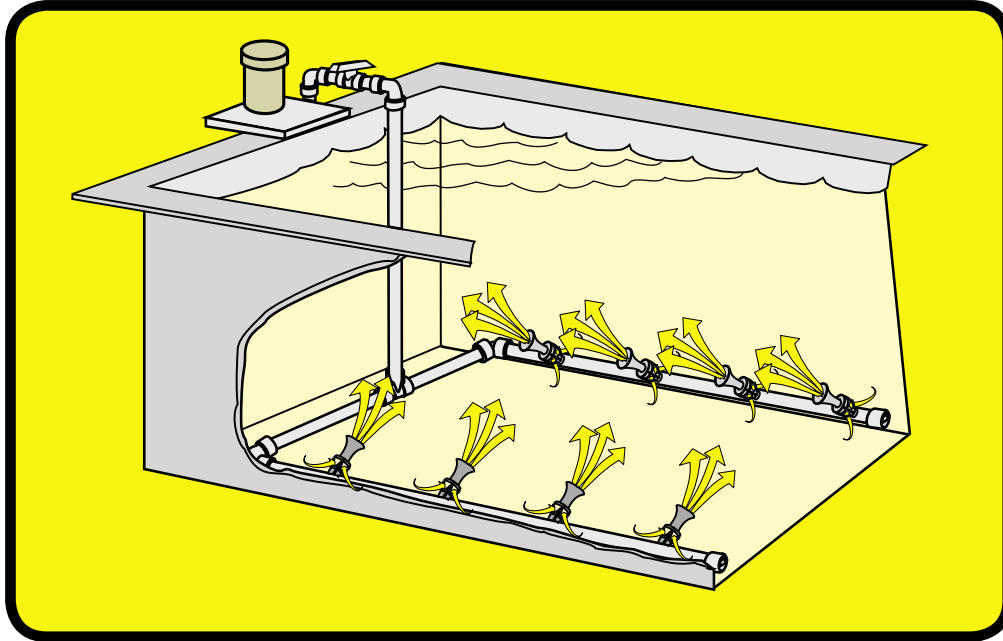




## Efficient agitation and mixing of: *CLEANING / RINSING / PLATING / WASTE TREATMENT and OTHER PROCESS SOLUTIONS*



A SER-DUCTOR system provides solution agitation with a centrifugal pump by drawing liquid from a tank and returning it to the tank through a sparger system, similar to that used for air agitation, with eductors strategically placed along the sparger pipe.

SER-DUCTOR agitation delivers 5 times the pump output at each nozzle. It effectively distributes the desired level of agitation to critical areas in your process tank. The system is driven by your choice of vertical, magnetic drive, self-priming or mechanical seal pump.

With SER-DUCTOR systems, solutions are agitated without the introduction of foreign matter such as airborne dirt or compressor oil, as is often the case with air agitation. Whether the solution is a cleaner, a rinse, a

plating bath or other process solution, it is only this fluid that is recirculated by the SER-DUCTOR system.

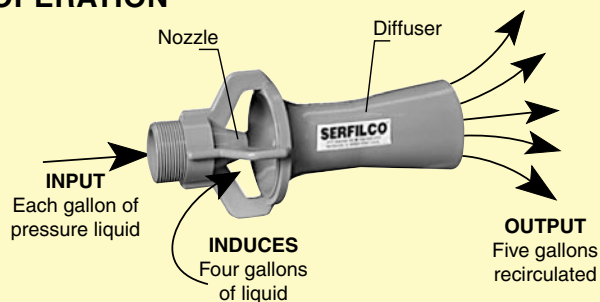
SER-DUCTOR agitation in a process tank keeps particulate from settling to the tank bottom where it can form a layer of sludge that shortens the life of the solution, requires expensive dumps, new make-ups and costly downtime in between for manual cleanout of the tank bottom. By effectively keeping the "dirt" in suspension, the SER-DUCTOR system makes it easier for a filtration system on the tank to remove particles. This extends the life of the bath and greatly reduces the possibility of contamination being carried to other tanks in the process cycle where it can lead to costly rejects and even product failure.

### PROVEN BENEFITS OF SER-DUCTOR SYSTEMS IN PLATING APPLICATIONS

- Reduces airborne fume emissions by 90%
- Saves heating costs up to 25%
- Reduces brightener consumption 20%
- Saves metal as a result of more uniform brightness and thickness distribution
- Improves throw and deposit thickness in blind and through holes and recesses
- Permits increased current density, especially compared to air or cathode rod agitation, for faster plating rate
- Reduces carbonates in alkaline processes
- Reduces or eliminates gas-pitting
- Provides constant agitation because SER-DUCTOR systems don't clog

## PRINCIPLE OF OPERATION

Liquid pumped into the eductor nozzle exits at high velocity, drawing an additional flow of the surrounding solution through the eductor. This additional flow (induced liquid) mixes with the pumped solution and multiplies its volume five-fold. The source of the pumped liquid (input) can be a pump or filter chamber discharge.



## TYPICAL APPLICATIONS

### FOR PRINTED CIRCUIT BOARDS AND RACK PLATING

SER-DUCTOR agitation in printed circuit board manufacturing and rack plating applications enhances plating solution flow across the board surface. Carefully engineered clusters of eductor nozzles sweep away cathode films swiftly, allowing faster plating at lower voltages with much higher current densities. More even plating and significantly lower metal usage result. (The horizontal direction of eductors stationed along vertical distributor pipes is a typical SER-DUCTOR configuration for these applications.)

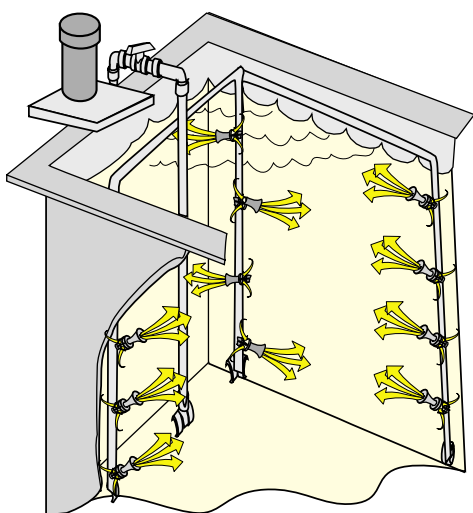
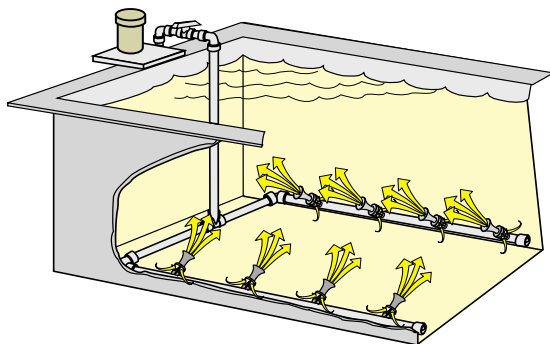
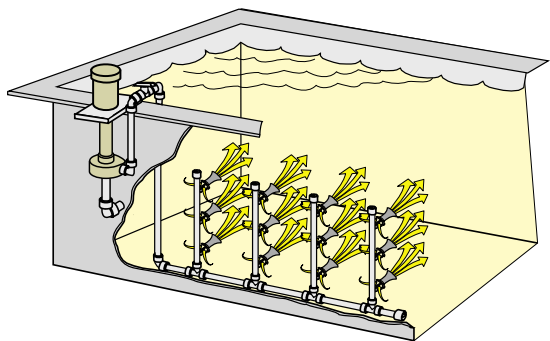
### FOR PARTS CLEANING IN BASKETS OR ON RACKS

SER-DUCTOR agitation for bulk parts cleaning in baskets or for racked work improves solution flow through the work and assures greater impingement of fresh solution on the parts.

Additionally, in cleaner tank applications, SER-DUCTOR agitation prevents temperature stratification. It also keeps solids in suspension so they can be more easily removed by filtration. This extends bath life and reduces chemical make-up costs. (The moderately upward angle of these eductors along "wishbone" distributor piping provides the proper direction of solution flow.)

### FOR MIXING

Vigorous SER-DUCTOR agitation within the tank creates sufficient solution movement to eliminate solution stratification. This movement lends itself to mixing two or more liquids or to mixing a liquid and a powder. (A more extreme angle of eductor positioning is helpful in mixing bath components and assuring continuing uniformity of the solution.)



**TO ORDER, use Price Code No.**

**SER-DUCTOR NOZZLES**

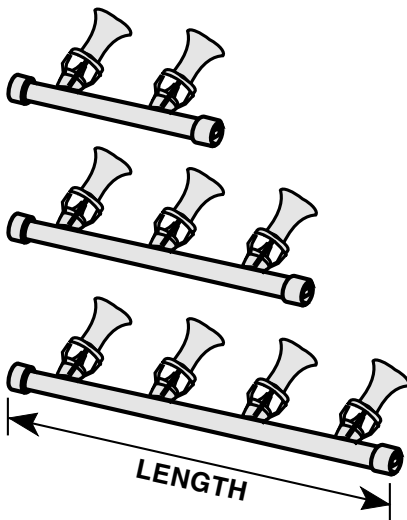
CONNS MNPT	DIMENSIONS		POLYPROPYLENE		CPVC		PVDF		316 STAINLESS STEEL		IRON	
	Length	Dia.	MODEL	PCN	MODEL	PCN	MODEL	PCN	MODEL	PCN	MODEL	PCN
1/4"	2-3/4"	1-1/4"	ME 1/4"	33-1930	MEC 1/4"	33-1930C	MEK 1/4"	33-1930K	—	—	—	—
3/8"	4-1/4"	2-1/8"	ME 3/8"	33-1732	MEC 3/8"	33-1732C	MEK 3/8"	33-1732K	MESS 3/8"	33-1732S	MES 3/8"	33-1732F
3/4"	6-3/8"	3"	ME 3/4"	33-1733	—	—	MEK 3/4"	33-1733K	MESS 3/4"	33-1733S	MES 3/4"	33-1733F
1"	8-1/2"	3-3/4"	ME 1"	33-1736	—	—	MEK 1"	33-1736K	MESS 1"	33-1736S	MES 1"	33-1736F
1-1/2"	9-7/8"	4-5/8"	ME 1-1/2"	33-1734	—	—	MEK 1-1/2"	33-1734K	MESS 1-1/2"	33-1734S	MES 1-1/2"	33-1734F

**SER-DUCTOR COUPLING / NOZZLE ASSEMBLY**



COUPLING SIZE - FNPT	1/4" PP NOZZLE	3/8" PP NOZZLE	3/4" PP NOZZLE
	PRICE CODE NO.	PRICE CODE NO.	PRICE CODE NO.
3/4"	33-7003	33-6098	—
1"	33-7004	33-6022	—
1-1/4"	33-7005	33-6099	33-6024
1-1/2"	—	33-7000	33-6025
2"	—	33-7001	33-6026

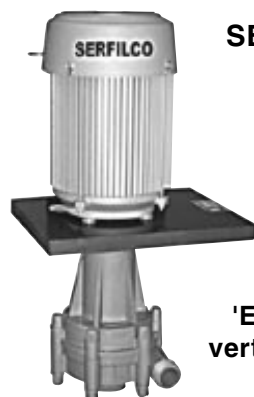
**PRE-ENGINEERED SYSTEMS**



PIPE SIZE MNPT	EDUCTORS		LENGTH <sup>1</sup>		PP/CPVC		PVDF/PVDF	
	No.	Size	Inches	Meters	Model	PCN	Model	PCN
1"	2	3/8"	24	.6	S-E1	33-6006	S-E1K	33-6006K
	3		36	.9	S-E2	33-6007	S-E2K	33-6007K
	4		48	1.2	S-E3	33-6008	S-E3K	33-6008K
1-1/4"	2	3/8"	24	.6	S-E4	33-6009	—	—
	3		36	.9	S-E5	33-6010	—	—
	4		48	1.2	S-E6	33-6011	—	—
1-1/4"	2	3/4"	24	.6	S-E7	33-6012	—	—
	3		36	.9	S-E8	33-6013	—	—
	4		48	1.2	S-E9	33-6014	—	—
1-1/2"	2	3/8"	24	.6	S-E16	33-6081	S-E16K	33-6081K
	3		36	.9	S-E17	33-6082	S-E17K	33-6082K
	4		48	1.2	S-E18	33-6083	S-E18K	33-6083K
1-1/2"	2	3/4"	24	.6	S-E10	33-6015	S-E10K	33-6015K
	3		36	.9	S-E11	33-6016	S-E11K	33-6016K
	4		48	1.2	S-E12	33-6017	S-E12K	33-6017K
2"	2	3/8"	24	.6	S-E19	33-6084	S-E19K	33-6084K
	3		36	.9	S-E20	33-6085	S-E20K	33-6085K
	4		48	1.2	S-E21	33-6086	S-E21K	33-6086K
2"	2	3/4"	24	.6	S-E13	33-6018	S-E13K	33-6018K
	3		36	.9	S-E14	33-6019	S-E14K	33-6019K
	4		48	1.2	S-E15	33-6020	S-E15K	33-6020K

<sup>1</sup> Eductors are spaced on 12" centers over the length of all SER-DUCTOR systems.  
All SER-DUCTOR systems can be connected to achieve extended length assemblies.

# PUMPS FOR SER-DUCTOR AGITATION SYSTEMS



'EH'  
vertical

SERFILCO also offers a variety of pumps to drive your SER-DUCTOR SYSTEM



'F' magnetic-coupled



'HE' horizontal

MODEL NUMBER	PRICE CODE NUMBER	GPM @ TDH (ft.) <sup>6</sup>	SUCTION	DISCHARGE	MOTOR, TEFC, 60 Hz, 3450 RPM		MATERIALS OF CONSTRUCTION
					HP	PHASE	

### VERTICAL SERIES 'EO' PUMPS<sup>1</sup>

EO1 CV1-C.3	39-1221A	15 @ 27	1¼"	1¼"	1/3	1	CPVC
EO1 CV3-C.75	39-1223C	30 @ 28	1¼"	1¼"	¾	1	CPVC
EO1¼ CV4-D1.0	39-2224J	50 @ 35	1½"	1½"	1	3	CPVC
EO1¼ CV5-D1.5	39-2225K	70 @ 38	1½"	1½"	1½	3	CPVC

### VERTICAL SERIES 'EH' PUMPS<sup>2</sup>

EH1½- 1SC-D1.5	45-0112	60 @ 40	2"	1½"	1½	3	CPVC
EH1½- 2SC-D2.0	45-0123	80 @ 48	2"	1½"	2	3	CPVC
EH1½- 3SC-D3.0	45-0134	100 @ 52	2"	1½"	3	3	CPVC
EH1½- 4SC-D5.0	45-0145	140 @ 68	2"	1½"	5	3	CPVC
EH1½- 5SC-D7.5	45-0156	180 @ 45	2"	1½"	7½	3	CPVC

### MAGNETIC-COUPLED SERIES 'M' PUMPS<sup>3</sup>

1x¾ MPVCR 1AC-C.5	51-4111 A	25 @ 28	1"	¾"	½	1	Polypropylene
1½x1 MPVCR 2B-C.75	51-6221 B	45 @ 32	1½"	1"	¾	1	Polypropylene
1½x1 MPVCR 3B-D1.0	51-6321 F	60 @ 32	1½"	1"	1	3	Polypropylene

### MAGNETIC-COUPLED SERIES 'F' PUMPS<sup>4</sup>

1½x1¼ MPGC2-C.75	51-1026 A	40 @ 34	1½"	1¼"	¾	1	Polypropylene
1½x1¼ MPGC3-D1.5	51-1036 F	50 @ 44	1½"	1¼"	1½	3	Polypropylene
1½x1¼ MPGC4-D2.0	51-1047 G	60 @ 53	1½"	1¼"	2	3	Polypropylene
1½x1¼ MPGC5-D3.0	51-1057 H	70 @ 57	1½"	1¼"	3	3	Polypropylene

### HORIZONTAL SERIES 'HE' PUMPS<sup>5</sup>

HE2x1½ CE1V(M2)-D1.5	42-0112 A	60 @ 43	2"	1½"	1½	3	CPVC / Viton®
HE2x1½ CE2V(M2)-D2.0	42-0122 B	80 @ 48	2"	1½"	2	3	CPVC / Viton
HE2x1½ CE3V(M2)-D3.0	42-0132 C	100 @ 56	2"	1½"	3	3	CPVC / Viton
HE2x1½ CE4V(M2)-D5.0	42-0142 D	140 @ 68	2"	1½"	5	3	CPVC / Viton
HE2x1½ CE5V(M2)-D7.5	42-0152 E	170 @ 77	2"	1½"	7½	3	CPVC / Viton

<sup>1-5</sup> Request appropriate bulletin for complete specifications, including alternate materials of construction, flow curves, dimensions, etc.

<sup>1</sup> Bulletin P-312

<sup>2</sup> Bulletin P-301

<sup>3</sup> Bulletin P-509

<sup>4</sup> Bulletin P-621

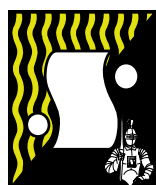
<sup>5</sup> Bulletin P-201

<sup>6</sup> Total dynamic head (TDH) in feet ÷ 2.31 = PSI

F.O.B. Northbrook, Illinois

Specifications subject to change without notice.

Viton is a registered trademark of DuPont Dow Elastomers



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