



Accumulator Charging with Integrated Check Valve

Brake Accumulator Charging Requirements

Safety requires hydraulic braking circuits to hold reserve pressure in accumulators. Providing fluid to the braking circuit and keeping the accumulators charged is a priority function for the vehicle hydraulic system. The brakes normally consume a small flow when operating. Excess flow is available for other functions. If the engine is turned off, or the supply fails, the reserve allows an operator to safely halt the moving vehicle. Other requirements may include capacity to depress brake pedal seven times, and redundant accumulators.



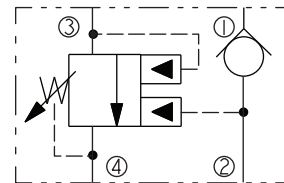
Remote-piloted Unloading

The UPCV10-F41 is built for this critical application. This is a remote piloted unloading valve with an integrated load-holding check. This valve pilots a flow regulator or compensator within a controlled range to provide pressure-compensated accumulator charging. You can specify the charging pressure and operating ratio when ordering. 60% to 90% ratios are possible in 10% increments.

This arrangement gives priority to maintaining accumulator charge, while unloading excess flow. The excess is available for other secondary functions. Because it is pressure compensated, the accumulator charges to the desired pressure, independent of pressure in the rest of the hydraulic circuit.

Ideal choices for accompanying compensators include EC10-42 with static load-sensing, or EC10-43 for circuits that require a dynamic load-sensing arrangement. The pressure-compensated flow regulator FR10-E40 eliminates the need for external orificing, simplifying the circuit even further.

Symbol



Operation

During operation, flow is normally blocked from 3 to 4, allowing the flow regulator/compensator to respond to its pilot signal and provide accumulator charge flow. When the set pressure is attained at ports 2 and 3, the valve relieves port 3 to 4, unloading the flow regulator/compensator pilot signal. This causes the flow regulator/compensator to bypass all flow.

The check allows free flow from 1 to 2 when charging, and holds accumulator pressure at 2. Pressure at port 2 holds the valve open after 3 is relieved, down to a set ratio. When pressure at 2 drops to the reload value, the valve blocks 3 to 4, allowing the charge cycle to repeat. The spring chamber is internally vented to port 4.

Savings

Allowing excess flow to other functions when the accumulator is charged saves energy. Integrating the load-holding check with the unloading pilot saves space, cost, and simplifies charging circuits.

When designing an accumulator charging circuit, you also have the opportunity to supply this circuit using a bypass-type priority flow regulator. The FR10-E40 is a pressure compensated flow regulator that allows you to define the charging rate, independent of pressure, and bypass excess flow for other vehicle functions. This valve is a simpler solution and performs better for charging flows up to 23 lpm (6 gpm).

For detailed information and specifications, visit www.hydraforce.com or contact your local HydraForce representative at www.hydraforce.com/distrib/world.htm

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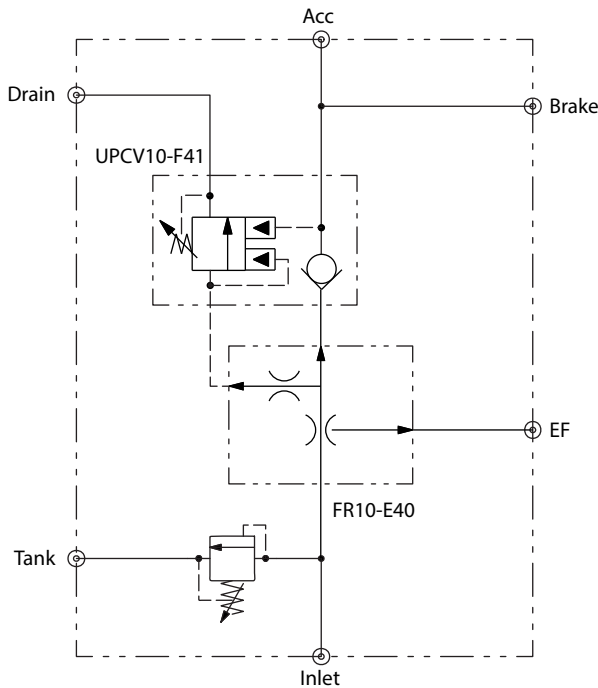
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Priority Accumulator Charging with FR



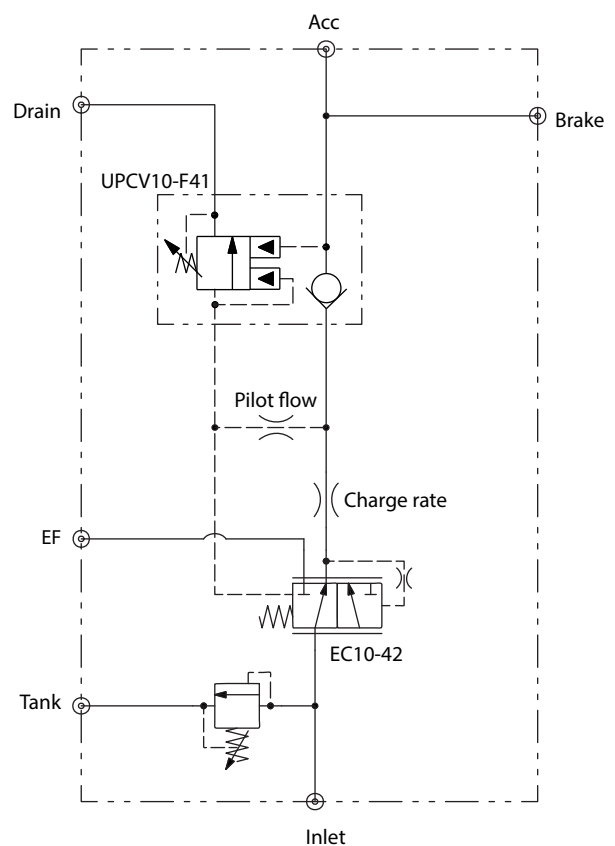
This circuit shows how you might apply the UPCV10-F41 to charge a brake accumulator. The UPCV pilots the FR while sensing the accumulator pressure. The valve cycles to maintain accumulator pressure within a specified range. The FR bypasses excess flow.

Other Situations

Pressure drop across the integrated check valve limits application of the UPCV10-F41 to flow rates of 45 lpm (12 gpm). For larger charging flow requirements, or when sharing priority flow with a dynamic steering orbital, contact us for additional options.

The FR10-E40 is limited to flow of 23 lpm (6 gpm). For charging flow rates above this, you can use a compensator such as the EC10-42, along with external orificing to provide pressure-compensated charging with excess flow to other functions.

Priority Accumulator Charging with EC



This circuit demonstrates accumulator charging as a priority function with a bypass type compensator. The UPCV pilots the EC while sensing the accumulator pressure. Orifices in the circuit control charging rate and pilot flow. The EC pilots downstream of the control orifice.

The UPCV cycles to maintain accumulator pressure within a specified range. The EC bypasses excess flow. This arrangement accommodates higher charging flows than the FR.

Benefits

- Accumulator charge has priority to other functions.
- Specify the charge pressure and operating range from 60% to 90%.
- Accumulator charge is independent of pressure in the rest of the circuit.
- Fewer components and simpler manifolds
- Space and cost savings