 **California Proposition 65 Warning** -- This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

System Installation

Pump Installation

Accessories should be installed with flex hose and be mounted as close to the pump as possible. The hose must be used right after accessories.

NOTE: If remaining installation is solid piping, a two-to-four-foot length of hose must be installed between accessories and solid piping for vibration isolation.

Hose

Selection of the right size and type of hose is vital for good performance. Be sure to hook up to the proper ports on the pump (note markings "IN" and "OUT" on pump).

Suction Hose

Always use a suction hose compatible with the fluids being pumped and at least the same inside diameter as pump ports. If the suction hose is over 5 feet long, use one size larger hose. Keep the suction hose as short as possible and restrictions such as elbows, check valves, etc. at a minimum. Use both inlet ports if the flow is to exceed 6 gpm.

Discharge Hose

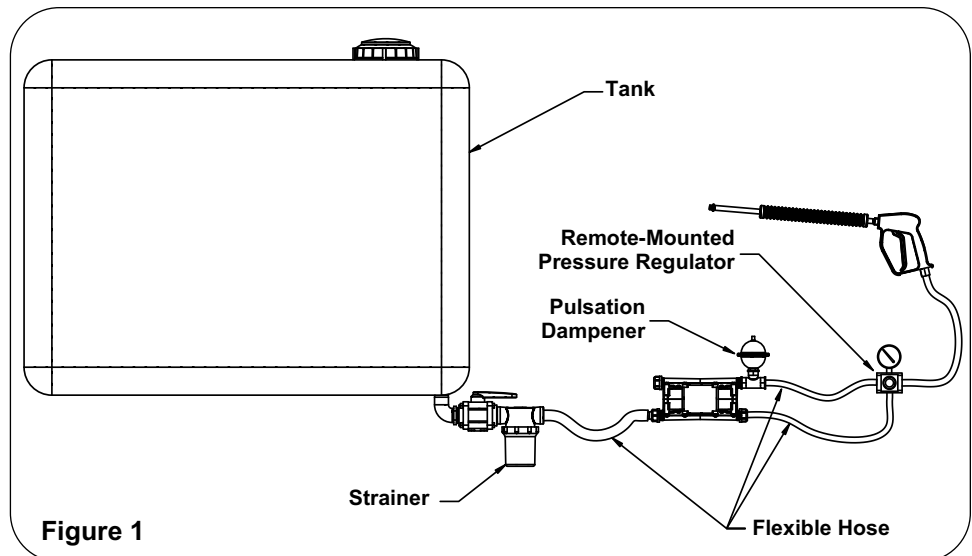
High pressure pumps require the use of special high pressure discharge hose (2 rayon braid or equivalent). Use a hose rated at least 50% greater than the highest operating pressure required of pump. **Example:** If required pump pressure is 300 psi, use discharge hose rated at minimum of 450 psi working pressure.

Unloader Valve

The unloader has a very important safety function in your plunger pump hookup. The unloader valve protects the pump by unloading pressure when the gun is shut off or discharge is otherwise blocked. This saves the pump and power because the liquid is bypassed at a very low pressure. If the gun is to be shut off for more than 5 minutes, install a thermal relief valve in the inlet side or stop the pump to prevent heat buildup. The length of time may vary due to the original temperature of the fluid being pumped.

Bypass Valve

Bypass valves incorporate an adjustable spring-loaded poppet that opens to protect the pump from over pressurizing when the pump outlet is shut off. The overflow is diverted back to the inlet of the pump or back to tank. Its main difference from an unloader valve is that it does not reduce the power requirements or pump pressure when the outlet is turned off. Instead, the pressure stays at whatever the set operating pressure is that the pump is working at. Bypass valves must be rated for the max. flow of the pump because



they return the full amount of flow when the outlet is shut off. If the pump is to run in shut-off condition for more than five minutes at a time, it is recommended that the bypass flow goes back to tank.

Strainers

Use a suction line strainer with at least 3 to 5 times the suction port area in open screen area. For example, an area of approximately 1.1 to 1.9 square inches for a 1/2" suction port. Be sure the screen is suitable for the liquid being pumped. Keep the filter clean. A clogged strainer will cause cavitation, which usually leads to poor performance and wear of the pump parts.

Compound Gauge (Optional)

The pump should not be subjected to high suction line vacuums. To check on this, install a compound gauge at pump inlet. For ultimate performance and life, the vacuum should be limited to 5 inches of mercury. High vacuum conditions may cause premature product failure and void warranty.

Pulsation Dampener

This device absorbs the shock and smooths out the pump discharge pulsations, providing smoother operation. For the proper operation of many unloader valves, the pulsation dampener should be installed on the discharge side downstream from the unloader valve. However, for maximum system protection, the pulsation dampener may be installed upstream from the unloader valve, provided the unloader valve will function properly. The dampener can be mounted vertically or horizontally.

Pressure Gauge/Dampener

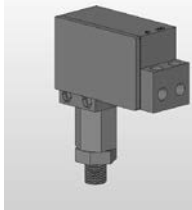
Use gauge capable of reading double the pump working pressure. Use a silicone-filled gauge or a gauge dampener to protect the gauge needle against pressure surges and provide easier reading.

System Installation

Inlet/Outlet Ports

This pump has dual inlet and outlet ports for your convenience. Use only one outlet port, and cap the other outlet port for best performance. For flows over 6 gpm, use both inlet ports to reduce cavitation in the diaphragm pump.

Pressure Switch/Demand Switch



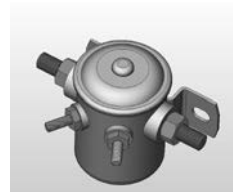
A pressure switch is used to turn the motor and pump off when the pressure at the discharge of the pump reaches maximum operating pressure and when spray nozzles or spray gun have been turned off. Pressure switches are wired through the normally closed (NC) circuit. A normally closed circuit allows power to flow through the

switch contacts until it reaches the switching pressure, where-by the contacts open and the pump is turned off. A pressure switch conserves energy in a DC voltage system by eliminating current draw when output from the pump is not required. The disadvantage of a pressure switch, when used with a positive displacement pump, is that the flow being used by the spray gun or system must exceed the pump's capacity at whatever pressure the pump is operating at. If the flow rate used by the spray gun is too low, the pump will cycle on and off, producing an undesirable effect to the user and harming the motor. See table below for part numbers.

Where Used	Part Number	
		2510-0041
Plunger Model	2120P-P18DC	
Plunger Models		2120P-P35DC 2120P-P39DC 2120P-P05AC

Solenoid DC POWER CONTACTS for 12 Volt Systems

A solenoid contact switch is used in low voltage, direct current (VDC) systems where the current (measured in amperes or amps) of the motor is too high for the rated capacity of a switch or relay. Low voltage systems with high inductive current requirements arc across the contacts and "burn" the switch out as the switch is turned on and off. It is recommended that a solenoid contact switch, the same type that is used in the automotive industry for starters, be used. The switch should be rated for 12 VDC applications with a minimum of 50 amps continuous duty (White Rogers 70-111244 or equivalent).



Automotive Fuse

It is important to always use an in-line fuse or circuit breaker rated for 12 VDC in direct current applications. It is best to place the in-line fuse near the source of power (battery) to safeguard the whole system (wires and motor). Failure to do so can lead to a vehicle fire should a short occur, or extended high amp condition caused by pump over-pressurization. Blade-type, easy-to-install fuses are the industry standard for low-voltage automotive rated for 32 VDC and are UL listed. The Maxi (time delay) fuse is the preferred choice to protect higher current circuits than mini and standard fuses. These fuses will not blow when exposed to harmless, temporary overload currents as the mini and standard fuses do. Fusible links and automotive circuit breakers are also available to be used in this type of application (Maxi Fuse Types: MAX, AF3, MAX/299).

