190	270	410	775
						640	22.2	7.9	245	355	505	770	1460

**MITSUDA**  
Spray Nozzle

**Model MED.201.00**  
**Tank Mixing Eductors**



**for improved in-tank solution  
circulation and agitation**





Inlet Conn. NPT or BSPT(M)	Approx Flow Rate Performance	Inlet Liquid Pressure									
		10 psi	15 psi	20 psi	25 psi	30 psi	35 psi	40 psi	50 psi	70 psi	
1/4	Inlet Flow Rate (gpm) "A"	3.5	4.3	5.0	5.5	6.1	6.6	7.0	7.6	7.8	
3/8		9	11	12.5	14	16	17	18	20	24	
3/4		13.5	17	19	21	23	25	27	30	36	
1-1/2		33	40	47	53	58	63	66	75	89	
1/4	Entrained Liquid (gpm) "B"	15.1	15.1	17.8	19.6	22	24	26	29	29	
3/8		36	44	50	56	64	68	72	80	96	
3/4		54	68	76	84	92	100	108	120	141	
1-1/2		132	160	188	212	232	252	264	300	366	
1/4	Circulation Rate (gpm) "A" + "B"	16.2	19.4	22.8	25.1	28.1	30.6	33	36.8	36.8	
3/8		45	55	62.5	70	80	85	90	100	120	
3/4		67.5	85	95	105	115	125	135	150	177	
1-1/2		165	200	235	265	290	315	330	375	455	
1/4	Effective Flow Field (feet)	3	5	7	8.5	10	12	14	17	17	
3/8		4	6	8	10	12	14	16	22	28	
3/4		5	8	11	14	17	20	24	33	50	
1-1/2		7.5	12	16	20	24	29	34	46	57	

Inlet Conn. NPT or BSPT(M)	Approx Flow Rate Performance	Inlet Liquid Pressure									
		0.5 bar	1 bar	1.5 bar	2 bar	2.5 bar	3 bar	3.5 bar	4 bar	5 bar	
1/4	Inlet Flow Rate (l/min) "A"	11.3	16.0	19.5	23	25	28	30	32	7.6	
3/8		29	42	51	59	65	70	77	82	91	
3/4		43	64	74	85	97	106	116	124	136	
1-1/2		106	151	184	215	243	259	288	308	337	
1/4	Entrained Liquid (l/min) "B"	42	59	72	84	93	102	110	118	29	
3/8		116	168	204	236	260	280	308	328	363	
3/4		172	256	296	340	388	424	464	496	534	
1-1/2		424	604	736	860	972	1036	1152	1232	1348	
1/4	Circulation Rate (l/min) "A" + "B"	53.3	75	91.5	107	118	130	140	150	36.8	
3/8		145	210	255	295	325	350	385	410	454	
3/4		215	320	370	425	485	530	580	620	670	
1-1/2		530	755	920	1075	1215	1295	1440	1540	1685	
1/4	Effective Flow Field (meters)	91	1.5	2.1	2.6	3.00	3.7	4.3	5.2	17	
3/8		1.2	1.8	2.4	3	3.7	4.3	4.9	6.7	9.1	
3/4		1.5	2.4	3.4	4.3	5.2	6.1	7.3	10.1	15.6	
1-1/2		2.3	3.7	4.9	6.1	7.3	8.8	10.4	14.0	17.8	

## Engineering Considerations

### Tank Turnover

The capacity and number of tank mixing eductors is determined by the turnover rate.

The turnover rate is defined as the number of times the entire liquid contents of tank is completely circulated through the eductors per hour. Please note that the turnover rate will vary according to the characteristics of the application. For example:

Most plating and rinsing tanks require 3 to 20 turnovers per hour. Other plating tanks may require more than 30 turnovers per hour.

Cleaning tanks require at least 10 turnovers per hour. Heavily soiled tanks require up to 20 turnovers per hour.

Critical cleaning tanks require turnover rates of more than 20 turnovers per hour. To find the required flow per minute, multiply the appropriate turnover rate by the tank volume, then divide by 60. By using the performance chart, find the eductor that has best effective flow field for your tank configuration.

Once the eductor size has been found, the number of eductors can be determined by dividing the circulation rate of this eductor at the given pressure into the required flow per minute.

## Tank Mixing Eductor Configurations

In larger tanks, eductors positioned around the tank provide more effective mixing than one centrally located eductor. Also, little agitation occurs below the level of the eductor. Eductors should be positioned as close as possible to the bottom of the tank for maximum liquid turnover. Here are a few examples of typical eductor configurations.

### Nozzle Application:

#### Mixing



Cylindrical Tanks



Spherical Tanks



Elongated Tanks

#### Directional Sweeping



Electrocoat Tanks



Rectangular and Square Tanks



Stratified Layers Tanks



Parts Cleaning Tanks

#### Tank Agitation



Rack Plating Tanks



## Compact desing simplifies mounting; saving time and money

The Model MED.201.00 Tank Mixing Eductor also features a very compact desing, its compact size prevents the eductor from interfering with plating racks and other in tank equipment. Plus, its in-tank mountaing capability eliminates the need for intricate above tank mounting structures.



## To learn more about the Model MED.201.00 Tank Mixing Eductor...

Additional enformation is available on the Model MED.201.00 Tank Mixing Eductor. Contact with us to learn more or visit our web site at [www.mitsuda.com.tr](http://www.mitsuda.com.tr).



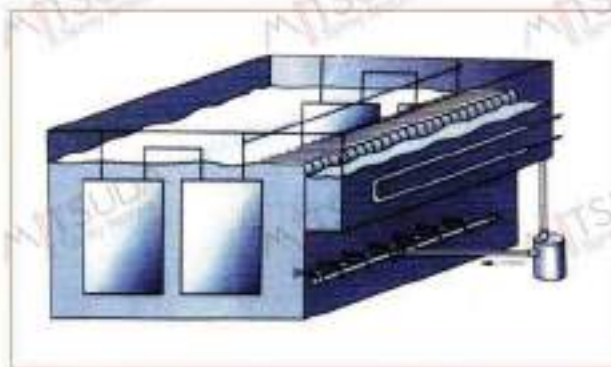
## Typical Applications

- | Anodizing
- | Cleaning
- | Electrocoating
- | Mixing
- | Plating Booths
- | Phosphating
- | Plating
- | Rinsing
- | Sludge removal
- | Stripping

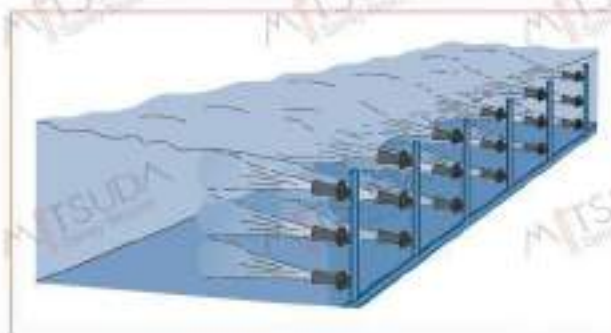
\*Maximum temperature is based on water. Maximum operating temperature may be affected by tank chemicals or processes. Contact with MITSUDA team for additional information.

## Expanded line includes more material choices and inlet connection sizes

The Model MED.201.00 Tank Mixing Eductor is constructed for excellent durability, corrosion resistance, and chemical resistance. For general use applications, like cleaning, coating, mixing, and rinsing, the eductor is available in glass-reinforced polypropylene or cast 316 stainless steel. The polypropylene version features a 1/4", 3/8", 3/4" or 1-1/2" NPT or BSPT (M) inlet connection and has a \*maximum operating temperature of 200 F (93 C) at 50 psi (3.5 bar). Inlet connection sizes for the stainless steel model include 3/8", and 1-1/2" NPT or BSPT (M). New to the line is a KYNAR® (PVDF) version of the Model MED.201.00 Tank Mixing Eductor. The KYNAR eductor was designed expressly for improved solution circulation and agitation in plating applications for circuit board manufacturing. In this application, the eductors aid in the process of cathode film removal. With the eductors mounted on a series of headers at the side of the plating tank, circulation between the plating racks and across the circuit board surface increases-allowing for improved plating. It is available with a 1/4" NPT or BSPT (M) inlet connection and has a \* maximum operating temperature of 220° F (104°C) at 50 psi (3.5 bar).



Eductors used in paint electro-deposition line manufacturing.



**Tank Mixing Eductors...a cost-effective method for optimizing liquid tank performance**

**Eductor's large flow opening and "flow through" Chamber minimize clogging for maximum liquid circulation**



Several distinct operating principles are key to the Model MED.201.00 Tank Mixing Eductor's in tank performance. First of all, liquid under pressure is pumped into the eductor through its large flow opening that helps minimize clogging. As the liquid exits the eductor at high velocity, it draws surrounding solution through eductor's "flow-through" chamber that's designed to eliminate internal material build up. Then, this additional liquid flow mixes with the pumped solution and multiplies its volume. This means that the eductor can pull in or "entrain" up to 4 additional gallons (15.1 liters) of surrounding solution for every 1 gallon (3.8 liters) pumped through the eductor.

MITSUDA's Model MED.201.00 Tank Mixing Eductor, when combined with a centrifugal pump, improves liquid circulation and agitation in closed or open recirculating process tanks. The eductor contains no moving parts to wear out or maintain. It provides a homogeneous fluid mix between the bottom and top of the tank without the use of costly and inefficient air agitation. Not only it is a cost-effective way for achieving optimum liquid tank performance, it also allows smaller pumps to circulate larger volumes of tank solution for possible energy savings.

Because of this multiplying effect, smaller pumps can be used to circulate large volumes of liquid. Since smaller pumps are less expensive to purchase and they use less energy to operate, significant cost savings can be realized.

**Additional eductor benefit: reduced maintenance, improved products quality**

The eductor prevents particulate from setting on the tank bottom. By keeping the particulate in suspension, filtration system clogging is prevented. This translates to a cleaner tank and reduced maintenance time. Products quality is also maintained or improved since the eductor's high circulation.





**Model MED.201.00 Tank Mixing Eductor Specifications Dimensions & Weights**

	Model No.	Inlet Conn. NPT or BSPT(M)	Orifice Dia.	Length	Dia.	Net Weight		
						K	Y	P
	MED.201.00.01.PP	1/4	3/16" (5mm)	3" (76mm)	1-1/4" (32mm)	51 oz (.01kg)	51 oz (.01kg)	—
	MED.201.00.03.PP	3/8	5/16" (5mm)	4-1/16" (103mm)	1-11/16" (52mm)	—	1 oz (.03kg)	9.9 oz (.28kg)
	MED.201.00.05.PP	3/4	3/8" (5mm)	6-3/8" (162mm)	3" (76mm)	—	2.8 oz (.08kg)	24.5 oz (.69kg)
	MED.201.00.09.PP	1-1/2	9/16" (5mm)	10" (254mm)	4-1/2" (114mm)	—	10.2 oz (.29kg)	73.5 oz (2.1kg)

**Material**

Material	Material Code	Eductor Model No. MED.201.00			
		1/4	3/8	3/4	1,1/2
KYNAR Polypropylene	KY PP	• •	• •	• •	• •
Cast 316 Stainless Steel	SS		•	•	•

**Ordering Info**

TANK MIXING EDUCTOR (WITH NPT CONNECTION)		
MED.201.00	- 3 / 8	PP
Model No.	Inlet Conn.	Material Code



TANK MIXING EDUCTOR (WITH BSPT CONNECTION)		
MED.201.00	- 3 / 8	SS
Model No.	Inlet Conn.	Material Code

**Accessories**



**MITSUDA**  
Spray Nozzle

**Air Nozzles**



**Air Nozzles and Accessories  
MTH.600 Series**



**MHT.600.332**



- | **Material:** PP
- | **Blowing force:** 2 N at 2 bar
- | **Noise Level:** 70 db(A) at 2 bar
- | **Air consumption:** VLN = 15 m<sup>3</sup>/h at 2 bar
- | **Pressure:** Pmax = 6 bar
- | **Max. temperature:** 55°C

**MHT.600.300**



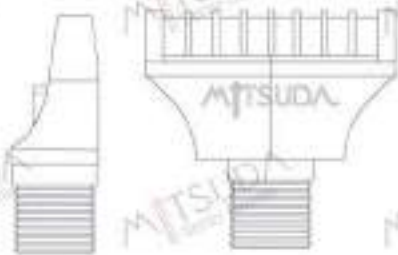
- | **Material:** PP
- | **Blowing force:** 2 N at 2 bar
- | **Noise Level:** 78 db(A) at 2 bar
- | **Air consumption:** VLN = 22 m<sup>3</sup>/h at 2 bar
- | **Pressure:** Pmax = 10 bar
- | **Max. temperature:** 55°C

**MHT.600.130**



- | **Material:** Stainless Steel 316L SS
- | **Blowing force:** 2 N at 2 bar
- | **Noise Level:** 76 db(A) at 2 bar
- | **Air consumption:** VLN = 15 m<sup>3</sup>/h at 2 bar
- | **Pressure:** Pmax = 25 bar
- | **Max. temperature:** 550°C

**MHT.600.493**



- | **Material:** PP
- | **Blowing force :** 2 N at 2 bar
- | **Noise Level:** 74 db(A) at 2 bar
- | **Air consumption:**  $V_{UN} = 13 \text{ m}^3/\text{h}$  at 2 bar
- | **Pressure:**  $P_{max} = 7.5 \text{ bar}$
- | **Max. temperature:** PP nature : 55°C



**MHT.600.606**



- | **Material:** Aluminium
- | **Blowing force :** 1.4 N bei at 2 bar
- | **Noise Level:** 68.5 db(A) at 2 bar
- | **Air consumption:**  $V_{UN} = 12 \text{ m}^3/\text{h}$  at 2 bar
- | **Pressure:**  $P_{max} = 11 \text{ bar}$
- | **Max. temperature:** 200°C

**MHT.600.326.5K**



- | **Material:** PP
- | **Blowing force :** 2 N.N at 2 bar
- | **Noise Level:** 74 db(A) at 2 bar
- | **Air consumption:**  $V_{UN} = 15 \text{ m}^3/\text{h}$  at 2 bar
- | **Pressure:**  $P_{max} = 6 \text{ bar}$
- | **Max. temperature:** PP nature : 55°C

**MHT.600.326.3W**



- | **Material:** Stainless Steel 316L SS
- | **Blowing force :** 2 N.1 at 2 bar
- | **Noise Level:** 79 db(A) at 2 bar
- | **Air consumption:**  $V_{UN} = 15 \text{ m}^3/\text{h}$  at 2 bar
- | **Pressure:**  $P_{max} = 6 \text{ bar}$
- | **Max. temperature:** PP nature : 50 C





The multi-channel flat fan jet nozzles of the MHT600.332 series generate a continuous powerful air jet. The noise level and air consumption remain low even at higher air pressures. The projecting tips at the nozzle outlet prevent air penetration into human skin. These nozzles comply with the OSHA standards.

**26% Cost Saving**

**21% Noise reduction**

Material	Blowing force	Noise level	Air consumption	Pressure	Max. temperature
PP	2 N at 2 bar	70 dp(A) at 2 bar	VLN = 15 m <sup>3</sup> /h at 2 bar	Pmax = 6 bar	55°C



Pressure	1 bar	3 bar	5 bar
Distance L [mm]	625	900	900
A [mm]:	125	200	230
B [mm]:	125	200	230

Ordering no.			
Type	Mat no.	Code	
	POM	1/4 BSPP	1/4 NPT
MHT.600.332	○	AC	BC

Example for ordering: Type MHT.600.332 + Mat no. 56 + Code AC = Ordering no. MHT.600.332.56.AC



The multi-channel round jet nozzles of the MHT.600.326 series generate a powerful, circular air jet. The noise level and air consumption remain low even at higher air pressures. The special geometry at the nozzle outlet prevents air penetration into human skin. These nozzles comply with the OSHA standards.

9% Cost Saving

17% Noise reduction

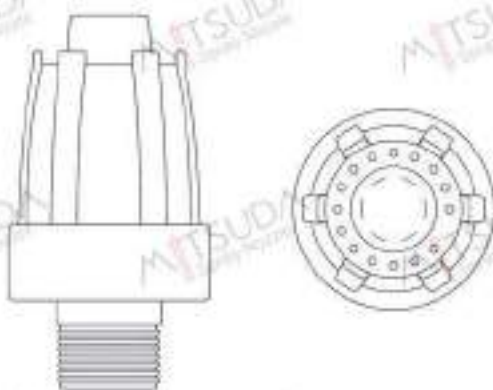
Material	Blowing force	Noise level	Air consumption	Pressure	Max. temperature
PP	2 N.N at 2 bar	74 db(A) at 2 bar	$V_{0.1} = 15 \text{ m}^3/\text{h}$ at 2 bar	$P_{\text{max}} = 6 \text{ bar}$	PP nature : 55°C



Pressure	1 bar	3 bar	5 bar
Distance L [mm]	700	900	900
A [mm]:	160	220	260
B [mm]:	160	220	260

Ordering no		Connection Thread
Type	Code	
MHT.600.326.5K (Material: ABS)	AC	1/4 BSPP
	AA	1/8 BSPP
	BA	1/8 NPT
	BC	1/4 NPT
	HG	M12 x 1.25

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





Nominal Diameter	Major Diameter	Tapping Drill Size	TPI	Pitch
	mm	mm		
1/16"	7.722	6.60	28	0.907
1/8"	9.728	8.80	28	0.907
1/4"	13.157	11.80	19	1.337
3/8"	16.662	15.25	19	1.337
1/2"	20.955	19.00	14	1.814
5/8"	22.911	21.00	14	1.814
3/4"	26.441	24.50	11	1.814
1"	33.249	30.75	11	2.309
1-1/4"	41.910	39.5	11	2.309
1-1/2"	47.803	45.25	11	2.309
2"	59.614	57.00	11	2.309
2-1/2"	75.184	72.60	11	2.309
3"	87.884	85.30	11	2.309
4"	113.030	110.40	11	2.309
5"	138.430	135.473	11	2.309
6"	163.830	160.873	11	2.309

PPRC Pipe Diameter	DN	Inch
Ø20	DN15	1/2"
Ø25	DN20	3/4"
Ø32	DN25	1"
Ø40	DN32	1-1/4"
Ø50	DN40	1-1/2"
Ø63	DN50	2"
Ø75	DN65	2-1/2"
Ø90	DN80	3"
Ø110	-	-
Ø125	DN100	4"



**MITSUDA**  
Spray Nozzle

[www.spreynozul.com](http://www.spreynozul.com)



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