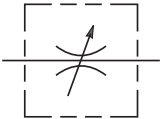
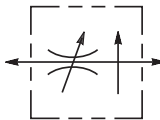
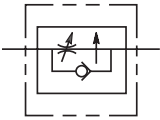
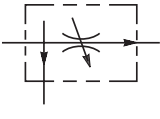
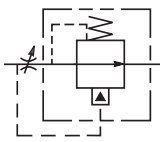
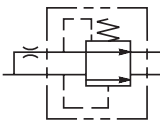
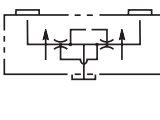


**Contents****Flow Control Valves**

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI
	<b>NEEDLE VALVES</b>				
	J02A2	C08-2	Needle Valve, Cartridge Type	45/12	420/6000
	NVH081	C08-2	Needle Valve, Cartridge Type	38/10	380/5500
	NVH101	C10-2	Needle Valve, Cartridge Type	60/16	380/5500
	J06A2	C16-2	Needle Valve, Cartridge Type	225/60	420/6000
	J02B2	C08-2	Needle Valve with Reverse Check, 2 to 1 Free Flow	30/8	420/6000
	FV101	C10-3	Needle Valve with Reverse Check, 1 to 2 Free Flow	45/12	210/3000
	FV102	C10-2	Needle Valve with Reverse Check, 1 to 2 Free Flow	23/6	210/3000
	<b>PRESSURE COMPENSATED FLOW CONTROLS</b>				
	J02E2	C08-2	Restrictive Flow Control, Adjustable	20/5.3	420/6000
	FR101	C10-2	Restrictive Flow Control, Tuneable	26/7	245/3500
	J04E2	C10-2	Restrictive Flow Control, Adjustable	40/10	420/6000
	J04C2	C10-2	Restrictive Flow Control, Adjustable	40/10	420/6000
	FA101	C10-2	Restrictive Flow Control, Reverse Check, Adjustable	21/5.5	210/3000
	FC101	C10-2	Restrictive Flow Control, Reverse Check, Tuneable	56/15	210/3000
	<b>PRESSURE COMPENSATED PRIORITY FLOW CONTROLS</b>				
	J02D3	C08-3	Priority Type, with Bypass	15/4	420/6000
	FP101	C10-3	Priority Type, with Bypass	56/15	245/3500
	J04D3	C10-3	Priority Type, with Bypass	45/12	420/6000
	J1A125	3A	Priority Type, with Bypass	90/24	350/5000
	<b>PRESSURE COMPENSATORS</b>				
	FCR101	C10-3	Restrictive Type, Press. Compensators	38/10	245/3500
	FCR161	C16-3	Restrictive Type, Press. Compensators	150/40	245/3500
	<b>PRIORITY PRESSURE COMPENSATORS</b>				
	FCP101	C10-4	Priority Type, with Bypass	56/15	245/3500
	FCPH121	C12-4	Priority Type, with Bypass	95/25	380/5500
	<b>FLOW DIVIDERS/COMBINERS</b>				
	FDC101	C10-4	Flow Divider/Combiner	45/12	245/3500
	L04A3	C10-4	Flow Divider/Combiner	60/16	420/6000
	L06A3	C16-4	Flow Divider/Combiner	180/47	420/6000
	L1A300	91-1	Flow Divider/Combiner	320/85	350/5000

**CV**Check  
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Controls**FC**Flow  
Controls**PC**Pressure  
Controls**LE**Logic  
Elements**DC**Directional  
Controls**MV**Manual  
Valves**SV**Solenoid  
Valves**PV**Proportional  
Valves**CE**Coils &  
Electronics**BC**Bodies &  
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CV

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## INTRODUCTION

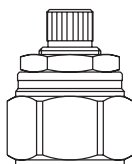
This technical tips section is designed to help familiarize you with the Parker line of Flow Control Valves. In this section we present common options available as well as a brief synopsis of the operation and applications of the various product offered in this section. The intent of this section is to help you in selecting the best products for your application.

## COMMON OPTIONS

As you will see, Parker offers a variety of Flow Control products. As such, some of the options mentioned below may not be available on all valve models. Consult the model coding and dimensions of 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 flow 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.

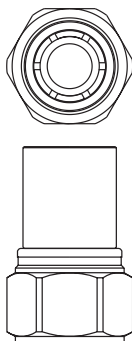
**Screw Adjustment** - Valve can be adjusted with an allen wrench. Lock nut included to maintain desired setting after adjustment. This is the most common adjustment option available on most Parker products.



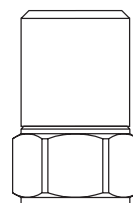
**Knob Adjustment** - An aluminum knob is added to the standard screw adjustment. A lock knob is provided to help maintain the desired setting after adjustment. Parker offers knob conversion kits for most flow control valves. For kit numbers consult the individual valve pages.



**Fixed Style** - In most cases, the Fixed Style product is a screw adjustable product with a steel collet threaded over the adjustment. These valves are preset at the factory. Should the valve need to be adjusted, the star washer and aluminum plate can be removed from the top of the assembly exposing the adjustment.

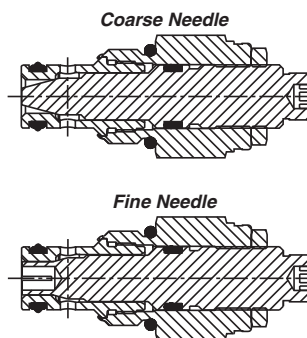


**Tamper Resistant** - The tamper resistant option is a screw adjustable valve with a steel cap installed to conceal the adjustment. The cap is designed so the internal edges clamp into the groove of the valve adapter. Once the cap is installed, it cannot be removed without damaging the cap and the valve. 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 flow control valves. For kit numbers consult the 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.

**Fine Meter Options:** Fine meter needles are offered on some needle valve series. When this option is specified, the standard needle is replaced by a slotted needle. The slotted needle restricts substantially more flow giving you finer control in the small flow ranges. Obviously, the maximum flow capacity of the needle valve is decreased with the fine meter option.

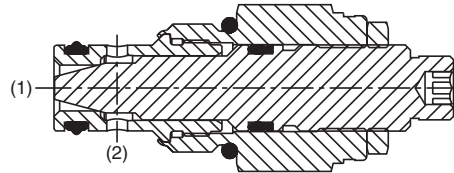
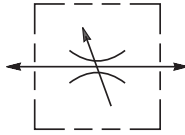


## PRODUCT TYPES / APPLICATIONS

**Needle Valve**

Needle valves provide uncompensated adjustable flow control of a desired function. They are ideal for applications where general control of hydraulic flow is needed, like in a bleed off circuit.

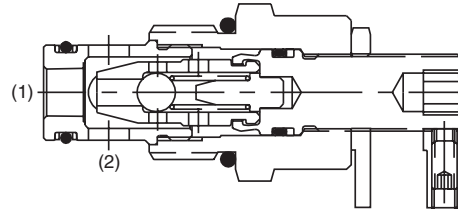
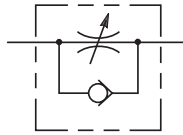
When used with a compensator spool, a pressure compensated system can be obtained.



**OPERATION** - The valve acts as a fixed orifice in a hydraulic circuit. The effective size of the orifice increases as the tapered needle is opened. Shutoff is provided when fully closed. While a needle valve will meter flow regardless of the flow path, flow from port 2 to 1 is preferred. When you flow in the reverse direction (1 to 2), pressure forces work on the nose of the needle in an effort to drive it off of its seat. As such, all leakage conditions found in the catalog are based on flow from side to nose (port 2 to port 1). In addition, the adjustment will be harder to turn due to the added force.

**Needle with a Reverse Check**

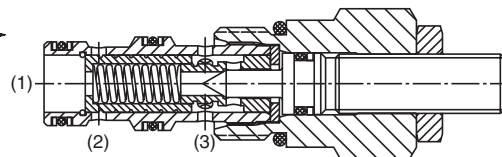
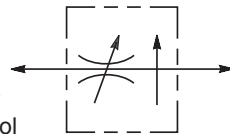
Needle valves with reverse check functions are sometimes also referred to as flow control valves. As the name implies, these valves provide uncompensated adjustable speed control in one direction and allow free flow in the opposite direction. When used with a compensator spool, a pressure compensated system can be obtained.



**OPERATION** - With flow entering the side of the cartridge (port 2), the needle acts as a fixed orifice. The effective size of this orifice is increased as the needle is opened controlling the output flow to port 1. With flow entering the nose (port 1), the check ball inside the needle is unseated allowing free flow to port 2.

**P.C. Flow Regulator**

Pressure compensated flow regulators maintain a regulated flow regardless of changes in load or inlet pressure. They are commonly used to accurately control an actuator function. They can be used in meter-in or meter-out applications.

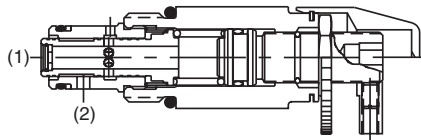
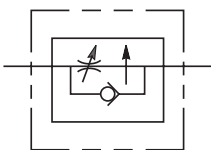


**OPERATION** - The valve consists of a control orifice within a normally open, spring biased compensator spool. Flow through the control orifice produces a pressure drop across the compensator spool. When inlet flow exceeds the flow setting of the valve, the force produced by the pressure differential across the spool exceeds the spring force and shifts the compensator spool to throttle or restrict flow; thus maintaining consistent flow through the valve. In the reverse direction, flow is metered, but not pressure compensated.

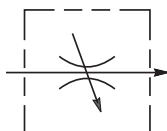
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Data**P.C. Flow Control**

Pressure compensated flow controls are pressure compensated regulators with a reverse flow check valve. They provide constant regulated flow in the one direction regardless of changes in load pressure. Flow in the reverse direction is non-regulated, free flow. They can be used in meter-in or meter-out applications.

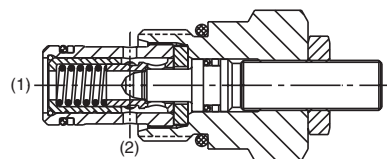
**Adjustable Flow Controls**

Most adjustable pressure compensated flow controls have a limited adjustment range. You will see in our catalog that we use the term "tuneable" for the FR101 and FC101 valves.



This means they are only adjustable within a pre-set range. The FA101, J02E2, J04E2 and J04C2 are fully adjustable.

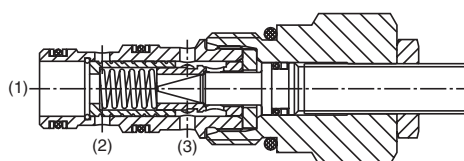
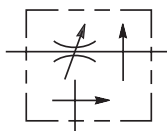
Keep this adjustment capability in mind when you select a flow control.



**OPERATION** - When flow enters the nose (port 1) of the cartridge, it passes through a control orifice. This control orifice creates a pressure differential across the regulating spool. As the inlet flow increases, the pressure differential across the regulating spool increases, allowing the regulating spool to overcome its spring force and begin to shift. As it shifts, it throttles to maintain a constant flow. When used in conjunction with a fixed displacement pump, a relief valve between pump and valve is needed. Full flow is allowed in the reverse direction (port 2 to 1).

**Priority Style P.C. Flow Regulator**

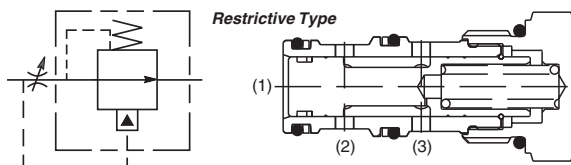
Priority style pressure compensator regulators maintain constant priority flow to one leg of the circuit regardless of changes in load or inlet pressure. Once this priority flow requirement is satisfied, the excess flow is diverted and can be used in another leg of the circuit. These valves are usually used in meter-in applications.



**OPERATION** - The valve consists of a control orifice within a spring biased compensator spool. The priority port is normally open while the bypass port is normally closed. As flow enters the inlet of the cartridge and passes through the control orifice, a pressure differential is created across the compensator spool. When the inlet flow exceeds the setting of the valve, the force produced by this pressure differential exceeds the spring force and shifts the compensator spool; opening up the bypass port, and bypassing the excess flow. If load pressure at the bypass port is greater than the load pressure at the priority port, the compensator spool will further shift restricting the priority flow to that of the valve setting. **Caution:** If the priority line is blocked so that no flow can pass through the control orifice, the compensator spool will shift, blocking the bypass port and allowing inlet pressure to go to full system relief pressure. These valves do not provide a pressure relieving function, so it is common to place an external relief valve downstream of port 3 to prevent a no flow condition.

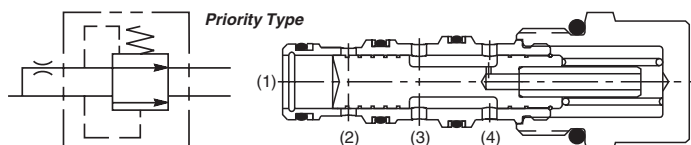
**Compensator Valves**

Compensator valves are used to provide pressure compensated control across an external fixed or adjustable orifice. Parker offers both the restrictive type of compensator and a priority style.

**OPERATION - Restrictive Type:**

Inlet flow (upstream of the orifice) is split with one portion going to the compensator port inlet (port 1), the other portion passes through the orifice to the supply port (port 3). As pressure drop across the orifice reaches the selected compensator pressure drop, the higher pressure (pre-orifice) at port 1 starts to shift the compensator spool into throttling position. The valve works to maintain a constant pressure drop across the orifice.

**Priority Type:** Flow through the external orifice into the supply port (port 4) produces a pressure drop across the compensator spool. When the inlet pressure exceeds the initial setting of the valve, the force produced by the pressure differential across the spool exceeds the spring force and shifts the compensator spool to throttle or restrict the flow, thus maintaining constant flow through the priority port (port 3). The excess flow is bypassed to port 2. Regulated port flow must be maintained for bypass flow to continue.

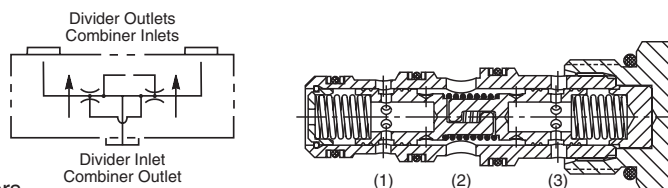
**Flow Divider / Combiner**

Flow divider / combiner valves are used to proportion the flow from a single source into two actuators. In the reverse mode, the valve takes the flow from the two sources and combines it into one flow.

When attempting to synchronize two cylinders

with a flow/divider combiner valve, please consider that the flow accuracy is +10%.

A crossover relief can be used to help re-synchronize the cylinders by bottoming them out after several cycles.



**OPERATION** - When flow enters the divider inlet port, it will pass through orifices in each of the interconnected spools. The flow passing through the orifices creates a pressure drop which pulls the two spools away from each other. The flow then passes to the two divider outlet ports. The division of flow (i.e. 50-50, 60-40, 66-33, etc.) is determined by the orifice sizes in the two spools. When flow is being combined, it enters the valve through two combiner inlets. The pressure drop across the orifices pulls the two spools together. The combined flow then passes through the combiner outlet.

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