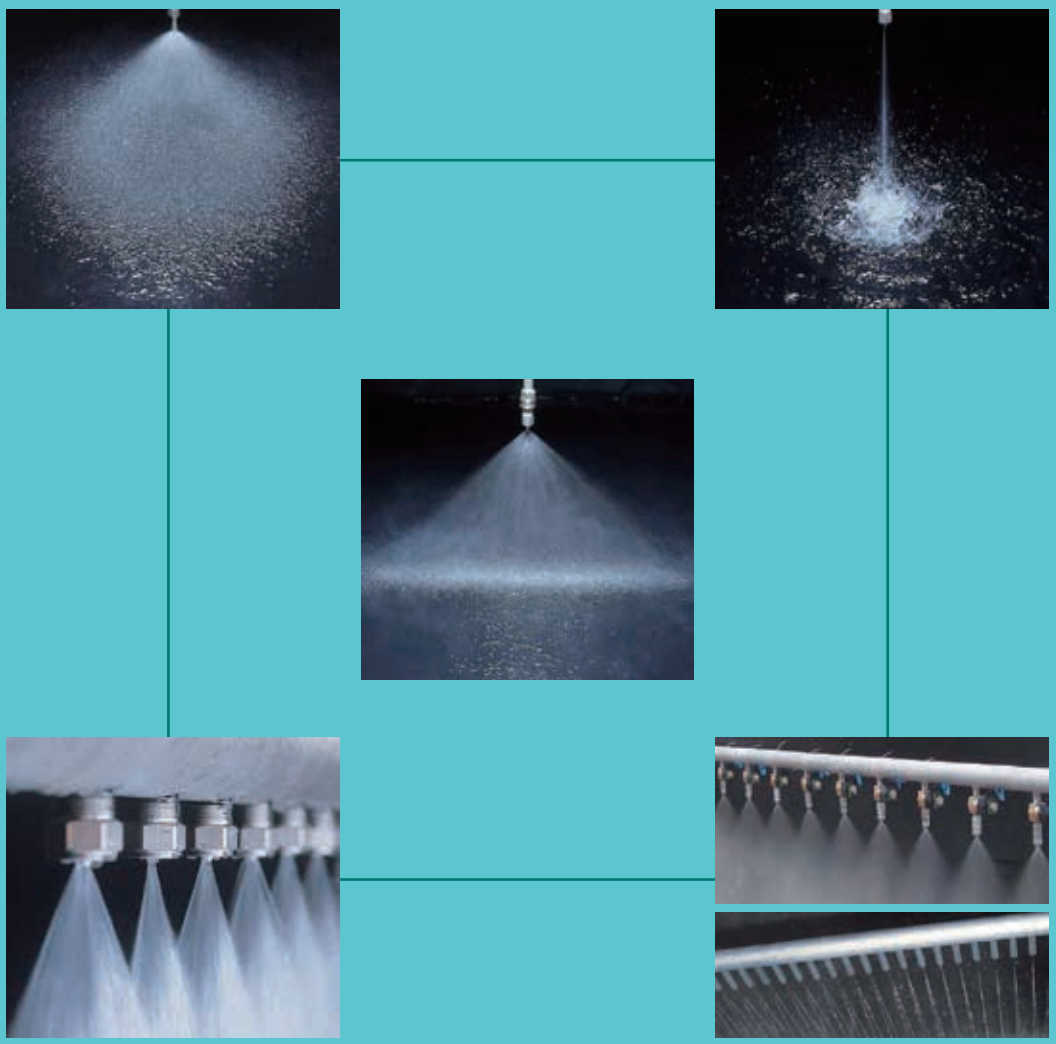
IKEUCHI

Catalog
on
Hydraulic
Spray
Nozzles

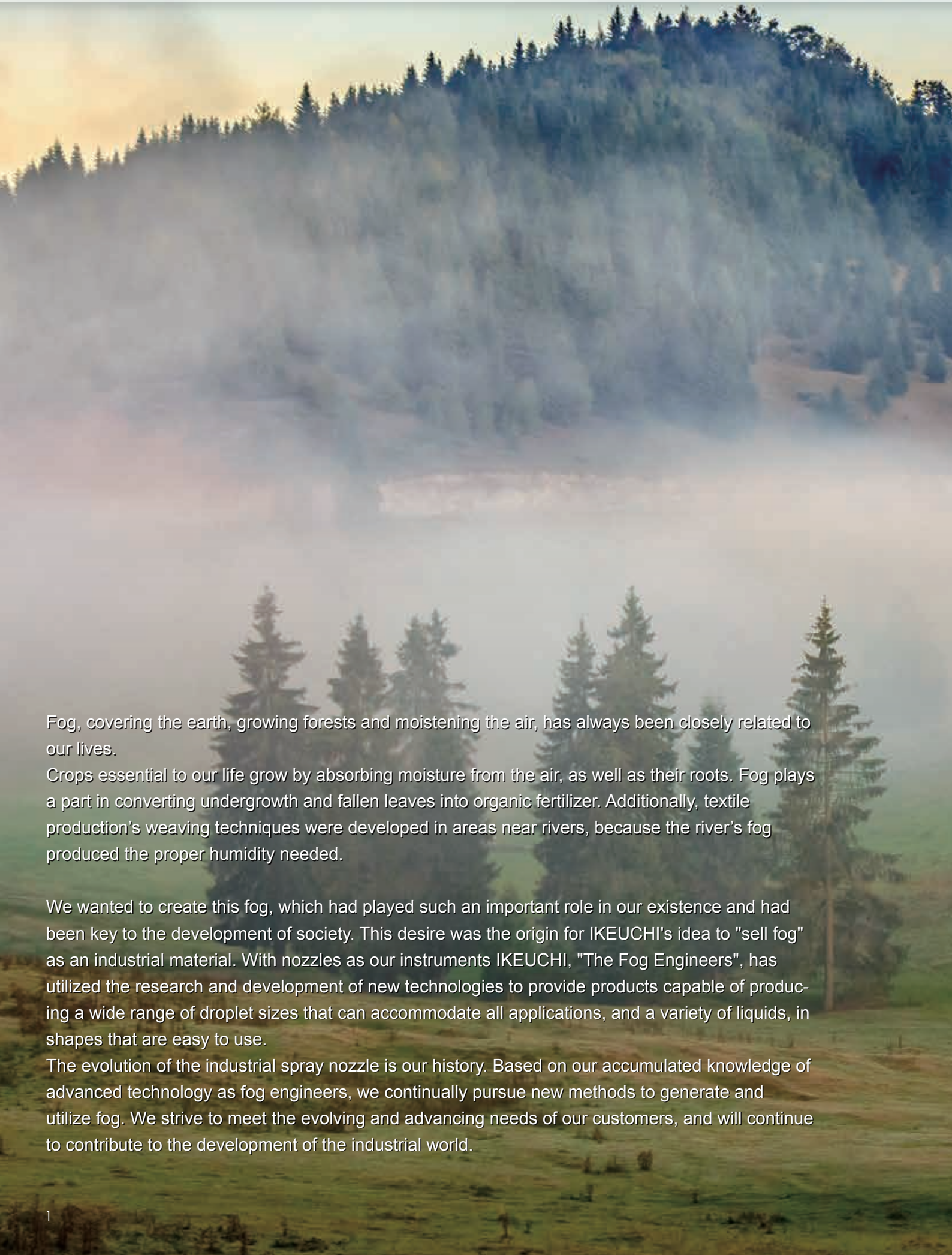


"The Fog Engineers"

H. IKEUCHI & CO., LTD.

18H

Fog, Humanity and IKEUCHI

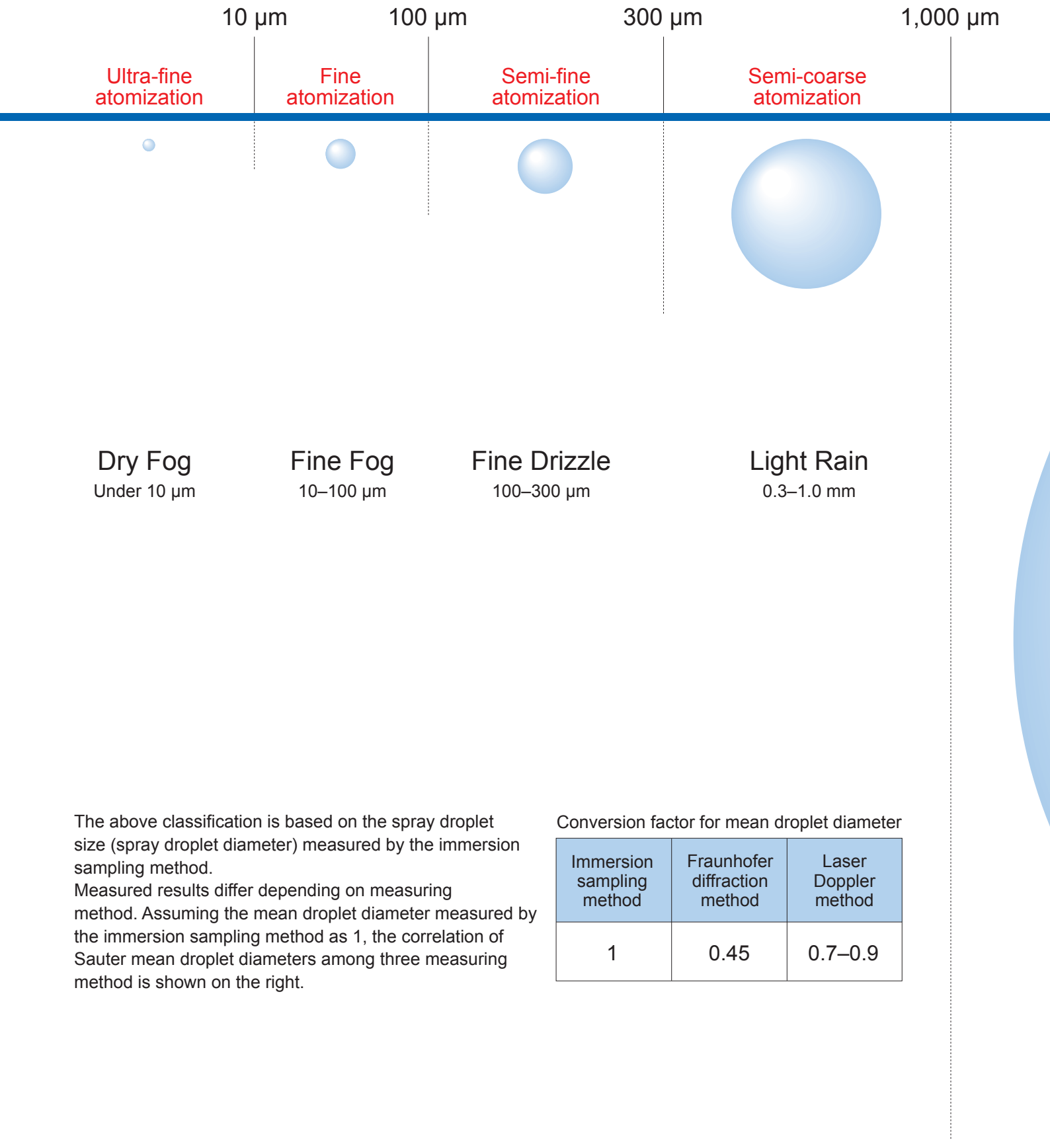


Fog, covering the earth, growing forests and moistening the air, has always been closely related to our lives.
Crops essential to our life grow by absorbing moisture from the air, as well as their roots. Fog plays a part in converting undergrowth and fallen leaves into organic fertilizer. Additionally, textile production's weaving techniques were developed in areas near rivers, because the river's fog produced the proper humidity needed.

We wanted to create this fog, which had played such an important role in our existence and had been key to the development of society. This desire was the origin for IKEUCHI's idea to "sell fog" as an industrial material. With nozzles as our instruments IKEUCHI, "The Fog Engineers", has utilized the research and development of new technologies to provide products capable of producing a wide range of droplet sizes that can accommodate all applications, and a variety of liquids, in shapes that are easy to use.
The evolution of the industrial spray nozzle is our history. Based on our accumulated knowledge of advanced technology as fog engineers, we continually pursue new methods to generate and utilize fog. We strive to meet the evolving and advancing needs of our customers, and will continue to contribute to the development of the industrial world.

Classification of Spray Droplet Size

There are many opinions on the classification of spray droplet sizes but IKEUCHI, "The Fog Engineers", have classified them as below.

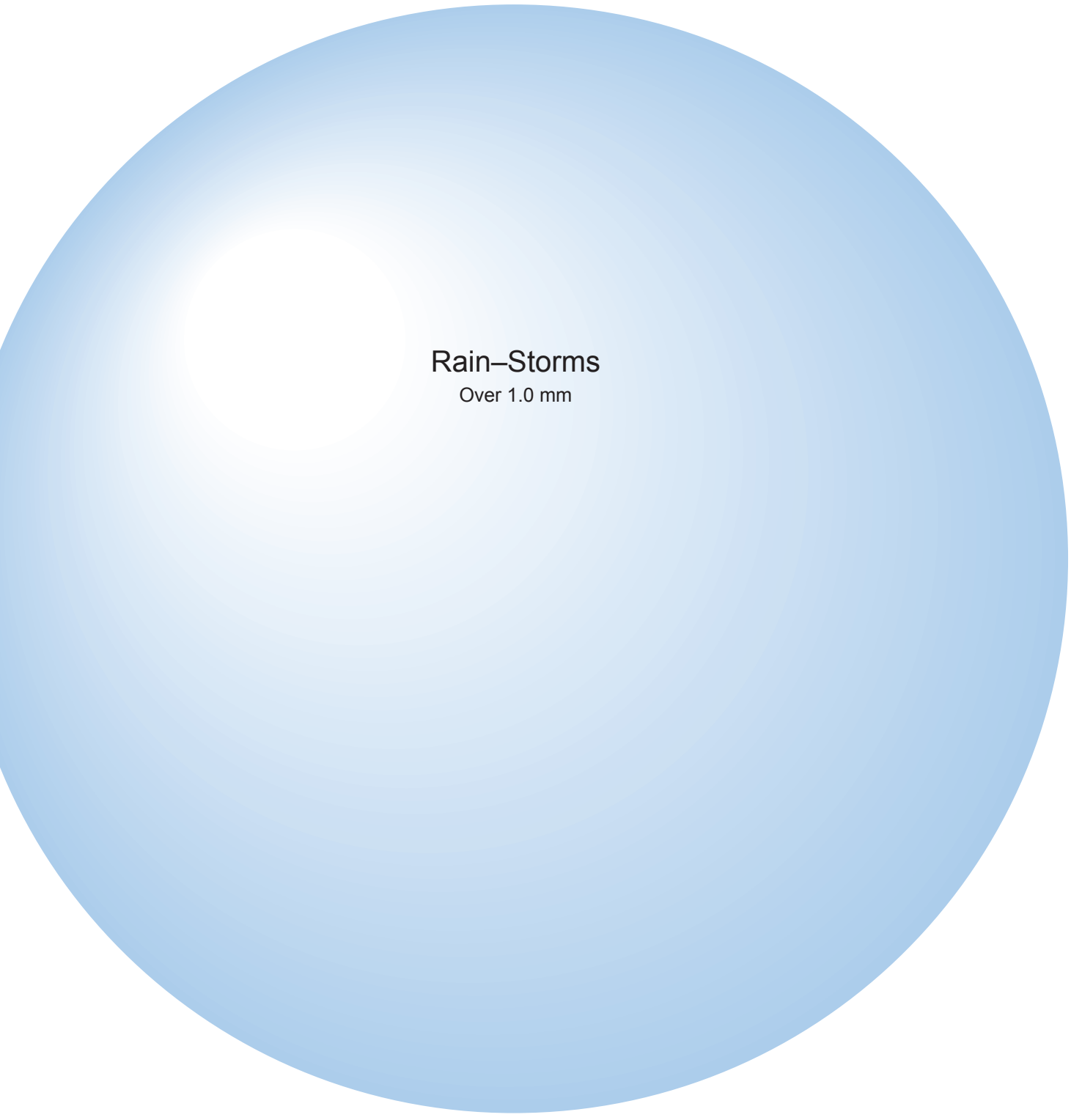


The above classification is based on the spray droplet size (spray droplet diameter) measured by the immersion sampling method.
Measured results differ depending on measuring method. Assuming the mean droplet diameter measured by the immersion sampling method as 1, the correlation of Sauter mean droplet diameters among three measuring method is shown on the right.

Conversion factor for mean droplet diameter

Immersion sampling method	Fraunhofer diffraction method	Laser Doppler method
1	0.45	0.7–0.9

Coarse
atomization



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■This catalog offers IKEUCHI's hydraulic spray nozzles, which are divided into the following sections: flat spray nozzles, hollow cone and full cone spray nozzles, solid stream jet nozzles, and special spray nozzles.

■Please refer to the Catalog on Pneumatic Spray Nozzles for pneumatic spray nozzles.

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Products Lineup pp.11–

Flat Spray Nozzles

Standard Flat Spray

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- Quick detach stainless steel nozzles — **INVV-SS** series ····· p.15; **INV** series ····· p.15
- One-piece structure standard flat spray — **VVP** series ····· p.17; **VP** series ····· p.17; **UVVP** series ····· p.21
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- Quick detach plastic nozzles — **INVV** series ····· p.23
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Even Flat Spray

- Even flat spray — **VE** series ····· p.26; **VEP** series ····· p.26
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Wide-angle Flat Spray

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Off-center Even Flat Spray

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Special Nozzles

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- Self-cleaning flat spray — **MOMOJet®** series ····· p.43
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Cone Spray Nozzles

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- Semi-fine atomization and small capacity — **K** series ····· p.55; **KKBP** series ····· p.56
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Cone Spray Nozzles

Full Cone Spray

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- Wide-angle full cone spray — **BBXP** series ..... p.78; **BBXP-PVDF** series ..... p.78; **BBXP-PVC** series p.78
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- Square spray nozzles — **SSXP** series ..... p.86; **SSXP-HTPVC** series p.86

Special Nozzles

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Solid Stream Jet Nozzles

Solid Stream Spray

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Multiple-orifice Solid Stream Spray

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Special Nozzles

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- Pipe cleaning nozzles — **RSP** series ..... p.104; **RSP-R** series p.106
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- Universal-joint type solid stream — **UT + CP** series p.108
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Others

- Air nozzles — **TAIFUJet®** series p.111
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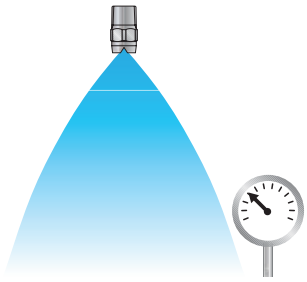
Guarantee of Precision Nozzle Performance

All IKEUCHI's precision-made hydraulic spray nozzles are guaranteed for spray capacities and spray angles. This guarantee covers metal, plastic, and ceramic nozzles.

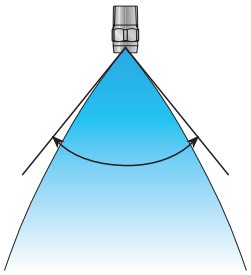
Spray Capacity Tolerance



+/-5%

Spray nozzles shown in this catalog are guaranteed to within +/-5% of the rated spray capacity under the standard pressure.

Spray Angle Tolerance



+/-5°

Flat spray and cone spray nozzles shown in this catalog are guaranteed to within +/-5° of the rated spray angle under the standard pressure. Spray angle is the angle of spray measured near the nozzle unless otherwise specified.

Spray Angle Tolerance for Solid Stream Nozzles

Within 3°

Solid stream jet nozzles shown in this catalog are guaranteed for the axis of spray direction within 3° from the nozzle body centerline under the standard pressure.

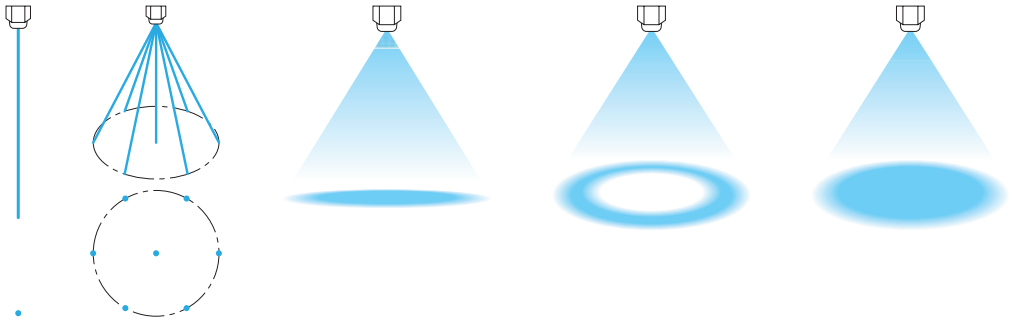
[Note] This guarantee does not cover air nozzles. Air consumption (blowing air volume) shown in this catalog is for reference only.

Fundamentals for Selecting Spray Nozzles

A standard pressure is defined as the design pressure based on the common liquid pressure during normal use for each hydraulic nozzle series.
Our nozzles are designed to provide the specified spray capacity, spray angle, optimal spray pattern (cross sectional shape of the spray), and spray distribution at each standard pressure. The standard pressures are indicated in each table.
In addition, IKEUCHI sets an original inspection standard for spray pattern and only the nozzles that pass the inspection will be shipped.
The figures in this catalog are based on tap water at room temperature and the liquid pressure is measured at the immediate upstream of the nozzle.
For details please see "Technical Data on Spray Nozzles" at the end of this catalog.

Spray Pattern

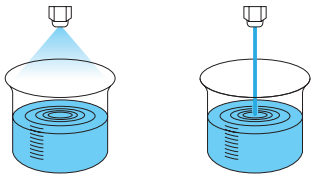
The spray pattern means the cross sectional shape of the spray.



Solid stream spray | Flat spray | Hollow cone spray | Full cone spray

Spray Capacity

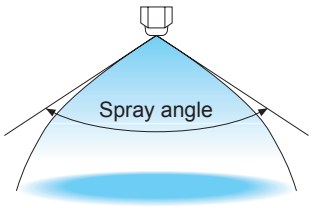
The spray capacity increases as the specific gravity of the liquid to be sprayed becomes lighter and the spray pressure becomes higher.



Flat/cone spray | Solid stream spray

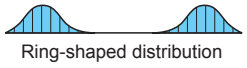
Spray Angle

The spray angle is the angle of spray measured near the nozzle.

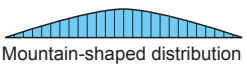


Spray Distribution

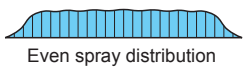
The spray distribution means the spray flow distribution in the direction of spray width.



Ring-shaped distribution



Mountain-shaped distribution

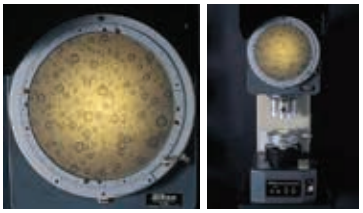


Even spray distribution

Spray Droplet Diameter

Mean droplet diameter, which is an important element in selecting nozzles and designing nozzle-related equipment, varies depending on the type of the spray nozzles, liquid pressure, and spray capacity.

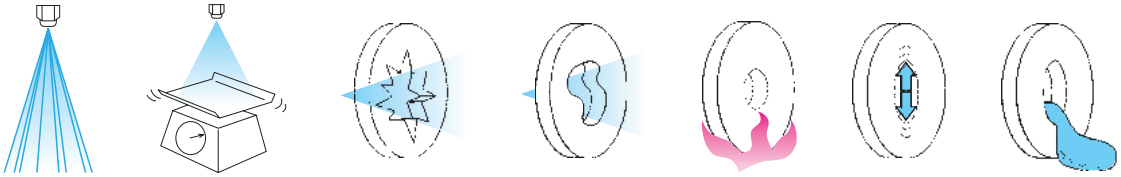
For details on spray droplet diameter, please see "Technical Date on Spray Nozzles" at the end of this catalog.



▲Immersion sampling method

▲Laser analyzer

Other Elements



With or without streaking | Spray impact | Wear resistance | Chemical resistance | Heat resistance | Pressure resistance | Viscosity

Spray Nozzle Materials

The standard and optional materials available for our nozzles are shown in the material table of each nozzle series, using the material codes listed below.
As "The Fog Engineers", we, IKEUCHI, have been developing nozzles in a variety of materials to meet the desires and applications of our customers. We were the first to develop ceramic orifice-inserted spray nozzles and succeed in marketing them throughout the world.
Listed below are the materials of nozzles and parts, and resistance characteristics of each material against common chemicals.
For more information on resistance characteristics, please see "Technical Date on Spray Nozzles" at the end of this catalog (p.120).

Metals

[Material code ····· Material]
S303 ····· Stainless steel 303
S304 ····· Stainless steel 304
S316 ····· Stainless steel 316
S316L ····· Stainless steel 316L
SCS13 ····· Die-cast stainless steel equiv. to S304
SCS14 ····· Die-cast stainless steel equiv. to S316
SCS16 ····· Die-cast stainless steel equiv. to S316L
S420J2 ····· Hardened stainless steel 420J2
B ····· Brass (C3604)

Rubbers

[Material code ····· Material]
NBR ····· Nitrile rubber
FKM ····· Fluororubber
FEPM ····· Tetrafluoroethylene-propylene rubber
EPDM ····· Ethylene-propylene rubber

Ceramics

CERJET® Ceramics
Alumina ceramics (Alumina 92%, etc.)
[Material code ····· Material]
SiC ····· Silicon nitride bonded silicon carbide
SiSiC ····· Sintered reaction-bonded silicon carbide

Plastics

[Material code ····· Material]
PP ····· Polypropylene
PPS ····· Polyphenylene sulfide
PVC ····· Polyvinyl chloride
HTPVC ····· Heat-treated polyvinyl chloride
PTFE ····· Polytetrafluoroethylene
PCTFE ····· Polychlorotrifluoroethylene
PVDF ····· Polyvinylidene fluoride
ABS ····· Acrylonitrile butadiene styrene
FRPP ····· Glass-fiber reinforced polypropylene
PA ····· Polyamide
PE ····· Polyethylene
Ultrahigh molecular weight polyethylene (UHMWPE)
Polyester elastomer
Araldite®*1 ····· Epoxy resin (Adhesive)
Araldite®H ····· High-temperature epoxy resin (Adhesive)

*1) Araldite is the registered trademark of Huntsman Advanced Materials.

Oil-free treatment is available at additional cost.
Contact us for details.

Materials \ Items		Chemical resistance												Heat resistance*2	
		Hydrochloric acid	Concentrated Hydrochloric acid	Sulfuric acid (35%)	Concentrated sulfuric acid	Nitric acid (35%)	Concentrated nitric acid	Acetic acid	Sodium hydroxide (caustic soda)	Aqueous ammonia	Acetone	Trichloro-ethylene	Ethyl alcohol	Suitable (°C)	Short-term use only (°C)
Metals	S303	×	×	×	×	○	△	△	○	○	○	○	○	400	800
	S304	×	×	×	×	○	○	○	○	○	○	○	○	400	800
	S316, S316L	×	×	×	○	○	△	○	○	○	○	○	○	400	800
	B	×	×	×	×	×	×	×	△	△	○	○	○	200	400
Plastics	PP	○	△	○	×	×	×	○	○	○	○	△	○	80	90
	PPS	○	○	○	△	△	×	○	○	○	○	○	○	170	180
	PVC	○	○	○	○	○	×	○	○	○	×	×	○	40	50
	PTFE	○	○	○	○	○	○	○	○	○	○	○	○	100	150
	PVDF	○	○	○	○	○	○	○	△	○	×	○	○	80	120
	ABS	△	△	△	×	×	×	×	△	○	×	×	△	80	90
	FRPP	○	△	○	×	×	×	○	△	○	○	△	○	90	100
	PA	×	×	×	×	△	△	△	○	○	○	○	△	130	230
	UHMWPE	○	○	○	×	△	×	○	○	○	△	△	○	80	100
	Polyester elastomer	×	×	×	×	×	×	○	△	×	△	△	○	100	120
	Araldite®	△	×	△	×	×	×	×	×	×	×	×	×	60	70
	Araldite®H	○	×	○	△	×	×	○	△	○	○	○	○	120	140
Rubbers	NBR	×	×	×	×	×	×	○	○	○	×	△	○	90	120
	FKM	○	○	○	○	○	○	○	△	×	×	○	○	150	200
	FEPM	○	○	○	○	○	○	○	○	×	×	○	○	150	200
	EPDM	○	△	○	△	×	×	○	○	○	○	×	○	90	120
Ceramics*3	CERJET® ceramics	○	○	○	○	○	○	○	×	○	○	○	○	700	800
	Alumina ceramics	○	○	○	○	○	○	○	△	○	○	○	○	1,000	1,200
	SiC	○	○	○	○	○	○	○	△	○	○	○	○	1,550	1,550
	SiSiC	○	○	○	○	○	○	○	△	○	○	○	○	1,350	1,350

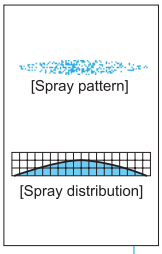
*2) The heat resistance (operating temperature limit) of spray nozzles varies widely depending on the operating conditions, environment, liquid sprayed, etc.
*3) Ceramic should be used at temperatures under 100˚C to avoid a crack caused by heat shock.
Note: As for the spray nozzles including adhesive, please also take into account the heat/chemical resistance of the adhesive.

○··· Suitable
△··· Possible for short term
×··· Unusable

How to Read the Tables

■ Spray nozzle specifications are shown in the respective tables.

One-piece Structure
Standard Flat Spray Nozzles
VVP/VP



[Features]
- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- Tapered edges overlap to provide uniformity of spray distribution in multiple-nozzle arrangements.

[Standard pressure]
0.3 MPa

[Applications]
Cleaning: Automotives, containers, films, felts, filters, screens, bottles, crushed stones, earth and sand, metal parts, machines, steel plates and pieces
Spraying: Etchants, oils, lubricants, liquids, solutions, insecticides, herbicides
Cooling: Gas, smokes, heat exchangers, tanks, steels, roofs
Water screen: Fire protection, heat protection, dust suppression, deodorization

The photo of spray at the standard pressure

Spray pattern and spray distribution

Spray angle code at the standard pressure (115)

Spray capacity code at the standard pressure (03)

Thread type* and size of spray nozzle:
R1/4: 1/4″ male taper pipe thread
Rc1/4: 1/4″ female taper pipe thread

Series (VVP)

Plastic nozzle with ceramic orifice injection molded

Spray angle at the specified pressure (124° at 0.7 MPa)

Calculated spray capacity at the specified pressure (0.21 ℓ/min at 0.15 MPa)

Spray capacity at the standard pressure (0.30 ℓ/min at 0.3 MPa)

Range of Sauter mean droplet diameter measured by immersion sampling method

Minimum passage diameter (approximate value)

Spray angle code	Spray capacity code	Pipe connection size: VVP All metal R1/8	VVP All metal R1/4	VVP All metal R3/8	VVP All metal R1/2	VVP All metal R3/4	VVP All metal R1	VVP All plastic R1/8	VVP All plastic R1/4	VP Metal R1/8	VP Metal R1/4	VP CER-TIM® R1/8	VP CER-TIM® R1/4	Spray angle (°): 0.15 MPa	0.3 MPa	0.7 MPa	Spray capacity (ℓ/min): 0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
115	03	○	○					○	○	●	●	○	○	101	115	124	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	140	0.2	200
	04	○	○					○	○	●	●	○	○	102	115	124	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	〃	0.2	200
	05	○	○					○	○	●	●	○	○	102	115	124	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	160	0.3	150
	07	○	○					○	○	●	●	○	○	103	115	124	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	〃	0.3	150
	10	○	○					○	○	●	●	○	○	103	115	124	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58		0.4	150
	15	●	●					○	○	●	●	○	○	104	115	123	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.5	100
	20	●	●					○	○	●		○	○	104	115	123	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	270	0.6	100
	30	●	●					○	○	●		○	○	105	115	122	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		0.8	50
	40	●	●					○	○					106	115	122	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		0.8	50
	60	○	○											107	115	121	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5	〃	1.0	—
	80	○	○											107	115	121	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.2	—
	100		○											107	115	120	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		1.7	—
	200		○											109	115	120	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	510	2.4	—
	230			○										109	115	119	9.39	13.3	16.3	18.8	23.0	29.7	35.1	42.0	59.4		2.7	—
	260			○										109	115	119	10.6	15.0	18.4	21.2	26.0	33.6	39.7	47.5	67.1	〃	2.8	—
	300			○										109	115	119	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5		3.0	—
	400				○									110	115	118	16.3	23.1	28.3	32.7	40.0	51.6	61.1	73.0	103	580	3.5	—
	500				○									110	115	118	20.4	28.9	35.4	40.8	50.0	64.6	76.4	91.3	129	〃	3.9	—
	600				○									111	115	118	24.5	34.6	42.4	49.0	60.0	77.5	91.7	110	155	610	4.3	—
	800													111	115	117	32.7	46.2	56.5	65.3	80.0	103	122	146	206	700	5.0	—
	1000													111	115	117	40.8	57.7	70.7	81.7	100	129	153	183	258	〃	5.6	—
															115	117	61.2	86.6	106	122	150	194	229	274	387	900	7.2	—
																	—	0.12	0.14	0.16	0.20	0.26	0.31	0.37	0.52	145		
																		0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77			
																			0.28	0.33	0.40	0.52	0.61	0.73				

●○ shows availability of the item
●: Available with/without a strainer
○: Available without a strainer
No mark: Not available

At 0.05 MPa, defined spray pattern does not develop

Mesh size number of strainer

*Threads noted in this catalog are tapered pipe threads unless otherwise specified.
In "How to order" section, "M" of the pipe connection size indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard).
For example, "1/4M" is used instead of R1/4 and "1/4F" instead of Rc1/4 in our nozzle thread description.

Products Lineup

Flat Spray Nozzles

Standard Flat Spray Nozzles pp.12–

- Three-piece structure: **VV/V**
- Quick-detach metal nozzles: **INVV-SS/INV**
- One-piece structure: **VVP/VP, UVVP**
- Coin-shaped design: **CVVP**
- Quick-detach plastic nozzles: **INVV**
- Effective use of standard flat spray nozzles

Even Flat Spray Nozzles pp.26–

- Even flat spray: **VE/VEP**
- Quick-detach metal nozzles: **INVE**
- High pressure cleaning nozzles: **VNP**
- Descaling nozzles: **DSP**
- Effective use of even flat spray nozzles

Wide-angle Flat Spray Nozzles pp.36–

- Wide-angle flat spray: **YYP**
- Wide-angle flat spray for ultra-low pressure: **LYYP**
- Effective use of wide-angle flat spray nozzles

Off-center Even Flat Spray Nozzles pp.40–

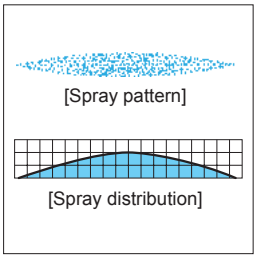
- Off-center even flat spray: **OVVEP**
- Quick-detach plastic nozzles: **INOVVE**
- Effective use of off-center even flat spray nozzles

Special Flat Spray Nozzles pp.42–

- Foam nozzles: **AWVV**
- Self-cleaning flat spray: **MOMOJet®**
- Air & steam spray: **VZ**
- Effective use of air & steam spray nozzles
- Flat spray with ON/OFF control: **SO-V**
- Universal-joint type flat spray: **UT+VP**
- Quick-installation nozzles: **QB**

Three-piece Structure
Standard Flat Spray Nozzles

VV/V



[Features]
- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- Tapered edges overlap to provide uniformity of spray distribution in multiple-nozzle arrangements.

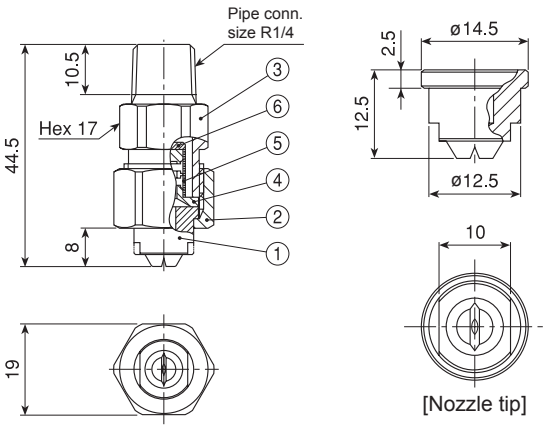
[Standard pressure]
0.3 MPa

[Applications]
Cleaning: Automotives, containers, films, felts, filters, screens, bottles, crushed stones, earth and sand, metal parts, machines, steel plates and pieces
Spraying: Etchants, oils, lubricants, glues, solutions, insecticides, herbicides
Cooling: Gas, smokes, heat exchangers, tanks, steels, roofs
Water screen: Fire protection, heat protection, dust suppression, deodorization

VV series

	VV series
Structure	• Made of metal, three-piece structure. • Comprises three parts: Nozzle tip, cap, and adaptor. Worn-out nozzle tip can be replaced separately. • Small spray capacity models come with or without a removable strainer.
Material	• S303 or B (brass) • Optional material: S316 or others
Mass	• Complete assemblies* S303: 56 g, B (brass): 60 g • Nozzle tip S303: 13 g, B (brass): 14 g

*When with a strainer, add 2–5 g to the above mass and 2 mm to the total length.
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

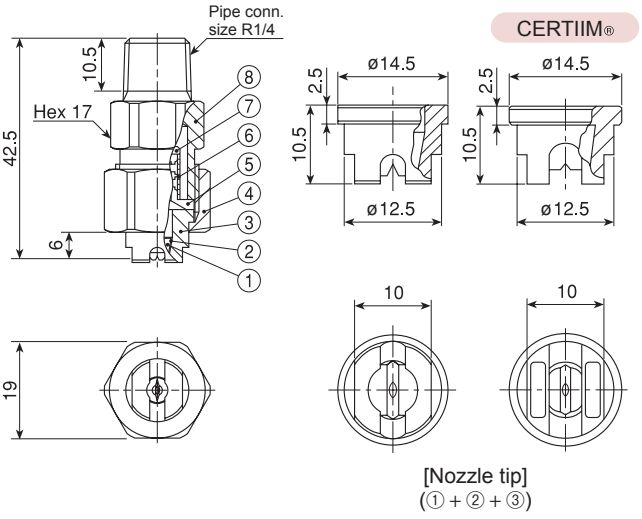


Ⓐ **Nozzle** (①Nozzle tip ②Cap ③Adaptor)
Ⓑ **Strainer** (④Strainer holder ⑤Strainer screen [S316] ⑥Strainer cap)

V series

	V series (with ceramic orifice inserted)
Structure	• Three-piece structure with ceramic orifice inserted. • Comprises three parts: Nozzle tip, cap, and adaptor. Worn-out nozzle tip can be replaced separately. • Small spray capacity models come with or without a removable strainer. • CERTIIM® is one-shot injection molded nozzle tip created by molding the precision-made ceramic orifice into a plastic retainer.
Material	• Nozzle orifice: ceramic • Tip retainer: S303, B (brass), or PVDF • Cap, Adaptor, and Strainer: S303 or B (brass) • Optional material: S316 or others
Mass	• Complete assemblies* S303: 49 g, B (brass): 53 g • Nozzle tip S303: 6.5 g, B (brass): 7 g CERTIIM®: 2 g

*When with a strainer, add 2–5 g to the above mass and 2 mm to the total length.
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



Ⓐ **Nozzle** (①Ceramic orifice ②Adhesive: Araldite® ③Tip retainer ④Cap ⑧Adaptor)
Ⓑ **Strainer** (⑤Strainer holder ⑥Strainer screen [S316] ⑦Strainer cap)

Three-piece Structure Standard Flat Spray Nozzles
VV/V series

Spray angle code	Spray capacity code	VV	V		Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
		All metal	Metal	CER-TIIM®	0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa			
115	03		●	○	101	115	124	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	140	0.2	200
	04		●	○	102	115	124	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	⟆	0.2	200
	05	●	●	○	102	115	124	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	160	0.3	150
	07	●	●	○	103	115	124	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.3	150
	10	●	●	○	103	115	124	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	⟆	0.4	150
	15	●	●	○	104	115	123	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.5	100
	20	●	●	○	104	115	123	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	270	0.6	100
	30	●	●	○	105	115	122	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		0.8	50
	40	●			106	115	122	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		0.8	50
	60	○			107	115	121	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5	⟆	1.0	—
	80	○			107	115	121	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.2	—
	100	○			107	115	120	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		1.4	—
	200	○			109	115	120	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	510	2.4	—
90	02		●	○	76	90	100	—	0.12	0.14	0.16	0.20	0.26	0.31	0.37	0.52	145	0.2	200
	03		●	○	76	90	100	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	150	0.2	200
	04		●	○	77	90	100	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	⟆	0.3	150
	05	●	●	○	77	90	100	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	170	0.3	150
	07	●	●	○	78	90	100	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.4	150
	10	●	●	○	78	90	99	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	⟆	0.5	100
	15	●	●	○	79	90	99	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.6	100
	20	●	●	○	79	90	98	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16		0.7	50
	30	●	●	○	80	90	97	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	280	0.9	50
	40	○	○	○	81	90	97	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.1	—
	50	○	○	○	81	90	97	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.2	—
	60	○			82	90	96	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5		1.3	—
	80	○			82	90	96	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.5	—
	100	○			82	90	96	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8	⟆	1.8	—
	120	○			83	90	95	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		1.9	—
	140	○			83	90	95	5.72	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1		2.1	—
	170	○			83	90	95	6.94	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9		2.3	—
	200	○			84	90	95	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	540	2.4	—
80	02		●	○	67	80	90	—	0.12	0.14	0.16	0.20	0.26	0.31	0.37	0.52	150	0.2	200
	03		●	○	67	80	90	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	⟆	0.3	150
	04		●	○	67	80	90	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03		0.3	150
	05	●	●	○	67	80	90	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	180	0.3	150
	07	●	●	○	68	80	89	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	⟆	0.4	150
	10	●	●	○	68	80	89	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58		0.5	100
	15		●	○	69	80	88	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.7	50
	20	●	●	○	69	80	88	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16		0.8	50
	30	○	○	○	70	80	87	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	290	1.0	—
	40	○	○	○	71	80	87	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.2	—
	50		○	○	71	80	86	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9	⟆	1.4	—
	60		○	○	72	80	86	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5		1.5	—
	80	○	○	○	72	80	86	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.7	—
	100	○			72	80	85	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		2.0	—
	120	○			73	80	85	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.3	—
	200	○			74	80	85	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	550	2.8	—
65	02		●	○	52	65	75	—	0.12	0.14	0.16	0.20	0.26	0.31	0.37	0.52	155	0.2	200
	03		●	○	52	65	75	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	160	0.3	150
	04		●	○	52	65	75	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	⟆	0.3	150
	05	●	●	○	52	65	74	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	190	0.4	150
	07	●	●	○	53	65	74	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.5	100
	10	●	●	○	54	65	73	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	⟆	0.6	100
	15	●	●	○	54	65	73	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.8	50
	20	●	●	○	55	65	72	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	310	0.9	50
	30	○	○	○	56	65	72	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.1	—
	40	○	○	○	56	65	71	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.3	—
	50	○	○	○	57	65	71	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.5	—
	60	○	○	○	57	65	71	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5		1.6	—
	80	○	○	○	58	65	71	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	⟆	1.9	—
	100	○			58	65	70	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		2.1	—
	120	○			58	65	70	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.3	—
	140	○			59	65	69	5.72	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1		2.5	—
	170	○			59	65	69	6.94	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9		2.8	—
	200	○			59	65	69	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	580	3.0	—
50	03		●	○	37	50	60	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	180	0.3	150
	04		●	○	37	50	60	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03		0.4	150
	05	●	●	○	38	50	59	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	210	0.4	150
	07	●	●	○	38	50	58	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.5	100
	10	●	●	○	40	50	58	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	⟆	0.6	100
	15		●	○	40	50	57	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.8	50
	20	○	○	○	41	50	57	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16		1.0	—
	30	○	○	○	42	50	56	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	340	1.2	—
	40	○	○	○	42	50	56	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.4	—
	50		○	○	43	50	55	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.6	—
	60		○	○	43	50	55	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5	⟆	1.7	—
	80	○	○	○	43	50	55	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.0	—
	120	○			44	50	54	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.4	—
	200	○			45	50	53	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	640	3.3	—

●: Available with/without strainer ○: Available without strainer

Spray angle code	Spray capacity code	VV	V		Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
		All metal	Metal	CER-TIIM®	0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa			
40	05	●			30	40	48	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	230	0.4	150
	07	●			30	40	48	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	≀	0.5	100
	10	●			31	40	47	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58		0.7	50
	20	○			32	40	46	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	380	1.0	—
	30	○			33	40	46	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.3	—
	40	○			33	40	45	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	≀	1.5	—
	80	○			34	40	44	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.1	—
	120	○			35	40	44	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.8	—
	200	○			35	40	43	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	710	3.5	—
25	05	●			18	25	32	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	270	0.5	100
	07	●			18	25	32	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	≀	0.6	100
	10	●			18	25	32	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58		0.8	50
	15	○			19	25	31	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87	440	1.0	—
	30	○			19	25	30	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.4	—
	40	○			19	25	30	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	≀	1.7	—
	80	○			20	25	29	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.3	—
	200	○			21	25	27	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	850	3.9	—
15	05	●			9	15	22	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	310	0.5	100
	07	●			9	15	21	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.7	50
	10	●			9	15	21	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	≀	0.8	50
	15	○			10	15	20	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		1.0	—
	30	○			10	15	19	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	510	1.5	—
	40	○			10	15	19	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	≀	1.7	—
	80	○			11	15	18	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.4	—
	200	○			11	15	17	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	1,000	4.0	—

●: Available with/without strainer ○: Available without strainer

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/4M VV 11505 S303W

1/4M	VV	115	05	S303	W
	Series	Spray angle code	Spray capacity code	Material	Strainer
	■ VV ■ V	■ 115 ■ ≀ ■ 15	■ 02 ■ ≀ ■ 200	■ S303 ■ B	■ W (with strainer) ■ (Blank denotes "without strainer")

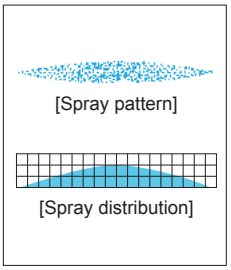
②Nozzle tip only

〈Example〉 1/4 VV 11505 S303

1/4	VV	115	05	S303
	Series	Spray angle code	Spray capacity code	Material
	■ VV ■ V	■ 115 ■ ≀ ■ 15	■ 02 ■ ≀ ■ 200	■ S303 ■ B ■ TPVDF*

*TPVDF is only for V series (PVDF nozzle tip with ceramic orifice).

Quick-detachable Standard Flat Spray Nozzles Stainless Steel INVV-SS/INV



[Features]

- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- Easy mounting/dismounting with a knurled tab.
- Quick-detachable design helps to significantly reduce maintenance time.

[Standard pressure]

0.3 MPa

[Applications]

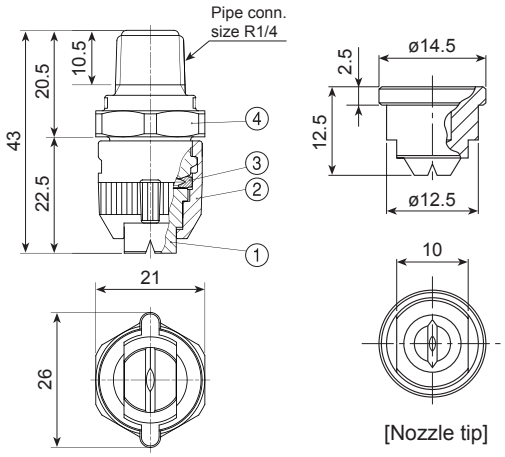
Cleaning: Automotives, containers, films, felts, filters, screens, bottles, crushed stones, earth and sand, metal parts, machines, steel plates and pieces
Spraying: Oils, lubricants, glues, insecticides, herbicides
Cooling: Tanks, roofs
Water screen: Dust suppression, deodorization

INVV-SS series

	INVV-SS series
Structure	• Comprises a nozzle part (nozzle tip + cap + packing) and an adaptor. • Worn-out nozzle tip and other parts are individually available for replacement. • The nozzle part can be removed and installed simply by turning 90° with one hand. • Tip or packing will not fall off when removing the nozzle part.
Material	• Nozzle tip: S303 • Cap and Adaptor: S316L equivalent • Packing: FEPM
Mass	• Complete assemblies: 57 g • Nozzle tip: 13 g

Heat resistance temperature: 150°C
Withstanding pressure: 2.0 MPa

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



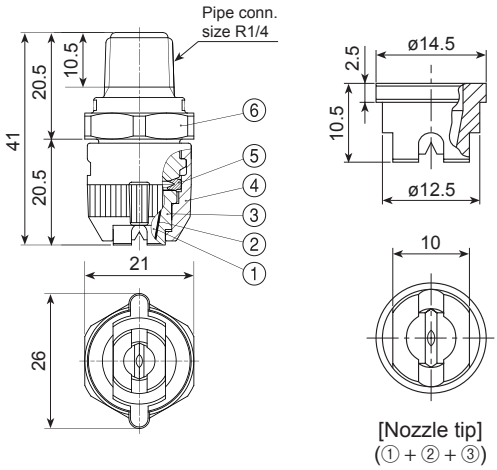
①Nozzle tip ②Cap ③Packing ④Adaptor

INV series

	INV series (with ceramic orifice inserted)
Structure	• Includes a ceramic orifice in the nozzle tip. • Comprises a nozzle part (nozzle tip + cap + packing) and an adaptor. • Worn-out nozzle tip and other parts are individually available for replacement. • The nozzle part can be removed and installed simply by turning 90° with one hand. • Tip or packing will not fall off when removing the nozzle part.
Material	• Nozzle orifice: Ceramic • Tip retainer: S303 • Cap and Adaptor: S316L equivalent • Packing: FEPM
Mass	• Complete assemblies: 51 g • Nozzle tip: 6.5 g

Heat resistance temperature: 60°C
Withstanding pressure: 2.0 MPa

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Adhesive: Araldite® ③Tip retainer
④Cap ⑤Packing ⑥Adaptor

Spray angle code	Spray capacity code	INVV-SS (All metal)	INV (with ceramic orifice)	Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)
				0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa		
115	60	○		107	115	121	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5	340	1.0
	80	○		107	115	121	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	⟆	1.2
	100	○		107	115	120	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		1.4
	200	○		109	115	120	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	510	2.4
90	40	○	○	81	90	97	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	300	1.1
	50	○	○	81	90	97	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.2
	60	○		82	90	96	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5		1.3
	80	○		82	90	96	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.5
	100	○		82	90	96	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8	⟆	1.8
	120	○		83	90	95	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		1.9
	140	○		83	90	95	5.72	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1		2.1
	170	○		83	90	95	6.94	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9		2.3
	200	○		84	90	95	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	540	2.4
80	30	○	○	70	80	87	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	290	1.0
	40	○	○	71	80	87	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.2
	80	○	○	72	80	86	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	⟆	1.7
	100	○		72	80	85	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		2.0
	120	○		73	80	85	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.3
	200	○		74	80	85	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	550	2.8
65	30	○	○	56	65	72	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	310	1.1
	40	○	○	56	65	71	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.3
	50	○	○	57	65	71	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.5
	60	○	○	57	65	71	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5		1.6
	80	○	○	58	65	71	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	⟆	1.9
	100	○		58	65	70	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		2.1
	120	○		58	65	70	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.3
	140	○		59	65	69	5.72	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1		2.5
	170	○		59	65	69	6.94	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9		2.8
	200	○		59	65	69	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	580	3.0
50	20	○	○	41	50	57	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	320	1.0
	30	○	○	42	50	56	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.2
	40	○	○	42	50	56	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	⟆	1.4
	80	○	○	43	50	55	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.0
	120	○		44	50	54	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.4
	200	○		45	50	53	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	640	3.3
40	20	○		32	40	46	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	380	1.0
	30	○		33	40	46	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.3
	40	○		33	40	45	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	⟆	1.5
	80	○		34	40	44	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.1
	120	○		35	40	44	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.8
	200	○		35	40	43	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	710	3.5
25	15	○		19	25	31	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87	440	1.0
	30	○		19	25	30	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.4
	40	○		19	25	30	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	⟆	1.7
	80	○		20	25	29	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.3
	200	○		21	25	27	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	850	3.9
15	15	○		10	15	20	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87	500	1.0
	30	○		10	15	19	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.5
	40	○		10	15	19	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	⟆	1.7
	80	○		11	15	18	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.4
	200	○		11	15	17	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	1,000	4.0

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/4M INVV 11560 S303 (FEPM) + S316L-IN

1/4M INVV 115 60 S303 (FEPM) + S316L-IN

Series	Spray angle code	Spray capacity code
INVV	115	15
INV	⟆	⟆
	15	200

②Nozzle tip only

〈Example〉 1/4 VV 11560 S303

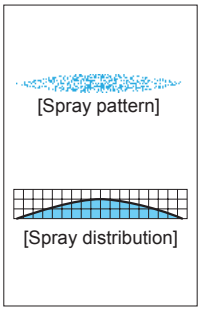
1/4 VV 115 60 S303

Series	Spray angle code	Spray capacity code
VV	115	15
V	⟆	⟆
	15	200

Note:
Nozzle tips of INVV-SS series are the same as those used on **VV** series.
Nozzle tips of INV series are the same as those used on **V** series.

One-piece Structure
Standard Flat Spray Nozzles

VVP/VP



[Features]

- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges
- Tapered edges overlap to provide uniformity of spray distribution in multiple-nozzle arrangements.

[Standard pressure]

0.3 MPa

[Applications]

Cleaning: Automotives, containers, films, felts, filters, screens, bottles, crushed stones, earth and sand, metal parts, machines, steel plates and pieces

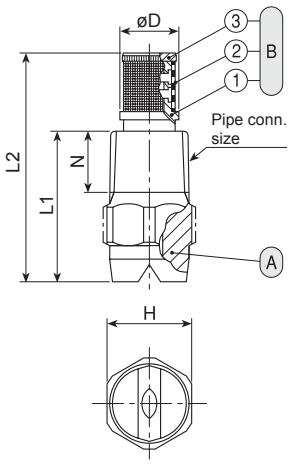
Spraying: Etchants, oils, lubricants, liquids, solutions, insecticides, herbicides

Cooling: Gas, smokes, heat exchangers, tanks, steels, roofs

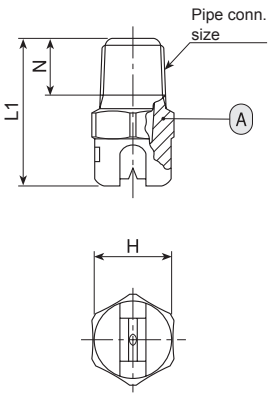
Water screen: Fire protection, heat protection, dust suppression, deodorization

VVP series

	VVP series
Structure	• Made of metal or plastic, one-piece structure. • Small spray capacity models of metal VVP come with or without a strainer.
Material	• S303, B (brass), or PP • S316L equivalent (precision-molded stainless steel)*3 • Strainer for precision-molded stainless steel: S303 or S316 • Optional material: S316, PVC, PVDF, Ultrahigh molecular weight polyethylene, or others



PP Injection molded



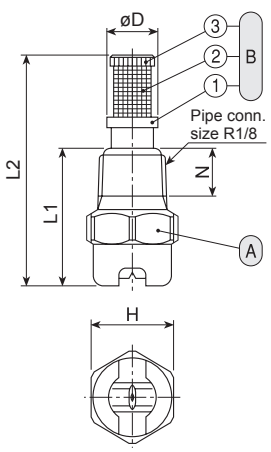
Ⓐ **Nozzle**
Ⓑ **Strainer** (①Strainer holder ②Strainer screen [S316] ③Strainer cap)

Series	Pipe conn. size	Dimensions (mm)					Mass (g)*1			
		L1	L2	H	øD	N	S303	B	S316L equiv.	PP
VVP*2	R1/8	18.5	31	12	7.5	6.5	10	11	—	—
	R1/4	25	40	14	10	10.5	21	23	—	—
	R3/8	30	—	19	—	10.5	37	40	—	—
	R1/2	38	—	23	—	14	65	70	—	—
	R3/4	45	—	29	—	15	110	120	—	—
	R1	55	—	35	—	18	170	180	—	—
VVP*3 (Precision-molded stainless steel)	R1/8	20	33.5	12	7.5	7	—	—	9.6	—
	R1/4	27	41	14	10	10.5	—	—	16	—
VVP-PP (Injection molded)	R1/8	22	—	12	—	8.5	—	—	—	1.1
	R1/4	27	—	14	—	11.5	—	—	—	2.2

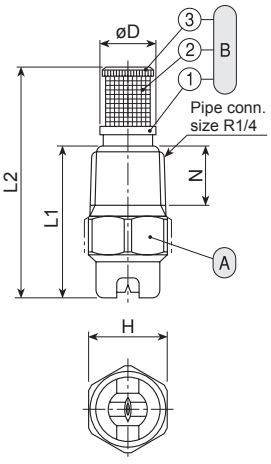
*1) When with a strainer, add 2–5 g to the above mass.
*2) VVP with spray capacity code of 20 or smaller slightly differs in dimensions (L1, L2) and in shape of nozzle tip from the above. Contact us for details.
*3) Please see the chart on page 20 for availability.
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Precision-molded stainless steel

R1/8



R1/4



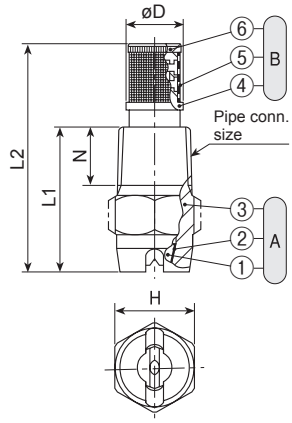
Ⓐ **Nozzle**
Ⓑ **Strainer** (①Strainer holder ②Strainer screen [S316] ③Strainer cap)

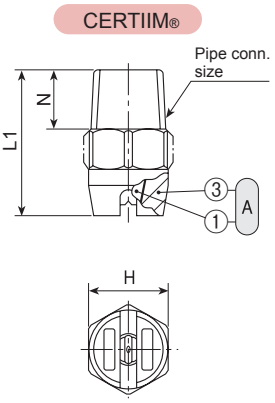
VP series

	VP series (with ceramic orifice inserted)
Structure	• Ceramic orifice is inserted and adhered into a metal or plastic body. • Small spray capacity models of metal VP come with or without a strainer. • CERTIIM® is a plastic spray nozzle with a one-shot injection molded ceramic orifice.
Material	• Nozzle orifice: ceramic • Metal parts: S303 or B (brass) • CERTIIM®'s plastic body: PVDF • Optional material: S316 or others

Body material	Pipe conn. size	Dimensions (mm)					Mass (g)*1		
		L1	L2	H	øD	N	S303	B	CER-TIIM®
Metal	R1/8	16.5	30	12	7.5	6.5	8	9	—
	R1/4	26	40	14	10	10.5	20	22	—
PVDF (CERTIIM®)	R1/8	22	—	12	—	8.5	—	—	2.1
	R1/4	26	—	14	—	10.5	—	—	6

*1) When with a strainer, add 2–5 g to the above mass.





Ⓐ **Nozzle** (①Ceramic orifice ②Adhesive: Araldite® ③Nozzle body)
Ⓑ **Strainer** (④Strainer holder ⑤Strainer screen [S316] ⑥Strainer cap)

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

■ VVP series, VP series

Spray angle code	Spray capacity code	Pipe connection size: VVP All metal R1/8	R1/4	R3/8	R1/2	R3/4	R1	VVP All plastic R1/8	R1/4	VP Metal R1/8	R1/4	VP CER-TIIM® R1/8	R1/4	Spray angle (°) 0.15 MPa	0.3 MPa	0.7 MPa	Spray capacity (ℓ/min) 0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
115	03							○	○	●	●	○	○	101	115	124	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	140	0.2	200
	04							○	○	●	●	○	○	102	115	124	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	⟆	0.2	200
	05							○	○	●	●	○	○	102	115	124	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	160	0.3	150
	07							○	○	●	●	○	○	103	115	124	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.3	150
	10							○	○	●	●	○	○	103	115	124	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	⟆	0.4	150
	15	●	●					○	○	●	●	○	○	104	115	123	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.5	100
	20	●	●					○	○		●		○	104	115	123	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	270	0.6	100
	30	●	●					○	○		●		○	105	115	122	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		0.8	50
	40	●	●					○	○					106	115	122	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		0.8	50
	60	○	○											107	115	121	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5	⟆	1.0	—
	80	○	○											107	115	121	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.2	—
	100		○											107	115	120	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		1.7	—
	200		○											109	115	120	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	510	2.4	—
	230			○										109	115	119	9.39	13.3	16.3	18.8	23.0	29.7	35.1	42.0	59.4		2.7	—
	260			○										109	115	119	10.6	15.0	18.4	21.2	26.0	33.6	39.7	47.5	67.1	⟆	2.8	—
	300			○										109	115	119	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5		3.0	—
	400				○									110	115	118	16.3	23.1	28.3	32.7	40.0	51.6	61.1	73.0	103	580	3.5	—
	500				○									110	115	118	20.4	28.9	35.4	40.8	50.0	64.6	76.4	91.3	129	⟆	3.9	—
	600				○									111	115	118	24.5	34.6	42.4	49.0	60.0	77.5	91.7	110	155	610	4.3	—
	800					○								111	115	117	32.7	46.2	56.5	65.3	80.0	103	122	146	206	700	5.0	—
	1000					○								111	115	117	40.8	57.7	70.7	81.7	100	129	153	183	258	⟆	5.6	—
	1500						○							111	115	117	61.2	86.6	106	122	150	194	229	274	387	900	7.2	—
90	02									●	●	○	○	76	90	100	—	0.12	0.14	0.16	0.20	0.26	0.31	0.37	0.52	145	0.2	200
	03							○	○	●	●	○	○	76	90	100	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	150	0.2	200
	04							○	○	●	●	○	○	77	90	100	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	⟆	0.3	150
	05							○	○	●	●	○	○	77	90	100	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	170	0.3	150
	07							○	○	●	●	○	○	78	90	100	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.4	150
	10							○	○		●		○	78	90	99	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	⟆	0.5	100
	15	●	●					○	○		●		○	79	90	99	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.6	100
	20	●	●					○	○		●		○	79	90	98	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16		0.7	50
	30	●	●					○	○		●		○	80	90	97	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	280	0.9	50
	40	○	○					○	○		○		○	81	90	97	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.1	—
	50	○	○					○	○		○		○	81	90	97	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.2	—
	60	○	○											82	90	96	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5		1.3	—
	80	○	○											82	90	96	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.5	—
	100	○												82	90	96	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8	⟆	1.7	—
	120	○												83	90	95	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.0	—
	140		○											83	90	95	5.72	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1		2.2	—
	170		○											83	90	95	6.94	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9		2.4	—
	200		○											84	90	95	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	540	2.6	—
	230		○											84	90	94	9.39	13.3	16.3	18.8	23.0	29.7	35.1	42.0	59.4		2.8	—
	260		○											84	90	94	10.6	15.0	18.4	21.2	26.0	33.6	39.7	47.5	67.1	⟆	3.1	—
	300		○											84	90	94	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5		3.4	—
	400			○										85	90	94	16.3	23.1	28.3	32.7	40.0	51.6	61.1	73.0	103	580	3.8	—
	500				○									85	90	93	20.4	28.9	35.4	40.8	50.0	64.6	76.4	91.3	129	⟆	4.2	—
	600				○									86	90	93	24.5	34.6	42.4	49.0	60.0	77.5	91.7	110	155		4.7	—
	800				○									86	90	93	32.7	46.2	56.5	65.3	80.0	103	122	146	206	700	5.4	—
	900					○								86	90	92	36.7	52.0	63.6	73.5	90.0	116	137	164	232	750	5.7	—
	1000					○								86	90	92	40.8	57.7	70.7	81.7	100	129	153	183	258	⟆	6.0	—
	1200					○								86	90	92	49.0	69.3	84.9	98.0	120	155	183	219	310		6.6	—
	1500						○							86	90	92	61.2	86.6	106	122	150	194	229	274	387	950	7.2	—

●: Available with/without strainer ○: Available without strainer ⋯: Precision-molded stainless steel type available (see page 20)

One-piece Structure Standard Flat Spray Nozzles
VVP/VP series

Spray angle code	Spray capacity code	Pipe connection size: VVP All metal R1/8	R1/4	R3/8	R1/2	R3/4	R1	VVP All plastic R1/8	R1/4	VP Metal R1/8	R1/4	VP CER-TIIM® R1/8	R1/4	Spray angle (°) 0.15 MPa	0.3 MPa	0.7 MPa	Spray capacity (ℓ/min) 0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
80	02									●	●	○	○	67	80	90	—	0.12	0.14	0.16	0.20	0.26	0.31	0.37	0.52	150	0.2	200
	03									●	●	○	○	67	80	90	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	≀	0.3	150
	04									●	●	○	○	67	80	90	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03		0.3	150
	05	●	●					○	○	●	●	○	○	67	80	90	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	180	0.3	150
	07	●	⬚							●	●	○	○	68	80	89	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.4	150
	10	●	⬚					○	○		●		○	68	80	89	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	≀	0.5	100
	15										●		○	69	80	88	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.7	50
	20	●	●								●		○	69	80	88	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16		0.8	50
	30	○	○								○		○	70	80	87	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	290	1.0	—
	40	○	○					○	○		○		○	71	80	87	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.2	—
	50										○		○	71	80	86	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.4	—
	60										○		○	72	80	86	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5	≀	1.5	—
	80	○	○											72	80	86	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		1.7	—
	100	○												72	80	85	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		1.8	—
	120	○												73	80	85	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.1	—
	200		○											74	80	85	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	550	2.9	—
	300		○											74	80	84	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5	570	3.7	—
	400			○										75	80	83	16.3	23.1	28.3	32.7	40.0	51.6	61.1	73.0	103	600	4.1	—
	500			○										75	80	83	20.4	28.9	35.4	40.8	50.0	64.6	76.4	91.3	129		4.8	—
	600				○									76	80	83	24.5	34.6	42.4	49.0	60.0	77.5	91.7	110	155	≀	5.1	—
	800				○									76	80	82	32.7	46.2	56.5	65.3	80.0	103	122	146	206		6.1	—
	1000					○								76	80	82	40.8	57.7	70.7	81.7	100	129	153	183	258	850	6.2	—
65	02									●	●	○	○	52	65	75	—	0.12	0.14	0.16	0.20	0.26	0.31	0.37	0.52	155	0.2	200
	03	⬚	⬚					○	○	●	●	○	○	52	65	75	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	160	0.3	150
	04	⬚	⬚					○	○	●	●	○	○	52	65	75	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	≀	0.3	150
	05	⬚	⬚					○	○	●	●	○	○	52	65	74	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	190	0.4	150
	07	⬚	⬚					○	○	●	●	○	○	53	65	74	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.5	100
	10	⬚	⬚					○	○		●		○	54	65	73	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	≀	0.6	100
	15	●	●					○	○		●		○	54	65	73	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.8	50
	20	●	●					○	○		●		○	55	65	72	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	310	0.9	50
	30	○	○					○	○		○		○	56	65	72	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.1	—
	40	○	○					○	○		○		○	56	65	71	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.3	—
	50	○	○					○	○		○		○	57	65	71	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.5	—
	60	○	○								○		○	57	65	71	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5		1.6	—
	80	○	○					○	○		○		○	58	65	71	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	≀	1.9	—
	100	○												58	65	70	4.08	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8		2.1	—
	120	○												58	65	70	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.3	—
	140		○											59	65	69	5.72	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1		2.5	—
	170		○											59	65	69	6.94	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9		2.8	—
	200		○											59	65	69	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	580	3.0	—
	300		○											60	65	69	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5	650	3.9	—
	400			○										60	65	68	16.3	23.1	28.3	32.7	40.0	51.6	61.1	73.0	103		4.7	—
	500			○										61	65	67	20.4	28.9	35.4	40.8	50.0	64.6	76.4	91.3	129		5.3	—
	600				○									61	65	67	24.5	34.6	42.4	49.0	60.0	77.5	91.7	110	155	≀	5.7	—
	800				○									62	65	67	32.7	46.2	56.5	65.3	80.0	103	122	146	206		6.5	—
	1000					○								62	65	66	40.8	57.7	70.7	81.7	100	129	153	183	258		7.3	—
	1500					○								62	65	66	61.2	86.6	106	122	150	194	229	274	387	1,000	9.0	—
50	03										●		○	37	50	60	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	180	0.3	150
	04										●		○	37	50	60	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	≀	0.4	150
	05	●	●								●		○	38	50	59	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	210	0.4	150
	07	●	●								●		○	38	50	58	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.5	100
	10	●	●								●		○	40	50	58	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	≀	0.6	100
	15										●		○	40	50	57	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		0.8	50
	20	○	○								○		○	41	50	57	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16		1.0	—
	30	○	○					○	○		○		○	42	50	56	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	340	1.2	—
	40	○	○								○		○	42	50	56	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.4	—
	50										○		○	43	50	55	2.04	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9		1.6	—
	60										○		○	43	50	55	2.45	3.46	4.24	4.90	6.00	7.75	9.17	11.0	15.5	≀	1.7	—
	80	○	○								○		○	43	50	55	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.0	—
	120	○												44	50	54	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0	550	2.5	—
	200		○											45	50	53	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	640	3.3	—
	300		○											45	50	53	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5		4.2	—
	400			○										46	50	52	16.3	23.1	28.3	32.7	40.0	51.6	61.1	73.0	103	≀	4.9	—
	500			○										46	50	52	20.4	28.9	35.4	40.8	50.0	64.6	76.4	91.3	129		5.6	—
	600				○									47	50	52	24.5	34.6	42.4	49.0	60.0	77.5	91.7	110	155	750	6.1	—
	800				○									47	50	51	32.7	46.2	56.5	65.3	80.0	103	122	146	206	≀	7.1	—
	1000					○								47	50	51	40.8	57.7	70.7	81.7	100	129	153	183	258	1,000	7.9	—
	1500					○								48	50	51	61.2	86.6	106	122	150	194	229	274	387	1,100	9.7	—

●: Available with/without strainer ○: Available without strainer ⬚: Precision-molded stainless steel type available (see page 20)

Spray angle code	Spray capacity code	Pipe connection size: VVP All metal R1/8	VVP All metal R1/4	VVP All metal R3/8	VVP All metal R1/2	VVP All metal R3/4	VVP All metal R1	VVP All plastic R1/8	VVP All plastic R1/4	VP Metal R1/8	VP Metal R1/4	VP CER-TIIM® R1/8	VP CER-TIIM® R1/4	Spray angle (°) 0.15 MPa	0.3 MPa	0.7 MPa	Spray capacity (ℓ/min) 0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
40	05	●	●											30	40	48	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	230	0.4	150
	07	●	●											30	40	48	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	≀	0.5	100
	10	●	●											31	40	47	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58		0.7	50
	20	○	○											32	40	46	0.82	1.15	1.41	1.63	2.00	2.58	3.06	3.65	5.16	380	1.0	—
	30	○	○											33	40	46	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75		1.3	—
	40	○	○											33	40	45	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	≀	1.5	—
	80	○	○											34	40	44	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.1	—
	120	○												35	40	44	4.90	6.93	8.49	9.80	12.0	15.5	18.3	21.9	31.0		2.8	—
	200		○											35	40	43	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	710	3.5	—
	300		○											36	40	42	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5	800	4.5	—
	400			○										36	40	42	16.3	23.1	28.3	32.7	40.0	51.6	61.1	73.0	103	≀	5.3	—
	500			○										37	40	42	20.4	28.9	35.4	40.8	50.0	64.6	76.4	91.3	129	850	5.8	—
	600				○									37	40	42	24.5	34.6	42.4	49.0	60.0	77.5	91.7	110	155		6.6	—
	800				○									37	40	41	32.7	46.2	56.5	65.3	80.0	103	122	146	206	≀	7.4	—
	1000					○								38	40	41	40.8	57.7	70.7	81.7	100	129	153	183	258	1,100	8.3	—
	1500					○								38	40	41	61.2	86.6	106	122	150	194	229	274	387	1,200	10.3	—
25	05	●	●											18	25	32	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	270	0.5	100
	07	●	●											18	25	32	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	≀	0.6	100
	15	○	○											19	25	31	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		1.0	—
	30	○	○											19	25	30	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	440	1.4	—
	40	○	○											19	25	30	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3		1.7	—
	80	○	○											20	25	29	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	≀	2.3	—
	200		○											21	25	27	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	850	4.0	—
	300		○											21	25	27	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5	950	4.9	—
15	05	●	●											9	15	22	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	310	0.5	100
	07	●	●											9	15	21	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	≀	0.7	50
	15	○	○											10	15	20	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87		1.0	—
	30	○	○											10	15	19	1.23	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	510	1.5	—
	40	○	○											10	15	19	1.63	2.31	2.83	3.27	4.00	5.16	6.11	7.30	10.3	≀	1.7	—
	80	○	○											11	15	18	3.27	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6		2.4	—
	200		○											11	15	17	8.16	11.5	14.1	16.3	20.0	25.8	30.6	36.5	51.6	1,000	4.0	—
	300		○											12	15	17	12.2	17.3	21.2	24.5	30.0	38.7	45.8	54.8	77.5	1,100	5.0	—

●: Available with/without strainer ○: Available without strainer

■ VVP series (Precision-molded stainless steel, small spray capacity)

Spray angle code	Spray capacity code	Pipe connection size R1/8	R1/4	Spray angle (°) 0.15 MPa	0.3 MPa	0.7 MPa	Spray capacity (ℓ/min) 0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
115	03	●	●	101	115	124	—	—	0.21	0.24	0.30	0.39	0.46	0.55	0.77	140	0.2	200
	04	●	●	102	115	124	—	—	0.28	0.33	0.40	0.52	0.61	0.73	1.03		0.2	200
	05	●	●	102	115	124	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	≀	0.3	150
	07	●	●	103	115	124	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.3	150
	10	●	●	103	115	124	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	270	0.4	150
90	03	●	●	76	90	100	—	—	0.21	0.24	0.30	0.39	0.46	0.55	0.77	150	0.2	200
	04	●	●	77	90	100	—	—	0.28	0.33	0.40	0.52	0.61	0.73	1.03		0.3	150
	05	●	●	77	90	100	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	≀	0.3	150
	07	●	●	78	90	100	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.4	150
	10	●	●	78	90	99	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	280	0.5	100
80	07		●	68	80	89	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	180 ≀ 290	0.4	150
	10		●	68	80	89	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58		0.5	100
65	03	●	●	52	65	75	—	—	0.21	0.24	0.30	0.39	0.46	0.55	0.77	160	0.3	150
	04	●	●	52	65	75	—	—	0.28	0.33	0.40	0.52	0.61	0.73	1.03		0.3	150
	05	●	●	52	65	74	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	≀	0.4	150
	07	●	●	53	65	74	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81		0.5	100
	10	●	●	54	65	73	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	310	0.6	100

●: Available with/without strainer

How to order

Please inquire or order for a specific nozzle using this coding system.

①VVP/VP series

〈Example〉 1/4M VVP 11515 S303W

1/4M	VVP	115	15	S303	W
Pipe conn. size*4	Series	Spray angle code	Spray capacity code	Material*5	Strainer
■1/8M ≀ ■1M	■VVP ■VP	■115 ≀ ■15	■02 ≀ ■1500	■S303 ■B ■TPVDF ■PP-IN	■W (with strainer) ■(Blank denotes "without strainer")

②VVP series (Precision-molded stainless steel, small spray capacity)

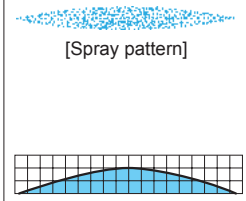
〈Example〉 1/4M VVP 6507 S316L-IN + WS303

1/4M	VVP	65	07	S316-IN +	W	S303
Pipe conn. size*4		Spray angle code	Spray capacity code		Strainer	Strainer material
■1/8M ■1/4M		■115 ≀ ■65	■03 ■04 ■05 ■07 ■10		■W (with strainer) ■(Blank denotes "without strainer")	■S303 ■S316

*4) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
*5) TPVDF is only for VP series. PP-IN is only for VVP series.

One-piece Structure
Standard Flat Spray Nozzles

UVVP



[Spray pattern]

[Spray distribution]

[Features]

- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- Made of ultrahigh molecular weight polyethylene, UVVP series features high wear resistance and keep stable performance as polishing nozzles over prolonged use.

[Standard pressure]

0.3 MPa

[Applications]

Polishing: Liquid honing, through-hole

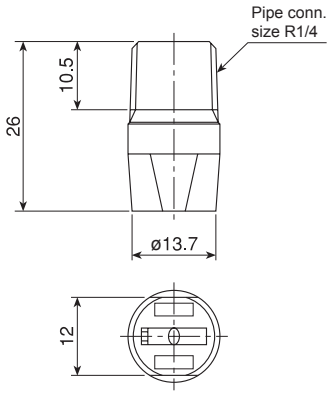
Others: Cleaning, spraying, cooling

UVVP series

	UVVP series
Structure	• Simple one-piece structure.
Material	• Ultrahigh molecular weight polyethylene (UPE)
Mass	• 2.5 g

[Note]

- Appearance and dimensions may differ slightly depending on materials and nozzle codes.
- The spread of the flat spray is parallel to the grooves.



Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)						Mean droplet diameter (μm)	Free passage diameter (mm)
	0.15 MPa	0.3 MPa	0.5 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
40	50	65	70	1.63	2.31	2.83	3.27	4.00	5.16	300–360	1.3
50	51	65	70	2.04	2.89	3.54	4.08	5.00	6.46		1.5

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M UVVP 6540 UPE

1/4M UVVP 65 40 UPE

Spray capacity code
- 40
- 50

Coin-shaped
Standard Flat Spray Nozzles

CVVP

[Spray pattern]

[Spray distribution]

[Features]

- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- In the shape of a thin coin, this nozzle does not protrude out of a pipe-surface, which makes it easy to accommodate nozzle headers in narrow spaces.

[Standard pressure]

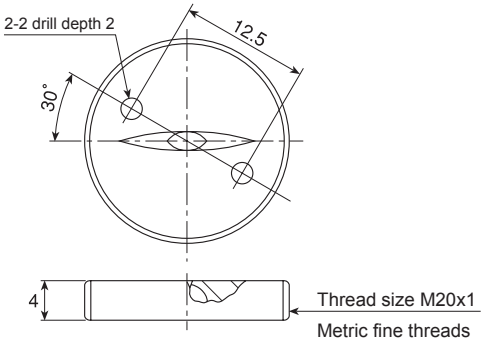
0.3 MPa

[Applications]

Cleaning: Felts, rolls, screens, filters, wires
Spraying: Lubricants, chemicals
Cooling: Steel plates and coils

CVVP series

	CVVP series
Structure	• One-piece structure with threaded outside edge.
Material	• S303 or S316
Mass	• 8.5 g



[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray angle code	Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)											Mean droplet dia. (μm)	Free passage dia. (mm)
		0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.07 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa		
90	10	78	90	99	0.41	0.48	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.24	2.58	210	0.5
	15	79	90	98	0.61	0.72	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.36	3.87		0.6
	20	80	90	97	0.82	0.97	1.15	1.41	1.63	2.00	2.58	3.06	3.65	4.47	5.16		0.7
	30	82	90	96	1.23	1.45	1.73	2.12	2.45	3.00	3.88	4.58	5.48	6.71	7.75	≀	0.9
	40	83	90	97	1.63	1.93	2.31	2.83	3.27	4.00	5.16	6.11	7.30	8.94	10.3		1.1
	50	83	90	97	2.04	2.42	2.89	3.54	4.08	5.00	6.46	7.64	9.13	11.2	12.9		1.2
	60	83	90	97	2.45	2.90	3.46	4.24	4.90	6.00	7.75	9.17	11.0	13.4	15.5		1.3
	80	84	90	97	3.27	3.86	4.62	5.66	6.53	8.00	10.3	12.2	14.6	17.9	20.6	420	1.5
80	10	69	80	87	0.41	0.48	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.24	2.58	210	0.5
	15	70	80	86	0.61	0.72	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.36	3.87		0.7
	20	71	80	86	0.82	0.97	1.15	1.41	1.63	2.00	2.58	3.06	3.65	4.47	5.16		0.8
	30	72	80	84	1.23	1.45	1.73	2.12	2.45	3.00	3.88	4.58	5.48	6.71	7.75	≀	1.0
	40	74	80	83	1.63	1.93	2.31	2.83	3.27	4.00	5.16	6.11	7.30	8.94	10.3		1.2
	50	74	80	83	2.04	2.42	2.89	3.54	4.08	5.00	6.46	7.64	9.13	11.2	12.9		1.4
	60	74	80	83	2.45	2.90	3.46	4.24	4.90	6.00	7.75	9.17	11.0	13.4	15.5		1.5
	80	74	80	83	3.27	3.86	4.62	5.66	6.53	8.00	10.3	12.2	14.6	17.9	20.6	430	1.7
65	10	53	65	72	0.41	0.48	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.24	2.58	230	0.6
	15	53	65	72	0.61	0.72	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.36	3.87		0.8
	20	54	65	72	0.82	0.97	1.15	1.41	1.63	2.00	2.58	3.06	3.65	4.47	5.16		0.9
	30	55	65	72	1.23	1.45	1.73	2.12	2.45	3.00	3.88	4.58	5.48	6.71	7.75	≀	1.1
	40	57	65	72	1.63	1.93	2.31	2.83	3.27	4.00	5.16	6.11	7.30	8.94	10.3		1.3
	50	58	65	72	2.04	2.42	2.89	3.54	4.08	5.00	6.46	7.64	9.13	11.2	12.9		1.5
	60	59	65	72	2.45	2.90	3.46	4.24	4.90	6.00	7.75	9.17	11.0	13.4	15.5		1.6
	80	62	65	72	3.27	3.86	4.62	5.66	6.53	8.00	10.3	12.2	14.6	17.9	20.6	450	1.9

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 M20x1 CVVP 9010 S303

M20x1 CVVP **90** **10** **S303**

Spray angle code	Spray capacity code	Material
■ 90	■ 10	■ S303
■ 80	≀	■ S316
■ 65	■ 80	

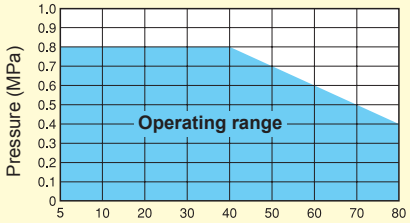
Quick-detachable Standard Flat Spray Nozzles

Plastic **INVV**

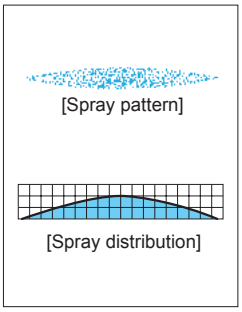
[Features]
- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- Made of high chemical and heat resistant PP (polypropylene).
- Quick-detachable design helps to significantly reduce maintenance time.
- Nozzle tips are color-coded by spray capacity for easy identification.

[Standard pressure]
0.3 MPa

[Maximum pressures at various temperatures]



Use within the operating range.



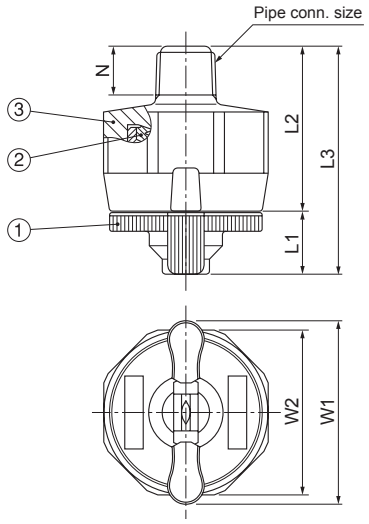
[Applications]
- Cleaning
- Etching
- Stripping
- Chemical treatment
- For periodic maintenance or for the applications where precise spray alignment is required

INVV series

	INVV series
Structure	• Two-piece structure comprising a nozzle tip (with packing) and an adaptor. • Easy installation and removal of the nozzle tip just by turning 60°.
Material	• Nozzle tip: PP • Adaptor: PP or PPS • Packing: FEPM

Pipe conn. size	Dimensions (mm)						Mass (g)	
	L1	L2	L3	W1	W2	N	PP	PPS
R1/8	10	27	37	30	27	8	9.0	12
R1/4	10	30	40	30	27	11.5	9.4	12
R3/8	10	30	40	30	27	12	10.3	14

[Note]
- **INVV series nozzles are not compatible with the discontinued ISVV series.**
- Appearance and dimensions may differ slightly depending on materials and nozzle codes.
- Tab line conforms with the flat spray spread direction.



①Nozzle tip ②Packing (FEPM) ③Adaptor

Spray angle code	Spray capacity code	Pipe connection size			Spray angle (°)			Spray capacity (ℓ/min)							Mean drop. dia. (μm)	Free pass. dia. (mm)	Color of nozzle tip
		R1/8	R1/4	R3/8	0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa			
115	05	○	○	○	102	115	124	—	0.29	0.35	0.41	0.50	0.65	0.76	160	0.3	
	07	○	○	○	103	115	124	—	0.40	0.49	0.57	0.70	0.90	1.07		0.3	
	10	○	○	○	103	115	124	0.41	0.58	0.71	0.82	1.00	1.29	1.53		0.4	
	15	○	○	○	104	115	123	0.61	0.87	1.06	1.23	1.50	1.94	2.29		0.5	
	20	○	○	○	104	115	123	0.82	1.15	1.41	1.63	2.00	2.58	3.06	≀	0.6	
	30	○	○	○	105	115	122	1.23	1.73	2.12	2.45	3.00	3.88	4.58		0.8	
	40	○	○	○	106	115	122	1.63	2.31	2.83	3.27	4.00	5.16	6.11		0.8	
	50	○	○	○	106	115	122	2.04	2.89	3.54	4.08	5.00	6.46	7.64	300	0.9	
90	05	○	○	○	77	90	100	—	0.29	0.35	0.41	0.50	0.65	0.76	170	0.3	
	07	○	○	○	78	90	100	—	0.40	0.49	0.57	0.70	0.90	1.07		0.4	
	10	○	○	○	78	90	99	0.41	0.58	0.71	0.82	1.00	1.29	1.53		0.5	
	15	○	○	○	79	90	99	0.61	0.87	1.06	1.23	1.50	1.94	2.29		0.6	
	20	○	○	○	79	90	98	0.82	1.15	1.41	1.63	2.00	2.58	3.06	≀	0.7	
	30	○	○	○	80	90	97	1.23	1.73	2.12	2.45	3.00	3.88	4.58		0.9	
	40	○	○	○	81	90	97	1.63	2.31	2.83	3.27	4.00	5.16	6.11		1.1	
	50	○	○	○	81	90	97	2.04	2.89	3.54	4.08	5.00	6.46	7.64	300	1.2	
65	05	○	○	○	52	65	74	—	0.29	0.35	0.41	0.50	0.65	0.76	190	0.4	
	07	○	○	○	53	65	74	—	0.40	0.49	0.57	0.70	0.90	1.07		0.5	
	10	○	○	○	54	65	73	0.41	0.58	0.71	0.82	1.00	1.29	1.53		0.6	
	15	○	○	○	54	65	73	0.61	0.87	1.06	1.23	1.50	1.94	2.29		0.8	
	20	○	○	○	55	65	72	0.82	1.15	1.41	1.63	2.00	2.58	3.06	≀	0.9	
	30	○	○	○	56	65	72	1.23	1.73	2.12	2.45	3.00	3.88	4.58		1.1	

Spray angle code	Spray capacity code	Pipe connection size			Spray angle (°)			Spray capacity (ℓ/min)							Mean drop. dia. (μm)	Free pass. dia. (mm)	Color of nozzle tip
		R1/8	R1/4	R3/8	0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa			
65	40	○	○	○	56	65	71	1.63	2.31	2.83	3.27	4.00	5.16	6.11		1.3	
	50	○	○	○	57	65	71	2.04	2.89	3.54	4.08	5.00	6.46	7.64	350	1.5	
50	05	○	○	○	38	50	59	—	0.29	0.35	0.41	0.50	0.65	0.76	210	0.4	
	07	○	○	○	38	50	58	—	0.40	0.49	0.57	0.70	0.90	1.07		0.5	
	10	○	○	○	40	50	58	0.41	0.58	0.71	0.82	1.00	1.29	1.53		0.6	
	15	○	○	○	40	50	57	0.61	0.87	1.06	1.23	1.50	1.94	2.29	∫	0.8	
	20	○	○	○	41	50	57	0.82	1.15	1.41	1.63	2.00	2.58	3.06		1.0	
	30	○	○	○	42	50	56	1.23	1.73	2.12	2.45	3.00	3.88	4.58		1.2	
	40	○	○	○	42	50	56	1.63	2.31	2.83	3.27	4.00	5.16	6.11		1.4	
	50	○	○	○	43	50	55	2.04	2.89	3.54	4.08	5.00	6.46	7.64	400	1.6	

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/8M INVV 9030 PP (FEPM) + PP

1/8M INVV 90 30 PP (FEPM) + PP

- Pipe conn. size*: 1/8M, 1/4M, 3/8M
- Spray angle code: 115 ∫ 50
- Spray capacity code: 05 ∫ 50
- Adaptor material: PP, PPS

②Nozzle tip only (with packing)

〈Example〉 INVV 9030 PP (FEPM)

INVV 90 30 PP (FEPM)

- Spray angle code: 115 ∫ 50
- Spray capacity code: 05 ∫ 50

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

ALSO AVAILABLE!

Quick-detachable
Off-center Even Flat
Spray Nozzles
INOVVE series
See p.41 of this catalog.

Quick-detachable
Full Cone
Spray Nozzles
INJJX series
See p.69 of this catalog.

Quick-detachable Nozzle Connector INCO

Photo is INCO with a wide-angle flat spray nozzle YYP series.

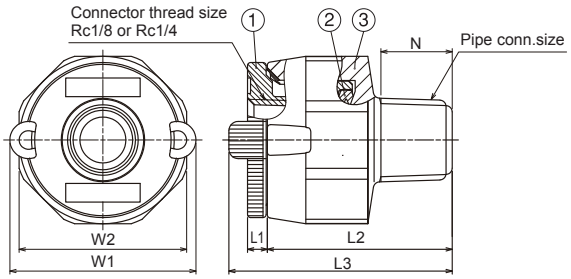
[Features]

- Easy installation and removal just by attaching a nozzle to this connector.
- Made of high chemical and heat resistant plastic.
- R1/4 or R1/8 threaded nozzles are attachable.

INCO series

	INCO series
Structure	• Two-piece structure including a connector and an adaptor. • Easy installation and removal of the connector just by turning 60°.
Material	• Connector: PP • Adaptor: PP or PPS • Packing: FEPM

Pipe conn. size	Dimensions (mm)						Mass (g)	
	L1	L2	L3	W1	W2	N	PP	PPS
R1/8	3	27	33	30	27	8	9	12
R1/4	3	30	36	30	27	11.5	10	13
R3/8	3	30	36	30	27	12	11	14



①Nozzle connector ②Packing (FEPM) ③Adaptor

[Note] Appearance and dimensions may differ slightly depending on materials and connector codes.

How to order

Please inquire or order for a specific nozzle connector using this coding system.

①Complete assemblies

〈Example〉 INCO 1/4M×1/8F PP (FEPM) + PP

INCO 1/4M × 1/8F PP (FEPM) + PP

- Pipe conn. size*: 1/8M, 1/4M, 3/8M
- Connector thread size*: 1/8F, 1/4F
- Adaptor material: PP, PPS

②Nozzle connector only (with packing)

〈Example〉 INCO 1/8F PP (FEPM)

INCO 1/8F PP (FEPM)

- Connector thread size*: 1/8F, 1/4F

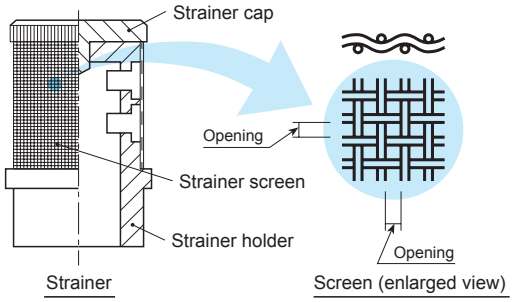
*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard).

Effective Use of Standard Flat Spray Nozzles

Strainer Mesh Size

The strainer fitted inside the nozzle comprises strainer holder, strainer screen, and strainer cap.

Strainer mesh size	Opening (mm)	Free passage diameter (mm)
#200	0.07	0.2 or less
#150	0.10	0.3–0.4
#100	0.15	0.5–0.7
#50	0.30	0.8–0.9

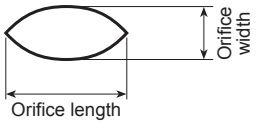


Advantages and Disadvantages of Ceramic Nozzles

- CERJET® Ceramic Nozzle can resist most acids and strong corrosive liquid except for hydrofluoric acid and strong alkalis (pH 12 or higher).
- CERJET® Ceramic Nozzle has high wear resistance (its hardness Mohs scale 7), several hundred times that of brass and 20–30 times that of stainless steel. It is well-suited for high pressure cleaning. However, it is brittle and may crack by quenching or sudden temperature drops of more than 200˚C.
- For most of our spray nozzles with ceramic orifice inserted, epoxy resin adhesive (Araldite®) is used for bonding a ceramic orifice to a metal part. In applications where epoxy resin is not suitable, we recommend our CERTIIM®, a plastic nozzle with a one-shot injection molded ceramic orifice.

Free Passage Diameter

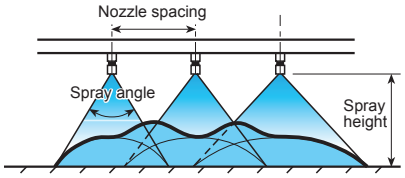
The standard flat spray nozzle orifice has a cat-eye shape. The free passage diameter is the orifice width multiplied with a safety factor.



Spray Distribution

Our standard flat spray nozzles are designed to produce a mountain-shaped distribution in order to obtain a uniform spray distribution in a multiple-nozzle arrangement.
Although the distribution depends on spray height, nozzle spacing, liquid pressure, and liquid nature, it is not possible to get the desired spray distribution if spray nozzles have some variation in product quality. IKEUCHI's hydraulic spray nozzles are guaranteed for spray angles and spray capacities so that uniform distribution is maintained as designed.

① Spray distribution of nozzles with no quality guarantee

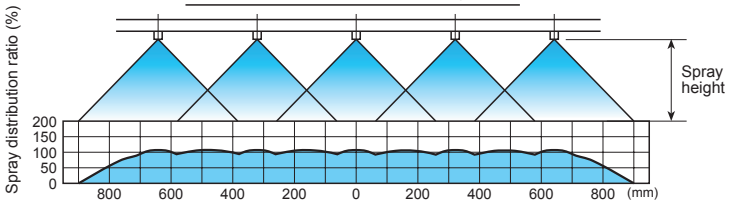


Uniform distribution is not obtained.

② Spray distribution of IKEUCHI nozzles with quality guarantee

When using our nozzles with spray performance guaranteed, uniform distribution is formed by overlapping mountain-shaped distributions.

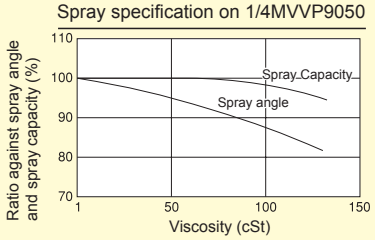
Example of multiple-nozzle arrangement



Viscosity

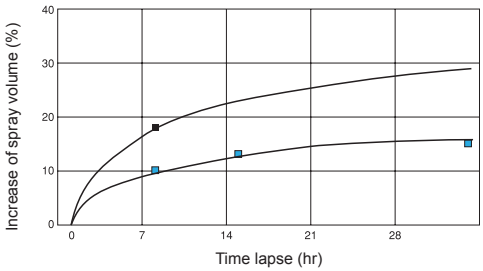
There is a tendency for spray capacity and spray angle to be decreased and also for spray distribution to deteriorate if the viscosity of the liquid is increased. The resistance of liquid in the pipe is also increased. When spraying such liquids, pressure drop in the pipe must be also taken into consideration.

Spray specification on 1/4MVVP9050



Comparison of Wear-resistance

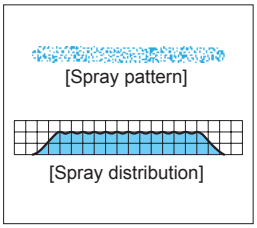
Shown below is the comparison of wear-resistance between a UVVP series flat spray nozzle and our conventional type.



■ Conventional type
■ UVVP series

Pressure: 0.3 MPa
Test liquid: $A\ell_2O_3$ (#200) in water
Percentage of $A\ell_2O_3$: 20wt%

Even Flat Spray Nozzles VE/VEP



[Features]

- Flat spray pattern with uniform distribution throughout pattern area.
- Even spray impact across the entire spray area.

[Standard Pressure]

0.3 MPa

[Applications]

Cleaning: Automotives, containers, films, felts, filters, screens, bottles, crushed stones, earth and sand, metal parts, machines, steel plates, steel pieces, wires

Spraying: Etchants, oils, lubricants, liquids, solutions, insecticides, herbicides

Cooling: Gas, smokes, heat exchangers, tanks, steels, roofs

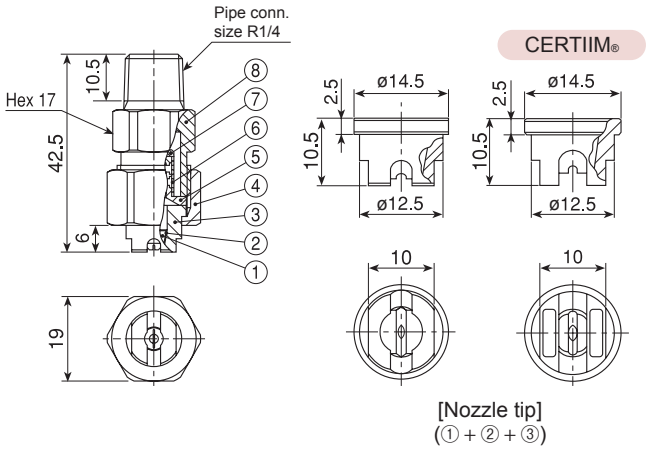
Water screen: Fire protection, heat protection, dust suppression, deodorization

VE series (three-piece structure)

	VE series (with ceramic orifice inserted)
Structure	• Three-piece structure with ceramic orifice inserted. • Comprises three parts: Nozzle tip, cap, and adaptor. Worn-out nozzle tip can be replaced separately. • Small spray capacity models come with or without a removable strainer. • CERTIIM® is an one-shot injection molded nozzle tip created by molding the precision-made ceramic orifice into a plastic retainer.
Material	• Nozzle orifice: ceramic • Tip retainer: S303, B (brass), or PVDF • Cap, Adaptor, and Strainer: S303 or B (brass) • Optional material: S316 or others
Mass	• Complete assemblies*1 S303: 49 g, B (brass): 53 g • Nozzle tip S303: 6.5 g, B (brass): 7 g CERTIIM®: 2 g

*1) When with a strainer, add 2–5 g to the above mass and 2 mm to the total length.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



Ⓐ **Nozzle** (①Ceramic orifice ②Adhesive: Araldite® ③Tip retainer ④Cap ⑧Adaptor)

Ⓑ **Strainer** (⑤Strainer holder ⑥Strainer screen [S316] ⑦Strainer cap)

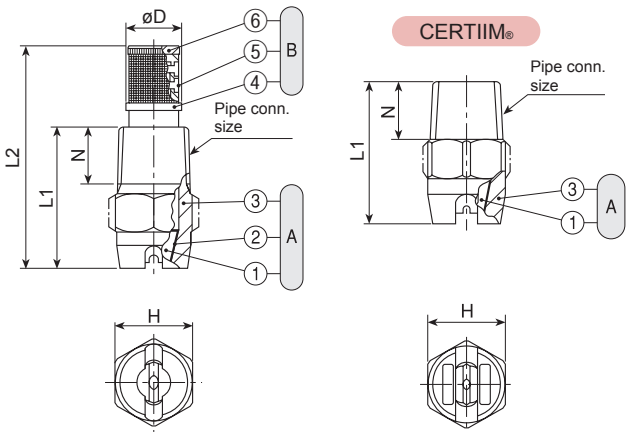
VEP series (one-piece structure)

	VEP series (with ceramic orifice inserted)
Structure	• Ceramic orifice is inserted and adhered into a metal or plastic body. • Small spray capacity models of metal VEP come with or without a strainer. • CERTIIM® is a plastic spray nozzle with a one-shot injection molded ceramic orifice.
Material	• Nozzle orifice: ceramic • Metal parts: S303 or B (brass) • CERTIIM®'s plastic body: PVDF • Optional material: S316 or others

Pipe conn. size	Dimensions (mm)					Mass*1(g)		
	L1	L2	H	øD	N	S303	B	CERTIIM®
R1/8	16.5	30	12	7.5	6.5	8	9	—
R1/4	26	40	14	10	10.5	20	22	—
R3/8	30	—	19	—	11	33	35	—
R1/2	38	—	23	—	14	57	62	—
CERTIIM® R1/8	22	—	12	—	8.5	—	—	2.1
CERTIIM® R1/4	26	—	14	—	10.5	—	—	6

*1) When with a strainer, add 2–5 g to the above mass.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



Ⓐ **Nozzle** (①Ceramic orifice ②Adhesive: Araldite® ③Nozzle Body)

Ⓑ **Strainer** (④Strainer holder ⑤Strainer screen [S316] ⑥Strainer cap)

Spray angle code	Spray capacity code	Pipe connection size: VE Metal	VE CER-TIIM®	VEP Metal				VEP CER-TIIM®		Spray angle (°): 0.15 MPa	0.3 MPa	0.7 MPa	Spray capacity (ℓ/min): 0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	3 MPa	5 MPa	Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
		R1/4	R1/4	R1/8	R1/4	R3/8	R1/2	R1/8	R1/4																	
115	19	●	○		●				○	104	115	122	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.47	4.91	6.00	7.76	240	0.5	100
	23	●	○		●				○	105	115	122	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39		0.6	100
	31	●	○		●				○	105	115	122	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7		0.6	100
	36	●	○		●				○	105	115	122	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		0.7	50
	39	●	○		●				○	105	115	122	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9	≀	0.7	50
	59	●	○		●				○	105	115	122	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		0.9	50
	78	○	○		○				○	106	115	121	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		1.0	—
	117	○	○		○				○	106	115	120	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		1.2	—
	157	○	○		○				○	106	115	120	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		1.4	—
	196					○				108	115	120	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	450	1.6	—
	235					○				108	115	118	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	1.7	—
	274					○				108	115	118	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		1.9	—
	314						○			108	115	118	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	510	2.0	—
	392						○			108	115	118	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	2.2	—
	469						○			108	115	118	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	640	2.4	—
90	03	●	○	●	●			○	○	78	90	101	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	0.95	1.22	140	0.2	200
	04	●	○	●	●			○	○	79	90	101	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	1.26	1.63		0.2	200
	05	●	○	●	●			○	○	79	90	101	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	1.58	2.04		0.3	150
	07	●	○	●	●			○	○	80	90	101	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	2.21	2.86	≀	0.3	150
	10	●	○	●	●			○	○	80	90	100	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	3.16	4.08		0.4	150
	15	●	○	●	●			○	○	82	90	100	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87	4.74	6.12		0.4	150
	19	●	○		●				○	82	90	98	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.47	4.91	6.00	7.76	250	0.7	50
	23	●	○		●				○	82	90	98	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39		0.7	50
	31	●	○		●				○	83	90	97	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7		0.9	50
	36	○	○		○				○	83	90	97	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.0	—
	39	○	○		○				○	83	90	97	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9	≀	1.0	—
	59	○	○		○				○	83	90	97	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		1.2	—
	78	○	○		○				○	84	90	97	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		1.4	—
	117	○	○		○				○	84	90	96	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		1.7	—
	157	○	○		○				○	84	90	96	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		2.0	—
	196					○				84	90	96	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	480	2.2	—
	235					○				85	90	95	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	2.4	—
	274					○				85	90	95	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		2.6	—
	314						○			85	90	94	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	540	2.8	—
	392						○			85	90	94	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	3.1	—
	469						○			85	90	94	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	680	3.4	—
80	19	●	○		●				○	72	80	84	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.47	4.91	6.00	7.76	260	0.7	50
	23	●	○		●				○	72	80	84	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39		0.8	50
	31	●	○		●				○	72	80	84	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7		0.9	50
	36	○	○		○				○	72	80	84	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.0	—
	39	○	○		○				○	73	80	84	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9	≀	1.0	—
	59	○	○		○				○	74	80	84	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		1.3	—
	78	○	○		○				○	74	80	84	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		1.6	—
	117	○	○		○				○	75	80	84	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		1.9	—
	157	○	○		○				○	76	80	84	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		2.4	—
	196					○				76	80	83	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	490	2.6	—
	235					○				76	80	83	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	3.1	—
	274					○				76	80	83	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		3.3	—
	314						○			76	80	83	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	560	3.3	—
	392						○			76	80	83	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	3.7	—
	469						○			76	80	83	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	700	4.3	—
65	03	●	○	●	●			○	○	54	65	76	—	0.17	0.21	0.24	0.30	0.39	0.46	0.55	0.77	0.95	1.22	150	0.3	150
	04	●	○	●	●			○	○	54	65	76	—	0.23	0.28	0.33	0.40	0.52	0.61	0.73	1.03	1.26	1.63		0.3	150
	05	●	○	●	●			○	○	54	65	75	—	0.29	0.35	0.41	0.50	0.65	0.76	0.91	1.29	1.58	2.04		0.4	150
	07	●	○	●	●			○	○	55	65	75	—	0.40	0.49	0.57	0.70	0.90	1.07	1.28	1.81	2.21	2.86	≀	0.4	150
	10	●	○	●	●			○	○	56	65	74	0.41	0.58	0.71	0.82	1.00	1.29	1.53	1.83	2.58	3.16	4.08		0.5	100
	15	●	○	●	●			○	○	56	65	74	0.61	0.87	1.06	1.23	1.50	1.94	2.29	2.74	3.87	4.74	6.12		0.5	100
	19	●	○		●				○	57	65	73	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.47	4.91	6.00	7.76	270	0.8	50
	23	●	○		●				○	57	65	73	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39		0.9	50
	31	○	○		○				○	57	65	73	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7		1.1	—
	36	○	○		○				○	57	65	73	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.2	—
	39	○	○		○				○	57	65	73	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9	≀	1.3	—
	59	○	○		○				○	58	65	72	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		1.4	—
	78	○	○		○				○	58	65	72	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		1.8	—
	117	○	○		○				○	58	65	69	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.3	—
	157	○	○		○				○	58	65	69	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		2.7	—
	196					○				60	65	69	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	520	2.9	—
	235					○				60	65	69	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	3.4	—
	274					○				60	65	69	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		3.6	—
	314						○			60	65	69	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	590	3.7	—
	392						○			60	65	69	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	4.4	—
	469						○			60	65	68	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	740	4.4	—

●: Available with/without strainer ○: Available without strainer

Spray angle code	Spray capacity code	Pipe connection size								Spray angle (°)			Spray capacity (ℓ/min)											Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
		VE		VEP																						
		Metal	CER-TIIM®	Metal				CER-TIIM®		0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	3 MPa	5 MPa			
		R1/4	R1/4	R1/8	R1/4	R3/8	R1/2	R1/8	R1/4																	
50	19	●	○		●				○	43	50	56	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.47	4.91	6.00	7.76	300	0.9	50
	31	○	○		○				○	43	50	55	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7		1.2	—
	39	○	○		○				○	43	50	55	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9		1.4	—
	59	○	○		○				○	43	50	55	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1	≀	1.5	—
	78	○	○		○				○	43	50	55	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		2.0	—
	117	○	○		○				○	43	50	54	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.4	—
	157	○	○		○				○	43	50	54	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		2.9	—
	196					○				43	50	53	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	570	3.3	—
	235					○				43	50	53	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	3.7	—
	274					○				43	50	53	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		4.0	—
	314						○			44	50	52	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	650	4.4	—
	392						○			44	50	52	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	4.7	—
	469						○			44	50	52	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	850	5.0	—
40	23	○	○		○				○	31	40	46	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39	350	1.1	—
	36	○	○		○				○	32	40	45	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.4	—
	59	○	○		○				○	32	40	45	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		1.8	—
	78	○	○		○				○	33	40	45	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8	≀	2.1	—
	117	○	○		○				○	33	40	44	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.6	—
	157	○	○		○				○	33	40	44	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		3.0	—
	196					○				33	40	43	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	630	3.6	—
	235					○				33	40	43	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	3.7	—
	274					○				33	40	43	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		4.1	—
	314						○			33	40	43	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	720	4.3	—
	392						○			33	40	43	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	4.8	—
	469						○			34	40	43	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	900	5.5	—
25	19	○	○		○				○	18	25	32	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.47	4.91	6.00	7.76	390	1.1	—
	31	○	○		○				○	19	25	32	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7		1.4	—
	39	○	○		○				○	20	25	32	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9		1.5	—
	59	○	○		○				○	21	25	32	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1	≀	1.9	—
	78	○	○		○				○	21	25	32	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		2.3	—
	117	○	○		○				○	21	25	32	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.7	—
	157	○	○		○				○	21	25	32	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		3.4	—
	196					○				21	25	32	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	730	3.7	—
	235					○				21	25	31	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	4.0	—
	274					○				21	25	31	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		4.5	—
	314						○			21	25	31	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	800	4.8	—
	392						○			21	25	31	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	5.1	—
	469						○			21	25	31	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	1,050	5.5	—
15	23	○	○		○				○	10	15	19	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39	500	1.3	—
	36	○	○		○				○	10	15	19	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.6	—
	59	○	○		○				○	10	15	19	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		2.0	—
	78	○	○		○				○	10	15	19	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8	≀	2.4	—
	117	○	○		○				○	10	15	19	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		3.0	—
	157	○	○		○				○	12	15	19	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1		3.5	—
	196					○				13	15	19	8.00	11.3	13.9	16.0	19.6	25.3	30.0	35.8	50.6	62.0	80.0	850	3.8	—
	235					○				13	15	19	9.54	13.6	16.6	19.2	23.5	30.3	35.9	42.9	60.7	74.3	95.9	≀	4.3	—
	274					○				13	15	19	11.2	15.8	19.4	22.4	27.4	35.4	41.9	50.0	70.7	86.6	112		4.7	—
	314						○			13	15	19	12.8	18.1	22.2	25.6	31.4	40.5	48.0	57.3	81.1	99.3	128	950	5.2	—
	392						○			13	15	19	16.0	22.6	27.7	32.0	39.2	50.6	60.0	71.6	101	124	160	≀	5.4	—
	469						○			13	15	18	19.1	27.0	33.2	38.4	46.9	60.7	71.8	85.6	121	149	192	1,250	5.8	—

●: Available with/without strainer ○: Available without strainer

How to order VE series

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/4M VE 11519 S303W

1/4M VE	115	19	S303	W
	Spray angle code	Spray capacity code	Material	Strainer
	■ 115 ≀ ■ 15	■ 03 ≀ ■ 157	■ S303 ■ B	■ W (with strainer) ■ (Blank denotes "without strainer")

②Nozzle tip only

〈Example〉 1/4 VE 11519 S303

1/4 VE	115	19	S303
	Spray angle code	Spray capacity code	Material
	■ 115 ≀ ■ 15	■ 03 ≀ ■ 157	■ S303 ■ B ■ TPVDF

How to order VEP series

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M VEP 11519 S303W

1/4M	VEP	115	19	S303	W
Pipe conn. size*2		Spray angle code	Spray capacity code*3	Material	Strainer*4
■ 1/8M ■ 1/4M ■ 3/8M ■ 1/2M		■ 115 ≀ ■ 15	■ 03 ≀ ■ 469	■ S303 ■ B ■ TPVDF	■ W (with strainer) ■ (Blank denotes "without strainer")

*2) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

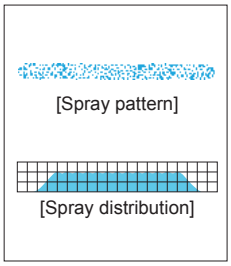
*3) When spray capacity code is 03, 04, or 05, "(AL99)" is indicated at the end of nozzle description.
〈Example〉 1/4MVEP9003S303W (AL99)

*4) No strainer for VEP-TPVDF.

Quick-detachable
Even Flat Spray Nozzles

Stainless Steel

INVE



[Features]

- Flat spray pattern with uniform distribution throughout pattern area.
- Easy mounting/dismounting with a knurled tab.
- Quick-detachable design helps to significantly reduce maintenance time.

[Standard pressure]

0.3 MPa

[Applications]

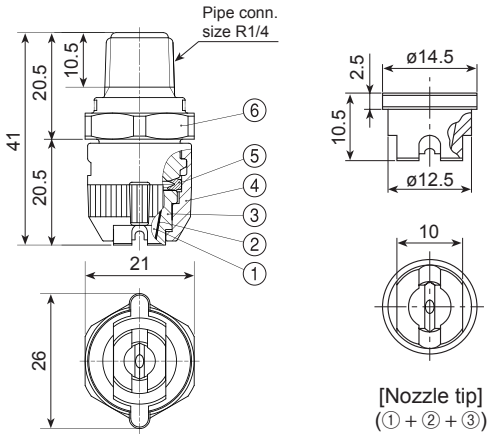
Cleaning: Automotives, containers, films, felts, filters, screens, bottles, crushed stones, earth and sand, metal parts, machines, steel plates and pieces, wires
Spraying: Oils, lubricants, glues, insecticides, herbicides
Cooling: Tanks, roofs
Water screen: Dust suppression, deodorization

INVE series

	INVE series (with ceramic orifice inserted)
Structure	● Includes a ceramic orifice in the nozzle tip. ● Comprises a nozzle part (nozzle tip + cap + packing) and an adaptor. ● Worn-out nozzle tip and other parts are individually available for replacement. ● The nozzle part can be removed and installed simply by turning 90° with one hand. ● Tip or packing will not fall off when removing the nozzle part.
Material	● Nozzle orifice: Ceramic ● Tip retainer: S303 ● Cap and Adaptor: S316L equivalent ● Packing: FEPM
Mass	● Complete assemblies: 51 g ● Nozzle tip: 6.5 g

Heat resistance temperature: 60°C
Withstanding pressure: 2.0 MPa

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Adhesive: Araldite® ③Tip retainer
④Cap ⑤Packing ⑥Adaptor

Common features of INVV-SS, INV, and INVE series

Easy installation and removal just by turning the nozzle manually!

Stainless steel types have been newly added to our quick-detachable IN series. See pages 15–16 for INVV-SS and INV series nozzles.

Spray angle code	Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)											Mean droplet diameter (μm)	Free passage diameter (mm)
		0.15 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	3 MPa	5 MPa		
115	78	106	115	121	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8	350	1.0
	117	106	115	120	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8	⟆	1.2
	157	106	115	120	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	450	1.4
90	36	83	90	97	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6	300	1.0
	39	83	90	97	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9		1.0
	59	83	90	97	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1	⟆	1.2
	78	84	90	97	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		1.4
	117	84	90	96	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		1.7
	157	84	90	96	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	480	2.0
80	36	72	80	84	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6	310	1.0
	39	73	80	84	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9		1.0
	59	74	80	84	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		1.3
	78	74	80	84	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8	⟆	1.6
	117	75	80	84	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		1.9
	157	76	80	84	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	490	2.4
65	31	57	65	73	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7	310	1.1
	36	57	65	73	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.2
	39	57	65	73	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9		1.3
	59	58	65	72	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1	⟆	1.4
	78	58	65	72	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		1.8
	117	58	65	69	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.3
	157	58	65	69	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	520	2.7
50	31	43	50	55	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7	350	1.2
	39	43	50	55	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9		1.4
	59	43	50	55	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1	⟆	1.5
	78	43	50	55	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		2.0
	117	43	50	54	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.4
	157	43	50	54	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	570	2.9
40	23	31	40	46	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39	350	1.1
	36	32	40	45	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.4
	59	32	40	45	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1	⟆	1.8
	78	33	40	45	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		2.1
	117	33	40	44	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.6
	157	33	40	44	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	630	3.0
25	19	18	25	32	0.78	1.10	1.34	1.55	1.90	2.45	2.90	3.47	4.91	6.00	7.76	390	1.1
	31	19	25	32	1.26	1.79	2.19	2.53	3.10	4.00	4.74	5.66	8.00	9.80	12.7		1.4
	39	20	25	32	1.59	2.25	2.76	3.18	3.90	5.03	5.96	7.12	10.1	12.3	15.9		1.5
	59	21	25	32	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1	⟆	1.9
	78	21	25	32	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8		2.3
	117	21	25	32	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		2.7
	157	21	25	32	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	730	3.4
15	23	10	15	19	0.94	1.33	1.63	1.88	2.30	2.97	3.51	4.20	5.94	7.27	9.39	500	1.3
	36	10	15	19	1.47	2.08	2.55	2.94	3.60	4.65	5.50	6.57	9.30	11.4	14.6		1.6
	59	10	15	19	2.40	3.41	4.17	4.82	5.90	7.62	9.01	10.8	15.2	18.6	24.1		2.0
	78	10	15	19	3.18	4.50	5.52	6.37	7.80	10.1	11.9	14.2	20.1	24.7	31.8	⟆	2.4
	117	10	15	19	4.78	6.75	8.27	9.55	11.7	15.1	17.8	21.4	30.2	37.0	47.8		3.0
	157	12	15	19	6.41	9.06	11.1	12.8	15.7	20.3	24.0	28.0	40.5	49.6	64.1	850	3.5

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/4M INVE 11578 S303 (FEPM) + S316L-IN

1/4M INVE 115 78 S303 (FEPM) + S316L-IN

- 115 (Spray angle code) ⟆ 15
- 19 (Spray capacity code) ⟆ 157

②Nozzle tip only

〈Example〉 1/4M VE 11578 S303

1/4 VE 115 78 S303

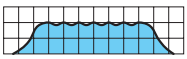
- 115 (Spray angle code) ⟆ 15
- 19 (Spray capacity code) ⟆ 157

Note: Nozzle tips of INVE series are the same as those used on **VE** series.

High Pressure Cleaning
Even Flat Spray Nozzles

VNP

[Spray pattern]



[Spray distribution]

[Features]
- Flat spray pattern with uniform distribution throughout pattern area.
- Small R1/4 and R1/8 pipe connection sizes for high pressure cleaning.

[Standard Pressure]
3 MPa

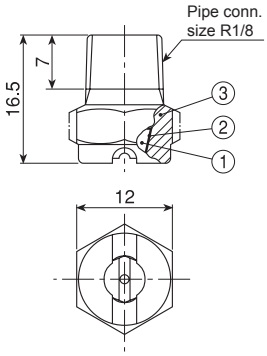
[Applications]
High pressure cleaning:
Automotives, containers, tanks, wire and felt parts of paper making machines, wire cylinders, filter presses, other industrial cleaning and degreasing

VNP series

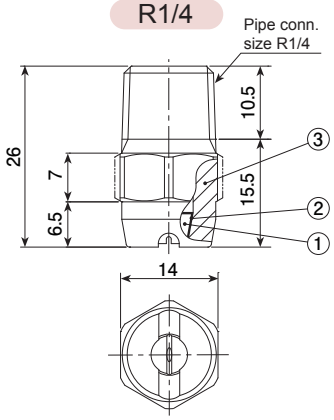
	VNP series (with ceramic orifice inserted)
Structure	• Ceramic orifice is inserted and adhered into a metal body.
Material	• Nozzle orifice: ceramic • Metal parts: S303 or B (brass) • Optional material: S316
Mass	• R1/8...S303: 7 g, B (brass): 7.4 g • R1/4...S303: 20 g, B (brass): 22 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

R1/8



R1/4



①Ceramic orifice ②Adhesive: Araldite® ③Nozzle body

Spray angle code	Spray capacity code	Pipe conn. size R1/8	Pipe conn. size R1/4	Spray angle (°) 1 MPa	Spray angle (°) 3 MPa	Spray angle (°) 5 MPa	Spray capacity (ℓ/min) 1 MPa	2 MPa	2.5 MPa	3 MPa	3.5 MPa	4 MPa	4.5 MPa	5 MPa	6.5 MPa	8 MPa	10 MPa	15 MPa	Free pass. dia. (mm)
65	43	○	○	60	65	65	2.50	3.54	3.96	4.33	4.68	5.00	5.30	5.59	6.37	7.06	7.91	9.67	0.7
	49	○	○	60	65	65	2.86	4.04	4.52	4.94	5.34	5.71	6.06	6.38	7.28	8.07	9.04	11.1	0.8
	56	○	○	60	65	65	3.22	4.54	5.08	5.56	6.01	6.42	6.81	7.18	8.19	9.08	10.2	12.4	0.9
	62	○	○	60	65	65	3.57	5.05	5.65	6.18	6.68	7.14	7.57	7.98	9.10	10.1	11.3	13.8	0.9
	68	○	○	60	65	65	3.93	5.55	6.21	6.80	7.35	7.85	8.33	8.79	10.0	11.1	12.4	15.2	1.0
	74	○	○	60	65	65	4.29	6.06	6.78	7.42	8.01	8.56	9.09	9.58	10.9	12.1	13.6	16.6	1.0
	80	○	○	60	65	65	4.65	6.56	7.35	8.04	8.68	9.28	9.85	10.4	11.8	13.1	14.7	18.0	1.0
	87	○	○	60	65	65	5.00	7.07	7.91	8.66	9.35	10.0	10.6	11.2	12.8	14.1	15.8	19.4	1.1
	99	○	○	60	65	65	5.72	8.08	9.04	9.89	10.7	11.4	12.1	12.8	14.6	16.2	18.1	22.1	1.1
	124	○	○	60	65	65	7.15	10.1	11.3	12.4	13.4	14.3	15.2	16.0	18.2	20.2	22.6	27.7	1.3
40	25	○	○	35	40	40	1.43	2.02	2.25	2.47	2.67	2.85	3.03	3.19	3.64	4.03	4.51	5.52	0.6
	31	○	○	35	40	40	1.78	2.52	2.82	3.09	3.34	3.57	3.78	3.99	4.55	5.05	5.64	6.91	0.7
	37	○	○	35	40	40	2.14	3.03	3.39	3.71	4.01	4.28	4.54	4.79	5.46	6.06	6.77	8.30	0.7
	43	○	○	35	40	40	2.50	3.54	3.96	4.33	4.68	5.00	5.30	5.59	6.37	7.06	7.91	9.67	0.8
	49	○	○	35	40	40	2.86	4.04	4.52	4.94	5.34	5.71	6.06	6.38	7.28	8.07	9.04	11.1	1.0
	56	○	○	35	40	40	3.22	4.54	5.08	5.56	6.01	6.42	6.81	7.18	8.19	9.08	10.2	12.4	1.0
	62	○	○	35	40	40	3.57	5.05	5.65	6.18	6.68	7.14	7.57	7.98	9.10	10.1	11.3	13.8	1.1
	68	○	○	35	40	40	3.93	5.55	6.21	6.80	7.35	7.85	8.33	8.79	10.0	11.1	12.4	15.2	1.1
	74	○	○	35	40	40	4.29	6.06	6.78	7.42	8.01	8.56	9.09	9.58	10.9	12.1	13.6	16.6	1.1
	80	○	○	35	40	40	4.65	6.56	7.35	8.04	8.68	9.28	9.85	10.4	11.8	13.1	14.7	18.0	1.2
	87	○	○	35	40	40	5.00	7.07	7.91	8.66	9.35	10.0	10.6	11.2	12.8	14.1	15.8	19.4	1.2
	99	○	○	35	40	40	5.72	8.08	9.04	9.89	10.7	11.4	12.1	12.8	14.6	16.2	18.1	22.1	1.4
	124	○	○	35	40	40	7.15	10.1	11.3	12.4	13.4	14.3	15.2	16.0	18.2	20.2	22.6	27.7	1.5
30	25	○	○	26	30	30	1.43	2.02	2.25	2.47	2.67	2.85	3.03	3.19	3.64	4.03	4.51	5.52	0.6
	31	○	○	26	30	30	1.78	2.52	2.82	3.09	3.34	3.57	3.78	3.99	4.55	5.05	5.64	6.91	0.7
	37	○	○	26	30	30	2.14	3.03	3.39	3.71	4.01	4.28	4.54	4.79	5.46	6.06	6.77	8.30	0.8
	43	○	○	26	30	30	2.50	3.54	3.96	4.33	4.68	5.00	5.30	5.59	6.37	7.06	7.91	9.67	0.9
	49	○	○	26	30	30	2.86	4.04	4.52	4.94	5.34	5.71	6.06	6.38	7.28	8.07	9.04	11.1	1.0
	56	○	○	26	30	30	3.22	4.54	5.08	5.56	6.01	6.42	6.81	7.18	8.19	9.08	10.2	12.4	1.1
	62	○	○	26	30	30	3.57	5.05	5.65	6.18	6.68	7.14	7.57	7.98	9.10	10.1	11.3	13.8	1.1
	68	○	○	26	30	30	3.93	5.55	6.21	6.80	7.35	7.85	8.33	8.79	10.0	11.1	12.4	15.2	1.1
	74	○	○	26	30	30	4.29	6.06	6.78	7.42	8.01	8.56	9.09	9.58	10.9	12.1	13.6	16.6	1.2
	80	○	○	26	30	30	4.65	6.56	7.35	8.04	8.68	9.28	9.85	10.4	11.8	13.1	14.7	18.0	1.3
	87	○	○	26	30	30	5.00	7.07	7.91	8.66	9.35	10.0	10.6	11.2	12.8	14.1	15.8	19.4	1.3
	99	○	○	26	30	30	5.72	8.08	9.04	9.89	10.7	11.4	12.1	12.8	14.6	16.2	18.1	22.1	1.5
	124	○	○	26	30	30	7.15	10.1	11.3	12.4	13.4	14.3	15.2	16.0	18.2	20.2	22.6	27.7	1.7

Spray angle code	Spray capacity code	Pipe conn. size		Spray angle (°)			Spray capacity (ℓ/min)												Free pass. dia. (mm)
		R1/8	R1/4	1 MPa	3 MPa	5 MPa	1 MPa	2 MPa	2.5 MPa	3 MPa	3.5 MPa	4 MPa	4.5 MPa	5 MPa	6.5 MPa	8 MPa	10 MPa	15 MPa	
25	25	○	○	22	25	25	1.43	2.02	2.25	2.47	2.67	2.85	3.03	3.19	3.64	4.03	4.51	5.52	0.7
	31	○	○	22	25	25	1.78	2.52	2.82	3.09	3.34	3.57	3.78	3.99	4.55	5.05	5.64	6.91	0.7
	37	○	○	22	25	25	2.14	3.03	3.39	3.71	4.01	4.28	4.54	4.79	5.46	6.06	6.77	8.30	0.8
	43	○	○	22	25	25	2.50	3.54	3.96	4.33	4.68	5.00	5.30	5.59	6.37	7.06	7.91	9.67	0.9
	49	○	○	22	25	25	2.86	4.04	4.52	4.94	5.34	5.71	6.06	6.38	7.28	8.07	9.04	11.1	1.0
	56	○	○	22	25	25	3.22	4.54	5.08	5.56	6.01	6.42	6.81	7.18	8.19	9.08	10.2	12.4	1.1
	62	○	○	22	25	25	3.57	5.05	5.65	6.18	6.68	7.14	7.57	7.98	9.10	10.1	11.3	13.8	1.1
	68	○	○	22	25	25	3.93	5.55	6.21	6.80	7.35	7.85	8.33	8.79	10.0	11.1	12.4	15.2	1.2
	74	○	○	22	25	25	4.29	6.06	6.78	7.42	8.01	8.56	9.09	9.58	10.9	12.1	13.6	16.6	1.3
	80	○	○	22	25	25	4.65	6.56	7.35	8.04	8.68	9.28	9.85	10.4	11.8	13.1	14.7	18.0	1.3
	87	○	○	22	25	25	5.00	7.07	7.91	8.66	9.35	10.0	10.6	11.2	12.8	14.1	15.8	19.4	1.4
	99	○	○	22	25	25	5.72	8.08	9.04	9.89	10.7	11.4	12.1	12.8	14.6	16.2	18.1	22.1	1.5
	124	○	○	22	25	25	7.15	10.1	11.3	12.4	13.4	14.3	15.2	16.0	18.2	20.2	22.6	27.7	1.7
15	25	○	○	12	15	15	1.43	2.02	2.25	2.47	2.67	2.85	3.03	3.19	3.64	4.03	4.51	5.52	0.7
	31	○	○	12	15	15	1.78	2.52	2.82	3.09	3.34	3.57	3.78	3.99	4.55	5.05	5.64	6.91	0.8
	37	○	○	12	15	15	2.14	3.03	3.39	3.71	4.01	4.28	4.54	4.79	5.46	6.06	6.77	8.30	0.9
	43	○	○	12	15	15	2.50	3.54	3.96	4.33	4.68	5.00	5.30	5.59	6.37	7.06	7.91	9.67	1.0
	49	○	○	12	15	15	2.86	4.04	4.52	4.94	5.34	5.71	6.06	6.38	7.28	8.07	9.04	11.1	1.1
	56	○	○	12	15	15	3.22	4.54	5.08	5.56	6.01	6.42	6.81	7.18	8.19	9.08	10.2	12.4	1.1
	62	○	○	12	15	15	3.57	5.05	5.65	6.18	6.68	7.14	7.57	7.98	9.10	10.1	11.3	13.8	1.2
	68	○	○	12	15	15	3.93	5.55	6.21	6.80	7.35	7.85	8.33	8.79	10.0	11.1	12.4	15.2	1.3
	74	○	○	12	15	15	4.29	6.06	6.78	7.42	8.01	8.56	9.09	9.58	10.9	12.1	13.6	16.6	1.3
	80	○	○	12	15	15	4.65	6.56	7.35	8.04	8.68	9.28	9.85	10.4	11.8	13.1	14.7	18.0	1.4
	87	○	○	12	15	15	5.00	7.07	7.91	8.66	9.35	10.0	10.6	11.2	12.8	14.1	15.8	19.4	1.5
	93	○	○	12	15	15	5.36	7.58	8.48	9.28	10.0	10.7	11.4	12.0	13.7	15.2	17.0	20.8	1.5
	99	○	○	12	15	15	5.72	8.08	9.04	9.89	10.7	11.4	12.1	12.8	14.6	16.2	18.1	22.1	1.6
	111	○	○	12	15	15	6.43	9.09	10.2	11.1	12.0	12.9	13.6	14.4	16.4	18.2	20.3	24.9	1.6
	124	○	○	12	15	15	7.15	10.1	11.3	12.4	13.4	14.3	15.2	16.0	18.2	20.2	22.6	27.7	1.7

How to order

Please inquire or order for a specific nozzle using this coding system.

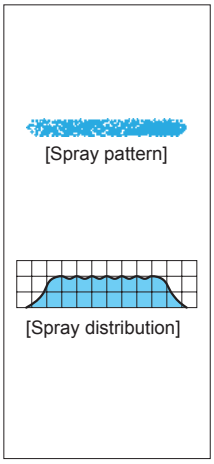
〈Example〉 1/8M VNP 6543 S303

1/8M	VNP	65	43	S303
Pipe conn. size*1		Spray angle code*2	Spray capacity code	Material
■ 1/8M ■ 1/4x1/8M		■ 65 〵 ■ 15	■ 25 〵 ■ 124	■ S303 ■ B

*1) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
Size R1/4 is indicated as "1/4x1/8M" in VNP series.

*2) Color of ceramic orifice differs depending on nozzle codes.
When spray angle code is 25 or 15 and spray capacity code is in the range of 43–124, "Brown tip" or "Brown" is indicated after material code.
〈Example〉1/8MVNP2543S303 (Brown)

Descaling Nozzles DSP



[Features]

- World-rare flat spray nozzle engineered especially for powerful cleaning and descaling. Producing a thin flat spray pattern like a sharp razor blade, DSP series nozzles have high spray impact, yielding more powerful cleaning performance than any other flat spray nozzles (under the same spray pressure and spray capacity conditions).

[Standard Pressure]

5 MPa

[Applications]

High pressure cleaning, descaling, rust-removal, degreasing

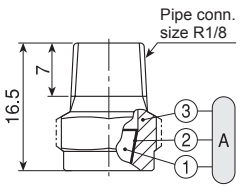
DSP series

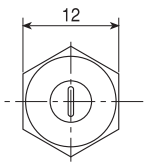
	DSP series (with ceramic orifice inserted)
Structure	• Ceramic orifice is inserted and adhered into a metal body. • Opening of ceramic orifice is circular from inlet to throat and it gradually contracts to a longer rectangle towards the outlet.
Material	• Nozzle orifice: ceramic • Metal parts: S303
Mass*1	• R1/8: 7 g • Rc3/8: 52 g

*1) When with a strainer, add 2–5 g to the above mass.

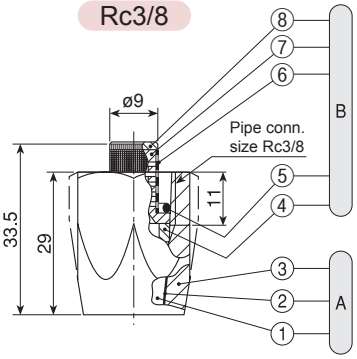
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

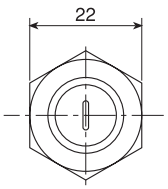
R1/8





Rc3/8





Ⓐ **Nozzle** (①Ceramic orifice ②Adhesive: Araldite® ③Nozzle body)
Ⓑ **Strainer** (④Packing (PTFE) ⑤O-ring (NBR) ⑥Strainer screen [S316] ⑦Strainer holder ⑧Strainer cap)

Spray angle code	Spray capacity code	Pipe conn. size R1/8	Pipe conn. size Rc3/8	Spray angle (°) 3 MPa	5 MPa	10 MPa	Spray capacity (ℓ/min) 3 MPa	3.5 MPa	4 MPa	4.5 MPa	5 MPa	6.5 MPa	8 MPa	10 MPa	15 MPa	20 MPa	Free pass. dia. (mm)
15	56	○		14	15	15	4.33	4.68	5.00	5.30	5.59	6.37	7.06	7.91	9.67	11.2	0.4
	64	○		14	15	15	4.94	5.34	5.71	6.06	6.38	7.28	8.07	9.04	11.1	12.8	0.4
	72	○		14	15	15	5.56	6.01	6.42	6.81	7.18	8.19	9.08	10.2	12.4	14.4	0.4
	80	○		14	15	15	6.18	6.68	7.14	7.57	7.98	9.10	10.1	11.3	13.8	16.0	0.4
	88	○		14	15	15	6.80	7.35	7.85	8.33	8.79	10.0	11.1	12.4	15.2	17.6	0.4
	96	○		14	15	15	7.42	8.01	8.56	9.09	9.58	10.9	12.1	13.6	16.6	19.1	0.5
	104	○		14	15	15	8.04	8.68	9.28	9.85	10.4	11.8	13.1	14.7	18.0	20.8	0.5
	112	○		14	15	15	8.66	9.35	10.0	10.6	11.2	12.8	14.1	15.8	19.4	22.4	0.5
	120	○		14	15	15	9.26	10.0	10.7	11.4	12.0	13.7	15.2	17.0	20.8	24.0	0.6
	128	○		14	15	15	9.89	10.7	11.4	12.1	12.8	14.6	16.2	18.1	22.1	25.6	0.6
	144	○		14	15	15	11.1	12.0	12.9	13.6	14.4	16.4	18.2	20.3	24.9	28.8	0.7
	160	○		14	15	15	12.4	13.4	14.3	15.2	16.0	18.2	20.2	22.6	27.7	32.0	0.8

Spray angle code	Spray capacity code	Pipe conn. size		Spray angle (°)			Spray capacity (ℓ/min)										Free pass. dia. (mm)
		R1/8	Rc3/8	3 MPa	5 MPa	10 MPa	3 MPa	3.5 MPa	4 MPa	4.5 MPa	5 MPa	6.5 MPa	8 MPa	10 MPa	15 MPa	20 MPa	
12	83		●	11	12	12	6.43	6.94	7.42	7.87	8.30	9.46	10.5	11.7	14.4	16.6	0.4
	103		●	11	12	12	7.98	8.62	9.21	9.77	10.3	11.7	13.0	14.6	17.8	20.6	0.4
	148		○	11	12	12	11.5	12.4	13.2	14.0	14.8	16.9	18.7	20.9	25.6	29.6	0.5
	166		○	11	12	12	12.9	13.9	14.8	15.7	16.6	18.9	21.0	23.5	28.8	33.2	0.5
	189		○	11	12	12	14.6	15.8	16.9	17.9	18.9	21.5	23.9	26.7	32.7	37.8	0.6
	224		○	11	12	12	17.4	18.7	20.0	21.3	22.4	25.5	28.2	31.6	38.8	44.7	0.7
	250		○	11	12	12	19.4	20.9	22.4	23.7	25.0	28.5	31.6	35.4	43.3	50.0	0.7
	300		○	11	12	12	23.2	25.1	26.8	28.5	30.0	34.2	37.9	42.4	52.0	60.0	0.9
	332		○	11	12	12	25.7	27.8	29.7	31.5	33.2	37.9	42.0	46.9	57.5	66.4	1.0
	478		○	11	12	12	37.0	40.1	42.8	45.3	47.8	54.5	60.5	67.7	82.8	95.7	1.5
	865		○	11	12	12	67.0	72.5	77.4	82.1	86.5	98.6	110	123	150	173	2.6

●: Available with/without strainer (strainer mesh size #150) ○: Available without strainer

Precautions for use

Please use clean water to prevent the nozzles from clogging.

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/8M DSP 1556 S303 (Brown)

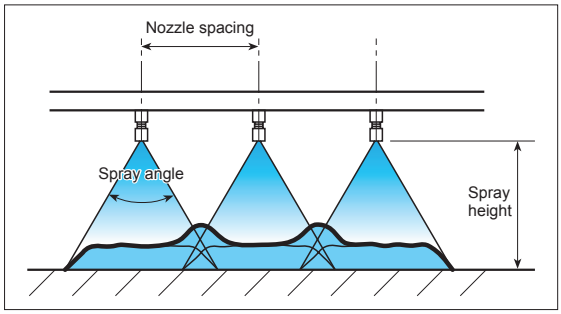
1/8M	DSP	15	56	S303	(Brown)
Pipe conn. size*2		Spray angle code	Spray capacity code	Strainer	
■ 1/8M ■ 3/8F		■ 15 ■ 12	■ 56 〜 ■ 865	■ W (with strainer) ■ (Blank denotes "without strainer")	

*2) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

Effective Use of Even Flat Spray Nozzles

Spray Distribution

Even flat spray nozzles are designed to produce an even spray distribution to even out the cleaning power in the spray width direction and are suitable for cleaning when using one nozzle.
When using even flat spray nozzles in multiple-nozzle arrangements, the overlapping spray distribution may be inferior to that of standard flat spray nozzles (see page 25 for details).



Tightening Torque

For high-pressure cleaning, high wear-resistant CERJET® nozzles with ceramic orifice inserted are most suitable. However, if screwed too tight, the nozzle body, especially small ones such as 1/8″ size, may be damaged which results in cracking the ceramic orifice. Please apply the recommended torque. Tightening torque should not exceed the following.

8 N-m for size 1/8″ (stainless steel body and brass body)
15 N-m for size 1/4″ (stainless steel body and brass body)

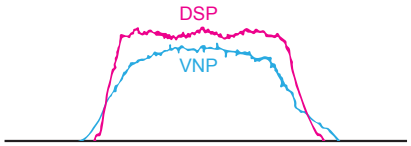
Cleaning Force

The factors for showing cleaning efficiency of a nozzle are complex. To evaluate them, we use the spray impact and the amount of cavitation erosion. At a given liquid pressure, spray capacity, and spray distance, the cleaning force of solid stream jet nozzles is the strongest followed by flat spray nozzles and cone spray nozzles.

[Spray Impact]

	Spray impact (x $\frac{1}{100}$ N/cm)	
	Max.	Average
1/8MDSP15104	560	503
1/8MVNP1580	460	390

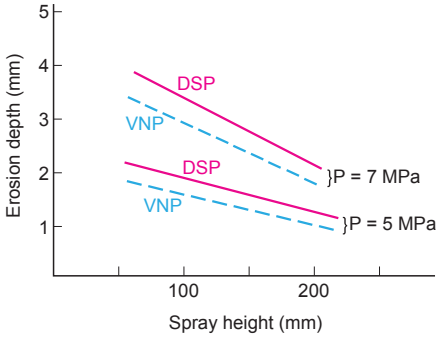
■ Pressure: 5 MPa
■ Spray height: 150 mm



[Amount of Cavitation Erosion]

The amount of cavitation erosion is the depth of the depression on a sample piece dug out by flat spray nozzles.

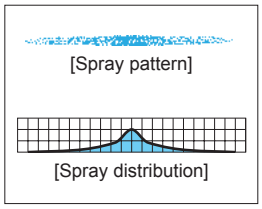
Specifications	1/8MDSP15104		1/8MVNP1580	
Pressure (MPa)	5.0	7.0	5.0	7.0
Spray angle (°)	16.0	16.0	16.5	17.0
Spray capacity (ℓ/min)	9.9	11.7	10.1	12.0



Wide-angle Flat Spray Nozzles YYP

[Features]
- Capable of generating wide-angle flat spray even at a low liquid pressure.
- YYP clogs the least compared with other flat spray nozzles, although the spray impact is less strong.
- Spray direction is 75° to the nozzle axis.

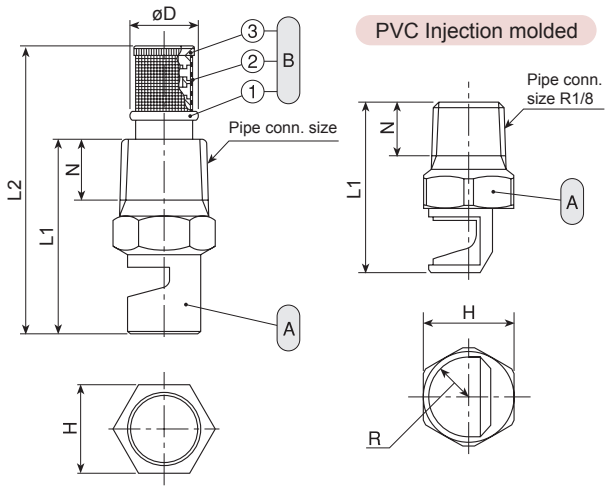
[Standard pressure]
0.15 MPa



[Applications]
Cleaning: Conveyor belts, film, eliminator plates, plate glass, planks
Foam breaking: Waste water treatment, papermaking
Cooling: Conveyor belts, roofs, tanks
Water screen: Fire protection, heat protection, deodorization
Others: Applications which require wide angle flat spray at low pressures

YYP series

	YYP series
Structure	• Made of metal or plastic, one-piece structure. • Small spray capacity models come with or without a strainer. (No strainers for YYP-PVC.)
Material	• S303 or B (brass) • Injection-molded PVC • Optional material: S316 or others



Ⓐ **Nozzle**
Ⓑ **Strainer** (①Strainer holder ②Strainer screen [S316] ③Strainer cap)

Series	Pipe conn. size*1	Dimensions (mm)						Mass (g)*2		
		L1	L2	H	øD	N	R	S303	B	PVC
YYP	R1/8 (03–13)	23	35.5	10	7.5	7	—	7.5	8	—
	R1/8 (16–60)	25	—	10	—	7	—	9.3	10	—
	R1/4	34	—	14	—	10.5	—	28	30	—
	R3/8	44	—	19	—	11	—	65	72	—
	R1/2	50	—	22	—	14	—	105	112	—
	R3/4 (620)	55	—	27	—	15	—	175	187	—
	R3/4 (1000)	65	—	36	—	15	—	345	370	—
	R1	75	—	41	—	18	—	510	550	—
YYP-PVC (Injection molded)	R1/8 (03–13)	21.5	—	12	—	7	4.5	—	—	1.8
	R1/8 (16–30)	22.5	—	12	—	7	5.25	—	—	1.8

*1) Figures in ( ) after the pipe connection sizes indicate the spray capacity codes.
*2) When with a strainer, add 2–5 g to the above mass.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

■ YYP series (Metal)

Spray capacity code	Pipe connection size						Spray angle (°)			Spray capacity (ℓ/min)					Mean droplet dia. (μm)	Free passage dia. (mm)	Strainer mesh size
	R1/8	R1/4	R3/8	R1/2	R3/4	R1	0.05 MPa	0.15 MPa	0.2 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa			
03	●						—	100	107	—	—	0.25	0.30	0.35	190	0.6	100
04	●						—	120	126	—	—	0.33	0.40	0.46		0.7	50
05	●						—	130	136	—	—	0.41	0.50	0.58		0.8	50
07	○						—	130	136	—	—	0.57	0.70	0.81	≀	1.0	—
10	○						103	130	135	—	0.58	0.82	1.00	1.15		1.1	—
13	○						108	130	135	—	0.75	1.06	1.30	1.50		1.3	—
16	○						110	130	134	—	0.92	1.31	1.60	1.85	280	1.5	—
20	○						116	135	139	0.89	1.15	1.63	2.00	2.31		1.7	—
25	○						117	135	139	1.12	1.44	2.04	2.50	2.89		1.8	—
30	○						118	135	139	1.34	1.73	2.45	3.00	3.46	≀	2.0	—
40	○						119	135	139	1.79	2.31	3.27	4.00	4.62		2.4	—
50	○						120	135	138	2.24	2.89	4.08	5.00	5.77		2.6	—
60	○						121	135	138	2.68	3.46	4.90	6.00	6.93	470	2.8	—

●: Available with/without strainer ○: Available without strainer

Wide-angle Flat Spray Nozzles
YYP series

■ YYP series (Metal)

Spray capacity code	Pipe connection size						Spray angle (°)			Spray capacity (ℓ/min)					Mean droplet dia. (μm)	Free passage dia. (mm)	Strainer mesh size
	R1/8	R1/4	R3/8	R1/2	R3/4	R1	0.05 MPa	0.15 MPa	0.2 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa			
70		○					125	140	144	3.13	4.04	5.72	7.00	8.08	480	3.1	—
100		○					128	140	143	4.47	5.77	8.16	10.0	11.5	〃	3.6	—
140		○					130	140	143	6.26	8.08	11.4	14.0	16.2	610	4.3	—
180			○				131	140	142	8.05	10.4	14.7	18.0	20.8	〃	4.8	—
230			○				133	140	142	10.3	13.3	18.8	23.0	26.6	650	5.3	—
320				○			134	140	142	14.3	18.5	26.1	32.0	37.0	〃	6.4	—
450				○			135	140	142	20.1	26.0	36.7	45.0	52.0	850	7.6	—
620					○		135	140	142	27.7	35.8	50.6	62.0	71.6	〃	9.0	—
1000					○		135	140	141	44.7	57.7	81.6	100	115	1,150	11.4	—
1500						○	136	140	140	67.1	86.6	122	150	173	1,100	14.5	—
2500						○	136	140	140	112	155	204	250	289	1,550	18.5	—

○: Available without strainer

■ YYP-PVC series (Injection molded)

Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)					Mean droplet diameter (μm)	Free passage diameter (mm)
	0.05 MPa	0.15 MPa	0.2 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa		
03	—	115	122	—	—	0.25	0.30	0.35	190	0.6
04	—	120	126	—	—	0.33	0.40	0.46		0.7
05	—	130	136	—	—	0.41	0.50	0.58		0.8
07	—	130	136	—	—	0.57	0.70	0.81	〃	1.0
10	103	130	135	—	0.58	0.82	1.00	1.15		1.1
13	108	130	135	—	0.75	1.06	1.30	1.50		1.3
16	110	130	134	—	0.92	1.31	1.60	1.85	280	1.5
20	116	135	139	0.89	1.15	1.63	2.00	2.31	〃	1.7
25	117	135	139	1.12	1.44	2.04	2.50	2.89		1.8
30	118	135	139	1.34	1.73	2.45	3.00	3.46	380	2.0

[Note] No strainers for injection-molded YYP-PVC series.

How to order

Please inquire or order for a specific nozzle using this coding system.

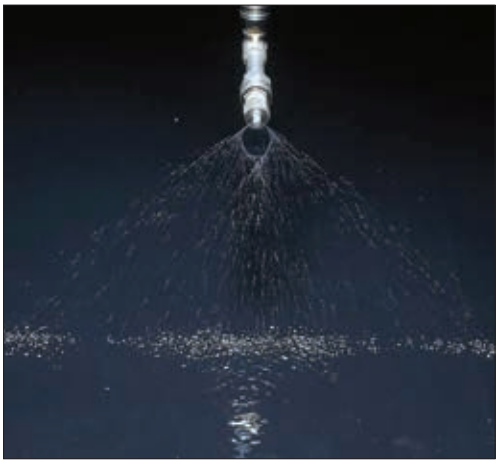
〈Example〉 1/8M YYP 03 S303W

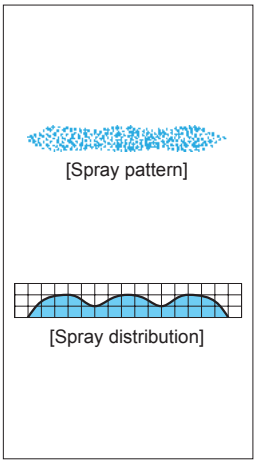
1/8M	YYP	03	S303	W
Pipe conn. size*3		Spray capacity code	Material	Strainer
1/8M		03	S303	W (with strainer)
〃		〃	B	(Blank denotes "without strainer")
1M		2500	PVC*4	

*3) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
*4) Injection-molded PVC.

Wide-angle Flat Spray Nozzles for Ultra-low Pressure Spraying

LYYP





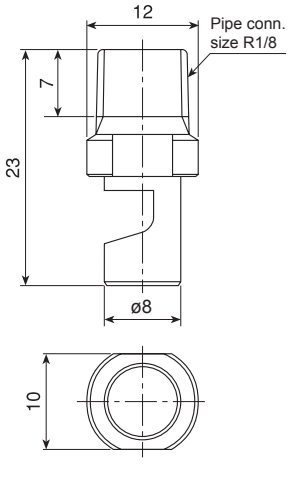
[Features]
- Wide-angle flat spray with uniform distribution.
- Capable of low operating pressures (0.015 MPa).
- Low spray impact and volume, resulting in no bubbles on the spray surface.
- Oil-free product.

[Standard Pressure]
0.015 MPa

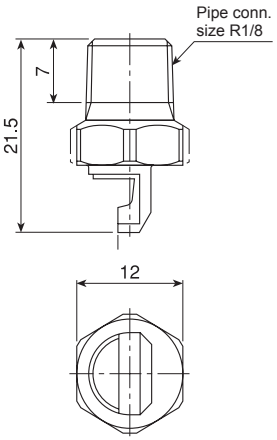
[Applications]
Spraying developing solution for semi-conductor manufacturing processes, ultra-low volume spray for pharmaceutical manufacturing processes, chemical spraying to surface treated steel plates

LYYP series

	LYYP series
Structure	● Made of plastic, one-piece structure.
Material	● PVC ● Optional material: S316 or PCTFE
Mass	● 1.5 g



Injection molded
(Spray capacity code: 02, 035, and 04 only)



[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	LYYP	LYYP (Injection molded)	Spray angle (°) 0.01 MPa	0.015 MPa	0.02 MPa	Spray capacity (ℓ/min) 0.008 MPa	0.01 MPa	0.012 MPa	0.015 MPa	0.02 MPa	0.03 MPa	0.04 MPa	Mean droplet diameter (μm)	Free passage diameter (mm)
02		○	—	70	77	—	—	0.18	0.20	0.23	0.28	0.33	850	0.9
025	○		67	80	87	—	0.20	0.22	0.25	0.29	0.35	0.41		1.0
03	○		77	90	97	0.22	0.24	0.27	0.30	0.35	0.42	0.49		1.0
035		○	87	100	107	0.26	0.29	0.31	0.35	0.40	0.49	0.57		1.1
04		○	88	100	108	0.29	0.33	0.36	0.40	0.46	0.57	0.65	⟆	1.3
05	○		97	110	117	0.37	0.41	0.45	0.50	0.58	0.71	0.82		1.3
06	○		107	120	127	0.44	0.49	0.54	0.60	0.69	0.85	0.98		1.4
07	○		107	120	127	0.51	0.57	0.63	0.70	0.81	0.99	1.14		1.6
08	○		108	120	128	0.58	0.65	0.72	0.80	0.92	1.13	1.31		1.7
10	○		108	120	128	0.73	0.82	0.89	1.00	1.15	1.41	1.63	1,350	1.9

[Note] LYYP series nozzles are guaranteed for spray angle within -5˚ to +10˚ of the rated angle and for spray capacity within +/-10% of the rated capacity under the standard pressure.

How to order

Please inquire or order for a specific nozzle using this coding system.

①LYYP series

〈Example〉 1/8M LYYP 025 PVC

1/8M LYYP 025 PVC

Spray capacity code
- 025
- ⟆
- 10

②LYYP (Injection molded) series

〈Example〉 1/8M LYYP 02 PVC-IN

1/8M LYYP 02 PVC–IN

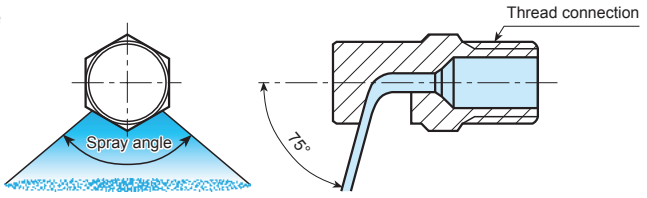
Spray capacity code
- 02
- 035*
- 04

*When spray capacity code is 035, the nozzle description is 1/8MLYYP035PVC (Injection-molded).

Effective Use of Wide-angle Flat Spray Nozzles

Spray Angle and Inclination Angle

Wide-angle flat spray nozzles spray at an angle of 75° to the axis of the nozzle.
For installation, the inclination angle of 75° must be taken into consideration.



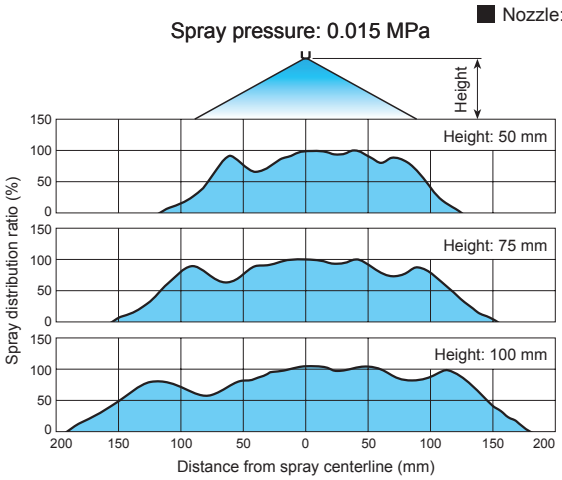
Free Passage Diameter

The free passage diameter of wide-angle flat spray nozzle shows the approximate diameter of the spray orifice. Having the largest free passage diameter among our flat spray nozzles with the same spray capacity, wide-angle flat spray nozzles are clog-resistant and suitable for use when water quality is a problem.

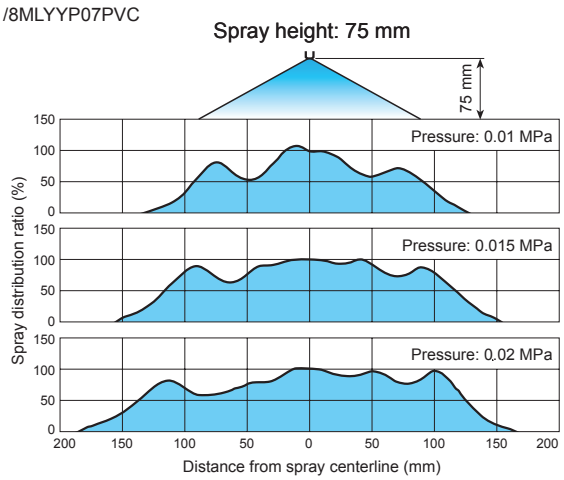
Spray Distribution of LYYP series Wide-angle Flat Spray Ultra-low Pressure Nozzles

The variation in spray distribution is minimal despite changes in the spray height and spray pressure.

■ Nozzle: 1/8MLYYP07PVC



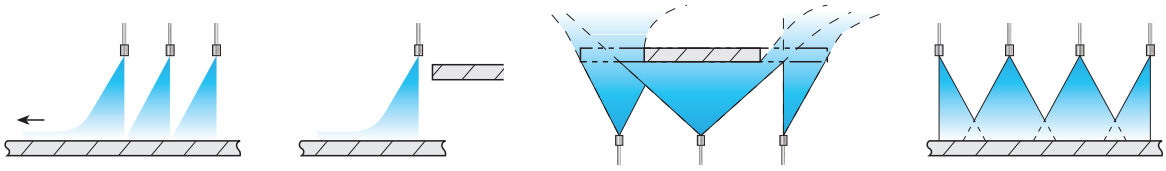
Relation between spray height and spray distribution



Relation between spray pressure and spray distribution

Effective Use of Off-center Even Flat Spray Nozzles

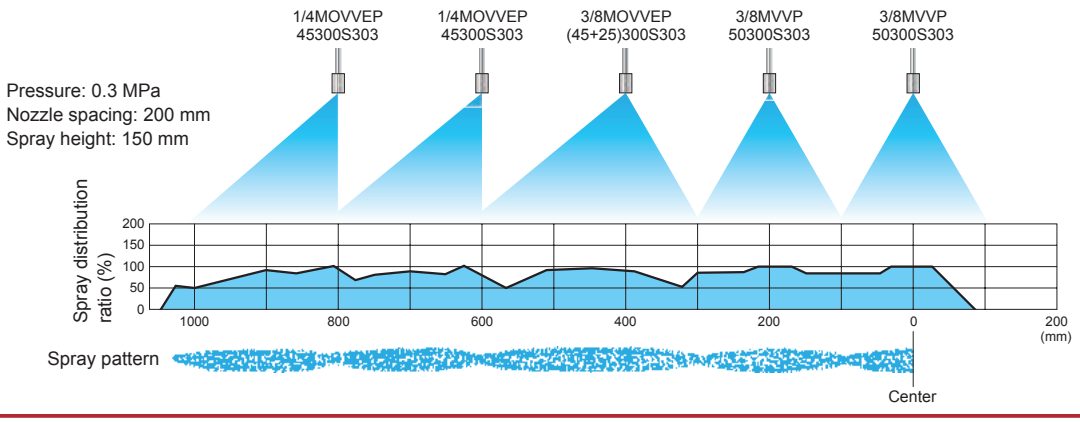
How to Use Off-center Even Flat Spray Nozzles



● Spray in one direction ● Spray in a limited space ● Avoid spraying on the reverse side ● Save spray liquid

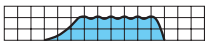
Combined Use with Standard Flat Spray Nozzles

For applications such as cooling steel plates, the direction of flow can be controlled by using a combination of OVVEP series nozzles and standard flat spray nozzles.



Off-center Even Flat Spray Nozzles OVVEP

[Spray pattern]



[Spray distribution]

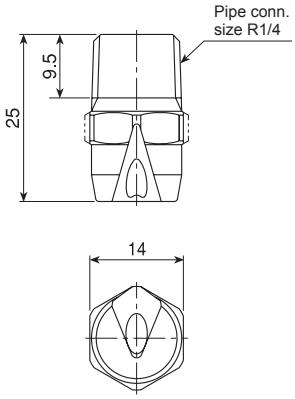
[Features]
- Off-center flat spray pattern with uniform distribution throughout pattern area.
- With obliquely-angled flow, OVVEP series prevents accumulation of spray fluid in multiple-nozzle arrangements.
- No need for oblique installation, as the angle is built-in.

[Standard Pressure]
0.3 MPa

[Applications]
Cooling: Steel plates, steel pieces
Spraying: Etchants, oils, lubricants, glues, acids, insecticides, herbicides
Cleaning: Steel plates, steel pieces, filters, felts, screens

OVVEP series

	OVVEP series
Structure	• Made of metal, one-piece structure.
Material	• S303 or B (brass) • Optional material: S316 or others
Mass	• S303: 17 g • B (brass): 18 g



[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray angle code	Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)											Mean droplet dia. (μm)	Free passage dia. (mm)
		0.05 MPa	0.3 MPa	0.7 MPa	0.05 MPa	0.07 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa		
60	200	56	60	62	8.2	9.7	11.5	14.1	16.3	20.0	25.8	30.6	36.5	44.7	51.6	540	2.4
	250	57	60	61	10.2	12.1	14.4	17.7	20.4	25.0	32.3	38.2	45.6	55.9	64.5	≀	2.7
	300	57	60	61	12.2	14.5	17.3	21.2	24.5	30.0	38.7	45.8	54.8	67.1	77.5	670	3.0
45	200	41	45	48	8.2	9.7	11.5	14.1	16.3	20.0	25.8	30.6	36.5	44.7	51.6	600	3.2
	250	42	45	47	10.2	12.1	14.4	17.7	20.4	25.0	32.3	38.2	45.6	55.9	64.5	≀	3.6
	300	42	45	47	12.2	14.5	17.3	21.2	24.5	30.0	38.7	45.8	54.8	67.1	77.5	750	4.0

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M OVVEP 60200 S303

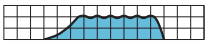
1/4M OVVEP **60** **200** **S303**

Spray angle code	Spray capacity code	Material
60	200	S303
45	250	B
	300	

Quick-detachable
Off-center Even Flat Spray Nozzles

INOVVE

[Spray pattern]



[Spray distribution]

[Features]

- Off-center flat spray pattern with even distribution.
- In addition to the benefits of OVVEP series, INOVVE is easy to install and remove—just turning the nozzle tip until it clicks. No need to adjust spray direction.
- Made of high chemical and heat resistant polypropylene.

[Standard pressure]

0.3 MPa

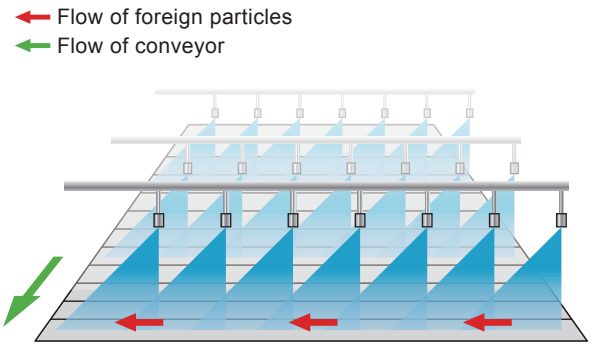
[Applications]

Cleaning, Rinsing
Etching

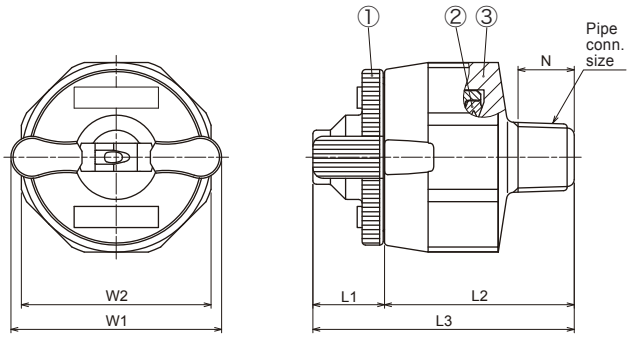
INOVVE series

	INOVVE series
Structure	• Two-piece structure comprising a nozzle tip (with packing) and an adaptor. • Easy installation and removal of the nozzle tip just by turning 60°.
Material	• Nozzle tip: PP • Adaptor: PP or PPS • Packing: FEPM

Pipe conn. size	Dimensions (mm)						Mass (g)	
	L1	L2	L3	W1	W2	N	PP	PPS
R1/8	10	27	37	30	27	8	9	12
R1/4	10	30	40	30	27	11.5	10	13
R3/8	10	30	40	30	27	12	11	14



Spraying in one direction prevents accumulation of spray fluid and foreign particles.



①Nozzle tip ②Packing (FEPM) ③Adaptor

[Note]
·Appearance and dimensions may differ slightly depending on materials and nozzle codes.
·Tab line conforms with the flat spray spread direction.

Spray capacity code	Pipe connection size			Spray angle (°)			Spray capacity (ℓ/min)				Mean droplet diameter (μm)	Free passage diameter (mm)
	R1/8	R1/4	R3/8	0.15 MPa	0.3 MPa	0.5 MPa	0.15 MPa	0.3 MPa	0.5 MPa	0.7 MPa		
30	○	○	○	42	45	46	2.12	3.00	3.88	4.58	600–800	1.0
50	○	○	○	42	45	46	3.54	5.00	6.46	7.64		1.3

[Note] Please see page 23 for the range of operating pressure and liquid temperature.

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/4M INOVVE 4530PP (FEPM) + PP

1/4M INOVVE 45 30 PP (FEPM) + PP

- Pipe conn. size*: ■ 1/8M ■ 1/4M ■ 3/8M
- Spray capacity code: ■ 30 ■ 50
- Adaptor material: ■ PP ■ PPS

②Nozzle tip only (with packing)

〈Example〉 INOVVE 4530PP (FEPM)

INOVVE 45 30 PP (FEPM)

- Spray capacity code: ■ 30 ■ 50

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

Foaming Spray Nozzles AWVV

[Spray pattern]

[Spray distribution]

[Features]

- Sprays detergent.
- Generates large amounts of foam due to air suction only driven by the liquid pressure.
- The long-lasting time of the foam helps to increase the cleaning performance.
- Wide spray angle covering a larger cleaning area.
- Compressor is not required.

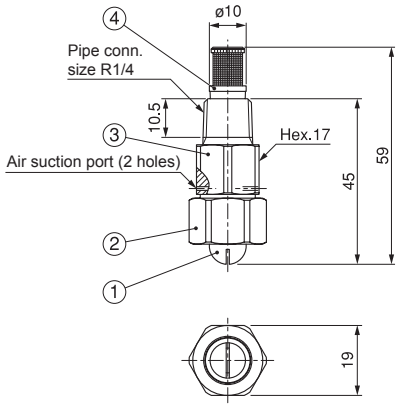
[Standard pressure]

- Cleaning: conveyors, outer surface of vehicles, factory floors/walls

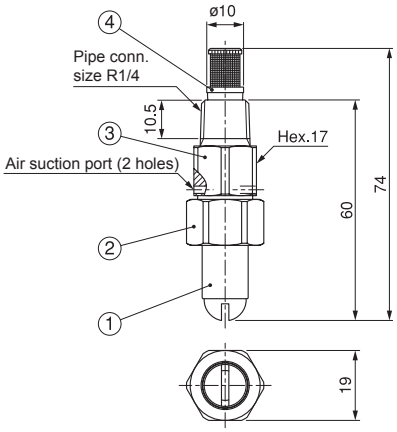
AWVV series

	AWVV series
Structure	• Made of metal. • Comprises a nozzle tip, cap, adaptor, and strainer.
Material	• S303
Mass	• Spray capacity code 10: 60 g • Spray capacity code 30 and 50: 65 g

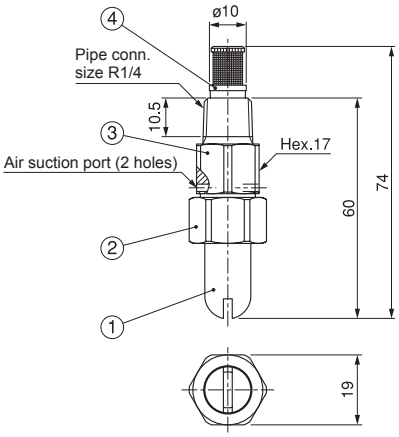
Spray capacity code 10



Spray capacity code 30



Spray capacity code 50



①Nozzle tip ②Cap ③Adaptor ④Strainer

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray angle code	Spray capacity code	Liquid	Spray angle* (°)			Spray capacity (ℓ/min)						Strainer mesh size
			0.1 MPa	0.3 MPa	0.6 MPa	0.1 MPa	0.2 MPa	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	
100	10	Water	50	105	116	0.58	0.82	1.00	1.15	1.29	1.41	50
		Detergent	55	100	116							
	30	Water	75	105	113	1.73	2.45	3.00	3.46	3.87	4.24	
		Detergent	82	100	113							
	50	Water	75	105	113	2.89	4.08	5.00	5.77	6.45	7.07	
		Detergent	82	100	113							
80	10	Water	40	80	100	0.58	0.82	1.00	1.15	1.29	1.41	
		Detergent	—	80	100							
	30	Water	57	80	95	1.73	2.45	3.00	3.46	3.87	4.24	
		Detergent	57	80	95							
	50	Water	57	80	95	2.89	4.08	5.00	5.77	6.45	7.07	
		Detergent	57	80	95							

*Spray angle for detergent is measured for reference only, when spraying commercial dishwasher detergent diluted 100 times.

How to order

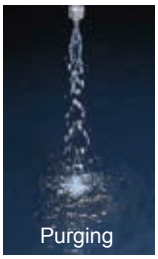
Please inquire or order for a specific nozzle using this coding system.

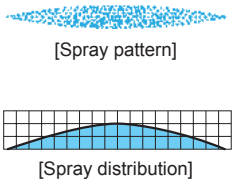
〈Example〉 1/4M AWVV 10010 S303W

1/4M AWVV 100 10 S303W

Spray angle code	Spray capacity code
100	10
80	30
	50

Self-cleaning Flat Spray Nozzles MOMOJet®





[Features]
- If clogged, by reducing the pressure to 0.03 MPa, the nozzle tip is retracted and purges foreign particles. By increasing the pressure to 0.2 MPa and greater, normal spraying is restored.
- Straight-through orifice is suitable for multiple-nozzle arrangement.

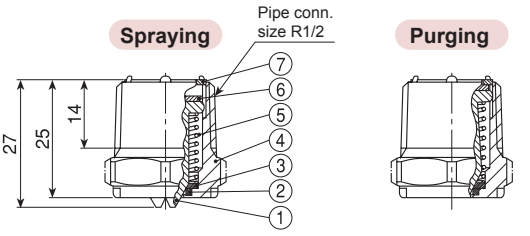
[Standard pressure]
0.3 MPa

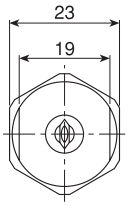
[Applications]
Cleaning: Papermaking (wire, felt parts and rollers), steel plates, PCB
Cooling: Steel plates
Foam breaking: Waste water treatment
Others: Applications where recirculated water is being used

MOMOJet® series

	MOMOJet® series
Structure	• By changing the liquid pressure, a built-in spring moves the split nozzle tip up and down and opens the orifice for purging. • Nozzle tips are made by metal injection molding.
Material	• S303
Mass	• 45 g

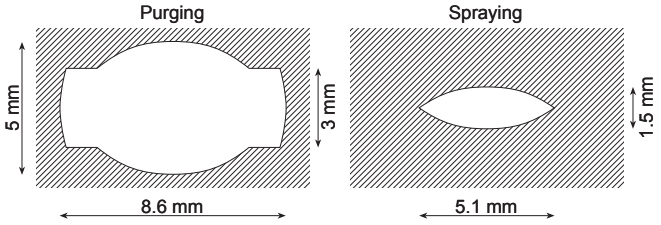
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.





①Nozzle tip ②Packing (EPDM) ③Plate ④Nozzle body
⑤Spring ⑥Packing (EPDM) ⑦Ring

■Nozzle: 1/2MOMO8060S303



When purging, the nozzle tip opens wide and the spray capacity increases.
This must be taken into consideration when selecting a pump.

Spray capacity code	Spray angle (°)		Spray capacity (ℓ/min)							Mean droplet diameter (μm)	Free passage diameter	
	0.3 MPa	0.7 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa		Spraying (mm)	Purging (mm)
20	80	86	1.63	2.00	2.58	3.06	3.65	4.47	5.16	300	0.8	3.0
40	80	83	3.27	4.00	5.16	6.11	7.30	8.94	10.3	≀	1.2	3.3
60	80	83	4.90	6.00	7.75	9.17	11.0	13.4	15.5	490	1.5	3.5

Precautions for use
1. To start spraying a flow rate of about 9 ℓ/min at 0.05 MPa is required for all models because the nozzle tip opens wide. Select an appropriate pump.
2. MOMOJet® is designed to start spraying at the pressure of 0.1 MPa. Use MOMOJet® at 0.2 MPa and greater.
3. Since MOMOJet® series nozzles have active nozzle tips, the spray capacity is only guaranteed within +/-10% and the spray angle within +/-10° under the standard pressure.

How to order Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/2 MOMO 8020 S303

1/2 MOMO 80 20 S303

Spray capacity code
- 20
- 40
- 60

ALSO AVAILABLE!

Self-cleaning
Solid Stream Jet
MOMOJet®"C" series
See p.103 of this catalog.

Air & Steam Spray Flat Spray Nozzles VZ

[Note] Water is sprayed here to better show the spray pattern.

[Spray pattern]

[Features]
- Produces a flat spray pattern of air or steam.
- Effective spray angle does not hold long, as air and steam disperse very quickly.

[Standard pressure]
0.3 MPa

[Applications]
Compressed air: Cleaning, dust suppression, drying, air curtain
Steam: Humidification, temperature control, moisture control

VZ series

	VZ series (three-piece structure)
Structure	• Comprises three parts: Nozzle tip, cap, and adaptor. • Worn-out nozzle tip can be replaced separately. • Cap and adaptor are exchangeable with those of three-piece structure standard flat spray nozzles for liquids.
Material	• S303 or B (brass) • Optional material: S316

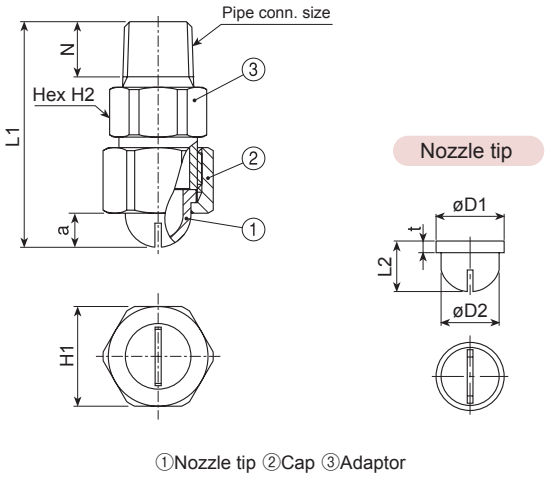
[Complete assemblies]

Pipe conn. size	Dimensions (mm)					Mass (g)	
	L1	H1	H2	N	a	S303	B
R1/4	43	19	17	10.5	6.5	44	47
R3/8	48.5	23	21	11	9.5	73	78

[Nozzle tip]

Pipe conn. size*1	Dimensions (mm)				Mass (g)	
	L2	øD1	øD2	t	S303	B
R1/4	11	14.5	12.5	2.5	4.7	5.0
R3/8	14	18	16	2.5	7.7	8.1

*1) Pipe connection size of the complete assemblies



①Nozzle tip ②Cap ③Adaptor

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Air capacity code	Pipe conn. size		Air capacity (ℓ/min, Normal)						Steam capacity (kg/hr)						Free passage diameter (mm)
	R1/4	R3/8	0.05 MPa	0.1 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	0.05 MPa	0.1 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	
150	○		55.7	77.6	116	154	230	307	2.62	3.56	5.27	6.97	10.3	13.7	0.2
200	○		73.1	102	152	202	302	402	3.44	4.67	6.92	9.14	13.6	17.9	0.3
250	○		90.5	126	188	250	374	498	4.26	5.78	8.57	11.3	16.8	22.2	0.4
300	○		108	150	224	298	446	594	5.08	6.90	10.2	13.5	20.0	26.5	0.5
350	○		125	175	261	346	518	690	5.90	8.00	11.9	15.7	23.2	30.7	0.6
400	○		143	199	297	394	590	786	6.72	9.12	13.5	17.9	26.5	35.0	0.7
450	○		160	223	333	443	662	882	7.54	10.2	15.2	20.0	29.7	39.3	0.8
500	○		177	247	369	491	734	977	8.36	11.3	16.8	22.2	32.9	43.5	0.9
550		○	199	278	414	551	823	1,096	9.38	12.7	18.8	24.9	36.9	48.8	0.6
600		○	219	305	455	605	905	1,205	10.3	14.0	20.7	27.4	40.6	53.7	0.7
650		○	235	328	489	650	972	1,295	11.1	15.0	22.3	29.4	43.6	57.7	0.8
700		○	253	353	526	700	1,047	1,394	11.9	16.2	24.0	31.7	46.9	62.1	0.8
750		○	272	380	566	753	1,126	1,500	12.8	17.4	25.8	34.1	50.5	66.8	0.9
900		○	326	454	677	901	1,347	1,794	15.3	20.8	30.8	40.7	60.4	79.9	1.1
1130		○	406	566	844	1,122	1,678	2,235	19.1	25.9	38.4	50.8	75.2	99.5	1.4

[Note] The above air capacity and steam capacity are for reference only and are not guaranteed.

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/4M VZ 150 S303

1/4M	VZ	150	S303
Pipe conn. size*2		Air capacity code	Material
■ 1/4M ■ 3/8M		■ 150 ≀ ■ 1130	■ S303 ■ B

②Nozzle tip only

〈Example〉 1/4 VZ 150 S303

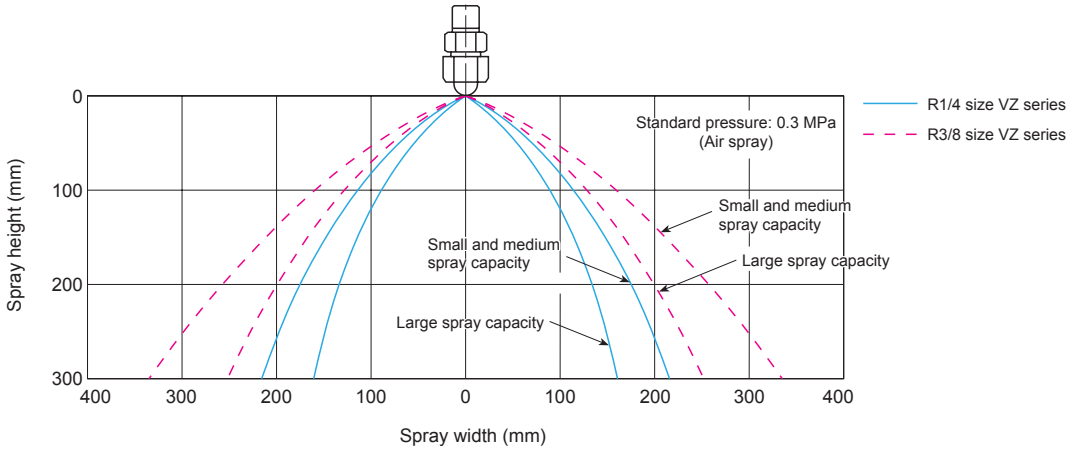
1/4	VZ	150	S303
Pipe conn. size*1		Air capacity code	Material
■ 1/4 ■ 3/8		■ 150 ≀ ■ 1130	■ S303 ■ B

*2) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/4M = R1/4.

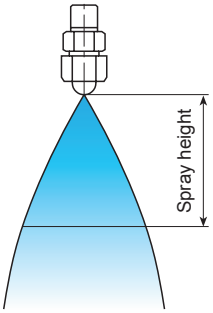
Effective Use of Air & Steam Spray Nozzles

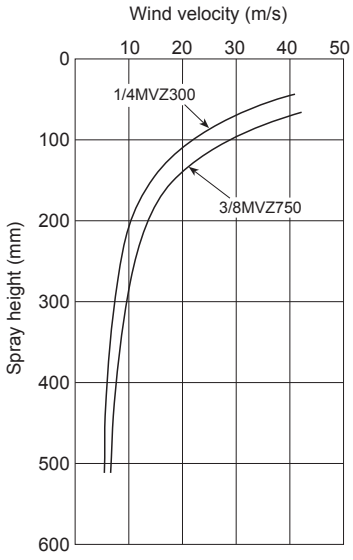
Spray Height and Spray Width of VZ series Air & Steam Flat Spray Nozzles

The spray width at various spray heights is shown below.

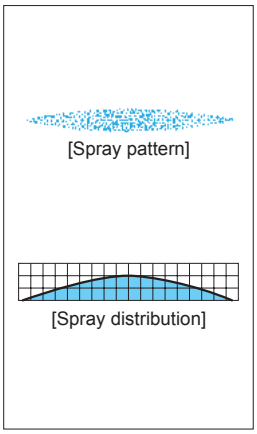


Shown below is the wind velocity at various spray heights.





Flat Spray Nozzles with ON/OFF Control SO-V



[Features]
- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- Prevents dripping after spraying stops.
- Quick response ON/OFF spray.
- Spray ON/OFF can be regulated by pilot air ON/OFF.

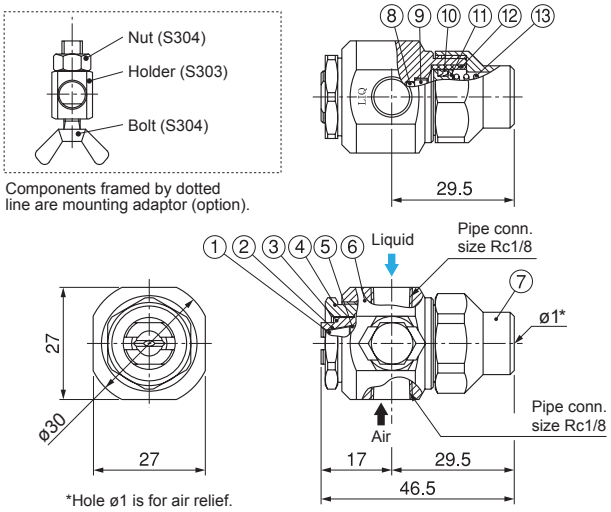
[Standard pressure]
0.3 MPa

[Applications]
Coating: Release agent, lubricant, food additive (seasoning)
Moisture control: Paper, food

SO-V series

	SO-V series (with ceramic orifice inserted)
Structure	• Spray ON/OFF can be regulated by switching the pilot air ON/OFF. The pilot air activates an internal piston to regulate the spray.
Material	• Nozzle orifice: ceramic • Metal parts: S303
Mass	• 150 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Adhesive: Araldite® ③Tip retainer ④Cap ⑤Packing (PTFE) ⑥Adaptor ⑦Spring cap ⑧O-ring (FKM) ⑨Lock nut ⑩Y-packing (NBR) ⑪Piston ⑫Sleeve (UHMWPE) ⑬Spring (S304)

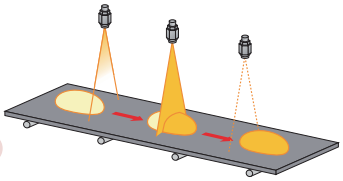
Mounting adaptor (Optional)

A mounting adaptor is available for fixing SO-V series nozzle onto a pole to spray in the desired direction.
Please specify "(with ø10 mounting adaptor)" at the end of the product code to order.

Spray capacity code	Spray angle code (0.3 MPa) 115	90	80	65	50	40	25	15	Spray capacity (ℓ/min) 0.3 MPa
02		○	○	○					0.20
03	○	○	○	○	○	○	○	○	0.30
04	○	○	○	○	○	○	○	○	0.40
05	○	○	○	○	○	○	○	○	0.50
07	○	○	○	○	○	○	○	○	0.70
10	○	○	○	○	○	○	○	○	1.00
15	○	○	○	○	○	○	○	○	1.50
20	○	○	○	○	○	○	○	○	2.00

For the spray angle and spray capacity at pressures other than 0.3 MPa, please see the chart of V series nozzles on pages 13–14.

Example of use



Seasoning (coating)

Operation time chart

Pilot air	OFF	ON	OFF	ON	OFF
Liquid	Stop	Spray	Stop	Spray	Stop

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/8 SO-V 11503 S303 (with ø10 mounting adaptor)

1/8 SO-V [115] [03] S303 (with ø10 mounting adaptor)

- [115] Spray angle code: 115 〜 15
- [03] Spray capacity code: 02 〜 20
- S303 (with ø10 mounting adaptor) (Option)

ALSO AVAILABLE!

Solid Stream Jet with ON/OFF Control

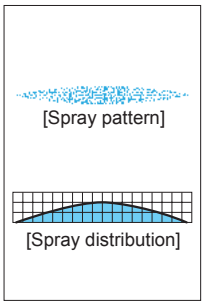
SO-CM series

See p.107 of this catalog.

⚠ CAUTIONS

- **Supply liquid pressure at 0.5 MPa or less. • Supply pilot air pressure at between 0.2 and 0.5 MPa.**
- Pilot air ON/OFF regulates spray ON/OFF.
- For better shut off and preventing dripping, purge the air inside/between the solenoid valve and SO-V series nozzle at OFF time, using a 3-way solenoid valve.

Universal-joint Type Flat Spray Nozzles UT+VP



[Features]
- Flat spray pattern with a mountain-shaped spray distribution having gradually tapered edges.
- Spray direction is adjustable over a range of 40 degrees as desired.

[Standard pressure]
0.3 MPa

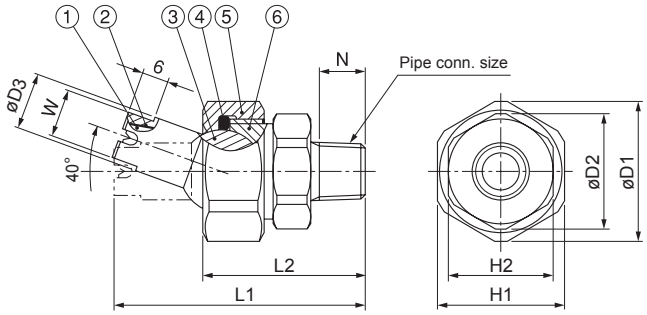
[Applications]
Cleaning: Automotives, containers, films, felts, filters, screens, bottles, crushed stones, earth and sand, metal parts, machines, steel plates, steel pieces
Spraying: Oils, lubricants, liquids, solutions, insecticides, herbicides

UT+VP series

	UT+VP series (with ceramic orifice inserted)
Structure	• Includes a ceramic orifice in the nozzle tip. • Comprises three parts: Nozzle tip, cap, and adaptor. Worn-out nozzle tip can be replaced. • Nozzle tip has integrated universal ball joint for adjusting spray direction.
Material	• Nozzle orifice: ceramic • Metal parts: S303

Pipe conn. size	Dimensions (mm)									Mass (g)
	L1	L2	H1	H2	W	øD1	øD2	øD3	N	
R1/4	57.5	37	29	24	11	32	26.5	13	10.5	120
R3/8	63.5	44	35	30	14	38.5	33	17	11	200

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Adhesive: Araldite® ③Ball
④O-ring (NBR) ⑤Cap ⑥Adaptor

Spray angle code	Spray capacity code	Pipe conn. size		Spray angle (°)			Spray capacity (ℓ/min)								Free passage diameter (mm)
		R1/4	R3/8	0.15 MPa	0.3 MPa	0.7 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	
80	30	○		70	80	87	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	1.0
	50	○		71	80	86	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9	1.4
	80	○		72	80	86	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	1.7
	100		○	72	80	85	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8	2.0
	140		○	73	80	85	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1	2.5
	170		○	73	80	85	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9	2.7
65	30	○		56	65	72	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	1.1
	50	○		57	65	71	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9	1.5
	80	○		58	65	71	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	1.9
	100		○	58	65	70	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8	2.1
	140		○	59	65	69	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1	2.5
	170		○	59	65	69	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9	2.8
50	30	○		42	50	56	1.73	2.12	2.45	3.00	3.88	4.58	5.48	7.75	1.2
	50	○		43	50	55	2.89	3.54	4.08	5.00	6.46	7.64	9.13	12.9	1.6
	80	○		43	50	55	4.62	5.66	6.53	8.00	10.3	12.2	14.6	20.6	2.0
	100		○	44	50	54	5.77	7.07	8.17	10.0	12.9	15.3	18.3	25.8	2.2
	140		○	44	50	54	8.08	9.90	11.4	14.0	18.1	21.4	25.6	36.1	2.7
	170		○	45	50	54	9.82	12.0	13.9	17.0	22.0	26.0	31.1	43.9	3.0

[Note] 1. Spray nozzle performance is guaranteed only when the nozzle is set at no angle.
2. For spray droplet diameter, please see the chart of VP series nozzles on page 19.

How to order Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M UT+VP 8030 S303

1/4M	UT+VP	80	30	S303
Pipe conn. size*		Spray angle code	Spray capacity code	
■ 1/4M		■ 80	■ 30	
■ 3/8M		■ 65	⟆	
		■ 50	■ 170	

Contact us if you want to order only nozzle tips.
*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/4M = R1/4.

ALSO AVAILABLE!

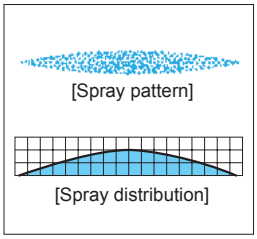
Universal-joint Type
Solid Stream Jet
UT+CP series

See p.108 of this catalog.

Quick-installation Nozzles QB

[Features]

- Flat spray pattern with stable distribution having tapered spray pattern edges.
- Easy to install. Just drill a hole (ø14.3 mm) on a pipe and insert a nozzle.
- Quick-detachable design helps to significantly reduce maintenance time.
- Spray direction is adjustable within 50 degrees as desired.
- Nozzle tips are color-coded by spray capacity for easy identification.
- Adaptors, color-coded by size, are available in 1″, 1*1/4″, 1*1/2″, 2″, 25A, and 30A.
- O-ring seals between pipe and adaptor for pressures up to 0.4 MPa.
- Caps are interchangeable for all sizes.
- Double locked by fitting spring lock (option).



[Standard pressure]

0.3 MPa

[Applications]

Pre-treatment for painting (car, home electric appliances)

Cleaning: water rinsing after acid treatment of steel plates, water rinsing process in food factory

QB series

	QB series
Structure	• Comprises three parts: Nozzle tip, ball, and adaptor. • Worn-out nozzle tip can be replaced separately.
Material	• Main parts: FRPP • Packing: FEPM • O-ring: NBR • Spring clip and spring lock: S304

[QB for metal pipes]

Pipe size (inch)*1	Color of adaptor	Dimensions (mm)						Mass (g)
		L1	L2	L3	L4	øD1	øD2	
1		105	89	72	55	34	48	61
1*1/4		114	98	76	55	42.7	48	
1*1/2		120	104	79	55	48.6	48	
2		132	116	85	55	60.5	48	

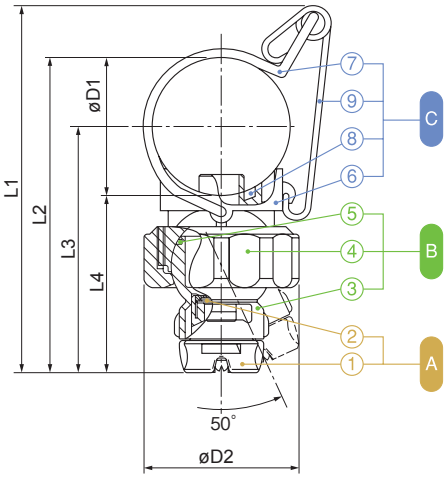
*1) Pipes should be stainless steel pipes compliant with JIS G 3459.

[QB for PVC pipes]

Pipe size (ND)*2	Color of adaptor	Dimensions (mm)						Mass (g)
		L1	L2	L3	L4	øD1	øD2	
25A		103	87	71	55	32	48	61
30A		109	93	74	55	38	48	
40A		120	104	79	55	48.6	48	
50A		132	116	85	55	60.5	48	

*2) Pipes should be PVC pipes compliant with JIS K 6742.
40A, 50A adaptors for PVC pipes are the same as 1*1/2″, 2″ adaptors for metal pipes.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



Ⓐ **Nozzle tip** (①Nozzle tip ②Packing [FEPM])

Ⓑ **Ball** (③Ball ④Cap ⑤O-ring [NBR])

Ⓒ **Adaptor** (⑥Adaptor ⑦Spring clip ⑧O-ring [NBR] ⑨Spring lock*3)

*3) ⑨ is optional (at extra cost).

Spray angle code	Spray capacity code	Pipe size (inch)	Pipe size (ND)	Spray capacity (ℓ/min) 0.1 MPa	0.2 MPa	0.3 MPa	0.4 MPa	Mean droplet diameter (μm)	Free passage diameter (mm)	Color of nozzle tip
80	80	1, 1*1/4, 1*1/2, or 2	25A, 30A, (40A), or (50A)	4.62	6.53	8.00	9.24	430	1.7	
	100			5.77	8.16	10.0	11.5		2.0	
	120			6.93	9.80	12.0	13.9		2.3	
	160			9.24	13.1	16.0	18.5		2.7	
	180			10.4	14.7	18.0	20.8	⟆	2.8	
	200			11.5	16.3	20.0	23.1		2.8	
	240			13.9	19.6	24.0	27.7		3.2	
	280			16.2	22.9	28.0	32.3		3.6	
	390			22.5	31.8	39.0	45.0	610	4.3	

Spray angle code	Spray capacity code	Pipe size (inch)	Pipe size (ND)	Spray capacity (ℓ/min) 0.1 MPa	0.2 MPa	0.3 MPa	0.4 MPa	Mean droplet diameter (μm)	Free passage diameter (mm)	Color of nozzle tip
65	80	1, 1*1/4, 1*1/2, or 2	25A, 30A, (40A), or (50A)	4.62	6.53	8.00	9.24	460	1.8	
	100			5.77	8.16	10.0	11.5		2.2	
	120			6.93	9.80	12.0	13.9		2.4	
	160			9.24	13.1	16.0	18.5		2.8	
	180			10.4	14.7	18.0	20.8	≀	3.0	
	200			11.5	16.3	20.0	23.1		3.3	
	240			13.9	19.6	24.0	27.7		3.6	
	280			16.2	22.9	28.0	32.3		3.8	
	390			22.5	31.8	39.0	45.0	650	4.5	
40	80			4.62	6.53	8.00	9.24	560	2.2	
	100			5.77	8.16	10.0	11.5		2.5	
	120			6.93	9.80	12.0	13.9		2.8	
	160			9.24	13.1	16.0	18.5		3.2	
	180			10.4	14.7	18.0	20.8	≀	3.3	
	200			11.5	16.3	20.0	23.1		3.6	
	240			13.9	19.6	24.0	27.7		3.9	
	280			16.2	22.9	28.0	32.3		4.3	
	390			22.5	31.8	39.0	45.0	800	5.1	

[Note] INVV and INJJX series nozzle tips (p.23 and p.69) are not attachable to QB series.

⚠ CAUTIONS

Maximum operating pressure is 0.4 MPa.
Do not use under conditions where water hammer or sudden change of water pressure may occur.

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 ISVV 65280 FRPP + ISB + 1*1/4 QB FRPP + L

NOZZLE TIP PART | BALL PART | ADAPTOR PART | SPRING LOCK (OPTION)

ISVV 65 280 FRPP + ISB + 1*1/4 QB FRPP + L

Spray angle code
- 80
- 65
- 40

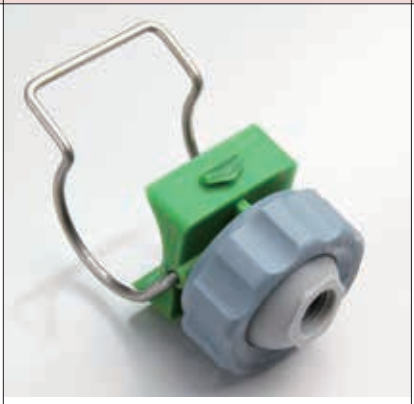
Spray capacity code
- 80
- ≀
- 390

Pipe size*4
- 1″ (Outer diameter 34.00 ±0.5 mm)
- 1*1/4″ (Outer diameter 42.7 ±0.5 mm)
- 1*1/2″ (Outer diameter 48.6 ±0.5 mm)
- 2" (Outer diameter 60.5 ±0.5 mm)
- 25A (Outer diameter 32.00 ±0.5 mm)
- 30A (Outer diameter 38.00 ±0.5 mm)

*4) 1. Please check the dimensions of øD1 (outer diameter).
2. Order 1*1/2″ adaptor for 40A, and 2″ adaptor for 50A.

Related Products

Series	Appearance	Features
BAA+QB series		● Air washer (air conditioning humidification) nozzle made by combining AA series nozzle (hollow cone spray nozzle) with QB series adaptor and ball parts. ● Easy installation. Just open a hole (ø14.3 mm) into existing piping, then insert the nozzle. ● Includes a spring lock to firmly secure the nozzle in place. ● Clog-resistant structure.

Series	Appearance	Features
Ball Joint Adaptor QBP series	 (Photo below shows QBP adaptor with a spray nozzle) 	● Spray direction is adjustable as desired with the ball joint. ● Easy installation onto a pipe with a spring clip fastener. ● Available in metal pipe sizes of 1″, 1*1/4″, 1*1/2″, or 2″ and in PVC pipe sizes of 25A, 30A, 40A, and 50A. (40A, 50A adaptors for PVC pipes are the same as 1*1/2″, 2″ adaptors for metal pipes.) ● IKEUCHI's spray nozzles can be easily screwed in. R1/4, R3/8, or R1/2 threaded nozzle is attachable. ● Main material: FRPP

Products Lineup

Cone Spray Nozzles

Hollow Cone Spray Nozzles pp.52–

- Extremely fine fog and ultra-small capacity: **KB, KBN**
- Semi-fine atomization and small capacity: **K, KKBP**
- Small capacity: **KD**
- Medium capacity: **AAP**
- Alumina ceramic nozzles: **AP-AL92**
- Flange-type, large capacity: **TAA**
- Effective use of hollow cone spray nozzles

Full Cone Spray Nozzles pp.63–

- Standard full cone spray: **JJXP**
- Quick-detach plastic nozzles: **INJJX**
- Ceramic orifice and whirler inserted: **JUP**
- Alumina ceramic nozzles: **JUXP-AL92**
- Small capacity: **JJRP, J**
- Flange-type, large capacity: **TJJX**
- Wide-angle full cone spray: **BBXP**
- Narrow angle full cone spray: **NJJP**
- Clog-resistant vaneless nozzles: **AJP, AJP-AL92**
- Effective use of full cone spray nozzles

Square Spray Nozzles pp.86–

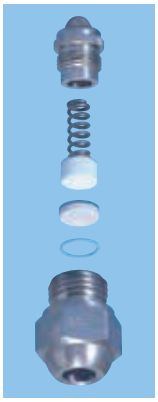
- Square full cone spray: **SSXP**

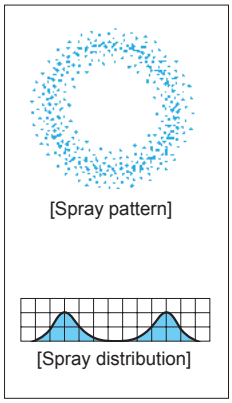
Special Cone Spray Nozzles pp.88–

- SPILLBACK nozzles: **SPB**
- Seven-head full cone spray: **7KB, 7JJXP**
- Multiple-orifice semi-fine fog nozzles: **TSP**

Extremely Fine Fog and Ultra-small Capacity Hollow Cone Spray Nozzles

KB





[Features]

- Ultra-small capacity hollow cone spray nozzle with the finest atomization among hydraulic nozzles.
- Capable of generating extremely fine spray.
- The whirl chamber is formed by a ceramic orifice and closer,*1 which provides excellent wear resistance.

[Standard pressure]

0.7 MPa

[Applications]

Humidifying: Air handling units, greenhouses
Cooling: Gas, thin plates, poultry
Spraying: Alcohol, chemicals

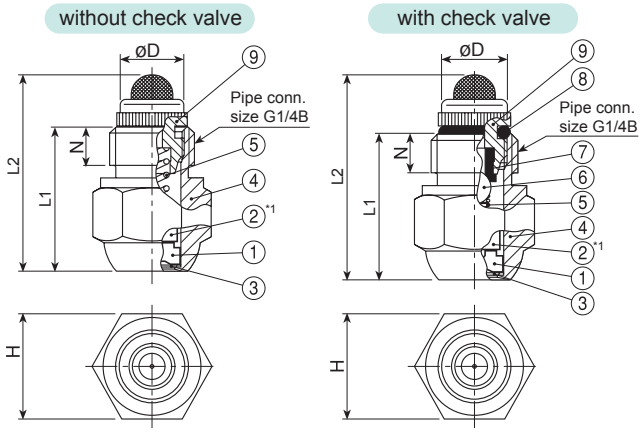
KB series

	KB series (with ceramic orifice inserted)
Structure	• Nozzle orifice and closer are made of ceramics.*1 • Male parallel pipe thread (G1/4B). • All models include built-in strainers. • Comes with check valve at extra cost.
Material	• Nozzle orifice & closer: ceramic*1 • Metal parts: S303 or B (brass)

Series	Dimensions (mm)					Mass (g)	
	L1	L2	H	øD	N	S303	B
KB (w/o check valve)	22.5	31	17(S303) 16(B)	10.5	6	24.8	25
KB**CV (w/ check valve)	22.5	32	17(S303) 16(B)	10.5	6	25.3	25.5

*1) For KB nozzles with N in the spray capacity code (see p.53), the closer is made of polyester elastomer instead of ceramic.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



Spray angle code	Spray capacity code*2	Spray angle (°)			Spray capacity (ℓ/hr)									Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
		0.3 MPa	0.7 MPa	2 MPa	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	0.7 MPa	1 MPa	1.2 MPa	1.5 MPa	2 MPa			
80	063N	65	80	80	1.36	1.55	1.72	1.86	2.00	2.35	2.56	2.83	3.22	45	0.20	200
	071	—	80	80	—	1.70	1.90	2.08	2.25	2.69	2.95	3.29	3.81		0.15	200
	08	—	80	80	—	1.97	2.20	2.41	2.60	3.11	3.40	3.80	4.40		0.15	200
	09	—	80	80	—	2.23	2.49	2.73	2.95	3.53	3.86	4.32	4.99	⟆	0.15	200
	10N	65	80	80	2.19	2.51	2.78	3.03	3.25	3.84	4.18	4.63	5.30		0.25	200
	125N	65	80	80	2.77	3.16	3.51	3.82	4.10	4.84	5.27	5.84	6.68	60	0.30	200
	14	—	80	80	—	3.48	3.89	4.26	4.60	5.50	6.02	6.73	7.78	50	0.15	200
	16N	65	80	80	3.51	4.02	4.47	4.88	5.25	6.22	6.79	7.55	8.66		0.35	150
	20N	65	80	80	4.41	5.06	5.62	6.13	6.60	7.82	8.53	9.49	10.9		0.40	150
	22N	65	80	80	4.84	5.55	6.18	6.74	7.25	8.59	9.37	10.4	12.0	⟆	0.40	150
	25	70	80	80	5.40	6.24	6.97	7.64	8.25	9.87	10.8	12.1	14.0		0.25	150
	28	70	80	80	6.05	6.99	7.82	8.56	9.25	11.1	12.1	13.5	15.7		0.30	150
	32	70	80	80	6.94	8.01	8.96	9.82	10.6	12.7	13.9	15.5	17.9	75	0.30	150
	38	70	80	80	8.25	9.52	10.7	11.7	12.6	15.1	16.5	18.4	21.3	65	0.40	150
	45	70	80	80	9.79	11.3	12.6	13.9	15.0	17.9	19.6	21.9	25.3		0.40	100
	50	70	80	80	10.9	12.6	14.0	15.4	16.6	19.9	21.8	24.3	28.1		0.40	100
	56	70	80	80	12.2	14.1	15.7	17.2	18.6	22.3	24.4	27.2	31.5	⟆	0.40	100
	63	72	80	80	13.7	15.8	17.7	19.4	21.0	25.1	27.5	30.7	35.5		0.40	100
	71	72	80	80	15.5	17.8	20.0	21.9	23.6	28.2	30.9	34.6	39.9		0.50	100
	80	72	80	80	17.5	20.2	22.6	24.7	26.7	31.9	35.0	39.0	45.1		0.50	100
	90	73	80	80	19.6	22.7	25.4	27.8	30.0	35.9	39.3	43.9	50.8	110	0.50	100
	100	73	80	80	21.8	25.2	28.2	30.9	33.3	39.9	43.7	48.8	56.4	90	0.50	100
	1250	73	80	80	27.2	31.5	35.2	38.5	41.6	49.8	54.5	60.9	70.4		0.50	100
	180	74	80	80	39.2	45.3	50.6	55.5	59.9	71.6	78.5	87.6	101	⟆	0.60	100
	200	74	80	80	43.6	50.4	56.3	61.7	66.6	79.7	87.3	97.5	113		0.60	100
	320	75	80	80	69.7	80.5	90.0	98.6	107	127	140	156	180	210	0.60	100
60	063	—	60	60	—	1.51	1.69	1.85	2.00	2.39	2.62	2.93	3.38	45	0.15	200
	14	—	60	60	—	3.48	3.89	4.26	4.60	5.50	6.02	6.73	7.78	⟆	0.15	200
	32	—	60	60	—	8.01	8.96	9.82	10.6	12.7	13.9	15.5	17.9		0.30	150
	56	50	60	60	12.2	14.1	15.7	17.2	18.6	22.3	24.4	27.2	31.5	90	0.40	100
	140	53	60	60	30.5	35.2	39.4	43.2	46.6	55.7	61.0	68.2	78.8	130	0.50	100
	280	54	60	60	61.0	70.5	78.8	86.4	93.2	112	122	136	158	190	0.60	100

*2) Spray capacity code with N is our newly-designed KB series. See page 53 for the features.

[Note] The spray capacity of KB series is in liters per hour (ℓ/hr), not in ℓ/min. The spray capacity code does not correspond with the spray capacity at the standard pressure.

Features of newly-designed KB (with code "N") series

● **Anti-clogging design**
- Features larger orifice diameter (1.3–2.6 times) compared with conventional KB models. Clog-resistant.

● **Available in wide range from low (0.2 MPa) to high (10 MPa) pressures**
- Capable of spraying from 0.2 MPa: Able to spray at low capacity.
- Designed to withstand pressures up to 10 MPa: Suitable for finer atomization.*3

*3) When spraying at pressure of 2 MPa and above, use S303 nozzles.

Spray capacity of KB series (with code "N") at high pressure

Spray angle code	Spray capacity code	Spray angle (°)	Spray capacity (ℓ/hr) 3 MPa	5 MPa	6 MPa	7 MPa	10 MPa	Mean drop. dia. at 10 MPa (μm)
80	063N	80	3.88	4.89	5.31	5.70	6.70	33
	10N		6.40	8.11	8.83	9.48	11.2	
	125N		8.07	10.2	11.1	12.0	14.1	〃
	16N		10.5	13.4	14.6	15.7	18.6	
	20N		13.2	16.8	18.4	19.8	23.4	
	22N		14.5	18.5	20.2	21.7	25.7	40

Check valve

For drip-free shut-off, KB series nozzles with check valves are available.
The standard operating pressure for check valve is 0.4 MPa. Supply pressure minus the operating pressure of the check valve (0.4 MPa) is the atomizing pressure. KB series nozzles with check valves are not guaranteed for spray angle and spray capacity.

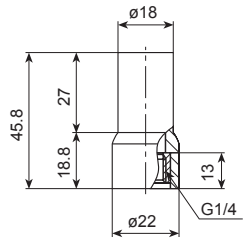
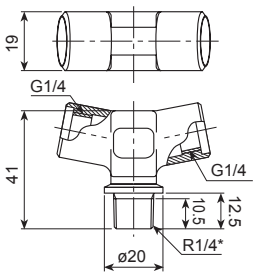
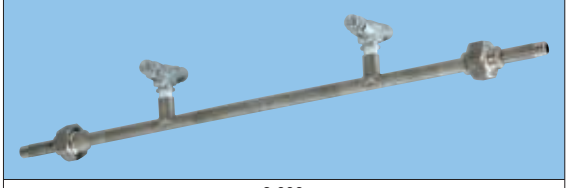
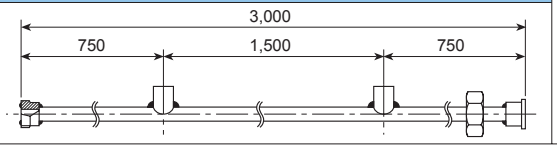
How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M KB 80071 S303 CV-RW

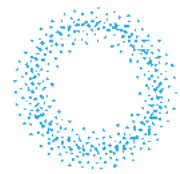
1/4M KB	80	071	S303	CV	-RW
	Spray angle code	Spray capacity code	Material	Check valve	
	■80 ■60	■063N 〃 ■320	■S303 ■B	■CV (with check valve) ■(Blank denotes "without check valve")	

Optional Accessories for KB series

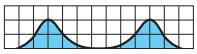
Product	Appearance	Structure	Features
Fitting for PVC pipe 13AKB adaptor PVC			• Fitting for KB series nozzle to 13A (1/2″) Tee. • Material: PVC
Two-way adaptor			• Adaptor for connecting 2 pcs. of KB. series nozzles. • Material: Chrome-plated brass *Three types of threads for pipe connection are available: male taper thread, male parallel thread, or M15x1.
Spray header	 		• Stainless steel header with two-way adaptors. • Length of header: 3 m or 4 m Please contact us for details.

Extremely Fine Fog and Ultra-small Capacity Hollow Cone Spray Nozzles

KBN



[Spray pattern]



[Spray distribution]

[Features]

- Ultra-small capacity hollow cone spray nozzle with the finest atomization among hydraulic nozzles.
- Minimal clogging with free passage diameter 1.3–2.6 times bigger than that of conventional nozzles.
- High-purity alumina ceramic tip provides stable performance with longer life even under high pressure conditions.

[Standard pressure]

1 MPa (Max. operating pressure: 7 MPa)

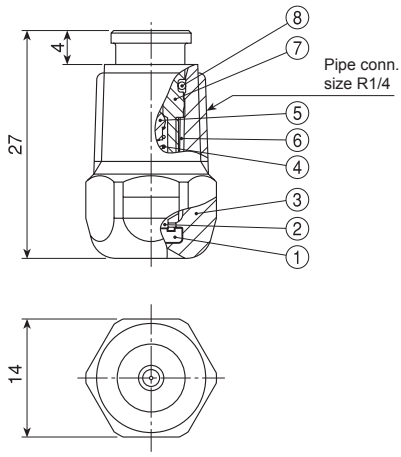
[Applications]

Cooling: Poultry farms, Outside cooling
Humidifying: Air handling units, greenhouses
Spraying: Alcohol, disinfectant
Others: Dust suppression, irrigation for greenhouse

KBN series

	KBN series (with ceramic orifice inserted)
Structure	● One-piece structure with one-shot injection molded ceramic orifice. ● Thread is R1/4 (PT1/4 male) or NPT1/4 male. ● All models come with strainer and check valve.
Material	● Nozzle orifice: ceramic ● Closer: polyester elastomer ● Nozzle body: PA
Mass	● 4 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Closer ③Nozzle body ④Spring (S304)
⑤Poppet (NBR) ⑥Strainer screen (S316)
⑦Strainer holder (PP) ⑧O-ring (NBR)

Spray angle code	Spray capacity code	Spray angle (°) 0.5 MPa	1 MPa	1.3 MPa	2 MPa	Spray capacity (ℓ/hr) 0.5 MPa	0.8 MPa	1 MPa	1.3 MPa	2 MPa	3.5 MPa	5 MPa	6 MPa	7 MPa	Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size	Nozzle body color
80	063	50	80	80	80	1.13	1.72	2.00	2.35	2.99	3.99	4.75	5.19	5.58	35	0.2	200	
	125	60	80	80	80	2.29	3.51	4.10	4.84	6.19	8.31	9.94	10.9	11.7	≀	0.3	100	
	22	65	80	80	80	3.99	6.18	7.25	8.59	11.1	15.0	18.0	19.7	21.3	65	0.4	100	

[Note]
1. The spray capacity of KBN series is in liters per hour (ℓ/hr), not in ℓ/min.
2. Check valve which closes and opens at 0.3 MPa is built into the nozzle.
3. KBN series nozzles with check valves are not guaranteed for spray angle and spray capacity.

How to order

Please inquire or order for a specific nozzle using this coding system.

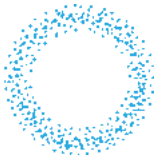
〈Example〉 1/4M KBN 80125 TPACVW

1/4M KBN 80 125 TPACVW

Spray capacity code
- 063
- 125
- 22

Semi-fine Atomization and Small Capacity
Hollow Cone Spray Nozzles

K



[Spray pattern]

[Spray distribution]

[Features]
- Small capacity hollow cone spray nozzle.
- Semi-fine atomization.
- The whirl chamber is formed by a ceramic orifice and closer, which provides excellent wear-resistance.

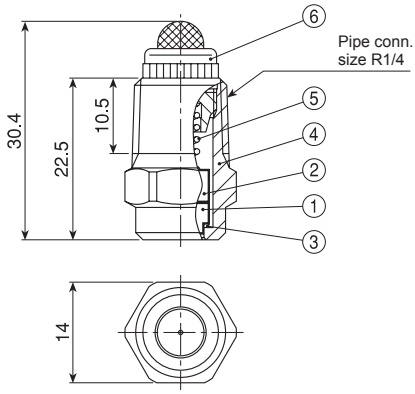
[Standard pressure]
0.3 MPa

[Applications]
Humidifying: Air handling units
Cooling: Gas, metals
Spraying: Chemicals

K series

	K series (with ceramic orifice inserted)
Structure	• Nozzle orifice and closer are made of ceramics. • All models include built-in strainers.
Material	• Nozzle orifice & closer: ceramic • Nozzle body: S303 or B (brass)
Mass	• S303: 17.5 g • B (brass): 18.5 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Ceramic closer ③Packing (PTFE)
④Nozzle body ⑤Spring (S316)
⑥Strainer (S303+S304 or B+S304)

Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)	Strainer mesh size
	0.15 MPa	0.3 MPa	0.7 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa	2.5 MPa			
006	—	80	80	—	—	0.06	0.08	0.09	0.11	0.13	0.15	0.16	80	0.4	150
008	—	80	80	—	—	0.08	0.10	0.12	0.14	0.17	0.20	0.22		0.4	150
010	—	80	80	—	—	0.10	0.13	0.15	0.18	0.22	0.25	0.27		0.5	100
012	—	80	80	—	—	0.12	0.15	0.18	0.21	0.26	0.30	0.33		0.5	100
015	—	80	80	—	0.12	0.15	0.19	0.22	0.27	0.32	0.37	0.41	⟆	0.6	100
020	70	80	80	0.14	0.16	0.20	0.26	0.30	0.35	0.43	0.49	0.55		0.7	50
025	70	80	80	0.18	0.21	0.25	0.32	0.37	0.44	0.54	0.62	0.69		0.7	50
030	70	80	80	0.22	0.25	0.30	0.38	0.45	0.53	0.65	0.74	0.82		0.9	50
040	70	80	80	0.29	0.33	0.40	0.51	0.60	0.71	0.86	0.99	1.10		0.9	50
050	70	80	80	0.36	0.41	0.50	0.64	0.75	0.89	1.08	1.23	1.37	200	1.0	50
060	70	80	80	0.43	0.49	0.60	0.77	0.90	1.06	1.29	1.48	1.65	220	1.0	50
070	70	80	80	0.50	0.58	0.70	0.89	1.05	1.24	1.51	1.73	1.92		1.0	50
080	70	80	80	0.58	0.66	0.80	1.02	1.20	1.42	1.72	1.97	2.20		1.2	50
100	70	80	80	0.72	0.82	1.00	1.28	1.50	1.77	2.15	2.47	2.74	⟆	1.3	50
120	70	80	80	0.86	0.99	1.20	1.53	1.80	2.13	2.58	2.96	3.29		1.3	50
140	70	80	80	1.01	1.15	1.40	1.79	2.10	2.48	3.01	3.46	3.84		1.5	50
160	70	80	80	1.15	1.32	1.60	2.04	2.40	2.84	3.44	3.95	4.39		1.5	50
180	70	80	80	1.29	1.48	1.80	2.30	2.69	3.19	3.87	4.44	4.94	380	1.7	50

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M K 006N S303W

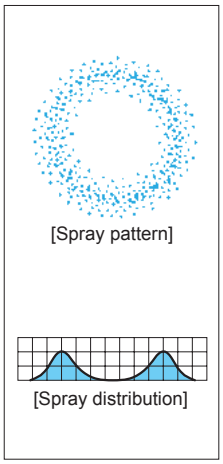
1/4M K 006N S303 W

Spray capacity code
- 006
- ⟆
- 180

Material
- S303
- B

Semi-fine Atomization and Small Capacity Hollow Cone Spray Nozzles

KKBP



[Features]
- Small capacity hollow cone spray nozzle.
- Unique whirler design with large free passage diameter minimizes clogging.
- Semi-fine atomization.
- Compact, lightweight design with a small number of parts.
- Maintenance is easy as whirler is detachable.

[Standard pressure]
0.3 MPa

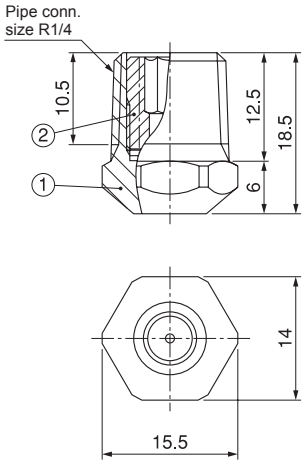
[Applications]
Humidifying: Air handling units
Cooling: Gas, metals
Spraying: Chemicals
Snow making (for snow machines)

KKBP series

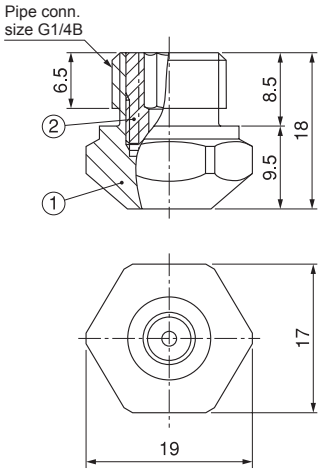
	KKBP series
Structure	• Comprises a nozzle body and whirler. • Available with male taper pipe thread (R1/4) or male parallel pipe thread (G1/4B).
Material	• Nozzle body: S303 • Whirler: S316L equivalent • Optional material (of nozzle body): S316, S316L, Brass
Mass	• Taper pipe thread type: 15 g • Parallel pipe thread type: 20 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Taper thread



Parallel thread (G)



①Nozzle body ②Whirler

Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)								Mean droplet diameter (μm)	Free passage diameter (mm)
	0.2 MPa	0.3 MPa	1.0 MPa	0.2 MPa	0.3 MPa	0.5 MPa	1 MPa	1.5 MPa	2 MPa	3 MPa	5 MPa		
050	63	65	68	0.41	0.50	0.64	0.89	1.08	1.24	1.51	1.93	160	1.0
060	65	68	70	0.49	0.60	0.77	1.07	1.30	1.49	1.82	2.32		1.0
070	60	63	65	0.58	0.70	0.89	1.25	1.52	1.74	2.12	2.71	⟆	1.2
080	63	65	68	0.66	0.80	1.02	1.43	1.73	1.99	2.42	3.09		1.2
100	55	58	60	0.82	1.00	1.28	1.78	2.17	2.49	3.03	3.87	250	1.4
120	58	60	63	0.99	1.20	1.53	2.14	2.60	2.99	3.63	4.64	260	1.4
140	55	58	60	1.15	1.40	1.79	2.50	3.04	3.49	4.24	5.41		1.6
160	55	58	60	1.32	1.60	2.05	2.85	3.47	3.98	4.84	6.19	⟆	1.6
180	50	53	55	1.48	1.80	2.30	3.21	3.90	4.48	5.45	6.96		1.8
200	53	55	58	1.65	2.00	2.56	3.57	4.34	4.98	6.05	7.73	360	1.8

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M KKBP 050 S303

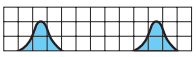
1/4M	KKBP	050	S303
Pipe conn. size*		Spray capacity code	
1/4M		050	
1/4M (G)		⟆	
		200	

*In case parallel thread type is required, please specify the pipe connection size as 1/4M (G).
"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/4M = R1/4.

Small Capacity
Hollow Cone Spray Nozzles

KD

[Spray pattern]



[Spray distribution]

[Features]

- Small capacity hollow cone spray nozzle. Three-piece structure.
- Combines compact design and semi-fine atomization capability.
- The whirl chamber is formed by a ceramic orifice and whirler, which provides excellent wear-resistance.

[Standard pressure]

0.3 MPa

[Applications]

Cooling: Gas

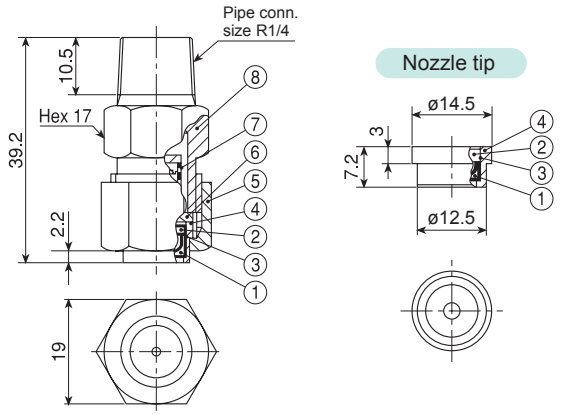
Spraying: Chemicals, dust suppression

KD series

	KD series (with ceramic orifice inserted)
Structure	• Nozzle orifice and whirler are made of ceramics. • Comprises three parts: Nozzle tip, cap, and adaptor. Worn-out nozzle tip can be replaced separately. • Small spray capacity models (KD03 and KD033) come with or without a strainer.
Material	• Nozzle orifice & whirler: ceramic • Metal parts: S303 or B (brass) • Optional material: S316 or others
Mass	• Complete assemblies* S303: 46 g, B (brass): 49 g • Nozzle tip S303: 3 g, B (brass): 3 g

*When with a strainer, add 2–5 g to the above mass and 2 mm to the total length.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Ceramic whirler ③Adhesive: Araldite®
④Tip retainer ⑤Cap ⑥Strainer holder ⑦Strainer screen (S316)
⑧Adaptor

Spray capacity code	Pipe conn. size	Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)
	R1/4	0.15 MPa	0.3 MPa	0.7 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa		
03	●	—	80	85	—	—	0.25	0.30	0.38	0.44	0.52	0.63	0.72	130	0.7
033	●	—	80	88	—	—	0.27	0.33	0.42	0.49	0.58	0.69	0.79		0.7
037	○	—	70	75	—	—	0.31	0.37	0.47	0.55	0.64	0.77	0.88	⟆	1.0
042	○	90	93	97	—	0.30	0.35	0.42	0.53	0.62	0.73	0.88	1.00		0.7
057	○	78	85	90	—	0.41	0.47	0.57	0.72	0.84	0.99	1.19	1.36		1.1
068	○	90	95	99	—	0.49	0.56	0.68	0.86	1.01	1.18	1.42	1.62	200	1.1
084	○	90	95	103	0.50	0.61	0.70	0.84	1.05	1.21	1.42	1.69	1.92	⟆	1.1
116	○	66	70	72	0.70	0.84	0.96	1.16	1.45	1.68	1.96	2.34	2.65	260	1.3
146	○	74	78	80	0.88	1.06	1.21	1.46	1.85	2.16	2.54	3.05	3.49	310	1.8
176	○	71	73	75	1.06	1.27	1.46	1.76	2.22	2.60	3.06	3.68	4.20		1.7
182	○	81	87	91	1.10	1.32	1.51	1.82	2.30	2.69	3.17	3.81	4.34		1.8
211	○	83	88	92	1.27	1.53	1.75	2.11	2.67	3.12	3.67	4.41	5.04	⟆	1.8
224	○	75	80	82	1.34	1.62	1.85	2.24	2.83	3.31	3.90	4.69	5.35		1.7
262	○	75	80	83	1.57	1.90	2.17	2.62	3.31	3.87	4.56	5.48	6.25		1.7
316	○	93	97	97	1.90	2.29	2.62	3.16	3.99	4.67	5.50	6.61	7.54		1.8
394	○	83	87	91	2.36	2.85	3.26	3.94	4.98	5.82	6.86	8.24	9.40	420	1.7

●: Available with/without strainer (mesh size #50) ○: Available without strainer

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/4M KD 03 S303W

1/4M KD | 03 (Spray capacity code) | S303 (Material) | W (Strainer)

- 03 ⟆ 394
- S303: S303; B: B
- W: W (with strainer); (Blank denotes "without strainer")

②Nozzle tip only

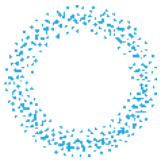
〈Example〉 1/4 KD 03 S303

1/4 KD | 03 (Spray capacity code) | S303 (Material)

- 03 ⟆ 394
- S303: S303; B: B

Medium Capacity
Hollow Cone Spray Nozzles

AAP



[Spray pattern]

[Spray distribution]

[Features]

- Hollow cone spray nozzle with relatively fine atomization. Stable spray pattern at both low and high pressure.
- No-whirler design minimizes clogging.
- Spraying axis 90° from the axis of the nozzle inlet.

[Standard pressure]

0.2 MPa

[Applications]

Cleaning: Gas, air, machines, pre-painting treatment

Cooling: Gas, air handling unit, roofs, machineries, foods, warm water

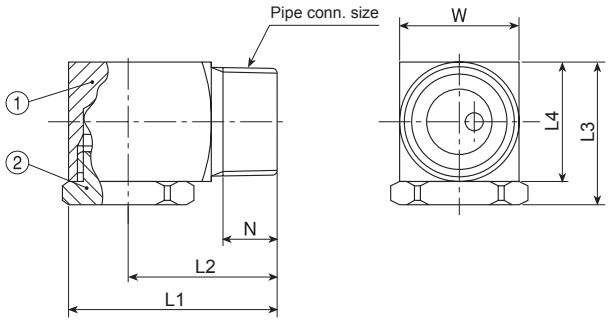
Spraying: Aeration, humidification

AAP series

	AAP series
Structure	• Comprises a nozzle body and orifice cap. • Orifice cap is screwed into the nozzle body and removable.
Material	• Nozzle body: S304 • Orifice cap: S303 • Optional material: S316, S316L, or B (brass)

Pipe conn. size	Dimensions (mm)						Mass (g)
	L1	L2	L3	L4	W	N	
R1/4	32	23	20.5	16	16	10.5	49
R3/8	36	26	23.5	19	19	11	72
R1/2	46	33.5	31	25	25	14	160

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body (S304) ②Orifice cap

Spray capacity code	Pipe conn. size			Spray angle (°)			Spray capacity (ℓ/min)							Mean droplet diameter (μm)	Free passage diameter (mm)
	R1/4	R3/8	R1/2	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
01	○			71	75	77	0.40	0.51	0.72	0.87	1.00	1.22	1.55	260	2.0
02	○			71	75	77	0.80	1.03	1.43	1.74	2.00	2.43	3.11		2.5
03	○			71	75	77	1.21	1.54	2.15	2.61	3.00	3.65	4.66	⟆	3.2
04	○			76	80	82	1.61	2.05	2.87	3.48	4.00	4.86	6.21		3.7
05	○			76	80	82	2.01	2.57	3.58	4.35	5.00	6.08	7.77	500	4.3
06		○		76	80	82	2.41	3.08	4.30	5.22	6.00	7.29	9.32	470	4.8
07		○		76	80	82	2.81	3.59	5.02	6.10	7.00	8.51	10.9		5.0
08		○		76	80	82	3.21	4.11	5.73	6.97	8.00	9.72	12.4	⟆	5.5
10		○		76	80	83	4.02	5.14	7.17	8.71	10.0	12.2	15.5		5.8
12		○		76	80	83	4.82	6.16	8.60	10.4	12.0	14.6	18.6	650	6.2
14			○	76	80	83	5.62	7.19	10.0	12.2	14.0	17.0	21.7	580	6.8
18			○	76	80	83	7.23	9.24	12.9	15.7	18.0	21.9	28.0	⟆	7.5
23			○	76	80	83	9.24	11.8	16.5	20.0	23.0	28.0	35.7	800	8.0

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M AAP 01 S303

1/4M AAP 01 S303

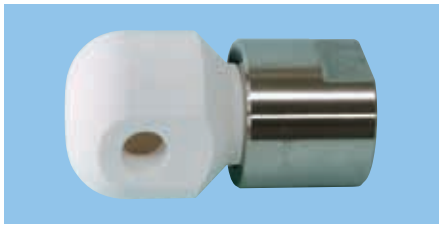
Pipe conn. size*
- 1/4M
- 3/8M
- 1/2M

Spray capacity code
- 01
- ⟆
- 23

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/4M = R1/4.

Alumina Ceramic and Medium Capacity Hollow Cone Spray Nozzles

AP-AL92



[Spray pattern]

[Spray distribution]

[Features]

- Hollow cone spray nozzle made of alumina ceramic having excellent wear-resistance. Relatively fine atomization.
- Spray pattern is stable both at low and high pressures.
- No-whirler design minimizes clogging.
- Spraying axis 90˚ from the axis of the nozzle inlet.

[Standard pressure]

0.2 MPa

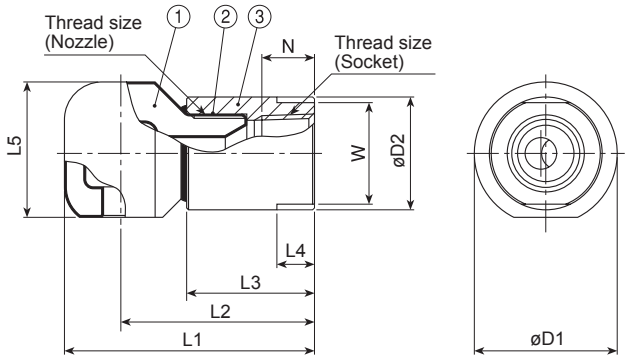
[Applications]

Cleaning: Gas, air, machines, pre-painting treatment
Cooling: Gas, air handling unit, roofs, machinery, foods, warm water
Spraying: Aeration, humidification

AP-AL92 series

	AP-AL92 series
Structure	• Alumina ceramic one-piece structure. • No obstructions in nozzle interior.
Material	• Nozzle body: 92% Alumina • Socket: S316

We offer AP-AL92 series with a socket made of S316 to prevent thread damage, as the nozzle's alumina threads get easily chipped.
Our S316 socket is female threaded.



①Nozzle body ②Adhesive: Araldite®H ③Socket (S316)

Thread sizes		Dimensions (mm)									Mass (g)
Nozzle	Socket	L1	L2	L3	L4	L5	W	øD1	øD2	N	
R1/2	Rc1/2	67	52	34	10	36	27	38	30	14	240
R3/4	Rc3/4	80	60	39	14	44	35	46	40	15	430
R1	Rc3/4	95	71	41	18	52.5	41	56	50	15	590
R1	Rc1	97	73	43	18	52.5	41	56	50	17	790
R1*1/2	Rc1	129	94	47	24	81.5	60	85	70	17	1,960
R1*1/2	Rc1*1/2	132	97	50	24	81.5	60	85	70	19	2,240
R2	Rc1*1/2	154	109	54	27	99	70	104	80	19	2,780
R2	Rc2	158	113	58	27	99	70	104	80	23	3,200
R2*1/2	Rc2	193	133	62	30	123.5	90	128	100	23	5,900
R2*1/2	Rc2*1/2	197	137	66	30	123.5	90	128	100	27	6,500
R3	Rc2*1/2	241	171	71	35	150	100	160	110	27	10,400
R3	Rc3	245	175	75	35	150	100	160	110	30	11,100

[Note]
Appearance and dimensions may differ slightly depending on materials and nozzle codes.
Position of the machined flat surfaces (L4 in the drawing) of the socket is not always the same as shown in the above photo and drawing.

Spray capacity code	Nozzle thread size							Spray angle (°)			Spray capacity (ℓ/min)							Mean drop. dia. (μm)	Free pass. dia. (mm)
	R1/2	R3/4	R1	R 1*1/2	R2	R 2*1/2	R3	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
14	○							76	80	83	5.62	7.19	10.0	12.2	14.0	17.0	21.7	580	5.6
16	○							76	80	83	6.43	8.22	11.5	13.9	16.0	19.4	24.9		7.0
18	○							76	80	83	7.23	9.24	12.9	15.7	18.0	21.9	28.0	〃	7.5
20	○							76	80	83	8.03	10.3	14.0	17.4	20.0	24.3	31.1		7.5
23	○							76	80	83	9.24	11.8	16.5	20.0	23.0	28.0	35.7	800	8.0
26		○						76	80	83	10.4	13.4	18.6	22.6	26.0	31.6	40.4	670	9.2
30		○						76	80	83	12.1	15.4	21.5	26.1	30.0	36.5	46.6	〃	9.9
35		○						76	80	83	14.1	18.0	25.1	30.5	35.0	42.5	54.4		10.3
40		○						76	80	83	16.1	20.5	28.7	34.8	40.0	48.6	62.1	850	10.5
45			○					81	85	89	18.1	23.1	32.2	39.2	45.0	54.7	69.9	750	12.1
50			○					81	85	89	20.1	25.7	35.8	43.5	50.0	60.8	77.7		12.3
55			○					81	85	89	22.1	28.2	39.4	47.9	55.0	66.8	85.4	〃	13.1
60			○					81	85	89	24.1	30.8	43.0	52.2	60.0	72.9	93.2		13.7
70			○					81	85	89	28.1	35.9	50.2	61.0	70.0	85.1	109	1,000	15.0

Spray capacity code	Nozzle thread size							Spray angle (°)			Spray capacity (ℓ/min)							Mean drop. dia. (μm)	Free pass. dia. (mm)
	R1/2	R3/4	R1	R 1*1/2	R2	R 2*1/2	R3	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
80				○				81	85	89	32.1	41.1	57.3	69.7	80.0	97.2	124	1,000	15.3
100				○				81	85	89	40.2	51.4	71.7	87.1	100	122	155		16.2
120				○				81	85	89	48.2	61.6	86.0	104	120	146	186	〃	16.6
150				○				81	85	89	60.3	77.0	107	131	150	182	233		18.0
200					○			81	85	89	80.3	103	143	174	200	243	311		22.5
250					○			81	85	89	100	128	179	218	250	304	388	1,400	24.3
300						○		81	85	89	121	154	215	261	300	365	466	1,500	28.8
400						○		81	85	89	161	205	287	348	400	486	621	〃	30.6
500							○	81	85	89	201	257	358	435	500	608	777	〃	36.9
600							○	81	85	89	241	308	430	522	600	729	932	1,800	39.6

How to order

Please inquire or order for a specific nozzle using this coding system.

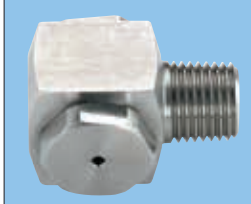
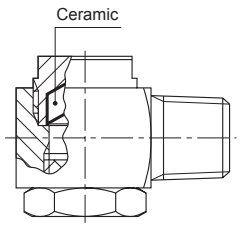
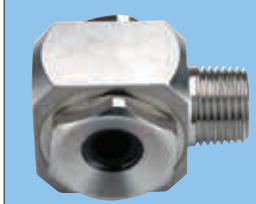
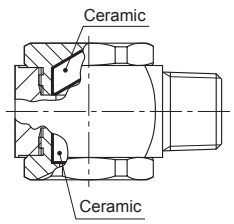
〈Example〉 1/2M AP 14 AL92 + 1/2Fx1/2F SOC S316

1/2M	AP	14	AL92 +	1/2F	x	1/2	F SOC S316
Nozzle thread size*		Spray capacity code		Socket thread size* (Pipe conn. size)		Nozzle thread size (without "R")	
1/2M 〃 3M		14 〃 600		1/2F 〃 3F		1/2 〃 3	

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/2M = R1/2, 1/2F = Rc1/2.

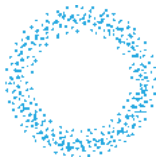
Sister Products

Hollow cone spray nozzles are superior in atomizing performance. On the other hand, the wear at the bottom of the nozzle is increased by an air core generated inside the nozzle. For applications such as spraying slurry where wear resistance of nozzles must be considered, AP series hollow cone spray nozzles with highly wear-resistant ceramics are available. Contact us for details.

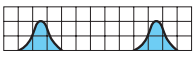
Series	Appearance	Structure	Features	Applications
AP			Hollow cone spray nozzle with ceramic bottom.	Spraying slurry
AP with ceramic orifice inserted			Hollow cone spray nozzle with ceramic bottom and ceramic orifice.	Spraying slurry

Flange-type, Large Capacity Hollow Cone Spray Nozzles

TAA



[Spray pattern]



[Spray distribution]

[Features]
- Stable hollow cone spray pattern under low pressures owing to the involute vortex chamber design.
- Made of high wear-resistant SiC (silicon nitride bonded silicon carbide).
- Flange connection.
- Lightweight (weighs less than a half of metal nozzle).

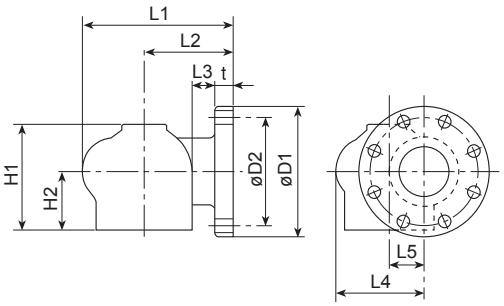
[Standard pressure]
0.07 MPa

[Applications]
- Absorption tower of flue gas desulfurization equipment
- Spraying slurry

TAA series

	TAA series
Structure	• One-piece cast-molded ceramics. • Flanged connection.
Material	• SiC (silicon nitride bonded silicon carbide) • Optional material: SiSiC (sintered reaction-bonded silicon carbide)

Flange size (inch)	Spray capacity code	Dimensions (mm) L1	L2	L3	L4	L5	H1	H2	øD1	øD2	t	Flange bolt holes (JIS 10K) Number of holes	Diameter (mm)	Mass (kg)
2	200	151	99	37	74	28	102	57	155	120	22	4	19	1.8
	300	169	106	37	90	35	112	62	155	120	22	4	19	2.0
3	400	184	114	37	100	38	129	71	185	150	24	8	19	3.1
	500	202	122	37	116	45	145	82	185	150	24	8	19	3.7
	650	210	125	36	124	49	150	85	185	150	24	8	19	4.0
	800	210	125	36	124	49	150	85	185	150	24	8	19	4.0
4	1000	253	154	55	143	56	177	100	210	175	24	8	19	6.0
	1200	271	161	55	159	63	187	105	210	175	24	8	19	6.8



[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	Flange connection size (inch) 2	3	4	Spray angle (°) 0.03 MPa	0.07 MPa	0.1 MPa	Spray capacity (ℓ/min) 0.03 MPa	0.05 MPa	0.07 MPa	0.1 MPa	0.15 MPa	Mean droplet diameter (μm)	Free passage diameter (mm)
200	○			62	67	69	133	170	200	237	288	1,800	28
300	○			62	67	69	199	255	300	356	432	2,100	33
400		○		62	67	69	266	340	400	474	576	2,100	38
500		○		62	67	69	332	425	500	592	720	≀	41
650		○		62	67	69	432	552	650	770	936		50
800		○		75	80	82	532	680	800	950	1,154	3,600	57
1000			○	75	80	82	665	850	1,000	1,187	1,442	3,600	63
1200			○	75	80	82	798	1,020	1,200	1,424	1,731	3,800	68

[Note] 1. Since TAA series nozzles are die-cast molded, the spray capacity is guaranteed within +/-10% and the spray angle within +/-7° under the standard pressure.
2. Bolt tightening torque for connecting the flange must not exceed 30 N-m per bolt.

How to order

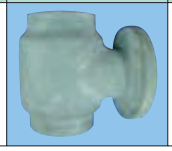
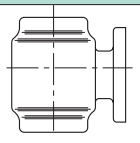
Please inquire or order for a specific nozzle using this coding system.

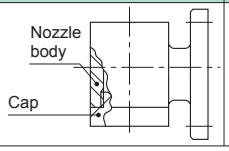
〈Example〉 2 TAA 200 SiC

2	TAA	200	SiC
Flange connection size		Spray capacity code	
■ 2		■ 200	
■ 3		≀	
■ 4		■ 1200	

Sister Products

Also available are TWAA series nozzles for two-direction spray and TAA series nozzles made of chemical-resistant PP.

Series	Appearance	Structure	Features
TWAA-SiC			• Two-direction (180° opposite direction) jet type made of SiC ceramic.

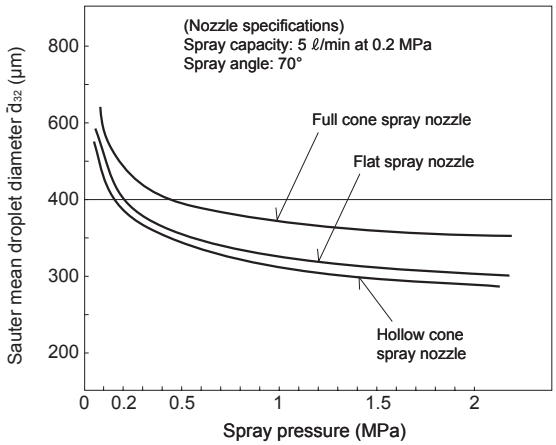
Series	Appearance	Structure	Features
TAA-PP			• Hollow cone spray nozzle made of PP. • Chemical-resistant and lightweight.

Effective Use of Hollow Cone Spray Nozzles

Mean Droplet Diameter

If spray pressure, spray capacity and spray angle are kept the same, the mean droplet diameter of a hollow cone spray nozzle is the smallest among all hydraulic nozzles.
Reducing the mean droplet diameter increases the total surface area of the spray liquid which has a great effect on transport phenomena of materials, such as chemical reaction, absorption, adsorption, etc.
Hollow cone spray nozzles are suitable for cooling and washing gases, humidifying, and chemical reactions.

[Pressure and mean droplet diameter]

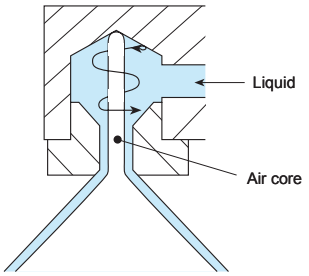


Free Passage Diameter

Free passage diameter shows the approximate value of the smallest dimension of liquid passage in the nozzle. **AAP** and **TAA series** nozzles, with no obstructions in nozzle interior, are the most effective in preventing clogging problems among our hollow cone spray nozzles.

Wear Resistance

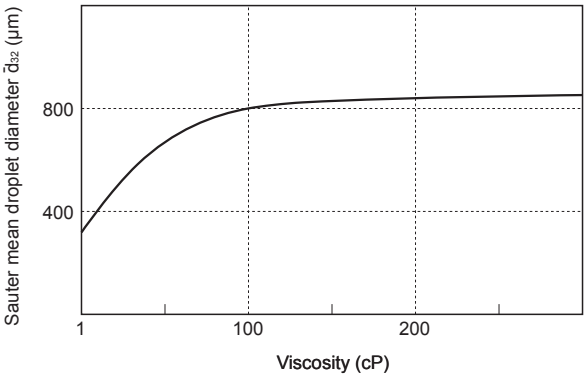
In the tangential hollow cone spray nozzles an air core is generated in the center of the vortex current, which causes wear at the end of the air core when the spraying liquid contains slurry.
In order to maintain optimum nozzle performance, the nozzle material is very important. That is why IKEUCHI's hollow cone spray nozzles are made of high wear-resistant materials such as ceramics and SiC.



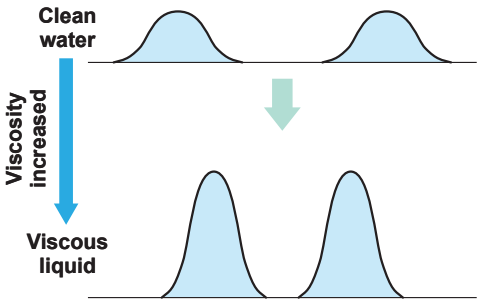
Viscosity

As the viscosity of liquid increases, the spray capacity of hollow cone spray nozzles increases but the spray angle decreases. Also, the mean droplet diameter becomes larger. Because viscous liquid increases the resistance inside the pipe, the liquid pressure drop must be also taken into consideration.

[Relation between viscosity and droplet diameter]



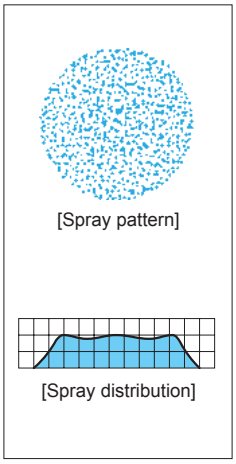
Spray pressure: 0.1 MPa



Variation in liquid flow distribution caused by increase of viscosity

Standard Type
Full Cone Spray Nozzles

JJXP



[Features]
- Full cone spray pattern with a round impact area and uniform distribution.
- Spray capacity ranges from small to medium.
- X-shaped whirler provides large free passage diameter, minimizing clogging.

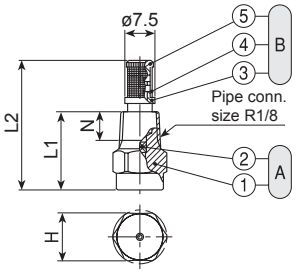
[Standard pressure]
0.2 MPa

[Applications]
Cleaning: Gas, incinerator fumes, machinery, eliminators, screen, tanks, parts, crushed stones, earth and sand
Cooling: Gas, machineries, tanks, steels
Spraying: Waste water treatment, aeration, foam breaking, fire extinguishing, dust suppression, sea water desalination

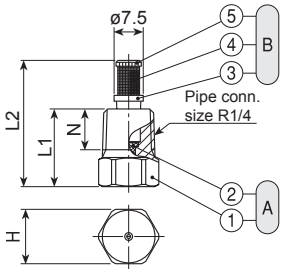
JJXP series

	JJXP series
Structure	• One-piece structure with a press-fit X-shaped whirler.
Material	• Sizes R1/8–R3/8 (Rc3/8): S303 • Sizes Rc1/2–Rc1: S303 or B (brass) • Sizes Rc1*1/2 or larger: S316 • Whirler material is mainly S316L equivalent, but depending on nozzle codes, S316 equivalent or SCS16 whirlers are used. • Optional material*1: S316, S316L, PP, or PTFE (PP and PTFE for Rc3/8 sizes and larger only) *1) Thread size of optional material may differ depending on materials.

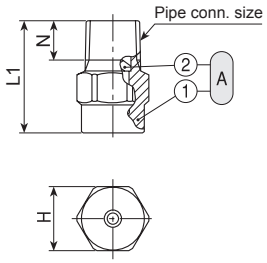
R1/8 (005)



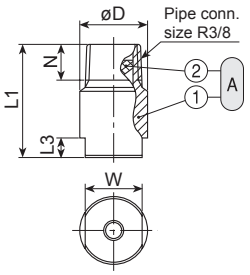
R1/4 (005)



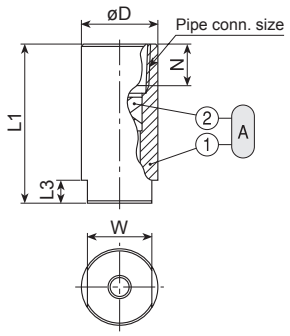
R1/8, R1/4



R3/8



Rc3/8 and over



Pipe conn. size*2	Dimensions (mm)							Mass (g)	
	L1	L2	L3	H	W	øD	N	S303 S316	B
R1/8 (005)	20	32.5	—	12	—	—	7	9.5*3	—
R1/8 (010–030)	20	—	—	12	—	—	7	11	—
R1/4 (005)	20	32.5	—	14	—	—	10.5	18	—
R1/4 (010–030)	20	—	—	14	—	—	10.5	18	—
R1/4 (040–060)	28	—	—	14	—	—	10.5	21	—
R3/8	34	—	6	—	17	20	11	50	—
Rc3/8	43	—	6	—	17	20	11	61	—
Rc1/2	54	—	8	—	22	25	14	140	150
Rc3/4	69	—	10	—	27	32	15	270	290
Rc1	89	—	14	—	34	40	17	515	550
Rc1*1/2	124	—	20	—	50	58	19	1,520	—
Rc2 (250–350)	160	—	24	—	60	70	23	2,600	—
Rc2 (400–500)	118.5	—	24	—	60	70	23	2,050	—
Rc2*1/2	147.5	—	27	—	80	90	27	4,360	—
Rc3 (920)	163.5	—	30	—	90	105	30	6,700	—
Rc3 (1200)	170.5	—	30	—	90	105	30	6,500	—

*2) Figures in ( ) after the pipe connection sizes indicate the spray capacity codes.
*3) For JJXP005 with strainer, add 2 g to the above mass.

Ⓐ **Nozzle** (①Nozzle body ②Whirler)
Ⓑ **Strainer** (③Strainer holder ④Strainer screen [S316] ⑤Strainer cap)

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	Pipe connection size				Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	R1/8	R1/4	R3/8	Rc3/8	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
005	●	●			—	55	65	—	—	0.36	0.44	0.50	0.59	0.73	0.83	0.96	270	0.4
010	○	○			50	55	45	—	0.53	0.73	0.88	1.00	1.18	1.45	1.67	1.93	290	0.7
015	○	○			60	65	55	—	0.79	1.09	1.31	1.50	1.77	2.18	2.50	2.89	〃	0.8
020	○	○			60	65	55	—	1.06	1.46	1.75	2.00	2.36	2.91	3.34	3.86		1.4
030	○	○			65	70	60	—	1.59	2.18	2.63	3.00	3.54	4.36	5.00	5.79	410	1.4
040		○			60	65	55	—	2.12	2.91	3.51	4.00	4.72	5.81	6.67	7.72	380	1.7
050		○			65	70	60	—	2.65	3.64	4.38	5.00	5.90	7.27	8.34	9.64	〃	1.7
060		○			70	75	65	2.51	3.18	4.37	5.26	6.00	7.08	8.72	10.0	11.6	520	1.7
070			○	○	60	65	60	2.93	3.71	5.09	6.13	7.00	8.26	10.2	11.7	13.5	480	1.9
080			○	○	65	70	65	3.35	4.24	5.82	7.01	8.00	9.44	11.6	13.3	15.4	〃	1.9
10			○	○	75	80	75	4.19	5.29	7.28	8.76	10.0	11.8	14.5	16.7	19.3		2.6
12			○	○	80	85	80	5.03	6.35	8.73	10.5	12.0	14.2	17.4	20.0	23.1	660	2.6

Spray capacity code	Pipe connection size							Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	Rc 1/2	Rc 3/4	Rc 1	Rc 1*1/2	Rc 2	R 2*1/2	Rc 3	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
14	○							65	70	55	5.86	7.41	10.2	12.3	14.0	16.5	20.3	23.3	27.0	590	3.5
16	○							70	75	60	6.70	8.47	11.6	14.0	16.0	18.9	23.3	26.7	30.9	〃	3.5
18	○							75	80	65	7.54	9.53	13.1	15.8	18.0	21.2	26.2	30.0	34.7		3.5
20	○							80	85	70	8.38	10.6	14.6	17.5	20.0	23.6	29.1	33.4	38.6	740	3.5
23		○						70	75	60	9.63	12.2	16.7	20.2	23.0	27.1	33.4	38.4	44.4	630	4.7
26		○						75	80	65	10.9	13.8	18.9	22.8	26.0	30.7	37.8	43.4	50.1		4.7
30		○						80	85	70	12.6	15.9	21.8	26.3	30.0	35.4	43.6	50.0	57.9	〃	4.7
35		○						85	90	75	14.7	18.5	25.5	30.7	35.0	41.3	50.9	58.4	67.5		4.7
40		○						90	95	80	16.8	21.2	29.1	35.1	40.0	47.2	58.1	66.7	77.2		4.7
45		○						90	95	80	18.8	23.8	32.7	39.4	45.0	53.1	65.4	75.0	86.8	950	4.7
50			○					70	75	60	20.9	26.5	36.4	43.8	50.0	59.0	72.7	83.4	96.4	800	6.0
60			○					80	85	70	25.1	31.8	43.7	52.6	60.0	70.8	87.2	100	116	〃	6.0
80			○					90	95	80	33.5	42.4	58.2	70.1	80.0	94.4	116	133	154		6.0
90			○					90	95	80	37.7	47.7	65.5	78.9	90.0	106	131	150	174	1,150	6.6
100				○				80	85	70	41.9	52.9	72.8	87.6	100	118	145	167	193	1,000	8.4
150				○				85	90	75	62.8	79.4	109	131	150	177	218	250	289	〃	10.3
200				○				90	95	80	83.8	106	146	175	200	236	291	334	386	1,350	10.3
250					○			85	90	75	105	132	182	219	250	295	363	417	482	1,200	12.7
300					○			90	95	80	126	159	218	263	300	354	436	500	579		12.7
350					○			90	95	80	147	185	255	307	350	413	509	584	675	〃	12.7
400					○			75	80	65	168	212	291	351	400	472	581	667	772		13.2
500					○			95	95	80	209	265	364	438	500	590	727	834	964	1,500	13.2
600						○		75	80	65	251	318	437	526	600	708	872	1,001	1,157	1,500	16.9
700						○		85	90	75	293	371	509	613	700	826	1,017	1,167	1,350	1,800	16.9
920							○	100	100	85	385	487	669	806	920	1,086	1,337	1,534	1,775	1,660	18.1
1200							○	105	105	90	503	635	873	1,052	1,200	1,416	1,744	2,001	2,315	1,950	20.0

●: Available with/without strainer (mesh size #100) ○: Available without strainer

For spraying slurry, the nozzle material should be wear-resistant. For this purpose, the JUXP-AL92 series nozzles made of high-purity alumina are available (see page 72).

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/8M JJXP 005 S303 W

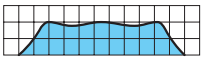
1/8M	JJXP	005	S303	W
Pipe conn. size*4		Spray capacity code	Material*5	Strainer
1/8M		005	S303	W (with strainer: JJXP005 only)
〃		〃	B	(Blank denotes "without strainer")
3F		1200	S316	

*4) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
When spray capacity code is 005–030, pipe connection size for R1/4 is indicated as "1/4x1/8M".
*5) See "Material" information on page 63 for standard materials by each size.

Standard Type
Full Cone Spray Nozzles

JJXP-PP
JJXP-PVDF

[Spray pattern]



[Spray distribution]

[Features]
- Full cone spray pattern with a round impact area and uniform distribution.
- X-shaped whirler provides large free passage diameter, minimizing clogging.

[Standard pressure]
0.2 MPa

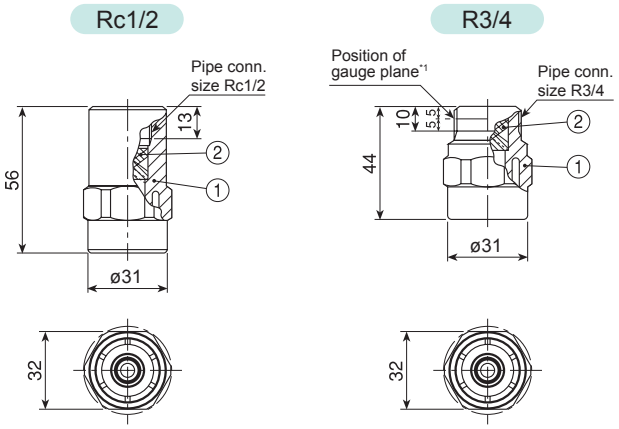
[Applications]
Cleaning: Machinery, screens, tanks, crushed stones, earth and sand
Cooling: Machinery, tanks
Spraying: Waste water treatment, aeration, foam breaking, dust suppression, etching, chemicals

JJXP-PP series

	JJXP-PP series
Structure	• One-piece structure with a press-fit X-shaped whirler.
Material	• PP
Mass	• Rc1/2: 25.3 g • R3/4: 17.9 g

*1) Please note that the position of standard diameter for male thread type has been changed.

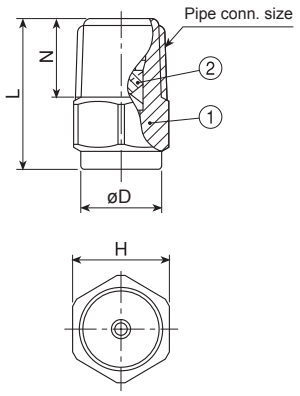
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body ②Whirler

JJXP-PVDF series

	JJXP-PVDF series
Structure	• One-piece structure with a press-fit X-shaped whirler.
Material	• PVDF



①Nozzle body ②Whirler

Pipe conn. size	Dimensions (mm)				Mass (g)
	L	H	øD	N	
R1/8	18	12	11	8	2.2
R1/4	22	14	12	11.5	4.1

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

■ JJXP-PP series

Spray capacity code 2*100/	Pipe conn. size Rc1/2	Pipe conn. size R3/4	Spray angle (°) 0.05 MPa	0.2 MPa	0.5 MPa	Spray capacity (ℓ/min) 0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	Mean droplet diameter (μm)	Free passage diameter (mm)
12	○	○	96	100	92	5.03	6.35	8.73	10.5	12.0	14.2	17.4	20.0	23.1	570	3.1
13		○	96	100	92	5.44	6.88	9.46	11.4	13.0	15.3	18.9	21.7	25.1		3.1
14	○	○	96	100	92	5.86	7.41	10.2	12.3	14.0	16.5	20.3	23.3	27.0		3.5
15	○	○	96	100	92	6.28	7.94	10.9	13.1	15.0	17.7	21.8	25.0	28.9	≀	3.5
16	○	○	96	100	92	6.70	8.47	11.6	14.0	16.0	18.9	23.3	26.7	30.9		3.5
18	○	○	96	100	92	7.54	9.53	13.1	15.8	18.0	21.2	26.2	30.0	34.7		3.5
20	○	○	96	100	92	8.38	10.6	14.6	17.5	20.0	23.6	29.1	33.4	38.6	740	3.5

[Note] JJXP-PP with spray capacity code of 12–16 are guaranteed to within 0 to +10% of the rated spray capacity under the standard pressure.

■ JJXP-PVDF series

Spray capacity code	Pipe conn. size R1/8	Pipe conn. size R1/4	Spray angle (°) 0.05 MPa	0.2 MPa	0.5 MPa	Spray capacity (ℓ/min) 0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	Mean droplet diameter (μm)	Free passage diameter (mm)
010	○	○	60	65	55	—	0.53	0.73	0.88	1.00	1.18	1.45	1.67	1.93	290	0.8
015	○	○	60	65	55	—	0.79	1.09	1.32	1.50	1.77	2.18	2.50	2.89		1.0
020	○	○	60	65	55	—	1.06	1.46	1.75	2.00	2.36	2.91	3.34	3.86	≀	1.5
025	○	○	60	65	55	—	1.32	1.82	2.20	2.50	2.95	3.62	4.17	4.82		1.5
030	○	○	60	65	55	—	1.59	2.18	2.63	3.00	3.54	4.36	5.00	5.79	410	1.5

How to order

Please inquire or order for a specific nozzle using this coding system.

①JJXP-PP series

〈Example〉 1/2F JJXP 2*100/14 PP

1/2F JJXP 2*100/ 14 PP

- 1/2F JJXP 2*100/ … Pipe conn. size*2
  - 1/2F
  - 3/4M
- 14 PP … Spray capacity code
  - 12
  - ≀
  - 20

②JJXP-PVDF series

〈Example〉 1/8M JJXP 010 PVDF

1/8M JJXP 010 PVDF

- 1/8M JJXP … Pipe conn. size*2
  - 1/8M
  - 1/4x1/8M
- 010 PVDF … Spray capacity code
  - 010
  - ≀
  - 030

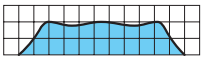
*2) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
Pipe connection size for R1/4 is indicated as "1/4x1/8M" in JJXP-PVDF series.

Standard Type
Full Cone Spray Nozzles

JJXP-HTPVC
JJXP-PVC

For spraying chemicals such as hydrochloric acid, heat-treated HTPVC injection-molded JJXP-HTPVC series nozzles are available.

[Spray pattern]



[Spray distribution]

[Features]
- Full cone spray pattern with a round impact area and uniform distribution.
- X-shaped whirler provides large free passage diameter, minimizing clogging.
- X-shaped whirler is removable for easy maintenance.

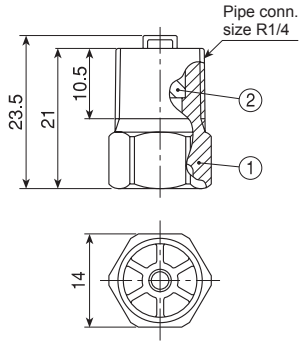
[Standard pressure]
0.2 MPa

[Applications]
Spraying: Etchants, chemicals
Cleaning: Printed circuit boards

JJXP-HTPVC series

	JJXP-HTPVC series
Structure	• One-piece structure with a removable X-shaped whirler.
Material	• HTPVC
Mass	• 2.5 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

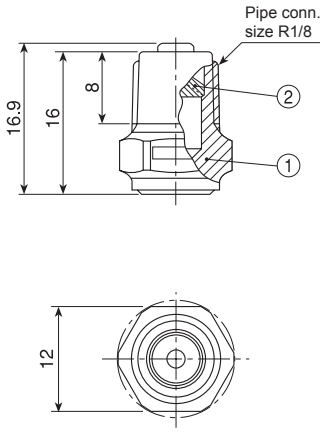


①Nozzle body ②Whirler

JJXP-PVC series

	JJXP-PVC series
Structure	• One-piece structure with a removable X-shaped whirler.
Material	• PVC
Mass	• 1.4 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body ②Whirler

■ JJXP-HTPVC series

Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)
	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
040	60	65	55	—	2.12	2.91	3.51	4.00	4.72	5.81	6.67	7.72	380	2.2
050	65	70	60	—	2.65	3.64	4.38	5.00	5.90	7.27	8.34	9.64	〃	2.2
060	70	75	65	2.51	3.18	4.37	5.26	6.00	7.08	8.72	10.0	11.6	520	2.2

■ JJXP-PVC series [1/8M JJXP 2⋆75/2 PVC]

Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)
0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
70	75	66	—	1.06	1.46	1.75	2.00	2.36	2.91	3.34	3.86	350	1.5

How to order

Please inquire or order for a specific nozzle using this coding system.

①JJXP-HTPVC series

〈Example〉 1/4M JJXP 040 HTPVC

1/4M JJXP 040 HTPVC

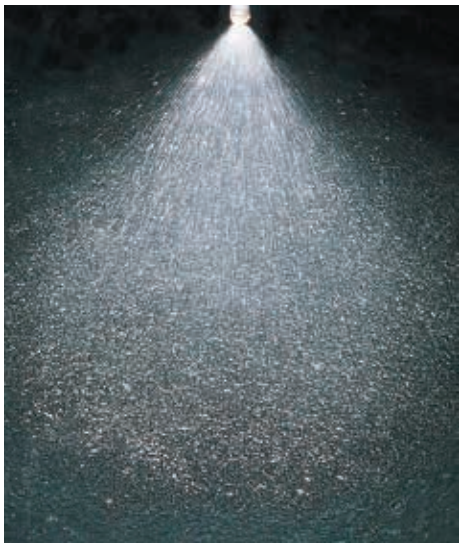
Spray capacity code
- 040
- 050
- 060

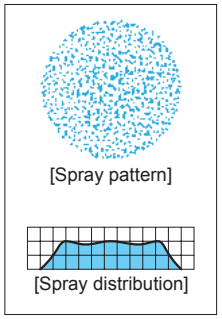
②JJXP-PVC series

1/8M JJXP 2⋆75/2 PVC

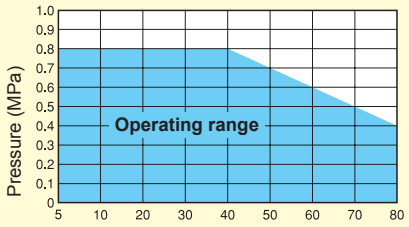
Quick-detachable
Standard Full Cone Spray Nozzles

INJJX





[Maximum pressures at various temperatures]



Use within the operating range.

[Features]

- Full cone spray nozzle with a removable whirler.
- Made of high chemical and heat resistant PP (polypropylene).
- Quick-detachable design helps to significantly reduce maintenance time.
- Nozzle tips are color-coded by spray capacity for easy identification.

[Standard pressure]

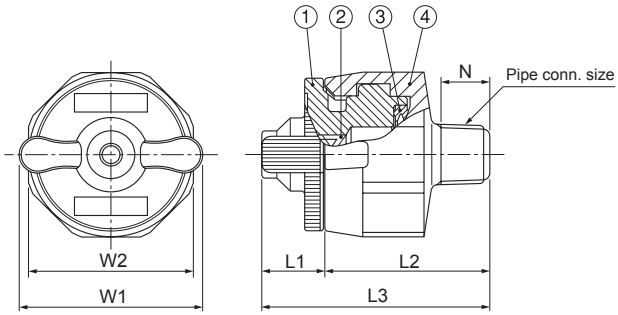
0.2 MPa

[Applications]

- Cleaning • Etching • Stripping
- Chemical treatment
- For periodic maintenance or for the applications where precise spray alignment is required

INJJX series

	INJJX series
Structure	• Two-piece structure comprising a nozzle tip (with packing) and an adaptor. Whirler is included inside the nozzle tip. • Easy installation and removal of the nozzle tip just by turning 60°.
Material	• Nozzle tip and whirler: PP • Adaptor: PP or PPS • Packing: FEPM



①Nozzle tip ②Whirler ③Packing (FEPM) ③Adaptor

Pipe conn. size	Dimensions (mm)						Mass (g)	
	L1	L2	L3	W1	W2	N	PP	PPS
R1/8	10	27	37	30	27	8	9.2	12
R1/4	10	30	40	30	27	11.5	9.6	13
R3/8	10	30	40	30	27	12	10.5	14

[Note]

- **INJJX series nozzles are not compatible with the discontinued ISJJX series.**
- Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	Pipe conn. size			Spray angle (°)			Spray capacity (ℓ/min)								Mean drop. dia. (μm)	Free pass. dia. (mm)	Color of nozzle tip
	R1/8	R1/4	R3/8	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa			
010	○	○	○	60	65	55	—	0.53	0.73	0.88	1.00	1.18	1.45	1.67	290	0.8	
015	○	○	○	60	65	55	—	0.79	1.09	1.32	1.50	1.77	2.18	2.50		1.0	
020	○	○	○	60	65	55	—	1.06	1.46	1.75	2.00	2.36	2.91	3.34		1.5	
025	○	○	○	60	65	55	—	1.32	1.82	2.20	2.50	2.95	3.62	4.17		1.5	
030	○	○	○	60	65	55	—	1.59	2.18	2.63	3.00	3.54	4.36	5.00		1.5	
040	○	○	○	60	65	55	—	2.12	2.91	3.51	4.00	4.72	5.81	6.67		2.0	
050	○	○	○	65	70	60	—	2.65	3.64	4.38	5.00	5.90	7.27	8.34		2.0	
060	○	○	○	70	75	65	2.51	3.18	4.37	5.26	6.00	7.08	8.72	10.0	520	2.0	

How to order

Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 1/8M INJJX 040 PP (FEPM) + PP

1/8M INJJX 040 PP (FEPM) + PP

- Pipe conn. size*: 1/8M, 1/4M, 3/8M
- Spray capacity code: 010 〜 060
- Adaptor material: PP, PPS

②Nozzle tip only

〈Example〉 INJJX 040 PP (FEPM)

INJJX 040 PP (FEPM)

- Spray capacity code: 010 〜 060

Nozzle tip contains a packing and whirler.

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

ALSO AVAILABLE!

Quick-detachable Standard Flat Spray Nozzles

INVV series

See p.23 of this catalog.

Stainless steel type

Quick-detachable

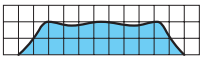
INJJX-SS series

Contact us for details.

Ceramic Orifice and Whirler Inserted Full Cone Spray Nozzles

JUP

[Spray pattern]



[Spray distribution]

[Features]

- Full cone spray pattern with a round impact area and uniform distribution.
- Ceramic disc whirler and ceramic orifice forming vortex chamber provide excellent wear resistance.
- Medium spray capacity range.

[Standard pressure]

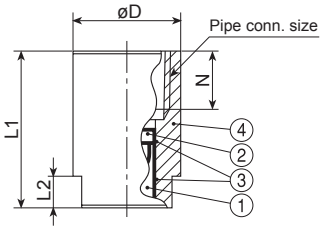
0.2 MPa

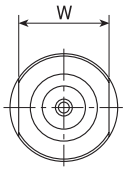
[Applications]

Cleaning: Gas, incinerator fumes, machinery, eliminators, screen, tanks, crushed stones, earth and sand
Cooling: Gas, machinery, tanks, steels
Spraying: Waste water treatment, aeration, foam breaking, dust suppression

JUP series

	JUP series (with ceramic orifice inserted)
Structure	• One-piece structure with a ceramic whirler and orifice forming vortex chamber.
Material	• Nozzle orifice & whirler: ceramic • Nozzle body: Sizes Rc1 or smaller: S303 or B (brass) Sizes Rc1*1/2 or larger: S316 • Optional material: S316L





①Ceramic orifice ②Ceramic whirler
③Adhesive: Araldite® ④Nozzle body

Pipe conn. size	Dimensions (mm)					Mass (g)	
	L1	L2	W	øD	N	S303 S316	B
Rc3/8	30	6	17	20	11	41	44
Rc1/2	39	8	22	25	14	115	125
Rc3/4	49	10	27	32	15	167	177
Rc1	59	14	34	40	17	300	320
Rc1*1/2	80	20	50	58	19	860	—

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	Pipe connection size					Spray angle (°)			Spray capacity (ℓ/min)							Mean drop. dia. (μm)	Free pass. dia. (mm)
	Rc3/8	Rc1/2	Rc3/4	Rc1	Rc1*1/2	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
03	○					50	60	52	—	1.57	2.17	2.62	3.00	3.55	4.37	380	1.2
04	○					50	60	52	—	2.09	2.89	3.50	4.00	4.73	5.83	⟆	1.4
05	○					55	65	55	—	2.61	3.61	4.37	5.00	5.91	7.29	490	1.5
06		○				50	60	52	2.46	3.13	4.33	5.24	6.00	7.09	8.75	470	2.0
07		○				55	63	55	2.87	3.65	5.05	6.12	7.00	8.27	10.2		2.0
08		○				55	65	55	3.28	4.18	5.78	6.99	8.00	9.46	11.7	⟆	2.0
10		○				60	70	58	4.10	5.22	7.22	8.74	10.0	11.8	14.6		2.2
12		○				63	70	60	4.92	6.26	8.66	10.5	12.0	14.2	17.5	600	2.3
14			○			63	70	60	5.74	7.31	10.1	12.2	14.0	16.5	20.4	580	2.8
16			○			63	70	60	6.56	8.35	11.6	14.0	16.0	18.9	23.3		2.8
18			○			70	77	65	7.38	9.40	13.0	15.7	18.0	21.3	26.2		3.0
20			○			75	80	68	8.20	10.4	14.4	17.5	20.0	23.6	29.2	⟆	3.0
23			○			75	80	68	9.43	12.0	16.6	20.1	23.0	27.2	33.5		3.2
26			○			78	83	70	10.7	13.6	18.8	22.7	26.0	30.7	37.9		3.2
30			○			78	83	72	12.3	15.7	21.7	26.2	30.0	35.5	43.7	730	3.4

Ceramic Orifice and Whirler Inserted Full Cone Spray Nozzles
JUP series

Spray capacity code	Pipe connection size					Spray angle (°)			Spray capacity (ℓ/min)							Mean drop. dia. (μm)	Free pass. dia. (mm)
	Rc3/8	Rc1/2	Rc3/4	Rc1	Rc1*1/2	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
35				○		80	83	70	14.4	18.3	25.3	30.6	35.0	41.4	51.0	700	4.0
40				○		80	83	70	16.4	20.9	28.9	35.0	40.0	47.3	58.3		4.0
45				○		83	85	70	18.5	23.5	32.5	39.3	45.0	53.2	65.6	〃	4.0
50				○		83	85	72	20.5	26.1	36.1	43.7	50.0	59.1	72.9		4.0
55				○		83	85	72	22.6	28.7	39.7	48.1	55.0	65.0	80.2	900	4.0
60					○	75	80	70	24.6	31.3	43.3	52.4	60.0	70.9	87.5	800	5.0
70					○	78	83	70	28.7	36.5	50.5	61.2	70.0	82.7	102	〃	5.0
80					○	80	83	72	32.8	41.8	57.8	69.9	80.0	94.6	117		5.0
90					○	82	85	72	36.9	47.0	65.0	78.7	90.0	106	131	1,000	5.0

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 3/8F JUP 03 S303

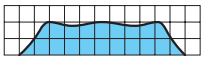
3/8F	JUP	03	S303
Pipe conn. size*1		Spray capacity code	Material*2
■ 3/8F		■ 03	■ S303
〃		〃	■ B
■ 1*1/2F		■ 90	■ S316

*1) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 3/8F = Rc3/8.
*2) See "Material" information on page 70 for standard materials by each size.

All Alumina Ceramic
Full Cone Spray Nozzles

JUXP-AL92

[Spray pattern]



[Spray distribution]

[Features]
- X-shaped whirler provides large free passage diameter, minimizing clogging.
- Made of high-purity alumina ceramic, offering excellent wear resistance.
- Spray capacity ranges from medium to large.

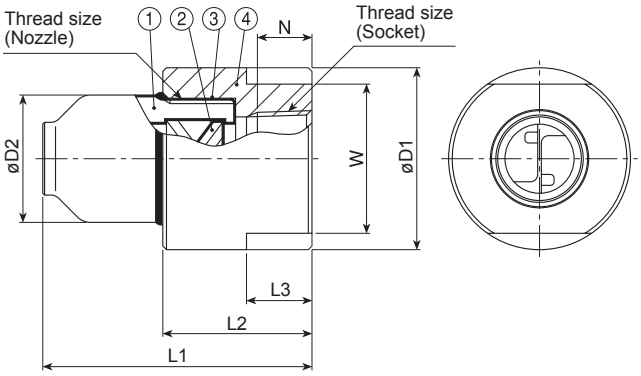
[Standard pressure]
0.2 MPa

[Applications]
- Absorption tower of flue gas desulfurization equipment
- Spraying slurry

JUXP-AL92 series

	JUXP-AL92 series
Structure	• Whole nozzle fired as one piece.
Material	• Nozzle body: 92% Alumina • Socket: S316

We offer AP-AL92 series with a socket made of S316 to prevent thread damage, as the nozzle's alumina threads get easily chipped.
Our S316 socket is female threaded.



①Nozzle body ②Ceramic whirler ③Adhesive: Araldite®H ④Socket (S316)

Thread sizes		Dimensions (mm)							Mass (g)
Nozzle*1	Socket	L1	L2	L3	W	øD1	øD2	N	
R1	Rc3/4	74	41	18	41	50	35	15	310
R1	Rc1	76	43	18	41	50	35	17	510
R1*1/2	Rc1	91	47	24	60	70	50	17	910
R1*1/2	Rc1*1/2	94	50	24	60	70	50	19	1,190
R2	Rc1*1/2	127	54	27	70	80	65	19	1,440
R2	Rc2	131	58	27	70	80	65	23	1,860
R2*1/2 (250–350)	Rc2	167	62	30	90	100	80	23	2,920
R2*1/2 (400–550)	Rc2	125	62	30	90	100	80	23	2,530
R2*1/2 (250–350)	Rc2*1/2	171	66	30	90	100	80	27	3,520
R2*1/2 (400–550)	Rc2*1/2	129	66	30	90	100	80	27	3,130
R3	Rc2*1/2	156	71	35	100	110	90	27	3,190
R3	Rc3	160	75	35	100	110	90	30	3,890

*1) Figures in ( ) after the nozzle thread sizes indicate the spray capacity codes.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	Nozzle thread size					Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	R1	R 1*1/2	R2	R 2*1/2	R3	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
23	○					70	75	60	9.63	12.2	16.7	20.2	23.0	27.1	33.4	38.4	44.4	630	4.7
26	○					75	80	65	10.9	13.8	18.9	22.8	26.0	30.7	37.8	43.4	50.1		4.7
30	○					80	85	70	12.6	15.9	21.8	26.3	30.0	35.4	43.6	50.0	57.9	≀	4.7
35	○					85	90	75	14.7	18.5	25.5	30.7	35.0	41.3	50.9	58.4	67.5		4.7
40	○					90	95	80	16.8	21.2	29.1	35.1	40.0	47.2	58.1	66.7	77.2		4.7
45	○					90	95	80	18.8	23.8	32.7	39.5	45.0	53.1	65.4	75.0	86.8	950	4.7
50		○				70	75	60	20.9	26.5	36.4	43.8	50.0	59.0	72.7	83.4	96.4	800	6.0
55		○				75	80	65	23.0	29.1	40.0	48.2	55.0	64.9	79.9	91.7	105		6.0
60		○				80	85	70	25.1	31.8	43.7	52.6	60.0	70.8	87.2	100	115	≀	6.0
70		○				85	90	75	29.3	37.1	50.9	61.4	70.0	82.6	100	120	135		6.0
80		○				90	95	80	33.5	42.4	58.2	70.1	80.0	94.4	115	135	155		6.6
90		○				90	95	80	37.7	47.7	65.5	78.9	90.0	106	130	150	175	1,150	6.6

Spray capacity code	Nozzle thread size					Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	R1	R 1*1/2	R2	R 2*1/2	R3	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
100			○			80	85	70	41.9	52.9	72.8	87.7	100	120	145	170	195	1,000	8.7
120			○			80	85	70	50.3	63.5	82.3	105	120	140	175	200	230		8.7
150			○			85	90	75	62.8	79.4	110	130	150	180	220	250	290	〃	8.7
180			○			90	95	80	75.4	95.3	130	160	180	210	260	300	350		10.3
200			○			90	95	80	83.8	105	145	175	200	240	290	335	385	1,350	10.7
250				○		85	90	75	105	130	180	220	250	295	360	420	480	1,200	12.7
300				○		90	95	80	125	160	220	265	300	355	435	500	580	〃	12.7
350				○		90	95	80	150	185	255	310	350	415	510	585	675	1,450	12.7
400				○		80	80	65	170	210	290	350	400	470	580	670	770	1,300	13.4
450				○		90	90	75	190	240	330	395	450	530	655	750	870	〃	13.4
500				○		95	95	80	210	265	365	440	500	590	730	835	965		13.4
550				○		100	100	85	230	290	400	480	550	650	800	920	1,060	1,550	13.4
600					○	80	80	65	250	320	440	525	600	710	870	1,000	1,160	1,500	17.0
700					○	90	90	75	290	370	510	615	700	826	1,020	1,170	1,359	1,800	17.0

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1M JUXP 23 AL92 + 3/4Fx1F SOC S316

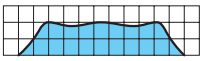
1M	JUXP	23	AL92 +	3/4F	x	1	F SOC S316
Nozzle thread size*2		Spray capacity code		Socket thread size*2 (Pipe conn. size)		Nozzle thread size (without "R")	
1M 〃 3M		23 〃 700		3/4F 〃 3F		1 〃 3	

*2) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1M = R1, 3/4F = Rc3/4.

Small Capacity
Full Cone Spray Nozzles

JJRP

[Spray pattern]



[Spray distribution]

[Features]

- Small capacity full cone spray nozzles made of excellent wear-resistant PTFE or injection molded PVDF.
- Disc whirler is designed to provide uniform spray distribution at small spray capacity.

[Standard pressure]

0.2 MPa

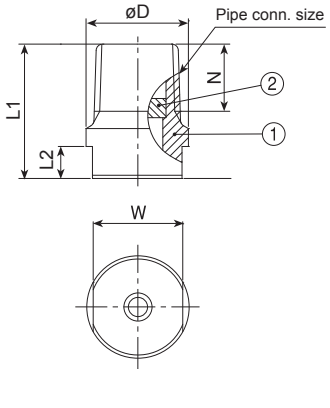
[Applications]

Spraying: Etchants, acid liquids
Cleaning: When spraying pure water

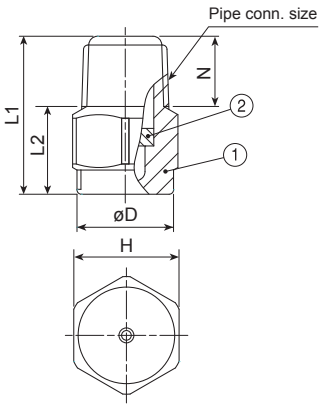
JJRP series

	JJRP series
Structure	• One-piece structure with a press-fit disc whirler. • JJRP-PVDF nozzle body is injection molded.
Material	• PTFE or PVDF

JJRP-PTFE



JJRP-PVDF



①Nozzle body ②Whirler

Series	Pipe conn. size	Dimensions (mm)						Mass (g)
		L1	L2	H	W	øD	N	
JJRP-PTFE	R1/8	16	4	—	10	12	7	2
	R1/4	21	5	—	14	16	10.5	5
JJRP-PVDF	R1/8	18	10	12	—	11	8	2
	R1/4	22	10.5	14	—	12	11.5	4.1

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	Pipe connection size				Spray angle (°)			Spray capacity (ℓ/min)								Mean drop. dia. (μm)	Free pass. dia. (mm)
	JJRP-PTFE		JJRP-PVDF														
	R1/8	R1/4	R1/8	R1/4	0.15 MPa	0.2 MPa	0.5 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
005	○	○	○	○	56	60	60	—	0.36	0.44	0.50	0.59	0.74	0.85	0.99	260	0.4
007	○	○	○	○	60	65	62	—	0.51	0.61	0.70	0.83	1.03	1.19	1.39		0.6
010	○	○			63	65	62	—	0.73	0.88	1.00	1.19	1.48	1.70	1.98		0.8
015	○	○			64	70	72	0.79	1.09	1.31	1.50	1.78	2.22	2.56	2.98	〃	1.0
020	○	○			64	70	72	1.06	1.45	1.75	2.00	2.38	2.95	3.41	3.97		1.2
030	○	○			75	80	78	1.58	2.18	2.63	3.00	3.56	4.43	5.11	5.95	410	1.3
040		○			67	70	65	2.11	2.91	3.50	4.00	4.75	5.91	6.82	7.93	380	1.4
050		○			76	80	70	2.64	3.63	4.38	5.00	5.94	7.38	8.52	9.92	〃	1.6
060		○			88	90	80	3.17	4.36	5.26	6.00	7.13	8.86	10.2	11.9	520	1.6

How to order

Please inquire or order for a specific nozzle using this coding system.

①JJRP-PTFE series

〈Example〉 1/8M JJRP 005 PTFE

1/8M JJRP 005 PTFE

Pipe conn. size*	Spray capacity code
1/8M	005
1/4M	〃
1/4Mx1/8M	060

②JJRP-PVDF series

〈Example〉 1/8M JJRP 007 PVDF

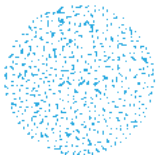
1/8M JJRP 007 PVDF

Pipe conn. size*	Spray capacity code
1/8M	005
1/4Mx1/8M	007

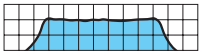
*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
When spray capacity code is 005–030, pipe connection size for R1/4 is indicated as "1/4x1/8M".

Small Capacity
Full Cone Spray Nozzles

J



[Spray pattern]



[Spray distribution]

[Features]

- Full cone spray pattern with a round impact area and uniform distribution.
- Features smallest spray capacity among our full cone spray nozzles.
- Ceramic orifice and closer provide excellent wear-resistance.

[Standard pressure]

0.5 MPa for spray capacity codes of 006 and 008.
0.2 MPa for spray capacity codes of 010 and over.

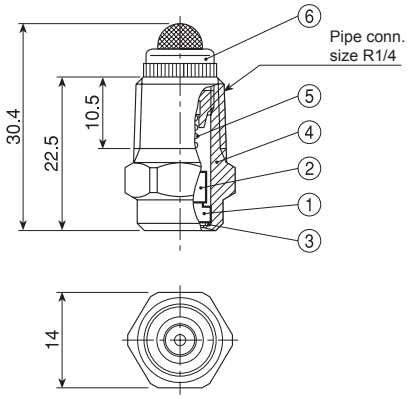
[Applications]

Spraying: Oils, lubricants, glues, etchants
Cleaning: Galvanizing, gas
Cooling: Machinery, gas

J series

	J series (with ceramic orifice inserted)
Structure	• Nozzle orifice and closer are made of ceramics. • All models include built-in strainers.
Material	• Nozzle orifice & closer: ceramic • Nozzle body: S303 or B (brass) • Optional material: S316
Mass	• S303: 17.5 g • B (brass): 18.5 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Ceramic closer ③Packing (PTFE)
④Nozzle body ⑤Spring (S316)
⑥Strainer (S303+S304 or B+S304)

Spray capacity code	Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (μm)	Strainer mesh size
	0.1 MPa	0.2 MPa	0.5 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa			
006	—	—	70	—	—	—	0.07	0.09	0.10	0.12	0.14	0.16	130	0.2	200
008	—	—	70	—	—	—	0.09	0.12	0.14	0.16	0.19	0.22	140	0.2	200
010	—	70	65	—	0.09	0.10	0.12	0.15	0.17	0.20	0.24	0.28	160	0.3	200
012	—	70	65	—	0.10	0.12	0.14	0.18	0.21	0.25	0.29	0.33	190	0.3	200
015	—	70	65	—	0.13	0.15	0.18	0.23	0.26	0.31	0.37	0.42	170	0.3	200
020	60	70	65	0.14	0.17	0.20	0.24	0.30	0.35	0.41	0.49	0.56	〃	0.3	200
025	65	70	67	0.18	0.22	0.25	0.30	0.38	0.44	0.51	0.61	0.70	230	0.3	200
030	67	70	68	0.22	0.26	0.30	0.36	0.45	0.52	0.61	0.73	0.83	220	0.4	150
040	67	70	68	0.29	0.35	0.40	0.48	0.60	0.70	0.82	0.98	1.11	〃	0.4	150
050	68	70	68	0.36	0.44	0.50	0.60	0.75	0.87	1.02	1.22	1.39	290	0.5	150
060	68	70	68	0.43	0.52	0.60	0.72	0.90	1.05	1.23	1.47	1.67	280	0.5	150
070	68	70	68	0.51	0.61	0.70	0.84	1.05	1.22	1.43	1.71	1.95	〃	0.6	150
080	68	70	68	0.58	0.70	0.80	0.95	1.19	1.38	1.61	1.92	2.18	350	0.7	150
100	68	70	68	0.72	0.87	1.00	1.19	1.49	1.72	2.01	2.40	2.72		0.7	100
120	68	70	68	0.87	1.05	1.20	1.43	1.79	2.07	2.42	2.88	3.27	〃	0.8	50
140	68	70	68	1.01	1.22	1.40	1.67	2.09	2.41	2.82	3.36	3.81	440	0.9	50

How to order

Please inquire or order for a specific nozzle using this coding system.

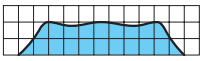
〈Example〉 1/4M J 006N S303W

1/4M	J	006	N	S303	W
		Spray capacity code		Material	
		006 〃 140		S303 B	

Flange-type, Large Capacity
Full Cone Spray Nozzles

TJJX

[Spray pattern]



[Spray distribution]

[Features]

- Full cone spray pattern with a round impact area and uniform distribution.
- Flange connection.
- X-shaped whirler provides large free passage diameter, minimizing clogging.
- Adopting newly developed X-shaped whirler has shortened total nozzle length by 20% compared to conventional nozzles.

[Standard pressure]

0.2 MPa

[Applications]

Cooling: Gas, liquids
Reacting: Chemical plants
Spraying: Aeration, sea water desalination

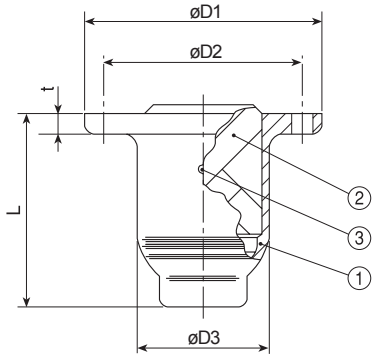
Full Cone

TJJX series

	TJJX series
Structure	• One-piece structure with a removable X-shaped whirler fixed to nozzle body by lock bolt. • Flanged connection.
Material	• Nozzle body: S304, S316, SCS13, or SCS14 • Whirler: SCS13 or SCS14 • Lock bolt: S316 • Optional material: S316L, SCS16

Flange size (inch)	Dimensions (mm)					Flange bolt holes (JIS 10K)		Mass (kg)
	L	øD1	øD2	øD3	t	Number of holes	Diameter (mm)	
4	171	210	175	117	18	8	19	9.3
5	211	250	210	143	20	8	23	11.4
6	253	280	240	169	22	8	23	22.7

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body ②Whirler ③Lock bolt

Spray capacity code	Flange connection size (inch)			Spray angle (°)			Spray capacity (ℓ/min)							Mean droplet diameter (μm)	Free passage diameter (mm)
	4	5	6	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
1500	○			90	90	75	628	794	1,091	1,315	1,500	1,770	2,180	1,850	29
2000	○			100	100	85	838	1,059	1,455	1,753	2,000	2,360	2,907	⟆	29
2500		○		90	90	75	1,047	1,324	1,819	2,191	2,500	2,950	3,634		36
3000		○		100	100	85	1,257	1,588	2,183	2,629	3,000	3,540	4,361	2,500	36
3500			○	90	90	75	1,466	1,853	2,547	3,067	3,500	4,130	5,087	⟆	44
4000			○	95	95	80	1,675	2,118	2,911	3,505	4,000	4,720	5,814	2,650	44

[Note] TJJX series nozzle with larger spray flow and larger flange size is available upon request.

How to order

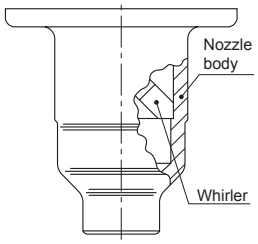
Please inquire or order for a specific nozzle using this coding system.

〈Example〉 4 TJJX 1500 S304

4	TJJX	1500	S304
Flange conn. size		Spray capacity code	Material
■ 4		■ 1500	■ S304
⟆		⟆	■ S316
■ 6		■ 4000	■ SCS13
			■ SCS14

Sister Products

For spraying slurry, wear resistance of nozzles must be considered. TJJX-SiC series nozzles made of high wear-resistant SiC (silicon nitride bonded silicon carbide) are available for such applications.
Please contact us for details.

Series	Appearance	Structure	Features	Applications
TJJX-SiC			● Full cone spray pattern with a round impact area and uniform distribution. ● X-shaped whirler provides large free passage diameter, minimizing clogging. ● Whole nozzle fired as one piece. ● High wear-resistant and lightweight structure made of SiC. [Note] Since TJJX-SiC series nozzles are die-cast molded, the spray capacity is guaranteed within +/-10% and the spray angle within +/-7˚ under standard pressure.	● Spraying recirculated water for water granulation ● Other applications for spraying slurry

Wide-angle
Full Cone Spray Nozzles

BBXP
BBXP-PVDF/PVC

[Spray pattern]

[Spray distribution]

[Features]
- Wide-angle full cone spray pattern with a round impact area and uniform distribution.
- Spray angle of 120° provides larger spray coverage than other nozzles.
- Spray capacity ranges from small to medium.
- X-shaped whirler provides large free passage diameter, minimizing clogging.

[Standard pressure]
0.2 MPa for spray capacity codes of 008–060.
0.35 MPa for spray capacity codes of 10 and over.

[Applications]
Cleaning: Gas, incinerator fumes, machinery, eliminators, screen, tanks, parts, crushed stones, earth and sand
Cooling: Gas, machineries, tanks, steel plates
Spraying: Water treatment, aeration, foam breaking, fire extinguishing, dust suppression, sea water desalination

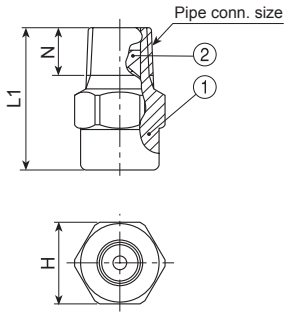
BBXP series

	BBXP series
Structure	• One-piece structure with a press-fit X-shaped whirler.
Material	• Sizes R1/8– R3/8 (Rc3/8): S303 • Sizes Rc1/2–Rc1: S303 or B (brass) • Sizes Rc1*1/2 or larger: S316 • Optional material: S316L or others

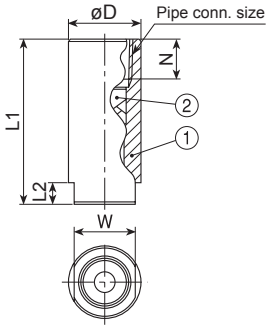
Pipe conn. size*1	Dimensions (mm)						Mass (g)	
	L1	L2	H	W	øD	N	S303 S316	B
R1/8	21	—	12	—	—	7	11	—
R1/4 (015, 020)	21	—	14	—	—	10.5	20	—
R1/4 (030)	21.5	—	14	—	—	10.5	20	—
R1/4 (040–060)	29	—	14	—	—	10.5	21	—
R3/8	36.5	6	—	17	20	11	55	—
Rc3/8	45.5	6	—	17	20	11	75	—
Rc1/2	56	8	—	22	25	14	140	150
Rc3/4	73	10	—	27	32	15	300	320
Rc1	94	14	—	34	40	17	585	625
Rc1*1/2	131	20	—	50	58	19	1,760	—
Rc2	168	24	—	60	70	23	2,980	—
Rc2*1/2	199	27	—	80	90	27	5,890	—
Rc3	220	30	—	90	105	30	9,400	—
Rc4	278	40	—	115	130	36	16,100	—

*1) Figures in ( ) after the pipe connection sizes indicate the spray capacity codes.

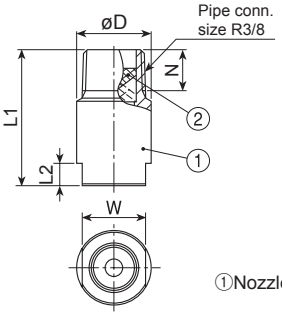
R1/8, R1/4



Rc3/8 and over



R3/8



①Nozzle body ②Whirler

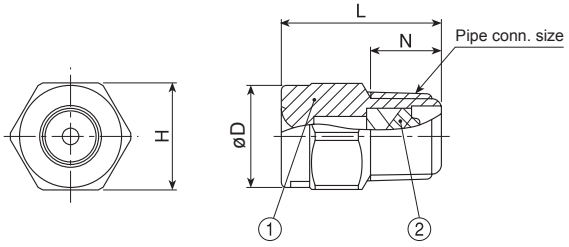
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

BBXP-PVDF series

	BBXP-PVDF series
Structure	• One-piece structure with a press-fit X-shaped whirler.
Material	• PVDF

Pipe conn. size	Dimensions (mm)				Mass (g)
	L	H	øD	N	
R1/8	18	12	11	8	2
R1/4	22	14	12	11.5	4.1

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

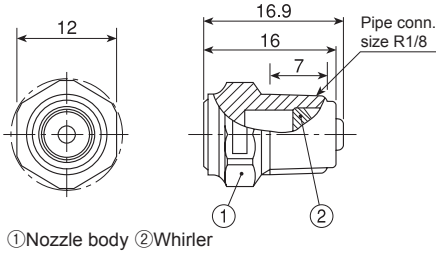


①Nozzle body ②Whirler

BBXP-PVC series

	BBXP-PVC series
Structure	• One-piece structure with a removable X-shaped whirler.
Material	• PVC
Mass	• 1.4 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body ②Whirler

Wide-angle Full Cone Spray Nozzles

BBXP/BBXP-PVDF/BBXP-PVC series

BBXP series

Spray capacity code	Pipe conn. size		Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	R1/8	R1/4	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.35 MPa	0.5 MPa	0.7 MPa	1 MPa		
015	○	○	—	120	112	—	—	1.09	1.32	1.50	1.88	2.18	2.50	2.89	300	0.7
020	○	○	110	120	112	—	1.06	1.46	1.75	2.00	2.51	2.91	3.34	3.86	〃	0.9
030	○	○	112	120	113	—	1.59	2.18	2.63	3.00	3.77	4.36	5.00	5.79	340	0.9
040		○	110	120	112	—	2.12	2.91	3.51	4.00	5.03	5.81	6.67	7.72	350	1.4
050		○	112	120	113	—	2.65	3.64	4.38	5.00	6.28	7.27	8.34	9.64	〃	1.7
060		○	114	120	114	2.51	3.18	4.37	5.26	6.00	7.54	8.72	10.0	11.6	430	1.7

Spray capacity code	Pipe connection size										Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	R 3/8	Rc 3/8	Rc 1/2	Rc 3/4	Rc 1	Rc 1*1/2	Rc 2	Rc 2*1/2	Rc 3	Rc 4	0.15 MPa	0.35 MPa	0.7 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.35 MPa	0.5 MPa	0.7 MPa	1 MPa		
10	○	○									123	120	111	3.34	4.21	5.79	6.98	7.96	10.0	11.6	13.3	15.3	340	2.0
12	○	○									124	120	112	4.00	5.06	6.95	8.37	9.55	12.0	13.9	15.9	18.4		2.0
14	○	○									124	120	112	4.67	5.90	8.10	9.77	11.1	14.0	16.2	18.6	21.5	〃	2.4
16	○	○									125	120	113	5.33	6.74	9.25	11.2	12.7	16.0	18.5	21.2	24.6		2.6
18			○								123	120	111	6.00	7.58	10.4	12.6	14.3	18.0	20.8	23.9	27.6	420	2.8
20			○								123	120	111	6.67	8.43	11.6	14.0	15.9	20.0	23.1	26.5	30.7	〃	2.8
23			○								124	120	112	7.67	9.69	13.3	16.0	18.3	23.0	26.6	30.5	35.3		2.8
26			○								124	120	112	8.67	11.0	15.1	18.1	20.7	26.0	30.1	34.5	39.9	480	2.8
30				○							123	120	111	10.0	12.6	17.4	20.9	23.9	30.0	34.7	39.8	46.0	〃	3.8
40				○							124	120	112	13.3	16.9	23.2	27.9	31.8	40.0	46.3	53.1	61.4		4.8
50				○							125	120	113	16.7	21.0	29.0	34.9	39.8	50.0	57.8	66.3	76.7	580	4.8
60					○						124	120	112	20.0	25.3	34.7	41.9	47.7	60.0	69.4	79.6	92.1	〃	5.4
80					○						125	120	113	26.7	33.7	46.3	55.8	63.7	80.0	92.5	106	123	630	6.0
100						○					123	120	111	33.3	42.1	57.9	69.8	79.6	100	115	135	155		7.2
150						○					124	120	112	50.0	63.2	86.9	105	120	150	175	200	230	〃	8.5
200							○				124	120	112	66.7	84.3	115	140	160	200	230	265	310	710	8.9
300							○				125	120	113	100	125	175	210	240	300	350	400	460	900	10.2
400								○			124	120	112	135	170	235	280	320	400	465	530	615	〃	14.3
500								○			125	120	113	170	210	290	350	400	500	580	665	770	1,000	14.3
600									○		124	120	112	200	255	350	420	480	600	695	795	920	〃	19.0
700									○		125	120	113	235	295	405	490	550	700	810	930	1,070	1,100	19.0
900										○	124	120	112	300	380	520	630	720	900	1,041	1,195	1,380	〃	19.8
1200										○	125	120	113	400	505	695	840	955	1,200	1,390	1,590	1,840	1,200	21.7

BBXP-PVDF series

Spray capacity code*2	Pipe conn. size		Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)	Nozzle body color
	R1/8	R1/4	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.35 MPa	0.5 MPa	0.7 MPa	1 MPa			
008	○		—	120	112	—	—	0.58	0.70	0.80	1.00	1.16	1.33	1.54	280	0.5	
015	○	○	—	120	112	—	—	1.09	1.32	1.50	1.88	2.18	2.50	2.89	〃	0.8	
020	○		110	120	113	—	1.06	1.46	1.75	2.00	2.51	2.91	3.34	3.86	340	1.2	

*2) Nozzle body colors differ depending on the spray capacity codes: BBXP008 and BBXP020 are black (BLA), BBXP015 is gray (GRA).

BBXP-PVC series [1/8MBBXP030PVC-IN]

Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)
0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
115	120	110	—	1.59	2.18	2.63	3.00	3.54	4.36	5.00	5.79	350	1.5

How to order

Please inquire or order for a specific nozzle using this coding system.

①BBXP series (metal)

〈Example〉 1/8M BBXP 015 S303

1/8M BBXP 015 S303

- Pipe conn. size*3: 1/8M 〃 4F
- Spray capacity code: 015 〃 1200
- Material*4: S303, B, S316

②BBXP-PVDF series

〈Example〉 1/8M BBXP 020 PVDF (BLA)

1/8M BBXP 020 PVDF (BLA)

- Pipe conn. size*3: 1/8M, 1/4x1/8M
- Spray capacity code: 008, 015, 020
- Nozzle color: BLA (BBXP008, 020), GRA (BBXP015)

③BBXP-PVC series

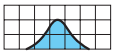
1/8MBBXP030PVC-IN

*3) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
When spray capacity code is 005–030, pipe connection size for R1/4 is indicated as "1/4x1/8M".
*4) See "Material" information on page 78 for standard materials by each size.

Narrow-angle
Full Cone Spray Nozzles

NJJP

[Spray pattern]



[Spray distribution]

[Features]

- Narrow-angle full cone spray pattern with a round impact area and uniform distribution.
- Unique design producing fine atomization without a whirler.
- No-whirler design with large free passage diameter minimizes clogging.

[Standard pressure]

0.3 MPa

[Applications]

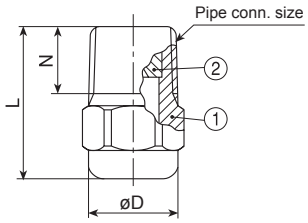
Cleaning: Pipes, bottles, containers, filters
Cooling: Steel plates

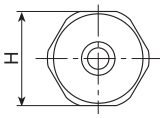
NJJP series

	NJJP series
Structure	• One piece structure with a press-fit orifice tip. • No obstructions in nozzle interior.
Material	• S303 • Optional material: S316

Pipe conn. size	Dimensions (mm)				Mass (g)
	L	H	øD	N	
R1/4	24	14	13.5	10.5	19.5
R3/8	32	19	18	11	48

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.





①Nozzle body ②Orifice tip

Spray angle code	Spray capacity code	Pipe conn.size		Spray angle (°)			Spray capacity (ℓ/min)						Mean droplet diameter (μm)	Free passage diameter (mm)
		R1/4	R3/8	0.15 MPa	0.3 MPa	0.7 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
30	06	○		26	30	32	4.80	5.26	6.00	7.42	8.54	9.91	750	2.5
	08	○		26	30	32	6.40	7.02	8.00	9.90	11.4	13.2	⟆	3.0
	14		○	26	30	32	11.2	12.3	14.0	17.3	19.9	23.1		3.9
	20		○	26	30	32	16.0	17.5	20.0	24.7	28.5	33.0	970	4.6
15	06	○		12	15	16	4.80	5.26	6.00	7.42	8.54	9.91	925	2.4
	08	○		12	15	16	6.40	7.02	8.00	9.90	11.4	13.2	⟆	3.0
	14		○	12	15	16	11.2	12.3	14.0	17.3	19.9	23.1		3.9
	20		○	12	15	16	16.0	17.5	20.0	24.7	28.5	33.0	1,200	4.6

[Note] Please use NJJP series nozzles at water pressure of 0.15 MPa or greater to obtain a stable spray pattern.

How to order

Please inquire or order for a specific nozzle using this coding system.

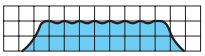
〈Example〉 1/4M NJJP 30 06 S303

1/4M	NJJP	30	06	S303
Pipe conn. size*		Spray angle code	Spray capacity code	
1/4M		30	06	
3/8M		15	⟆	
			20	

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/4M = R1/4.

Clog-resistant
Vaneless Full Cone Spray Nozzles AJP/AJP-PPS

[Spray pattern]



[Spray distribution]

[Features]

- Full cone spray pattern with a round impact area and uniform distribution.
- Unique design to produce fine atomization by liquid impinging inside chamber without a whirler.
- No-whirler design with large free passage diameter minimizes clogging.
- Spraying axis 90° from the axis of the nozzle inlet.
- High chemical and wear resistant AJP-PPS series is available for spraying hydrochloric acid and other chemicals.

[Standard pressure] 0.2 MPa

[Applications]

Cleaning: Pre-painting treatment, washing booths, machine parts, gas, incinerator fumes
Cooling: Steel plates, copper pieces, gas
Spraying: Aeration, foam breaking
Others: Applications where re-circulated water is being used or clogging is a concern

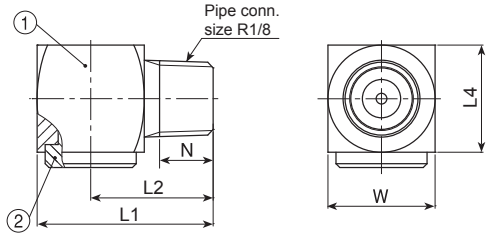
AJP series

	AJP series
Structure	● Comprises a nozzle body and orifice cap. ● Orifice cap for sizes R1/8, R3/8, and R1/2 is pressed into the nozzle body. Orifice cap for the other sizes are screw-in type. ● No obstructions in nozzle interior.
Material	● Body: S304, S303, or SCS13 (vary by the spray capacity code) ● Orifice cap: S303 ● Optional material: S316

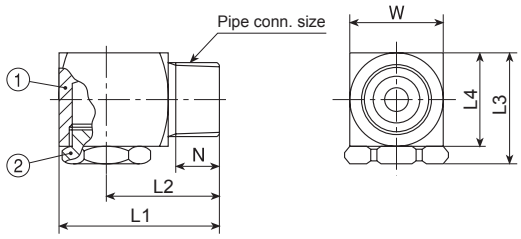
Pipe conn. size	Dimensions (mm)						Mass (g)
	L1	L2	L3	L4	W	N	
R1/8	23	16	14	—	14	7	25
R1/4	32	23	20.5	16	16	10.5	55
R3/8	36	26	23.5	19	20	11	70
R1/2	46	33.5	31	25	25	14	180
R3/4	55	39	38	32	32	15	340
R1	70	50	48	40	40	18	670
R1*1/2	100	70	72	58.5	58.5	20	2,400

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

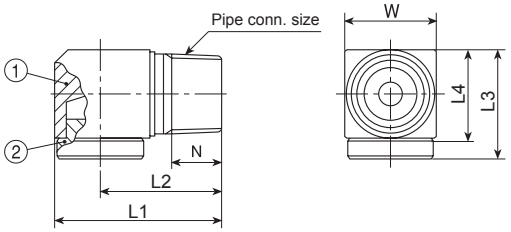
R1/8



R1/4, R3/4, R1, R1*1/2



R3/8, R1/2



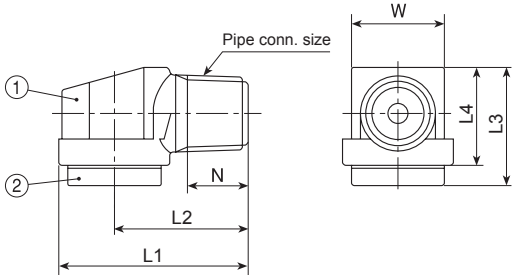
①Nozzle body ②Orifice cap

AJP-PPS series

	AJP-PPS series
Structure	● Comprises an injection-molded nozzle body and orifice cap. ● Orifice cap is ultrasonically welded to the nozzle body. ● No obstructions in nozzle interior.
Material	● PPS

Pipe conn. size	Dimensions (mm)						Mass (g)
	L1	L2	L3	L4	W	N	
R1/4	32.5	23	20.5	17	16	10.5	6.8
R3/8	37	26	23	20	19	11	10.3

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body ②Orifice cap

Spray capacity code	Pipe connection size									Spray angle (°)			Spray capacity (ℓ/min)							Mean drop. dia. (μm)	Free pass. dia. (mm)
	AJP (metal)							AJP-PPS													
	R1/8	R1/4	R3/8	R1/2	R3/4	R1	R 1*1/2	R1/4	R3/8	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
02	○									64	75	69	—	1.02	1.43	1.74	2.00	2.35	2.89	640	1.6
03	○									65	75	69	—	1.53	2.14	2.61	3.00	3.53	4.33		1.9
04		○						○		65	75	68	1.59	2.04	2.86	3.48	4.00	4.70	5.77		2.2
05		○						○		65	75	68	1.99	2.55	3.57	4.35	5.00	5.88	7.21	〃	2.5
06		○						○		70	80	73	2.39	3.06	4.29	5.22	6.00	7.06	8.66		2.8
07		○						○		70	80	73	2.79	3.57	5.00	6.09	7.00	8.23	10.1		3.1
08			○						○	70	80	73	3.19	4.08	5.71	6.96	8.00	9.54	11.9	740	3.2
10			○						○	70	80	73	3.98	5.10	7.14	8.70	10.0	11.9	14.9		3.7
12			○						○	75	85	78	4.78	6.12	8.57	10.4	12.0	14.3	17.9	〃	4.1
14			○						○	75	85	78	5.57	7.14	10.0	12.2	14.0	16.7	20.9		4.5
16			○						○	75	85	78	6.37	8.16	11.4	13.9	16.0	19.1	23.8	820	5.0
18				○						76	85	79	7.17	9.18	12.9	15.7	18.0	21.6	27.1		5.1
20				○						76	85	79	7.96	10.2	14.3	17.4	20.0	23.9	30.1	〃	5.4
23				○						76	85	79	9.16	11.7	16.4	20.0	23.0	27.5	34.6		6.0
26				○						76	85	79	10.4	13.3	18.6	22.6	26.0	31.1	39.1		6.5
30				○						76	85	79	11.9	15.3	21.4	26.1	30.0	35.9	45.1	900	7.1
35				○						83	90	85	13.9	17.9	25.0	30.4	35.0	41.9	52.6		7.8
40				○						83	90	85	15.9	20.4	28.6	34.8	40.0	47.9	60.1		8.5
45				○						83	90	85	17.9	23.0	32.1	39.1	45.0	53.9	67.6	〃	9.2
50				○						83	90	85	19.9	25.5	35.7	43.5	50.0	59.9	75.1		9.8
55					○					83	90	85	21.9	28.1	39.3	47.8	55.0	65.9	82.6	1,000	9.6
60					○					83	90	85	23.9	30.6	42.9	52.2	60.0	71.8	90.2		10.1
70					○					83	90	85	27.9	35.7	50.0	60.9	70.0	83.8	105		11.2
80					○					83	90	85	31.9	40.8	57.1	69.6	80.0	95.8	120	〃	12.2
90					○					83	90	85	35.8	45.9	64.3	78.3	90.0	108	135		13.0
100						○				83	90	85	39.8	51.0	71.4	87.0	100	120	150	1,120	13.0
120						○				83	90	85	47.8	61.2	85.7	104	120	144	180		14.8
150						○				83	90	85	59.7	76.5	107	130	150	180	225	〃	17.4
180							○			83	90	85	71.7	91.8	129	157	180	216	270	1,280	17.8
200							○			83	90	85	79.6	102	143	174	200	239	301	〃	18.8
250							○			83	90	85	99.5	128	179	217	250	299	376	1,350	22.3

How to order

Please inquire or order for a specific nozzle using this coding system.

①AJP series (Metal)

〈Example〉 1/4M AJP 04 S303

1/4M AJP 04 S303

- Pipe conn. size*: 1/8M 〃 1*1/2M
- Spray capacity code: 02 〃 250

②AJP-PPS series (Plastic)

〈Example〉 3/8M AJP 08 PPS

3/8M AJP 08 PPS

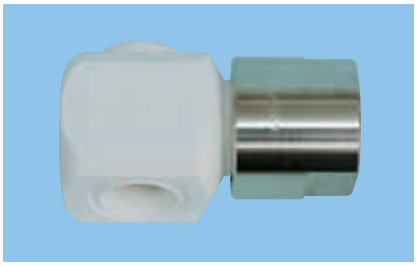
- Pipe conn. size*: 1/4M, 3/8M
- Spray capacity code: 04 〃 16

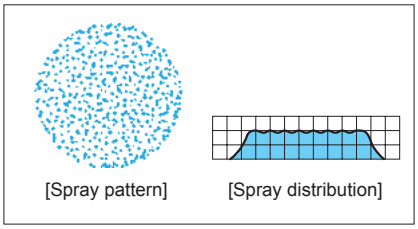
*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

Clog-resistant Alumina Ceramic Full Cone Spray Nozzles

AJP-AL92

Clog-resistant full cone nozzle made of high wear-resistant and chemical-resistant alumina ceramics.





[Features]

- Full cone spray pattern with a round impact area and uniform distribution.
- Unique design to produce fine atomization by liquid impinging inside chamber without a whirler.
- No-whirler design with large free passage diameter minimizes clogging.
- Spraying axis 90° from the axis of the nozzle inlet.
- Right angle nozzle suitable for installation in narrow space.

[Standard pressure]

0.2 MPa

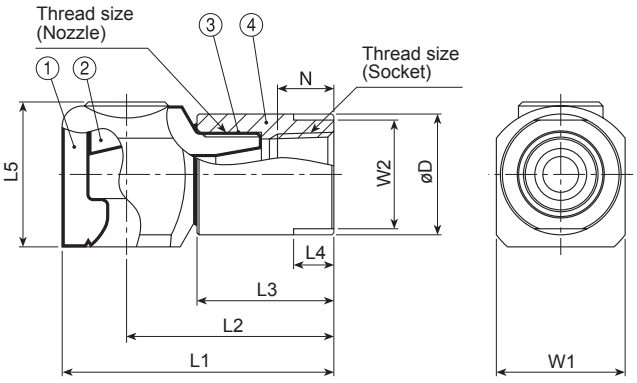
[Applications]

- Spraying slurry
- Absorption tower of flue gas desulfurization equipment
- Spraying water in cooling tower

AJP-AL92 series

	AJP-AL92 series
Structure	● Whole nozzle fired as one piece. ● No obstructions in nozzle interior.
Material	● Nozzle body: 92% Alumina ● Socket: S316

We offer AJP-AL92 series with a socket made of S316 to prevent thread damage, as the nozzle's alumina threads get easily chipped. Our S316 socket is female threaded.



①Nozzle body ②Ceramic plate ③Adhesive: Araldite®H ④Socket (S316)

Thread sizes		Dimensions (mm)									Mass (g)
Nozzle	Socket	L1	L2	L3	L4	L5	W1	W2	øD	N	
R1/2	Rc1/2	68	52	34	10	36	32	27	30	14	240
R3/4	Rc3/4	80	60	39	14	44	41	35	40	15	450
R1	Rc3/4	97	71	41	18	54	50	41	50	15	650
R1	Rc1	99	73	43	18	54	50	41	50	17	850
R1*1/2	Rc1	130	94	47	24	80.5	75	60	70	17	2,160
R1*1/2	Rc1*1/2	133	97	50	24	80.5	75	60	70	19	2,440

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.
Position of the machined flat surfaces (L4 in the drawing) of the socket is not always the same as shown in the above photo and drawing.

Spray capacity code	Nozzle thread size				Spray angle (°)			Spray capacity (ℓ/min)							Mean droplet diameter (μm)	Free passage diameter (mm)
	R1/2	R3/4	R1	R 1*1/2	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa		
18	○				76	85	79	7.16	9.18	12.9	15.7	18.0	21.5	27.1	800	5.1
20	○				76	85	79	7.96	10.2	14.3	17.4	20.0	23.9	30.1		5.4
23	○				76	85	79	9.15	11.7	16.4	20.0	23.0	27.5	34.6		6.0
26	○				76	85	79	10.3	13.3	18.6	22.6	26.0	31.1	39.1		6.5
30	○				76	85	79	11.9	15.3	21.4	26.1	30.0	35.9	45.1		7.1
35	○				83	90	85	13.9	17.9	25.0	30.5	35.0	41.9	52.6		7.8
40	○				83	90	85	15.9	20.4	28.6	34.8	40.0	47.9	60.1		8.5
45	○				83	90	85	17.9	23.0	32.1	39.2	45.0	53.9	67.6	≀	9.2
50	○				83	90	85	19.9	25.5	35.7	43.5	50.0	59.9	75.2		9.8
55		○			83	90	85	21.9	28.1	39.3	47.9	55.0	65.8	82.7		9.6
60		○			83	90	85	23.9	30.6	42.8	52.2	60.0	71.8	90.2		10.1
70		○			83	90	85	27.9	35.7	50.0	60.9	70.0	83.8	105		11.2
80		○			83	90	85	31.4	40.8	57.1	69.6	80.0	95.8	120		12.2
90		○			83	90	85	35.8	45.9	64.3	78.3	90.0	108	135	1,250	13.0
100			○		83	90	85	39.8	51.0	71.4	87.0	100	120	150		13.0
120			○		83	90	85	47.8	61.2	85.7	104	120	144	180		14.8
150			○		83	90	85	59.7	76.5	107	131	150	180	226	≀	17.4
180				○	83	90	85	71.6	91.8	129	157	180	216	271		17.8
200				○	83	90	85	79.6	102	143	174	200	240	300		18.8
250				○	83	90	85	99.5	128	179	217	250	299	376	1,400	22.3

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/2M AJP 18 AL92 + 1/2Fx1/2F SOC S316

1/2M AJP 18 AL92 + 1/2F x 1/2 F SOC S316

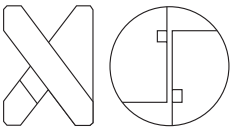
- 1/2M: Nozzle thread size* — 1/2M ≀ 1*1/2M
- 18: Spray capacity code — 18 ≀ 250
- 1/2F: Socket thread size* (Pipe conn. size) — 1/2F ≀ 1*1/2F
- 1/2: Nozzle thread size (without "R") — 1/2 ≀ 1*1/2

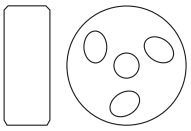
*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/2M = R1/2, 1/2F = Rc1/2.

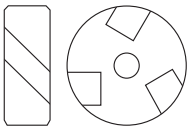
Effective Use of Full Cone Spray Nozzles

Clogging and Free Passage Diameter

Typical full cone spray nozzles comprise a whirler to form a round spray area with uniform distribution. The whirler part is the bottleneck of the liquid passage and where clogging can occur. There are several types of whirlers including X-shaped whirler, disc-shaped whirler, and spiral-shaped whirler. The diameter of a sphere that can pass through the whirler is defined as free passage diameter. Among them, the X-shaped whirler has the largest free passage diameter and allows for minimize clogging.
In our full cone nozzle series developed to have no whirler so as to eliminate clogging problems, our AJP series nozzles are the most clog-resistant due to its unique vaneless design and the largest free passage diameter.


X-shaped whirler


Disc whirler


Spiral-shaped whirler

Wear and Corrosion Resistance

When the liquid contains slurry, the inside of the nozzle exposed to the flow of liquid at high speed can wear out quickly. For these applications, the **JUP series** nozzle is ideal, as the orifice and whirler are made of ceramics. **JUXP, AJP-AL92, and TJJX-SiC series** nozzles are more effective as all parts are made of ceramics. For corrosive applications, nozzles made of special materials such as plastics and titanium alloy are available.

Reduction in Mass

For arrangements of many large size nozzles, mass savings of the nozzles affects the total production cost for the systems. The **TJJX series** nozzle with a newly developed X-shaped whirler has a 20% shorter overall length and 20% less mass than conventional nozzles. Furthermore, TJJX-SiC series nozzle (made of silicon nitride bonded silicon carbide) weighs less than a half of metal nozzle.

Rotation Reaction Force

In full cone spray nozzles with whirlers, rotation torque is generated as a reaction force by the vortex current produced by the whirler, which is determined by the following equation.

$$T \approx C \cdot Q \cdot D \cdot \sqrt{P}$$

T: Torque (N-m)
C: Constant
Q: Spray capacity (ℓ/min)
D: External dimension of whirler (mm)
P: Spray pressure (MPa)

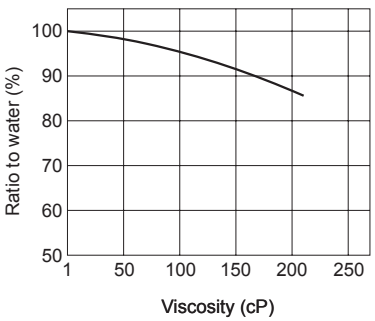
[Example]

Nozzle No.	Torque at pressure of 0.2 MPa
3/4FJJXP23	0.025 N-m
6TJJX4000	3,000 N-m

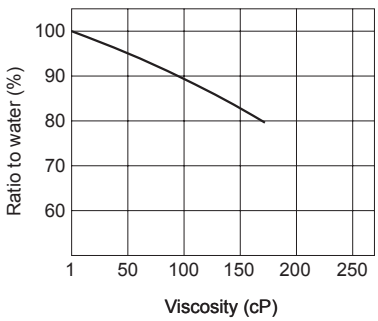
Viscosity

As the viscosity of the liquid increases, generally spray capacity and angle decreases, spray distribution deteriorates, and spray droplet size becomes larger.
(Spray capacity of hollow cone spray nozzles increases as the viscosity of liquid increases. See page 62 for details.)

[Relation between viscosity and spray capacity]



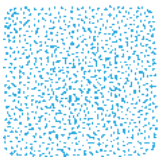
[Relation between viscosity and spray angle]



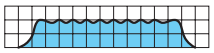
Nozzle tested: JJXP90
Spray pressure: 0.02–0.03 MPa

Square Spray Nozzles

SSXP
SSXP-HTPVC



[Spray pattern]



[Spray distribution]

[Features]

- Square full cone spray pattern with uniform distribution.
- Wide spray angle of 90–100° provides large spray coverage.
- Square full cone spray pattern leaves no gaps in multiple-nozzle arrangements.
- X-shaped whirler provides large free passage diameter, minimizing clogging.

[Standard pressure]

SSXP series: 0.2 MPa
SSXP-HTPVC series: 0.15 MPa

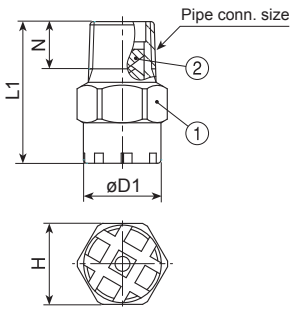
[Applications]

Cleaning: Gas, incinerator fumes, machinery, eliminators, screen, tanks, crushed stones, earth and sand
Cooling: Gas, machinery, tanks, steels
Spraying: Waste water treatment, foam breaking, fire extinguishing, dust suppression

SSXP series

	SSXP series
Structure	• One-piece structure with a press-fit X-shaped whirler.
Material	• Sizes R1/8, R1/4: S303 • Sizes R3/8–Rc1: S303 or B (brass) • Sizes Rc1*1/2 or larger: S316 (SCS14) • Optional material: S316L (SCS16)

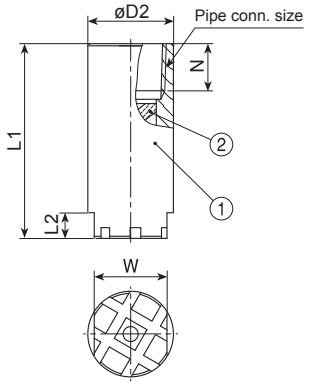
R1/8, R1/4



Pipe conn. size	Dimensions (mm)							Mass (g)	
	L1	L2	H	W	øD1	øD2	N	S303 S316	B
R1/8	21	—	12	—	11.5	—	7	11.5	—
R1/4	29	—	14	—	13.5	—	10.5	20	—
Rc3/8	45.5	6	—	17	—	20	11	70	74
Rc1/2	56	8	—	22	—	25	14	150	160
Rc3/4	73	10	—	27	—	32	15	300	320
Rc1	94	14	—	34	—	40	17	575	620
Rc1*1/2	131	20	—	50	—	58	19	1,690	—
Rc2	168	24	—	60	—	70	23	2,910	—
Rc2*1/2	199	27	—	80	—	90	27	5,860	—
Rc3	220	30	—	90	—	105	30	9,420	—

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Rc3/8 and over

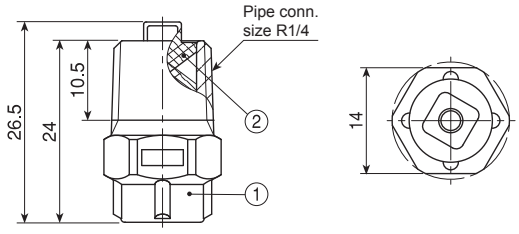


①Nozzle body ②Whirler

SSXP-HTPVC series

	SSXP-HTPVC series
Structure	• One-piece structure with a removable X-shaped whirler.
Material	• HTPVC
Mass	• 3.1 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body ②Whirler

Square Spray Nozzles
SSXP/SSXP-HTPVC series

■ SSXP series

Spray capacity code	Pipe conn. size		Spray angle (°)			Spray capacity (ℓ/min)									Mean droplet diameter (μm)	Free passage diameter (mm)
	R1/8	R1/4	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
020	○		86	90	81	—	1.06	1.46	1.75	2.00	2.36	2.91	3.34	3.86	330	0.9
030	○		86	90	81	—	1.59	2.18	2.63	3.00	3.54	4.36	5.00	5.79	380	1.2
040		○	90	95	85	—	2.12	2.91	3.51	4.00	4.72	5.81	6.67	7.72	360	1.3
050		○	91	95	86	—	2.65	3.64	4.38	5.00	5.90	7.27	8.34	9.64	〃	1.7
060		○	91	95	86	2.51	3.18	4.37	5.26	6.00	7.08	8.72	10.0	11.6	490	1.7

Spray capacity code	Pipe connection size								Spray angle (°)			Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	Rc 3/8	Rc 1/2	Rc 3/4	Rc 1	Rc 1*1/2	Rc 2	Rc 2*1/2	Rc 3	0.05 MPa	0.2 MPa	0.5 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
070	○								94	100	89	2.93	3.71	5.09	6.14	7.00	8.26	10.2	11.7	13.5	440	2.0
080	○								95	100	90	3.35	4.24	5.82	7.01	8.00	9.44	11.6	13.3	15.4	〃	2.0
10	○								96	100	91	4.19	5.29	7.28	8.77	10.0	11.8	14.5	16.7	19.3		2.6
12	○								97	100	92	5.03	6.35	8.73	10.5	12.0	14.2	17.4	20.0	23.1	630	2.6
16		○							95	100	90	6.70	8.47	11.6	14.0	16.0	18.9	23.3	26.7	30.9	〃	2.8
20		○							96	100	91	8.36	10.6	14.6	17.5	20.0	23.6	29.1	33.4	38.6	710	3.5
30			○						96	100	91	12.6	15.9	21.8	26.3	30.0	35.4	43.6	50.0	57.9	〃	3.8
40			○						97	100	92	16.8	21.2	29.1	35.1	40.0	47.2	58.1	66.7	77.2		4.8
50				○					95	100	90	20.9	26.5	36.4	43.8	50.0	59.0	72.7	83.4	96.4	750	5.4
60				○					96	100	91	25.1	31.8	43.7	52.6	60.0	70.8	87.2	100	115	〃	5.4
80				○					97	100	92	33.5	42.4	58.2	70.1	80.0	94.4	115	135	155	1,000	6.0
100					○				96	100	91	41.9	52.9	72.8	87.7	100	120	145	170	195	〃	7.1
150					○				97	100	92	62.8	79.4	110	130	150	180	220	250	290		10.2
300						○			97	100	92	125	160	220	265	300	355	435	500	580	1,350	12.7
500							○		97	100	92	210	265	365	440	500	590	730	835	965	1,500	16.8
700								○	97	100	92	290	370	510	615	700	826	1,020	1,170	1,350	1,700	17.1

■ SSXP-HTPVC series [1/4MSSXP1.5*65/4.5HTPVC]

Spray angle (°)			Spray capacity (ℓ/min)								Mean droplet diameter (μm)	Free passage diameter (mm)
0.05 MPa	0.15 MPa	0.5 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa		
56	65	65	2.72	3.74	4.50	5.14	6.06	7.46	8.56	9.90	450	2.2

How to order

Please inquire or order for a specific nozzle using this coding system.

①SSXP series (metal)

〈Example〉 1/8M SSXP 020 S303

1/8M	SSXP	020	S303
Pipe conn. size*		Spray capacity code	Material
■ 1/8M		■ 020	■ S303
〃		〃	■ B
■ 3F		■ 700	■ S316

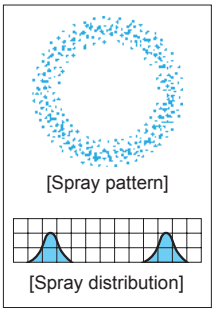
②SSXP-HTPVC series (plastic)

1/4M SSXP 1.5*65/4.5 HTPVC

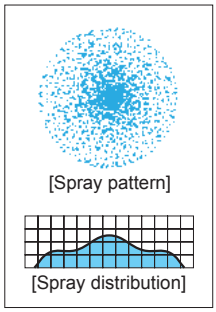
*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

SPILLBACK Nozzles for gas cooling SPB

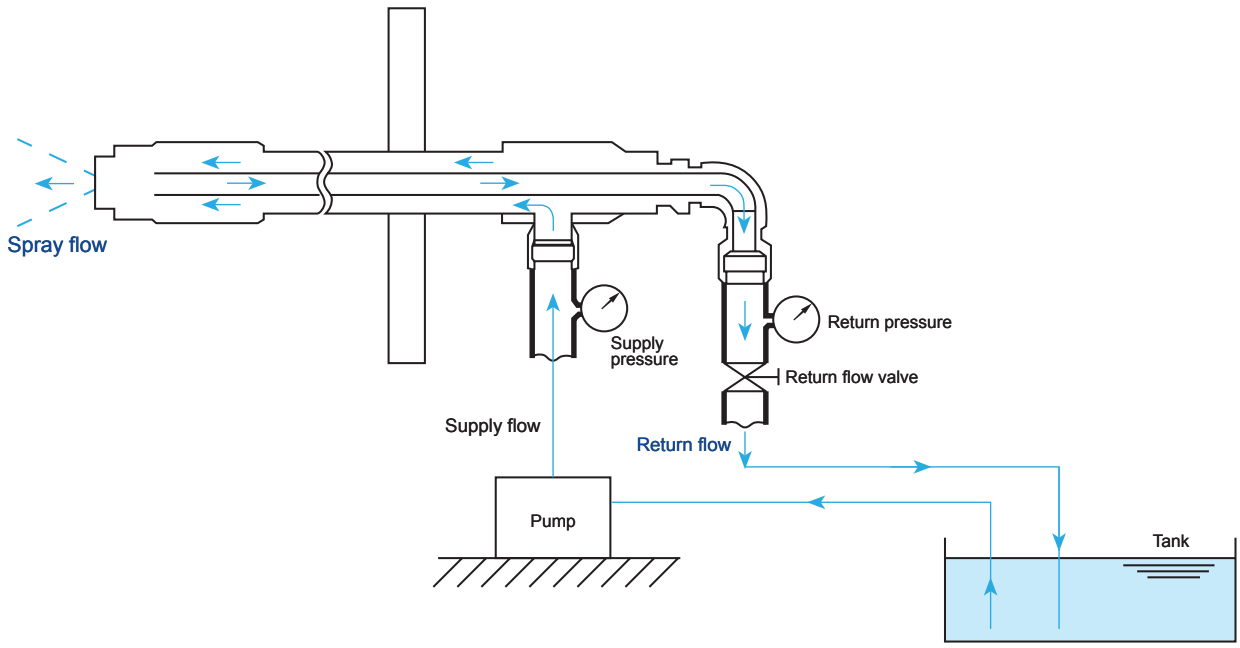
Single-head SPB-R series



Four-orifice SPB series



System diagram (example)



[Features]

- Variable capacity hollow cone spray nozzle generating fine atomization with uniform spray distribution (single-head).
- Spray capacity can be controlled by only adjusting return pressure while supply pressure is kept constant.
  Spray capacity is maximized by fully closing the return flow valve and minimized by fully opening the return flow valve.
  The turn-down ratio of spray capacity is 1:10.
- Part of the supplied liquid flows back when the return flow valve is opened, causing supply flow to increase.
  The increase of supply flow is within 40% of the maximum spray capacity.
- Featuring minimal variation in spray droplet size despite the modulation of spray flow, our SPILLBACK nozzles are ideal for gas cooling where the inlet gas temperature varies.
- Multiple-head SPILLBACK nozzles are suitable for applications which require larger spray capacity and minimal increase in spray droplet size.

[Standard pressure]

Supply pressure: 2 MPa (with return flow valve totally closed)

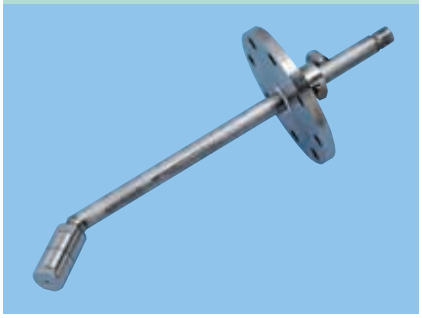
[Applications]

Cooling: Incinerators, cement factories, glass factories, blast furnaces, iron works
Moisture control: Blast furnaces

Please contact us for further information.

The following are also available to suit various installations.

L-type (45°) SPILLBACK nozzles



Flange-mounted protection pipe

Pressure-resistant flexible hose

Sister Product

■Large Flow High-pressure Return Nozzles **GSPB** series

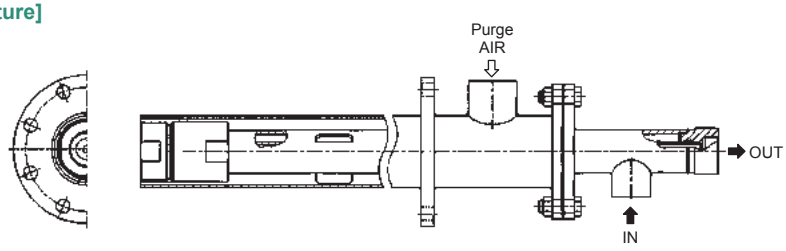
Min. spray capacity

Supply pressure: 3.5 MPa
Spray capacity: 1,000 ℓ/hr (16.7 ℓ/min)
Spray angle: 130°

Max. spray capacity

Supply pressure: 3.5 MPa
Spray capacity: 10,000 ℓ/hr (167 ℓ/min)
Spray angle: 90°

[Structure]



[Materials]
- Nozzle tip: Tungsten carbide
- Other parts: S316L, S304, S440C
- Protector: S316

This drawing is just one example.
Protector is optional.

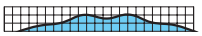
[Features]
- SPILLBACK NOZZLE for circulating fluidized bed flue gas desulfurization (CFB-FGD).
- Hollow cone spray nozzle with large flow of 10,000 liters per hour.
- Turndown ratio of 1:10 with minimal variation in spray droplet size. Ideal for gas cooling.

Please contact us for details.

Seven-head Full Cone Spray Nozzles
Extremely fine atomization

7KB

[Spray pattern]



[Spray distribution]

[Features]

- Full cone spray nozzle with an almost round-shaped spray area.
- Produces fine atomization.
- Seven KB hollow cone spray nozzles are installed in a very compact header adaptor.
- KB series nozzles with ceramic whirl chambers and orifices provide excellent wear-resistance.

[Standard pressure]

0.7 MPa

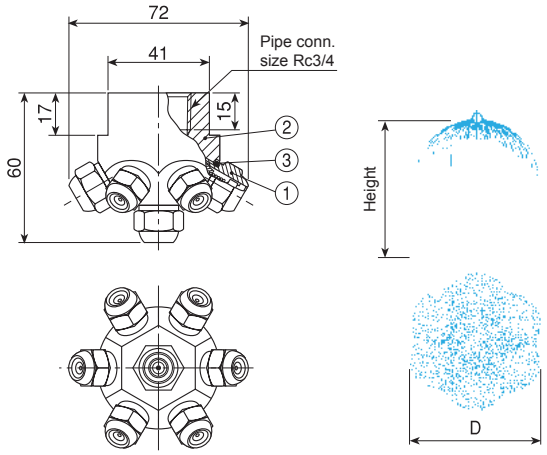
[Applications]

- Gas cooling ● Cleaning
- Moisture control ● Humidification
- Dust suppression

7KB series

	7KB series (with ceramic orifice inserted)
Structure	● 7 pcs. of KB series hollow cone spray nozzles (spray angle code 60°) are screwed into a header adaptor. ● Nozzle orifice and closer are made of ceramics. ● Each KB series nozzle has a built-in strainer.
Material	● Nozzle orifice & closer: ceramic ● Metal parts: S303 or B (brass) ● Optional material: S316
Mass	● S303: 370 g ● B (brass): 390 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①KB series nozzle ②Header adaptor ③O-ring (NBR)

See the chart below for spray dimension D.

Spray capacity code	Spray angle (°)			Spray dimension D (m) at each spray height (at 0.7 MPa)				Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)	Strainer mesh size
	0.3 MPa	0.7 MPa	1 MPa	0.5 m	1.0 m	1.5 m	2.0 m	0.3 MPa	0.4 MPa	0.5 MPa	0.6 MPa	0.7 MPa	1 MPa	1.2 MPa	1.5 MPa	2 MPa			
023	—	180	180	0.51	0.65	0.66	—	—	0.18	0.20	0.22	0.23	0.28	0.31	0.34	0.39	45	0.15	200
054	—	180	180	0.56	0.75	0.80	0.80	—	0.41	0.45	0.50	0.54	0.64	0.70	0.79	0.91	50	0.15	200
124	—	180	180	0.61	0.82	0.88	0.88	—	0.93	1.05	1.15	1.24	1.48	1.62	1.81	2.09	75	0.30	150
544	173	180	180	0.80	1.14	1.32	1.40	3.56	4.11	4.60	5.04	5.44	6.50	7.12	7.96	9.19	≀	0.50	100
1087	174	180	180	0.99	1.37	1.60	1.70	7.12	8.22	9.19	10.1	10.9	13.0	14.2	15.9	18.4	210	0.60	100

[Note] 7KB series nozzles are guaranteed only for spray capacity under the standard pressure.

How to order

Please inquire or order for a specific nozzle using this coding system.

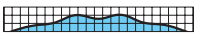
〈Example〉 3/4F 7KB 023 S303

3/4F 7KB 023 S303

Spray capacity code	Material
023	S303
≀	B
1087	

Seven-head Full Cone Spray Nozzles 7JJXP

[Spray pattern]



[Spray distribution]

[Features]

- Full cone spray nozzle with an almost round-shaped spray area.
- Seven JJXP full cone spray nozzles are installed in a very compact header adaptor.
- Mean spray droplet diameter is about half that of other single-head full cone spray nozzles with the same spray capacity.
- X-shaped whirler provides large free passage diameter, minimizing clogging.

[Standard pressure]

0.2 MPa

[Applications]

- Gas cooling ● Cleaning ● Moisture control
- Dust suppression

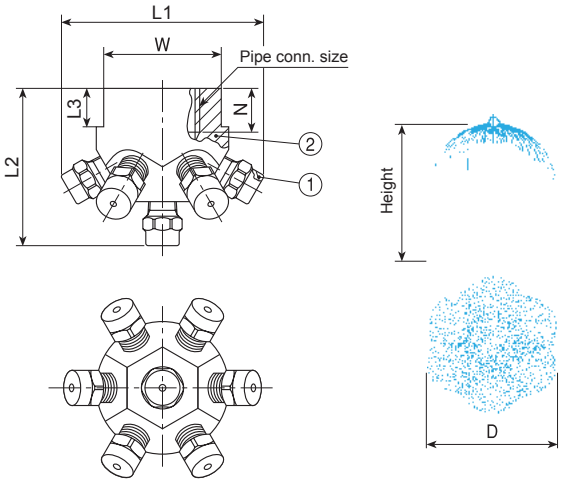
7JJXP series

	7JJXP series
Structure	● 7 pcs. of JJXP series full cone spray nozzles are screwed into a header adaptor. ● JJXP series full cone spray nozzle has one-piece structure with press-fit X-shaped whirler.
Material	● Nozzle: S303 for the spray capacity code 70–840 S303 or B (brass) for the spray capacity code 1120 or larger ● Header adaptor: S303 or B (brass) ● Optional material: S316

Pipe conn. size*1	Dimensions (mm)					Mass (g)	
	L1	L2	L3	W	N	S303	B
Rc3/4	71	55	13	40	15	380	400
Rc1 (280)	89	67.5	17	46	17	620	660
Rc1 (490, 840)	103	75	20	55	17	1,080	1,140
Rc1*1/2	128	92.5	20	70	19	1,860	1,970
Rc2	166	121.5	27	85	23	3,650	3,870

*1) Figures in ( ) after the pipe connection sizes indicate the spray capacity codes.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①JJXP series nozzle ②Header adaptor

See the chart below for spray dimension D.

Spray capacity code	Pipe conn. size				Spray angle (°)			Spray dimension D (m) at each spray height (at 0.2 MPa)						Spray capacity (ℓ/min)									Mean drop. dia. (μm)	Free pass. dia. (mm)
	Rc 3/4	Rc 1	Rc 1*1/2	Rc 2	0.05 MPa	0.2 MPa	0.5 MPa	1 m	1.5 m	2 m	2.5 m	3 m	3.5 m	0.05 MPa	1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa		
70	○				170	175	165	1.9	2.4	2.8	3.0	3.1	3.1	—	5.11	6.16	7.00	8.26	10.2	11.7	13.5	15.9	17.9	290	0.7
140	○				180	185	175	2.7	3.3	3.8	4.2	4.5	4.7	—	10.2	12.3	14.0	16.5	20.4	23.4	27.0	31.9	35.8	≀	1.4
280		○			180	185	175	3.4	3.9	4.4	4.8	5.2	5.4	14.8	20.4	24.6	28.0	33.0	40.7	46.7	54.0	63.7	71.7	380	1.7
490		○			180	185	180	4.3	4.8	5.4	5.8	6.2	6.4	26.0	35.6	43.0	49.0	57.8	71.4	81.9	94.5	112	125	480	1.9
840		○			200	205	200	5.2	5.8	6.3	6.8	7.2	7.5	44.5	61.1	73.5	84.0	99.4	122	140	162	191	215	660	2.6
1120			○		190	195	180	5.6	6.3	6.9	7.4	7.8	8.1	59.3	81.2	98.0	112	132	163	187	216	255	287	≀	3.5
1400			○		200	205	190	6.0	6.7	7.3	7.8	8.3	8.6	74.2	102	123	140	165	204	234	270	319	358	740	3.5
1820				○	195	200	185	6.2	6.9	7.5	8.0	8.5	8.8	96.6	132	160	182	215	265	304	351	414	466	≀	4.7
2450				○	205	210	195	6.4	7.1	7.7	8.2	8.7	9.0	130	179	215	245	289	356	409	473	558	627		4.7
3150				○	210	215	200	6.6	7.3	7.9	8.4	8.9	9.2	167	229	277	315	372	458	525	608	717	806	950	4.7

[Note] 7JJXP series nozzles are guaranteed only for spray capacity under the standard pressure.

How to order

Please inquire or order for a specific nozzle using this coding system.

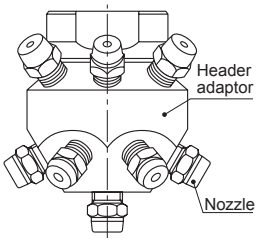
〈Example〉 3/4F 7JJXP 70 S303

3/4F	7JJXP	70	S303
Pipe conn. size*2		Spray capacity code	Material
■ 3/4F		■ 70	■ S303
≀		≀	■ B
■ 2F		■ 3150	

*2) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 3/4F = Rc3/4.

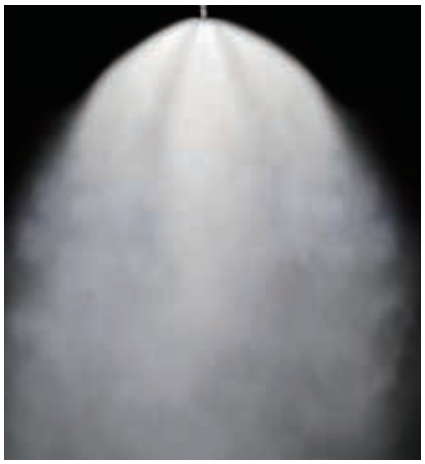
Sister Products

13JJXP series (13-head Full Cone Spray Nozzles)

Series	Appearance	Structure	Features	Applications
13JJXP			● Full cone spray nozzle with an almost round-shaped spray area. ● 13 pcs. of JJXP series full cone spray nozzles are screwed into a very compact header adaptor. ● Spray droplet diameter is smaller than those of other single-head full cone spray nozzles with the same spray capacity.	● Gas cooling ● Moisture control

Multiple-orifice Semi-fine Fog Nozzles for Fire Extinguishing

TSP



[Spray pattern]

[Spray distribution]

[Features]

- With an ultra-wide spray angle produced from multiple nozzle orifices, a single TSP nozzle provides a large spray coverage from 2.8 m up to 4 m.
- Produces semi-fine atomization with a mean droplet diameter of 100–200 μm.
- Compact design.

[Standard pressure]

5 MPa

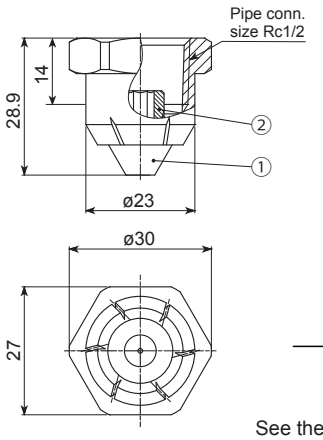
[Applications]

Fire extinguishing, dust suppression, spraying, tank cleaning

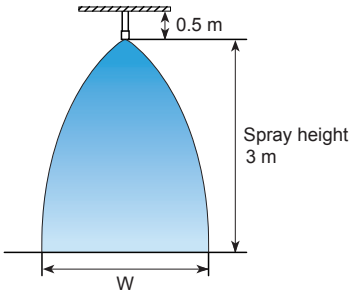
TSP series

	TSP series
Structure	• Produces a hollow cone spray pattern from the tip of the nozzle and flat spray patterns from the side slits of the nozzle, resulting in a nearly round impact area at a spray height of 2–3 m.
Material	• Nozzle body: S303 • Whirler: S316L equivalent
Mass	• 45 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Nozzle body ②Whirler



See the chart below for spray width W.

Spray capacity code	Spray capacity (ℓ/min) 3 MPa	4 MPa	5 MPa	7 MPa	10 MPa	Spray width W (m) (at 5 MPa) Spray height: 3 m	Mean droplet diameter (μm)	Free passage diameter (mm)
15	11.7	13.5	15.0	17.8	21.2	2.8		0.4
20	15.6	18.0	20.1	23.8	28.4	3.0		0.5
30	23.3	26.9	30.1	35.5	42.4	3.3	100–200	0.6
40	31.0	35.8	40.0	47.3	56.5	3.5		0.7
60	46.6	53.8	60.1	71.1	84.9	4.0		0.8

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/2F TSP 15 S303

1/2F TSP 15 S303

Spray capacity code

- 15
- 20
- 30
- 40
- 60

Products Lineup

Solid Stream Spray Nozzles and others

Solid Stream Spray Nozzles pp.95–

- Standard solid stream: **CCP/CP**
- Convex round inlet solid stream: **CCRP/CRP (AL99)**
- Trimming nozzles: **CMP-T/CTM/CM**

Multiple-orifice Solid Stream Spray Nozzles pp.101–

- Multiple-orifice solid stream: **2CCP•7CCP/2CP•7CP**

Special Solid Stream Spray Nozzles pp.103–

- Self-cleaning solid stream: **MOMOJet®"C"**
- Pipe cleaning nozzles: **RSP, RSP-R**
- Solid stream with ON/OFF control: **SO-CM**
- Universal-joint type solid stream: **UT+CP**
- Ejector nozzles: **EJX**
- Surface washing nozzles
- Effective use of solid stream spray nozzles

Other Special Nozzles and Accessories pp.111–

- Air nozzles: **TAIFUJet®**
- Slit laminar nozzles: **SLNH-H/SLNHA-H**
- Slit laminar nozzles for blower air: **SLNB**
- Universal ball joints: **UT, WUT**

Standard Solid Stream Jet CCP/CP

[Spray pattern]

[Spray distribution]

[Features]

- Our highest impact solid stream. Interior design featuring minimal pressure drop generates much larger flow of solid stream jet as compared with other solid stream nozzles having the same orifice diameters.

[Standard pressure]

3 MPa

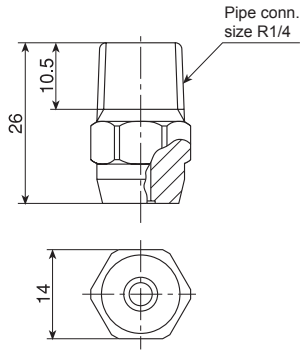
[Applications]

High pressure cleaning:
Wire and felt parts of paper making machines, vehicles, returnable containers, machinery, parts

Trimming: Paper making, asbestos plate

CCP series

	CCP series
Structure	• Made of metal, one-piece structure.
Material	• S303 [Note] Use CCP series nozzles below the pressure of 3.5 MPa. • Optional material: S316, B (brass)
Mass	• 20 g

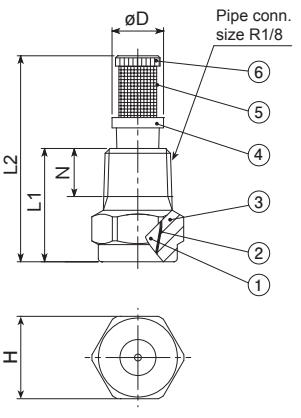


[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

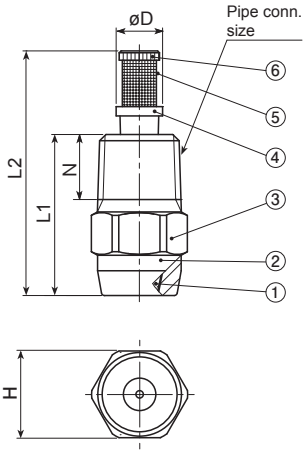
CP series

	CP series (with ceramic orifice inserted)
Structure	• One-piece structure with ceramic orifice inserted.
Material	• Nozzle orifice: ceramic • Metal parts: S303 or B (brass) • Optional material: S316

R1/8



R1/4, R3/8



Pipe conn. size	Dimensions (mm)					Mass (g)*1	
	L1	L2	H	øD	N	S303	B
R1/8	16.5	30	12	7.5	7	7.1	7.8
R1/4	26	39.5	14	7.5	10.5	19.5	21
R3/8	30	—	19	—	11	38	40

*1) When with a strainer, add 2–5 g to the above mass.

①Ceramic orifice ②Adhesive: Araldite® ③Nozzle body
④Strainer holder ⑤Strainer screen ⑥Strainer cap

No strainer available for size R3/8.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Spray capacity code	Pipe connection size				Spray capacity (ℓ/min)													Free pass. dia. (mm)	Strainer mesh size
	CCP	CP			0.1 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	3 MPa	4 MPa	5 MPa	6.5 MPa	8 MPa	10 MPa	15 MPa		
	R1/4	R1/8	R1/4	R3/8															
25		●	●		0.45	0.78	1.01	1.19	1.43	2.02	2.47	2.85	3.19	3.64	4.03	4.51	5.52	0.8	50
31		●	●		0.56	0.98	1.26	1.49	1.78	2.52	3.09	3.57	3.99	4.55	5.05	5.64	6.91	0.9	50
37		○	○		0.68	1.17	1.51	1.79	2.14	3.03	3.71	4.28	4.79	5.46	6.06	6.77	8.30	1.0	—
43		○	○		0.79	1.37	1.77	2.09	2.50	3.54	4.33	5.00	5.59	6.37	7.06	7.91	9.67	1.1	—
49		○	○		0.90	1.56	2.02	2.39	2.86	4.04	4.94	5.71	6.38	7.28	8.07	9.04	11.1	1.2	—
56		○	○		1.02	1.76	2.27	2.69	3.22	4.54	5.56	6.42	7.18	8.19	9.08	10.2	12.4	1.2	—
62		○	○		1.13	1.95	2.52	2.99	3.57	5.05	6.18	7.14	7.98	9.10	10.1	11.3	13.8	1.3	—
68		○	○		1.24	2.15	2.78	3.28	3.93	5.55	6.80	7.85	8.79	10.0	11.1	12.4	15.2	1.4	—
74		○	○		1.35	2.35	3.03	3.58	4.29	6.06	7.42	8.56	9.58	10.9	12.1	13.6	16.6	1.4	—
80		○	○		1.47	2.54	3.28	3.88	4.65	6.56	8.04	9.28	10.4	11.8	13.1	14.7	18.0	1.5	—
87		○	○		1.58	2.74	3.54	4.18	5.00	7.07	8.66	10.0	11.2	12.8	14.1	15.8	19.4	1.6	—
93		○	○		1.69	2.93	3.79	4.48	5.36	7.58	9.28	10.7	12.0	13.7	15.2	17.0	20.8	1.6	—
99		○	○		1.81	3.13	4.04	4.78	5.72	8.08	9.89	11.4	12.8	14.6	16.2	18.1	22.1	1.7	—
111		○	○		2.03	3.51	4.53	5.36	6.43	9.09	11.1	12.9	14.4	16.4	18.2	20.3	24.9	1.8	—
124		○	○		2.26	3.92	5.06	5.99	7.15	10.1	12.4	14.3	16.0	18.2	20.2	22.6	27.7	1.9	—
136	○	○	○		2.48	4.30	5.55	6.57	7.85	11.1	13.6	15.7	17.6	20.0	22.2	24.8	30.4	2.0	—
148		○	○		2.70	4.68	6.04	7.15	8.57	12.1	14.8	17.1	19.2	21.8	24.2	27.1	33.2	2.0	—
161		○	○		2.94	5.09	6.57	7.78	9.28	13.1	16.1	18.6	20.8	23.7	26.2	29.3	35.9	2.1	—
173		○	○		3.16	5.47	7.06	8.36	9.99	14.1	17.3	20.0	22.4	25.5	28.3	31.6	38.7	2.2	—
186		○	○		3.40	5.88	7.59	8.98	10.7	15.2	18.6	21.4	24.0	27.3	30.3	33.9	41.5	2.3	—
198		○	○		3.61	6.26	8.08	9.56	11.4	16.2	19.8	22.8	25.5	29.1	32.3	36.1	44.2	2.4	—
210		○	○		3.83	6.64	8.57	10.1	12.1	17.2	21.0	24.3	27.1	30.9	34.3	38.4	47.0	2.4	—
223	○		○		4.07	7.05	9.10	10.8	12.9	18.2	22.3	25.7	28.7	32.8	36.3	40.6	49.8	2.5	—
247			○		4.51	7.81	10.1	11.9	14.3	20.2	24.7	28.6	31.9	36.4	40.4	45.2	55.3	2.6	—
272			○		4.97	8.60	11.1	13.1	15.7	22.2	27.2	31.4	35.1	40.0	44.4	49.7	60.8	2.7	—
297			○		5.42	9.39	12.1	14.3	17.1	24.2	29.7	34.3	38.3	43.7	48.5	54.2	66.4	2.9	—
322	○		○		5.88	10.2	13.1	15.6	18.6	26.3	32.2	37.1	41.5	47.3	52.5	58.7	71.9	3.0	—
346			○		6.32	10.9	14.1	16.7	20.0	28.3	34.6	40.0	44.7	51.0	56.5	63.2	77.4	3.1	—
371			○		6.77	11.7	15.1	17.9	21.4	30.3	37.1	42.8	47.9	54.6	60.6	67.7	82.9	3.2	—
396			○		7.23	12.5	16.2	19.1	22.8	32.3	39.6	45.7	51.1	58.2	64.6	72.2	88.5	3.3	—
420			○		7.67	13.3	17.1	20.3	24.3	34.3	42.0	48.5	54.3	61.9	68.7	76.8	94.0	3.4	—
445	○		○		8.12	14.1	18.2	21.5	25.7	36.3	44.5	51.4	57.5	65.5	72.7	81.3	99.5	3.5	—
470			○		8.58	14.9	19.2	22.7	27.1	38.4	47.0	54.3	60.7	69.2	76.7	85.8	105	3.6	—
495			○		9.04	15.7	20.2	23.9	28.6	40.4	49.5	57.1	63.8	72.8	80.8	90.3	111	3.7	—
519			○		9.48	16.4	21.2	25.1	30.0	42.4	51.9	60.0	67.0	76.4	84.8	94.8	116	3.8	—
544			○		9.93	17.2	22.2	26.3	31.4	44.4	54.4	62.8	70.2	80.1	88.8	99.3	122	3.9	—
569	○			○	10.4	18.0	23.2	27.5	32.8	46.4	56.9	65.7	73.4	83.7	92.9	104	127	4.0	—
594				○	10.8	18.8	24.2	28.7	34.3	48.5	59.4	68.5	76.6	87.4	96.9	108	133	4.1	—
717	○			○	13.1	22.7	29.3	34.6	41.4	58.6	71.7	82.8	92.6	106	117	131	160	4.5	—
767				○	14.0	24.3	31.3	37.0	44.3	62.6	76.7	88.5	99.0	113	125	140	171	4.6	—
890	○			○	16.2	28.1	36.3	43.0	51.4	72.7	89.0	103	115	131	145	163	199	5.0	—
1040	○			○	19.0	32.9	42.5	50.2	60.0	84.8	104	120	134	153	170	190	232	5.4	—

●: Available with/without strainer ○: Available without strainer

Sister Products

■ Small orifice diameter CP series

Orifice diameter code	Pipe connection size		Spray capacity (ℓ/min)												Orifice diameter (mm)	Strainer mesh size
	R1/8	R1/4	1 MPa	2 MPa	2.5 MPa	3 MPa	3.5 MPa	4 MPa	4.5 MPa	5 MPa	6.5 MPa	8 MPa	10 MPa	15 MPa		
ø0.1	●	●	0.020	0.028	0.031	0.034	0.037	0.039	0.042	0.044	0.050	0.056	0.062	0.076	0.1	200
ø0.15	●	●	0.044	0.063	0.070	0.077	0.083	0.089	0.094	0.099	0.113	0.126	0.141	0.172	0.15	200
ø0.2	●	●	0.08	0.11	0.13	0.14	0.15	0.16	0.17	0.18	0.20	0.22	0.25	0.31	0.2	200
ø0.25	●	●	0.12	0.18	0.20	0.22	0.23	0.25	0.26	0.28	0.32	0.35	0.39	0.48	0.25	200
ø0.3	●	●	0.18	0.25	0.28	0.31	0.33	0.36	0.38	0.40	0.46	0.51	0.56	0.69	0.3	150
ø0.4	●	●	0.32	0.45	0.50	0.55	0.59	0.63	0.67	0.71	0.81	0.90	1.00	1.23	0.4	150
ø0.5	●	●	0.50	0.70	0.79	0.86	0.93	0.99	1.05	1.11	1.27	1.40	1.57	1.92	0.5	100
ø0.6	●	●	0.72	1.01	1.13	1.24	1.34	1.43	1.52	1.60	1.83	2.02	2.26	2.77	0.6	100
ø0.7	●	●	0.97	1.37	1.53	1.68	1.81	1.94	2.06	2.17	2.47	2.74	3.07	3.76	0.7	50
ø0.8	●	●	1.27	1.80	2.01	2.20	2.38	2.54	2.69	2.84	3.24	3.59	4.02	4.92	0.8	50

●: Available with/without strainer

[Note] The above nozzles are manufactured for specific orifice diameters, therefore spray capacity is not guaranteed.

How to order

Please inquire or order for a specific nozzle using this coding system.

①Standard CP and CCP series

〈Example〉 1/8M CP 25 S303 W

1/8M	CP	25	S303	W
Pipe conn. size*2	Series	Spray capacity code	Material	Strainer
■ 1/8M ■ 1/4x1/8M ■ 1/4M ■ 3/8M	■ CCP ■ CP	■ 25 ⟆ ■ 1040	■ S303 ■ B	■ W (with strainer) ■ (Blank denotes "without strainer")

②Small orifice diameter CP series

〈Example〉 1/8M CP ø0.1 S303 W

1/8M	CP	ø0.1	S303	W
Pipe conn. size*2		Orifice diameter code	Material	Strainer
■ 1/8M ■ 1/4x1/8M		■ ø0.1 ⟆ ■ ø0.8	■ S303 ■ B	■ W (with strainer) ■ (Blank denotes "without strainer")

*2) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.
In the standard CP series, when spray capacity code is 25–210, pipe connection size for R1/4 is indicated as "1/4x1/8M".
In the small orifice diameter CP series, pipe connection size for R1/4 is indicated as "1/4x1/8M".

Convex Round Inlet Solid Stream Jet

CCRP CRP(AL99)

[Spray pattern]

[Spray distribution]

[Features]

- Convex round inlet protrudes inside the pipe to prevent particles from flowing into the nozzle, reducing clogging.
- CRP (AL99) series features high-purity alumina ceramic orifice providing stable performance with longer life.
- Short water path design enables easy and thorough brush-cleaning.

[Standard pressure]

2 MPa

[Applications]

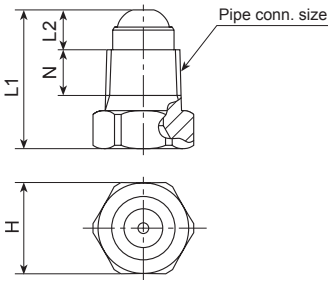
Cleaning: Wire and felt parts of papermaking machines, machinery, parts, vehicles, returnable containers, bottles

CCRP series

	CCRP series (All metal)
Structure	• Made of metal, one-piece structure.
Material	• S303

Pipe conn. size	Dimensions (mm)				Mass (g)
	L1	L2	H	N	
R1/8	18.5	5.5	12	6	8.5
R1/4	22.5	7	14	7.5	17

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

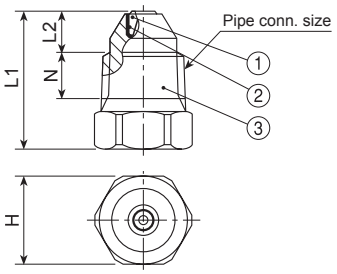


CRP (AL99) series

	CRP (AL99) series (with alumina ceramic orifice inserted)
Structure	• One-piece structure with high-purity alumina orifice inserted.
Material	• Nozzle orifice: 99% alumina • Nozzle body: S303

Pipe conn. size	Dimensions (mm)				Mass (g)
	L1	L2	H	N	
R1/8	18	5	12	6	7
R1/4	22	6.5	14	7.5	15

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice (99% Alumina)
②Adhesive: Araldite® ③Nozzle body

Orifice diameter code	Pipe connection size				Spray capacity (ℓ/min)					
	CCRP		CRP (AL99)							
	R1/8	R1/4	R1/8	R1/4	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	3 MPa
ø0.5	○	○	○	○	0.20	0.26	0.31	0.37	0.52	0.63
ø0.6	○	○	○	○	0.29	0.37	0.44	0.53	0.74	0.91
ø0.7	○	○	○	○	0.39	0.51	0.60	0.72	1.01	1.24
ø0.8	○	○	○	○	0.51	0.66	0.78	0.94	1.32	1.62
ø0.9	○	○	○	○	0.65	0.84	0.99	1.18	1.67	2.05
ø1.0	○	○	○	○	0.80	1.03	1.22	1.46	2.07	2.53
ø1.1	○	○	○	○	0.97	1.25	1.48	1.77	2.50	3.06
ø1.2	○	○	○	○	1.15	1.49	1.76	2.10	2.98	3.64
ø1.3	○	○	○	○	1.35	1.75	2.07	2.47	3.49	4.28
ø1.4	○	○	○	○	1.57	2.02	2.40	2.86	4.05	4.96
ø1.5	○	○	○	○	1.80	2.32	2.75	3.29	4.65	5.69
ø1.7	○	○	○	○	2.31	2.99	3.53	4.22	5.97	7.31
ø2.0	○	○	○	○	3.20	4.13	4.89	5.84	8.26	10.1

[Note] The above nozzles are manufactured for specific orifice diameters, therefore spray capacity is not guaranteed.

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/8M CRP ø0.6 S303 (AL99)

1/8M	CRP	ø0.6	S303 (AL99)
Pipe conn. size*	Series	Orifice diameter code	Material
■ 1/8M ■ 1/4M	■ CRP ■ CCRP	■ ø0.5 〜 ■ ø2.0	■ S303 (AL99): CRP series ■ S303: CCRP series

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

Paper Trimming Nozzles CMP-T/CTM/CM

[Spray pattern]

[Spray distribution]

[Features]
- Extra fine and clear non-turbulent solid stream nozzles with high impact cutting force.

[Standard pressure]
1 MPa

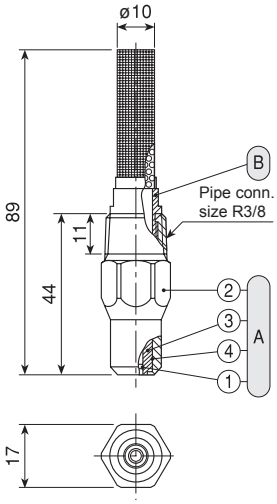
[Applications]
Trimming: Papermaking, asbestos plate
Cutting: Timber, food
Others: Cleaning of precision machine parts, injection of chemicals, deburring, foaming of beer (jet foamer)

CMP-T series

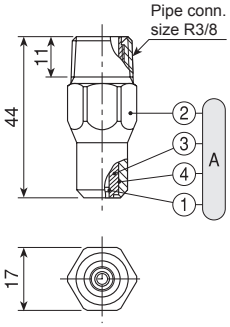
	CMP-T series (with alumina ceramic orifice inserted)
Structure	• High-purity alumina ceramic orifice is inserted into a sleeve of strong engineering plastics. • Comprises two parts: Nozzle and strainer. Worn-out nozzles can be replaced separately.
Material	• Nozzle orifice: 99% alumina • Sleeve: PA • Metal parts: S303 • O-ring: NBR
Mass	• Complete assemblies: 47 g • Nozzle only: 40 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Complete assemblies



Nozzle only



Ⓐ **Nozzle** (①99% Alumina orifice ②Nozzle body ③Sleeve ④O-ring [NBR])
Ⓑ **Strainer**

CTM series

	CTM series (with tungsten carbide orifice inserted)
Structure	• Includes a tungsten carbide orifice in the tip of the nozzle. • Comprises two parts: Nozzle and adaptor-strainer. Worn-out nozzles can be replaced separately.
Material	• Nozzle orifice: tungsten carbide • Metal parts: S303

[Complete assemblies]

Orifice diameter code	Nozzle thread size	Dimensions (mm)						Mass (g)
		L2	L3	H1	H2	øD	N2	
ø0.2–ø0.9	R1/8	54	92	10	17	10	11	39
ø1.0–ø1.5	R1/4	52	90	14	17	10	11	47

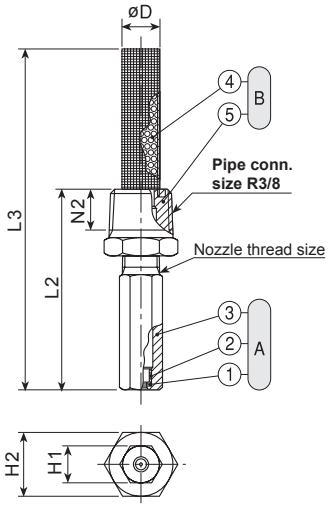
Adaptor thread size (pipe connection size) is R3/8.

[Nozzle only]

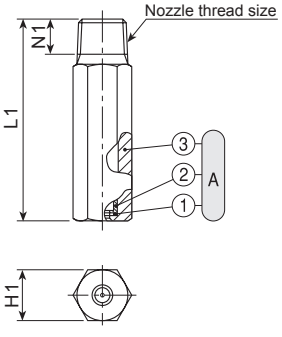
Orifice diameter code	Nozzle thread size	Dimensions (mm)			Mass (g)
		L1	H1	N1	
ø0.2–ø0.9	R1/8	40	10	7	16.5
ø1.0–ø1.5	R1/4	40	14	10.5	30

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Complete assemblies



Nozzle only



Ⓐ **Nozzle** (①Tungsten carbide orifice ②Sleeve ③Nozzle body)
Ⓑ **Strainer** (④Strainer ⑤Adaptor)

[Note] Adaptor and strainer are NOT detachable.

CM series

	CM series (with ceramic orifice inserted)
Structure	• Includes a ceramic orifice in the tip of the nozzle. • Comprises two parts: Nozzle and adaptor-strainer. Worn-out nozzles can be replaced separately.
Material	• Nozzle orifice: ceramic • Metal parts: S303 or B (brass)

[Complete assemblies]

Orifice diameter code	Nozzle thread size	Dimensions (mm)						Mass (g)	
		L2	L3	H1	H2	øD	N2	S303	B
ø0.1–ø0.9	R1/8	54	92	10	17	10	11	39	42
ø1.0–ø1.5	R1/4	52	90	14	17	10	11	47	51

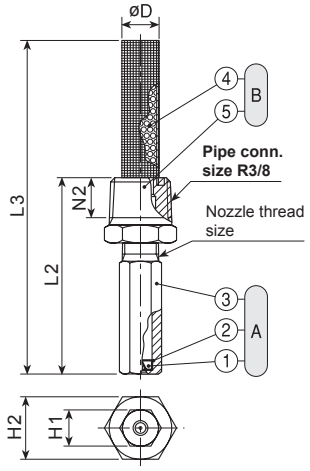
Adaptor thread size (pipe connection size) is R3/8.

[Nozzle only]

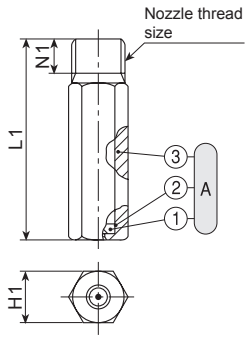
Orifice diameter code	Nozzle thread size	Dimensions (mm)			Mass (g)	
		L1	H1	N2	S303	B
ø0.1–ø0.9	R1/8	40	10	7	16.5	18
ø1.0–ø1.5	R1/4	40	14	10.5	30	33

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Complete assemblies



Nozzle only



Ⓐ **Nozzle** (①Ceramic orifice ②Adhesive: Araldite® ③Nozzle body)
Ⓑ **Strainer** (④Strainer ⑤Adaptor)
[Note] Adaptor and strainer are NOT detachable.

Orifice diameter code	CMP-T	CTM	CM	Spray capacity (ℓ/min) 0.5 MPa	1 MPa	2 MPa	3 MPa	4 MPa	5 MPa	Strainer mesh size
ø0.1			●	0.011	0.016	0.022	0.027	0.031	0.035	200
ø0.15			●	0.03	0.04	0.05	0.06	0.07	0.08	200
ø0.2		●	●	0.05	0.06	0.09	0.11	0.12	0.14	200
ø0.25		●	●	0.07	0.10	0.14	0.17	0.19	0.21	200
ø0.3	●	●	●	0.10	0.14	0.19	0.23	0.27	0.30	150
ø0.4	●	●	●	0.17	0.24	0.34	0.41	0.47	0.52	150
ø0.5	●	●	●	0.25	0.35	0.49	0.60	0.68	0.76	80
ø0.6	●	●	●	0.36	0.51	0.71	0.86	0.99	1.10	80
ø0.7	●	●	●	0.49	0.69	0.96	1.17	1.34	1.49	50
ø0.8	●	●	●	0.65	0.90	1.26	1.53	1.75	1.95	50
ø0.9	●	●	●	0.78	1.09	1.52	1.84	2.11	2.35	50
ø1.0	●	●	●	0.97	1.34	1.88	2.28	2.61	2.91	50
ø1.1		●	●	1.17	1.63	2.27	2.75	3.16	3.51	50
ø1.2		●	●	1.39	1.94	2.70	3.28	3.76	4.18	50
ø1.3		●	●	1.63	2.27	3.17	3.85	4.41	4.91	50
ø1.4		●	●	1.89	2.64	3.68	4.46	5.12	5.69	50
ø1.5		●	●	2.17	3.03	4.22	5.12	5.88	6.54	50

●: Available with strainer

[Note] The above nozzles are manufactured for specific orifice diameters, therefore spray capacity is not guaranteed.

■ CMP-T series (with alumina ceramic orifice inserted)

How to order Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 3/8M CMP ø0.3T S303W

3/8M CMP ø0.3 T S303W

Orifice diameter code
☐ ø0.3～☐ ø1.0

②Nozzle only

〈Example〉 3/8M CMP ø0.3T S303

3/8M CMP ø0.3 T S303

Orifice diameter code
☐ ø0.3～☐ ø1.0

■ CTM series (with tungsten carbide orifice inserted)

How to order Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 3/8MCTM ø0.2 S303W (PM-Strainer ø10)

3/8M CTM ø0.2 S303W (PM-Strainer ø10)

Orifice diameter code
☐ ø0.2～☐ ø1.5

②Nozzle only

〈Example〉 1/8M CTMP ø0.2 S303

1/8M CTMP ø0.2 S303

Nozzle thread size*
☐ 1/8M
☐ 1/4M

Orifice diameter code
☐ ø0.2～☐ ø1.5

■ CM series (with ceramic orifice inserted)

How to order Please inquire or order for a specific nozzle using this coding system.

①Complete assemblies

〈Example〉 3/8MCM ø0.1 S303W (PM-Strainer ø10)

3/8M CM ø0.1 S303 W (PM-Strainer ø10)

Orifice diameter code
☐ ø0.1～☐ ø1.5

Material
☐ S303
☐ B

②Nozzle only

〈Example〉 1/8M CMP ø0.1 S303

1/8M CMP ø0.1 S303

Nozzle thread size*
☐ 1/8M
☐ 1/4M

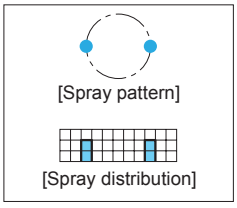
Orifice diameter code
☐ ø0.1～☐ ø1.5

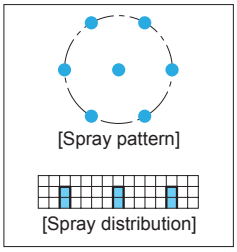
Material
☐ S303
☐ B

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

Multiple-orifice Solid Stream Jet

2CCP·7CCP/2CP·7CP





[Features]
- Multiple solid streams with high impact force.
- 2-orifice and 7-orifice types are available.
- Compact design.

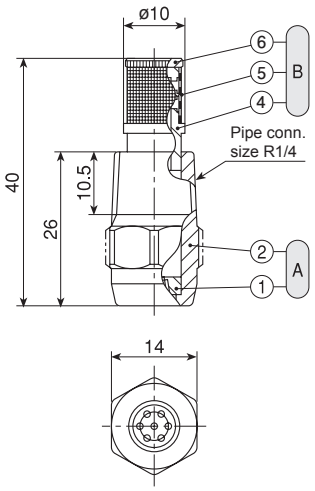
[Standard pressure]
1 MPa

[Applications]
Cleaning: Wire and felt parts of papermaking machines, dandy rolls, machine parts, bottles, vehicles, returnable containers

2CCP/7CCP series

	2CCP and 7CCP series (All metal)
Structure	• Made of metal, one-piece structure.
Material	• S303 • Optional material: S420J2 (Nozzle orifice only)
Mass*1	• 16 g

*1) When with a strainer, add 2–5 g to the above mass.



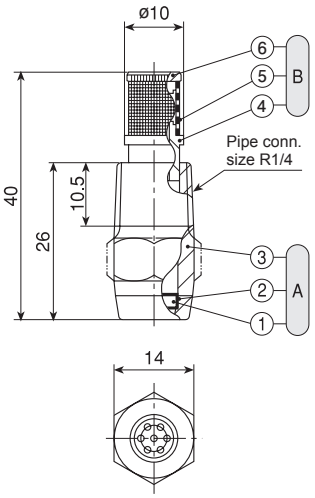
Ⓐ **Nozzle** (①Nozzle orifice ②Nozzle body)
Ⓑ **Strainer** (④Strainer holder ⑤Strainer screen ⑥Strainer cap)

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

2CP/7CP series

	2CP and 7CP series (with ceramic orifice inserted)
Structure	• One-piece structure with ceramic orifice inserted.
Material	• Nozzle orifice: ceramic • Metal parts: S303
Mass*1	• 17 g

*1) When with a strainer, add 2–5 g to the above mass.



Ⓐ **Nozzle** (①Ceramic orifice ②Adhesive: Araldite® ③Nozzle body)
Ⓑ **Strainer** (④Strainer holder ⑤Strainer screen ⑥Strainer cap)

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Two-orifice type

Spreading angle code	Spray capacity code	2CCP (Metal)	2CP (Ceramic orifice inserted)	Spreading angle*2 (°)			Spray capacity (ℓ/min)							Free passage diameter (mm)	Strainer mesh size
				0.5 MPa	1 MPa	2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa	3 MPa		
25	09		●	25	25	25	0.47	0.61	0.72	0.86	1.05	1.22	1.49	0.5	100
	12		●	25	25	25	0.68	0.88	1.04	1.24	1.52	1.75	2.15	0.6	100
	17	●	●	25	25	25	0.92	1.19	1.41	1.68	2.06	2.38	2.91	0.7	50
	22	●	●	25	25	25	1.19	1.54	1.82	2.18	2.67	3.08	3.78	0.8	50
	34	○	○	25	25	25	1.87	2.42	2.86	3.42	4.19	4.84	5.92	1.0	—
15	09		●	15	15	15	0.47	0.61	0.72	0.86	1.05	1.22	1.49	0.5	100
	12		●	15	15	15	0.68	0.88	1.04	1.24	1.52	1.75	2.15	0.6	100
	17	●	●	15	15	15	0.92	1.19	1.41	1.68	2.06	2.38	2.91	0.7	50
	22	●	●	15	15	15	1.19	1.54	1.82	2.18	2.67	3.08	3.78	0.8	50
	34	○	○	15	15	15	1.87	2.42	2.86	3.42	4.19	4.84	5.92	1.0	—
10	09		●	10	10	10	0.47	0.61	0.72	0.86	1.05	1.22	1.49	0.5	100
	12		●	10	10	10	0.68	0.88	1.04	1.24	1.52	1.75	2.15	0.6	100
	17	●	●	10	10	10	0.92	1.19	1.41	1.68	2.06	2.38	2.91	0.7	50
	22	●	●	10	10	10	1.19	1.54	1.82	2.18	2.67	3.08	3.78	0.8	50
	34	○	○	10	10	10	1.87	2.42	2.86	3.42	4.19	4.84	5.92	1.0	—

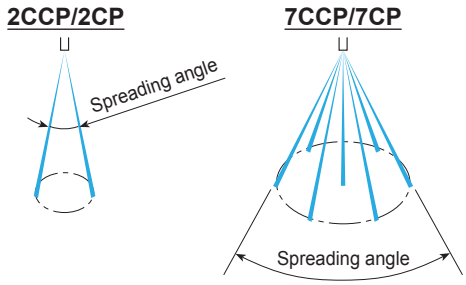
●: Available with/without strainer ○: Available without strainer

Seven-orifice type

Spreading angle code	Spray capacity code	7CCP (Metal)	7CP (Ceramic orifice inserted)	Spreading angle*2 (°)			Spray capacity (ℓ/min)							Free passage diameter (mm)	Strainer mesh size
				0.5 MPa	1 MPa	2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	1.5 MPa	2 MPa	3 MPa		
15	30		●	15	15	15	1.65	2.13	2.52	3.01	3.69	4.26	5.21	0.5	100
	43		●	15	15	15	2.38	3.07	3.63	4.34	5.32	6.14	7.52	0.6	100
	59	●	●	15	15	15	3.22	4.16	4.92	5.88	7.20	8.32	10.2	0.7	50
	76	●	●	15	15	15	4.18	5.40	6.38	7.63	9.34	10.8	13.2	0.8	50
	119	○	○	15	15	15	6.52	8.41	9.96	11.9	14.6	16.8	20.6	1.0	—

●: Available with/without strainer ○: Available without strainer

*2) Spreading angle means the angle between solid streams.



How to order

Please inquire or order for a specific nozzle using this coding system.

①Two-orifice type (2CCP/2CP series)

〈Example〉 1/4M 2CCP 2517 S303W

1/4M 2CCP 25 17 S303 W

Series	Spreading angle code	Spray capacity code	Strainer
2CCP	25	09	W (with strainer)
2CP	15	⟆	(Blank denotes "without strainer")
	10	34	

②Seven-orifice type (7CCP/7CP series)

〈Example〉 1/4M 7CCP 1559 S303W

1/4M 7CCP 15 59 S303 W

Series	Spray capacity code	Strainer
7CCP	30	W (with strainer)
7CP	⟆	(Blank denotes "without strainer")
	119	

Self-cleaning Solid Stream Jet MOMOJet® "C"

[Spray pattern]

[Spray distribution]

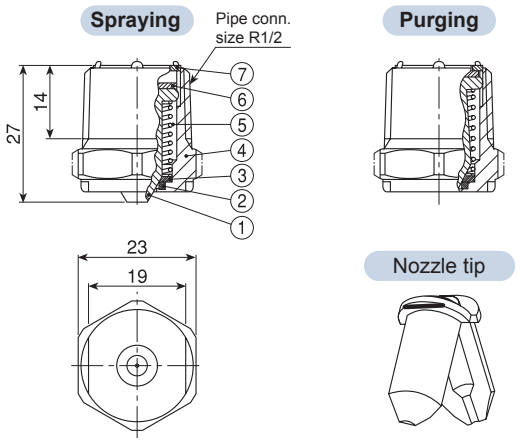
[Features]
- High impact solid stream.
- If clogged, by reducing the pressure to 0.03 MPa, the nozzle tip is retracted and purges foreign particles. By increasing the pressure to 0.2 MPa and greater, normal spraying is restored.
- Straight-through orifice is suitable for multiple-nozzle arrangement.

[Standard pressure]
1 MPa

[Applications]
Cleaning: Papermaking (wire, felt parts and rollers) steel plates, PCB
Cooling: Steel plates
Foam breaking: Waste water treatment
Others: Applications where recirculated water is being used

MOMOJet® "C" series

	MOMOJet® "C" series
Structure	• By changing the liquid pressure, a built-in spring moves the split nozzle tip up and down and opens the orifice for purging.
Material	• S303
Mass	• 52 g



[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

①Nozzle tip ②Packing (EPDM) ③Plate ④Nozzle body ⑤Spring ⑥Packing (EPDM) ⑦Ring

Spray capacity code	Spray capacity (ℓ/min) 0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	Free passage diameter (mm) Spraying	Purging
10	0.55	0.71	0.84	1.00	1.41	0.7	1.8
16	0.88	1.13	1.34	1.60	2.26	0.9	1.9
23	1.26	1.63	1.93	2.30	3.25	1.1	2.0
32	1.75	2.26	2.68	3.20	4.53	1.2	2.0
47	2.58	3.32	3.93	4.70	6.65	1.5	2.2
65	3.56	4.60	5.44	6.50	9.19	1.8	2.4

Precautions for use
1. To start spraying a flow rate of about 9 ℓ/min at 0.05 MPa is required for all models because the nozzle tip opens wide. Select an appropriate pump.
2. MOMOJet® is designed to start spraying at the pressure of 0.1 MPa. Use MOMOJet® at 0.2 MPa and greater.
3. Since MOMOJet® series nozzles have active nozzle tips, the spray capacity is only guaranteed within +/-10% under the standard pressure.

How to order Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/2 MOMOC 10 S303

1/2 MOMOC 10 S303

Spray capacity code
10
⟆
65

ALSO AVAILABLE!

Self-cleaning
Flat Spray Nozzles
MOMOJet® series

See p.43 of this catalog.

Pipe Cleaning Nozzles

RSP

[Features]

- Cleaning inside pipes and tubes, moving itself by means of spraying solid stream jets in different directions as driving force.
- High impact jets effectively remove scale and dirt inside pipes.

[Standard pressure]

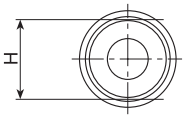
Not specified (RSP series is a made-to-order nozzle)

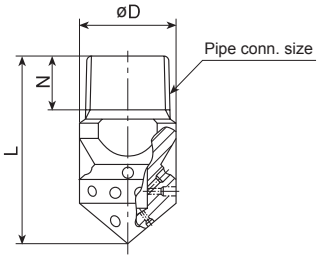
[Applications]

Cleaning inside pipes (drains, distribution pipes),
Removing scale and dirt inside tubes of heat exchangers and cooling machines

RSP series

	RSP series
Structure	• Made of metal, one-piece structure.
Material	• S303 • Optional material: S420J2



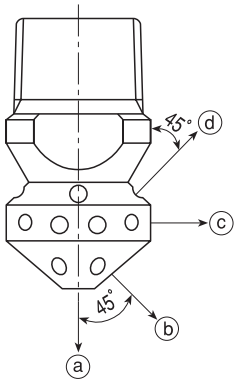


Pipe conn. size	Dimensions (mm)				Mass (g)
	L	H	øD	N	
R1/8	26	10.5	12	7	14
R1/4	34	14	17	9	30
R3/8	38	16	19	11	48
R1/2	42	22	25	14	88

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

How to order

RSP series nozzles are made-to-order products. Please select pipe connection size, orifice diameter, and the number of orifices in each direction according to **HOW TO SELECT RSP series** in the next page.



〈Example〉 1/8M RSP (0.6) $\frac{(0.6)^3}{(0.6)^3}$ $(0.6)^3$ S303

1/8M RSP (ⓐ) $\frac{(ⓑ)^{\square}}{(ⓒ)^{\square}}$ (ⓓ)$^{\square}$ S303

Pipe conn. size*
- 1/8M
- 1/4M
- 3/8M
- 1/2M

( ): Orifice diameter for directions ⓐ through ⓓ.
□: Number of orifices for directions ⓑ through ⓓ.

[Note] To indicate no orifices in a direction, use "0" as orifice diameter.

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

HOW TO SELECT RSP SERIES

① Pipe Connection Size

Refer to the table to select the pipe connection size suitable for the spray capacity you require.

Pipe conn. size	Max. spray capacity by pipe connection size (ℓ/min)							
	3 MPa	5 MPa	7 MPa	10 MPa	15 MPa	20 MPa	25 MPa	30 MPa
R1/8	24	31	37	44	54	62	70	76
R1/4	96	124	147	176	216	249	278	305
R3/8	96	124	147	176	216	249	278	305
R1/2	105	135	160	191	234	270	302	331

② Orifice diameter and the number of orifices

Refer to the table to select the orifice diameter and the number of orifices.

Orifice diameter (ømm)	Spray capacity per one orifice (ℓ/min)							
	3 MPa	5 MPa	7 MPa	10 MPa	15 MPa	20 MPa	25 MPa	30 MPa
0.6	0.7	0.9	1.1	1.3	1.6	1.9	2.1	2.3
0.7	1.0	1.3	1.5	1.8	2.2	2.5	2.8	3.1
0.8	1.3	1.7	2.0	2.3	2.9	3.3	3.7	4.1
0.9	1.6	2.1	2.5	3.0	3.6	4.2	4.7	5.1
1.0	2.0	2.6	3.1	3.7	4.5	5.2	5.8	6.4
1.2	2.9	3.7	4.4	5.3	6.5	7.5	8.3	9.1
1.5	4.5	5.8	6.9	8.2	10.1	11.7	13.0	14.3
2.0	8.0	10.4	12.3	14.7	18.0	20.7	23.2	25.4

③ Spray direction and the number of orifices in each direction

Refer to the table and specify the desired number of orifices in each direction ⓑ, ⓒ, and ⓓ.

Pipe conn. size	Max. number of orifices in the direction of ⓑ, [ⓒ+ⓓ] (see Remarks)						
	ø0.6	ø0.7	ø0.8	ø1.0	ø1.2	ø1.5	ø2.0
R1/8	6	6	6	6	4	—	—
R1/4	10	10	10	10	8	8	—
R3/8	10	10	10	10	8	8	6
R1/2	12	10	10	10	8	8	6

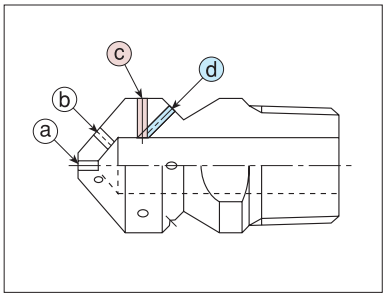
Remarks

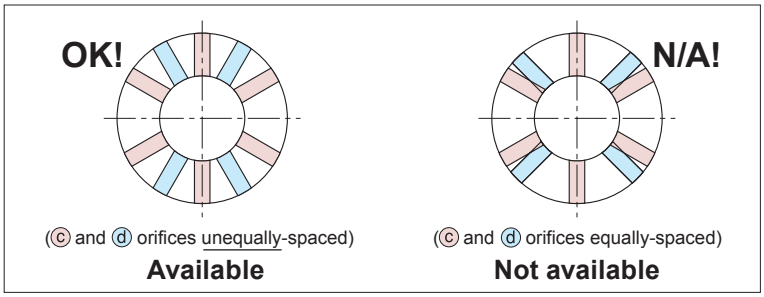
- The number of orifices in direction ⓑ must not exceed the value in the above table.
- The total number of orifices in directions ⓒ and ⓓ must not exceed the value in the above table.
- Odd numbers, except three (3), are not recommended. Seven (7) is not acceptable.
- The numbers of orifices for ⓒ and ⓓ should be the same or one should be a multiple number of the other.

For the other combinations, please contact us.

Note

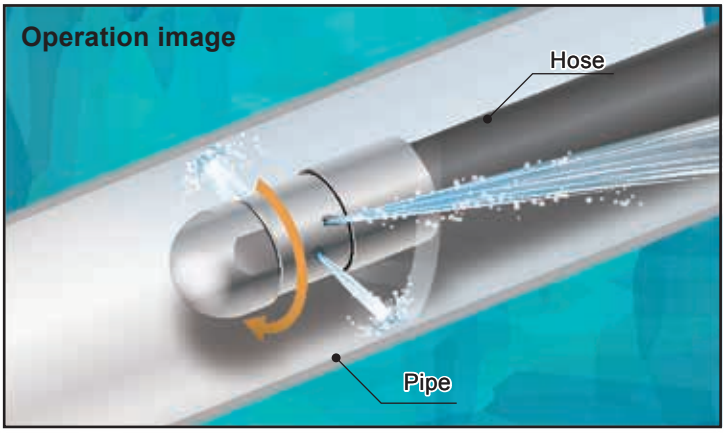
In case the numbers for ⓒ and ⓓ have to be 6 and 4, it can be made but only with orifices for ⓒ and ⓓ unequally-spaced as shown in the sketch below.





High-Pressure Rotating Pipe Cleaning Nozzles

RSP-R



[Features]

- Rotating by spray reaction force. Self-moving inside the pipe.
- Rotating solid stream jets with a high spray impact clean thoroughly the entire inner surface of a pipe.
- Compact design. Made of special stainless steel with excellent wear resistance.

[Standard pressure]

1 MPa

Operating pressure range: 1–10 MPa

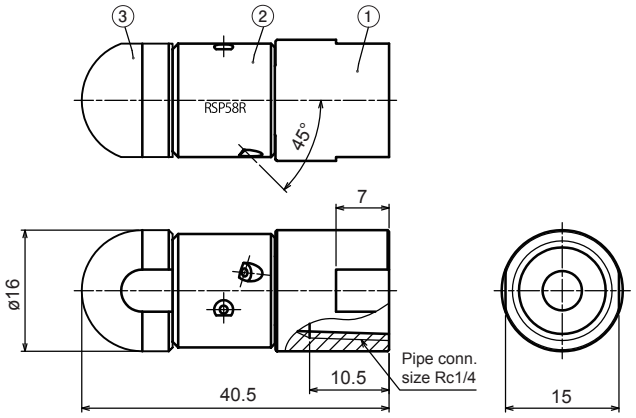
[Applications]

Cleaning inside pipes (drains, distribution pipes), Removing scale and dirt inside tubes of heat exchangers and cooling machines

RSP-R series

	RSP-R series
Structure	• Made of metal. • Comprises a connecting adaptor, nozzle body, and cap.
Material	• HS (Hardened stainless steel)
Mass	• 40 g

Max. allowable temperature is 150°C (300°F).

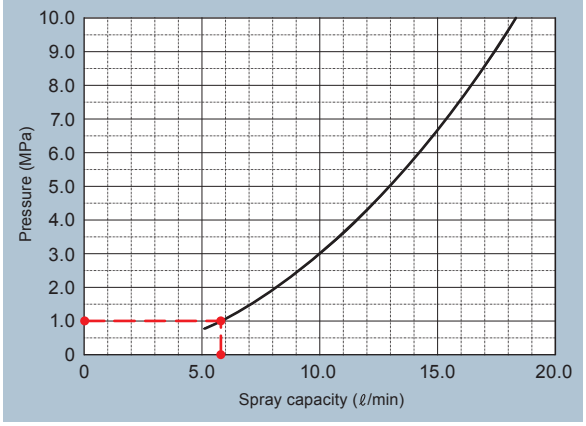


[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

①Connecting adaptor ②Nozzle body (Rotating part) ③Cap

Spray capacity (ℓ/min)			
1 MPa	2 MPa	5 MPa	10 MPa
5.8	8.2	13.0	18.3

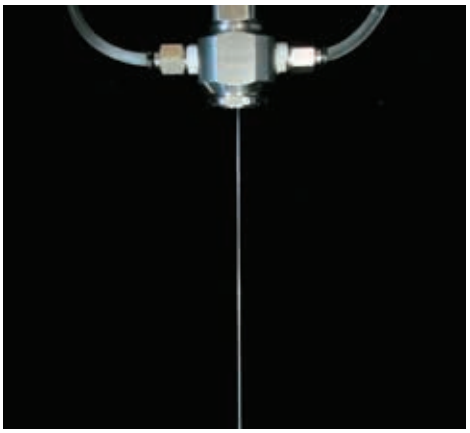
Flow-rate diagram



How to order Please inquire or order using this product code.

1/4F RSP 58R HS

Solid Stream Jet with ON/OFF Control SO-CM



[Spray pattern]

[Spray distribution]

[Features]
- Solid stream nozzles with high spray impact.
- Prevents dripping after spraying stops.
- Quick response ON/OFF spray.
- Spray ON/OFF can be regulated by pilot air ON/OFF.

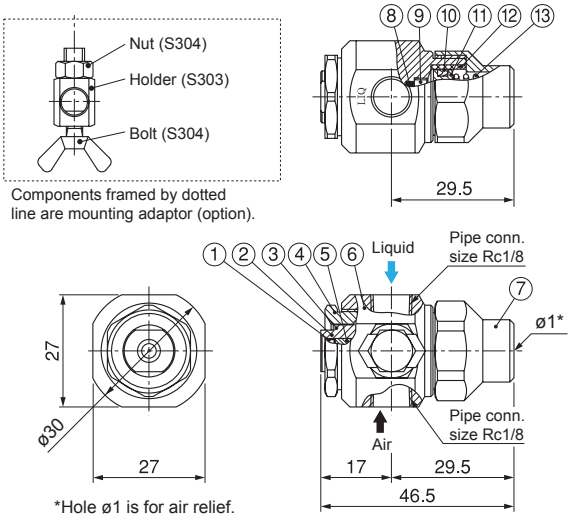
[Standard pressure]
0.3 MPa

[Applications]
Trimming: Papermaking, asbestos plate
Cutting: Timber, food
Others: Marking, cleaning of precision machine parts, injection of chemicals, deburring

SO-CM series

	SO-CM series (with ceramic orifice inserted)
Structure	• Spray ON/OFF can be regulated by switching the pilot air ON/OFF. The pilot air activates an internal piston to regulate the spray.
Material	• Nozzle orifice: ceramic • Metal parts: S303
Mass	• 150 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Adhesive: Araldite® ③Tip retainer ④Cap ⑤Packing (PTFE) ⑥Adaptor ⑦Spring cap ⑧O-ring (FKM) ⑨Lock nut ⑩Y-packing (NBR) ⑪Piston ⑫Sleeve (UHMWPE) ⑬Spring (S304)

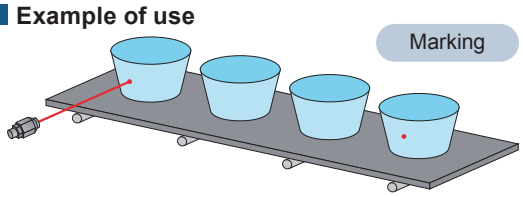
Mounting adaptor (Optional)

A mounting adaptor is available for fixing SO-CM series nozzle onto a pole to spray in the desired direction.
Please specify "(with ø10 mounting adaptor)" at the end of the product code to order.

Orifice diameter code	Spray capacity (ℓ/min)	
	0.3 MPa	0.5 MPa
ø0.3	0.08	0.10
ø0.4	0.14	0.17
ø0.5	0.20	0.25
ø0.6	0.29	0.36
ø0.7	0.39	0.49
ø0.8	0.51	0.65
ø0.9	0.61	0.78
ø1.0	0.75	0.97

[Note] SO-CM series nozzles are manufactured for specific orifice diameters, therefore spray capacity is not guaranteed.

Example of use



Operation time chart

Pilot air	OFF	ON	OFF	ON	OFF
Liquid	Stop	Spray	Stop	Spray	Stop

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/8 SO-CM ø0.3 S303 (with ø10 mounting adaptor)

1/8 SO-CM ø0.3 S303 (with ø10 mounting adaptor)

ø0.3 = Orifice diameter code

(with ø10 mounting adaptor) = (Option)

ø0.3
〜
ø1.0

ALSO AVAILABLE!

Flat Spray Nozzles with ON/OFF Control
SO-V series
See p.46 of this catalog.

⚠ CAUTIONS

- **Supply liquid pressure at 0.5 MPa or less. • Supply pilot air pressure at between 0.2 and 0.5 MPa.**
- Pilot air ON/OFF regulates spray ON/OFF.
- For better shut off and preventing dripping, purge the air inside/between the solenoid valve and SO-CM series nozzle at OFF time, using a 3-way solenoid valve.

Universal-joint Type Solid Stream Jet UT+CP

[Spray pattern]

[Spray distribution]

[Features]
- High impact force oscillating solid stream flow.
- Internal design keeps flow resistance to a minimum, yielding large volume flow.
- Spray direction is adjustable over a range of 40 degrees as desired.

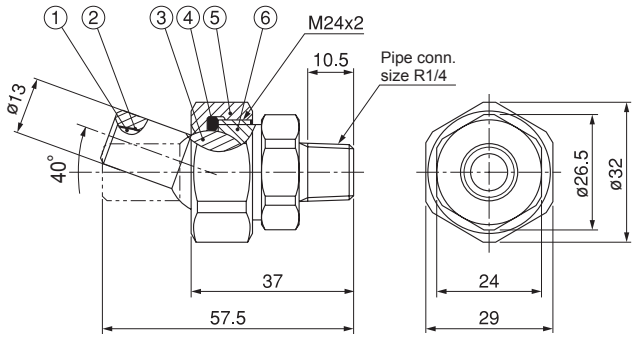
[Standard pressure]
0.3 MPa

[Applications]
Cleaning: High pressure jet cleaning, wire and felt parts of papermaking machines, vehicles, returnable containers, machinery, parts
Trimming: Paper making, asbestos plate

UT+CP series

	UT+CP series (with ceramic orifice inserted)
Structure	• Includes a ceramic orifice in the nozzle tip. • Comprises nozzle tip, O-ring, cap, and adaptor. Worn-out nozzle tip can be replaced. • Nozzle tip has integrated universal ball joint for adjusting spray direction.
Material	• Nozzle orifice: ceramic • Metal parts: S303
Mass	• 125 g

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



①Ceramic orifice ②Adhesive: Araldite® ③Ball
④O-ring (NBR) ⑤Cap ⑥Adaptor

Spray capacity code	Spray capacity (ℓ/min) 0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.5 MPa	0.7 MPa	1 MPa	2 MPa	Free passage diameter (mm)
37	0.68	0.83	0.96	1.17	1.51	1.79	2.14	3.03	1.0
49	0.90	1.10	1.28	1.56	2.02	2.39	2.86	4.04	1.2
80	1.47	1.80	2.08	2.54	3.28	3.88	4.65	6.56	1.5
111	2.03	2.48	2.87	3.51	4.53	5.36	6.43	9.09	1.8
136	2.48	3.04	3.51	4.30	5.55	6.57	7.85	11.1	2.0
247	4.51	5.52	6.38	7.81	10.1	11.9	14.3	20.2	2.6
322	5.88	7.20	8.31	10.2	13.1	15.6	18.6	26.3	3.0
445	8.12	9.95	11.5	14.1	18.2	21.5	25.7	36.3	3.5

[Note] Precision guarantee for UT+CP series is only for spray angle (its axis of spray direction is within 3° from nozzle body centerline).

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 1/4M UT+CP 37 S303

1/4M UT+CP 37 S303

Spray capacity code
- 37
- ⟆
- 445

Contact us if you want to order only nozzle tips.

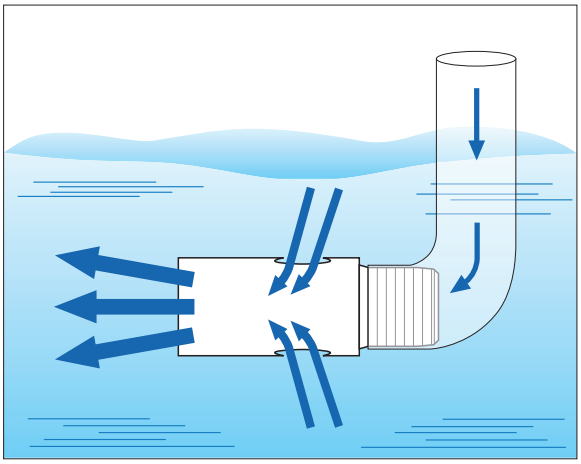
ALSO AVAILABLE!

Universal-joint Type Flat Spray Nozzles

UT+VP series

See p.47 of this catalog.

Ejector Nozzle for Solution Agitation EJX



[Features]

- Taking in surrounding liquid, EJX series solution agitation nozzle spouts out 3–4 times more volume than the amount supplied.
- Small size and simple structure suitable for multiple-nozzle arrangement.

[Standard pressure]

0.05 MPa

[Applications]

- Solution agitation, preventing deposition, uniformizing concentration and pH
- Cleaning in liquids
- Submerged etching
- Plating

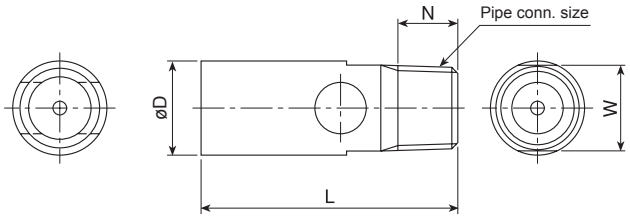
EJX series

	EJX series
Structure	• One-piece structure.
Material	• S303 (S304 for sizes R1 and R1*1/2) • PP (PVC for sizes R1 and R1*1/2)

Pipe conn. size	Dimensions (mm)				Mass (g)	
	L	W	øD	N	S303 S304	PP PVC
R1/8	30	10 (11)*2	11	7	11	1.3*1
R1/4	48	14 (16)*2	16	10.5	26	3.2*1
R3/8	72	22	24	11	80	10
R1/2	93	27	31	14	170	20
R3/4	126	34	42	15	420	48
R1	172	60	76.3 (80)*2	18	2,200	460
R1*1/2	212	80	89.1 (90)*2	20	3,200	540

*1) Sizes R1/8 and R1/4 made of PP are injection molded.
*2) Dimensions in ( ) shows those of plastic EJX series nozzles.

[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.



Supplied volume code	Pipe conn. size	Supplied water volume (ℓ/min)						Outlet water volume (ℓ/min) [Reference only]						Free passage diameter (mm)
		0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	0.03 MPa	0.05 MPa	0.1 MPa	0.15 MPa	0.2 MPa	0.3 MPa	
1	R1/8	0.85	1.10	1.56	1.91	2.20	2.69	2.2	3.1	5.0	6.6	9.2	10	1.5
4	R1/4	3.10	4.00	5.66	6.93	8.00	9.80	8.1	11	18	24	34	38	2.8
9	R3/8	6.97	9.00	12.7	15.6	18.0	22.0	18	26	41	54	75	85	4.2
16	R1/2	12.4	16.0	22.6	27.7	32.0	39.2	33	46	72	95	134	151	5.7
30	R3/4	23.2	30.0	42.4	52.0	60.0	73.5	61	86	140	180	250	280	7.7
90	R1	69.7	90.0	127	156	180	220	180	260	410	540	760	850	13.3
160	R1*1/2	124	160	226	277	320	392	330	460	720	950	1340	1510	17.5

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 3/8M EJX 1-9 PP

3/8M EJX 1 - 9 PP

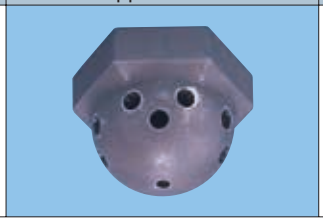
Pipe conn. size*3
- 1/8M
- ⟆
- 1*1/2M

Supplied volume code
- 1
- ⟆
- 160

Material
- S303
- S304 (for sizes 1M and 1*1/2M)
- PP (PP-IN for sizes 1/8M and 1/4M)
- PVC (for sizes 1M and 1*1/2M)

*3) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8.

Surface Washing Nozzles

Series	Appearance	Features	Applications
Surface washing nozzles		• Produces solid stream spray from a hemispheric nozzle body in a radial pattern.	• Cleaning sand filter bed at water purification plant

Effective Use of Solid Stream Spray Nozzles

Tightening Torque

For high-pressure cleaning, the high wear-resistant CERJET® nozzle with inserted ceramic orifices is most suitable. However, if it is screwed too tight, the nozzle body, especially small ones such as 1/8" size, may be damaged, which results in cracking the ceramic orifice. Please apply the recommended torque.
Tightening torque should not exceed the following.

8 N-m for size R1/8 (stainless steel body and brass body)
15 N-m for size R1/4 (stainless steel body and brass body)

Precautions for Nozzle Installation

Avoid installing the nozzle at the immediate downstream of a bent pipe or elbow.
Turbulence may affect the nozzle performance.

Nozzle Reaction Force

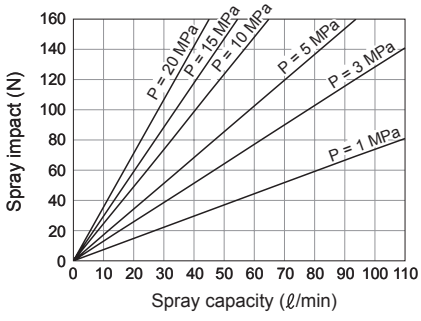
When spraying water under high pressure, the approximate reaction force is calculated by the following formula.

$$F = 0.745 \cdot Q \cdot \sqrt{P}$$

- F: Reaction force (N)
- Q: Spray capacity (ℓ/min)
- P: Spray pressure (MPa)

Spray Impact

Spray impact means the force of spray droplets hitting the target surface. The stronger spray impact the nozzle has, the better cleaning effect it achieves.



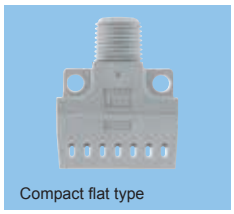
Variation in spray impact of solid stream jet nozzles
(Spray distance: 200 mm)

Air Nozzles

TAIFUJet®


Flat type


Flat type


Compact flat type


Round type


Round type

Flat type


[Spray pattern]

Round type


[Spray pattern]

[Features]

- Takes in surrounding air, boosting the volume of powerful air blow. Ideal for blowing off water.
- Uniform and efficient air blow with lower air consumption.
- Designed to have minimal noise level.
- Available in economical plastic or chemical/heat resistant stainless steel, in spray patterns of flat type or round type.

[Applications]

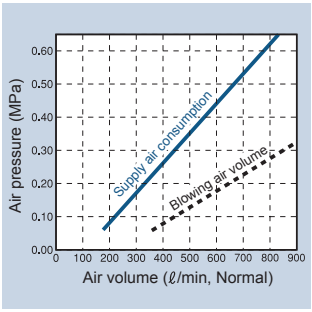
- Blowing off drying
- Blowing off dust/liquid
- Air cooling
- Cleaning

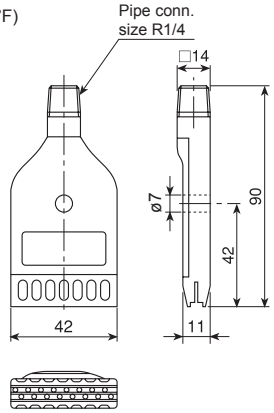
TAIFUJet® series (Flat type/Plastic)

	TAIFUJet® series (Flat type, 42 mm wide)
Material	• PPS
Mass	• 30 g

Max. air pressure: 0.7 MPa (100 psi)
Max. allowable temperature: 120°C (240°F)

■ 1/4MTF-F42-16-010PPS



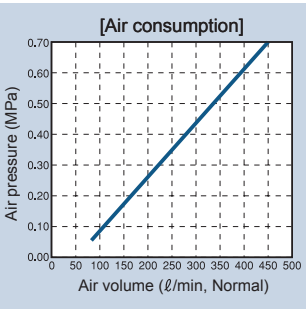


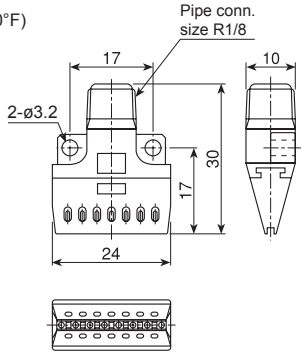
TAIFUJet® series (Compact flat type/Plastic)

	TAIFUJet® series (Flat type, 24 mm wide)
Material	• PPS
Mass	• 4 g

Max. air pressure: 0.7 MPa (100 psi)
Max. allowable temperature: 120°C (240°F)

■ 1/8MTF-F24-8-010PPS-IN





TAIFUJet® series (Flat type/Stainless steel)

	TAIFUJet® series (Flat type, 42 mm or 50 mm wide)
Material	• 42 mm type: S316L equivalent • 50 mm type: S304

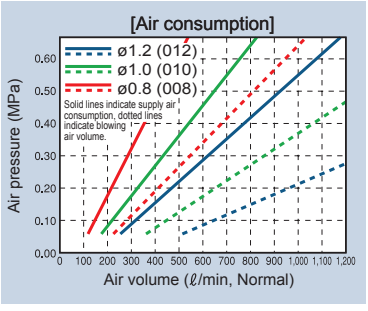
Nozzle code	Dimensions (mm)						Mass (g)
	L1	L2	L3	L4	L5	øC	
1/4MTF-F 42-16-***S316L-IN	90	42	11	42	—	7	144
1/4MTF-F 50-16-012S304	65	50	12	30	14	—	140

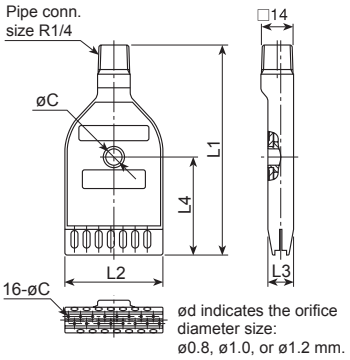
Max. air pressure: 1.0 MPa (140 psi)
Max. allowable temperature: 400°C (750°F)

1/4MTF-F42-16 is available in orifice diameters of ø0.8, ø1.0, or ø1.2 mm.

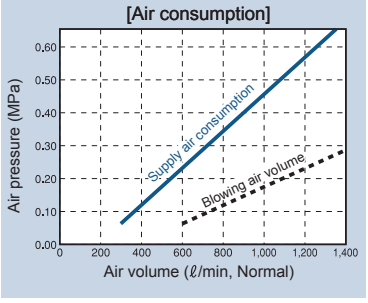
Enter 008 for ø0.8 mm, 010 for ø1.0 mm, or 012 for ø1.2 mm in place of *** in the nozzle codes when you order.

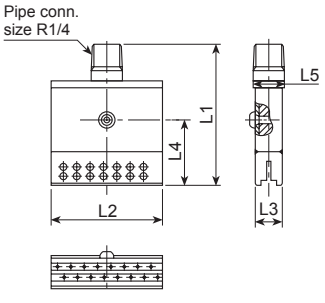
■ 1/4MTF-F42-16-***S316L-IN





■ 1/4MTF-F50-16-012S304





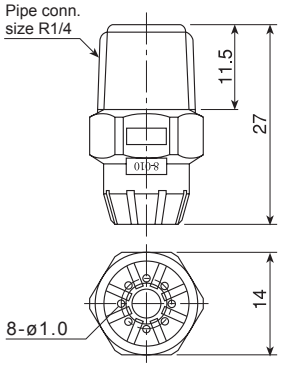
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

TAIFUJet® series (Round type/Plastic)

	TAIFUJet® series (Round type, PP)
Material	• PP
Mass	• 2 g

Max. air pressure: 0.7 MPa (100 psi)
Max. allowable temperature: 60°C (140°F)

■1/4MTF-R8-010PP-IN



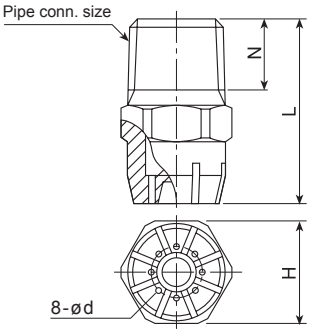
TAIFUJet® series (Round type/Stainless steel)

	TAIFUJet® series (Round type, Stainless steel)
Material	• S316L equivalent

Nozzle code	Pipe conn. size	Dimensions (mm)			Mass (g)
		L	H	N	
1/8MTF-R8-△△△S316L-IN	R1/8	20	12	7	7
1/4MTF-R8-▲▲▲S316L-IN	R1/4	25	14	9.5	12

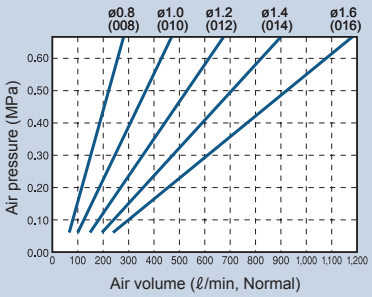
Max. air pressure: 1.0 MPa (140 psi)
Max. allowable temperature: 400°C (750°F)
・Enter 008 for ø0.8 mm, 010 for ø1.0 mm, 012 for ø1.2 mm, or 014 for ø1.4 mm in place of △△△ in the nozzle codes.
・Enter 010 for ø1.0 mm, 012 for ø1.2 mm, 014 for ø1.4 mm, or 016 for ø1.6 mm in place of ▲▲▲ in the nozzle codes.

■1/8MTF-R8-△△△S316L-IN
■1/4MTF-R8-▲▲▲S316L-IN

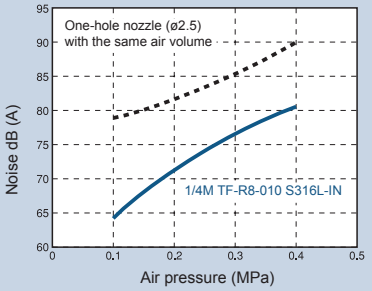


ød indicates the orifice diameter size:
ø0.8, ø1.0, ø1.2, ø1.4, or ø1.6 mm.

■Air consumption (Round type)



■Noise level comparison (Round type)



Other TAIFUJet® series nozzles

Long flat type

●Made of stainless steel.
Available effective widths in 100, 150, 200, 300, 400, 500, 600, 700, 800, 900, 1,000, 1,200, and 1,400 mm.

Cluster header type

●Header with a cluster of multiple round-type stainless steel air nozzles.
Header and adaptor made of stainless steel or aluminum.
Please contact us for details.

Blower-air driven type

See our AIR NOZZLE CATALOG for details of TAIFUJet series and more.

How to order

Please inquire or order for a specific nozzle using this coding system.

① Flat type made of plastic (PPS)

1/4MTF-F42-16-010PPS

② Compact flat type made of plastic (PPS)

1/8MTF-F24-8-010PPS-IN

③ Flat type made of stainless steel

1/4MTF-F42-16-***S316L-IN
1/4MTF-F50-16-012S304

Enter 008, 010, or 012 in ***.

④ Round type made of plastic (PP)

1/4MTF-R8-010PP-IN

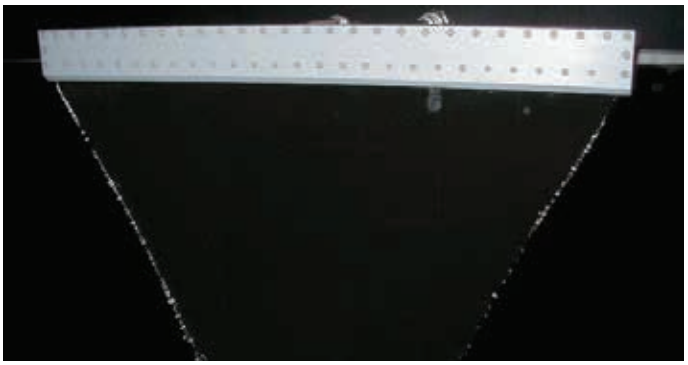
⑤ Round type made of stainless steel

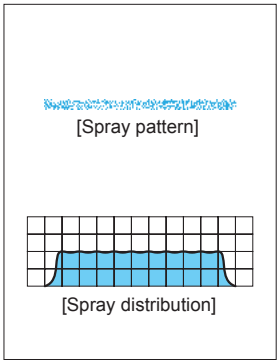
1/8MTF-R8-△△△S316L-IN
1/4MTF-R8-▲▲▲S316L-IN

Enter 008, 010, 012, or 014 in △△△.
Enter 010, 012, 014, or 016 in ▲▲▲.

Slit Laminar Nozzles
Water (Air) Curtain

SLNH-H/SLNHA-H





[Features]
- Water or air sprayed from slit nozzles is uniform in width direction.
- SLNH-H series for liquid spraying with even spray flow distribution. SLNHA-H series for air spraying with even spray impact distribution.
- Thinner liquid film spray saves cost of chemicals and water.
- Compact and space-saving design.

[Applications]
- Blowing off drying
- Cleaning
- Developing ● Etching

Others

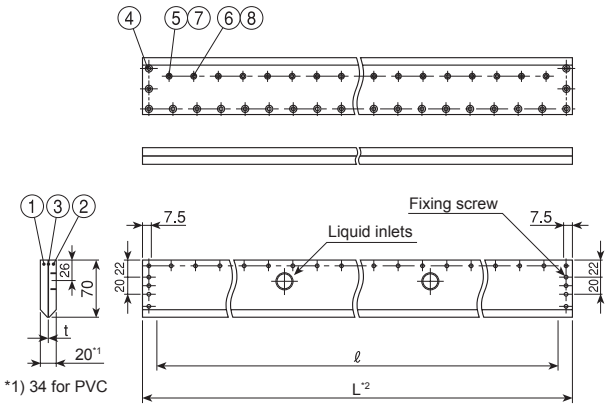
SLNH-H/SLNHA-H series

	SLNH-H/SLNHA-H series
Material	● S304 or PVC

Series	Slit length ℓ (mm)	Slit opening t (mm)	Effective liquid film width (mm) at 10 mm height	Number of inlets	Thread size: Liquid inlet	Thread size: Fixing	Total length L*2 (mm)	Mass (kg): S304	Mass (kg): PVC
SLNH-H (Liquid spraying)	460	0.1	410	2	Rc3/8	S304: M5 (depth 8) PVC: M5 (depth 10)	490	4.3	1.3
	600		550				630	5.5	1.6
	700		650		Rc1/2		730	6.4	1.9
	780		730				810	7.1	2.1
	1,200		1,150	3			1,230	11.0	3.1
	460	0.3	410	2	Rc1/2		490	4.3	1.3
	600		550	3			630	5.5	1.6
	700		650				730	6.4	1.9
	780		730	4			810	7.1	2.1
	1,200		1,150	5			1,230	11.0	3.1
SLNHA-H (Air spraying)	530	0.1	—	2	Rc3/8		560	5.0	1.5
	700		—		Rc1/2		730	6.5	1.9
	810		—				840	7.5	2.2
	900		—				930	8.0	2.5
	1,400		—	3			1,430	12.0	4.0

*2) Available total length (L): Min. 250 mm–Max. 3,950 mm for S304, Min. 250 mm–Max. 2,950 mm for PVC.

[Note] Appearance and dimensions are subject to change due to product improvement.



①Nozzle body A (S304) ②Nozzle body B (S304) ③Packing (PE) ④Bolt [M5x10] (S304) ⑤Bolt [M4x8] (S304) ⑥Bolt [M4x10] (S304) ⑦O-ring [P-4] (FKM) ⑧O-ring (FKM)

The above drawing is of stainless steel SLNH-H series.
Contact us for drawings for SLNH-H (PVC) and SLNHA-H (S304/PVC) series.
Inquiry drawing forms are available to verify dimensional specifications.

Series	Slit length (mm)	Slit opening (mm)	Spray capacity (ℓ/min)*3: 0.01 MPa	0.02 MPa	0.03 MPa	0.04MPa	0.05 MPa	0.06 MPa	0.07 MPa	0.08 MPa
SLNH-H (Liquid spraying)	460	0.1	7.2	10.7	13.4	15.7	17.8	19.7	21.4	23.1
	600		9.4	13.9	17.4	20.5	23.2	25.7	27.9	30.1
	700		11.0	16.2	20.3	23.9	27.0	29.9	32.6	35.1
	780		12.3	18.1	22.7	26.6	30.1	33.3	36.3	39.1
	1200		18.9	27.8	34.9	40.9	46.4	51.3	55.9	60.2
	460	0.3	21.7	32.0	40.1	47.1	53.3	59.0	64.3	69.2
	600		28.3	41.7	52.3	61.4	69.5	77.0	83.8	90.3
	700		33.0	48.7	61.0	71.7	81.1	89.8	97.8	105
	780		36.8	54.2	68.0	79.8	90.4	100	109	117
	1200		56.6	83.4	105	123	139	154	168	181
SLNHA-H (Air spraying)	530	0.1	209	355	472	570	657	736	810	880
	700		276	469	623	753	868	972	1,070	1,160
	810		319	543	721	871	1,000	1,130	1,240	1,350
	900		355	603	802	968	1,120	1,250	1,380	1,490
	1400		552	938	1,250	1,510	1,740	1,940	2,140	2,330

*3) ▪ The above spray capacity indicates liquid flow rate for SLNH-H series, and air flow rate for SLNHA-H series.
▪ Measure for air flow rate is ℓ/min at normal conditions (0˚C, 1atm). ▪ The above spray capacities are for reference only and subject to design changes.

How to order

Please inquire or order for a specific nozzle using this coding system.

①SLNH-H series (Liquid spraying)

〈Example〉 2-3/8F SLNH-H 460x0.1 PVC

2-3/8F SLNH-H 460 x 0.1 PVC

Number of inlets -Thread size*4	Slit length	Slit opening	Material
2-3/8F	460	0.1	S304
2-1/2F	600	0.3	PVC
3-1/2F	700		
4-1/2F	780		
5-1/2F	1200		

②SLNHA-H series (Air spraying)

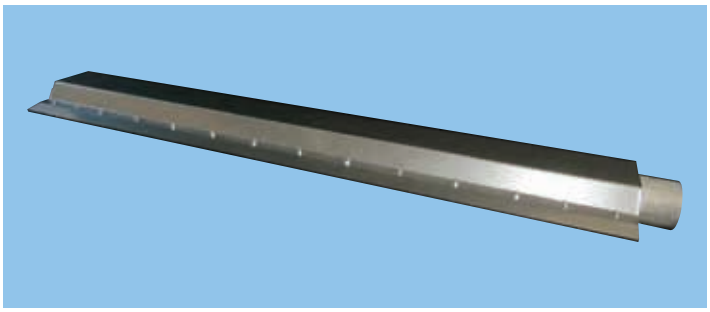
〈Example〉 2-3/8F SLNHA-H 530x0.1 PVC

2-3/8F SLNHA-H 530 x 0.1 PVC

Number of inlets -Thread size*4	Slit length	Material
2-3/8F	530	S304
2-1/2F	700	PVC
3-1/2F	810	
	900	
	1400	

*4) "M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 3/8F = Rc3/8.

Slit Nozzles Utilizing Blower Air
Energy-saving Slit Laminar (Air Curtain) SLNB

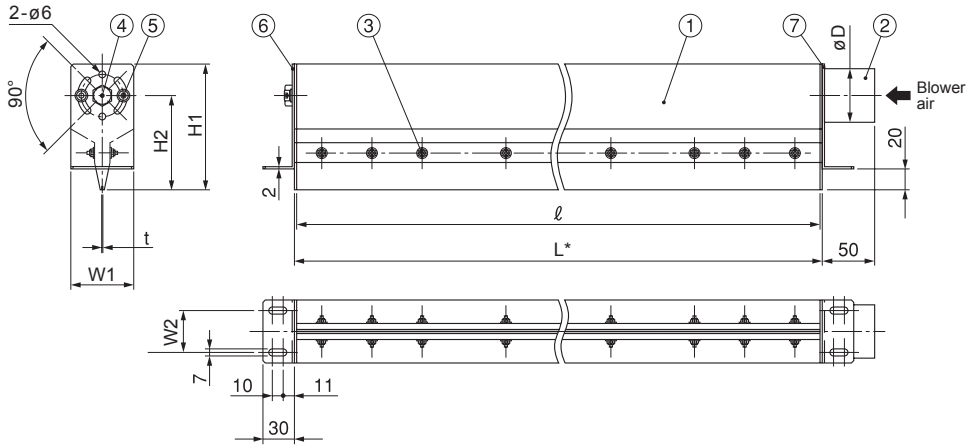



[Spray pattern]

[Features]
- Pressure loss is minimal to enable high spray impact performance.
- Long thin slit with tapered nose is suitable for installation in a narrow space such as between support rolls.
- Drastic energy saving is achieved by switching from compressor-using type.

[Applications]
- Blowing off drying
- Air knife

SLNB series



①Nozzle body
②Inlet pipe
③Adjusting bolt (M4)
④Bolt (M10)
⑤Bolt (M5)
⑥⑦Bracket

Material: S304

Air inlet type	Slit length ℓ (mm)	Slit opening t (mm)	Dimensions (mm)						Mass (kg)
			L*	H1	H2	W1	W2	øD	
D38	400	0.5	404	105	80	50	30	38.0	1.9
	600		604						2.7
	800		804						3.5
	1,000		1,004						4.3
D50	1,200		1,204	120	90	60	40	50.8	5.9
D38	400	1.0	404	105	80	50	30	38.0	1.9
D50	600		604	120	90	60	40	50.8	3.2
	800		804						4.1
D65	1,000		1,004	140	102.5	75	50	63.5	6.2
	1,200		1,204						7.4

*Length L is available from 250 mm to 1,950 mm.
[Note] Appearance and dimensions may differ slightly depending on materials and nozzle codes.

Slit length (mm)	Slit opening (mm)	Blowing air volume (air consumption) [m³/min, Normal]					
		5 kPa	10 kPa	15 kPa	20 kPa	25 kPa	30 kPa
400	0.5	0.97	1.60	2.01	2.58	3.01	3.40
600		1.45	2.39	3.18	3.87	4.51	5.10
800		1.94	3.19	4.24	5.17	6.01	6.80
1000		2.42	3.99	5.30	6.46	7.52	8.50
1200		2.91	4.79	6.36	7.75	9.02	10.20
400	1.0	1.91	2.81	3.52	4.13	4.67	5.16
600		2.87	4.22	5.28	6.19	7.00	7.74
800		3.82	5.62	7.04	8.23	9.34	10.33
1000		4.78	7.03	8.80	10.32	11.67	12.91
1200		5.73	8.43	10.56	12.39	14.01	15.49

How to order

Please inquire or order for a specific nozzle using this coding system.

〈Example〉 D65 SLNB 1200 x 1.0 S304-S-A

D65	SLNB	1200	x	1.0	S304-S-A
Air inlet type		Slit length		Slit opening	
■ D38		■ 400 ■ 1000		■ 0.5	
■ D50		■ 600 ■ 1200		■ 1.0	
■ D65		■ 800			

Universal Ball Joints

UT

(Photo is UT Ball Joint with a spray nozzle)

(Photo is UT Ball Joint with a spray nozzle)

[Features]

- Allows adjustment of the spray direction over a range of 50 degrees as desired.

Metal Ball Joints

- Accurate nozzle alignment is possible after connecting to a pipe.
- Available from 1/8″ to 3/4″ in pipe connection size.
- Stainless steel UT series is designed to withstand high pressure up to 15 MPa.

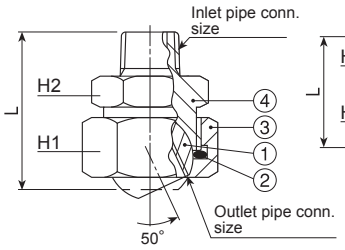
Plastic Ball Joints

- Spray direction is adjustable while spraying at a pressure up to 0.3 MPa.
- No O-ring. Easy installation by hand without tools.
- Lightweight, only half the weight of the metal ball joint.
- Low price due to injection-molded construction.

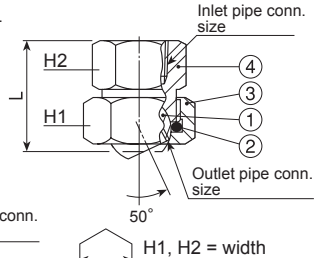
UT series (metal)

	Metal UT series
Material	• S303 or B (brass) • Optional material: S316 or others

Male thread inlet



Female thread inlet



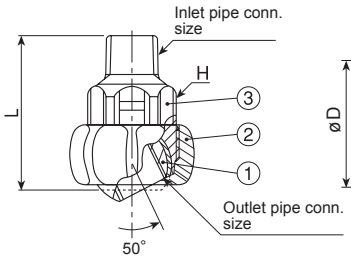
①Ball ②O-ring (NBR) ③Cap ④Adaptor

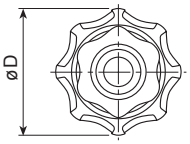
H1, H2 = width across flats

Ball joint code (Inlet x Outlet)	Inlet pipe conn. size	Outlet pipe conn. size	Dimensions (mm)			Mass (g)	
			L	H1	H2	S303	B
UT 1/8M × 1/8F	R1/8	Rc1/8	32.5	22	21	56	60
UT 1/4M × 1/8F	R1/4	Rc1/8	36.0	22	21	60	65
UT 1/4M × 1/4F	R1/4	Rc1/4	39.5	29	24	100	110
UT 3/8M × 1/4F	R3/8	Rc1/4	40.0	29	24	110	115
UT 3/8M × 3/8F	R3/8	Rc3/8	47.5	35	30	190	205
UT 1/2M × 1/2F	R1/2	Rc1/2	54.5	41	41	325	350
UT 3/4M × 3/4F	R3/4	Rc3/4	61.5	50	46	490	525
UT 1/8F × 1/8F	Rc1/8	Rc1/8	28.5	22	21	63	69
UT 1/4F × 1/8F	Rc1/4	Rc1/8	28.5	22	21	58	63
UT 1/4F × 1/4F	Rc1/4	Rc1/4	33.5	29	24	110	120
UT 3/8F × 1/4F	Rc3/8	Rc1/4	33.5	29	24	100	110
UT 3/8F × 3/8F	Rc3/8	Rc3/8	44.5	35	30	220	235
UT 1/2F × 1/2F	Rc1/2	Rc1/2	48.5	41	41	375	405
UT 3/4F × 3/4F	Rc3/4	Rc3/4	55.5	50	46	560	600

UT series (plastic)

	Plastic UT series
Material	• Adaptor and Cap: FRPP • Ball: FRPP + PP + EPDM





①Ball ②Cap ③Adaptor

H = width across flats

Ball joint code (Inlet x Outlet)	Inlet pipe conn. size	Outlet pipe conn. size	Dimensions (mm)			Mass (g)
			L	H	øD	
UT 1/8M × 1/8F	R1/8	Rc1/8	38.0	21	32	12
UT 1/4M × 1/8F	R1/4	Rc1/8	40.0	21	32	13
UT 1/4M × 1/4F	R1/4	Rc1/4	40.0	21	32	12
UT 3/8M × 1/8F	R3/8	Rc1/8	41.0	21	32	13
UT 3/8M × 1/4F	R3/8	Rc1/4	41.0	21	32	12

How to order

Please inquire or order for a specific metal ball joint using this coding system.

〈Example〉 UT 1/8M × 1/8F S303

UT	1/8M	×	1/8F	S303
	Inlet pipe connection size*		Outlet pipe connection size*	Material
	☐ 1/8M ☐ 1/8F ☐ 1/4M ☐ 1/4F ☐ 3/8M ☐ 3/8F ☐ 1/2M ☐ 1/2F ☐ 3/4M ☐ 3/4F		☐ 1/8F ☐ 1/4F ☐ 3/8F ☐ 1/2F ☐ 3/4F	☐ S303 ☐ B

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8, 1/8F = Rc1/8.

How to order

Please inquire or order for a specific plastic ball joint using this coding system.

〈Example〉 UT 1/8M × 1/8F FRPP-IN

UT	1/8M	×	1/8F	FRPP-IN
	Inlet pipe connection size*		Outlet pipe connection size*	
	☐ 1/8M ☐ 1/4M ☐ 3/8M		☐ 1/8F ☐ 1/4F	

*"M" indicates male thread ("R" of the ISO standard) and "F" indicates female thread ("Rc" of the ISO standard), e.g. 1/8M = R1/8, 1/8F = Rc1/8.

Cautions

Metal UT **Use UT-S303 at pressure under 15 MPa, UT-B (brass) under 4 MPa.**

Plastic UT **Use UT-FRPP at pressure under 1 MPa (at room temperature).**

[Note] 1. Do not use under conditions where water hammer or sudden change of water pressure occurs.
2. For use with KB and KKBP series nozzles, different type of UT Ball Joints are required. Contact us for details.

360° Rotatable Universal Joints WUT

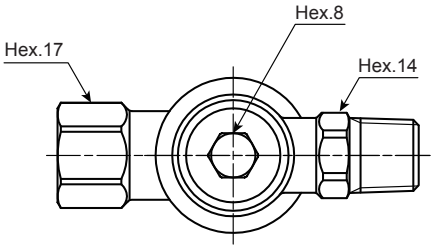
Photo is WUT Universal Joint with a spray nozzle.

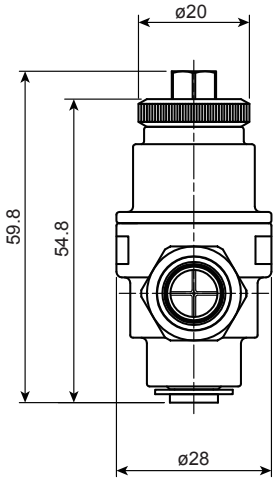
[Features]

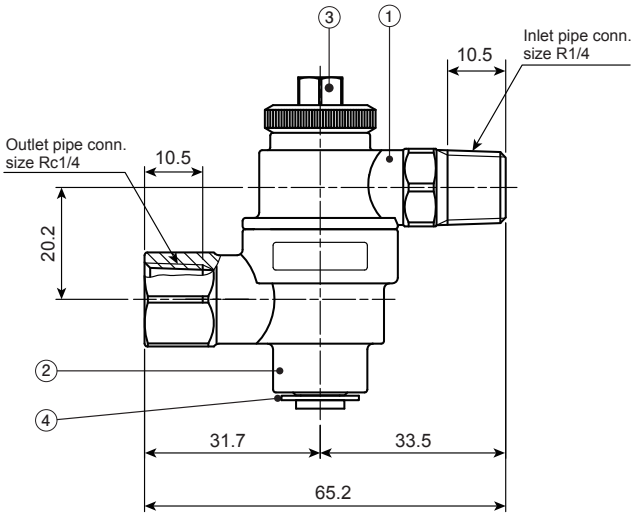
- 360° rotatable to adjust spray direction.
- Includes the rotating lock to keep the nozzle direction fixed.
- Stabilizing function suppresses internal turbulent flow.
- Withstands high pressure up to 3 MPa.
- Safe design prevents parts from dropping off when the lock is released.
- R1/4 threaded nozzle is attachable.

WUT series

	WUT series
Material	• Adaptor: SCS13 • Bolt: S303 • E-ring: S304 • O-ring: NBR
Mass	• 146 g







①②Adaptor ③Bolt ④E-ring

Cautions for use

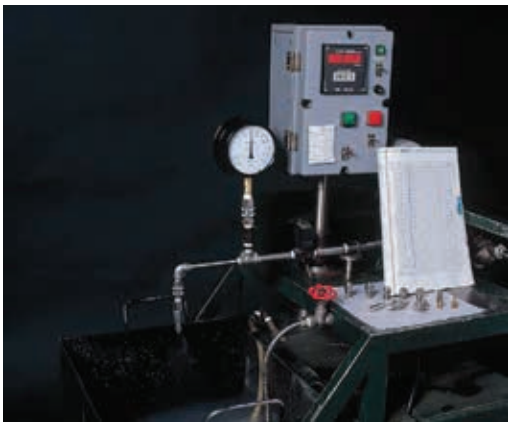
- The bolt may loosen because of vibration if it is screwed in by hand. Tighten with a torque-wrench at **6 N-m.**
- Maximum working pressure is **3 MPa.**
- When used with a solid stream jet nozzle, slightly turbulent flow occurs.

How to order Please inquire or order using this product code.

WUT 1/4M x1/4F SCS13

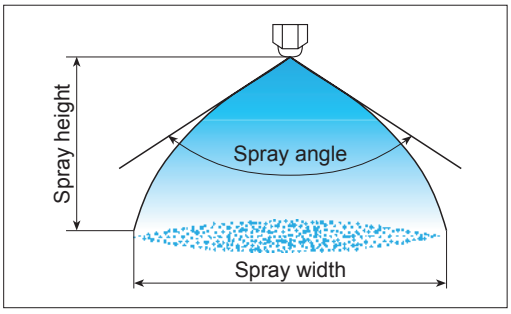
Technical Data on Spray Nozzles

Spray Pressure



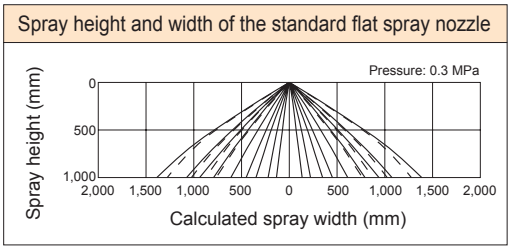
For each nozzle series the most commonly used liquid pressure is defined as the standard pressure.
Each nozzle is designed to provide the specified spray angle, spray capacity, optimum spray pattern, and spray distribution at each standard pressure.
The figures in this catalog are based on tap water at room temperature and the liquid pressure is measured at the immediate upstream of the nozzle.

Spray Angle



The spray angle is the angle of spray near the nozzle, measured at the top of the pattern made by straight lines from the spray edges.
As the spray flies through the air, droplets gradually lose momentum and the area it can cover decreases.
In actual spraying, the spray width varies with spray height.

Spray height and width of the standard flat spray nozzle



		Calculated spray width (mm)												
Spray angle		150°	140°	130°	115°	100°	90°	80°	65°	50°	40°	25°	15°	12°
Spray height (mm)	10	74.6	54.9	42.9	31.4	23.8	20	16.8	12.7	9.3	7.3	4.4	2.6	2.1
	20	149	110	85.8	62.8	47.7	40	33.6	25.5	18.7	14.6	8.9	5.3	4.2
	50	373	275	214	157	119	100	83.9	63.7	46.6	36.4	22.2	13.2	10.5
	70	522	385	300	220	167	140	117	89.2	65.3	51.0	31.0	18.4	14.7
	100	746	549	429	314	238	200	168	127	93.3	72.8	44.3	26.3	21.0
	150	1,120	824	643	471	358	300	252	191	140	109	66.5	39.5	31.5
	200	1,492	1,099	858	628	477	400	336	255	187	146	88.7	52.7	42.0
	250	1,866	1,374	1,072	785	596	500	420	319	233	182	111	65.8	52.6

Spray Capacity

Spray capacity vs. Liquid density

The spray capacities shown in this catalog are based on tap water at room temperature.
Theoretically, the spray capacity is inversely proportional to the square root of liquid density.
To determine the spray capacity of liquid having density (γ) other than 1 g/cm^3, multiply the spray capacity by conversion factor of $\frac{1}{\sqrt{\gamma}}$.

Spray capacity vs. Pressure

In hydraulic spray nozzles, the spray capacity (Q) increases as the liquid pressure (P) increases. Theoretically, the spray capacity is proportional to the square root of the pressure. To determine the spray capacity at a pressure (Px) not shown in the catalog tables, you can calculate the approximate spray capacity (Qx) by using the following equation.

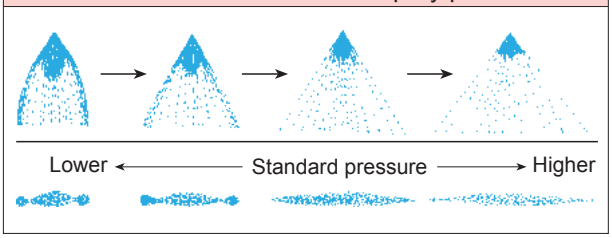
$$Qx = Q\sqrt{\frac{Px}{P}}$$

P: Known pressure (select the value nearest to Px from the catalog table)
Q: Spray capacity at the pressure of P (see the catalog table)
Px: Desired pressure
Qx: Expected spray capacity (approximation)

■ Spray Pattern

The spray pattern means the cross sectional shape of spray. Select the suitable spray pattern for each application to achieve the most efficient spray performance. Spray pattern changes as the spray pressure is gradually increased from low to high.

Variation in standard flat spray pattern

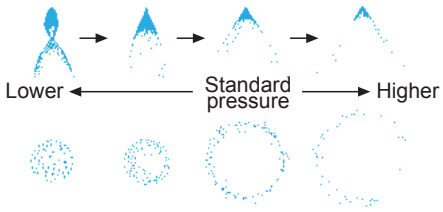


Standard flat spray

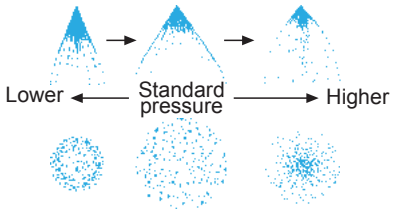
Even flat spray

Wide-angle flat spray

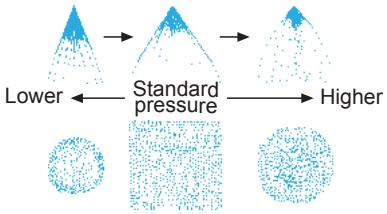
Variation in hollow cone spray pattern



Variation in full cone spray pattern



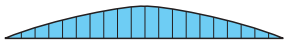
Variation in square full cone spray pattern



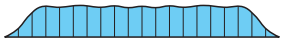
■ Spray Distribution

The spray distribution means the distribution of spray flow in the spray width direction. A mountain-shaped distribution is useful in producing uniform spray distribution across the entire spray width by overlapping patterns in multiple-nozzle arrangements, while an even spray distribution is suitable for applications like cleaning that require uniform spray impact across the entire spray width. Spray distribution varies depending on the spray height and pressure.

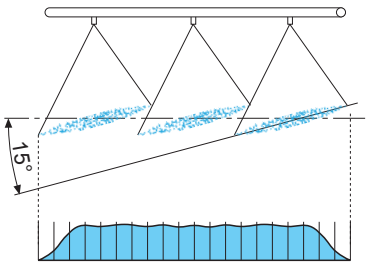
Mountain-shaped distribution

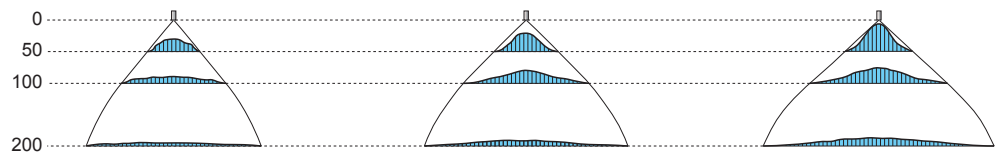
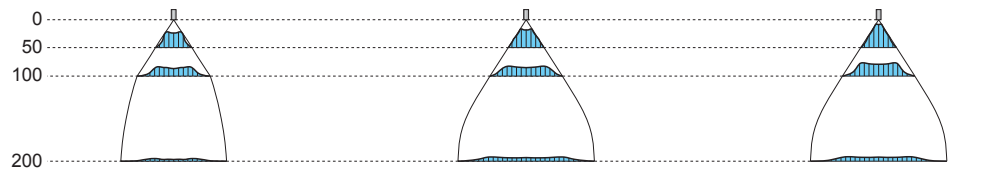


Even distribution



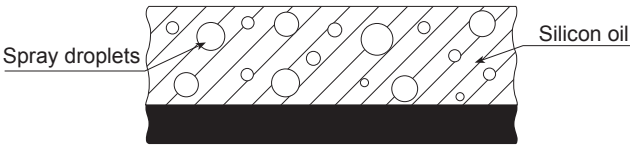
Spray distribution of 1/4MVP9030 in a multiple-nozzle arrangement



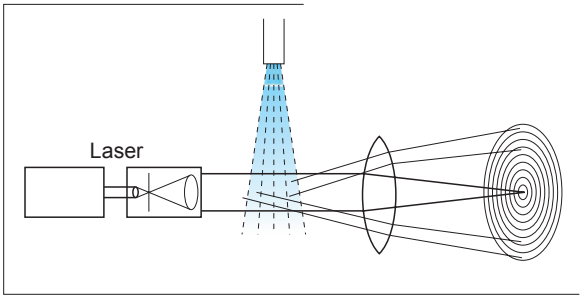
Liquid pressure	0.1 MPa	0.3 MPa	0.5 MPa
Variation in spray distribution of 1/4MVP9030 (flat spray nozzle)			
Liquid pressure	**0.05 MPa**	**0.2 MPa**	**0.5 MPa**
Variation in spray distribution of 3/8FJJXP070 (full cone spray nozzle)			

Technical Data on Spray Nozzles

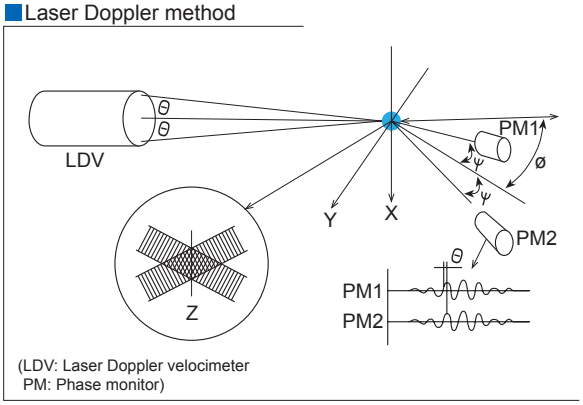
Spray Droplet Diameter



Fraunhofer diffraction method



Laser Doppler method



(LDV: Laser Doppler velocimeter
PM: Phase monitor)

Example of calculating Sauter mean droplet diameter

Range (μm)	Median d (μm)	Quantity n	nd^2	nd^3
0–100	50	1,664	4,160,000	208,000,000
100–200	150	2,072	46,620,000	6,993,000,000
200–300	250	444	27,750,000	6,937,500,000
300–400	350	161	19,722,500	6,902,875,000
400–500	450	73	14,782,500	6,652,125,000
500–600	550	35	10,587,500	5,823,125,000
600–700	650	17	7,182,500	4,668,625,000
700–800	750	4	2,250,000	1,687,500,000
	Total	4,470	133,055,000	3.987275×10^{10}

$$\bar{d}_{32} = \frac{\sum nd^3}{\sum nd^2} = 299.6711886 = 300\ \mu m$$

Methods to measure droplet diameter

The immersion sampling method and the laser analyzer are used as industrial methods of measuring spray droplet sizes.

● Immersion sampling method

As shown in the diagram, droplets are collected on a glass plate coated with silicone oil and are immediately photographed at high magnification for subsequent scanning. In this method, the collected droplets quickly settle in the silicone oil and do not evaporate even in strong light while being photographed. Remaining suspended in the silicone oil, they are measured as perfect spheres. However, ultra-fine droplets, too small to break the surface tension of the oil, will evaporate without settling. Thus the droplet sizes of the fine and ultra-fine fog determined by the immersion sampling method are larger than the actual values.

● Laser analyzer

1. Fraunhofer diffraction method

This method applies the fact that when spray particles exist in the laser's optical path, the laser rays are scattered by the edges of those particles and those scattered rays create a diffraction pattern (Fraunhofer diffraction). The diffraction pattern depends on particle size and distribution. In this method, it is possible to measure all of the particles existing in the laser at the same time, but if the particle concentration is too high, the scattered laser can be scattered again by other particles (multiple scattering), which could result in showing smaller values than the actual droplet sizes.

2. Laser Doppler method

In this analyzer, two lasers are crossed and an interference fringe is formed. Several light sensors from a certain distance detect the laser scattered by the particles passing through this interference fringe, by whose phase difference droplet size is calculated. This method has advantages that the particle concentration has relatively little effect and that the speed of the particles can be measured at the same time. However, measurement is made only at a single point in the spray.

The spray droplet diameters shown in the tables of this catalog are measured by the immersion sampling method.

Mean droplet diameter

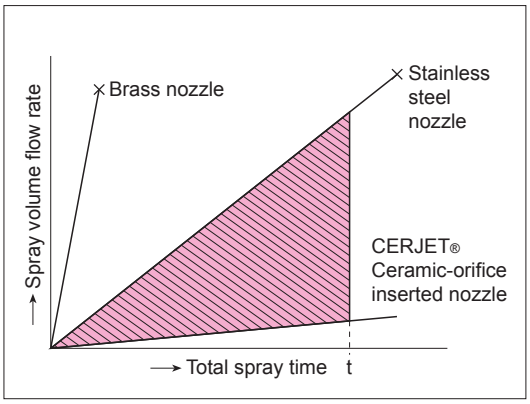
Mean droplet diameter is one of the important factors in selecting nozzles and designing nozzle-related equipment. The following three are commonly used.

- Sauter Mean Droplet Diameter ($\bar{d}_{32}$) ····· $\sum nd^3/\sum nd^2$
- Volume Mean Droplet Diameter ($\bar{d}v$) ····· $(\sum nd^3/\sum n)^{1/3}$
- Mass Median Droplet Diameter ($Dv_{.5}$) ····· $\int_0^{Dv.5} dv/v = \int_{Dv.5}^{\infty} dv/v = 50\%$

It is usual in chemical processes such as cooling, evaporation, combustion, and drying that efficiency is determined by the ratio of volume-surface area, i.e. specific surface. Because a small portion of large droplets is more influential over the rate of reaction than a large portion of small droplets, it is advisable to use Sauter Mean Droplet Diameter as representative droplet sizes.
Sauter Mean Diameter is used in this catalog.

■ Wear Resistance

Nozzle orifices are always subject to abrasion as they are constantly exposed to the flow of liquid at high speed. If a circulated liquid containing slurry is used, they will wear out faster. The ceramic orifice of CERJET® spray nozzles has an outstanding wear-resistance, with a hardness of 7 on the Mohs scale. It can last 20–30 times longer than stainless steel nozzles and several hundred times longer than brass ones.
The sketch shows the increase in flow of each nozzle due to a worn orifice. The shaded area shows the excess spray flow from a stainless steel nozzle relative to the CERJET® during total spray time (t). If the spray liquid is agricultural chemicals, it could cause crop injury.
In high-pressure cleaning, worn nozzles cause pump pressure to drop and the cleaning effect is rapidly degraded.
As for flat spray nozzle, increased wear makes its spray angle narrower and spray distribution uneven.



■ Chemical Resistance

In spraying chemicals or using spray nozzles in a corrosive environment, chemical-resistant materials must be used as spray nozzles may corrode quickly. The ceramic orifice is high chemical-resistant and is not affected by almost all acids and highly corrosive chemicals except hydrofluoric acid and alkali liquids of pH12 and over.
However, for the applications where adhesives or metal nozzle body materials (brass or stainless steel) may corrode, we recommend our CERTIIM® nozzle with ceramic orifice inserted into injection-molded engineering plastic body.
In addition to spray nozzles made of optional materials shown in this catalog, nozzles in other special materials are available on request.

■ Heat Resistance

The temperature that spray nozzles can withstand varies depending on the liquid and ambient environmental condition.
Nozzles made of special materials are available for use at high temperature.
CERJET® (nozzles with ceramic orifice inserted) may crack if abruptly cooled down from high temperatures (200°C).
Please also consider the heat resistance of any adhesives in spray nozzle assemblies.

■ Pressure Resistance

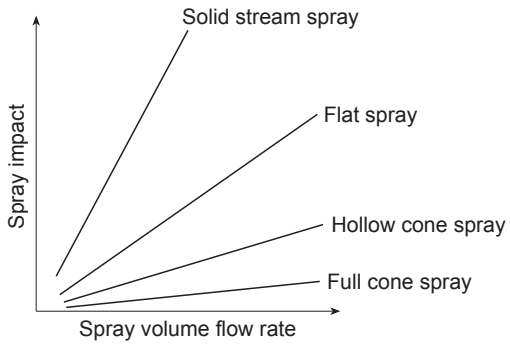
Nozzles are designed carefully so that they can withstand the pressures shown in each table, but depending on the system operation, water hammering may result in pressure increases of three to five times the spray pressure.
For use under high pressure, metal nozzles instead of plastic ones are recommended.

Technical Data on Spray Nozzles

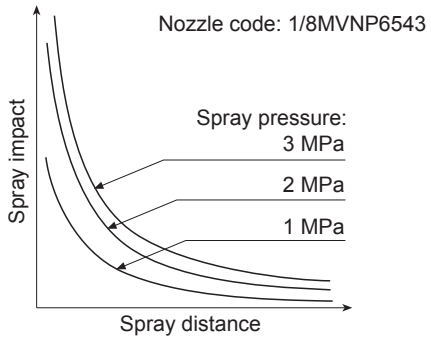
■ Spray Impact

Spray impact means the force of spray droplets hitting the target surface. Solid stream jet nozzles have the strongest spray impact, and the wider the spray angle becomes or the larger the spray area becomes, the weaker the spray impact becomes. Also, the impact decreases as the distance between the nozzles and the object becomes longer.

Relation between types of nozzles and spray impact



Variation in spray impact of flat spray nozzle



■ Viscosity

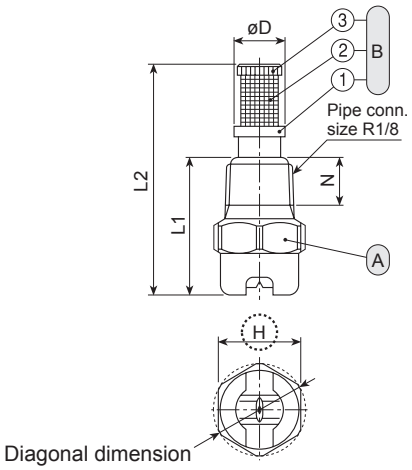
As the viscosity of the liquid increases, generally spray capacity and angle decrease and spray distribution diverges from the standard one. Because viscous liquid increases the resistance inside the pipe, the liquid pressure drop must be also taken into consideration.
(Spray capacity of hollow cone spray nozzles increases as the viscosity of liquid increases. See page 62 for details.)

■ Dimensional Calculation

To calculate the diagonal dimension of hexagonal geometry, the approximate value can be estimated by multiplying the width across the flats by 1.16.

(Example) In the figure at right, the dimension H is 12 mm, so the diagonal dimension is

13.92 (= 12 x 1.16).



[Complete assemblies]

Series	Pipe conn. size	Dimensions (mm)					Mass (g)	
		L1	L2	H	øD	N	S303	B
VVP	R1/8	18.5	31	12	7.5	6.5	10	11

Reference Data

Conversion of unit

	μm	mm	cm	m	in	ft
Length	1	1×10^{3}	1×10^{-4}	1×10^{-6}	3.94×10^{-5}	3.28×10^{-6}
	1×10^{3}	1	0.1	1×10^{-3}	3.94×10^{-2}	3.28×10^{-3}
	1×10^{4}	10	1	1×10^{-2}	3.94×10^{-1}	3.28×10^{-2}
	1×10^{6}	1×10^{3}	100	1	3.94×10	3.28
	2.54×10^{4}	25.4	2.54	2.54×10^{-2}	1	8.33×10^{-2}
	3.05×10^{5}	3.05×10^{2}	3.05×10	3.05×10^{-1}	12	1

	cm^2	m^2	in^2	ft^2
Area	1	1×10^{-4}	0.155	1.08×10^{-3}
	1×10^{4}	1	1.55×10^{3}	10.8
	6.45	6.45×10^{-4}	1	6.94×10^{-3}
	9.30×10^{2}	9.30×10^{-2}	1.44×10^{2}	1

	cm^3	ℓ	m^3 (kℓ)	ft^3	imperial gal.	U.S. gal.
Volume	1	1×10^{-3}	1×10^{-6}	3.53×10^{-5}	2.2×10^{-4}	2.64×10^{-4}
	1×10^{3}	1	1×10^{-3}	3.53×10^{-2}	0.220	0.264
	1×10^{6}	1×10^{3}	1	353	220	264
	2.83×10^{4}	28.3	2.83×10^{-2}	1	6.23	7.48
	4.55×10^{3}	4.55	4.55×10^{-3}	0.16	1	1.2
	3.79×10^{3}	3.79	3.79×10^{-3}	0.134	0.833	1

Others

Viscosity	1P = 100 cP 1St = 100 cSt
Mass	1kg ≈ 2.21 lb 1lb ≈ 0.454 kg
Temperature	[°F] ≈ ([°C] × 9/5) + 32 [°C] ≈ 5/9 ([°F] - 32)

Water flow and proper pipe size

Pipe size		Steel pipe		Spray flow (ℓ/min)
A	B	Inside diameter	Outside diameter	when pressure loss is 0.01–0.03MPa per pipe length of 10 m
6A	1/8B	6.5	10.5	1.3–2.2
8A	1/4B	9.2	13.8	3–5.2
10A	3/8B	12.7	17.3	7–12
15A	1/2B	16.1	21.7	12–21
20A	3/4B	21.6	27.2	22–38
25A	1B	27.6	34.0	38–65
32A	1*1/4B	35.7	42.7	70–120
40A	1*1/2B	41.6	48.6	120–210
50A	2B	52.9	60.5	215–370
65A	2*1/2B	67.9	76.3	410–700
80A	3B	80.7	86.1	680–1,200
100A	4B	105.3	114.3	1,200–2,100
125A	5B	130.8	139.8	2,100–3,600
150A	6B	155.2	165.2	3,300–5,700

	MPa	bar	kg/cm^2	lb/in^2 (psi)	atm	mmHg	mmH_2O (mmAq)
Pressure	1	10	10.2	145	9.87	7.5×10^{3}	1.02×10^{5}
	0.1	1	1.02	14.5	0.987	750	1.02×10^{4}
	0.098	0.981	1	14.2	0.968	736	1×10^{4}
	6.89×10^{-3}	0.069	0.070	1	0.068	51.7	703
	0.101	1.01	1.03	14.7	1	760	1.03×10^{4}
	1.33×10^{-4}	1.33×10^{-3}	1.36×10^{-3}	0.019	1.32×10^{-3}	1	13.6
	9.81×10^{-6}	9.81×10^{-5}	1×10^{-4}	1.42×10^{-3}	9.68×10^{-5}	0.074	1

	ℓ/min	m^3/min	m^3/hr	in^3/hr	ft^3/hr	Imperial gal./min	U.S. gal./min
Flow rate	1	1×10^{-3}	0.06	3.66×10^{3}	2.12	0.22	0.264
	1×10^{3}	1	60	3.66×10^{6}	2.12×10^{3}	220	264
	16.7	0.017	1	6.10×10^{4}	35.3	3.67	4.40
	2.73×10^{-4}	2.7×10^{-7}	1.64×10^{-5}	1	5.79×10^{-4}	6.01×10^{-5}	7.22×10^{-5}
	0.472	4.72×10^{-4}	0.028	1.73×10^{3}	1	0.104	0.125
	4.55	4.55×10^{-3}	0.273	1.66×10^{4}	9.63	1	1.20
	3.79	3.79×10^{-3}	0.227	1.39×10^{4}	8.02	0.833	1

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