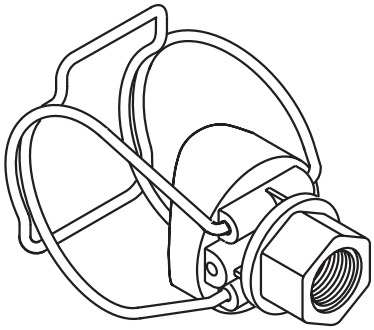
UNI-SPRAY SYSTEMS INC.

UNI-SPRAY

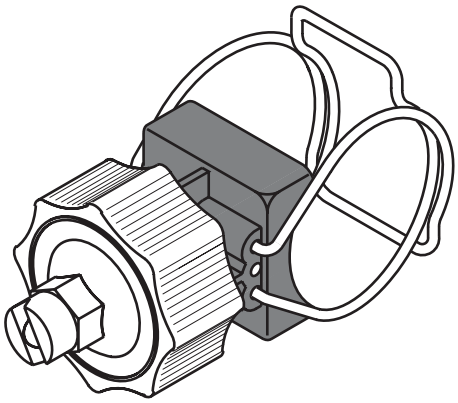
- CLAMP-ON NOZZLE SELECTION GUIDE -

Uni-Spray Nozzles ...

are injection molded from custom blended polypropylene, a cost effective material that is corrosion and heat resistant and is impervious to most chemicals. The Uni-Mix Tip design resists clogging and buildup due to its smooth shape and low coefficient of friction. A wide variety of Uni-Spray Clamp-On Nozzles are available to suit your application and are colour coded for easy identification (see table below). All nozzles are available with a Single Spring or an optional Double Spring configuration for pressures over 60 psi (4.0 bar). All of the nozzles are available in three spigot sizes to fit 21/32", 9/16" or 19mm diameter holes in the riser.



"Mark II"Fixed Nozzle Adapter



"Mark I"Adjustable Nozzle Assembly

"MARK I" Adjustable Nozzle Assembly...

permits nozzle directional adjustment of the nozzle tip anywhere within a 45° included angle. Interchangeable Nozzle Tips are available in Full Cone, Hollow Cone or Flat Spray styles with various combinations of spray angle and flow rate. The Mark I is also available with a Threaded Ball Connection in 1/8, 1/4, 3/8, and 1/2 inch NPT or BSP, allowing the use of any threaded plastic, brass or steel nozzle.

"MARK II" Fixed Nozzle Adapter...

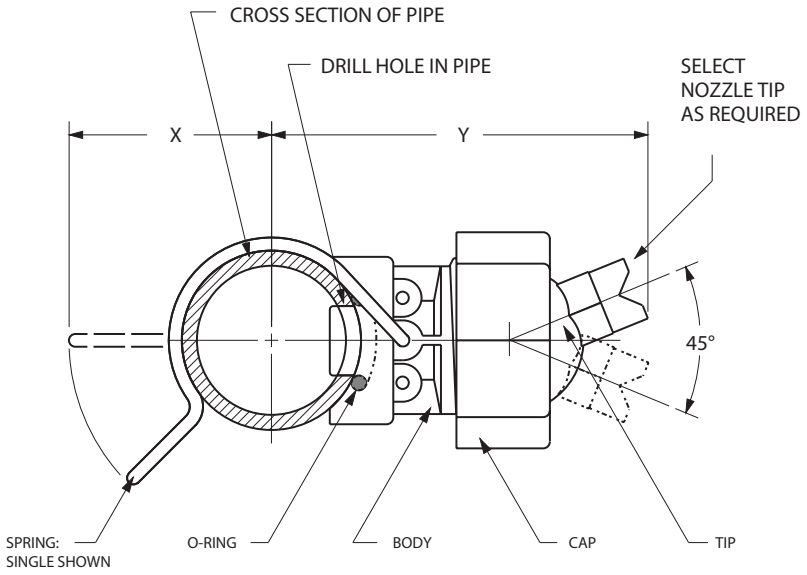
offers female threaded connections in 1/8, 1/4, 3/8 and 1/2 inch NPT or 1/8 BSP threads, allowing the use of any threaded plastic, brass or steel nozzle.

Available Sizes...

The "Mark I" and "Mark II" Nozzle Assemblies are colour-coded for convenient identification, and are available to fit the following pipe sizes:

1 inch	25 mm	blue
1-1/4 inch	32 mm	red
1-1/2 inch	40 mm	purple
2 inch	50 mm	green

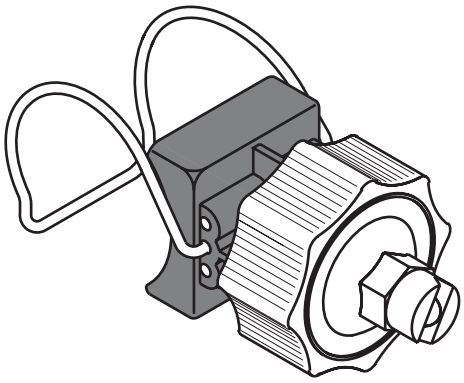
UNI-SPRAY "MARK I"
ADJUSTABLE NOZZLE ASSEMBLY

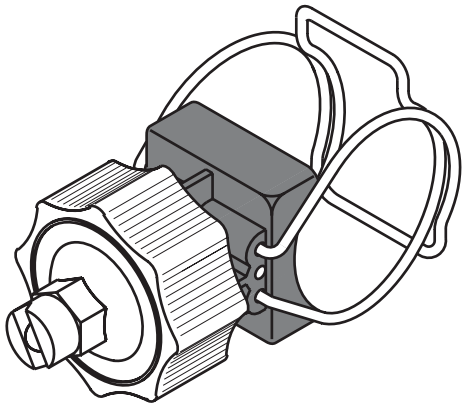


Major Dimensions

		X	Y
(inch)			
1"	Pipe	1.70	3.21
1-1/4"	Pipe	1.89	3.43
1-1/2"	Pipe	2.02	3.56
2"	Pipe	2.25	3.75
(mm)			
25 mm	Pipe	43.2	81.5
32 mm	Pipe	48.0	87.1
40 mm	Pipe	51.3	90.4
50 mm	Pipe	57.2	95.3

ALSO AVAILABLE WITH DOUBLE SPRINGS
FOR PRESSURES FROM 60 TO 150 PSI
(4.1 TO 10.3 BAR)

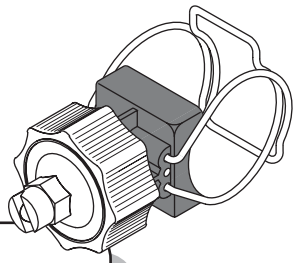




Features:

- inexpensive;
- corrosion resistant;
- impervious to most chemicals;
- good heat resistance;
- injection molded from custom blended polypropylene;
- standard with Single Spring Clamp;
- optional Double Spring Clamps for pressures over 60 psi (4.0 bar);
- resists clogging;
- directional adjustment of nozzle tip anywhere within 45°;
- tips available in Full Cone, Hollow Cone or Flat Spray configurations;
- tips available with threaded ball Connection in 1/8, 1/4, 3/8 and 1/2 inch NPT or BSP threads;
- nozzle bodies available in three spigot sizes to fit either 21/32", 9/16" or 19mm diameter holes on the riser.

"MARK I" ADJUSTABLE NOZZLE ASS'Y ORDERING INSTRUCTIONS



How To Order A Mark I Adjustable Nozzle Assembly:

The complete Part Number tells us exactly what assembly you want.

For example, let's say that you want to order a Mark I Adjustable Nozzle Assembly to fit on a 1-1/2 inch pipe, with a single spring, and with a 65° Flat Spray Nozzle Tip that will deliver 3.5 gpm at 30 psi:

Step 1:

The Part Number begins with 'UNI' and the Pipe Size, as follows:

'UNI 100' = 1 inch pipe
'UNI 125' = 1-1/4 inch pipe
'UNI 150' = 1-1/2 inch pipe
'UNI 200' = 2 inch pipe

... so in our example, we would have so far...

'UNI 150 ...'

Step 2:

Select a Nozzle Tip from th tip selection page and add the Tip Number to the Part Number, so in this example we now have...

'UNI 150 6540...'

Note that the 'UNI' in front of the Tip Number is dropped when the Tip Number is incorporated into the Assembly.

Step 3:

Add 'M1' to denote the Style, which is standard with Single Spring. If it was to have a Double Spring, the Style would be 'M1 D'.

So, in our example, we end up with...

'UNI 150 6540 M1'

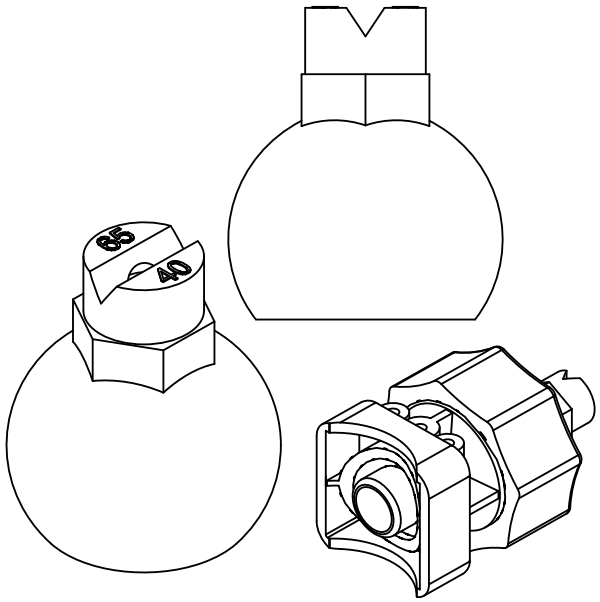
Note: Our standard Nozzle Assemblies are designed with spigots to fit risers with 21/32" diameter drilled holes. We also manufacture assemblies with smaller spigots for 9/16" diameter holes. To specify the 9/16" spigots, simply change the 'UNI' in the part number to 'SS' for 'Small Spigot'. In that case, using the example above, the part number would become...

'SS 150 6540 M1'

UNI-SPRAY SYSTEMS INC.

FLAT SPRAY NOZZLE TIP SELECTION DATA

Item No.	Nozzle Tip Part Number	Tip Colour	Spray Pattern	Capacity (US) GPM at PSI 5	10	15	20	30	35	40	60	Spray angle 10 psi	20 psi	30 psi
001	UNI 0030	Dk Green	15° Flat Spray	1.7	2.5	3.0	3.5	4.3	4.7	5.0	6.1	14°	15°	16°
002	UNI 3040	Black	30° Flat Spray	1.4	2.0	2.5	2.8	3.5	3.8	4.0	6.1	30°	35°	40°
003	UNI 4050	DK Green	40° Flat Spray	1.8	2.5	3.1	3.5	4.3	4.7	5.0	4.9	34°	36°	41°
004	UNI 50100	Grey	50° Flat Spray	3.5	5.0	6.1	7.1	8.6	9.3	10.0	12.2	45°	49°	50°
005	UNI 5070	Blue	50° Flat Spray	2.5	3.5	4.3	4.9	6.1	6.6	7.0	8.6	44°	49°	50°
006	UNI 5060	Orange	50° Flat Spray	2.1	3.0	3.7	4.2	5.2	5.6	6.0	7.3	43°	48°	50°
007	UNI 5050	Pink	50° Flat Spray	1.8	2.5	3.1	3.5	4.3	4.7	5.0	6.1	44°	48°	51°
008	UNI 5040	Mauve	50° Flat Spray	1.4	2.0	2.5	2.8	3.5	3.8	4.0	6.1	45°	49°	50°
009	UNI 5030	Blue	50° Flat Spray	1.1	1.5	1.8	2.1	2.6	2.8	3.0	3.7	45°	49°	50°
010	UNI 6560	Green	65° Flat Spray	2.1	3.0	3.7	4.2	5.2	5.6	6.0	7.3	54°	60°	64°
011	UNI 6550	Red	65° Flat Spray	1.8	2.5	3.1	3.5	4.3	4.7	5.0	6.1	53°	60°	64°
012	UNI 6540	Yellow	65° Flat Spray	1.4	2.0	2.5	2.8	3.5	3.8	4.0	4.9	54°	61°	65°
013	UNI 6530	Purple	65° Flat Spray	1.1	1.5	1.8	2.1	2.6	2.8	3.0	3.7	55°	62°	67°
014	UNI 6520	Grey	65° Flat Spray	.07	1.0	1.2	1.4	1.7	1.9	2.0	2.5	57°	62°	67°
015	UNI 8070	Beige	80° Flat Spray	2.5	3.5	4.3	4.9	6.1	6.6	7.0	8.6	72°	78°	82°
016	UNI 8060	Beige	80° Flat Spray	2.1	3.0	3.7	4.2	5.2	5.6	6.0	7.3	70°	78°	81°
017	UNI 8050	DK Green	80° Flat Spray	1.8	2.5	3.0	3.5	4.3	4.7	5.0	6.1	70°	78°	81°
018	UNI 8040	Beige	80° Flat Spray	1.4	2.0	2.4	2.8	35	3.8	4.0	4.9	70°	78°	81°
019	UNI 8010	Black	80° Flat Spray	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	52°	70°	82°
020	UNI 8006	Lt Green	80° Flat Spray	0.2	0.3	0.37	0.4	0.5	0.55	0.6	0.65	60°	69°	80°
021	UNI 9560	DK Green	95° Flat Spray	2.1	3.0	3.7	4.2	5.2	5.6	6.0	7.3	86°	96°	99°
022	UNI 12010	Grey	120° Flat Spray	0.3	0.5	0.6	0.7	0.9	0.95	1.0	1.2	100°	120°	120°
023	UNI 12070	Black	120° Flat Spray	2.5	3.5	4.3	4.9	6.1	6.6	7.0	8.6	100°	120°	120°
024	UNI-PLUG	Grey	Plug to Blank-off Spray											

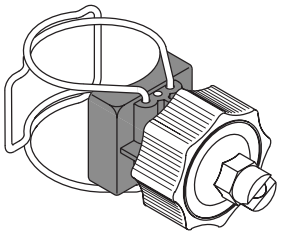


For easy identification, all flat Spray nozzle tips have the tip numbers molded into the ends of the tips.
When ordering Nozzle Tips as spare parts, add 'TIP' after the part Number: e.g. 'UNI6540TIP'

Custom nozzle designs are available upon request!

UNI-SPRAY SYSTEMS INC.

UNI-SPRAY NOZZLE TIPS:
SPRAY NOZZLE COVERAGE



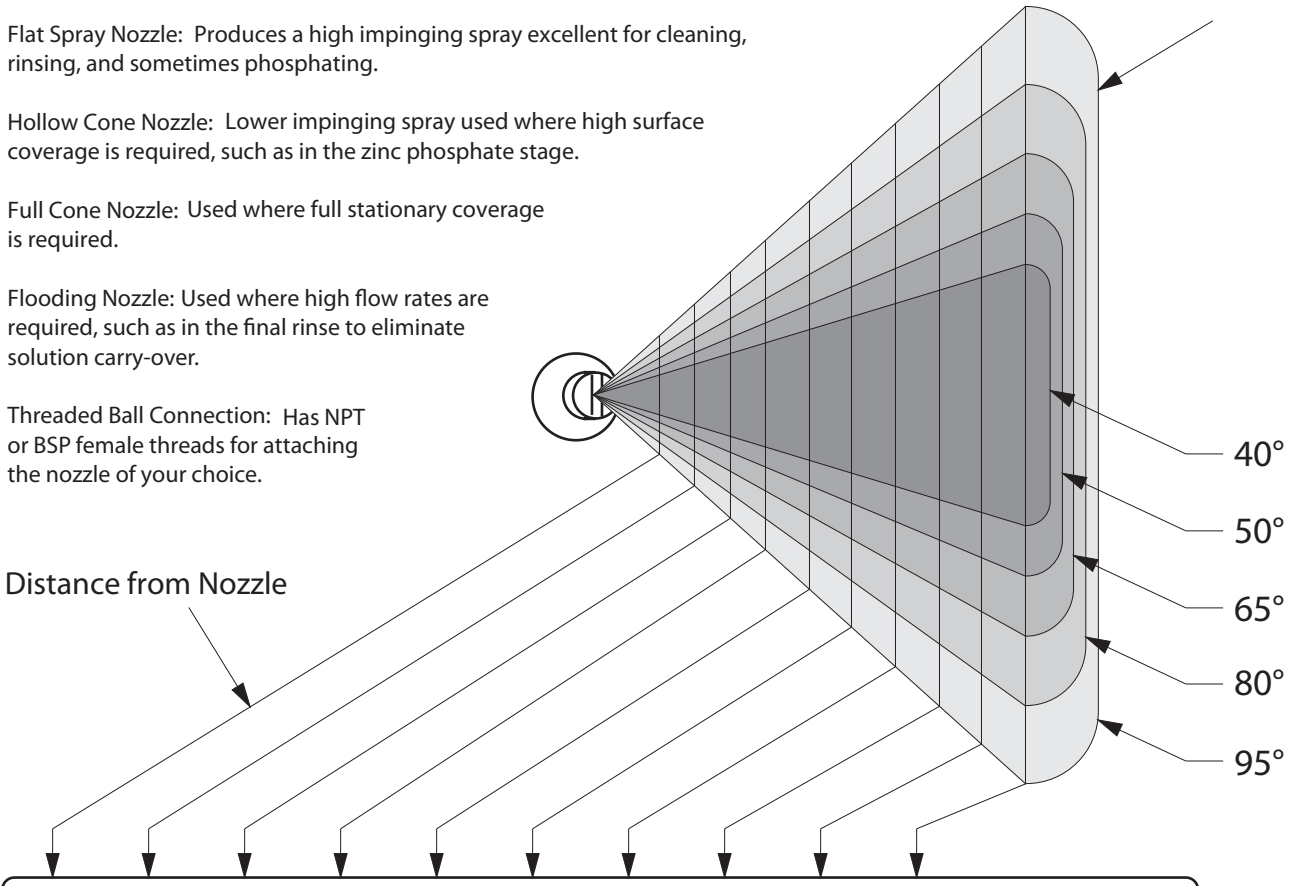
Flat Spray Nozzle: Produces a high impinging spray excellent for cleaning, rinsing, and sometimes phosphating.

Hollow Cone Nozzle: Lower impinging spray used where high surface coverage is required, such as in the zinc phosphate stage.

Full Cone Nozzle: Used where full stationary coverage is required.

Flooding Nozzle: Used where high flow rates are required, such as in the final rinse to eliminate solution carry-over.

Threaded Ball Connection: Has NPT or BSP female threads for attaching the nozzle of your choice.



Height of Included Angle of Spray Coverage (inches)										
4"	6"	8"	10"	12"	15"	18"	24"	30"	36"	@ Spray Angle
3.0	4.5	5.8	7.3	8.7	10.9	13.1	17.5	21.8	26.2	40°
3.7	5.6	7.5	9.3	11.2	14.0	16.8	22.4	28.0	33.6	50°
4.9	7.5	10.2	12.7	15.3	19.2	22.9	30.5	38.2	45.8	65°
6.7	10.0	13.4	16.8	20.2	25.2	30.3	40.3	50.4	60.4	80°
8.6	13.0	17.5	21.8	26.2	32.8	39.3	52.4	65.5	78.6	95°

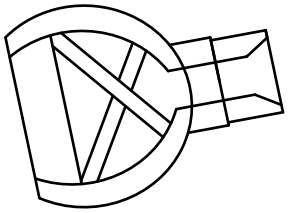
Height of Included Angle of Spray Coverage (cm)										
10 cm	15 cm	20 cm	25 cm	30 cm	40 cm	50 cm	60 cm	75 cm	90 cm	@ Spray Angle
7.6	11.4	14.5	18.2	21.7	29.1	36.4	43.7	54.5	65.5	40°
9.4	14.2	18.8	23.2	28.0	37.3	46.7	56.0	70.0	84.1	50°
12.4	19.1	25.5	31.7	38.2	51.2	63.6	76.2	95.5	114.6	65°
17.0	25.4	33.5	42.0	50.5	67.2	84.2	100.7	126.0	151.1	80°
21.8	33.0	43.8	54.5	65.5	87.5	109.2	131.0	163.7	196.6	95°

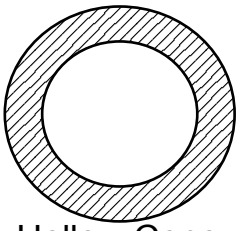
UNI-SPRAY SYSTEMS INC.

HOLLOW CONE/ FULL CONE NOZZLE TIP SELECTION DATA

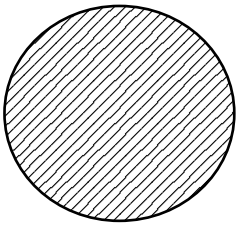
Item No.	Nozzle Tip Part Number	Tip Colour	Spray Pattern	Capacity (US) GPM at PSI 5	10	15	20	30	35	40	60	Spray angle 10 psi	20 psi	30 psi
046	UNI 29 HC	DK Green	Hollow Cone	2.0	2.9	3.5	4.1	5.1	5.5	5.9	7.2	50°	50°	50°
047	UNI 50 HC	Black	Hollow Cone	3.5	5.0	6.0	7.1	8.6	9.3	10.0	12.2	65°	65°	65°
048	UNI 08 HC	Blue	Hollow Cone	0.6	0.8	0.9	1.1	1.3	1.4	1.5	1.8	86°	88°	90°
049	UNI 20 HC	Orange	Hollow Cone	1.4	2.0	2.4	2.8	3.1	3.4	3.6	3.8	50°	50°	50°
050	UNI 25 HC	Red	Hollow Cone	1.5	2.3	2.6	3.1	3.5	3.8	4.0	4.3	50°	50°	50°
051	UNI 35 HC	Blue	Hollow Cone	2.3	3.5	4.4	5.1	5.6	6.4	7.2	8.0	50°	50°	50°
052	UNI 16 FC	Turquoise	Full Cone	1.3	1.6	1.9	2.2	2.7	2.9	3.1	3.8	30°	34°	37°
053	UNI 17 FC	Yellow	Full Cone	1.4	1.7	2.0	2.3	2.8	3.0	3.2	3.9	78°	80°	82°
054	UNI 52 FC	Pink	Full Cone	3.8	5.2	6.2	7.3	8.8	9.5	10.2	12.4	60°	62°	65°

Custom nozzle designs are available upon request!





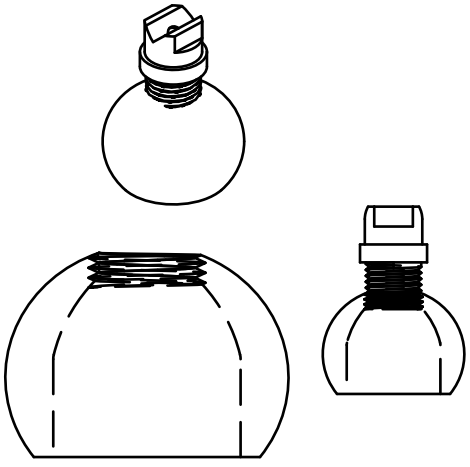
Hollow Cone Pattern



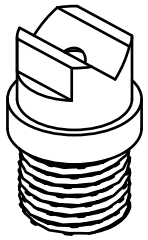
Full Cone Pattern

THREADED BALL SELECTION DATA

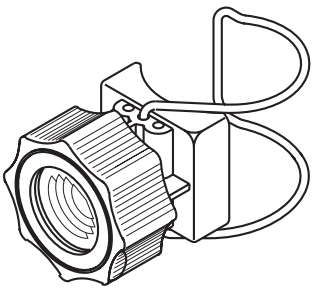
055	UNI 1/8 NPT	Blue	1/8 NPT Female Threaded Connection
056	UNI 1/8 BSPT	Beige	1/8 BSPT Female Threaded Connection
057	UNI 1/4 NPT	Blue	1/4 NPT Female Threaded Connection
058	UNI 1/4 BSPT	Beige	1/4 BSPT Female Threaded Connection
059	UNI 3/8 NPT	Blue	3/8 NPT Female Threaded Connection
060	UNI 3/8 BSPT	Beige	3/8 BSPT Female Threaded Connection
061	UNI 1/2 NPT	Blue	1/2 NPT Female Threaded Connection
062	UNI 1/2 BSPT	Beige	1/2 BSPT Female Threaded Connection



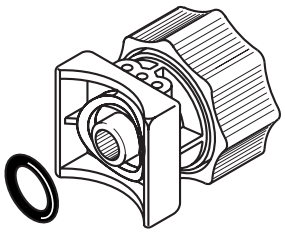
Uni-Spray also carries a large line of threaded nozzles for every application. Materials ranging from PVC to stainless steel are available in many thread sizes. Please call to discuss a nozzle for your specific application.



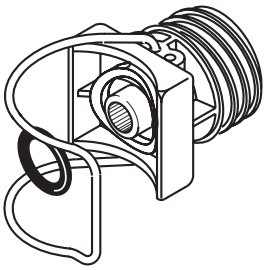
UNI-SPRAY SYSTEMS INC.



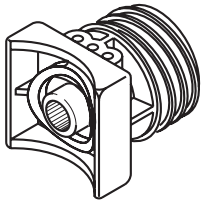
M1 Assembly (No Tip) Single Clamp:
UNI-100 BSOC
UNI-125 BSOC
UNI-150 BSOC
UNI-200 BSOC



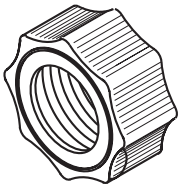
M1 Body, Cap, and "O" Ring:
UNI-100 BCO
UNI-125 BCO
UNI-150 BCO
UNI-200 BCO



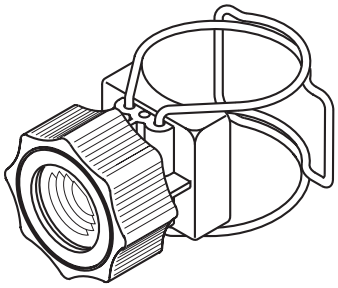
M1 Body, Single Clamp and "O" Ring:
\UNI-100 BSO
UNI-125 BSO
UNI-150 BSO
UNI-200 BSO



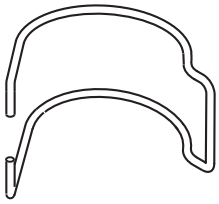
M1 Body only:
UNI-100 B
UNI-125 B
UNI-150 B
UNI-200 B



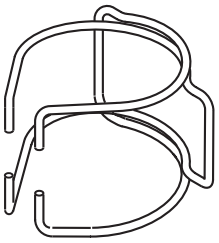
M1 Cap:
UNI RC



M1 Assembly (No Tip) Double Clamp:
UNI-100 BSOCD
UNI-125 BSOCD
UNI-150 BSOCD
UNI-200 BSOCD



M1 or M2 Single Clamp:
UNI-100 SS
UNI-125 SS
UNI-150 SS
UNI-200 SS

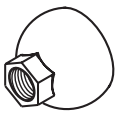


M1 or M2 Double Clamp Set:

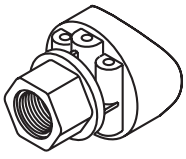
UNI-100 SS	plus	UNI-100 DW
UNI-125 SS	plus	UNI-125 DW
UNI-150 SS	plus	UNI-150 DW
UNI-200 SS	plus	UNI-200 DW

M1 or M2 "O" Ring:
UNI ODM EPDM
UNI OVT VITON

Nozzle Tip:



Threaded Ball:



M2 Adapter Body:
UNI-100 M2 B
UNI-125 M2 B
UNI-150 M2 B
UNI-200 M2 B

SPRAY NOZZLE PRESSURE AND FLOW:

Nozzle Type

In general, Full Cone Nozzles have the largest sized droplets followed by Flat Spray Nozzles and Hollow Cone Nozzles. For a better description of the various characteristics of various types of spray nozzles, refer to Pages 1-6 and 1-7.

Flow Rate

If you select a nozzle with a greater flow rate at the same pressure, droplet size increases. For example, a UNI 6550 Flat Spray Nozzle at 40 psi and a flow rate of 5.0 gpm will have a larger droplet size than a UNI 6540 Flat Spray Nozzle at 40 psi, which has a flow rate of only 4.0 gpm.

Pressure

If the pressure on any given nozzle is increased, then droplet size will decrease. For example, the same UNI 6550 Flat Spray Nozzle has a larger droplet size at 40 psi pressure than it does at 50 psi.

Of the factors affecting flow rate, the most influential is pressure. Theoretically, the flow rate varies in correlation with the square root of the pressure, neglecting all other factors. To compute pressures and flow rates other than those on Page 1-7, the following formulas may be used:

$$Q_2 = Q_1 \sqrt{\frac{P2}{P1}} \qquad P_2 = P_1 \left(\frac{Q2}{Q1}\right)^2$$

Q_1 and P_1 are the known flow rate and pressure.
Q_2 is the resulting flow rate from the new pressure P2.
P_2 is the resulting pressure from the new flow rate Q2.

Temperature

Changing temperature can alter a liquid's viscosity, surface tension, and specific gravity, and this in turn changes nozzle performance.

Viscosity generally changes significantly with temperature. As the temperature is lowered, viscosity increases, which increases the energy required to form a spray, and which also increases the droplet size. All performance data supplied on Page 1-7 is based on spraying water at room temperature.

As the specific gravity of a fluid is lowered, the higher is the flow rate through the nozzle at the same pressure, as shown in the equation...

$$(Q \text{ water}) \times \frac{1}{\sqrt{SG \text{ fluid}}} = (Q \text{ fluid})$$

For example, the flow rate for a fluid with a specific gravity of 1.3 would be about 87% of the flow rate of water:

$$(4 \text{ gpm water}) \times \frac{1}{\sqrt{1.3}} = (3.5 \text{ gpm fluid})$$

Increasing surface tension increases the effort required to atomize the spray, which increases the droplet size and reduces the spray angle.

Spray Angle

Increasing the spray angle will reduce the droplet size. For example, a UNI-6550 nozzle with a 65° spray angle and 5 gpm at 40 psi will have a finer droplet size than a UNI-5050 nozzle with a 50° spray angle at the same pressure and flow.

At any given pressure and flow, the impact force or impingement of a spray is increased with a narrower spray angle, and should be taken into account depending on your application.

Nozzle wear can also affect the spray angle. As nozzle wear increases, the orifice gets bigger, and flow rate will increase, which in turn can result in a loss of system pressure. This loss of spray pressure can often be seen by a narrowing of the spray pattern as in the drawing below, or by a general loss of uniformity in the spray patterns.

The Effect of Nozzle Wear on Spray Angle