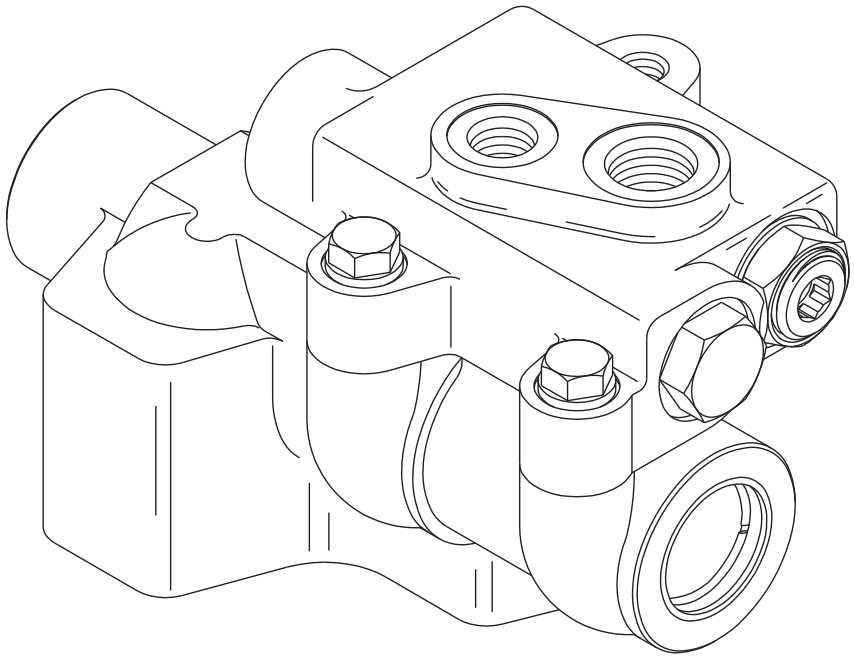
Single Accumulator Charging Valve

Description and Operation



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DISASSEMBLY

(Refer to Figures 1, 2, and 3)

The Single Accumulator Charging Valve is designed for installation in an open center hydraulic system. This valve is normally installed after the main pump/relief valve and before downstream secondary hydraulic devices, such as, a power steering valve, etc. (see Figure 1).

The Single Accumulator Charging Valve is designed for use with mineral base hydraulic oil. Mineral base hydraulic oil and compatible wheel cylinder seals must be used.

The accumulator charging valve creates pressure used to charge the accumulator from an open center circuit, designed to operate within a preset range. When the accumulator is fully charged, it becomes a separate closed center circuit. The stored pressure in the accumulator provides available pressure for a brake control valve.

Flow through to the power steering valve or secondary devices is reduced fractionally for a very short time during accumulator charging. This does not noticeably affect the operation of the power steering valve or secondary devices. Full system pressure is available to these devices at all times.

The energy stored in the accumulator permits full

hydraulic power braking even when the open center

hydraulic system is not functioning "power-off". The number of "power-off" brake applications is limited only by the amount of pressurized fluid stored in the accumulator and the volume required per application.

The accumulator charging rate, high pressure limit, and low pressure limit are preset at the factory to conform to specific customer requirements. Maximum available brake pressure is limited to prevent over-pressurizing the brake system.

This valve contains an internal filter through which all oil in the charging valve, accumulator and brake system must flow. Hydraulic system cleanliness and adequate circuit filtration is imperative in any hydraulic system, minimum 10 micron filtration is recommended. All models currently available can also be modified for use with water glycol fluid when the application requires it.

SYSTEM SCHEMATIC

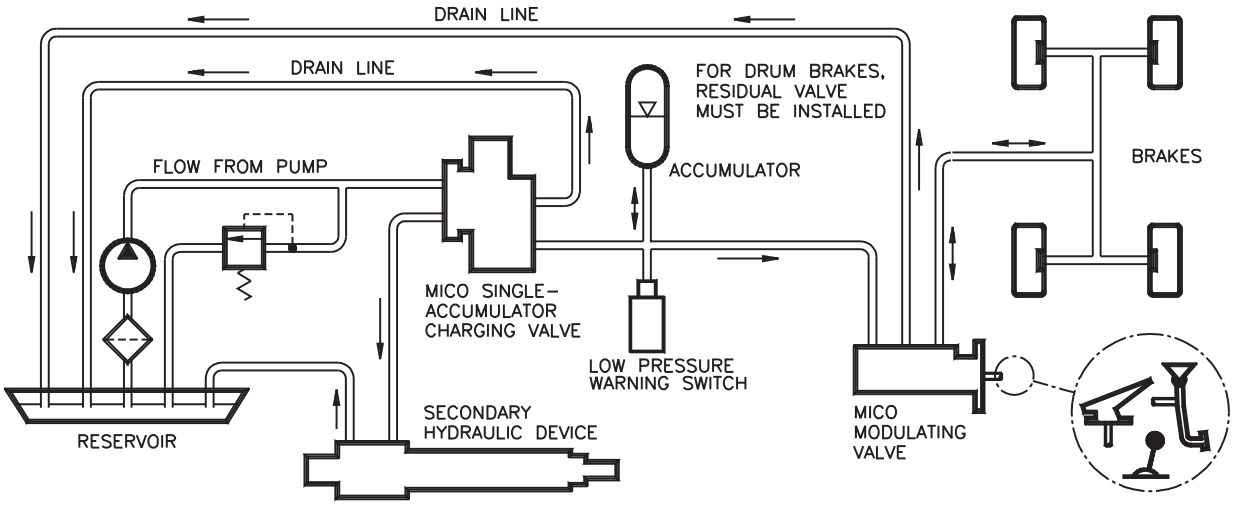


FIGURE 1

REPRESENTATIVE PERFORMANCE DATA

System pressure	to 186.2 bar (2700 PSI)
Flow range	7.6-132.5 L/min (2-35 GPM) 7.6-246.0 L/min (2-65 GPM) Split flange models only
Flow through pressure drop	1.4 bar @ 132.5 L/min (20 PSI @ 35 GPM)
Accumulator pressure, maximum	to 172.4 bar (2500 PSI)
Accumulator charging rate	1.9 to 12.1 L/min @ 69.0 bar (0.5 to 3.2 GPM @ 1000 PSI) in three ranges
Accumulator capacity	Determined from brake line pressure, displacement and number of power-off emergency brake applications.

Technical Data for any specific model furnished upon request.

OPERATION

Charging Mode

(Refer to Figure 2)

The single accumulator charging valve uses an internal spool valve to control hydraulic system flow to pressurize the accumulator.

At pump startup, force of spring (1) positions valve spool (2), causing flow restriction to the flow through port.

Fluid travels past the primary poppet check valve (11) to the accumulator port. Pilot valve spring (4) holds low limit check ball (5) open and closes high limit check ball (6). Pilot valve spool (7) only allows one of the check balls to be closed at a time. Flow to the accumulator also passes the open low limit check ball (5) and enters cavity (8). Simultaneously, pressure is building in cavity (3) and moving valve spool (2) toward stop (10), allowing hydraulic flow to the flow through port. The position of valve spool (2) continues to change until the force of fluid pressure and spring force are balanced at both ends of valve spool (2). The force of spring (1) on valve spool (2) generates an increased pressure in cavity (3) assuring pump pressure is always higher than accumulator pressure. This guarantees priority of the charging function.

The rate at which the accumulator is charged depends on the size of the orifice in the check valve seat (9).

Accumulator Being Charged

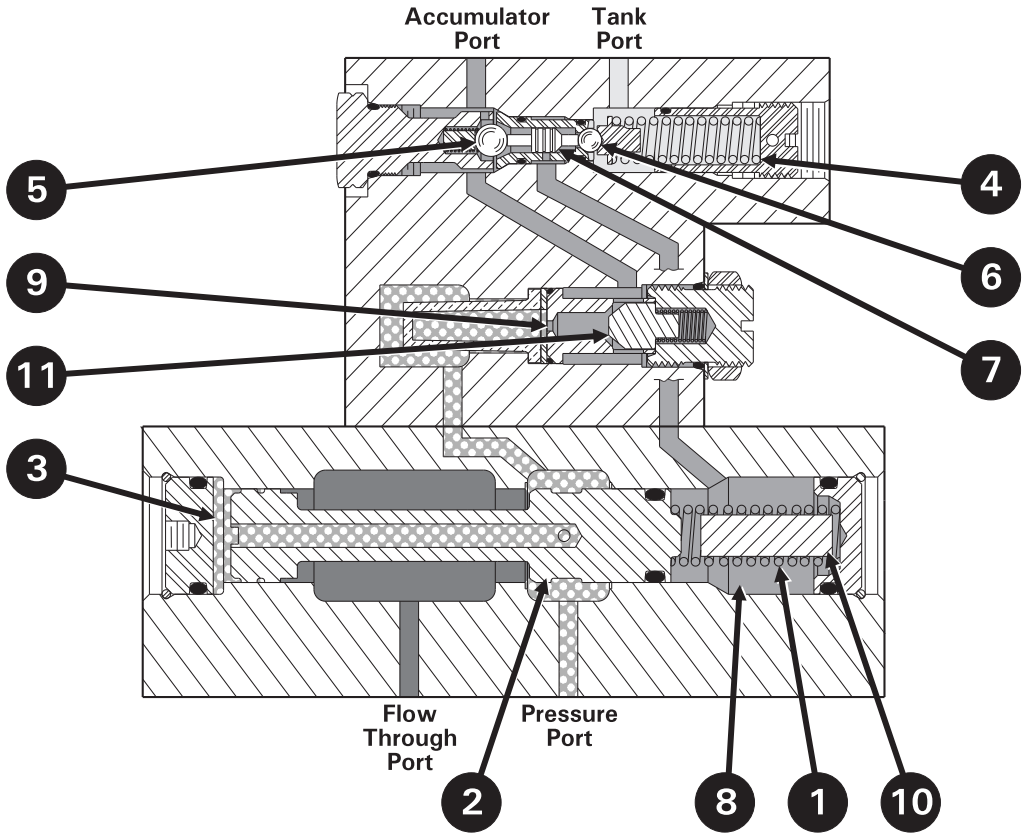


FIGURE 2

Hydraulic System Pressure

Return Line Pressure

Accumulator Pressure

Power Beyond Pressure

Standby Mode

(Refer to Figure 3)

When the accumulator pressure reaches the high charge limit, high limit check ball (6) opens and the low limit check ball (5) closes. With high limit check ball (6) open, pressure in cavity (8) is allowed to flow to tank port. Pressure in cavity (3) moves valve spool (2), allowing increased oil flow to be directed to the flow through port. Primary poppet check valve (11) seats, holding accumulator pressure.

The charging valve is now in the standby mode, pump pressure responds to the force caused by spring (1) plus any downstream requirements.

The charging valve returns to the charging mode when accumulator pressure drops to a level where the force of spring (4) unseats low limit check ball (5).

Accumulator Charged

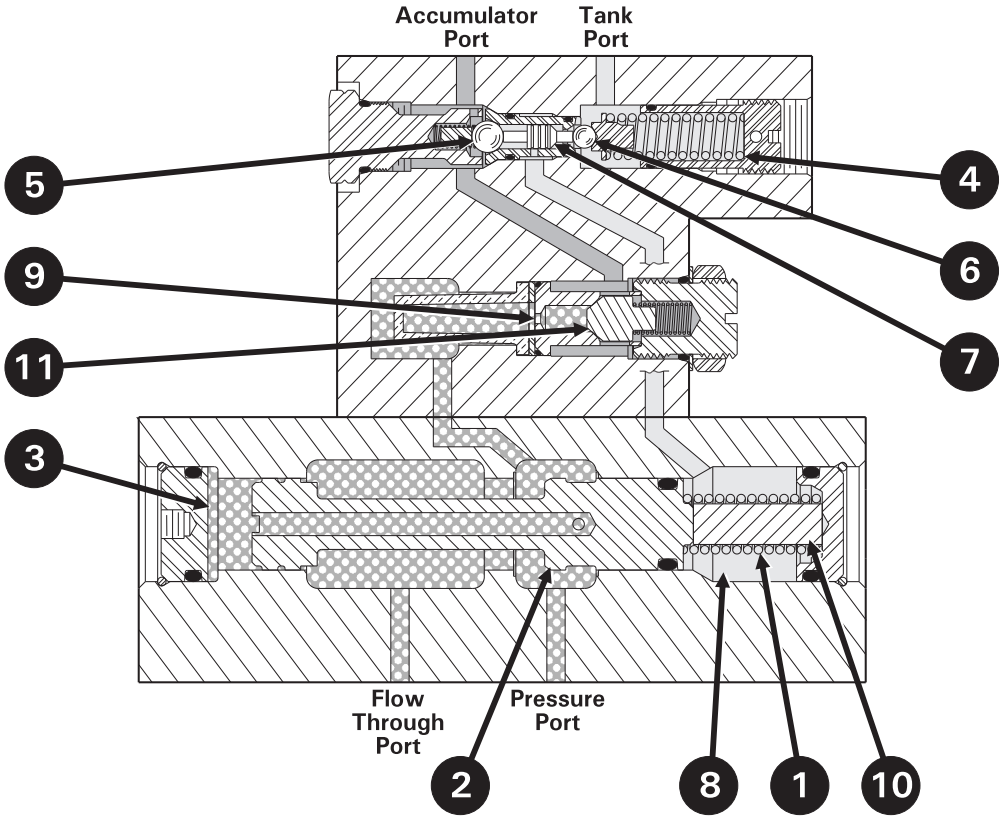


FIGURE 3

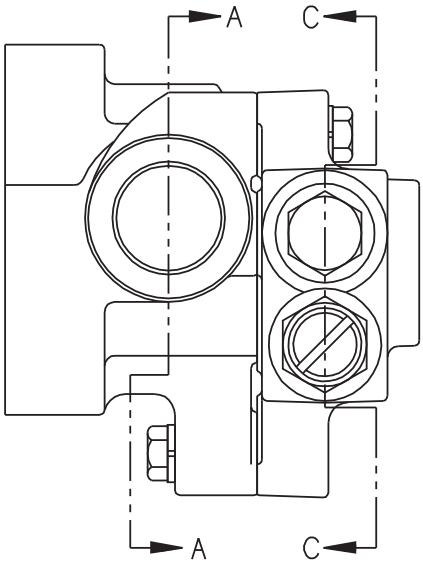
Hydraulic System and Power Beyond Pressure

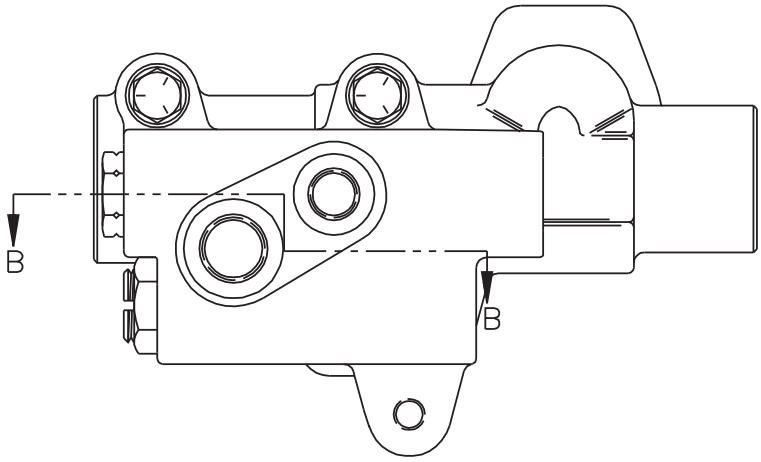
Return Line Pressure

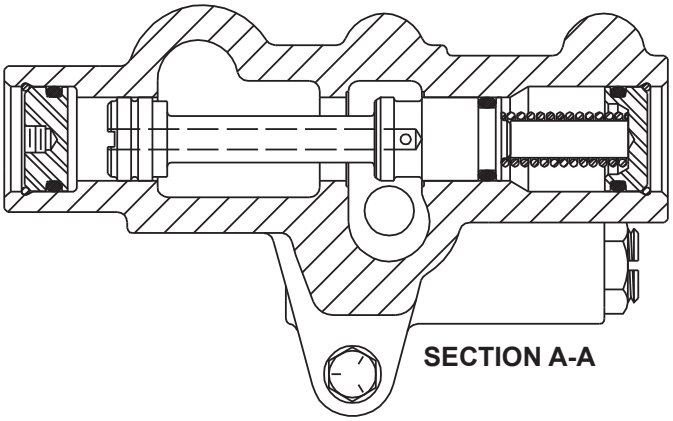
Accumulator Pressure

CROSS SECTION VIEWS - TYPICAL ACCUMULATOR CHARGING VALVE

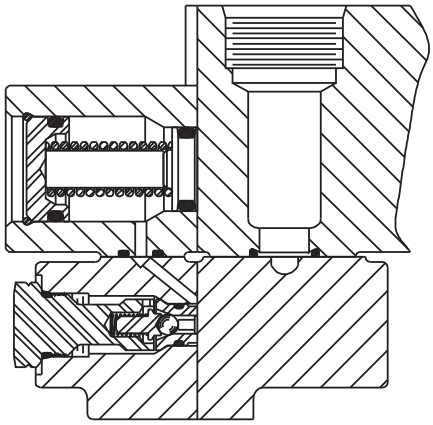
NOTE: Valve shown with accumulator at high limit setting and brake pressure at maximum setting.



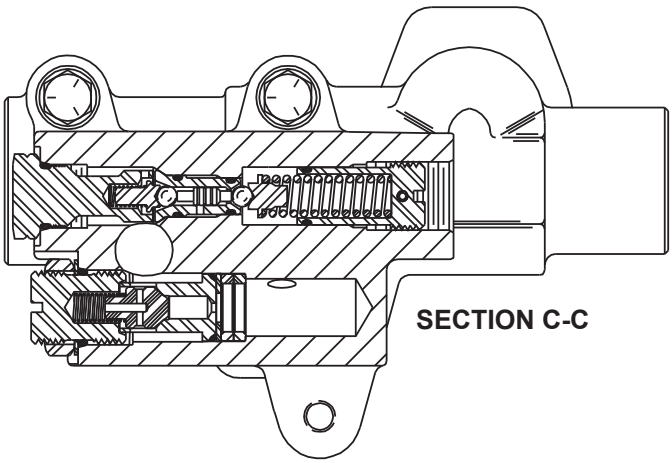




SECTION A-A



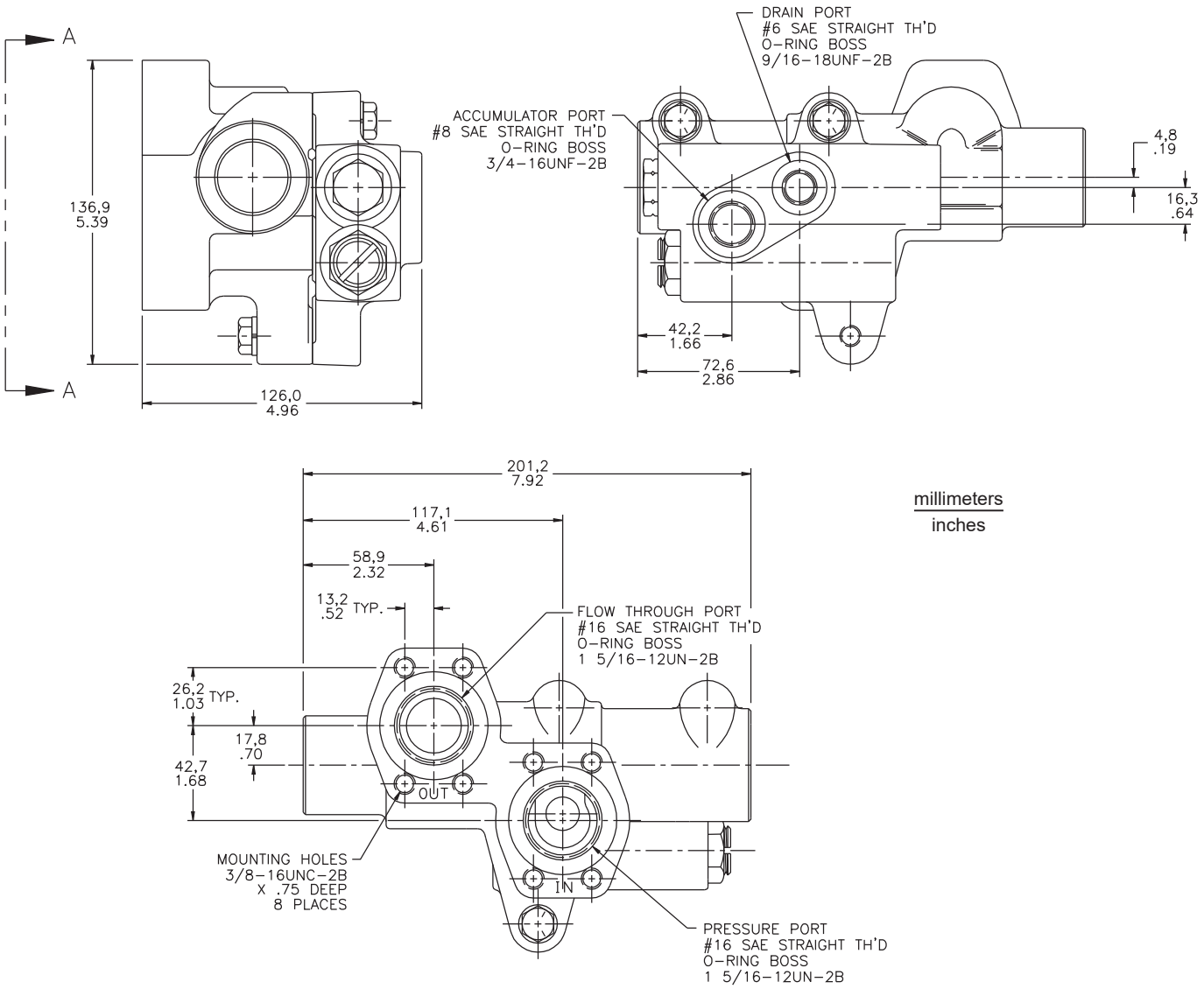
SECTION B-B



SECTION C-C

TYPICAL ACCUMULATOR CHARGING VALVE

(Dimensions will vary slightly between units and are to be used for reference purposes only.)



millimeters
inches

VIEW AA