

# TECHNICAL DATA - UNLOADER VALVES

## The Different Types of Unloaders along with the Industry's Most Popular Unloaders

### PRESSURE TYPE UNLOADER VALVES:

(Referred to as Trapped Pressure Unloaders)

Most pressure Washes 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.



#### 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.

#### Disadvantages:

The trapped pressure that creates the pop of pressure when the gun is opened is a big disadvantage. It can be dangerous when the operator is working from a ladder; it also spikes the pressure within the equipment.

### 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. Our first choice in any unloader is the New K-10 Flow Type which came on the market in 2003.

#### Advantages:

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.

#### Disadvantages:

The K-7 & K-5 flow unloaders do 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.



## COMPENSATING UNLOADER VALVE:

The compensating unloader valve is a pressure type unloader valve with a compensating feature that makes the characteristic pop of pressure that occurs when the trigger gun is opened less severe. The advantage of having this feature is that the unloader functions more like a flow actuated unloader without the same disadvantages.

## 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 Washes 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.

