Selecting and Maintaining UV Ink and Coating Transfer Pumps

An introduction to UV ink/coating transfer pumps

UVPS®
UV PROCESS SUPPLY, INC.

UV PROCESS SUPPLY, INC.
1229 W. Cortland Street • Chicago, IL 60614 • USA
Phone: 1-800-621-1296 • 773-248-0099
Fax: 1-800-99FAXUV • 773-880-6647
info@uvps.com • www.uvprocess.com

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INTRODUCTION

UV Process Supply is dedicated to promoting safety in the UV curing workplace. As part of our commitment, we offer a number of products that offer employees protection against UV ink and coating contact. While our Latex Disposable Gloves (Item #I004-002/003, I004-044/048), UV Barrier Cream (Item #I002-003), Aprons (Item #I003-002) and Coveralls (Item #I003-007) provide workers front-line defense, UV ink and coating pumps are critically important to improving employee safety. By reducing the potential for contact between the operator and the UV material or chemical being pumped, the pump can eliminate a number of health hazards that may result from improper exposure.

When examining the fluid dynamics of UV-curable inks and coatings, there are a number of pump designs that can be readily used to lift and transfer these materials from storage to application. Each of these pumps include specific design features which cause fluid motion, and which prevent the formation of a vacuum which can reduce the flow of the pumped material and damage the structure of the pump.

SELECTING A UV INK/COATING PUMP

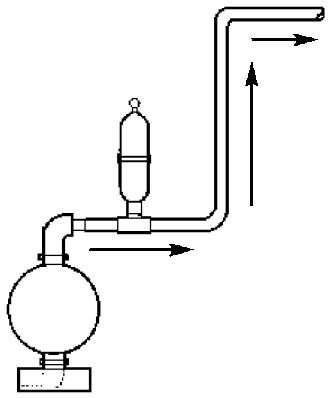
There are a wide variety of pump designs available for industrial and commercial uses. Each pump utilizes a unique design for fluid transfer, and most can be manufactured with components that are compatible with UV inks and coatings. Yet, prior to purchasing, you must:

1. Determine the compatibility of the material to be pumped. UV curable inks and coatings have a unique chemistry and composition that requires special handling and pumping needs. They are comprised of 100% solids, contain no solvents, and can react chemically with certain materials used in pump manufacture. Such reactive materials can ultimately change the physical characteristics of the UV ink or coating so that the material's performance attributes change.

   All wetted components, defined as parts that come in contact with the material being pumped, should be made of durable, non-porous materials. They should also have some level of

flexibility as high pumping speeds, cleaning solutions, and pumped material can cause diaphragms and seals to become brittle and breakdown over time. **All UV Process Supply pumps have been successfully tested for compatibility with the acrylate monomers and clean-up solvent typically found in UV ink and coating applications.**

2. Determine the fluid's characteristics: type and concentration; temperature; specific gravity; viscosity; solids content.



When selecting your UV ink pump remember to compensate for pressure-building elbows and fittings. Also determine how far and how high the material must be pumped from storage to application. These factors, amoung others, will help determine the pump size required.

3. Determine whether fluid characteristics of the pumped material are chemically compatible with the materials used to construct the pump.

4. Determine the conditions of operation for the application, including:

   Flow Rate: Calculated in Gallons per Minute(double-diaphragm) or Liters per Minute (peristaltic). GPM vs. L/min.

   Head Pressure: Calculated in feet, PSI or Bar and measured at the pump, this determines how far and how high material can be pumped from the pumping source. Remember to calculate the pressure-building effect that elbows, fittings, quick disconnects, and nozzles have on the system.

   Self-priming: If required, determine how many feet (meters) or inches (centimeters) there are from fluid level to the pump. For UV inks and coatings, this is important as air can be drawn through the pump when a job is complete to clear blockages. This air flow inhibits polymerization to keep the line clear during downtime.

   Duty cycle: Determine the amount of time the pump is used during an average production day and week.

5. Select a pump size in reference to the flow rate and pressure as determined in step 3. Inlet and discharge lines should be the same size or slightly larger than the pump port sizes.

6. Determine the application:

   A. Standard transfer or recirculation: If standard transfer, then a standard pump with no switch and no bypass is required. If recirculation, then a switch or control on the system must be used.

   B. On-demand material supply: If required, then a demand (switch) pump is necessary. The pump will be automatically actuated by the switch when a valve is opened in the discharge line and will automatically deactivate the pump when the valve is closed. Demand pumps should be mounted horizontally for optimal performance and safety.

   C. Continual short-period operation against a partially or fully closed valve: If required, then a bypass pump is necessary. This pump is fitted with a bypass valve to allow the fluid to bypass from the high pressure side to the low pressure side and not damage the pump.

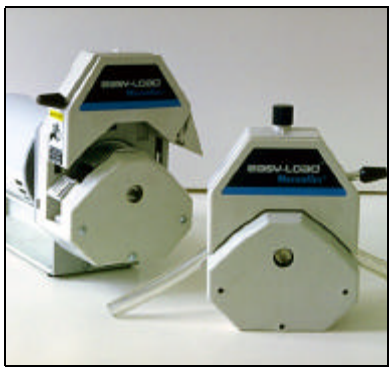
7. Determine the pump's requirements for port fittings and strainers and select the appropriate options.

8. Determine cost factors, such as purchase price and maintenance (clean-up/repair).

TYPES OF PUMPS

There are a variety of pump designs that incorporate different mechanisms for transferring materials. The pump design most suitable for transferring UV inks and coatings must consider critical performance factors such as seizing, shearing and viscosity.

Centrifugal and piston pumps generate heat when the pump's driving mechanism contacts the pump's stationary resistance force, or the stationary wall against which pressure is built. For centifugal pumps heat is generated when the impeller vane rotates against the pump casting. For piston pumps, heat is generated as the piston reciprocates against the cylinder wall. This repeated motion creates energy and the heat build-up can cause the ink or coating to polymerize within the pump chamber. Over time, this polymerized material will cause the pump to bind and ultimately fail.

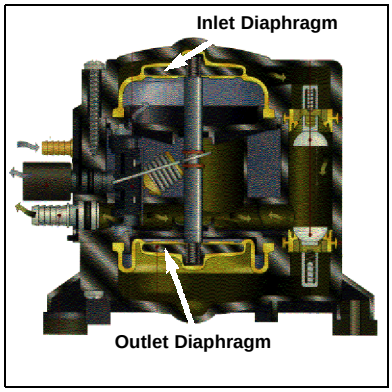


Peristaltic pumps reduce maintenance requirements as the transfer tubing is the only component which is in contact with the material being transferred. These pumps, though, offer very low flow rates as measured in mL/min as compared to most production requirements of gallons per minute. To achieve desired flow capacities, a peristaltic's drive mechanism would be excessively large and may pose a explosion hazard.

In addition, any pump which employs a mechanism which shears or cuts the material as it is being transferred (i.e. a centrifugal's impeller vane and its casting outlet), will lower the UV ink or coating's viscosity. Such a change will produce a higher flow rate and a variable film thickness during application. This will affect coverage and final UV cure as thicker films cure at a different rate (more energy; slower speeds) than thinner films.

Peristaltic pumps use transfer tubing positioned between a rotor and housing. As the tubing is squeezed, material is pushed and drawn through the tube in equal measure. Due to their limited flow rate of mL/min, these pumps typically do not yield the capacity required for most productions. To deliver the gallon(s) per minute flow rate of most operations, the peristaltic's drive must be considerably oversized and may pose an explosion hazard within the production environment.

Conversely, double-diaphragm pumps do not shear material during transfer. Air pressure on the backside of one diaphragm transfers material out of one chamber while a diaphragm creates a vacuum in the other chamber, drawing material into the chamber for the next pumping stroke. This action maintains viscosity throughout production and is ideally suited for handling UV inks and coatings.



Air-powered diaphragm pumps offer consistent and durable performance for UV ink and coating applications.

ADVANTAGES OF THE DOUBLE-DIAPHRAGM

Diaphragm pumps are one of the oldest pumping techniques used by man. The technology has progressed from animal skin diaphragms through mechanically-driven single diaphragms, to today's popular air-driven double diaphragm pumps.

Due to their low initial cost, easy clean-up, low maintenance cost, variety of available flow rates, and the availability of your choice of compatible wetted parts, the double-diaphragm pump offers the most cost-effective method for transferring UV curable inks and coatings from container to application system.

The following are a few features of the typical air-driven double diaphragm pump:

1. Pumping chambers and the material being pumped are not in

contact with any close fitting rotary or sliding seals. This makes double diaphragm pumps ideal for use with UV inks, coatings, abrasives and slurries.

2. Diaphragm pumps are the only pumps designed for dispensing purposes. This means that when operating the pump at 60 lbs. of air pressure, the pump will run until 60 lbs. of pressure is built up through the transfer line. Once this pressure is established, the pump will shutdown until additional pressure is required to meet the 60 lb. requirement. This allows the operator to place a cut-off valve at the press to control the flow without having to shutdown the pump. By closing the fluid outlet on a diaphragm pump, the pump stops. There is no movement, no wear, no overhead, no heat build-up, and no power consumption, making the pump 100% energy efficient.

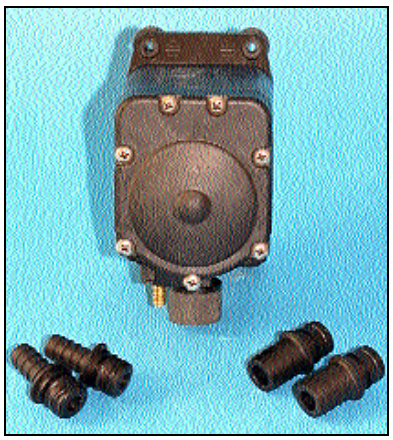
3. Inherently pressure balanced diaphragms always balance air pressure against the fluid being pumped. The diaphragm acts as a membrane that separates fluid and air, yet the diaphragm is not stressed as are members of mechanically driven pumps. Therefore, pumping efficiency remains constant. And since there are no rotors, gears, vanes or pistons, there is no gradual decline in performance due to wear.

4. With diaphragm pumps, there is no foaming or shearing of material so the material being pumped remains unchanged following transfer.

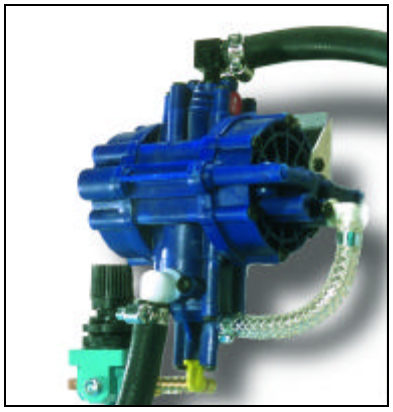
5. Capacities are infinitely variable within a specific pump's operating range. There is no need to use variable speed motors or variable drives.

6. Although the pumps deliver large volumes at intermediate pressures, they can also develop pressures of up to 125 PSI when substantial pressures are necessary or when high suction lifts are required.

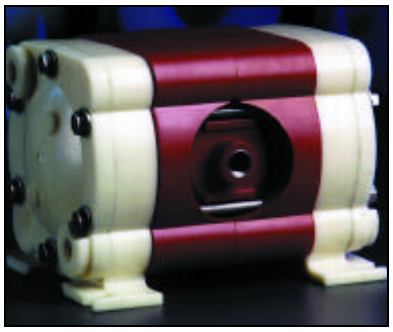
7. Air-driven double diaphragm pumps can be run dry with only additional wear to the diaphragm because, unlike centrifugal pumps, there are no rotary seals or packing glands that need



Transfer Pump 4 features a variable flow rate of up to 7 GPM and is self-priming up to 15 ft. (4.5m). Leak-resistant radial seals and corrosive retardant metals prevent seepage and pressure loss. Item #J004-079: 1/2" pump. Item #J004-111: 3/4" pump.

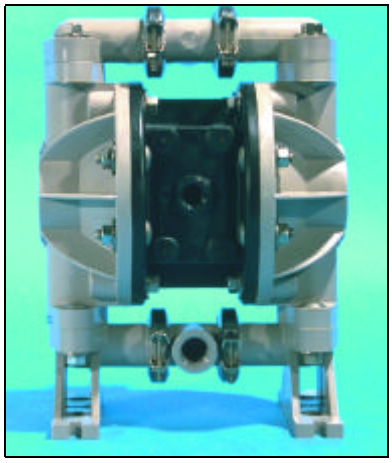


Transfer Pump 3 is our most popular double-diaphragm. Transports UV inks and coatings at a flow rate of 1.8 gallons per minute. Uses cubic inches of air rather than cubic feet. Requires minimal solvent for thorough cleaning. Item #J004-061.



1/4" Poly/Teflon Double-Diaphragm Pump is a durable, easy to maintain pump that handles higher viscosity materials. Polyethylene body with Teflon® wetted parts. Fully self-priming to 17 ft. vertical. Can be mounted in any position. Item #J004-103.

lubrication from the pumped medium. In addition, for UV ink and coating applications, this allows air to be drawn through the pump when a job is complete to clear blockages. This air flow also inhibits polymerization to keep the line clear during downtime



1/2" Double Diaphragm Pump is for use with higher viscosity inks and coatings. It can be run dry, is self-priming, and has a flow rate of 0-14 gallons per minute. Needs no electricity or pressure relief valve. Wetted parts are guaranteed for compatibility with UV inks and coatings. Item #J004-003.

1/4" Double Diaphragm Pump transports 5 gallons of medium viscosity material per minute with 20+ foot suction from bucket to ink delivery tray, making it ideal for extended, continual use. Mounts in any position. Item #J004-051.

UV Process Supply offers LARGER PUMP MODELS (up to 2" dia. inlet/outlet) to meet higher gallon per minute (GPM) flow rates.

Call for pricing information.

8. Pump discharge pressure can be no higher than air pressure; therefore, fluid pressure relief valves or other fluid pressure controls are not usually required.

9. Diaphragm pumps are self-priming with suction lifts of up to 10 feet or more. Again, this allows air to be drawn through the pump to inhibit polymerization by keeping the line clear during downtime.

10. Some diaphragm pumps can be totally submerged in fluids, even corrosives.

11. Diaphragm pumps can transfer extremely high viscosity fluids or slurries (flooded suction sometimes recommended).

12. Air-driven pumps do not utilize electrical motors or controls which can cause fire or explosion hazards though they should be grounded to avoid static build-up and discharge.

13. Diaphragm pumps are easy to install, and retain a lower replacement/repair cost than other pump designs.

14. These pumps can be constructed from a wide selection of elastomers and metals to handle the widest variety of materials.

15. Air-driven pumps cannot overheat since there are no heat-generating electrical components. When pumping solvent-based fluids, this mean reduced solvent flash-off.

16. Air-driven pumps offer pollution-free operation as there are no exhaust fumes.

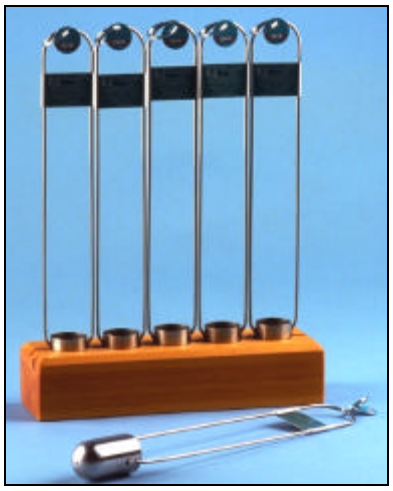
Based on the above characteristics, here are some of the applications for air-driven, double diaphragm pumps.

- PRINTING & PACKAGING INDUSTRY
  Ideal for UV curable glue, paint, ink and coating dispensing.

- PAINT INDUSTRY
  Suitable for drum transfer, tank level controls, tank filling, pigment transfer, solvent handling.

- COATING INDUSTRY
  Use for drum transfer of chemicals and cleaners.

- CHEMICAL INDUSTRY
  Use when handling abrasive and corrosive fluids, tank cleaning, drum transfer.



By measuring viscosity using an instrument such as a **Viscosity Cup** (Item #N002-001), you can benchmark an ink or coating's desired flow properties prior to production. Use this benchmark throughout production to ensure flow rate remains consistent.

INK AND COATING VISCOSITY

If the ink or coating can be poured, it can be pumped. Yet certain measures should be taken to ensure that your desired flow rate does not adversely affect print quality. This includes maintaining consistent viscosity levels.

Critical print parameters such as uniform color and ink coverage are a direct result of viscosity. As inks change color sharply when viscosity changes, maintaining the required viscosity level throughout production can help ensure print quality. On today's faster presses, the need to maintain viscosity levels in order to assure consistent, adequate ink distribution is greatly stressed. With diaphragm pumps, since there is no foaming or shearing of the ink or coating being pumped, the material remains unchanged following transfer.

55-gallon Drum Poly Bags are 24 micron polyethylene liners which collapse as material is pumped from 55-gallon drums. Prevents air pockets from forming. Item #J000-016.

It is important to note, though, that if the ink or coating's viscosity increases to a consistency similar to mayonnaise, then the suction developed by the pump has the potential to pull an air hole through the suction hose from the supply tank. When this happens, the pump will sound like it is stoking too fast and no fluid will exit the discharge. A close inspection of the supply tank will show that the fluid does not back fill on itself to keep the suction hose supplied with fluid.

The most common fix is to put a follower plate on top of the fluid in the supply tank to prevent the air hole, or "worm hole", from forming. The easiest way to handle very viscous fluids on the suction

end of the pump is to have the fluid packaged in a Drum Poly Bag (#J000-016: 55-gal.) that will totally collapse as the fluid is being drawn out of the bag. This prevents air holes from forming.

As a basic rule, remember that as the fluid increases in viscosity, the slower the pump should stroke. To adjust the speed of most diaphragms, use an air control valve to slow the air flow of the pump.

CAVITATION

It is possible to make a diaphragm pump stroke so fast that the fluid can not be pulled or sucked into the chamber as fast as the diaphragm is withdrawing. When this occurs, a vacuum is created and a vacuum hole or cavity will occur in the fluid in the suction chamber. This is called “cavitation”.

When cavitation occurs, the pump will abruptly increase speed with no increase in discharged fluid and will generally sound erratic. It is recommended that a throttling valve be used to control stroking speed. The air pressure control should be used to provide adequate pressure to force the fluid to flow from the discharge through all the discharge piping, always with some pressure to spare in case the material becomes more viscous, or more resistance is developed in the discharge piping. For most transfer operations, pressures in the range of 30 to 50 PSI are typical. If you are pumping through a complex of pipes in the discharge line, then 70 or 80 PSI or higher may be required.

Once the pressure is established at a very slow stroking speed, then the throttling valve can be opened until the pump cavitates. Close the throttling valve until the pump strokes uniformly and smoothly. Some pump manufacturers install a metering hole in the air supply port to limit the amount of air that can get into the valve thereby slowing the stroking rate of the pump. Usually, though, the metering hole can only be set for one fluid at maximum air pressure.

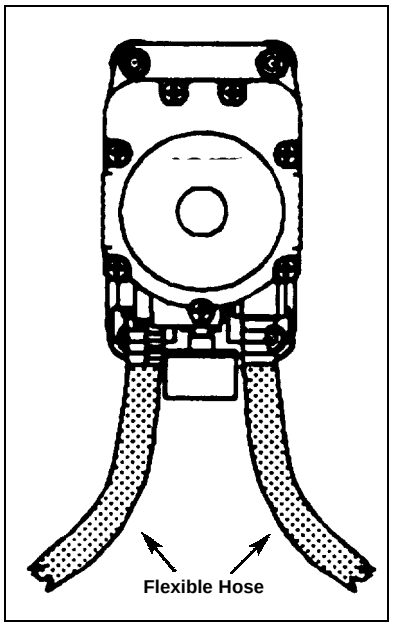
COMPRESSED AIR PREPARATION

Compressed air preparation is important to ensuring long term, trouble-free pump operation. Proper air preparation includes installing a filter, regulator, and lubricator (using a good grade of SAE 10 wt. oil or lighter; do not use a multi-viscosity motor oil) in the air

supply line. The oil is usually fed at a rate of approximately one drop every 20 SCFM. The filter should remove dirt as well as water from the supply air. However, the filter should be emptied or left open to bleed the trapped water out of the system.

To check lubrication quality of most diaphragm pumps, remove the muffler cover to expose the screen. The screen should have a thin, light film of oil. If the oil is heavy, gummy or milky-colored, it is probably of too high a viscosity or contains water. Too high viscosity oil or water mixed in with the oil will cause the valve to shift slowly or erratically. If the air is contaminated with dirt, this will also show on the screen.

Refrigerated, or chilled, air is also recommended as it removes water vapor from the air and further extends pump life.



Flexible Hose absorbs surge and vibration created by an ink transfer pump to ensure consistent material flow through the transfer line.

TRANSFER LINE VIBRATION

For all practical purposes, UV inks and coatings are not compressible. This means they will neither absorb nor cushion a pulse or surge created by a pump's action, but instead will transmit the energy from one form to another. Thus, pulsation and/or surge can occur when liquid is pulsated, stopped, or turned.

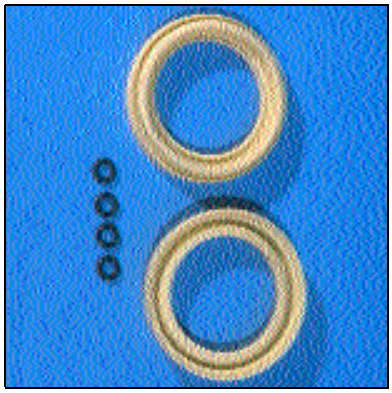
Diaphragm pumps move liquid by trapping and then expelling discrete units of that liquid. The pumped material actually comes to a complete stop every time the pump shifts, which can occur up to several hundred times per minute. This start-stop action creates spikes in the manner of high amplitude, low frequency pulses.

To control pulsation and surge, and to ensure that ink or coating flows consistently, there are several control methods that can be effectively employed:

• *Flexible hose.* At the pump discharge, add a 8 to 10 foot long flexible hose with an internal diameter three or four times the size of the pump's discharge. The hose should be no stronger than a 300% safety factor over the pump pressure. This hose will act as a capacitor to store the pressure from the pump while the valve is shifting directions from one chamber to the other.

Surge suppressors are designed specifically to reduce pulsation created within fluid pumping lines. By installing a suppressors as close as possible to the pump source, most pulsation can be dampened to ensure consistent flow.

Inks and coatings should always be properly strained and/or filtered prior to pumping to ensure pump damage is minimized.



Regular pump maintenance includes flushing the pump with a compatible cleaner, such as pH6 Liquid Soap, and periodically disassembling the pump and replacing seals and diaphragms. Such maintenance will extend the life of the pump body and components.

After the oversized hose, install a transfer line that reduces the pipe size to suit the application. A throttling valve should be placed in the discharge line at this point. Additional flow control valves may be used further downstream as the application requires.

UV Process Supply's UV transfer hose (Item #J008-001: 3/8" hose; #J008-005: 1/2" hose) is fiber-reinforced rubber/EPDM to handle the pressures built up during use. Its opaque composition prevents ambient UV light sources, such as sunlight and fluorescent lamps, from causing the UV materials to polymerize during transfer.

Typical transfer tubing is made of transparent vinyl material. Vinyl is incompatible with UV materials and any transparent hose transmits UV energy which may cause the UV material to polymerize during transfer. UV Process Supply offers a UV-compatible, semi-opaque silicone tubing (Item #J004-074C: 1/4" silicone tubing) for use with peristaltic applications.

• *Surge suppressors* (Item #J004-052: 1/2"; #J004-053: 1/4"). Used to absorb pressure surges caused by quick-closing va1ves, long vertical runs and pump start-up/shut-down. They act directly to equalize or balance the pulses generated by the pump, and generally provide an economical, efficient and safe method for controlling pulsation and surge.

FILTRATION REQUIREMENTS

Keeping your ink pumps contaminate-free helps extend the pump's overall life span and the life of the pump's wetted components. Even small contaminates can be harmful to diaphragms and seals. Therefore, all inks and coatings should be properly filtered before being pumped.

UV Process Supply's line of Disposable Strainers (Item #J012-014 - J012-023) for 1 and 5-gallon batches of inks, coatings, resins, pigments, additives, solvents or any other liquids provide a clean, hands-free filtering. These products restore the quality and consistency of inks, coatings and raw materials by removing settled contaminants and eliminate any downtime associated with clogged or damaged pumps or pump lines due to contaminated ink or coating. Inlet Strainers (Item #J004-013) are recommended on all applications

to prevent clogging of the valves.

CLEAN-UP CONSIDERATIONS

Regularly scheduled pump maintenance can preserve the integrity of the pump's wetted parts and overall operating performance. Therefore, every double-diaphragm pump must be regularly inspected, cleaned and occasionally retightened to ensure reliable long-term performance.

For cleaning UV inks and coatings from internal pump parts, pump pH Liquid Soap (Item #I001-007) through pump chamber and allow to soak. This soap will effectively dissolve UV resins and pigments remaining within the chamber. After soaking, flush the pump with water or a low-VOC solvent. As double-diaphragm pumps are compact in size, they require less clean-up chemicals for maintaining reliable performance.

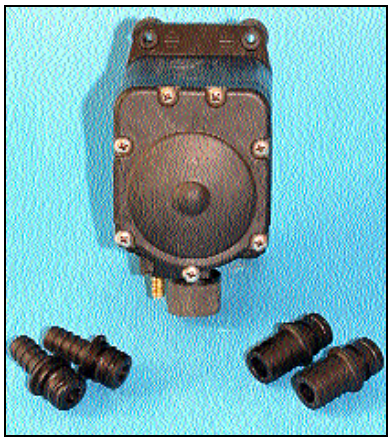
When replacing worn internal components, UV Process Supply also maintains Repair Kits for each of its Con-Trol-Cure™ pumps.

CONCLUSION

Selecting a dependable UV ink and coating pump requires an understanding of the unique characteristics of the materials being transferred. Choosing a pump which maintains the integrity of the material being pumped and which incorporates wetted parts that are compatible with UV chemistry is critical to obtaining reliable performance.

As we have shown, the air-driven double-diaphragm offers a clear advantage over other pump designs for safely handling UV materials. It has proven itself through years of consistent performance in various UV ink and coating applications, and remains the primary pump for most users of UV curing chemistries.

UV-COMPATIBLE INK PUMPS



TRANSFER PUMP 4

Now transfer UV-curable inks and coatings, and other fluid materials from container to applicator with unmatched volume capacity using the powerful Transfer Pump 4.

With the ability to generate an unprecedented flow rate of up to 7 GPM, this air-operated, double-diaphragm pump can easily handle a variety of viscosities. Ideal for most high volume applications, the TP4 is fully self-priming up to 15 ft. (4.5m), utilizes quick disconnect fittings of 1/2 or 3/4", and accepts variable air supply pressures of 20-120 PSI.

Constructed with leak-resistant radial seals and corrosive retardant metals to prevent seepage and pressure loss, the TP4 is engineered to deliver consistent, long-term performance. Quiet and remarkably compact, with a net weight of only 1.2 lbs. (.54kg), the TP4 can be quickly installed onto any press with minimal modification.

With such pumping capacity and performance, the TP4's design drastically minimizes ink handling requirements to yield significantly higher productivity and greater occupational safety.

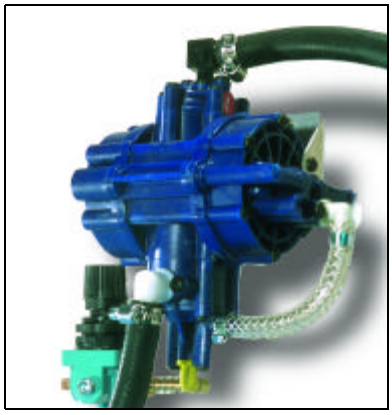
Features:

- Ideal for most UV ink and coating viscosities
- Variable flow rate up to 7 GPM (max.)
- Air-operated
- Constructed of corrosion-resistant metals and seals
- Installs easily with quick disconnect fittings; 1/2 and 3/4"
- Compact design permits fast mounting onto any press
- Quiet operation
- Includes air regulator, 2-6 ft. lengths of UV grade tubing, one 1/4" NPT brass male barb air line connector, 2 hose clamps, 1-1 ft. length of clear tubing

Specifications:

- Double-diaphragm design
- Wetted components: EPDM and polyethylene
- Handles air pressure from 20 to 120 PSI
- Self-priming up to 15 ft. (4.5m)
- Net weight of only 1.2 lbs. (.54kg)

Item No.	Description
J004-110	TRANSFER PUMP 4 KIT; 1/2" pump
J004-112	TRANSFER PUMP 4 KIT; 3/4" pump
J004-079	TRANSFER PUMP 4; pump only
J004-111	TRANSFER PUMP 4; 3/4" pump only



TRANSFER PUMP III

The Transfer Pump III transports UV/EB inks and coatings at a flow rate of 1.8 gallons per minute. This air-driven, double-diaphragm pump economizes operation by using cubic inches air consumption rather than cubic feet. Because of its small size, the TP3 requires less solvent for cleaning.

Offers self-priming, continuous flow without worry of electrical breakdowns or stalling. Minimal maintenance with few moving parts, high corrosion and wear resistance of wetted parts and easy to clean stainless steel metal components.

Specifications:

• Includes:	Air Regulator and 2-6 ft. lengths of UV hose
• Materials of Construction:	Polypropylene, EPDM, 304 Stainless Steel
• Air pressure:	10-60 PSI
• Dimensions:	7 x 6 x 4"
• Fittings:	3/8" Inlet and Outlet stainless steel 1/4" air inlet nylon fitting
• Lift (wet):	25 in.hg. (min)

Item No.	Description
J004-041	TRANSFER PUMP III KIT
J004-061	TRANSFER PUMP III ONLY

IMPORTANT NOTE: Check with ink or coating manufacturer to ensure compatibility between ink/coating chemistry and this pump's wet components.

TRANSFER PUMP 3V KIT

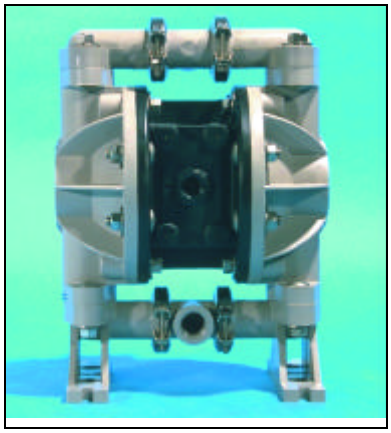
Similar in size and capabilities to the popular Transfer Pump III, the 3V utilizes components made of Viton® for greater resistance to most solvents and inks. Features of 1.8 GPM flow rate, easy cleaning, and universal mounting.

Specifications:

- Includes: Air Regulator and 2-6 ft. lengths of UV hose
- Materials: Viton®, EPDM, 304 Stainless Steel
- Air pressure: 10-60 PSI
- Dimensions: 7 x 6 x 4”
- Fittings: 3/8” Inlet and Outlet stainless steel; 1/4” air inlet nylon elbow fitting
- Lift (wet): 25 in.hg. (min)

Item No.	Description
J004-071	TRANSFER PUMP 3V KIT
J004-072	TRANSFER PUMP 3V ONLY
J004-073	TRANSFER PUMP 3V REPAIR KIT

DOUBLE DIAPHRAGM 1/2” PUMP



The CON-TROL-CURE™ Double Diaphragm 1/2” Pump is recommended for use with inks and coatings with viscosities too high for Transfer Pumps, or where greater flow rates are required. This air driven, double diaphragm pump can run dry, is self-priming, and has variable flow from 0-14 gallons per minute. Needs no electricity or pressure relief valve. Inlet and outlet have 1/2” connections. The pump can operate in 3 ways: fluid flow back-up, dual fluid or 2 fluid mixing. Wetted parts are compatible with UV inks, coatings, and cleaning solvents. This pump can function as a supply and return simultaneously. It can be converted into a drum pump with the 1/2” Pump Kit (J004-044). Repair kits for air (O-rings, seals, U-cup) and fluid control (ball bearings, O-rings) also available. The pulsating of a diaphragm pump can be stopped using the CON-TROL-CURE™ Surge Suppressor.

Item No.	Description
J004-003	DOUBLE DIAPHRAGM 1/2” PUMP
J004-115	AIR CONTROL REPAIR KIT
J004-116	FLUID CONTROL REPAIR KIT

1/2” DRUM PUMP KIT

Convert your CON-TROL-CURE™ 1/2” Pump (#J004-003) into a drum pump with the 1/2” Drum Pump Kit. The kit consists of a 1/2” polypropylene suction tube and 1/2” bung adapter that fits on standard 55 gallon drums. The suction tube attaches easily to the 1/2” pump and slides directly into the bung adapter. There is no need to unscrew the pump from the drum to reinstall into the next drum also, the air line and discharge tubing don’t have to be disconnected.

Item No.	Description
J004-044	1/2” PUMP KIT

DOUBLE DIAPHRAGM 1/4” PUMP

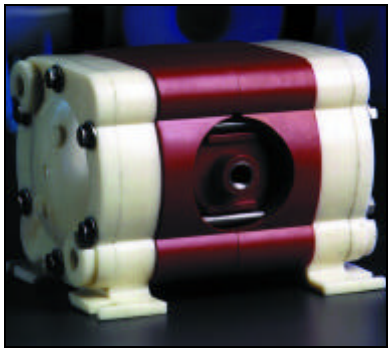
The Double Diaphragm 1/4” Pump transports 5 gallons per minute with 20+ foot suction from bucket to ink delivery tray, making it ideal for extended, continual use. The pump mounts in any position: upside down, sideways, right-side-up - 360° on all three axes without affecting performance. An unstallable air motor design will start up or shut off at any interval or length of time. With a one quarter inch piping capacity, the CON-TROL-CURE™ Double Diaphragm 1/4” Pump can be plumbed in any of 4 fluid inlet/outlet configurations.

Item No.	Description
J004-051	DOUBLE DIAPHRAGM 1/4” PUMP

ACCESSORY PACKAGE KIT

For the CON-TROL-CURE™ Double Diaphragm 1/4” Pump, the Accessory Package Kit contains: 2-6 ft pieces of 3/8” I.D. tubing; 1-regulator; 1-1 ft piece of tubing; 2-hose clamps; and 1-air connector (J004-014).

Item No.	Description
J004-058	ACCESSORY PACKAGE



1/4" POLY/TEFLON DOUBLE DIAPHRAGM PUMP

Durable, easy to maintain double diaphragm pump handles tough, heavy viscosity fluids. Polyethylene construction with Teflon® seals offers resistance to solvents and UV inks and coatings. Pump features leak-free, non-stalling operation, fully self-priming up to 17 ft. vertical, and can mounted in any operating position.

Features:

- Air-powered, spark-free operation
- Non-stalling
- Self-priming; 17 ft. vertical dry suction
- Runs dry
- Variable flow rate
- Pumps in any mounting position
- Reversible fluid inlet/outlet positions
- Up 30 fewer components than competitive pumps

Specifications:

• Seals:	Teflon®
• Construction:	Polypropylene
• Capacity:	Adjustable 0 to 4.3 GPM (16.3l/min.)
• Oper. Temp.:	150°F (66°C)
• Max. Air:	100 PSI (6.8 bar)
• Weight:	5 lbs.
• Max. Solids:	Up to 1/16"
• Air Inlet/Outlet:	1/4" NPSF Female
• Fluid Inlet/Discharge:	1/4" NPSF
• Dims (LxWxH):	7.50 x 5.50 x 5.34" (190.50 x 139.70 x 135.64mm)

Item No.	Description
J004-103	1/4" POLY/TEFLON DOUBLE DIAPHRAGM PUMP

DUPLEX-DIAPHRAGM ELECTRIC PUMPS

When pneumatic pumps are not an option, these electric-powered diaphragm pumps offer automatic control and operate only when liquid flow is required.

Duplex diaphragm design eliminates troublesome shaft seals. Excellent self-priming capability allows pump positioning above liquid. Corrosion-resistant polypropylene construction with no metal parts in contact with liquid being pumped. Handles small foreign particles such as resin, dust, dirt, etc. Recommended use with in-line strainer.

Must be properly grounded to prevent electrical shock. Supplied with grounding conductor and grounding-type attachment plug. IMPORTANT: Not intended for high flash point fluids (i.e. solvents, etc.).

Specifications:

• Pump design:	Duplex diaphragm
• Materials:	Housing:Reinforced polypropylene Elastomers: Santoprene, Viton®
• Pressure:	Off @ 60 psi (4.1 bar); On @ 40 psi (2.8 bar)
• Temperature:	Min. = 45°F (7°C); Max.= 160° F (71°C)
• Ports:	3/8 NPT
• Motor:	115 VAC, 50/60 cycle
• Current:	0.55 A (max.)
• Weight:	4 lbs. (1.8kg)

Item No.	Description
J004-095	3/8" DUPLEX DIAPHRAGM ELEC. PUMP W/SANTOPRENE SEALS
J004-096	3/8" DUPLEX DIAPHRAGM ELEC. PUMP W/ VITON® SEALS

5 GALLON DISPENSING SYSTEM

High-powered ink pump system attaches to most 5 gallon containers for metering purposes or for transferring inks and coatings. Handles low and high flow rates with gentle, smooth pumping action. System features polypropylene-encased pump with 7 GPM max. flow rate attached to 5 gal. pail cover. Complete with syphon tube, quick disconnect fitting, grounding wire, clamp.

Specifications:

- Max. fluid pressure: 100 psi (7 bar)
- Max. pump speed: 330 cpm
- Max. suction lift: 12 ft. (3.7m) dry; 21 ft. (6.4m) wet
- Air pressure Range: 15 - 100 psi (1-7 bar)
- Operating temperature: 40-150°F (4.4 - 65.5°C)

Item No.	Description
J004-097	5-GAL. DISPENSING SYSTEM

WALL-MOUNTED SPRAY SYSTEM

Lightweight and compact wall-mount pump ideal for in-plant spraying operations, such as adhesive application or woodworking. Color changes require only quick solvent-flush. Air-operated diaphragm pump providing 7 GPM flow rate. Grounded acetal construction with Teflon diaphragms is compatible with waterborne paints, solvents and petroleum-based solvents. Includes drum/bung suction kit, air and fluid hoses, and wall bracket.

Specifications:

- Air to fluid pressure: 1:1
- Max. fluid pressure: 100 psi (7 bar)
- Max pump speed: 330 cycles/min.
- Max. air usage: 5.5 scfm
- Air pressure range: 15-100 psi (1-7 bar)
- Operating temperature: 40-150°F (4.4-65.5°C)
- Max. lift: 7 ft (2.1m) dry; 12 ft. (3.7m) wet

Item No.	Description
J004-099	WALL-MOUNTED SPRAY SYSTEM

Viton® is a registered trademark of DuPont Dow Elastomers.

SURGE SUPPRESSORS

Double Diaphragm Pumps offer many benefits over most other types of reciprocating pumps. They do however, present the drawback of pulsation. These surges or pulsations can damage pipes, fittings, couplings and valves.

For a steady stream, the two CON-TROL-CURE™ Surge Suppressor models (for 1/4” and 1/2” flexible air hoses) act as shock absorbers to cushion the effects of pulsating flow. Basically constructed as closed chambers, they each contain an elastomer bladder inside. The bladder separates a compressed air cushion on the top from the pumped liquid on the bottom.

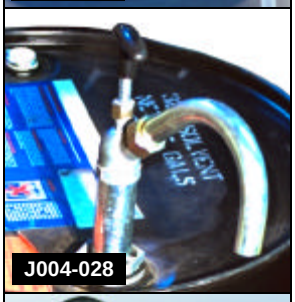
To control surges from delivery discharges, the Surge Suppressor should be installed at the pump’s discharge connection. The closer to the discharge, the better the dampening effect.

Item No.	Description
J004-052	1/2” SURGE SUPPRESSOR
J004-053	1/4” SURGE SUPPRESSOR

HAND PUMPS


J004-001


J004-045


J004-028


J004-027


J004-012


J004-026


J004-100

FIVE GALLON CONTAINER HAND PUMP
Hand operated pump for 5 gallon containers. A complete unit, once assembled, it directly replaces the original cover on a 5 gal pail. Ink or coating can be pumped directly to the application equipment or into smaller containers.

Item No.	Description
J004-001	FIVE GALLON CONTAINER HAND PUMP

POLYETHYLENE HAND PUMP
The construction of this affordable Polyethylene Hand Pump provides high resistance to most UV inks and coatings, inert and strong acids, alkalies and many solvents for contamination-free and long-term use. Its positive pressure on downstroke provides smooth transferring of materials to 12 feet (3.6 m). Empties 55 gallon drums to within 1/8" of bottom. Mounted in 2" diameter (51 mm) standard V-threaded polyethylene plug. 32"L.

Item No.	Description
J004-045	POLYETHYLENE HAND PUMP

NICKEL-PLATED HAND PUMP
The self-priming Nickel-Plated Hand Pump fits 15, 30 and 55 gallon drums with 1-1/2" or 2" openings. Resists chemical action of non-corrosive liquids. Pumps 12 ounces per stroke. Measures 41-3/8" high x 1-7/16" diameter.

Item No.	Description
J004-028	NICKEL-PLATED HAND PUMP

SOLVENT DRUM HAND PUMP
The hand operated Solvent Drum Pump is constructed of the finest materials and is resistant to most solvents. Self-priming, will easily dispense 12 ounces per stroke. Designed for heavy use to provide years of reliable service. For 15, 30 and 55 gallon drums. Measures 41-3/8" high x 1-7/16" diameter at base. For low viscosity materials.

Item No.	Description
J004-027	SOLVENT DRUM HAND PUMP

LOW VISCOSITY PLASTIC HAND PUMP
The deluxe CON-TROL-CURE Low Viscosity Plastic Pump is constructed of non-corrosive hi-density polyethylene and stainless steel. It is ideal for pumping low viscosity conventional or UV inks and coatings from drum storage. Simple lever action handle dispenses 8 ounces per stroke. For 15, 30 and 55 gallon drums with 1-1/2" or 2" opening. Measures 15-1/4" high x 1" diameter.

Item No.	Description
J004-012	LOW VISCOSITY PLASTIC HAND PUMP

PLASTIC CHEMICAL HAND PUMP
Chemical- and acid-resistant hand pump sistant conveniently adjusts to 2, 4, 6 or 8 oz pumping action. Fits 55 gallon drums with 3/4" or 2" opening. 48" h x 9/16" diameter. For low to medium viscosity UV coatings, solvent and fountain solutions, water- and solvent-based coatings.

Item No.	Description
J004-026	PLASTIC CHEMICAL HAND PUMP

PLASTIC SIPHON/PUMP - 55 GALLON
Upright polyethylene drum pump resists solvents for transferring petroleum-based products. Bung-mounts onto any 55-gallon drum. Extended hose reduces splashing.

Item No.	Description
J004-100	PLASTIC SIPHON/PUMP - 55 GALLON

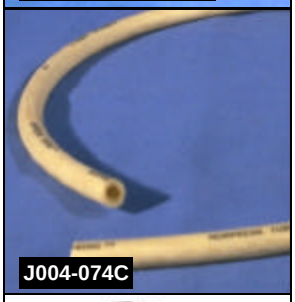
PUMP ACCESSORIES

TRANSPORT HOSE/TUBING

For use with the CON-TROL-CURE™ Pumps, CON-TROL-CURE™ Hose/Tubing has been selected for its compatibility with radiation curable formulations. The hose is opaque to light and will not swell or breakdown with UV curable materials. Please specify length and inside diameter (1/4, 3/8, 1/2 or 3/4").

Item No.	Description
J008-001	UV GRADE TRANSPORT HOSE (3/8")
J008-005	UV GRADE TRANSPORT HOSE (1/2")
J008-003	UV GRADE TRANSPORT HOSE (3/4")
J004-074C	UV GRADE REPLACEMENT TUBING (1/4")


J008-001/003/005


J004-074C

IN-LINE FLUID HEATER

Stainless steel heating element installs in-line with ink pumping system to handling inks and coatings requiring better flow rate. Incorporates 2 KW cartridge-type element equipped with variably controlled thermostatic. Wiring, element and thermostat are protected by a preset heat limiter. Heater will not switch on until temperature level exceeds room temperature. 1/2"-14 NPTF inlet and outlets. Can be plumbed in a row. Prewired for 120, 240 and 480 VAC. Temperature rise: 100 F @ 15 gallons per hour recovery rate. Temperature range: 60 to 250 F. Weight: 18 lbs.

Item No.	Description
J004-082	IN-LINE FLUID HEATER


J004-082

76 PIECE FITTING ASSORTMENT

Generous assortment of 76 fittings has everything you need for laboratory set-ups. Clear, hinged polystyrene storage case makes it is easy to find what you need. For low pressure applications (20 PSI or less).

Kit includes:

- 10 straight tubing connectors
- 12 T connectors
- 6 quick disconnects
- 12 straight-stepped tubing connectors
- 12 Y connectors
- 24 Polyethylene cup-type stoppers

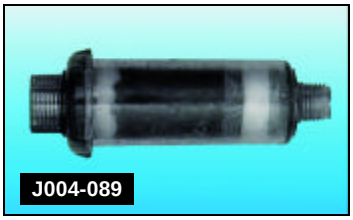
Item No.	Description
J004-009	76-piece

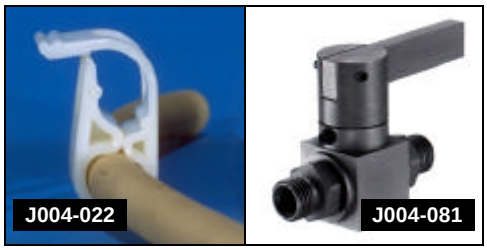

J004-009

PUMP FITTINGS

Fitting Assortment Molded from high-density polyethylene resins, these fittings are non-corrosive and will withstand pressures to 200 PSI. To assemble, simply push tubing over serrated end of fitting and attach clamp if necessary. 3/8" fittings fit CON-TROL-CURE™ Transfer Pumps; 1/2" fittings fit the CON-TROL-CURE™ All Flow Pump & Peristaltic Pump.

Item No.	Description
J004-004	3/8" barb 'Y'; barb all sides
J004-023	1/2" thread x 3/4" hose barb
J004-024	1/2" straight barb connector
J004-029	3/8" threaded tee; 3/8" 2-barb
J004-030	3/8" barb tee; barb all sides
J004-031	1/2" barb tee; barb all sides
J004-032	1/2" x 3/8" bar reducer
J004-033	1/2" thread x 1/2" hose barb
J004-034	3/8" barb; 90 degree elbow
J004-056	1/4" thread x 1/4" hose barb
J004-057	1/4" thread x 3/8" hose barb
J004-084	3/4" thread x 1/2" hose barb; 90 degree elbow
J004-085	1/2" thread x 3/8" hose barb
J004-086	3/8" straight barb connector
J004-087	3/8" x 1/4" barb reducer
J004-088	1/2" barb; 90 degree elbow
J004-108	3/8 barb; x (3) barb stem; stainless steel
J004-109	3/8 barb U-bend; stainless steel
J004-062	Pump Separator





IN-LINE STRAINER
CON-TROL-CURE™ In-Line Strainer provides pump protection, nozzle protection, or can be used for most applications where contaminants need to be removed in air or liquid lines. Molded of durable plastic which is resistant to solvents and UV coatings, the strainers are reinforced with tough stainless steel ferrules.Sediment is collected inside the screen for ultimate protection.

Diaphram pumps contain four valves which open and close with each pump stroke. Even small amounts of particulate matter will impede valve action and shorten pump life. Pumps fitted with the In-Line Strainer have been observed to last longer and operate with less maintenence. UV Process Supply recommends the In-Line Strainer for all 1/4" Double Diaphram and Transfer Pump III installations.

Item No.	Description
J004-013	IN-LINE STRAINER

IN-LINE FILTER DRYER
New disposable filter/dryer is compact, lightweight, and functions in both directions. It can be installed right at the point of use. The clear housing unit removes all traces of water, oil and dirt. 1/4 npt male x female thread. 125 PSI. Compact 3-3/4" length.

Item No.	Description
J004-089	IN-LINE FILTER DRYER

HIGH-FLOW QUICK DISCONNECT COUPLING
Chemical-resistant polypropylene for 1/2" ID tube size. Large flow capacity with small, lightweight body size. Half the cost of bulkier brass or stainless couplings. Ideal for water and solvent-filtration.

Item No.	Description
J004-090	High Flow Disconnect Coupling; 1/2" body w/insert

HOSE CLAMP
All stainless-steel micro-band for securing 1" O.D. nominal hose sizes. Fits hose diameter range of 11/16 to 1-1/2". 1/2" band width. Perfect for all UVPS double-diaphragm pumps.

Item No.	Description
J004-091	Hose Clamp; 1/2" wide; 1" nominal

NYLON HOSE CLAMP
One piece nylon (perfect for water, solvent, gas, etc.). Simply squeegee the serrated edges to edge and twist to release. Temperature range from -60 to 250°F.

Item No.	Size/Range
J004-092	1/2"; .538 to .608"
J004-093	3/8"; .410 to .468"
J004-094	1/4"; .246 to .290"

TUBE CLAMP
This snap grip Tube Clamp secures tubing and hose in seconds. Snap shut with pliers. Secure, safe and economical. Simple twist action with pliers removes clamp. Made of tough, durable nylon. Hose size 3/4".

Item No.	Description
J004-021	Tube Clamp

PINCH CLAMP
For flexible plastic tubing. Up to 12 position control with one-hand operation. Ratchet throttles flow evenly down to complete closure. Plastic construction will not distort or corrode. Fine or coarse teeth adjustment. 3/4" tube diameter

Item No.	Description
J004-022	PINCH CLAMP; 3/4" O.D.

STAINLESS STEEL BALL VALVES
3/8 and 1/4" heavy-duty, in-line ball valves feature 303 stainless steel construction and Teflon® seat material for durable on/off flow control of air or material lines. For pressures up to 6,000 psi or 413 bar.

Item No.	Description
J004-080	3/8 Ball Valve; 3/8 NPSM inlet/outlet
J004-081	1/4 Ball Valve; 1/4 NPSM 1/4 NPT inlet/outlet

SHUT-OFF VALVE

This straight compression Shut-Off Valve is constructed of Celcon (Acetal copolymer) plastic. It is excellent for water service, hot and cold; organic solvents and UV/EB materials. It can be used for temperatures of -20ºF to +200ºF. Maximum working pressure is 200 PSI. Component parts are interchangeable. Tight shut off. No seat washers.

Item No.	Description
J004-035	Shut-off Valve

POLYETHYLENE STOPCOCK

Unbreakable polyethylene Stopcock won't freeze or stick, so lubricants are not needed. It is molded in two pieces that snap together for a tight seal. A quarter turn of the key shuts off the flow.

Item No.	Description
J004-020	Polyethylene Stopcock

"STOPCOCK" TUBE SCREW CLAMP

Convenient to use and features complete ON/OFF and fine control with enough accuracy to replace stopcocks in many pump applications. Hinged side permits installation of clamp without disconnecting tubing from apparatus or interrupting operation. Constructed of durable Delrin(tm) acetal homopolymer. Easy to clean, auto clavable and highly resistant to weak acids and alkalies and organic solvents. Accepts any type of flexible tubing up to 1/2" O.D. (14 mm).

Item No.	Description
J004-046	"Stopcock" Tube Screw Clamp (3 pack)

FOOT OPERATED VALVE

This molded polypropylene Foot Operated Control Valve provides quick valve action for spray rinse tanks, filling containers, industrial rinse showers or many other applications. Resistant to UV/EB chemicals and acids. Can be operated by hand, foot or knee in either horizontal or vertical position. Rated at 125 PSI at 75 degrees F. Operates to 180 degrees F. Piston material, hi-density, unpigmented polyethylene. Valve will close when pressure is released from pedal. "Automatic shut-off": Push valve to open, spring to close.

Item No.	Description
J004-036	Foot Operated Valve

POLYPROPYLENE ELLIPTIC HAND VALVES

The unique design of the Elliptic Hand Valves offers unmatched suitability for a broad range of applications in fluid handling systems, especially where a high degree of resistance to corrosion and contamination is required. All models include these features:

- 1/2" NPT threaded connections
- 90 degree rotation from Off to Full Flow
- In-line servicing & cleaning
- Compact & lightweight
- Full flow
- Dynamic sealing effect
- Pressure rating- 80 PSI <R>73ºF water
- Individually tested

The versatile 4 position/ 3-Way Elliptic Valve may be used as:

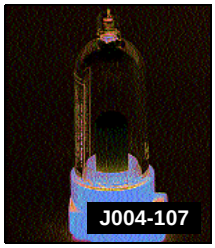
1. One inlet to either of 2 outlets
2. One inlet to both (2) outlets
3. Either of 2 inlets to one outlet
4. Both (2) inlets to one outlet

Item No.	Description
J004-037	2-way Valves; On/Off, throttling
J004-038	2-position 3-Way Valves; Flow diversion
J004-039	4-Position 3-Way Valve

CO_2 FILTER AUTO DRAIN

Two in-line CO_2 filters featuring manual or automatic drains. Adapts for use with most gas pumps. Complete kit includes filter, mounting bracket and 3/8" barb fitting.

Item No.	Description
J004-106	CO_2 Filter w/Auto Drain
J004-107	CO_2 Filter w/manual drain
J004-105	Mounting Bracket
J004-104	3/8" Barb Fitting



PUMP GLOSSARY

A.N.S.I. Standard
American National Standards Institute. A set of specifications (envelope dimensions) for centrifugal pumps manufactured in the United States

Alignment
The center line of the pump is perfectly aligned with the centerline of the driver (usually an electric motor).

Anti-friction bearing
Usually referring to a ball or roller bearing

Atmospheric pressure
At sea level, atmospheric pressure is 14.7 psi.

Back pull out pump
A design that allows the wet end of the pump to be left on the piping when the power end and adapter are removed. A.N.S.I. pumps are designed this way.

Ball bearing
Consists of an inner race, an outer race, and a series of balls between them. Often called a precision or anti friction bearing.

Bearing
Supports the rotating shaft and allows it to turn with a minimum amount of friction. Could be either sleeve or anti-friction type

B.E.P.
The best efficiency point. It is the point where the power coming out of the pump (water horse power) is the closest to the power coming into the pump (brake horse power) from the driver. This is also the point where there is no radial deflection on the shaft by unequal hydraulic forces acting on the impeller.

B.H.P.
Brake horse power. The actual amount of horsepower being consumed by the pump as measured on a prony brake or dynamometer.

Canned pump
A non seal pump with the shaft, bearings and rotor contained in a can to prevent product leakage. Limited to pumping clean lubricating liquids.

Capacity
Fluid flow measured in gpm, liters/min, M^3/hr. etc.

Cavitate
Cavities or bubbles form in the fluid low pressure area and collapse in a higher pressure area of the pump, causing noise, damage and a loss of capacity.

Centrifugal pump
Moves liquid with centrifugal force. Available in circular and volute configurations.

Checkvalve
An anti-backflow device installed in a pipeline to keep a liquid from flowing back down the line.

Close coupled
The pump impeller is mounted directly on the motor shaft. There is no separate bearing case.

Coupling
Used to connect the pump to the driver. It transmits torque and compensates for axial growth,
but not for radial misalignment.

Critical speed
Any object made of an elastic material has a natural period of vibration. When a pump rotor or shaft rotates at any speed corresponding to its natural frequency, minor unbalances will be magnified. These speeds are called the critical speeds.

Density
Measured in gm/cm^2 or lb/in^2. A measure of the weight of the fluid. A better term than specific gravity.

Dial indicator
A tool used to measure concentricity or displacement of a shaft.

Double suction pump
The rotor is suspended between two bearings with the fluid entering on either side of the impeller. Used at higher capacities.

Efficiency
Power out of the equipment divided by power in.

Eye of the impeller
The center of the impeller, where the fluid enters.

Filter
A devise used to remove solid particles from liquid. It removes smaller paricles than a strainer.

Footvalve
A checkvalve used on the end of a pump suction line to keep the line full of water and help maintain prime. Is usually fit with a strainer screen.

Gasket
Used between two static surfaces to provide a seal. Made from a variety of deformable materials.

Gland
The part that holds one half of the mechanical seal and attaches to the stuffing box.

Head
The equivalent height of the liquid. 20° C. water is used as the standard where 10 meters (33.9 ft.) of water equals one atmosphere (14.7 psi. or 1 bar). The term head is used instead of pressure in the centrifugal pump business.

Horse power
33,000 foot pounds per minute. A common method of measuring work.

I.D.
Inside diameter.

Impeller
Attaches to the end of the shaft to impart energy to the fluid being pumped. Available in open, semi-open and closed designs.

Impeller eye
The center of the impeller or the point where fluid enters the impeller.

Impeller setting
Open impellers require a clearance between the volute or the pump back plate depending upon design. This clearance must be set when the pump is at operating temperature and must be reset to compensate for wear. (0.015" to 0.020" or 0.04 mm to 0.05 mm is typical)

Impeller vane
Located between the eye and the discharge side of the impeller. Directs the flow of the liquid to the outside diameter of the impeller.

Inline pump
Mounted in the piping. No base plate or alignment required.

Kilowatt
One thousand watts. The normal unit for work in the metric system

kPa
A metric unit for pressure. 100 kPa = one atmosphere.

Magnetic drive
A type of seal less pump that is pretty much limited to pumping clean lubricating liquids. Similar in concept to a canned pump.

Mechanical seal
A positive sealing device used to seal all fluids (liquids and gases). The primary seal is a set of lapped seal faces that are installed perpendicular to the shaft.

Negative pressure
Less than atmospheric pressure.

N.P.S.H.A.
The net positive suction head available to prevent cavitation of the pump. It is defined as: Atmospheric pressure + gage pressure + static pressure - vapor pressure - friction loss in the suction piping.

N.P.S.H.R.
Net positive suction head required to stop a pump from cavitating. This number is given to you by the pump manufacturer. Since the number was generated by testing with cold fresh water, it can be lowered in some cases if you are pumping hot water or some hydrocarbons.

O.D.
Outside diameter.

O.E.M.
Original equipment manufacturer. The pump or seal company, not the distributor of the products

P.D. Pump
Positive displacement pump. It can pump a high pressure or head, but at a low volume.

Packing
The soft rings that mechanical seal replace to stop leakage. Packing must leak because it works on the theory of a series of pressure drops to reduce the stuffing box pressure to the point where the leakage is acceptable. A minimum of five rings of packing is required to do this.

Pipe strain
The strain on the pump volute caused by the piping. It will cause excessive mechanical seal movement and can cause contact between rotating and stationary pump and seal components.

PUMP GLOSSARY

Positive displacement pump
Called a PD pump. Gear, sliding vane, progressive cavity, lobe etc. the capacity determined by the pump speed. The maximum head is determined by the horsepower available and the casing strength.

Pressure head
The pump head exerted by atmospheric pressure or any additional pressure that might be in the vessel.

Pump curve
A diagram supplied by the pump manufacture to describe the relationship between the head and the capacity of a particular pump using various size impellers. The curve also includes information about efficiency, horse power consumption, N.P.S.H. required, etc.

Run out
Twice the distance that the center of the shaft is displaced from the axis of rotation.

Shaft packing
The soft packing supplied by pump manufacturers. Most of these leaking packings are being replaced by mechanical seals.

Shut off head
The maximum head that the pump can generate with a given impeller outside diameter and horsepower driver.

Sleeve bearing
A non precision bearing. Usually manufactured from carbon, Teflon. brass etc., Allows too much axial and radial movement for most mechanical seal applications.

Specific Gravity
A measure of the weight of a liquid. Fresh water at 4°C (39°F) is given a value of one. If the liquid you are questioning will float on water the specific gravity is less than one. If it sinks, it is higher than one. Density is a better term.

Specific speed
A formula that describes the shape of a pump impeller. The higher the specific speed the less N.P.S.H. required.

Suction head
The head on the suction side of the pump. You subtract it from the discharge head to determine the head being produced by the pump. It is a sum of the static, pressure and friction heads.

System head
The head caused by friction in the piping. valves and fittings.

T.D.H.
Total discharge head. A combination of the suction head and the head being produced by the pump.

Total head
The amount of head produced by the pump. Discharge head minus suction head. If suction head is a negative number it is added to the discharge head.

Velocity
A measurement of the speed of the liquid in the system. Measured in feet or meters per second. The pump is a constant velocity device.

Volute casing
Derives is name from a spiral shaped casing surrounding the pump impeller. It converts velocity energy to pressure energy.

Vortex Pump
A type of pump used for excessive solids. The impeller is recessed into the volute. A very low efficiency design, but practical in many applications.

Water Horse Power (W.H.P.)
The calculated horse power coming out of the pump using the formula WHP = head x gpm/3960

Watt
A measure of power. 746 watts equals one horsepower.

Wet end
The part of the pump that gets wet from the pumping fluid. Includes the volute, stuffing box, impeller wear rings, and shaft or sleeve.

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