

EVERLOY SPRAY NOZZLES

for PAPER MANUFACTURE



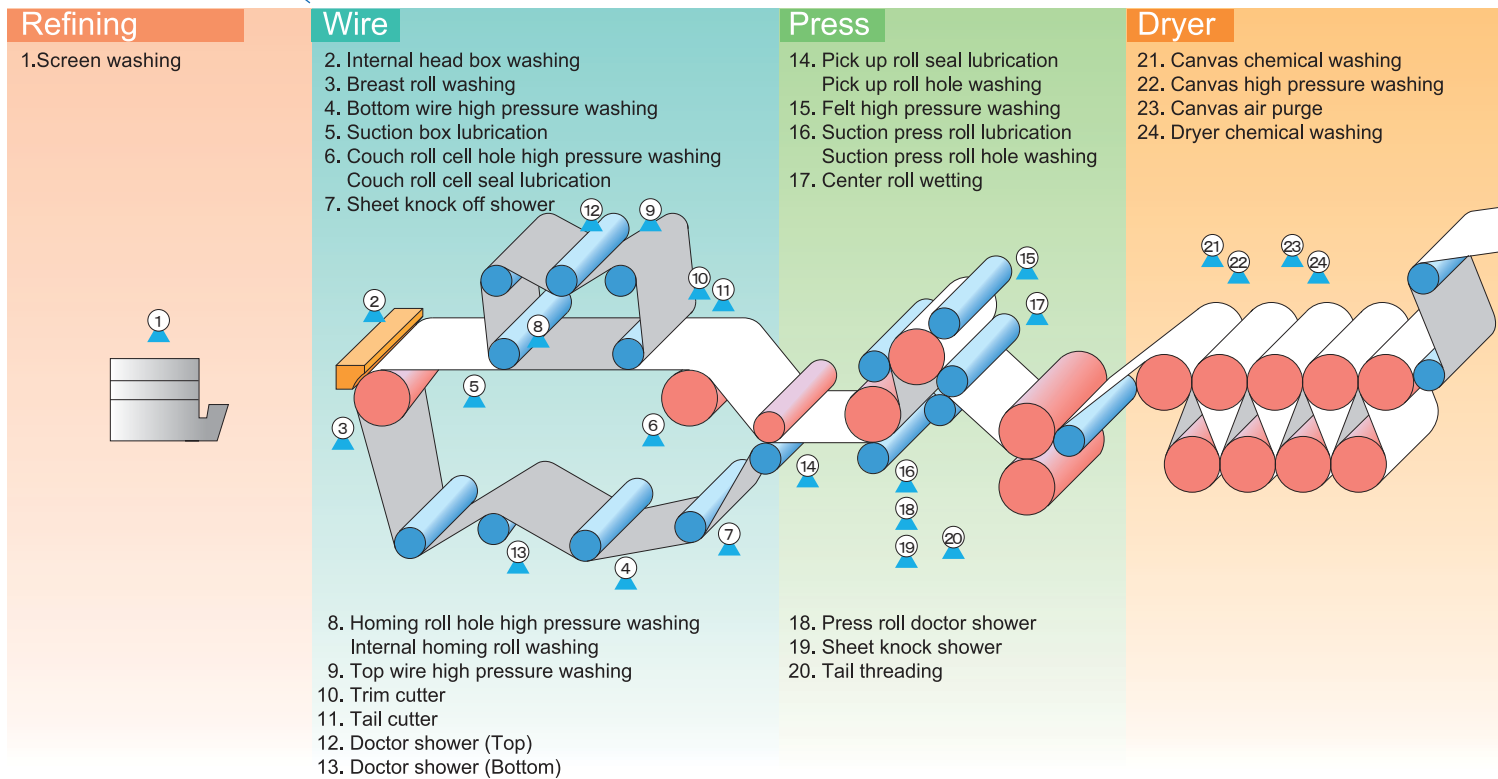
KYORITSU GOKIN CO., LTD.

Manufacturing Process

for Pulp and Paper

Pulp process

Paper making process



This chart shows the nozzles for pulp & paper manufacturing process.
The model numbers listed below are commonly used.

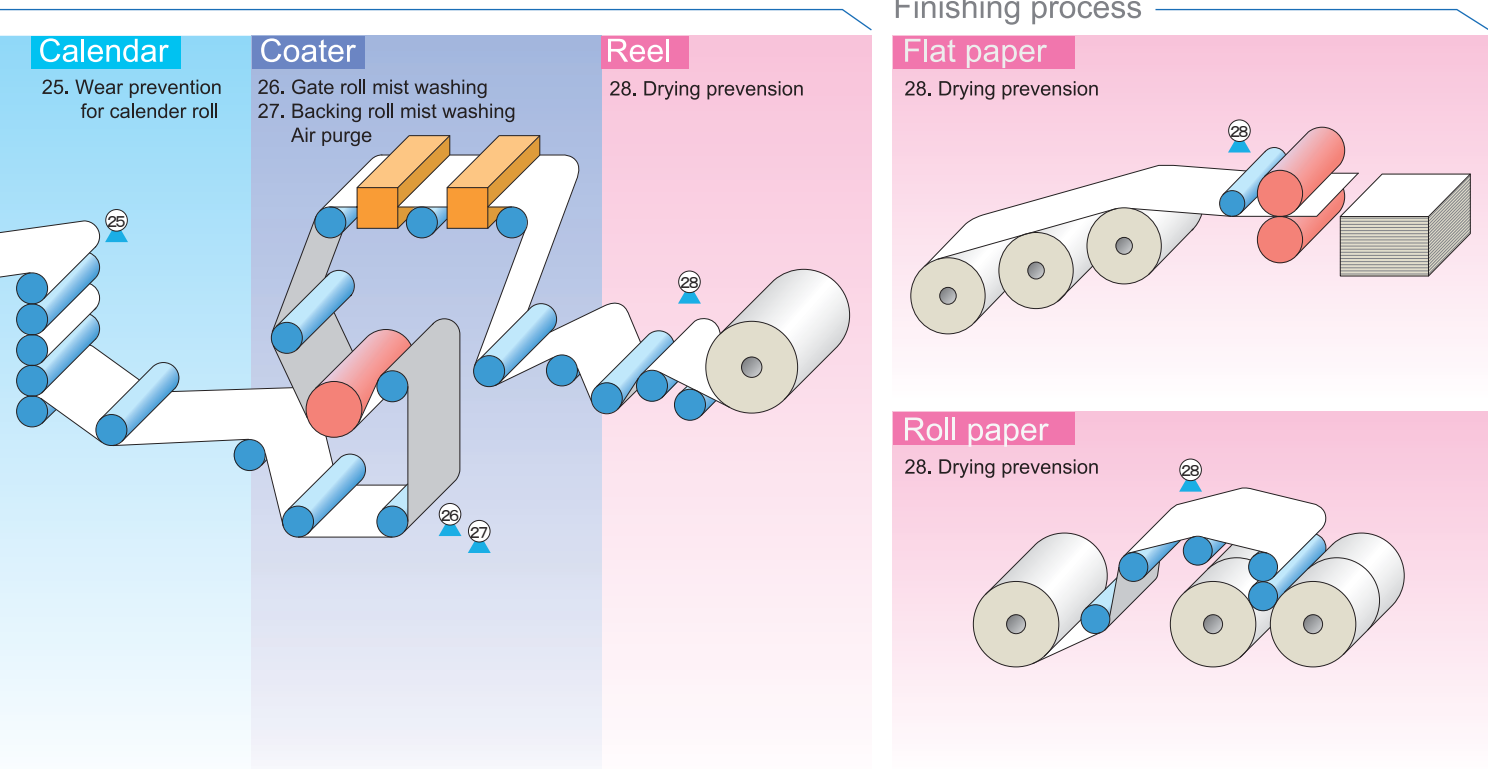
Process	Symbol	Application	Product name	Model number (representing value)	Page
Refining	1	Screen washing	Flat spray nozzles	1/4 KSH 1065	21
			Side spray nozzles	1/4 KSY 10	9
			Straight jet nozzles	1/4 KSJ 1.0 S	3
Wire part	2	Internal head box washing	Full-cone nozzles	1/4 KSFHS 0390	24
	3	Breast roll washing	Cat' s-eye nozzles	KSS 0565 P-B	11
	4	Bottom wire high pressure washing	Self-cleaning nozzles	1/2 SCJ 0.8	5
			Straight jet nozzles	1/4 KCJ 0.9 S	3
			Straight jet nozzles C type	1/4 KCJ 0.9 C	4
	5	Suction box lubrication	Flat spray nozzles	1/4 KSH 0465	21
			Flat atomizing nozzles	1/4 AS 00865	22
	6	Couch roll cell hole high pressure washing	Self-cleaning nozzles	1/2 SCJ 1.5	5
			Straight jet nozzles	1/4 KCJ 1.5 S	3
			Straight jet nozzles C type	1/4 KCJ 1.5 C	4
		Couch roll seal lubrication	Whirl spray nozzles	1/4 KSW 0480 H	26
	7	Sheet knock off shower	Cat' s-eye nozzles	KSS 1565 P-B	11
	8	Forming roll hole high pressure washing	Self-cleaning nozzles	1/2 SCJ 0.8	5
			Straight jet nozzles	1/4 KCJ 0.9 S	3
			Straight jet nozzles C type	1/4 KCJ 0.9 C	4
		Internal forming roll washing	Cat' s-eye nozzles	KSS 1065 P-B	11
	9	Top wire high pressure washing	Self-cleaning nozzles	1/2 SCJ 0.8	5
			Straight jet nozzles	1/4 KCJ 1.0 S	3
			Straight jet nozzles C type	1/4 KCJ 1.0 C	4
	10	Trim cutter	Needle jet nozzles	3/8 KCJ 0.4 D×2	1
				3/8 KRJ 0.4 D×2	1
	11	Tail cutter	Needle jet nozzles	1/8 KCJ 0.6 D	1
				1/8 KRJ 0.6 D	1
	12	Doctor shower (Top)	Cat' s-eye nozzles	KSS 1565 P-B	11
			Side spray nozzles	1/4 KSY 15	9
			Flat spray nozzles	1/4 KSH 1565	21

With an ever-increasing need to deliver larger and faster paper machines, spray nozzles plays an increasingly more critical function in pulp and paper manufacturing process.

There are two major functions of spray nozzles which are;

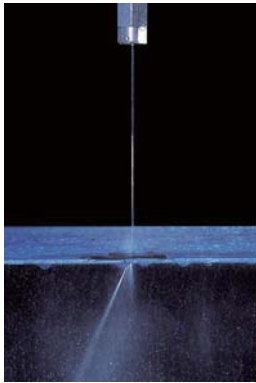
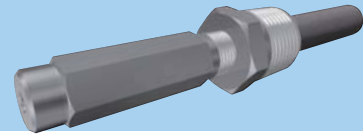
- Improving quality of paper and stable productivity
- Reducing running cost utilizing latest nozzle technology

Everloy Spray Nozzles offer state of the art technology and its deliver more effective washing, cooling and lubricating to match your applications.



Process	Symbol	Application	Product name	Model number (Common numbers)	Page	CONTENTS
Wire part	13	Doctor shower (Bottom)	Cat' s-eye nozzles	KSS 1565 P-B	11	Needle jet nozzles P. 1- 2
			Side spray nozzles	1/4 KSY 15	9	Straight jet nozzles P. 3- 4
			Flat spray nozzles	1/4 KSH 1565	21	Self-cleaning nozzles P. 5- 8
Press part	14	Pick up roll seal lubrication	Whirl spray nozzles	1/4 KSW 0480 H	26	Side spray nozzles P. 9-10
		Pick up roll hole washing	Side spray nozzles	3/8 KSY 20	9	Cat' s-eye nozzles P.11
	15	Felt hight pressure washing	Self-cleaning nozzles	1/2 SCJ 0.6	5	Pipe inner wall washing nozzles P.12
			Straight jet nozzles	1/4 KCJ 0.8 S	3	Mini atomize nozzles P.13-14
			Straight jet nozzles C type	1/4 KSJ 0.8 C	4	Mini mist nozzles P.15
	16	Suction press roll lubrication	Whirl spray nozzles	1/4 KSW 0480 H	26	Air mist nozzles P.16
		Suction press roll hole washing	Side spray nozzles	3/8 KSY 20	9	Air jet nozzles P.17
Dryer part	17	Center roll wetting	Side spray nozzles	1/4 KSY 06	9	Air blaster P.18
	18	Press roll doctor shower	Cat' s-eye nozzles	KSS 1095 P-B	11	Slit air nozzles P.19
			Side spray nozzles	1/4 KSY 10	9	Mist header P.20
			Flat spray nozzles	1/4 KSH 1080	21	Flat spray nozzles P.21-22
Calendar	19	Sheet knock shower	Side spray nozzles	3/8 KSY 30	9	Flat atomizing nozzles P.23
			Flat spray nozzles	1/4 KSH 3080	21	Full-cone nozzles P.24
			Air blaster	AB-15P	18	Noncore full-cone nozzles P.25
						Whirl spray nozzles P.26
Coater	21	Canvas chemical washing	Mini atomize nozzles	MMA-50 W	13	Shower pipe P.27
	22	Canvas high pressure washing	Straight jet nozzles	1/8 KSAJ 0.3	3	Test equipment P.28
	23	Canvas air purge	Air jet nozzles	3/8 KSV 2000 C	17	
Finishing	24	Dryer chemical washing	Mini atomize nozzles	MMA-50 W	13	
	25	Wear prevention for calendar roll	Mini mist nozzles	KSMMS 040115	15	
	26	Gate roll mist washing	Mini atomize nozzles	MMA-200 W	13	
Coater	27	Backing roll mist washing	Flat atomizing nozzles	1/4 AS 00280	22	
			Mini atomize nozzles	MMA-100 W	13	
			Air jet nozzles	1/4 KSV 1000 C	17	
Finishing	28	Drying prevention	Mini atomize nozzles	MMA-200 W	13	
			Air mist nozzles	PV-D 1.5	16	

Needle Jet Nozzles



Features

- High impact force without scatter of spray.
- Nozzle orifice of highly wear-resistant material.
- Any different diameters based upon paper weight and speed are available.

Materials

- Nozzle tip : Cemented carbide or Ruby
- Nozzle case : Stainless steel
(standard material : JIS SUS303)

Applications

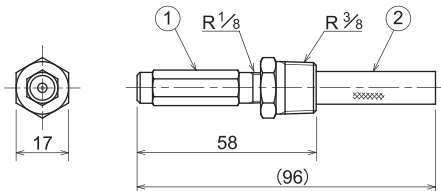
- Trim cutter (edge cutting), Tail cutter.

Ruby type :
Enlargement of the
nozzle orifice

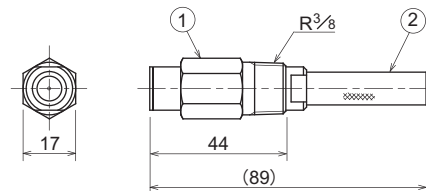


Shapes and dimensions

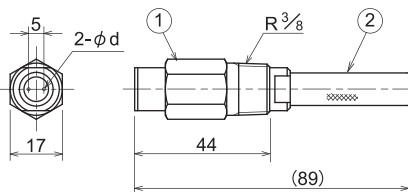
- $\frac{1}{8}$ KCJ ... D type
- $\frac{1}{8}$ KRJ ... D type



- $\frac{3}{8}$ KCJ ... D type
- $\frac{3}{8}$ KRJ ... D type



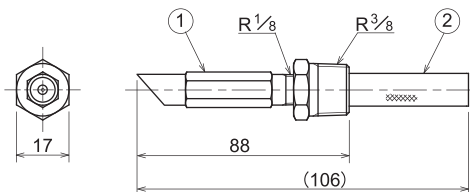
- $\frac{3}{8}$ KCJ ... D x 2 type (double-needle type)
- $\frac{3}{8}$ KRJ ... D x 2 type (double-needle type)



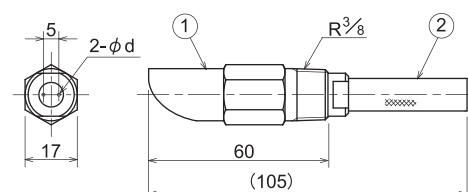
No.	Part name
1	Nozzle
2	Filter

Model	Weight (g)
$\frac{1}{8}$ KCJ...D	45
$\frac{3}{8}$ KCJ...D	60
$\frac{3}{8}$ KCJ...Dx2	60

- $\frac{1}{8}$ KCJK ... D type (Papar powder prevention type)
- $\frac{1}{8}$ KRJK ... D type (Papar powder prevention type)



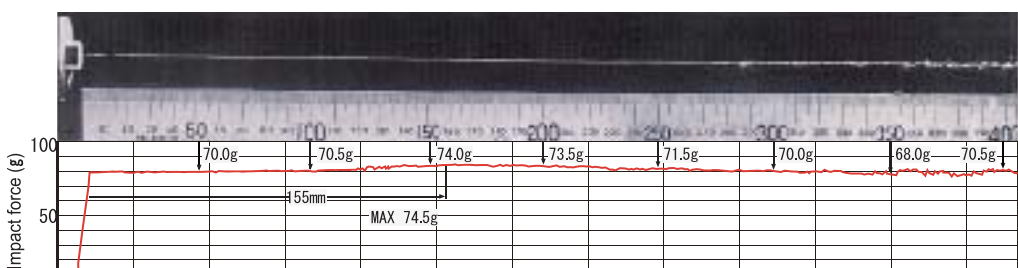
- $\frac{3}{8}$ KCJK ... D x 2 type (Papar powder prevention type)
- $\frac{3}{8}$ KRJK ... D x 2 type (Papar powder prevention type)



NPT thread is also available.

- The scatter of spray

- Double-needle type



Straightened laminar flow up to 200mm without scatter and impact force is maximized distance at 150mm.



Standard type model number list

● : Model availability

Connecting threads	Model		Model number	Orifice dia. (mm)	Flow rate (ℓ/min) at following pressure (MPa)								Filter (mesh)
	KCJ	KRJ			0.3	1	1.5	2	2.5	3	4	5	
1/8	●	●	0.3D	0.3	0.07	0.12	0.15	0.17	0.19	0.21	0.25	0.28	80
	●	●	0.4D	0.4	0.12	0.22	0.27	0.31	0.35	0.38	0.44	0.49	
	●	●	0.5D	0.5	0.19	0.34	0.42	0.48	0.54	0.59	0.68	0.77	
	●	●	0.6D	0.6	0.27	0.49	0.60	0.70	0.78	0.85	0.99	1.10	
	●	●	0.7D	0.7	0.37	0.67	0.82	0.95	1.06	1.16	1.34	1.49	
3/8	●	●	0.8D	0.8	0.48	0.88	1.07	1.24	1.39	1.52	1.75	1.96	50
	●	●	0.9D	0.9	0.61	1.11	1.36	1.57	1.76	1.92	2.2	2.5	
	●	●	1.0D	1.0	0.75	1.37	1.68	1.94	2.2	2.4	2.7	3.1	
	●	●	1.2D	1.2	1.08	1.97	2.4	2.8	3.1	3.4	3.9	4.4	
	●	●	1.2D	1.2	1.08	1.97	2.4	2.8	3.1	3.4	3.9	4.4	

※ Flow rates are just for reference as they depend on orifice diameter.

Standard type model number list (double-needle type)

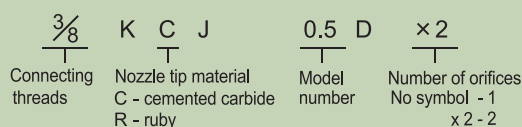
● : Model availability

Connecting threads	Model		Model number	Orifice dia. (mm)	Flow rate (ℓ/min) at following pressure (MPa)								Filter (mesh)
	KCJ	KRJ			0.3	1	1.5	2	2.5	3	4	5	
3/8	●	●	0.3D × 2	0.3	0.14	0.24	0.29	0.34	0.38	0.42	0.48	0.54	80
	●	●	0.4D × 2	0.4	0.24	0.44	0.54	0.62	0.70	0.76	0.88	0.98	
	●	●	0.5D × 2	0.5	0.38	0.68	0.84	0.96	1.08	1.18	1.36	1.52	
	●	●	0.6D × 2	0.6	0.54	0.98	1.20	1.40	1.56	1.70	1.98	2.2	
	●	●	0.7D × 2	0.7	0.74	1.34	1.64	1.90	2.1	2.3	2.7	3.0	50
	●	●	0.8D × 2	0.8	0.96	1.76	2.2	2.5	2.8	3.1	3.5	3.9	
	●	●	0.9D × 2	0.9	1.22	2.2	2.7	3.1	3.5	3.9	4.4	5.0	
	●	●	1.0D × 2	1.0	1.50	2.7	3.4	3.9	4.3	4.8	5.5	6.1	
	●	●	1.2D × 2	1.2	2.2	3.9	4.8	5.6	6.2	6.8	7.9	8.8	
	●	●	1.2D × 2	1.2	2.2	3.9	4.8	5.6	6.2	6.8	7.9	8.8	

※ • Flow rates are just for reference as they depend on orifice diameter.

• Double orifices with different diameter (ex. 0.3 x 0.4) is available. If material of the tip is cemented carbide, different hole diameters (ex. 0.45mm, 0.55mm) are also available.

Model and Model number representing



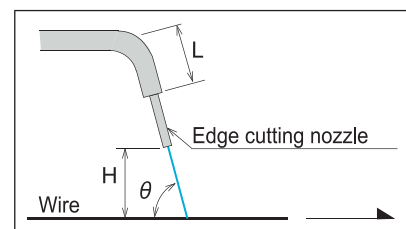
Selection of Edge cutting nozzle

The diameter of Edge cutting nozzle would be decided based upon following factors.

- paper weight
- paper speed
- water pressure
- spray distance

One of the important factors for paper cutting is the impact force and it is promotional to the product of pressure and flow rate. Increasing impact force and using larger orifice diameter is easy to apply, however following negative phenomenon would be generated.

- Spray pattern is no longer sharper when pressure is increased.
- Larger orifice makes spray area bigger.



These phenomenon leads to lack of sharpness on the paper edge and also the edge would be bunched. Furthermore, they are one of the causes of cutting paper after the wire part. Therefore, a nozzle which has greater straightness of spray and optimized impact force is needed. Based upon our expertise, the nozzle with double 0.4mm diameter orifices and using pressure 3 MPa is one of the best selections.

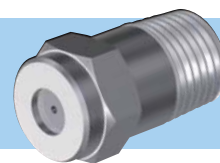
The edge cutting nozzle is normally installed with 60 to 75 degrees lead angle against traveling direction or counter direction. Spray distance "H" would be determined to maximize the impact however, preventing paper powder adherence needs to be considered at the same time. Putting filter on a nozzle is also considered to prevent clogging.

It is recommended that make "L" dimension longer, as it absorbs turbulent flow and spray pattern would be stable.

About paper powder

Paper powder would be generated while paper is cutting by sprayed water from the nozzle. To take measures to these phenomenon, some important specifications such as suitable nozzle orifice diameter, spray distance and pressure need to be considered. The amount of paper powder depends on the grade of paper, basic weight, paper speed, grade of wire and place of use. Please ask our sales representative for the selection of optimum spray nozzles based upon an application.

Straight Jet Nozzles



Features

- Highly excellent straightness and larger impact force for better cleaning effect.
- Orifice of highly wear-resistant material such as cemented carbide, ruby, etc. (KCJ, KRJ, etc.)
- No increasing water flow rate much even if you use it for long time.

Materials

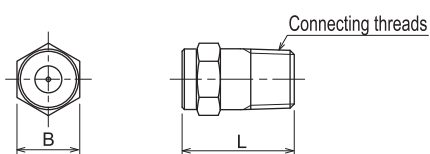
- Nozzle tip : Stainless steel, cemented carbide, ceramics, sapphire, or ruby
- Nozzle casing : Stainless steel (standard material : JIS SUS303)

Applications

- High pressure cleaning for wire, felts, coach roll, canvas, screen, etc.

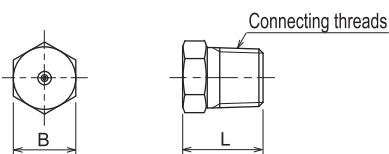
Shapes and dimensions

- KCJ ... S, KRJ ... S, KSJ ... S and KCEJ ... S types



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/8 KCJ...S	10	18	R 1/8	10
1/4 KCJ...S	14	25	R 1/4	30
3/8 KCJ...S	17	32	R 3/8	50

- KSAJ type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/8 KSAJ	12	16	R 1/8	10
1/4 KSAJ	14	18	R 1/4	20

NPT thread is also available

Standard type model number list

● : Model availability

Connecting threads	Model					Model number	Orifice dia. (mm)	Flow rate (ℓ/min) at following pressure (MPa)							
	KCJ	KRJ	KSJ	KCEJ	KSAJ			0.3	0.5	0.7	1	2	3	4	5
1/8	●	●	●	●	●	0.3	0.3	0.07	0.09	0.10	0.12	0.17	0.21	0.25	0.28
	●	●	●	●	●	0.4	0.4	0.12	0.15	0.18	0.22	0.31	0.38	0.44	0.49
	●	●	●	●	●	0.5	0.5	0.19	0.24	0.28	0.34	0.48	0.59	0.68	0.77
	●	●	●	●	●	0.6	0.6	0.27	0.35	0.41	0.49	0.70	0.85	0.99	1.10
	●	●	●	●	●	0.7	0.7	0.37	0.47	0.56	0.67	0.95	1.16	1.34	1.50
	●	●	●	●	●	0.8	0.8	0.48	0.62	0.74	0.88	1.24	1.52	1.75	1.96
	●	●	●	●	●	0.9	0.9	0.61	0.78	0.93	1.11	1.57	1.92	2.2	2.5
	●	●	●	●	●	1.0	1.0	0.75	0.97	1.15	1.37	1.94	2.4	2.7	3.1
	●	●	●	●	●	1.1	1.1	0.91	1.17	1.39	1.66	2.3	2.9	3.3	3.7
	●	●	●	●	●	1.2	1.2	1.08	1.39	1.65	1.97	2.8	3.4	3.9	4.4
	●	●	●	●	●	1.3	1.3	1.27	1.64	1.93	2.3	3.3	4.0	4.6	5.2
	●	●	●	●	●	1.4	1.4	1.47	1.90	2.3	2.7	3.8	4.6	5.4	6.0
	●	●	●	●	●	1.5	1.5	1.69	2.2	2.6	3.1	4.4	5.3	6.2	6.9
	●	●	●	●	●	1.6	1.6	1.92	2.5	2.9	3.5	5.0	6.1	7.0	7.8
	●	●	●	●	●	1.7	1.7	2.2	2.8	3.3	4.0	5.6	6.9	7.9	8.8
	●	●	●	●	●	1.8	1.8	2.4	3.1	3.7	4.4	6.3	7.7	8.9	9.9
1/4	●	●	●	●	●	1.9	1.9	2.7	3.5	4.1	4.9	7.0	8.6	9.9	11.0
	●	●	●	●	●	2.0	2.0	3.0	3.9	4.6	5.5	7.7	9.5	10.9	12.2
	●	●	●	●	●	2.1	2.1	3.3	4.3	5.1	6.0	8.5	10.5	12.1	13.5
	●	●	●	●	●	2.2	2.2	3.6	4.7	5.6	6.6	9.4	11.5	13.2	14.8
	●	●	●	●	●	2.3	2.3	4.0	5.1	6.1	7.2	10.2	12.5	14.5	16.2
	●	●	●	●	●	2.4	2.4	4.3	5.6	6.6	7.9	11.1	13.7	15.8	17.6
	●	●	●	●	●	2.5	2.5	4.7	6.0	7.2	8.6	12.1	14.8	17.1	19.1
	●	●	●	●	●										
3/8	●	●	●	●	●										
	●	●	●	●	●										
	●	●	●	●	●										
	●	●	●	●	●										
	●	●	●	●	●										
	●	●	●	●	●										
	●	●	●	●	●										
	●	●	●	●	●										

※ Flow rates are just for reference as they depend on orifice diameter.

- Model and Model number representing

1/4 K C J 1.0 S
 Connecting threads Nozzle tip material Model number
 C - cemented carbide
 R - ruby
 S - stainless steel
 CE - ceramics
 SA - sapphire

Straight Jet Nozzles — Type C —



Features

- When mounted on a pipe, the nozzle orifice projects inside the pipe, and is highly resistant to clogging.
- CL type (Long type) is higher clogging resistant.

Materials

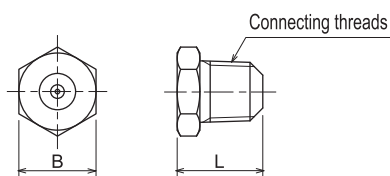
- Nozzle tip : Stainless steel, cemented carbide, ceramics, or ruby
- Nozzle casing : Stainless steel (standard material : JIS SUS303)

Applications

- High pressure cleaning for wire, felts, etc.

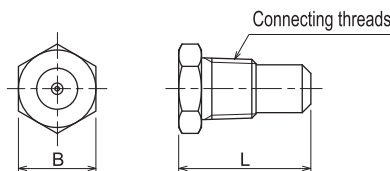
Shapes and dimensions

- KCJ ... C, KRJ ... C, KSJ ... C and KCEJ ... C types



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/8 KCJ...C	12	15	R 1/8	15
1/4 KCJ...C	17	19	R 1/4	25
KCJ...C	17	19	M 14	25

- KCJ ... CL, KRJ ... CL, KSJ ... CL and KCEJ ... CL types



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/8 KCJ...CL	12	29	R 1/8	20
1/4 KCJ...CL	17	29	R 1/4	40

NPT thread is also available

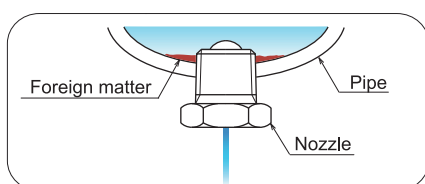
Standard type model number list

● : Model availability

Connecting threads	Model				Model number	Orifice dia. (mm)	Flow rate (ℓ/min) at following pressure (MPa)							
	KCJ	KRJ	KSJ	KCEJ			0.3	0.5	0.7	1	2	3	4	5
1/8	●	●			0.3	0.3	0.07	0.09	0.10	0.12	0.17	0.21	0.25	0.28
	●	●			0.4	0.4	0.12	0.15	0.18	0.22	0.31	0.38	0.44	0.49
	●	●			0.5	0.5	0.19	0.24	0.29	0.34	0.48	0.59	0.68	0.77
	●	●			0.6	0.6	0.27	0.35	0.41	0.49	0.70	0.85	0.99	1.10
	●	●			0.7	0.7	0.37	0.47	0.56	0.67	0.95	1.16	1.34	1.50
1/4	●	●	●	●	0.8	0.8	0.48	0.62	0.73	0.88	1.24	1.52	1.75	1.96
	●	●	●	●	0.9	0.9	0.61	0.78	0.93	1.11	1.57	1.92	2.2	2.5
	●	●			1.0	1.0	0.75	0.97	1.15	1.37	1.94	2.4	2.7	3.1
	●		●	●	1.2	1.2	1.08	1.39	1.65	1.97	2.8	3.4	3.9	4.4
	●		●	●	1.5	1.5	1.69	2.2	2.6	3.1	4.4	5.3	6.2	6.9
	●		●	●	2.0	2.0	3.0	3.9	4.6	5.5	7.7	9.5	10.9	12.2

※ Flow rates are just for reference as they depend on orifice diameter.

Example of use



Model and Model number representing

1/4	K	C	J	1.0	C
Connecting threads	Nozzle tip material			Model number	
	C - cemented carbide				
	R - ruby				
	S - stainless steel				
	CE - ceramics				

Self-cleaning Nozzles



Features

- Even if the nozzle orifice is blocked with foreign matter, the orifice can open wider by the reduction in spray pressure to 0.03 MPa, hence blockages can be removed without detaching the nozzle. It is effective when you are worried about clogging by water quality.

Material

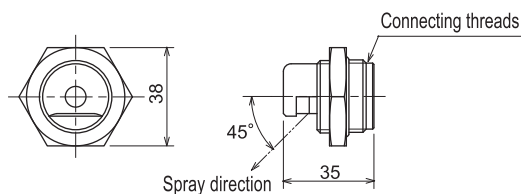
- Stainless steel (JIS SUS303 or SUS316)

Applications

- Cleaning wire and felts.
- Cleaning wire roll and press roll.
- Cleaning by the equipment which is difficult to de-installation.

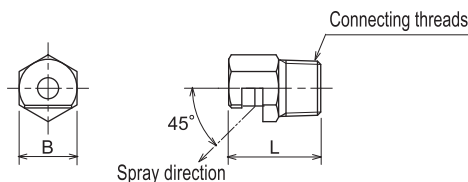
Shapes and dimensions

● Straight pattern (straight threaded type)



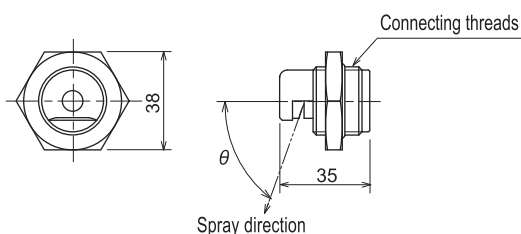
Model	Connecting threads	Weight (g)
SCJ	G $\frac{3}{4}$ ϕ 28, 20 threads	130

● Straight pattern (taper threaded type)



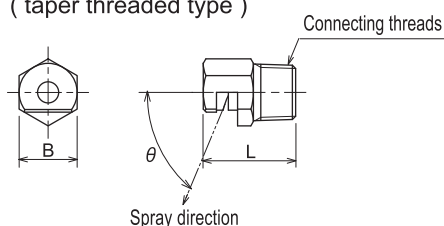
Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
$\frac{1}{2}$ SCJ	22	35	R $\frac{1}{2}$	75
$\frac{3}{4}$ SCJ	27	35	R $\frac{3}{4}$	120

● Flat pattern (straight threaded type)



Model	Connecting threads	Weight (g)
SCF	G $\frac{3}{4}$ ϕ 28, 20 threads	130

● Flat pattern (taper threaded type)



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
$\frac{1}{2}$ SCF	22	35	R $\frac{1}{2}$	75
$\frac{3}{4}$ SCF	27	35	R $\frac{3}{4}$	120

- ※
- Spray direction within 70- 85 degree.
 - Maximum flow rate 6 ℓ/min at 0.3 MPa for thread size 1/2. Thread size 3/4 is for more flow rate.

NPT thread is also available

● Model and Model number representing

● Straight threaded type

S C J
 J - straight pattern type
 F - flat pattern type

0.8
 Model number

G 3/4
 Connecting threads
 G 3/4 - JIS G threaded
 No symbol - ϕ 28, 20 threads

● Taper threaded type

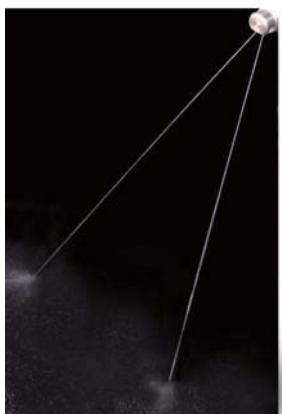
3/4
 Connecting threads

S C J
 J - straight pattern type
 F - flat pattern type

0.8
 Model number

■ Standard type model number list

Model	Model number	Equivalent orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)											Spray angle at 0.3 MPa
			0.1	0.2	0.3	0.4	0.5	0.7	1	2	3	4	5	
SCJ	0.5	0.5	0.16	0.23	0.28	0.32	0.37	0.43	0.52	0.73	0.90	1.04	1.16	—
	0.6	0.6	0.24	0.33	0.41	0.47	0.53	0.63	0.75	1.06	1.30	1.50	1.68	—
	0.7	0.7	0.32	0.46	0.56	0.65	0.72	0.85	1.02	1.45	1.77	2.0	2.3	—
	0.8	0.8	0.42	0.60	0.73	0.84	0.94	1.12	1.33	1.89	2.3	2.7	3.0	—
	0.9	0.9	0.56	0.80	0.98	1.13	1.26	1.49	1.78	2.5	3.1	3.6	4.0	—
	1.0	1.0	0.66	0.93	1.14	1.31	1.47	1.74	2.1	2.9	3.6	4.2	4.6	—
	1.2	1.2	0.95	1.34	1.64	1.90	2.1	2.5	3.0	4.2	5.2	6.0	6.7	—
	1.5	1.5	1.48	2.1	2.6	3.0	3.3	3.9	4.7	6.6	8.1	9.4	10.5	—
SCF	0215	1.3	1.15	1.63	2.0	2.3	2.6	3.1	3.7	—	—	—	—	15°
	0240	1.3	1.15	1.63	2.0	2.3	2.6	3.1	3.7	—	—	—	—	40°
	0280	1.3	1.15	1.63	2.0	2.3	2.6	3.1	3.7	—	—	—	—	80°
	02130	1.3	1.15	1.63	2.0	2.3	2.6	3.1	3.7	—	—	—	—	130°
	0415	1.9	2.3	3.3	4.0	4.6	5.2	6.1	7.3	—	—	—	—	15°
	0440	1.9	2.3	3.3	4.0	4.6	5.2	6.1	7.3	—	—	—	—	40°
	0480	1.9	2.3	3.3	4.0	4.6	5.2	6.1	7.3	—	—	—	—	80°
	04130	1.9	2.3	3.3	4.0	4.6	5.2	6.1	7.3	—	—	—	—	130°
	0615	2.3	3.5	4.9	6.0	6.9	7.7	9.2	11.0	—	—	—	—	15°
	0640	2.3	3.5	4.9	6.0	6.9	7.7	9.2	11.0	—	—	—	—	40°
	0680	2.3	3.5	4.9	6.0	6.9	7.7	9.2	11.0	—	—	—	—	80°
	06130	2.3	3.5	4.9	6.0	6.9	7.7	9.2	11.0	—	—	—	—	130°
	1015	3.0	5.8	8.2	10.0	11.5	12.9	15.3	18.3	—	—	—	—	15°
	1040	3.0	5.8	8.2	10.0	11.5	12.9	15.3	18.3	—	—	—	—	40°
	1080	3.0	5.8	8.2	10.0	11.5	12.9	15.3	18.3	—	—	—	—	80°
	10130	3.0	5.8	8.2	10.0	11.5	12.9	15.3	18.3	—	—	—	—	130°
	1415	3.5	8.1	11.4	14.0	16.2	18.1	21.4	25.6	—	—	—	—	15°
	1440	3.5	8.1	11.4	14.0	16.2	18.1	21.4	25.6	—	—	—	—	40°
	1480	3.5	8.1	11.4	14.0	16.2	18.1	21.4	25.6	—	—	—	—	80°
	14130	3.5	8.1	11.4	14.0	16.2	18.1	21.4	25.6	—	—	—	—	130°
	1815	4.0	10.4	14.7	18.0	20.8	23.2	27.5	32.9	—	—	—	—	15°
	1840	4.0	10.4	14.7	18.0	20.8	23.2	27.5	32.9	—	—	—	—	40°
	1880	4.0	10.4	14.7	18.0	20.8	23.2	27.5	32.9	—	—	—	—	80°
	18130	4.0	10.4	14.7	18.0	20.8	23.2	27.5	32.9	—	—	—	—	130°

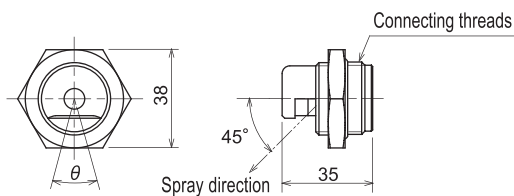


Available to increase cleaning efficiency.

More effective wire cleaning when just mounting both header end.

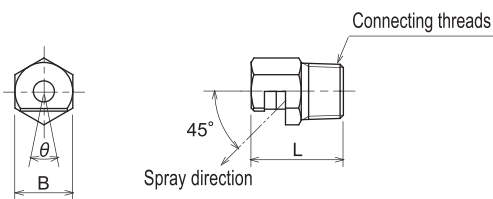
Spray angle : 30° type and 45° type.

- SCJ double-needle type (straight threaded type)



Model	Connecting threads	Weight (g)
SCJ $\cdot\cdot\cdot$ x2	G $\frac{3}{4}$ ϕ 28, 20 threads	130

- SCJ double-needle type (taper threaded type)



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/2 SCJ-2x2	22	35	R 1/2	75
3/4 SCJ-2x2	27	35	R 3/4	120

θ : Gap at each needle jets

NPT thread is also available

- Model and Model number representing

- Straight threaded type

S	C	J	$\frac{0.5 \times 2}{\text{Model number}}$	$\frac{G \frac{3}{4}}{\text{Connecting threads}}$	$\frac{- 45^\circ}{\text{Gap at each needle jets}}$
				$G \frac{3}{4}$ - JIS G threaded	
				No symbol - $\phi 28, 20$ threads	

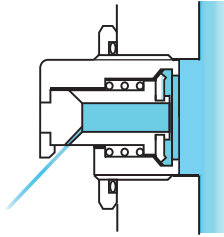
- Taper threaded type

$\frac{1}{2}$	S	C	J	$\frac{0.5 \times 2}{}$	$- \frac{30^\circ}{}$
Connecting threads				Model number	Gap at each needle jets

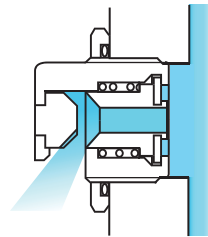
Model	Model number	Equivalent orifice diameter (mm)	Flow rate (ℓ /min) at following pressure (MPa)											Spray angle at 0.3 MPa
			0.1	0.2	0.3	0.4	0.5	0.7	1	2	3	4	5	
SCJ	0.5 X 2	0.5	0.32	0.46	0.56	0.64	0.74	0.86	1.04	1.46	1.80	2.1	2.3	—
	0.6 X 2	0.6	0.48	0.66	0.82	0.94	1.06	1.26	1.50	2.1	2.6	3.0	3.4	—
	0.7 X 2	0.7	0.64	0.92	1.12	1.30	1.44	1.70	2.0	2.9	3.5	4.0	4.6	—
	0.8 X 2	0.8	0.84	1.20	1.46	1.68	1.88	2.2	2.7	3.8	4.6	5.4	6.0	—
	0.9 X 2	0.9	1.12	1.60	1.96	2.3	2.5	3.0	3.6	5.0	6.2	7.2	8.0	—
	1.0 X 2	1.0	1.32	1.86	2.3	2.6	2.9	3.5	4.2	5.8	7.2	8.4	9.2	—
	1.2 X 2	1.2	1.90	2.7	3.3	3.8	4.2	5.0	6.0	8.4	10.4	12.0	13.4	—
	1.5 X 2	1.5	3.0	4.2	5.2	6.0	6.6	7.8	9.4	13.2	16.2	18.8	21.0	—

Cleaning principle

- In normal operation (at increased pressure)



- When cleaning foreign matters (at 0.03 MPa)



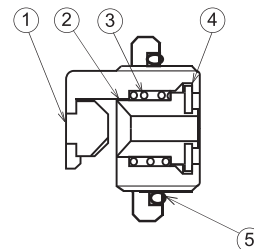
Flow rate should not exceed 10 ℓ/min for purging foreign substances.

● Nozzle Wear

Sometime, Self cleaning nozzle has wear from a high-pressure process.
 Everloy nozzles can be manufactured from materials other than standard materials.
 (Coated nozzle, Nozzle tip and guide manufactured from anti-wear materials etc.)
 For more information, please contact our sales representatives.

● Repair service

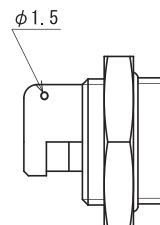
Everloy will offer assistance in good spray nozzle maintenance.
 We can replacement of components and check the performance in our factory. (fare-paying services)
 Components mean Nozzle tip, Nozzle guide, Spring, Diaphragm and O-ring.
 We can help your spray nozzle maintenance cost and time.



Symbol	Name	Material
1	Nozzle tip	SUS303
2	Nozzle guide	SUS303
3	Spring	SUS316
4	Diaphragm	Rubber
5	O ring	Rubber

● Protection against falling nozzles

We can manufacture the pierced nozzles as shown the picture if you need. Lacing a wire through a hole, it is available to protect against falling nozzles.



Side Spray Nozzles



Features

- Wide spray angle.
- Simple structure for resistance to clogging.
- No spraying interference by alternant layout of standard type and long type.

Material

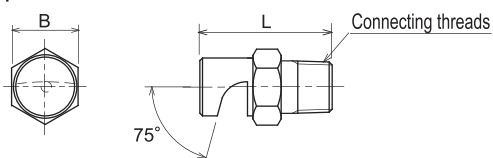
- Stainless steel (standard material : JIS SUS303)

Applications

- Low pressure cleaning for overall paper making process such as doctor shower, center roll wetting, etc.
- Defoaming

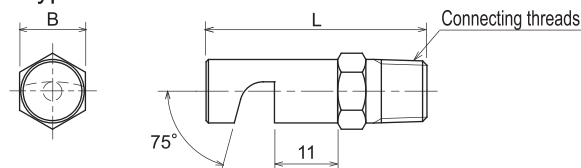
Shapes and dimensions

• KSY type



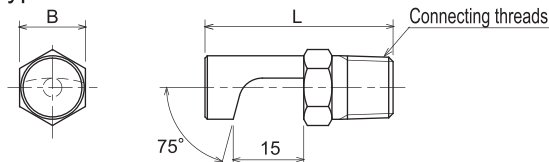
Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/8 KSY	12	25	R 1/8	20
1/4 KSY	14	34	R 1/4	35
3/8 KSY	17	44	R 3/8	70

• KSY... L type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/8 KSY...L	12	35	R 1/8	25
1/4 KSY...L	14	44	R 1/4	40

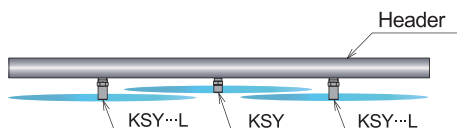
• KSYL type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/8 KSYL	12	40	R 1/8	25
1/4 KSYL	14	40	R 1/4	40
3/8 KSYL	17	44	R 3/8	70

NPT thread is also available

Example of use



• Model and Model number representing

1/4	K	S	Y	10
Connecting threads	material			Model number
	S - stainless steel			

Standard type model number list

● : Model availability

Connecting threads	Model			Model number	Minimum orifice dia. (mm)	Flow rate (ℓ/min) at following pressure (MPa)							Spray angle at following pressure (MPa)		
	KSY	KSY...L	KSYL			0.1	0.2	0.3	0.4	0.5	0.7	1.0	0.1	0.3	1.0
1/8	●	●	●	01	1.1	0.58	0.82	1.00	1.15	1.29	1.53	1.83	127°	140°	148°
	●	●	●	015	1.2	0.87	1.22	1.50	1.73	1.94	2.3	2.7	127°	140°	148°
	●	●	●	02	1.4	1.15	1.63	2.0	2.3	2.6	3.1	3.7	128°	140°	147°
	●	●	●	03	1.7	1.73	2.4	3.0	3.5	3.9	4.6	5.5	128°	140°	147°
1/4	●	●	●	04	2.0	2.3	3.3	4.0	4.6	5.2	6.1	7.3	128°	140°	147°
	●	●	●	06	2.4	3.5	4.9	6.0	6.9	7.7	9.2	11.0	128°	140°	147°
	●	●	●	08	2.9	4.6	6.5	8.0	9.2	10.3	12.2	14.6	128°	140°	147°
	●	●	●	10	3.1	5.8	8.2	10.0	11.5	12.9	15.3	18.3	128°	140°	147°
	●	●	●	15	3.9	8.7	12.2	15.0	17.3	19.4	22.9	27.4	128°	140°	147°
3/8	●	●	●	20	4.4	11.5	16.3	20.0	23.1	25.8	30.6	36.5	130°	140°	146°
	●	●	●	25	4.9	14.4	20.4	25.0	28.9	32.3	38.2	45.6	130°	140°	146°
	●	●	●	30	5.4	17.3	24.5	30.0	34.6	38.7	45.8	54.8	130°	140°	146°

- ※ • In general, in the case of using white water, it is said to be lower incidence rate of clogging by using nozzle with orifice diameter more than 3mm.
- Long nose type is relatively easy maintenance structure.

Side Spray Nozzles (for pulp displacement washing)



Features

- At the extremely low pressure such as 0.001 MPa, it is possible to spray wide angle.
- Effective cleaning by extremely soft impact for pulp, etc.

Material

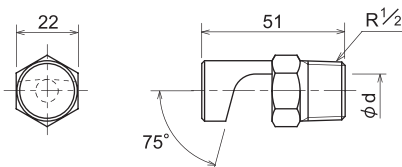
- Stainless steel (standard material : JIS SUS303)

Applications

- Washing of pulp in drum washer, drum filter, thickener etc.

Shapes and dimensions

● KSYD type

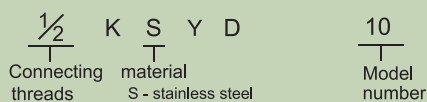


Weight (g)

80

NPT thread is also available

● Model and Model number representing

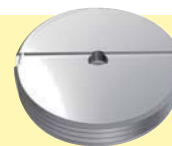


Standard type model number list

Model	Model number	Orifice dia. d (mm)	Flow rate (ℓ/min) at following pressure (MPa)						Spray width (mm) at following pressure (MPa) (spray distance : 200mm)					
			0.001	0.002	0.003	0.004	0.005	0.01	0.001	0.002	0.003	0.004	0.005	0.01
1/2 KSYD	8	8	4.1	5.9	7.1	8.2	9.2	13.0	235	415	445	465	505	705
	10	10	7.0	9.9	12.1	13.9	15.7	22.1	260	445	530	575	660	930
	12	12	7.9	11.1	13.6	15.8	17.6	24.8	295	515	575	655	800	1090
	13	13	9.1	12.8	15.8	18.2	20.3	28.8	380	595	640	735	1085	—

※ Flow rates are just for reference as they depend on orifice diameter.

Cat's-eye Nozzles



Features

- Minimum projection when installed on header. Useful for the very short spray distance or limited connecting space.
- Resistant to clogging due to an almost circular orifice section with an increased minimum orifice diameter.

Material

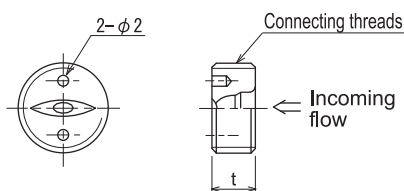
- Stainless steel (standard material : JIS SUS303)

Applications

- For wetting and low-pressure shower of Wire and Felt roll.
- Inner washing of Suction Roll.

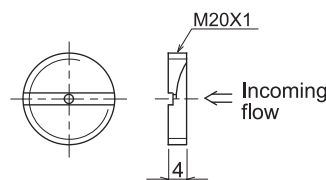
Shapes and dimensions

● KSS... P - A type



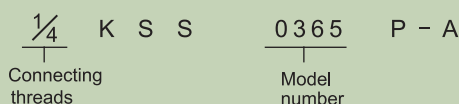
Model	Dimension t (mm)	Connecting threads	Weight (g)
1/4 KSS...P-A	5	G 1/4	4
3/8 KSS...P-A	8	G 3/8	10

● KSS... P - B type



Model	Weight (g)
KSS...P-B	8

● Model and Model number representing

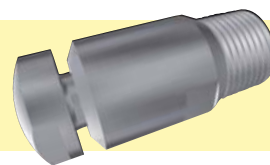


Standard type model number list

● : Model availability

Connecting threads (P-A type)	Model		Model number	Minimum Orifice dia. (mm)	Flow rate (ℓ/min) at following pressure (MPa)							Spray angle at following pressure (MPa)			
	KSS ...P-A	KSS ...P-B			0.05	0.1	0.2	0.3	0.4	0.5	0.7	0.1	0.2	0.3	0.5
1/4	●	●	00865	1.0	0.33	0.46	0.65	0.80	0.92	1.03	1.22	43°	59°	65°	69°
	●	●	0165	1.1	0.41	0.58	0.82	1.00	1.15	1.29	1.53	43°	59°	65°	69°
	●	●	0265	1.5	0.82	1.15	1.63	2.0	2.3	2.6	3.1	43°	59°	65°	69°
	●	●	0365	1.9	1.22	1.73	2.4	3.0	3.5	3.9	4.6	47°	60°	65°	68°
	●	●	0395	1.8	1.22	1.73	2.4	3.0	3.5	3.9	4.6	83°	92°	95°	98°
	●	●	0565	2.5	2.0	2.9	4.1	5.0	5.8	6.5	7.6	47°	60°	65°	68°
	●	●	0595	2.4	2.0	2.9	4.1	5.0	5.8	6.5	7.6	83°	92°	95°	98°
	●	●	0765	3.0	2.9	4.0	5.7	7.0	8.1	9.0	10.7	52°	61°	65°	68°
	●	●	0795	2.9	2.9	4.0	5.7	7.0	8.1	9.0	10.7	88°	93°	95°	98°
	●	●	1065	3.5	4.1	5.8	8.2	10.0	11.5	12.9	15.3	52°	61°	65°	68°
	●	●	1095	3.3	4.1	5.8	8.2	10.0	11.5	12.9	15.3	88°	93°	95°	98°
	●	●	1265	3.8	4.9	6.9	9.8	12.0	13.9	15.5	18.3	52°	61°	65°	68°
●	●	1295	3.6	4.9	6.9	9.8	12.0	13.9	15.5	18.3	88°	93°	95°	98°	
3/8	●	●	1565	4.3	6.1	8.7	12.2	15.0	17.3	19.4	22.9	52°	61°	65°	68°
	●		1595	4.1	6.1	8.7	12.2	15.0	17.3	19.4	22.9	88°	93°	95°	98°
	●	●	1965	4.8	7.8	11.0	15.5	19.0	21.9	24.5	29.0	52°	61°	65°	68°
	●		1995	4.6	7.8	11.0	15.5	19.0	21.9	24.5	29.0	88°	93°	95°	98°

Pipe Inner Wall Washing Nozzles



Features

- Water curtain of uniform spraying on inner surfaces of pipes.
- Most effective inner washing inside shower pipe by white water.

Material

- Stainless steel (standard material : JIS SUS303)

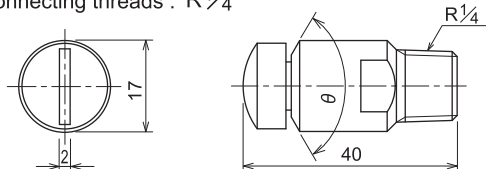
Applications

- Washing of inner walls of shower pipes and headers.

Shapes and dimensions

● DNP...B type (backward spraying)

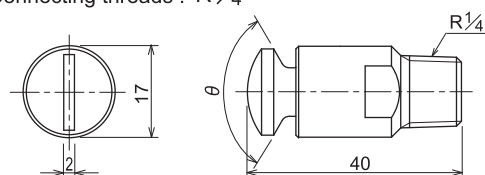
Connecting threads : R $\frac{1}{4}$



Model	Weight (g)
$\frac{1}{4}$ DNP...B	50

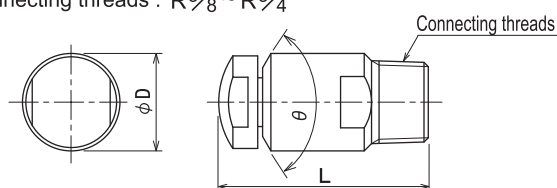
● DNP...F type (forward spraying)

Connecting threads : R $\frac{1}{4}$



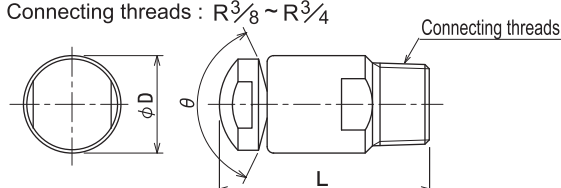
Model	Weight (g)
$\frac{1}{4}$ DNP...F	50

Connecting threads : R $\frac{3}{8}$ ~ R $\frac{3}{4}$



Model	Dimension (mm)		Connecting threads	Weight (g)
	D	L		
$\frac{3}{8}$ DNP...B	20	43	R $\frac{3}{8}$	85
$\frac{1}{2}$ DNP...B	25	50	R $\frac{1}{2}$	150
$\frac{3}{4}$ DNP...B	30	55	R $\frac{3}{4}$	230

Connecting threads : R $\frac{3}{8}$ ~ R $\frac{3}{4}$



Model	Dimension (mm)		Connecting threads	Weight (g)
	D	L		
$\frac{3}{8}$ DNP...F	20	43	R $\frac{3}{8}$	85
$\frac{1}{2}$ DNP...F	25	50	R $\frac{1}{2}$	150
$\frac{3}{4}$ DNP...F	30	55	R $\frac{3}{4}$	230

NPT thread is also available

● Model and Model number representing

$\frac{1}{4}$	D N P	10120	B
Connecting threads		Model number	B : backward spraying F : forward spraying

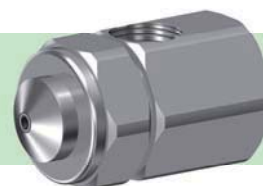
Standard type model number list

● : Model availability

Connecting threads	Model		Model number	Minimum orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)						Spray angle θ
	DNP...B	DNP...F			0.3	1.0	2.0	3.0	4.0	5.0	
$\frac{1}{4}$	●	●	10120	0.3	10.0	18.3	25.6	31.6	36.5	40.8	120°
	●	●	10150	0.3	10.0	18.3	25.6	31.6	36.5	40.8	150°
$\frac{3}{8}$	●	●	15120	0.45	15.0	27.4	38.7	47.4	54.8	61.2	120°
	●	●	15150	0.45	15.0	27.4	38.7	47.4	54.8	61.2	150°
$\frac{1}{2}$	●	●	25120	1.0	25.0	45.6	64.5	79.1	91.3	102	120°
	●	●	25150	1.0	25.0	45.6	64.5	79.1	91.3	102	150°
$\frac{3}{4}$	●	●	35120	1.3	35.0	63.9	90.4	111	128	143	120°
	●	●	35150	1.3	35.0	63.9	90.4	111	128	143	150°

※ Please confirm your pump capacity and flow rate consumption.

Mini Atomize Nozzles



Features

- Available as a pressure spray set-up or siphon spray set-up.
- Simple structure and easy maintenance.
- Fine droplets and wide full cone pattern.
- Lowest flow available.
- Anti-clogging.

Material

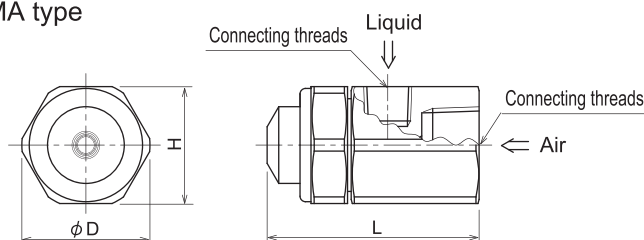
- Stainless steel (standard material : JIS SUS303)

Applications

- Cleaning for gate roll, backing roll and size roll.
- Prevention of excessive "size agent" build up.
- Canvas chemical washing of dryer parts.
- Humidity regulation, Drying prevention.
- Using in lower flow.

Shapes and dimensions

MMA type



Model and Model number representing

MMA - 100W
Model number

NPT thread is also available

Standard type model number list

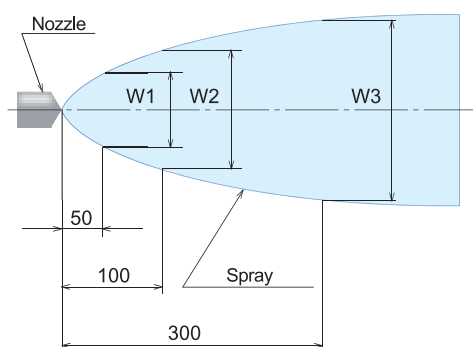
Model number	Minimum orifice diameter for liquid (mm)	Air flow rate (ℓ/min(Nor.)) (air pressure : 0.3MPa)	Water flow rate (mℓ/min)	Connecting threads		Weight (g)	Dimensions (mm)		
				Liquid	Air		D	H	L
50W	1.5	50	5~100	Rc 1/8	Rc 1/8	60	21	19	33
100W	2.0	100	10~200	Rc 1/8	Rc 1/4	80	23	21	38
200W	2.0	200	25~500	Rc 1/8	Rc 1/4	80	23	21	38
500W	2.5	500	50~1000	Rc 1/4	Rc 1/2	280	35	32	58
1000W	3.0	1000	100~2000	Rc 1/4	Rc 1/2	280	35	32	58

※・MMA 50W~100W : When using siphon system, above the flow rate will be supplied over 0.1MPa air pressure.

・MMA 200W~1000W : Using pressure set-up is available with the all the above flow rate.

・In case of using high viscosity. Please contact our sales representatives for more information.

Spray width (air pressure : 0.3 MPa , at minimum water flow rate)



Model number		Spray width (mm)		
		W 1	W 2	W 3
MMA	50W	25~30	50~55	110~130
	100W	30~35	55~60	130~150
	200W	30~35	55~60	130~150
	500W	40~45	70~80	180~200
	1000W	40~45	70~80	180~200

・ Spray angle is approx. 30° at 0.3 MPa, will be wider less than 0.3 MPa as Air pressure.

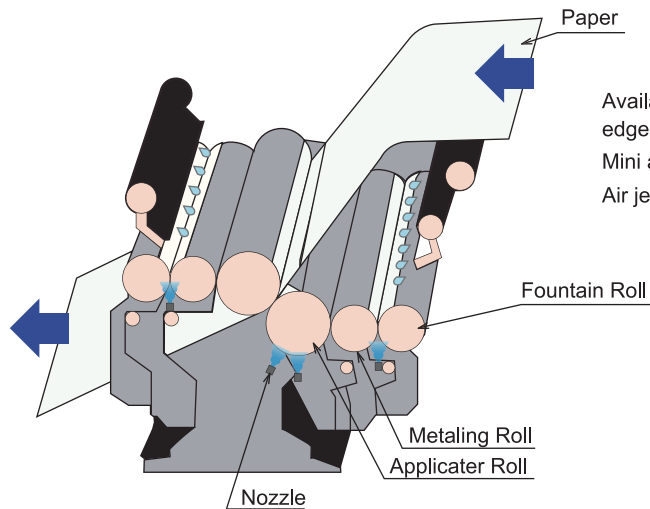
・ Air pressure of lower than 0.3 MPa, spray angle will be wider.

Atomize nozzle Features

Model	Features
Mini atomize nozzles	• Unobstructed flow passages, which minimize clogging. • Three part construction. • Easy to maintain. • Wide angle fullcone spray pattern.
Mini mist nozzles	• Compact and lightweight. • Wide angle flat spray pattern.
PV, PNV nozzles	• PV type can change spray pattern freely from fullcone to flat spray. • Non-drip feature can be provided by the automatic cylinder.

Example of use

● Gate roll coater

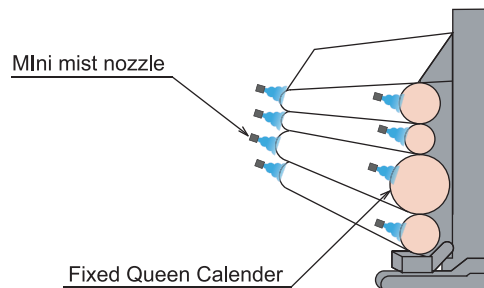


Available to keep roll clean constantly, when spraying roll edge.

Mini atomize nozzle or Flat atomizing nozzle are suitable.

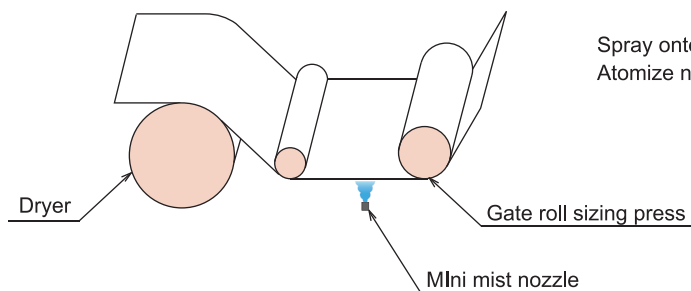
Air jet nozzle can be used to remove droplet. (P17).

● Calender roll (Wear prevention of roll edge)



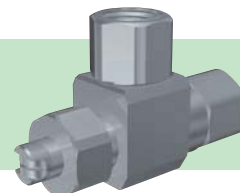
Using atomize nozzles are available in wear prevention of roll edge.

● Humidity regulation



Spray onto a dry part for humidity regulation. Atomize nozzles are suitable.

Mini Mist Nozzles



Features

- Flow rate controllable within a wide range, from very small to relatively large.
- Compact and lightweight nozzles for connection in a limited space.
- Sprayed mist spreading over a large area due to a wide spray pattern.
- Quick-drying mist.
- Simple structure for resistance to clogging and for easy overhaul cleaning.

Material

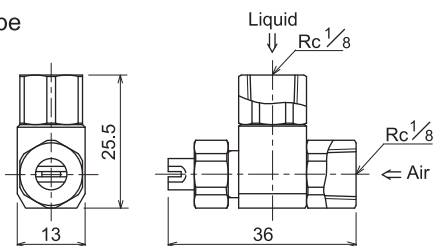
- Stainless steel (standard material : JIS SUS303)

Applications

- Mist-washing for roll
- Moisturizing to paper

Shapes and dimensions

Internal mixing type



Weight (g)

35

NPT thread is also available

Model and Model number representing

KSMMS

Model

015115

Model number

A11W035

Model number of mixing body

Standard type model number list

Model	Model number	Model number of mixing body	Minimum orifice diameter for liquid (mm)	Air pressure (MPa)	Water flow rate (mℓ/min) and air flow rate (ℓ/min(Nor.)) at following water pressure (MPa)								Spray width (mm) at following water pressure (MPa) (Spray distance : 500 mm)		
					0.2		0.3		0.4		0.5		0.2	0.3	0.4
					Water	Air	Water	Air	Water	Air	Water	Air			
KSMMS	015115	A11W035	0.35	0.1	64	16	107	15	121	15	129	15	800	800	900
				0.2	68	27	94	26	112	25	125	25	700	800	900
				0.3	50	36	79	35	100	34	117	33	600	800	900
				0.4	27	46	60	45	85	44	104	43	600	700	900
				0.5	—	—	41	54	71	53	92	52	—	700	900
	027115	A15W05	0.5	0.1	182	28	228	27	258	26	284	25	800	900	900
				0.2	146	47	200	45	248	43	280	41	800	800	900
				0.3	102	65	168	63	222	61	259	59	700	800	900
				0.4	58	83	127	82	189	80	232	78	600	800	900
				0.5	—	—	92	97	158	96	207	95	—	800	900
	040115	A18W06	0.6	0.1	256	43	315	41	357	40	390	38	800	900	900
				0.2	220	69	290	66	350	64	388	62	800	900	900
				0.3	276	97	252	96	318	95	372	93	700	800	900
				0.4	132	123	213	123	283	121	345	119	600	800	900
				0.5	89	149	176	146	249	146	313	145	600	800	900

Note: Blanks indicate water spraying at a very low flow rate or air jet only.

Please refer to external mixing type at our general catalog E31.

Air Mist Nozzles — PV, PNV type —



Features

- Wide range flowrate is controlled and adjustable on the value at hand.
- PV type can change spray pattern freely from fullcone to flat spray.
- No special tool required to overhaul.

Material

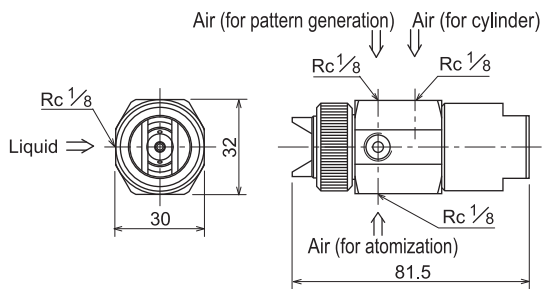
- Stainless steel (standard material : JIS SUS303)

Applications

- Humidification, humidity control, spraying of deodorant, painting, cooling, sterilization, dust deposition, washing, spraying of chemicals, etc.

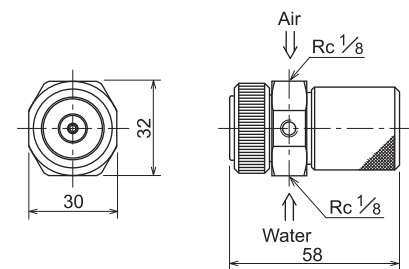
Shapes and dimensions

PV type (with automatic cylinder)



※ Nozzles with no automatic cylinder are also available.

PNV type



NPT thread is also available

Model	Weight(g)
PV	350
PNV	280

Model and Model number representing

PV — D 0.4
Model Model number

Standard type model number list

Model	Model number	Minimum orifice diameter for water (mm)	Water flow rate (ℓ/min) at following water pressure (MPa)						Air pressure (MPa)	Air flow rate (ℓ/min(Nor.))	Air flow rate for pattern generation (ℓ/min (Nor.)) (PV only)
			0.01	0.02	0.03	0.04	0.05	0.06			
PV PNV	0.4	0.4	30	42	52	61	68	75	0.1	19	36
									0.2	28	54
									0.3	38	72
									0.4	48	90
									0.5	57	108
	0.5	0.5	47	67	82	95	106	116	0.1	23	36
									0.2	38	54
									0.3	53	72
									0.4	68	90
									0.5	83	108
	1.0	1.0	190	267	327	378	423	463	0.1	27	36
									0.2	43	54
									0.3	59	72
									0.4	75	90
									0.5	90	108
	1.5	1.5	425	600	736	850	950	1040	0.1	38	36
									0.2	56	54
									0.3	76	72
									0.4	95	90
									0.5	113	108
	2.0	2.0	755	1070	1310	1510	1690	1850	0.1	47	36
									0.2	66	54
									0.3	87	72
									0.4	107	90
									0.5	127	108

Note: When a PV type is used to generate a flat spray pattern, its air flow rate is determined as the sum of the air flow rate for pattern generation and the air flow rate shown above.
PV type is available with spray angle (20~ 90°) as full cone and flat spray pattern. PNV type is available with spray angle 20° as fullcone spray pattern.

Air Jet Nozzles



Features

- Simple structure and anti-clogging.
- Divergent internal structure allows supersonic blow.
- Tapered nose shape minimizes turbulent flow and reduction in rate.

Materials

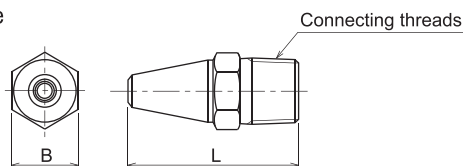
- Stainless steel (standard material : JIS SUS303)
- Brass
- Aluminum

Applications

- Air purging for roll edge.
- Blowing away paper dust.

Shapes and dimensions

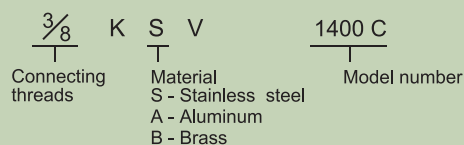
KSV type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/4 KSV...C	14	34	R 1/4	33
3/8 KSV...C	17	44	R 3/8	55

We can also provide for pipe attachment type. ($\phi 6$ and $\phi 8$)
For more information, please contact our sales representatives.

Model and Model number representing



Standard type model number list

● : Model availability

Connecting threads	Model			Model number	Orifice diameter (mm)	Air flow rate ($\ell/\text{min}(\text{Nor.})$) at following pressure (MPa)						
	KSV	KBV	KAV			0.1	0.2	0.3	0.4	0.5	0.6	0.7
1/4	●	●	●	0300	1.75	48	72	72	120	143	167	191
	●	●	●	0400	2.04	64	96	96	159	191	223	254
	●	●	●	0500	2.26	80	120	120	199	239	278	318
	●	●	●	0700	2.68	113	168	168	279	334	390	445
	●	●	●	1000	3.22	161	240	240	398	478	557	636
3/8	●	●	●	1400	3.80	225	336	447	558	669	780	890
	●	●	●	2000	4.56	322	480	639	797	955	1110	1270

※ Spray angle
: about 16°

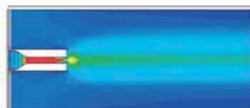
Performance data

Velocity distribution analysis result

Analysis condition : Minimum passage diameter = $\phi 6$ mm, Pressure = 0.1 MPa,
Nozzle length = approx. 50 mm

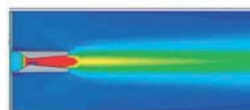
Pipes

Decaying speed at nozzle outlet.



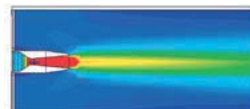
KBV (conventional type)

The less decaying speed than pipe type.



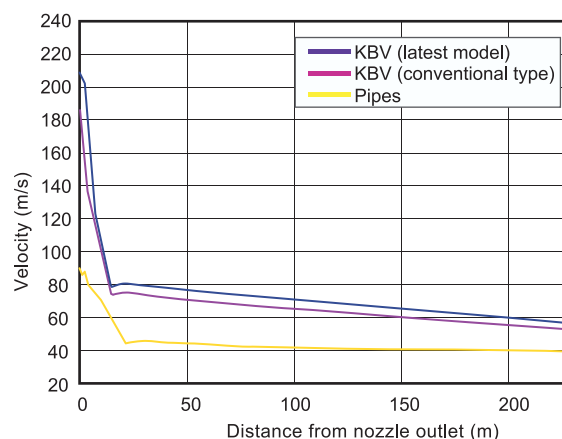
KBV (latest model)

Allow for the most rapid blowing.



Velocity (m/s)

Flow velocity of nozzle outlet



Air Blaster



Features

- Uniform impact force.
- Wide blow width with a single nozzle.
- Low noise.

Materials

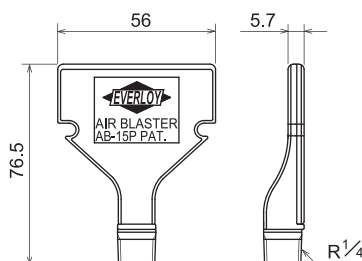
- Stainless steel (standard material : JIS SUS304)
- Aluminum
- ABS resin

Applications

- Paper guide.
- Blowing away paper dust.
- Air curtain.
- Removal of drip.

Shapes and dimensions

● AB type



Model	Material	Weight (g)	Heatproof temperature (°C)	Maximum service pressure (MPa)
AB - 15P	ABS resin	16	80	0.7
AB - 15A	Aluminum	59	200	0.4
AB - 15S	Stainless steel	165	200	0.4

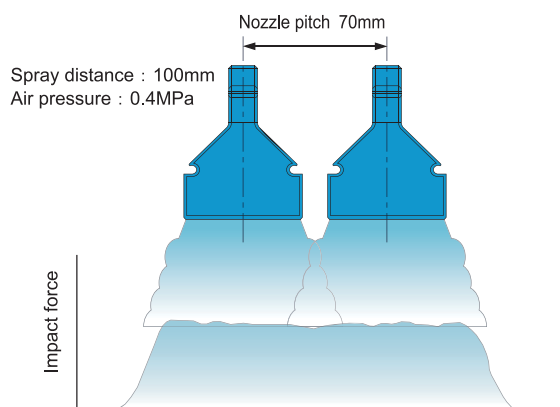
NPT thread is also available

Standard type model number list

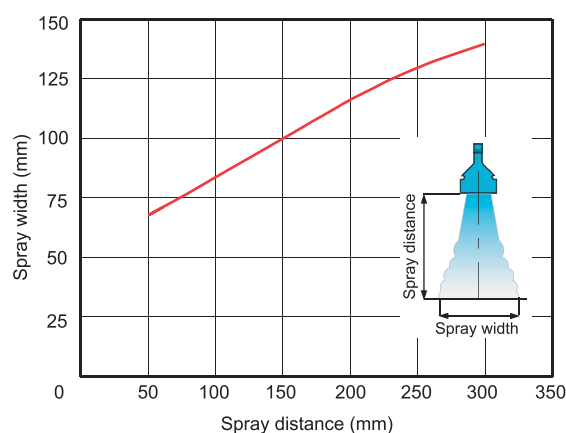
Model	Model number	Minimum orifice diameter (mm)	Air flow rate (ℓ/min(Nor.)) at following pressure (MPa)					
			0.1	0.2	0.3	0.4	0.5	0.7
AB	15	0.9	230	350	470	590	710	950

Performance data

Impact force distribution in overlapped application



Spray width characteristic curve



Slit Air Nozzles - Pipe type -



Features

- Compatibility with air from blower and compressor.
- Available in producing a excellent uniform air blow.
- Slit aperture from 0.15 to several millimeters.
- Overall length extendable to more than 2 m.
- Weight saving.

Material

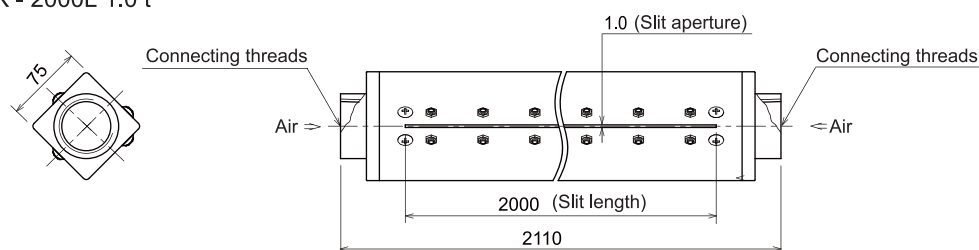
- Stainless steel (standard material : JIS SUS304)

Applications

- Air curtain
- Air purging for roll

Shapes and dimensions

- Model number : KAK - 2000L 1.0 t



- Model and Model number representing

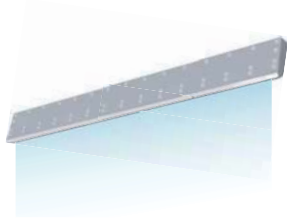
K A K — $\frac{2000}{\text{Slit length}} \text{ L } \frac{1.0}{\text{Slit aperture}} \text{ t}$

Performance data (Calculated value)

Slit length (mm)	Slit aperture (mm)	Air flow rate (m ³ /h(Nor.)) at following pressure (MPa)					
		0.005	0.01	0.02	0.03	0.04	0.05
500	0.15	23	33	46	57	66	73
	0.3	46	66	93	114	131	147
	0.5	77	110	155	190	219	245
	0.8	124	175	248	303	350	392
	1.0	155	219	310	379	438	490
1000	0.15	46	66	93	114	131	147
	0.3	93	131	186	328	263	294
	0.5	155	219	310	379	438	490
	0.8	248	350	496	607	701	784
	1.0	310	438	619	759	876	979
1500	0.15	70	99	136	171	197	220
	0.3	139	197	279	341	394	441
	0.5	232	329	465	569	657	735
	0.8	372	526	743	910	1051	1175
	1.0	465	657	919	1138	1314	1469
2000	0.15	93	131	186	228	263	294
	0.3	186	263	372	455	526	588
	0.5	310	438	619	759	879	979
	0.8	496	701	991	1214	1402	1567
	1.0	619	876	1239	1517	1752	1969
2400	0.15	111	158	223	273	315	353
	0.3	223	315	446	546	631	705
	0.5	372	526	743	910	1051	1175
	0.8	594	841	1189	1457	1682	1880
	1.0	743	1051	1487	1821	2102	2351

※ Flow rates are just for references as they depend on piping configuration.

Slit Air Nozzles - Plate type -



Features

- Remarkable uniformity over the entire width of spray.
- Suitable for compressed air.
- Available in removing residue water.
- Paper thin slit ranging from 0.05 to 0.3 mm.
- Available in slit length over 3 m.

Materials

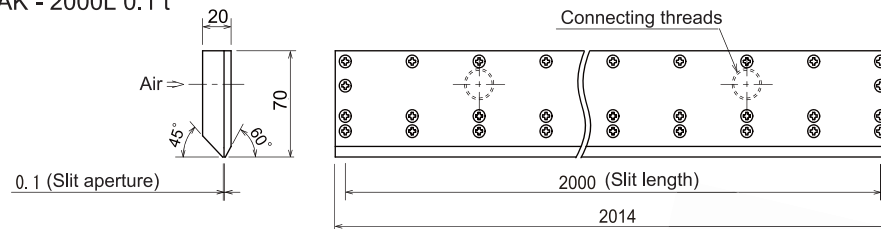
- Stainless steel (standard material : JIS SUS304)
- Aluminum alloy, Plastics (H-PVC, etc.)

Applications

- Air curtain
- Air purging for roll

Shapes and dimensions

- Model number : AK - 2000L 0.1 t



Mist Header



Features

- Two fluid nozzle
- Available in easy mounting of piping area
- Available in producing a excellent uniform flow and impact force

Material

- Stainless steel (standard material : JIS SUS303,SUS304)

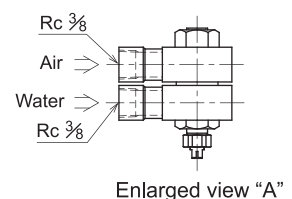
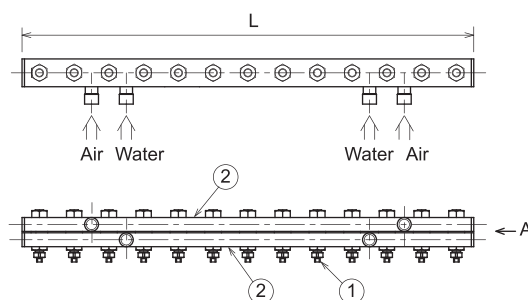
Applications

- Roll cleaning
- Canvas washing with mist spray

Shapes and dimensions

- KSMMS WP type

No.	Part name
1	Nozzle
2	Header



NPT thread is also available

Flat Spray Nozzles



Features

- Simple structure for resistance to clogging.
- High impact force and large size droplets.

Material

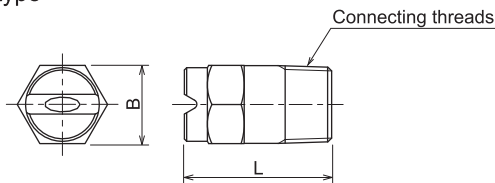
- Stainless steel (standard material : JIS SUS303)

Applications

- Sheet knock shower, doctor shower.
- Cleaning for rolls or screens.

Shapes and dimensions

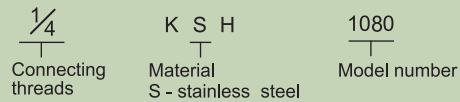
● KSH type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/4 KSH	14	25	R 1/4	25
3/8 KSH	17	32	R 3/8	45

NPT thread is also available

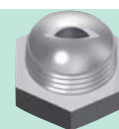
● Model and Model number representing



Standard type model number list

Connecting threads	Model number	Minimum orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)									Spray angle at following pressure (MPa)					
			0.05	0.1	0.2	0.3	0.5	0.7	1.0	1.5		0.1	0.2	0.3	0.5	1.0	1.5
1/4	0465	1.3	1.63	2.3	3.3	4.0	5.2	6.1	7.3	8.9		54°	61°	65°	69°	72°	72°
	0480	1.1	1.63	2.3	3.3	4.0	5.2	6.1	7.3	8.9		67°	75°	80°	85°	88°	88°
	0865	2.0	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9		56°	62°	65°	68°	71°	71°
	0880	1.7	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9		68°	76°	80°	84°	86°	86°
	1065	2.3	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4		56°	62°	65°	68°	70°	70°
	1080	2.0	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4		70°	77°	80°	83°	85°	85°
	1565	3.0	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5		56°	62°	65°	68°	70°	70°
	1580	2.5	6.1	8.7	12.2	15.0	19.4	22.9	27.4	33.5		70°	77°	80°	83°	85°	85°
	3065	4.2	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1		57°	62°	65°	68°	70°	70°
	3080	4.0	12.2	17.3	24.5	30.0	38.7	45.8	54.8	67.1		72°	77°	80°	83°	85°	85°
3/8	3565	4.6	14.3	20.2	28.6	35.0	45.2	53.5	63.9	78.3		57°	62°	65°	68°	70°	70°
	3580	4.4	14.3	20.2	28.6	35.0	45.2	53.5	63.9	78.3		72°	77°	80°	83°	85°	85°
	4065	5.0	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4		57°	62°	65°	68°	70°	70°
	4080	4.8	16.3	23.1	32.7	40.0	51.6	61.1	73.0	89.4		72°	77°	80°	83°	85°	85°

Flat Spray Nozzles — Type C —



Features

- When a nozzle of this type is mounted on a pipe, its orifice projects inside the pipe to prevent foreign matter from staying on the orifice.
- Resistant to clogging and easy to clean.

Material

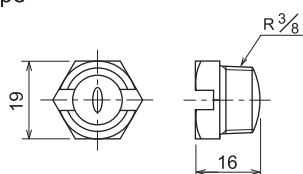
- Stainless steel (standard material : JIS SUS303)

Applications

- Cleaning for rolls at wire part and felt part.
- Various other washing purposes at locations where water of poor quality must be used.

Shapes and dimensions

- KSH··· C type

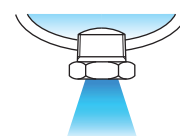


Weight (g)

20

NPT thread is also available

· Nozzle mounting example



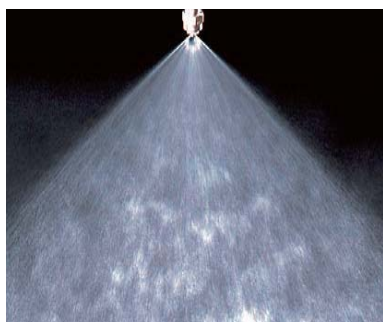
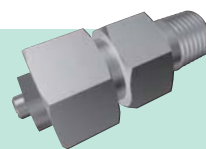
- Model and Model number representing

$\frac{3}{8}$ K S H 1050 C
 Connecting threads Material Model number
 S - stainless steel

Standard type model number list

Connecting threads	Model number	Minimum orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)								Spray angle at following pressure (MPa)					
			0.05	0.1	0.2	0.3	0.5	0.7	1.0	1.5	0.1	0.2	0.3	0.5	1.0	1.5
$\frac{3}{8}$	0550	1.1	2.0	2.9	4.1	5.0	6.5	7.6	9.1	11.2	35°	44°	50°	57°	62°	63°
	0650	1.2	2.4	3.5	4.9	6.0	7.7	9.2	11.0	13.4	35°	44°	50°	57°	62°	63°
	0750	1.4	2.9	4.0	5.7	7.0	9.0	10.7	12.8	15.7	35°	44°	50°	57°	62°	63°
	0850	1.5	3.3	4.6	6.5	8.0	10.3	12.2	14.6	17.9	35°	44°	50°	57°	62°	63°
	1050	1.7	4.1	5.8	8.2	10.0	12.9	15.3	18.3	22.4	35°	44°	50°	57°	62°	63°

Flat Atomizing Nozzles



Features

- Soft spraying of fine droplets.
- Simple structure and easy maintenance.
- Many flow rate are obtainable by interchanging nozzle tip.

Material

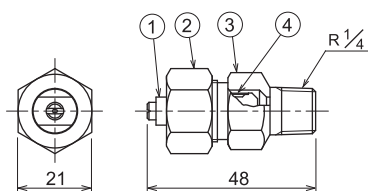
- Stainless steel (standard material : JIS SUS303)

Applications

- Cleaning for gate roll.
- Humidity regulation.
- Moisturizing wire or felt.

Shapes and dimensions

- AS type



Weight (g)

60

No.	Part name
1	Nozzle tip
2	Cap
3	Adapter
4	Filter

NPT thread is also available

- Model and Model number representing

$\frac{1}{4}$
Connecting
threads

A S

0180

Model number

Standard type model number list

Connecting threads	Model number	Minimum orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)							spray angle at following pressure (MPa)					Filter mesh
			0.1	0.2	0.3	0.5	0.7	1.0	1.5	0.1	0.3	0.5	1.0	1.5	
$\frac{1}{4}$	00240	0.3	0.115	0.163	0.20	0.26	0.31	0.37	0.45	14°	40°	52°	57°	57°	200
	00250	0.3	0.115	0.163	0.20	0.26	0.31	0.37	0.45	30°	50°	61°	67°	67°	
	00265	0.25	0.115	0.163	0.20	0.26	0.31	0.37	0.45	43°	65°	75°	82°	82°	
	00280	0.25	0.115	0.163	0.20	0.26	0.31	0.37	0.45	56°	80°	87°	92°	92°	
	00340	0.4	0.173	0.24	0.30	0.39	0.46	0.55	0.67	20°	40°	50°	55°	55°	200
	00350	0.3	0.173	0.24	0.30	0.39	0.46	0.55	0.67	35°	50°	59°	64°	64°	
	00365	0.3	0.173	0.24	0.30	0.39	0.46	0.55	0.67	45°	65°	74°	80°	80°	
	00380	0.3	0.173	0.24	0.30	0.39	0.46	0.55	0.67	58°	80°	86°	90°	90°	
	00440	0.5	0.23	0.33	0.40	0.52	0.61	0.73	0.89	25°	40°	48°	52°	52°	100
	00450	0.4	0.23	0.33	0.40	0.52	0.61	0.73	0.89	38°	50°	57°	61°	61°	
	00465	0.4	0.23	0.33	0.40	0.52	0.61	0.73	0.89	47°	65°	73°	78°	78°	
	00480	0.4	0.23	0.33	0.40	0.52	0.61	0.73	0.89	60°	80°	86°	90°	90°	
	00640	0.6	0.35	0.49	0.60	0.77	0.92	1.10	1.34	30°	40°	44°	46°	46°	100
	00650	0.6	0.35	0.49	0.60	0.77	0.92	1.10	1.34	39°	50°	56°	59°	59°	
	00665	0.5	0.35	0.49	0.60	0.77	0.92	1.10	1.34	49°	65°	72°	76°	76°	
	00680	0.5	0.35	0.49	0.60	0.77	0.92	1.10	1.34	62°	80°	86°	90°	90°	
	00840	0.7	0.46	0.65	0.80	1.03	1.22	1.46	1.79	31°	40°	44°	46°	46°	50
	00850	0.7	0.46	0.65	0.80	1.03	1.22	1.46	1.79	39°	50°	56°	59°	59°	
	00865	0.6	0.46	0.65	0.80	1.03	1.22	1.46	1.79	51°	65°	71°	75°	75°	
	00880	0.6	0.46	0.65	0.80	1.03	1.22	1.46	1.79	64°	80°	85°	88°	88°	
	0140	0.8	0.58	0.82	1.00	1.29	1.53	1.83	2.2	31°	40°	44°	46°	46°	50
	0150	0.8	0.58	0.82	1.00	1.29	1.53	1.83	2.2	40°	50°	55°	58°	58°	
	0165	0.7	0.58	0.82	1.00	1.29	1.53	1.83	2.2	51°	65°	71°	75°	75°	
	0180	0.6	0.58	0.82	1.00	1.29	1.53	1.83	2.2	66°	80°	85°	88°	88°	

Full-cone Nozzles



Features

- Full-circle spray pattern.
- Relatively small droplets size.
- Various flow rates and spray angles available.

Material

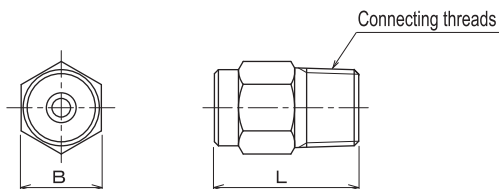
- Stainless steel (standard material : JIS SUS303)

Applications

- Cleaning the inside of head box.
- Defoaming.

Shapes and dimensions

- KSFHS type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/4 KSFHS	14	25	R 1/4	20
3/8 KSFHS	17	32	R 3/8	50

NPT thread is also available

- Model and Model number representing



Standard type model number list

Connecting threads	Model number	Minimum orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)							spray angle at following pressure (MPa)			
			0.05	0.1	0.2	0.3	0.5	0.7	1.0	0.1	0.3	0.5	0.7
1/4	0365	1.0	1.38	1.87	2.5	3.0	3.7	4.3	5.0	58°	65°	58°	45°
	0390	1.0	1.38	1.87	2.5	3.0	3.7	4.3	5.0	82°	90°	74°	56°
	0465	1.2	1.85	2.5	3.4	4.0	5.0	5.8	6.7	58°	65°	58°	45°
	0490	1.2	1.85	2.5	3.4	4.0	5.0	5.8	6.7	82°	90°	74°	56°
	04120W	1.2	1.85	2.5	3.4	4.0	5.0	5.8	6.7	115°	120°	105°	90°
	0665	1.4	2.8	3.7	5.0	6.0	7.5	8.6	10.1	58°	65°	58°	45°
	0690	1.4	2.8	3.7	5.0	6.0	7.5	8.6	10.1	82°	90°	76°	60°
	06120W	1.4	2.8	3.7	5.0	6.0	7.5	8.6	10.1	115°	120°	105°	90°
	0865	1.6	3.7	5.0	6.7	8.0	10.0	11.5	13.4	58°	65°	58°	45°
	0890	1.6	3.7	5.0	6.7	8.0	10.0	11.5	13.4	82°	90°	76°	60°
	08120W	1.6	3.7	5.0	6.7	8.0	10.0	11.5	13.4	117°	120°	107°	92°
3/8	1065	1.9	4.6	6.2	8.4	10.0	12.5	14.4	25.2	60°	65°	60°	48°
	1090	1.9	4.6	6.2	8.4	10.0	12.5	14.4	25.2	84°	90°	76°	60°
	10120W	1.9	4.6	6.2	8.4	10.0	12.5	14.4	25.2	117°	120°	107°	92°
	1565	2.2	6.9	9.4	12.6	15.0	18.7	21.6	33.6	60°	65°	60°	48°
	1590	2.2	6.9	9.4	12.6	15.0	18.7	21.6	33.6	84°	90°	76°	60°
	15120W	2.2	6.9	9.4	12.6	15.0	18.7	21.6	33.6	117°	120°	107°	92°

Noncore Full-cone Nozzles



Features

- Clog-free with no parts inside nozzles.
- High flow rate from a small body.

Material

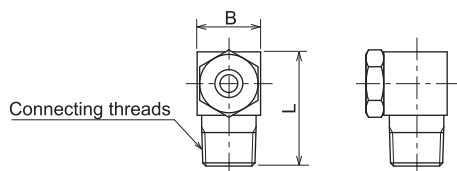
- Stainless steel (standard material : JIS SUS303)

Applications

- Deforming
- various washing

Shapes and dimensions

KSFL type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/4 KSFL	16	30	R 1/4	27
3/8 KSFL	22	38	R 3/8	48
1/2 KSFL	25	45	R 1/2	94

NPT thread is also available

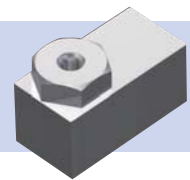
Model and Model number representing



Standard type model number list

Connecting threads	Model number	Minimum orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)						Spray angle at following pressure (MPa)
			0.05	0.1	0.2	0.3	0.4	0.5	
1/4	03	1.8	1.2	1.7	2.4	3.0	3.5	3.9	75° ~ 80°
	04	2.1	1.6	2.3	3.3	4.0	4.6	5.2	
	05	2.3	2.0	2.9	4.1	5.0	5.8	6.5	
	06	2.6	2.4	3.5	4.9	6.0	6.9	7.7	
	07	2.8	2.9	4.0	5.7	7.0	8.1	9.0	
	08	3.3	3.3	4.6	6.5	8.0	9.2	10.3	
	09	3.3	3.7	5.2	7.3	9.0	10.4	11.6	
	10	3.5	4.1	5.8	8.2	10.0	11.5	12.9	
	12	4.0	4.9	6.9	9.8	12.0	13.9	15.5	
3/8	14	4.1	5.7	8.1	11.4	14.0	16.2	18.1	75° ~ 80°
	16	4.3	6.5	9.2	13.1	16.0	18.5	20.7	
	18	4.5	7.3	10.4	14.7	18.0	20.8	23.2	
	20	4.7	8.2	11.5	16.3	20.0	23.1	25.8	
	22	5.0	9.0	12.7	18.0	22.0	25.4	28.4	
	24	5.2	9.8	13.9	19.6	24.0	27.7	31.0	
	26	5.8	10.6	15.0	21.2	26.0	30.0	33.6	
1/2	28	5.6	11.4	16.2	22.9	28.0	32.3	36.1	75° ~ 80°
	30	5.9	12.2	17.3	24.5	30.0	34.6	38.7	
	32	5.9	13.1	18.5	26.1	32.0	37.0	41.3	
	35	6.4	14.3	20.2	28.6	35.0	40.4	45.2	
	37	6.7	15.1	21.4	30.2	37.0	42.7	47.8	
	40	6.7	16.3	23.1	32.7	40.0	46.2	51.6	
	42	7.2	17.1	24.2	34.3	42.0	48.5	54.2	

Whirl spray Nozzles



Features

- Uniform flow distribution in the circumferential direction.
- Clog free with no parts inside nozzles.

Material

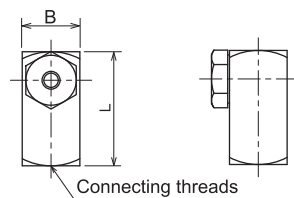
- Stainless steel (standard material : JIS SUS303)

Applications

- Inner washing of Couch Roll, Lubrication and Deforming.

Shapes and dimensions

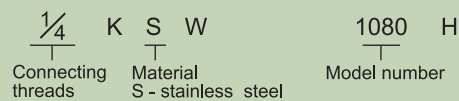
- KSW ... H type



Model	Dimension (mm)		Connecting threads	Weight (g)
	B	L		
1/4 KSW...H	16	32	Rc 1/4	55
3/8 KSW...H	22	38	Rc 3/8	105

NPT thread is also available

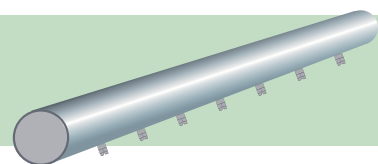
- Model and Model number representing



Standard type model number list

Connecting threads	Model number	Minimum orifice diameter (mm)	Flow rate (ℓ/min) at following pressure (MPa)								Spray angle at following pressure (MPa)	
			0.05	0.1	0.15	0.2	0.3	0.4	0.5	0.1	0.3	
1/4	0480	3.5	1.6	2.3	2.8	3.3	4.0	4.6	5.2	77°	80°	
	0680	4.5	2.4	3.5	4.2	4.9	6.0	6.9	7.7	77°	80°	
3/8	0880	5.0	3.3	4.6	5.7	6.5	8.0	9.2	10.3	77°	80°	
	1080	5.5	4.1	5.8	7.1	8.2	10.0	11.5	12.9	77°	80°	

Shower Pipe

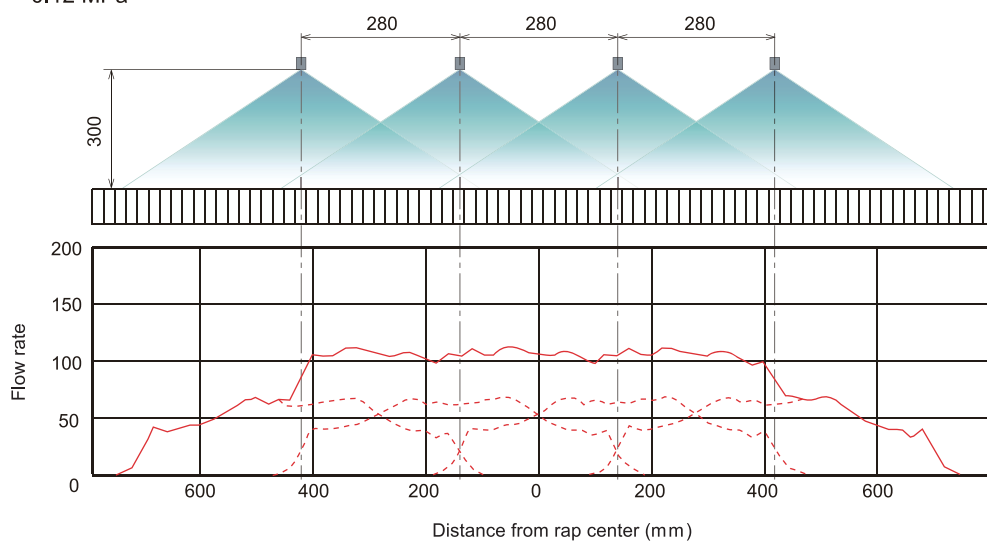


- The confirmation of needle jet performance and a uniform distribution at spray width of shower pipe, which we verify as the basic spray performance after manufacturing. And we will select a suitable nozzle model number and design a layout when providing us your request.

■ Lap flow rate distribution graph

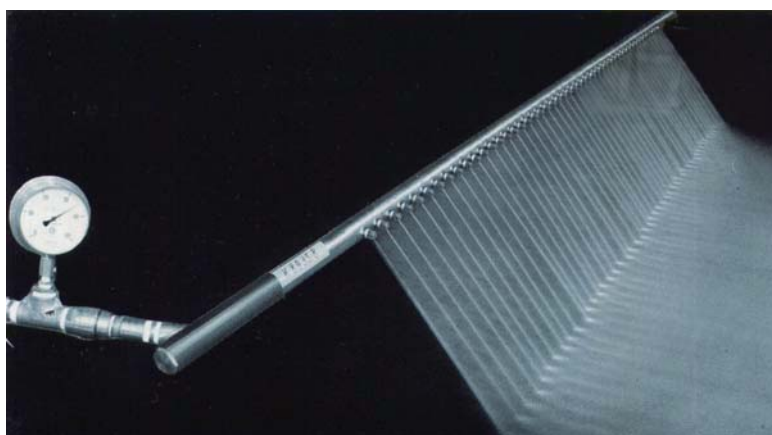
Model number ¼ KSS 0295

Pressure 0.12 MPa



■ Example of shower pipe specification

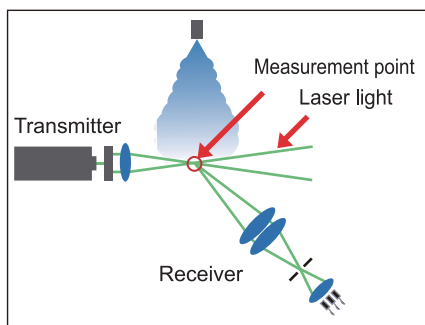
Pipe size 65A Sch40
 Length 4800 mm
 Material JIS SUS304
 Product name Self-cleaning nozzles
 Model number ½ SCJ 0.9
 Working pressure 3.5 MPa
 Number of nozzles 35 pcs.
 Flow rate per pipe 117.2 ℓ/min



Test Equipment

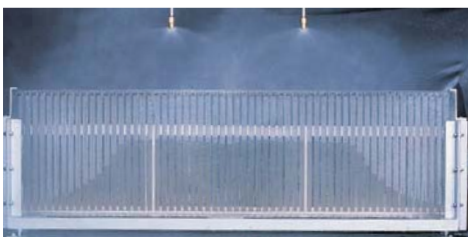
Kyoritsu Gokin conducts, various fluid tests and experiments. Typical test apparatuses include the PDPA system for the measurement of particle size and flow velocity, the particle size measurement system incorporating image analysis, the flow distribution measurement system, and the impact force distribution tester. Test results are utilized as fundamental data to improve the existing lines and to establish new technologies. Using these test apparatuses, we conduct tests and provide test results to meet your specific needs.

Phase Doppler Particle Analyzer (PDPA)



- This system is a particle analyzer making use of the phase doppler principle of the laser doppler system to measure the velocity and size of a particle simultaneously. The phase doppler principle is as follows. A lens placed on the transmitter allows two divided laser beams to cross each other. As particles pass the intersection, scattered rays form fringes. The receiver detects these fringes. PDPA (using the phase doppler method) measures the particle size of a continuous spray without interference with the spray. It is capable of sampling many particles instantaneously and has become dominant in particle size analysis. PDPA is suitable for the measurement of relatively small particles.

Flow distribution measurement system



- This system measures the distribution of spray flow density using an acrylic container grid, on which a liquid is sprayed, and the amounts of deposits are measured. It is also capable of measurement results in a flow distribution graph.

Impact force distribution tester



- This system determines the impact force distribution of a spray by running a pressure sensor underneath the spray. It is also capable of producing measurement results in an impact force distribution graph.

EVERLOY SPRAY NOZZLES

for PAPER MANUFACTURE



KYORITSU GOKIN CO., LTD.

Head Office	
Processing Division	12-16, Imazu-yamanaka-cho, Nishinomiya, Hyogo-pref. 663-8211 Japan TEL : +81-798-26-3606 FAX : +81-798-26-0544
Kaibara Works	
Nozzle Division	130-3, Kitayama, Kaibara-cho, Tamba, Hyogo-pref. 669-3313 Japan TEL : +81-795-72-3374 FAX : +81-795-72-3376
Cemented Carbide Division	100-1, Ohniya, Kaibara-cho, Tamba, Hyogo-pref. 669-3315 Japan TEL : +81-795-73-0026 FAX : +81-795-70-2120
Overseas Sales Dept.	2-24, 4-chome, Sagisu, Fukushima-ku, Osaka 553-0002 Japan TEL : +81-6-6452-2273 FAX : +81-6-6452-2187

URL <http://www.everloy-spray-nozzles.com/en/>

E-mail nozzle@everloy.co.jp

ISO 9001/14001 CERTIFICATION

