

Unloader Information

Unloader Installation

There are a variety of ways to install an unloader. Keep in mind that easy access for adjustment is important. Since unloaders wear out, the use of European style twist fast quick connects allows for rapid and easy replacement in the field. It is recommended that all the ports be set up with quick-connect couplers and plugs. A pressure gauge that is visible when adjusting the unloader is important for precise adjustments. Be sure to properly identify the ports, they are usually marked in, out, and bypass. If they aren't marked and you don't know, find out before proceeding. Some unloaders have more than one inlet port to allow flexibility during installation; others have an additional port for a pressure gauge. Unloaders can be mounted directly to the outlet port of the pump using a pipe nipple. There are advantages to mounting the unloader on the pressure washer frame using an unloader mounting block. The unloader can be located where it is the most accessible. A short length of high-pressure hose, which is also called a jumper hose, is used to connect between the pump outlet port and the unloader mounting block. A jumper hose is used to connect the unloader outlet to the inlet of the coil or to the outlet of the pressure washer. Most unloader valves can be mounted vertically or horizontally.

By-pass Configurations

Pressure washers generally are manufactured with a closed loop by-pass that cycles the by-pass water in a small amount from the unloader by-pass port to the inlet port of the pump, and then back to the inlet port of the unloader. This configuration is an accident waiting to happen. Friction generated by the plungers moving against the packings generates heat that is transferred to the water. Because there is only a small amount of water the water temperature increases rapidly. When the temperature exceeds about 155 degrees, damage begins to occur to the packings. If allowed to continue, the hot water can damage the plungers in the pump, damage seals in the unloader, and destroy the hoses between the pump and the unloader. Ideally, machines would either have their by-pass plumbed differently, or have a thermal relief valve or switch installed as a safeguard against by-pass heat build-up. Because most machines are manufactured in a way that allows this damage to occur, it is wise to change the set up aftermarket. For mobile wash set-ups that are truck or trailer mounted and are supplied by a water tank, the best way to configure the by-pass is to plumb it directly back to the water tank. The benefit of plumbing the by-pass this way is that it includes the water in the supply tank in the by-pass loop. With a large amount of water in the loop, there isn't enough heat generated to increase the water temperature enough to damage anything, no matter how long the equipment runs in by-pass. Connect a long by-pass hose from the by-pass port

of the unloader, plumbed with a hose barb, and have it terminate at a barb fitting on the water tank. The water tank can be fitted with a small bulkhead fitting on the top, then plumbed with a properly sized hose barb. The by-pass hose can be reinforced chemical tubing, hi spike bypass hose, or garden hose. The diameter of the by-pass hose is determined by the flow of the pump and the type of unloader being used. For pumps that are rated below 6 GPM, a ½" ID by-pass hose is recommended when using a pressure type unloader, and a ¼" ID by-pass hose is recommended when using a flow actuated unloader. For a pump with a flow rating of over 6 GPM, a ¾" by-pass hose is recommended when using a pressure type unloader, and a ½" by-pass hose is recommended when using a flow actuated unloader.

Diagnosing Unloader Problems

Start by eliminating possibilities. Examine other components that may be the problem, starting with the easiest. Low-pressure or low-flow. Make sure the inlet water supply is adequate. Inspect for leaks, repair any significant leaks found. Check for clogs in the downstream chemical injector orifice or the high pressure nozzle and remove any debris found. The next step is to shut down the equipment, remove the unloader by releasing the quick connects, and then install a back-up unloader. If the problem is solved resume working and figure out the other unloader when time permits. If the problem persists, make sure the engine is running at the correct RPM. At this point if the problem hasn't been resolved, begin pump diagnosis.

Pressure Type Unloader Valves

Pressure type Unloader Valves. (Also referred to as Trapped Pressure Unloaders) Most pressure washers use this type of unloader valve. It is the least complicated to use. This valve responds to the amount of pressure exerted on the by-pass valve. The unloader uses a seat, ball, and spring. These components control the flow of water into the by-pass port. When the operator has the trigger gun open, the water flows from the unloader inlet port to the outlet port, with only a small amount being by-passed. When the trigger gun is closed, the pressure increases as the pump continues to push water out. When the pressure becomes greater than the resistance of the spring, the ball moves off the seat and allows the water to go through the by-pass port. The by-pass valve opening is aided by a check valve in the outlet port that quickly diverts the water flow to the ball and seat of the unloader. The check valve in the outlet also traps the pressure in the hose giving the characteristic pop of pressure when the trigger gun is opened that is associated with a pressure type unloader. An adjustment knob or bolt allows adjustment of the springs tension on the ball by either compressing the spring down to create more resistance, or expanding the spring, thereby causing it to exert less pressure on the ball. When the spring is adjusted to create the maximum outlet pressure, little water enters the by-pass port. When the spring is expanded, lower water pressure can push the ball out of

the way, thus allowing more water to by-pass even when the trigger gun is open. This reduces the flow of water to the gun, and of course the nozzle. Less water being forced through the nozzle reduces the pressure at the nozzle. Here are some advantages. Pressure type unloaders are less sensitive to flow restrictions than flow type unloaders. This allows various orifice sizes to be used without cycling problems. Rebuilding kits are usually very simple and inexpensive, providing the ball, spring, and seals or gaskets. A disadvantage to this type of unloader is the trapped pressure that creates the pop of pressure when the gun is opened. It can be dangerous when the operator is working from a ladder; it also spikes the pressure within the equipment.

Pressure Type – Adjustment

Adjustments are made with the pressure washer running and the trigger gun open. Unloaders with knob adjustments should have the knob turned out to the maximum amount possible (counterclockwise). Always begin with the spring tension adjusted out (not compressed). If the adjustment is being made with an adjusting nut, loosen the jam nut to allow the nut to turn, and again, start with the nut screwed out so the spring is under very little tension. Turn the knob or nut one full turn in (clockwise) at a time until the desired pressure is reached. Never compress the spring fully because it will produce a damaging pressure spike when the trigger gun is closed. If the desired pressure isn't obtained, it is possible that the unloader is worn, the high-pressure nozzle is too large or worn out, there may be a water leak after the unloader, or the desired pressure is higher than the equipment design allows. When the adjustment is complete, remember to tighten the jam nut if applicable.

Flow Type Unloader Valves

A flow type unloader responds to the stoppage of the water flow between the unloader outlet orifice and the trigger gun. When the trigger gun is open the water flows through the inlet port and out the outlet port, with a small percentage exiting through the by-pass port. When the gun is closed, the flow is diverted through a channel that leads from in front of the outlet port to a piston assembly within the unloader body, forcing it to go down. The water is then all diverted into the by-pass port. With no check valve holding the pressure from returning into the unloader from the outlet, the pressure through out the system is relieved each time the unloader cycles. A cycle consists of the unloader supplying water to the outlet, and then diverting it to the by-pass. A advantage of this type of unloader is that when the trigger gun is opened, there is very low pressure in the hose. The pressure then builds for about one second at which point the maximum pressure is achieved. The smooth transition from low to high pressure is beneficial because it doesn't have a jarring effect on the operator. A

disadvantage is that a flow unloader does not allow an operator to downsize high-pressure nozzles. Because it senses flow, reducing the flow at the nozzle causes the unloader to cycle repeatedly. This type unloader should not be used with a weep gun, leaks will cause it to cycle.

Flow Type – Adjustment

Adjustments are made with the pressure washer running and the trigger gun closed. Loosen the jam nut and begin the adjustment procedure with the adjusting bolt turned all the way into the unloader body. It should be noted that this is the opposite of the procedure followed for a pressure type unloader. A flow actuated unloader's pressure output is increased as the bolt is screwed out from the unloader body. Turn the bolt one complete revolution at a time, then open the trigger gun and wait five seconds before taking a pressure reading. Continue to adjust one turn at a time and check the results after each turn until the desired pressure is obtained. Check bypass flow, a minimum of 10% of the pump's rated output should bypass when spraying. If the desired pressure can't be achieved, see the possible reasons listed in the pressure type unloader adjustment section.