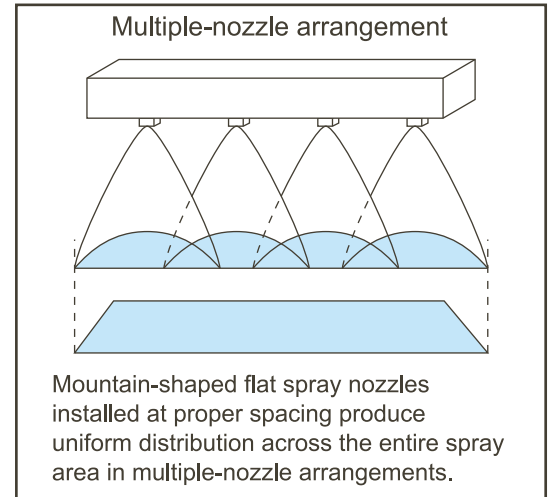
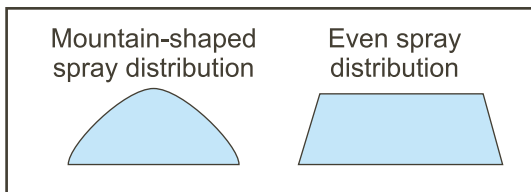


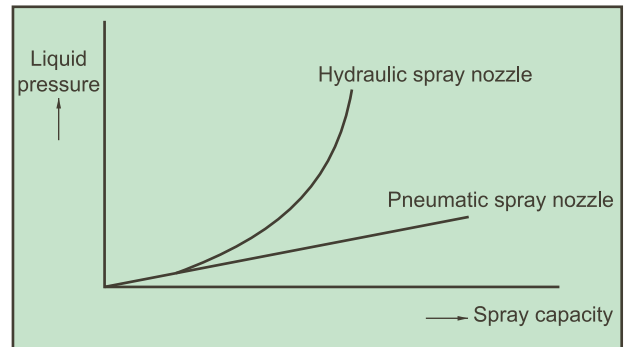
8. Spray distribution

The spray distribution means the distribution of spray capacity 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 even spray distribution is suitable for applications that require uniform spray distribution by one nozzle. The spray distribution changes depending on operational conditions such as spray height, pressure, and other conditions.

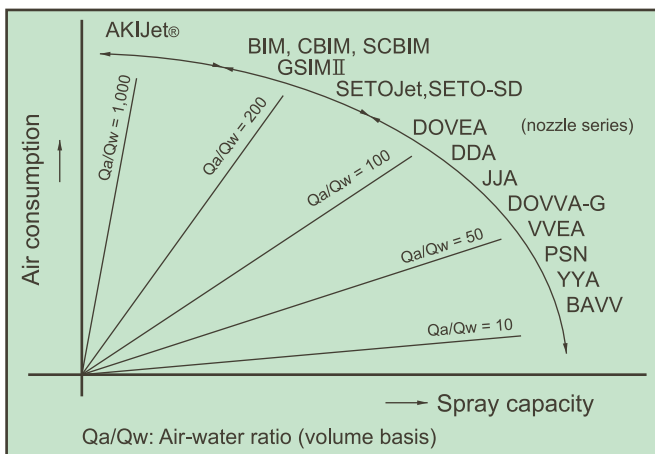


9. Turn-down ratio

The turn-down ratio means the ratio between the adjustable minimum spray capacity and the maximum spray capacity. The spray capacity of hydraulic spray nozzles is proportional to square root of the pressure and the variation of spray capacity greatly depends on the power of pump, so the turn-down ratio is small. On the other hand, pneumatic spray nozzles enable users to obtain large turn-down ratios by adjusting both air and liquid pressures. Hence, pneumatic spray nozzles are the most suitable for cooling combustion gas or applications requiring the nozzles producing small droplets and having large turn-down ratios.



10. Air-water ratio



Air-water ratio means the rate of air consumption divided by spray capacity. This is expressed as either a volume ratio or weight ratio. If the nozzles used are the same, the spray droplet size becomes smaller as the air-water ratio becomes higher.

The air-water ratio in this catalog is based on volume ratio, unless specified otherwise.

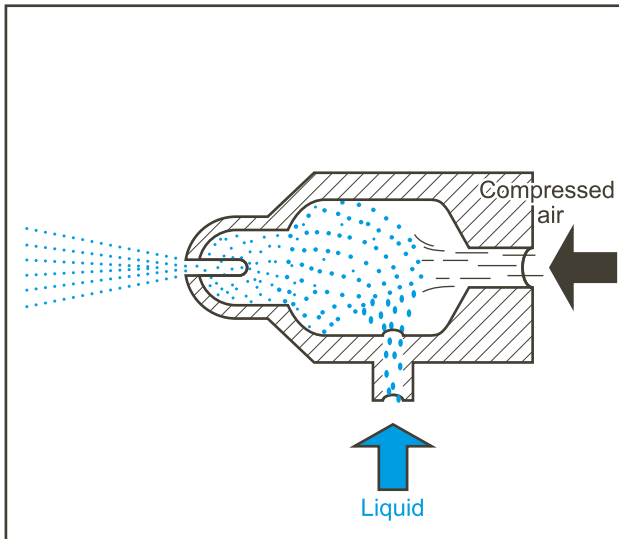
Technical Information on Pneumatic Spray Nozzles

1. Air-liquid mixing systems

Three air-liquid mixing systems are available for atomizing liquid.

Internal mixing type

Compressed air and liquid are mixed inside the nozzle. Generally, this type is excellent for atomizing liquid.



This internal mixing type is further classified into three types.

1. Inner air type

Compressed air flows in the center of the nozzle, while liquid flows along its circumference. This type provides an important benefit with a larger free passage diameter which minimizes clogging.

2. Outer air type

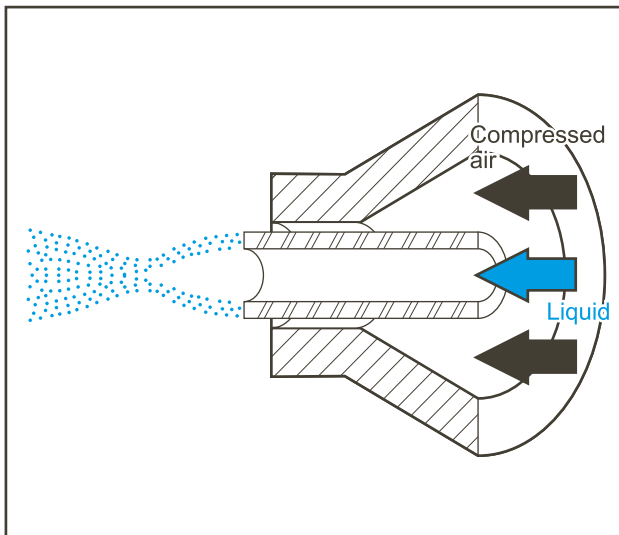
Liquid flows in the center of the nozzle, while compressed air flows along its circumference. This type of nozzle is selected for wide range of applications. Larger orifice size can be designed on demand while the spray droplets become a little coarser.

3. Pre-mix type

Even at a low air-water ratio, the increased velocity of the droplets results in a strong impact force. Furthermore, the turn-down ratio is larger and this type is suitable for cooling objects in high temperature range.

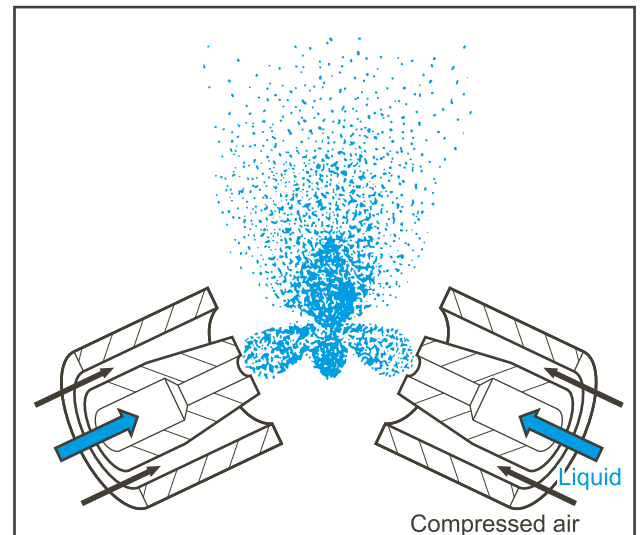
External mixing type

Compressed air and liquid are mixed outside the nozzle. Hence, this type clogs the least. This is also classified into inner air type and outer air type.

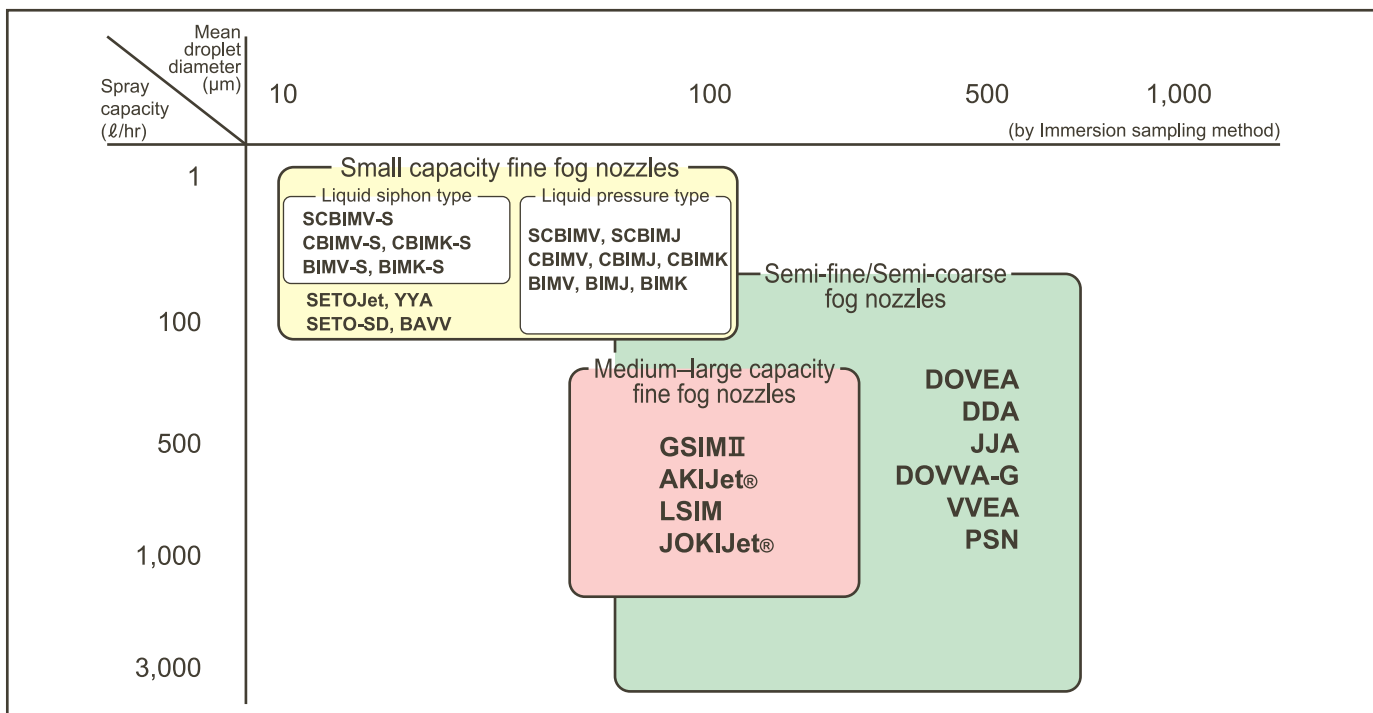


Impinging type

Air-stream entraining fine fog jets out from the nozzle and impinges against another air-stream of the same nature for shattering the fog into even finer, more-uniform droplets. This is an original method of IKEUCHI, "The Fog Engineers."



How to Select Pneumatic Spray Nozzles



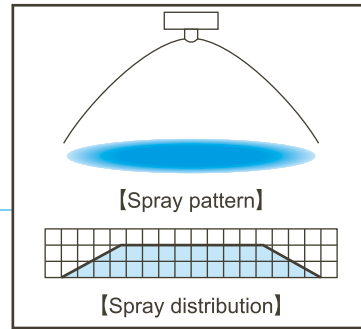
Air type	Nozzle type	Spray pattern	Liquid feeding system	Series	Air-liquid mixing system	Spray capacity	units	Spray angle (°)	Air consumption (ℓ/min, Normal)	Page
Compressed air	Small capacity Fine fog nozzle	Flat spray	Liquid pressure	BIMV, CBIMV, SCBIMV	Internal mixing inner air type	0.25–107	ℓ/hr	110–45	2.6–245	13, 31 35, 38
			Liquid siphon	BIMV-S, CBIMV-S, SCBIMV-S		0.1–4.7		80	3.75–92	15, 33 36, 39
		Hollow cone spray	Liquid pressure	BIMK, CBIMK		2.0–107		60	13–245	17, 32
			Liquid siphon	BIMK-S, CBIMK-S		1.8–4.7		60	27–92	19, 33
		Full cone spray	Liquid pressure	BIMJ, CBIMJ, SCBIMJ		0.25–107		20	2.6–245	21, 32 35, 38
	Medium-large capacity Fine fog nozzle	Full cone spray	Liquid pressure	GSIMII	Internal mixing outer air type	70–1,600	ℓ/min	60, 20	340–5,800	43
			Liquid pressure & Liquid siphon	AKIJet®	Impinging type			—		78
			Liquid pressure	AKIJet®-S				80		
	Semi-fine/ Semi-coarse fog nozzle	Flat spray	Liquid pressure	VVEA	Internal mixing pre-mix type	0.23–3.5	ℓ/min	80, 60	11–128	63
			Liquid pressure	DOVEA		0.42–40		110–55	30–630	49
			Liquid pressure	DDA		0.14–57.3		125–75	17–610	54
			Liquid pressure	DOVVA-G		1–25		70, 55	100–1,700	60
		Full cone spray	Liquid pressure	JJA		1.1–24		—	70–720	57
		Liquid film spray	Liquid pressure	PSN		8–28		—	520–1,700	66
	Clog-resistant nozzle	Flat spray	Liquid pressure	YYA	External mixing type	2.2–10.0	ℓ/hr	80	27–45	76
Liquid pressure & Liquid siphon			SETOV	External mixing outer air type	1.7–10.6	65, 55		27–75	72	
Full cone spray		Liquid pressure & Liquid siphon	SETOJet	(07503R-I+SD: Internal mixing outer air type)	2.0–111	—		38–290	69	
		Liquid pressure & Liquid siphon	SETO-SD		0.9–26.4			36–200	74	
Blower air	Ultra-low pressure nozzle	Flat spray	Liquid pressure	BAVV	Internal mixing inner air type	9.0–123	ℓ/hr	60	76–254	84
		Full cone spray	Liquid pressure	LSIM	Internal mixing outer air type	0–1,000	ℓ/hr	20	1,500–6,000	86
Steam	Steam driven nozzle	Full cone spray	Liquid pressure	JOKIJet®	External mixing outer air type	10–1,200	ℓ/hr	—	—	89

Small capacity fine fog nozzle: spray capacity measured at air pressure of 0.3 MPa & liquid pressure of 0.1–0.3 MPa, air consumption at air pressure of 0.2–0.4 MPa
 Medium-Large capacity fine fog nozzle: spray capacity measured at air pressure of 0.3 MPa & liquid pressure of 0.2–0.5 MPa, air consumption at air pressure of 0.3–0.4 MPa
 Semi-fine/Semi-coarse fog nozzle (except PSN): spray capacity and air consumption measured at air pressure of 0.1–0.4 MPa & liquid pressure of 0.07–0.7 MPa
 Semi-fine/Semi-coarse fog nozzle (PSN series): spray capacity and air consumption measured at air & liquid pressure of 0.1–0.4 MPa, slit length 1,000 mm, slit opening 0.05 mm
 Clog-resistant nozzle: spray capacity and air consumption measured at air pressure of 0.3 MPa & liquid pressure of 0–0.05 MPa
 Ultra-low pressure nozzle (BAVV series): spray capacity measured at liquid pressure of 0.02–0.04 MPa, air consumption at air pressure of 0.02 MPa
 Ultra-low pressure nozzle (LSIM series): spray capacity measured at liquid pressure of 0–2 MPa, air consumption at air pressure of 0.02–0.06 MPa
 Steam-driven nozzle: spray capacity measured at steam pressure of 0.1–0.6 MPa, liquid pressure of 0.1–0.5 MPa

Note: See the respective pages for spray capacity, spray pressure, and other details for each series.

How to Read Product Tables

- Spray nozzle specifications are shown in the respective tables.



• Spray pattern and spray distribution

Table

- Spray angle code (110)

- Air consumption code (02)

ℓ/min, Normal: ℓ/min at Normal Conditions (0°C, 1 atm)

- Air consumption (estimated value) at the specified pressures
(Estimated air consumption is 25 ℓ/min, Normal when air pressure is 0.4 MPa and liquid pressure is 0.15 MPa)

- Spray width at the specified pressures (280 mm at air pressure of 0.2 MPa and liquid pressure of 0.1 MPa)

- Minimum passage diameters of each part (approx. value)

Spray angle code 110	Air consumption code 02	Air pressure (MPa)	Spray capacity (ℓ/hr) & Air consumption (ℓ/min, Normal)										Spray width*3 (mm)			Mean droplet dia. (μm)	Free passage diameter (mm)			
			Liquid pressure (MPa)										Liquid press. (MPa)				Laser Doppler method	Spray orifice	Adaptor	
			0.1		0.15		0.2		0.25		0.3		0.1	0.15	0.25				Liquid	Air
			Liquid	Air	Liquid	Air	Liquid	Air	Liquid	Air	Liquid	Air								
		0.2	2.2	14	5.3	11	4.6	17	8.3	12	14.3	7	220	250	420	20-100	0.2	0.9	0.7	
		0.3	1.0	20	2.5	19	4.6	17	8.3	12	14.3	7	220	250	420	20-100	0.2	0.9	0.7	
		0.4	—	—	1.4	25	2.3	24	4.0	23	6.3	20	—	230	340	—	—	—	—	
	04	0.2	4.5	25	9.5	20	17.0	13	—	—	—	—	300	360	—	20-100	0.3	0.9	0.9	
		0.3	2.0	36	4.7	35	8.5	31	13.1	27	19.6	20	230	270	430	20-100	0.3	0.9	0.9	
		0.4	—	—	2.8	45	4.8	44	7.7	41	11.4	37	—	250	350	—	—	—	—	
	075	0.2	8.7	51	18.4	42	33.3	29	—	—	—	—	320	380	—	20-100	0.5	1.2	1.4	
		0.3	4.0	74	8.8	71	15.5	64	24.3	54	38.5	40	240	300	450	20-100	0.5	1.2	1.4	
		0.4	—	—	—	—	—	—	14.8	82	21.8	74	—	270	370	—	—	—	—	
		—	—	—	—	—	—	—	—	—	—	—	340	400	—	20-100	0.8	1.8	1.9	
		—	—	—	—	—	—	—	—	—	—	—	280	320	470	20-100	0.8	1.8	1.9	
		—	—	—	—	—	—	—	—	—	—	—	280	320	380	—	—	—	—	

- Calculated spray capacity at the specified pressures (Calculated spray capacity is 4.7 ℓ/hr when air pressure is 0.3 MPa and liquid pressure is 0.15 MPa)

- At air pressure of 0.2 MPa and liquid pressure of 0.3 MPa, defined spray pattern does not develop (coarse droplets, wheezing, etc.)

- Range of Sauter mean droplet diameters measured by laser Doppler method

Description for thread size and type

ISO Standard	Thread description
R1/4	1/4" male taper pipe thread
Rc1/4	1/4" female taper pipe thread

Threads noted in this catalog are taper pipe threads (PT), unless specified otherwise. In this catalog, the connection thread size and type is described according to ISO standard.