Direct-acting flow control circuits can be configured in a variety of ways to accomplish a full range of load-holding and motion control functions for hydraulically powered equipment. The hydraulic schematic above depicts several of the many possible ways you can build a circuit.

To ensure a high-level of efficiency and consistent flow control, a load-sense based circuit featuring the SPxx-20x cartridge valve provides pressure-compensated proportional flow control. In addition to the SPxx-20x flow control valve, this direct-acting flow control circuit includes a HCVxx-20 check valve and ECxx-32 pressure compensator.

"A load-sense circuit featuring the SPxx-2x cartridge valve provides pressure-compensated proportional flow control."

Direct-acting flow control circuits are available in the following nominally rated flow capacities (with compensation - see details in following pages)

- 10.6 to 22.7 lpm (2.8 to 6.0 gpm)
- 37.1 to 70.1 lpm (9.8 to 18.5 gpm)
- 55.0 to 106.0 lpm (14.5 to 28.0 gpm)

**FIGURE A - DIRECT-ACTING FLOW CONTROL**

<table>
<thead>
<tr>
<th>CARTRIDGE VALVE and PORTING KEY</th>
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</thead>
<tbody>
<tr>
<td>1 SPxx-20  WP Work Port</td>
</tr>
<tr>
<td>2 ECxx-32  P Inlet Port</td>
</tr>
<tr>
<td>3 HCVxx-20  LS Load Sense Port</td>
</tr>
</tbody>
</table>

**For detail, see Figure A**
For simplicity, the load hold valve downstream of the work port (WP) has been omitted. In Figure A - DIRECT-ACTING FLOW CONTROL, all products are shown at rest and with no pressure applied to the inlet.

In Figure B - DE-ENERGIZED, the pump is on and system pressure is fed to the inlet of the flow control valve. The compensator closes to block the flow of oil to the SP flow control.

When the solenoid coil is energized (Figure C - ENERGIZED), oil is allowed to flow to the work port. The control pressure drop sensed across the flow control valve (SPxx-20x) will have increased to match the spring setting of the compensator (ECxx-32). The compensator spool opens and closes, balancing the supply pressure from the pump against the spring force plus load pressure to maintain consistent flow output. The compensator remains in this position as long as flow is commanded by the flow control valve. As command current to the coil is increased, this circuit not only provides precise metering and repeatable flow output, but flow output will be unaffected by changes in work port pressure.

The load pressure sensed by the compensator is also communicated across the check valve (HCVxx-20), and out the LS port to feed the rest of the main load sense circuit. The HCVxx-20 is a spring-biased check valve, and only allows load pressure to feed into the main load sense circuit; pressure from main load sense circuit is blocked. The main load sense circuit may be controlled using a by-pass compensator and fixed displacement pump, or feed directly into a variable displacement type pump.

At the heart of this flow control circuit, the SPxx-2x valve is a two-way, poppet-type valve available in two configurations: normally closed (SPxx-20) and normally open (SPxx-21). SPxx-2x flow control valves are available in two metering configurations: Standard (Fine) Metering and Linear Metering models. Fine Metering models will have slightly lower maximum flow output due to lower area gain of poppet. See Performance Charts for metering characteristics.