Contents

Pressure Control Valves

☆ ***Denotes New Winner's Circle Product Line.***

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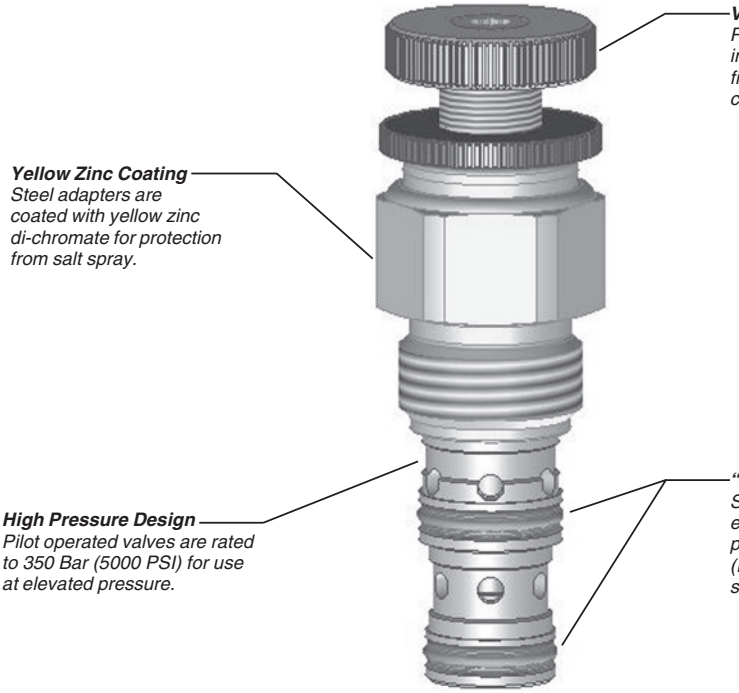
INTRODUCTION

This technical tips section is designed to help familiarize you with the Parker line of Pressure Controls. In this section we highlight new products to this catalog as well as some design features of our pressure control line. In addition we present common options available to help you in selecting products for your application. Finally we give a brief synopsis of the operation and applications of the various product offered in this section.

NEW PRODUCTS

There are several new additions and product improvements to our Pressure Controls product line.

Here are just some of the design features and advantages to the "Winner's Circle" product line.

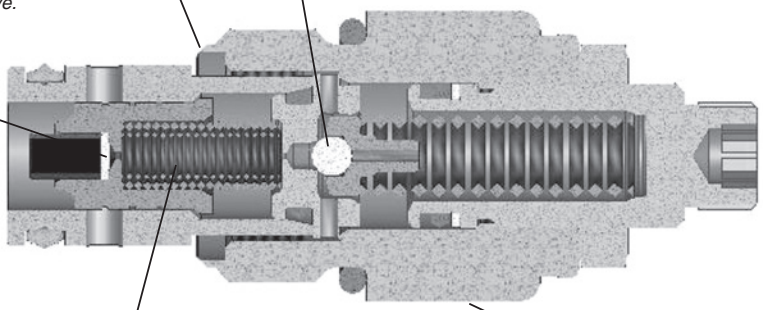


Variety of Adjustments
Pressure controls are offered in screw adjust, knob adjust, fixed and tamper resistant configurations.

Yellow Zinc Coating
Steel adapters are coated with yellow zinc di-chromate for protection from salt spray.

High Pressure Design
Pilot operated valves are rated to 350 Bar (5000 PSI) for use at elevated pressure.

"D"-Ring
Standard 4301 Polyurethane Seal eliminates the need for backup rings providing easier manifold installation. (For more information on "D"-Ring see Technical Data Section)



Crimp Design
Fold over crimp provides secure holding and eliminates the need for adhesive.

Guided Pilot
Pilot is fully guided providing a more consistent reseat.

Internal Screen
A small internal screen protects the pilot orifice and spring chamber from debris.

High Rate Bias Spring
Pilot operated reducing and sequence valves are designed with a high rate bias spring pressure, enhancing stability.

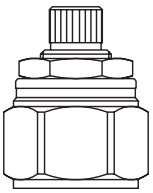
Low Profile Adapter
The low profile shape of the pilot operated pressure controls reduces the manifold clearance required.

COMMON OPTIONS

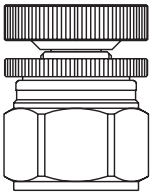
As you will see, Parker offers a variety of Pressure Control products. As such, some of the options mentioned below may not be available on all valves. Consult the model coding and dimensions for each valve for specifics. Here are some of the common options available.

Adjustment Types: Parker offers four primary types of adjustments for most of the pressure control products. Samples of these types are shown below. Please note all options may not be available for all valves. Consult the individual catalog pages for more details.

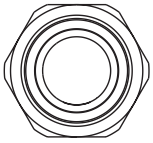
Screw Adjustment - Valve can be adjusted with an allen wrench. Lock nut included to maintain desired setting after adjustment. This is the most common adjustment option available on most Parker products.

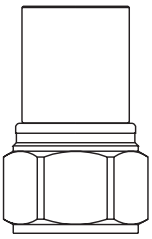


Knob Adjustment - An aluminum knob is added to the standard screw adjustment. A lock knob is provided to help maintain the desired setting after adjustment. Parker offers knob conversion kits for most pressure control valves. For kit numbers consult individual valve pages.

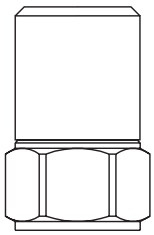


Fixed Style - In most cases, the Fixed Style product is a screw adjustable product with a steel collet threaded over the screw adjustment. These valves are preset at the factory.





Tamper Resistant - The tamper resistant option is a screw adjustable valve with a steel cap installed to conceal the adjustment. The cap is designed so that the internal edges clamp into the groove of the valve adapter. Once the cap is installed, it cannot be removed without damaging the cap and the valve. When a valve is ordered with the tamper resistant option, it will be preset at the factory, and the cap will be included in a separate plastic bag to allow for fine tuning at the customer site. Parker offers tamper resistant cap conversion kits for most pressure control valves. For kit numbers consult individual valve pages.

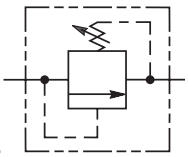


Seals: The Winner's Circle products feature a standard 4301 Polyurethane "D"-Ring. The "D"-Ring eliminates the need for backup rings. The majority of the products are available in Nitrile or Fluorocarbon Seals. You should match the seal compatibility to the temperature and fluid being used in your application.

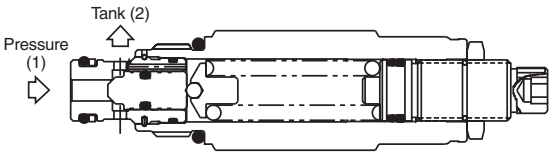
Pressure Range: Parker offers a range of spring settings for the Pressure Control product line. You want to choose the setting that best meets the operating range. The model callout is equivalent to the maximum setting (in psi) of the spring divided by 100 (i.e. 50 = 5000 psi).

PRODUCT TYPES / APPLICATIONS

Direct Acting Relief Valves

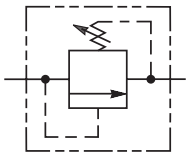


Direct acting relief valves are designed for fast response in intermittent duty applications. They are often used as an economical solution to clip pressure spikes. The poppet design allows for low leakage.

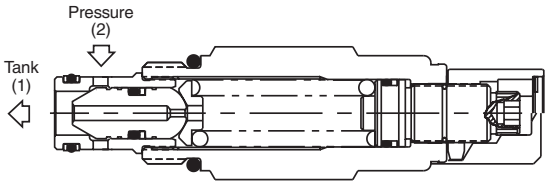


OPERATION - The valve poppet is held against the seat by the spring force. Inlet pressure on the nose (port 1) of the poppet acts against the spring force to unseat the poppet at the valve setting and allow flow to pass to tank. Since the pressure is working directly on the spring, this valve is very fast responding. It is not the best choice for system pressure regulation as it is slightly noisier than pilot operated relief valves and has higher pressure rise. *Note:* Any backpressure on port 2 would be additive to the spring setting.

Differential Area Relief Valves

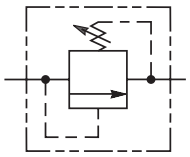


Differential area relief valves also are also best suited for intermittent applications where fast response is critical. These valves are often used as cross-over relief valves to chop pressure spikes. Due to their design, they generally can handle a larger flow rate and have a lower pressure rise than the standard directing acting relief. The poppet design allows for low leakage.

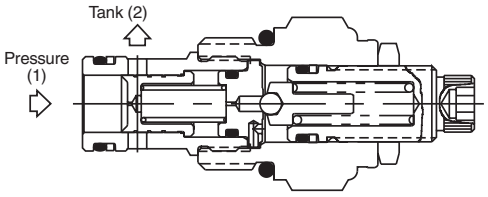


OPERATION - Pressure on the inlet (port 2) of the valve acts on the differential area of the poppet (difference between the O.D. of the poppet and the seat diameter) to produce a force which is opposed by the spring force. When pressure reaches the valve setting, the poppet is pushed off its seat, permitting flow to tank. *Note:* Any backpressure on port 1 would be additive to the spring setting.

Pilot Operated Relief



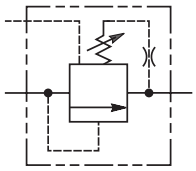
Pilot operated relief valves are designed for continuous duty applications. Due to their stability and low pressure rise, the pilot operated relief is the best option for setting the pressure of a hydraulic system.

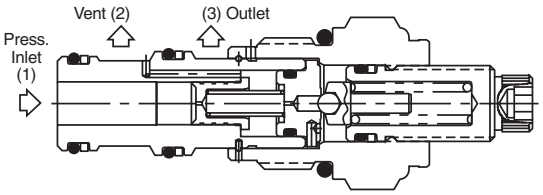


OPERATION - When inlet pressure at the nose (port 1) exceeds the valve setting, the pilot ball unseats. The pilot flow creates a pressure imbalance across the main spool causing the spool to move and allowing flow from inlet (port) 1 to tank (port 2.) *Note:* Any backpressure on port 2 would be additive to the spring setting.

Ventable Pilot Operated Relief

Ventable relief valves are a unique type of pilot operated relief. With this valve, you can control the pressure setting with the internal adjustment as well as via remote circuit. These valves are ideal in cirucits where multiple pressures are needed.

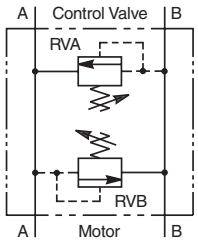


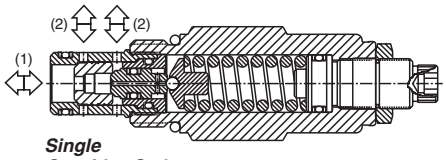


OPERATION - This valve can be controlled by the adjustment setting on the valve, or a remote circuit via the vent line. When the vent line is used, the smaller of the two pressure settings will determine the valve setting. In other words, if the pressure setting of the remote circuit is less than the adjusted setting, then the valve will relieve at the remote setting. If the pressure setting of the remote circuit is greater than the adjusted setting, then the valve will relieve at the adjusted setting. With the vent port (port 2) blocked, the valve operates like a standard pilot operated relief valve. Thus, a solenoid valve could be used on the vent port to select control between this valve another remote valve.

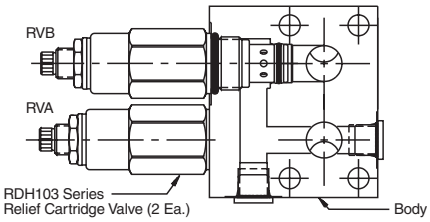
Dual Crossover Relief Valves

Dual crossover relief valves provide pressure surge protection for double acting hydraulic actuators. For best results, you always want to install the valve as close to the actuator as possible. The dual crossover feature can be achieved in two different methods. One way is to manifold two Differential Area Relief Valves into a single body. Parker offers three versions of this two cartridge arrangement. The advantage gained is higher flows can be pushed through this arrangement. The second method is to combine this dual function into a single cartridge. The single cartridge arrangement reduces cost considerably of the total package. In addition, a standard common cavity line body can be used instead of a special two body arrangement. The operation for the single cartridge style is shown below.





Single Cartridge Style

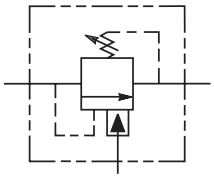


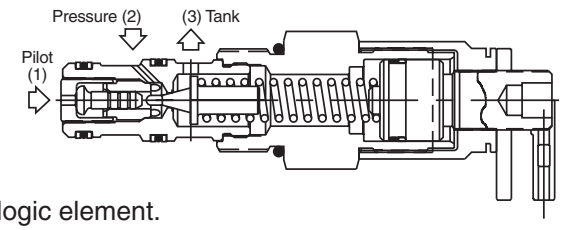
Two Cartridge Style

OPERATION - Pressure at port 1 acts on the spool to produce a force which is opposed by the spring setting. When pressure reaches the valve setting, the spool and poppet move relieving flow from port 1 to port 2. When port 2 is pressurized, the pressure acts on the differential area poppet to produce a force which is opposed by the spring force. When the pressure reaches the valve setting, the poppet is pushed off of its seat, relieving flow from port 2 to port 1. *Note:* Due to the construction and flow paths through the valve, the relief pressure settings may vary by approximately 300 psi from one direction to the other.

Differential Area Unloading Relief Valve

Unloading valves are differential area relief valves that can also be fully dumped or unloaded via a remote signal. They are best suited for low flow accumulator unloading circuits. They provide a fixed percentage between load and unload pressures. This pilot valve would generally be used in conjunction with a logic element.

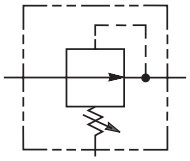


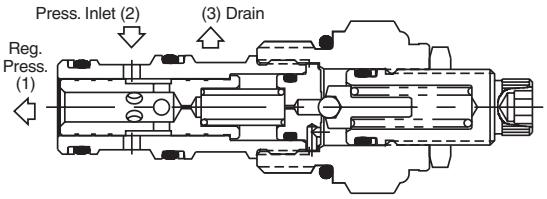


OPERATION - The fixed differential is provided by the pilot piston which has greater area than the dart seat. With its greater area, the piston is able to hold the dart off its seat, permitting flow from pressure to tank, until pressure on the pilot piston falls below the fixed percentage of the valve settings.

Pilot Operated Reducing Valve

Pilot operated pressure reducing valves can be used to reduce the pressure in a leg of the circuit lower than system pressure. Thus, they can be used to provide protection to downstream components from higher pressures.



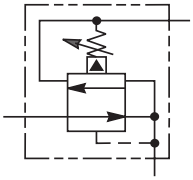


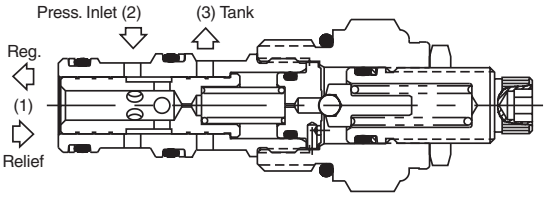
OPERATION - The pilot section controls the valve setting when reducing. As pressure at the regulated port exceeds the valve setting, the pilot ball is unseated. The pilot flow creates a pressure imbalance across the main spool causing the spool to throttle in order to maintain constant downstream pressure. The normally open design will allow flow to pass from inlet to reduced port with the only restriction being the pressure drop.

Pressure Reducing / Relieving Valves

Pressure reducing / relieving valves can be used to reduce the pressure in a leg of the circuit lower than system pressure. The valve also acts as a relief valve, relieving any shocks or surges that occur between the regulated port and the actuator. When the valve is in the relieving mode, the inlet port is blocked. Parker offers pressure reducing/relieving valves in both pilot operated and directing acting styles. The direct acting version is generally used in static applications where response is critical, or leakage is a concern.

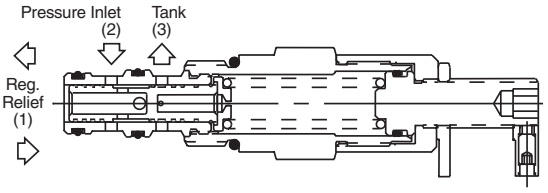
Pilot Operated





OPERATION - The pilot section controls the valve setting when reducing. As pressure at the regulated port exceeds the valve setting, the pilot ball is unseated. The pilot flow creates a pressure imbalance across the main spool causing the spool to throttle in order to maintain constant downstream pressure. A shock or surge at the regulated port shifts the spool, relieving flow to tank.

Direct Acting

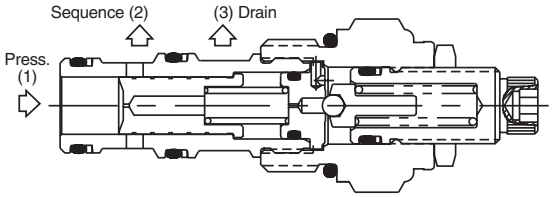


OPERATION - As pressure at the regulated port exceeds the valve setting, the valve throttles or closes in order to maintain constant downstream pressure. A shock or surge at the regulated port further shifts the spool, relieving flow to tank. This valve is not intended for rapidly changing flows which could lead to instability.

Pilot Operated Sequence Valves

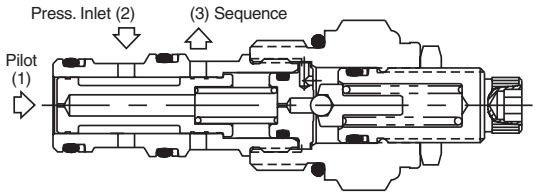
Sequence valves are used to control the sequence of operation of two or more hydraulic actuators. The sequence valve pressure is set higher than the first actuator operation pressure. Once the first actuator has completed its cycle, the sequence valve opens allowing the second actuator to move. Parker's line of pilot operated sequence valves include a series of internally piloted, externally drained valves and a series of externally piloted, internally vented valves. Parker also offers a line of direct acting sequence valves which are ideal for piloting logic elements in steady state applications.

P.O. Sequence (Internally Piloted, Externally Drained)



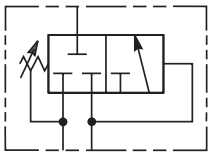
OPERATION - For this valve, the pilot pressure is sensed from the inlet of the valve (port 1). When the pilot pressure exceeds the valve setting, the pilot section opens creating a pressure imbalance across the main spool. This causes the spool to move allowing the flow to pass from the nose of the cartridge (port 1) to the actuator port (port 2). By externally draining the pilot flow directly to tank (port 3), the valve is insensitive to back pressure at the sequence port.

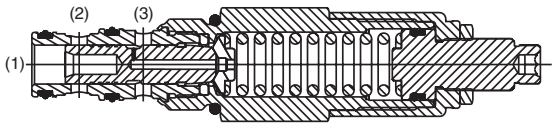
P.O. Sequence (Externally Piloted, Internally Vented)



OPERATION - For this valve, the pilot pressure is obtained from an external source and not from the pressure port. When the external pilot pressure (port 1) exceeds the valve setting, the pilot section opens creating a pressure imbalance across the main spool. This causes the spool to move allowing the flow to pass from the side of the cartridge (port 2) to the actuator port (port 3). Any pressure at port 3 is additive to the pressure setting. It is most common for port 3 to be connected to tank.

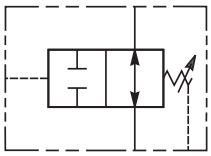
D.A. Sequence (Internally Piloted, Externally Drained)

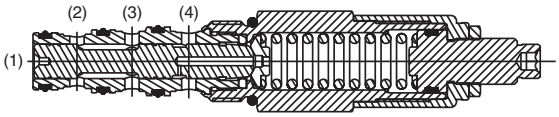




OPERATION - In the steady state condition, all three ports are blocked with the spring chamber drained to port 3. When the pressure at port 1 exceeds the valve setting, the spool moves allowing flow from the nose of the cartridge (port 1) to the actuator port (port 2). By externally draining the spring chamber directly to tank (port 3), the valve is insensitive to back pressure at the sequence port.

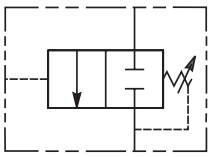
D.A. Sequence, N.O. (Externally Piloted, Externally Drained)

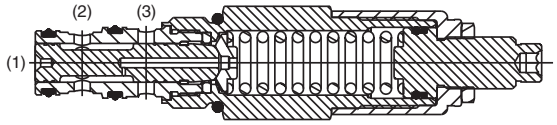




OPERATION - With no pressure at the pilot port (port 1), bi-directional flow is allowed between port 3 and port 2. When the pilot pressure at port 1 exceeds the valve setting the spool moves blocking both port 3 and port 2. By externally draining the spring chamber to tank (port 4), the valve is insensitive to back pressure at the sequencing ports.

D.A. Sequence, N.C. (Externally Piloted)





OPERATION - With no pressure at the pilot port (port 1), both port 3 and port 2 are blocked. When the pilot pressure at port 1 exceeds the valve setting, the spool moves opening a path and allowing flow from port 3 to port 2. This valve internally drains the spring chamber to tank via the sequencing port, thus any backpressure on port 2 would be additive to the spring setting.