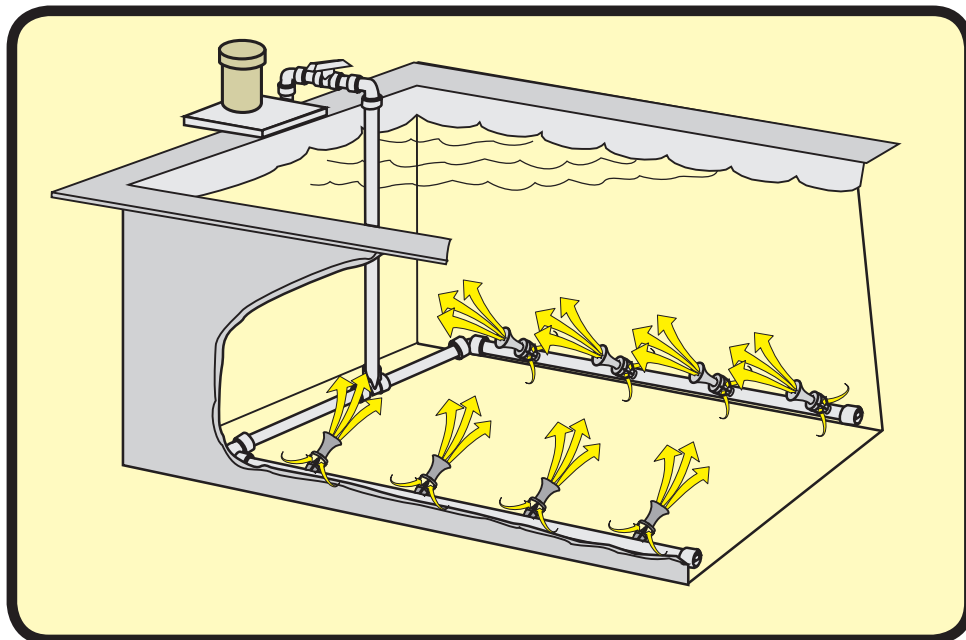


**SERFILCO®****SER-DUCTOR® | PUMPED AGITATION**2900 MacArthur Blvd. Northbrook, IL. USA 60062 www.serfilco.com (800) 323 - 5431BULLETIN
A-407_M
AUG 2011

***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.

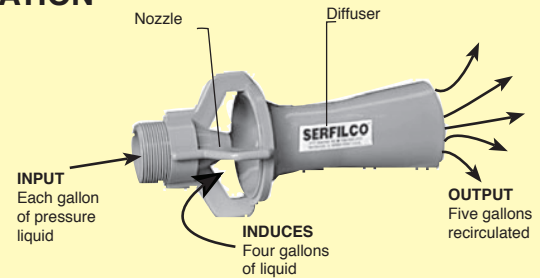
PROVEN BENEFITS OF SERDUCTOR SYSTEMS IN PLATING APPLICATIONS

- 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

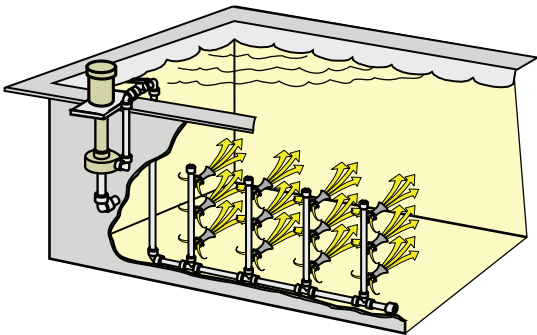


PRINCIPLE OF OPERATION

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.

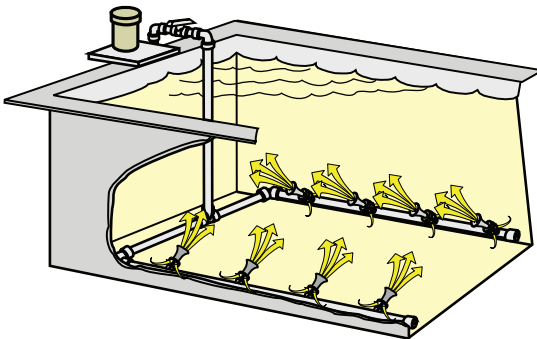


TYPICAL APPLICATIONS



FOR PRINTED CIRCUIT BOARDS AND RACK PLATING

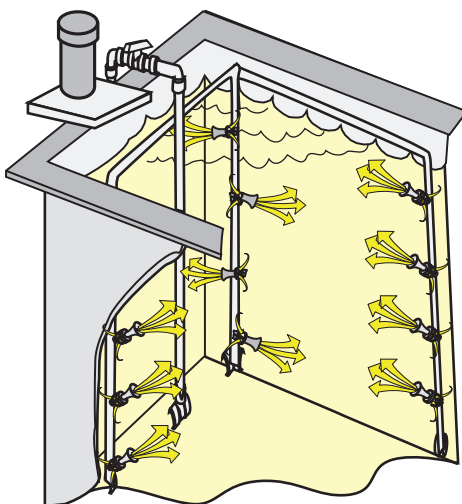
SER-DUCTOR agitation in printed circuit board manufacturing and rack plating applications enhances plating solution flow across the board surface. Carefully engineered clusters of eductor nozzles sweep away cathode films swiftly, allowing faster plating at lower voltages with much higher current densities. 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.)



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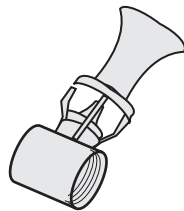
TO ORDER, use Price Code Number

SER-DUCTOR NOZZLES

| CONN | POLYPROPYLENE | | CPVC | | PVDF | | ECTFE | | 316 STAINLESS STEEL | | IRON | |
|--------|---------------|---------|----------|-----------|------------|-----------|----------|-----------|---------------------|-----------|------------|-----------|
| MN PT | MODEL | PCN | MODEL | PCN | MODEL | PCN | MODEL | PCN | MODEL | PCN | MODEL | PCN |
| 1/4" | ME 1/4" | 33-1930 | MEC 1/4" | 33-1930 C | MEK 1/4" | 33-1930 K | MEH 1/4" | 33-1930 H | — | — | — | — |
| 3/8" | ME 3/8" | 33-1732 | MEC 3/8" | 33-1732 C | MEK 3/8" | 33-1732 K | MEH 3/8" | 33-1732 H | MESS 3/8" | 33-1732 S | MES 3/8" | 33-1732 F |
| 3/4" | ME 3/4" | 33-1733 | MEC 3/4" | 33-1733 C | MEK 3/4" | 33-1733 K | MEH 3/4" | 33-1733 H | MESS 3/4" | 33-1733 S | MES 3/4" | 33-1733 F |
| 1-1/2" | ME 1-1/2" | 33-1734 | — | — | MEK 1-1/2" | 33-1734 K | — | — | MESS 1-1/2" | 33-1734 S | MES 1-1/2" | 33-1734 F |

NOZZLE DIMENSIONS

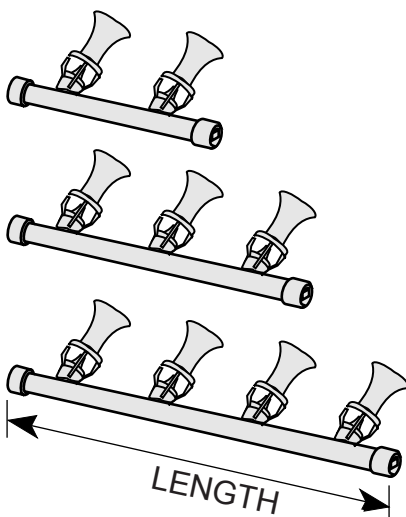
| CONNS | DIMENSIONS | |
|--------|------------|----------|
| MNPT | Length | Diameter |
| 1/4" | 2-3/4" | 1-1/4" |
| 3/8" | 4-1/4" | 2-1/8" |
| 3/4" | 6-3/8" | 3" |
| 1-1/2" | 9-7/8" | 4-5/8" |



SER-DUCTOR COUPLING/NOZZLE ASSEMBLY

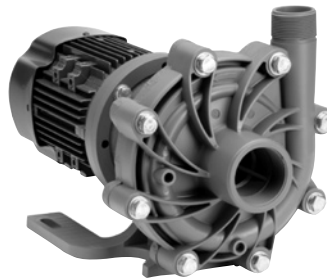
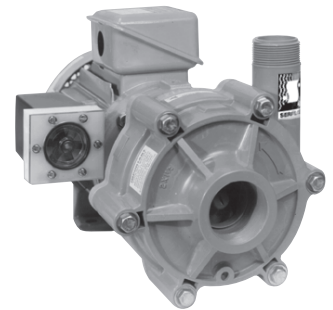
| COUPLING | 1/4" PP | 3/8" PP | 3/4" PP |
|----------|---------|---------|---------|
| FNPT | PCN | PCN | PCN |
| 3/4" | 33-7003 | 33-6098 | — |
| 1" | 33-7004 | 33-6022 | — |
| 1-1/4" | 33-7005 | 33-6099 | 33-6024 |
| 1-1/2" | — | 33-7000 | 33-6025 |
| 2" | — | 33-7001 | 33-6026 |

PRE-ENGINEERED SYSTEM



| PIPE SIZE | EDUCTORS | | LENGTH ¹ | | PP/CPVC | | CPVC/CPVC | | PVDF/PVDF | |
|-----------|----------|------|---------------------|--------|---------|---------|-----------|----------|-----------|-----------|
| MNPT | No. | Size | Inches | Meters | Model | PCN | Model | PCN | Model | PCN |
| 1" | 2 | 3/8" | 24 | .6 | S-E1 | 33-6006 | S-E1C | 33-6006C | S-E1K | 33-6006 K |
| | 3 | | 36 | .9 | S-E2 | 33-6007 | S-E2C | 33-6007C | S-E2K | 33-6007 K |
| | 4 | | 48 | 1.2 | S-E3 | 33-6008 | 2-E3C | 33-6008C | S-E3K | 33-6008 K |
| 1-1/4" | 2 | 3/8" | 24 | .6 | S-E4 | 33-6009 | S-E4C | 33-6009C | — | — |
| | 3 | | 36 | .9 | S-E5 | 33-6010 | S-E5C | 33-6010C | | |
| | 4 | | 48 | 1.2 | S-E6 | 33-6011 | 2-E6C | 33-6011C | | |
| 1-1/4" | 2 | 3/4" | 24 | .6 | S-E7 | 33-6012 | S-E7C | 33-6012C | — | — |
| | 3 | | 36 | .9 | S-E8 | 33-6013 | S-E8C | 33-6013C | | |
| | 4 | | 48 | 1.2 | S-E9 | 33-6014 | 2-E9C | 33-6014C | | |
| 1-1/2" | 2 | 3/8" | 24 | .6 | S-E16 | 33-6081 | S-E16C | 33-6081C | S-E16K | 33-6081 K |
| | 3 | | 36 | .9 | S-E17 | 33-6082 | S-E17C | 33-6082C | S-E17K | 33-6082 K |
| | 4 | | 48 | 1.2 | 2-E18 | 33-6083 | 2-E18C | 33-6083C | S-E18K | 33-6083 K |
| 1-1/2" | 2 | 3/4" | 24 | .6 | S-E10 | 33-6015 | S-E10C | 33-6015C | S-E10K | 33-6015 K |
| | 3 | | 36 | .9 | S-E11 | 33-6016 | S-E11C | 33-6016C | S-E11K | 33-6016 K |
| | 4 | | 48 | 1.2 | 2-E12 | 33-6017 | 2-E12C | 33-6017C | S-E12K | 33-6017 K |
| 2" | 2 | 3/8" | 24 | .6 | S-E19 | 33-6084 | S-E19C | 33-6084C | S-E19K | 33-6084 K |
| | 3 | | 36 | .9 | S-E20 | 33-6085 | S-E20C | 33-6085C | S-E20K | 33-6085 K |
| | 4 | | 48 | 1.2 | 2-E21 | 33-6086 | 2-E21C | 33-6086C | S-E21K | 33-6086 K |
| 2" | 2 | 3/4" | 24 | .6 | S-E13 | 33-6018 | S-E13C | 33-6018C | S-E13K | 33-6018 K |
| | 3 | | 36 | .9 | S-E14 | 33-6019 | S-E14C | 33-6019C | S-E14K | 33-6019 K |
| | 4 | | 48 | 1.2 | 2-E15 | 33-6020 | 2-E15C | 33-6020C | S-E15K | 33-6020 K |

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

**SERFILCO also offers a variety of pumps to drive your SER-DUCTOR SYSTEM****'EH' Vertical****'FE' magnetic-coupled****'HE' Horizontal**

| MODEL NUMBER | PRICE CODE NUMBER | GPM @ TDH (ft.)* | SUCTION | DISCHARGE | MOTOR TEFC, 60 Hz, 3450 RPM | | MATERIALS OF CONSTRUCTION |
|---|----------------------|---------------------|---------|-----------|--------------------------------|-------|------------------------------|
| | | | | | HP | PHASE | |
| VERTICAL SERIES 'EO' PUMPS ¹ | | | | | | | |
| EO1 CV1-C.3 | 39-1221 A | 20 @ 28 | 1¼" | 1" | 1/3 | 1 | CPVC/Viton |
| EO1 CV3-C.75 | 39-1223 C | 30 @ 30 | 1¼" | 1" | ¾ | 1 | CPVC/Viton |
| EO1¼ CV3-D1.0 | 39-2224 J | 60 @ 37 | 1½" | 1¼" | 1 | 3 | CPVC/Viton |
| EO1¼ CV3-D1.5 | 39-2225 K | 70 @ 38 | 1½" | 1¼" | 1½ | 3 | CPVC/Viton |
| VERTICAL SERIES 'EH' PUMPS ² | | | | | | | |
| EH1½- 1SC-D1.5-V | 45-0112 V | 60 @ 40 | 2" | 1½" | 1½ | 3 | CPVC/Viton |
| EH1½- 2SC-D1.5-V | 45-0123 V | 80 @ 48 | 2" | 1½" | 2 | 3 | CPVC/Viton |
| EH1½- 3SC-D1.5-V | 45-0134 V | 100 @ 52 | 2" | 1½" | 3 | 3 | CPVC/Viton |
| EH1½- 4SC-D1.5-V | 45-0145 V | 140 @ 68 | 2" | 1½" | 5 | 3 | CPVC/Viton |
| EH1½- 5SC-D7.5-V | 45-0156 V | 160 @ 60 | 2" | 1½" | 7½ | 3 | CPVC/Viton |
| MAGNETIC-COUPLED SERIES 'M' PUMPS ³ | | | | | | | |
| 1x¾ MPVCR 1A-C.75 | 51-4111 B | 25 @ 26 | 1" | ¾" | ¾ | 1 | PP/Viton |
| 1½x1 MPVCR 2B-D1.0 | 51-6221 F | 45 @ 30 | 1½" | 1" | 1 | 3 | PP/Viton |
| 1½x1 MPVCR 3B-D1.5 | 51-6331 P | 60 @ 25 | 1½" | 1" | 1½ | 3 | PP/Viton |
| MAGNETIC-COUPLED SERIES 'FE' PUMPS ⁴ | | | | | | | |
| FE1 MPVGC 1A-D1.0 | 51-0211 G | 50 @ 35 | 2" | 1½" | 1 | 3 | PP/Viton |
| FE1 MPVGC 2A-D1.5 | 51-0221 J | 60 @ 49 | 2" | 1½" | 1½ | 3 | PP/Viton |
| FE1 MPVGC 3B-D2.0 | 51-0232 K | 90 @ 53 | 2" | 1½" | 2 | 3 | PP/Viton |
| FE2 MPVGC 4C-D3.0 | 51-0443 L | 100 @ 58 | 2" | 1½" | 3 | 3 | PP/Viton |
| FE2 MPVGC 5C-D5.0 | 51-0454 A | 120 @ 58 | 2" | 1½" | 5 | 3 | PP/Viton |
| HORIZONTAL SERIES 'HE' PUMPS ⁵ | | | | | | | |
| H2x1½ CE1V(M8)-D1.5 | 42-0118 A | 60 @ 43 | 2" | 1½" | 1½ | 3 | CPVC/Viton |
| H2x1½ CE2V(M8)-D2.0 | 42-0128 B | 80 @ 48 | 2" | 1½" | 2 | 3 | CPVC/Viton |
| H2x1½ CE3V(M8)-D3.0 | 42-0138 C | 100 @ 56 | 2" | 1½" | 3 | 3 | CPVC/Viton |
| H2x1½ CE4V(M8)-D5.0 | 42-0148 D | 140 @ 68 | 2" | 1½" | 5 | 3 | CPVC/Viton |
| H2x1½ CE5V(M8)-D7.5 | 42-0158 E | 170 @ 77 | 2" | 1½" | 7½ | 3 | CPVC/Viton |

¹⁻⁵ Request appropriate bulletin for complete specifications, including alternate materials of construction, flow curves, dimensions, etc.¹ Bulletin P-312² Bulletin P-301³ Bulletin P-509⁴ Bulletin P-518⁵ Bulletin P-201⁶ Total dynamic head (TDH) in feet ÷ 2.31 = PSI