

CHAPTER 18

SYSTEMS



A. LOW-PRESSURE OPERATION

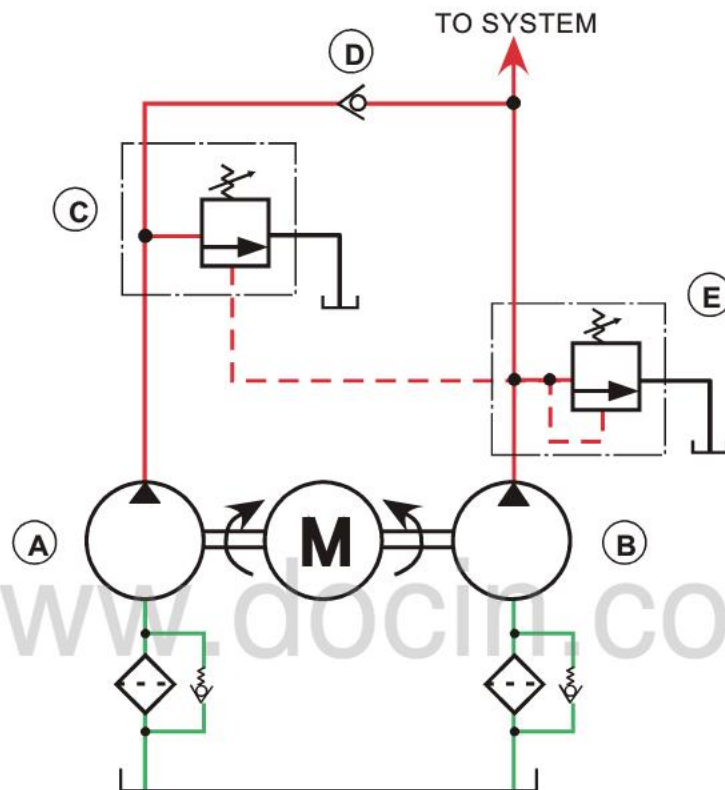


Figure 18-1 Unloading Circuit

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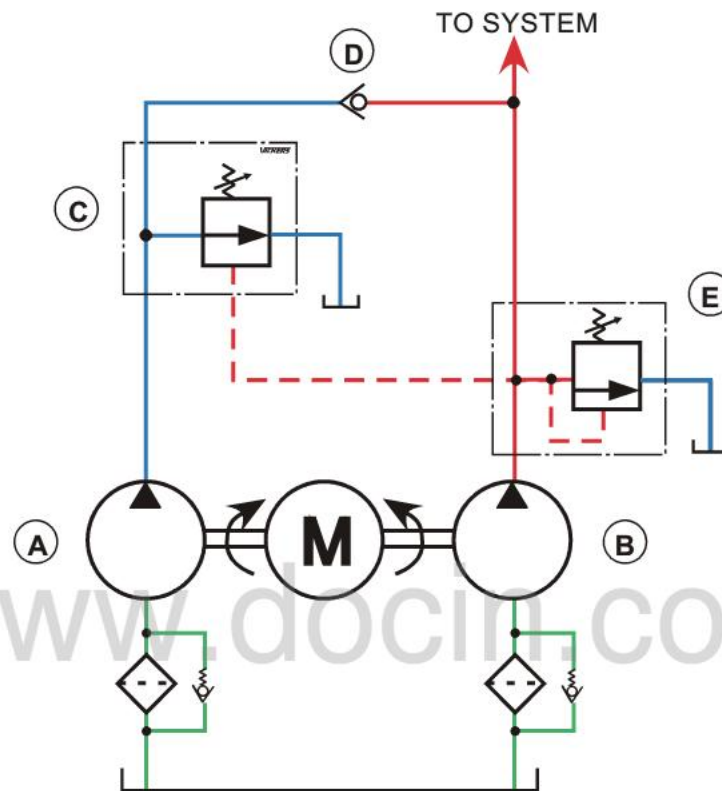


Figure 18-1 Unloading Circuit

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A. MIDSTROKE EXTENDING

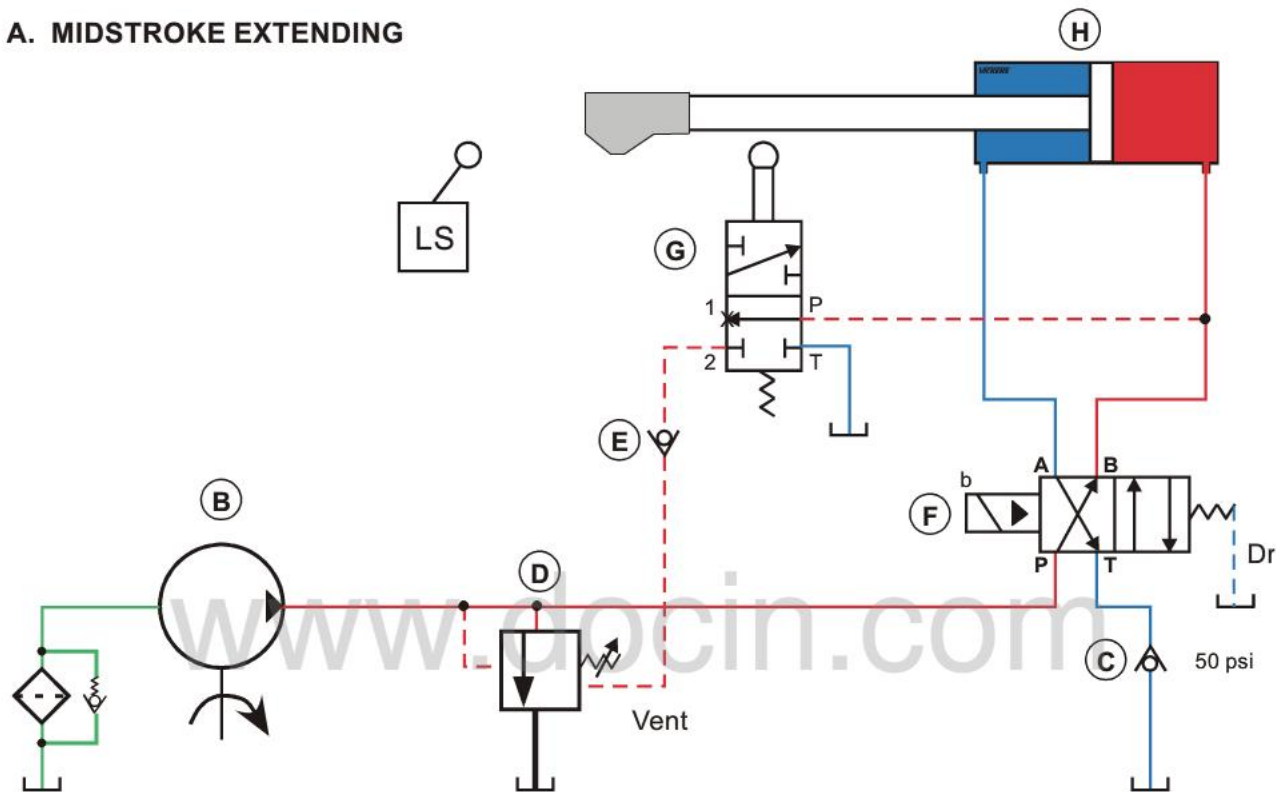


Figure 18-2 (A) Automatic venting at cycle end

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B. MIDSTROKE RETRACTING

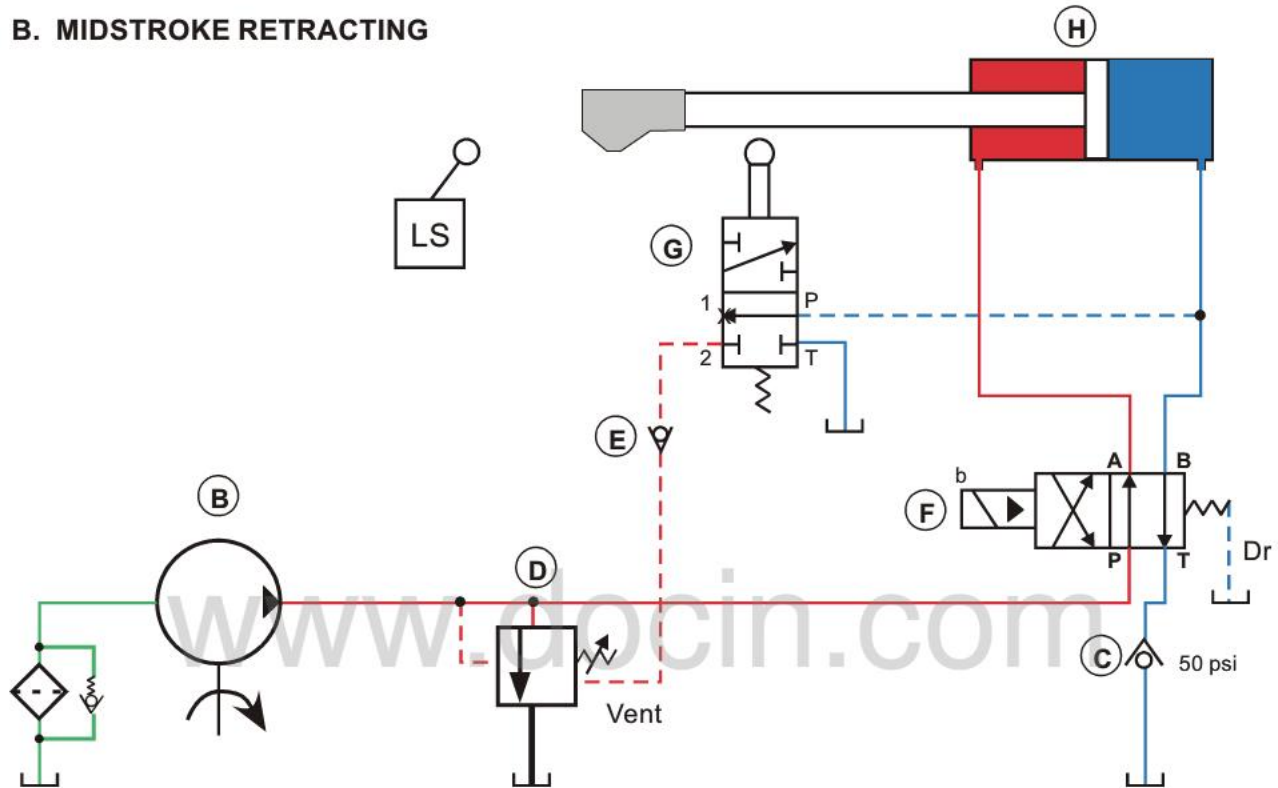


Figure 18-2 (B) Automatic venting at cycle end

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C. AUTOMATIC STOP

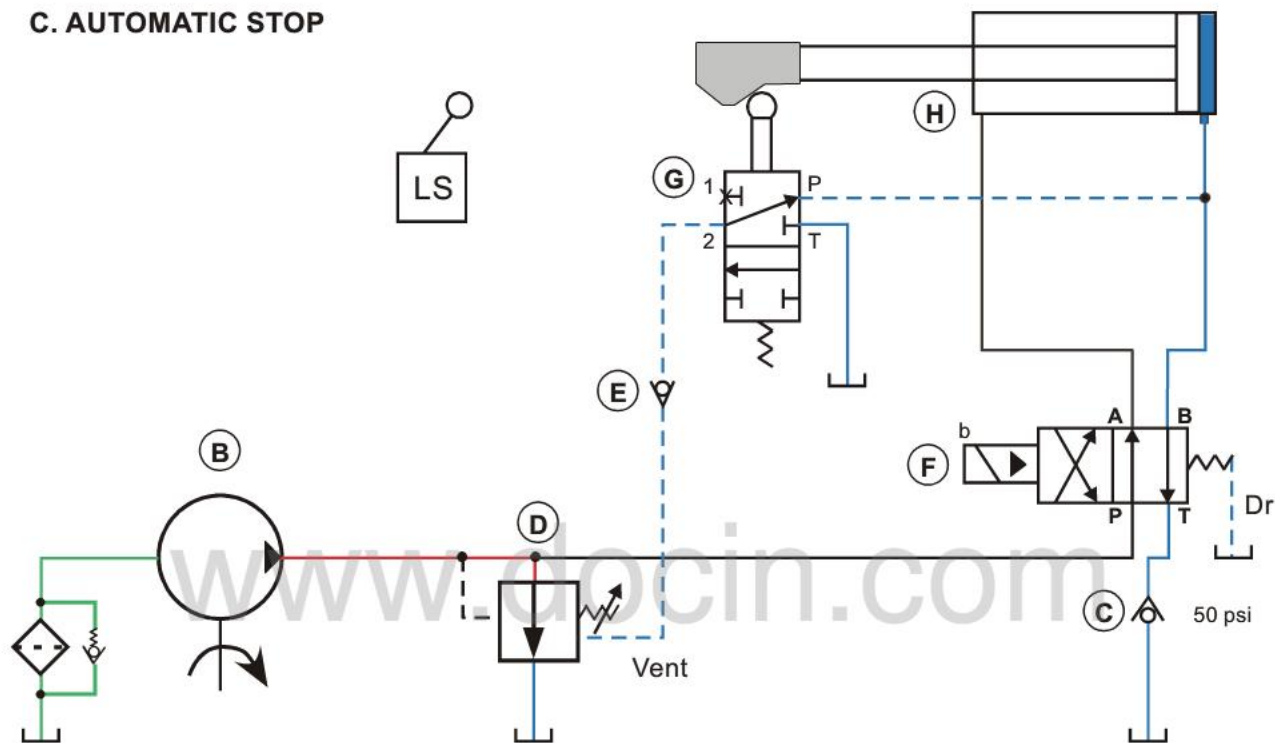


Figure 18-2 (C) Automatic venting at cycle end

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D. PUSH-BUTTON START

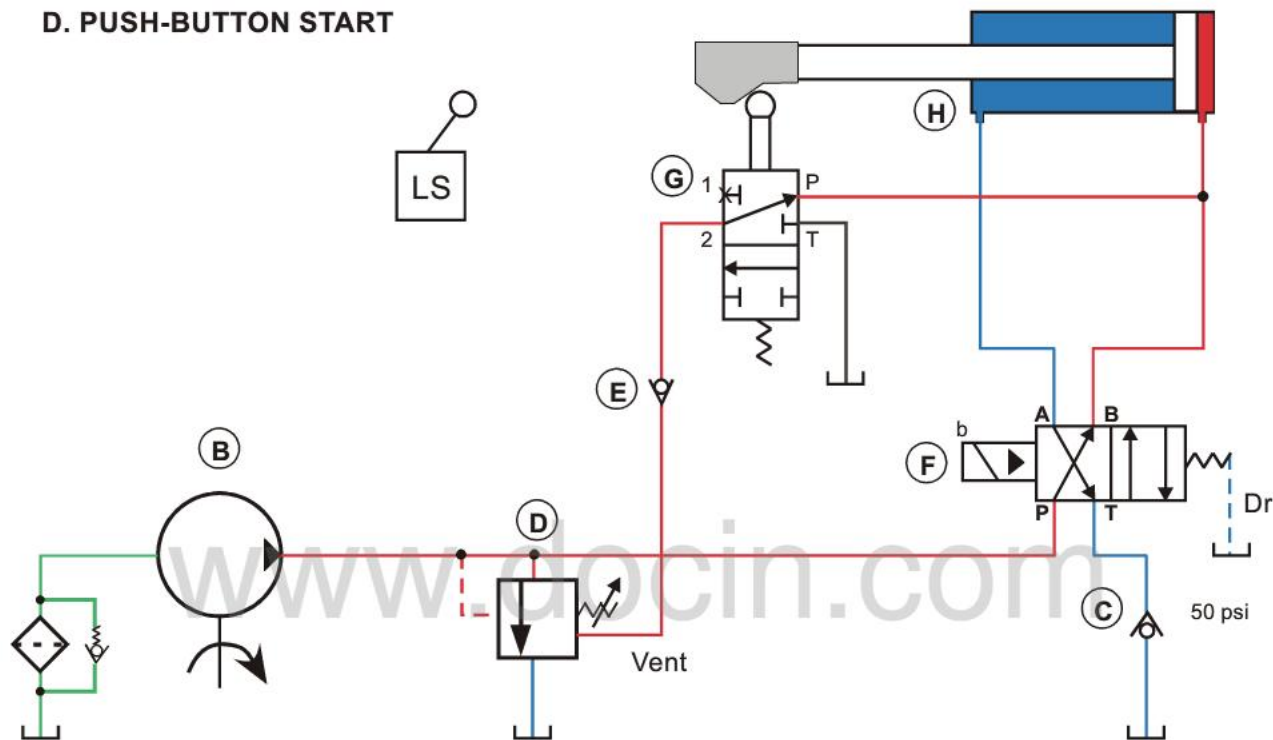


Figure 18-2 (D) Automatic venting at cycle end

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A. CHARGING

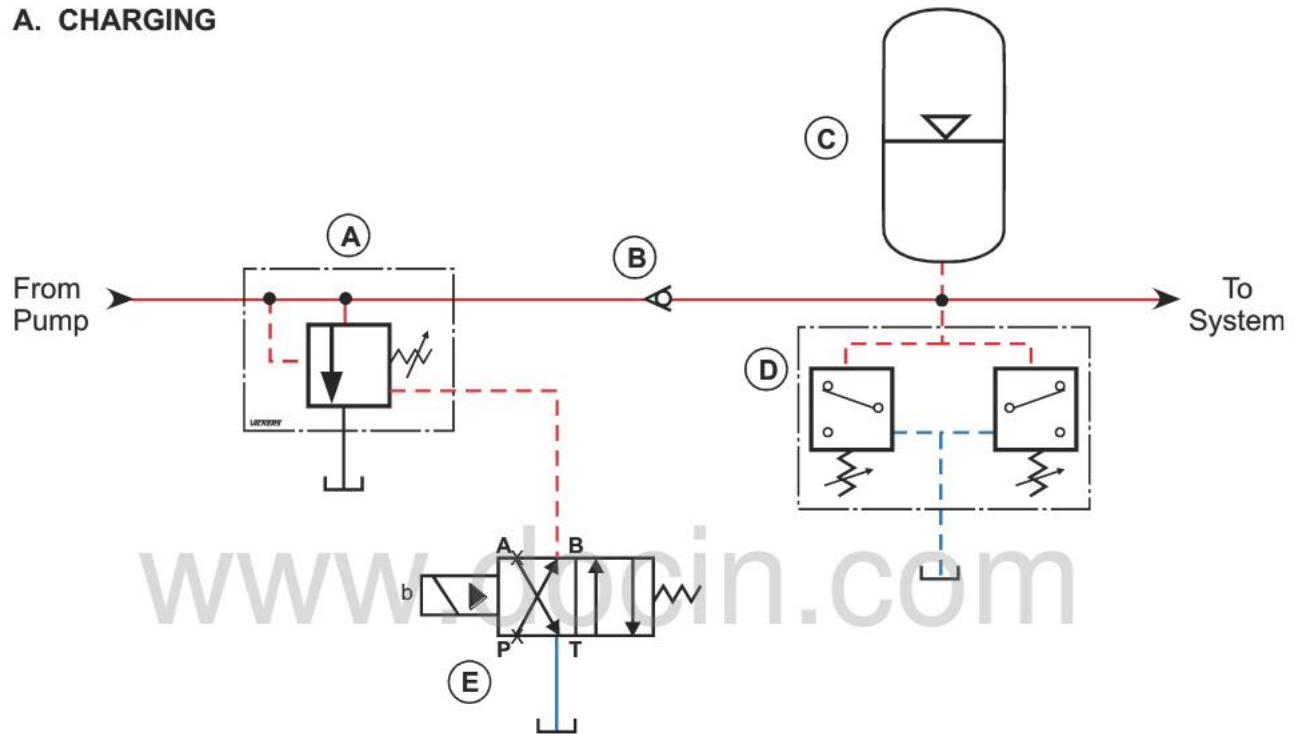


Figure 18-3 (A) Accumulator pump unloading (electric control)

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B. UNLOADING

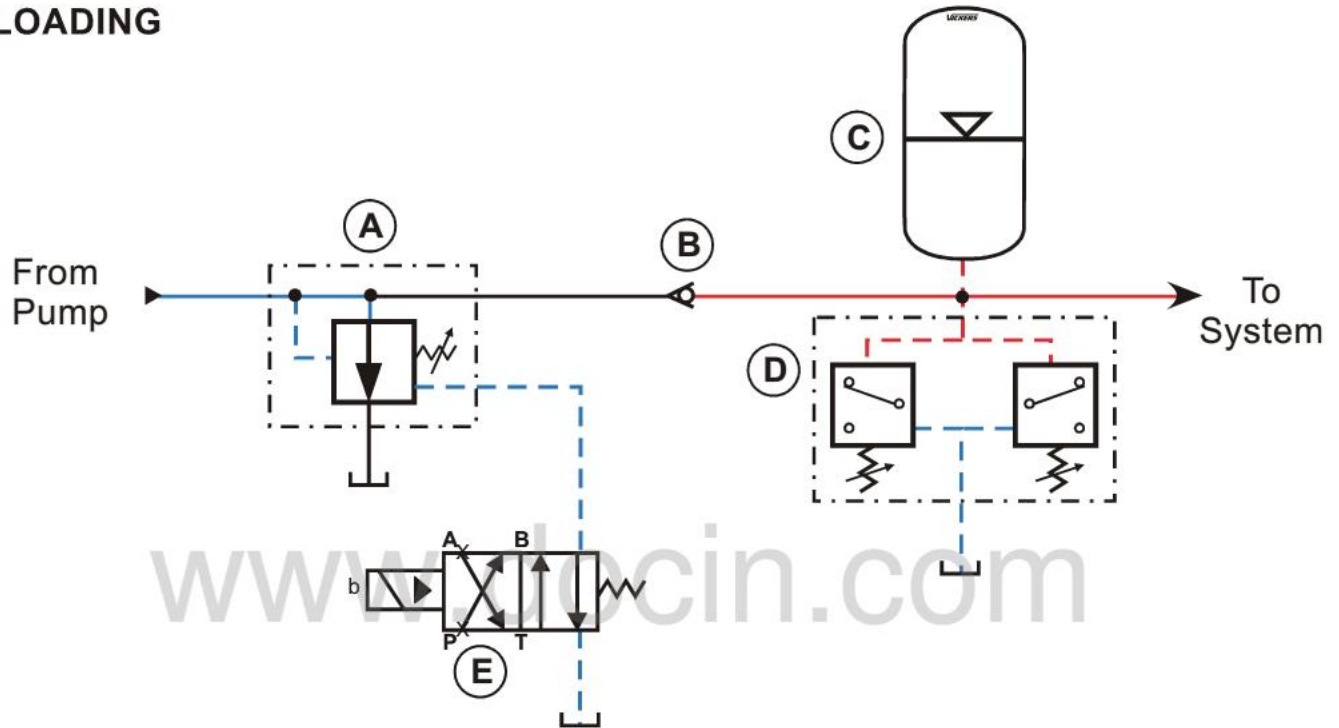


Figure 18-3 (B) Accumulator pump unloading (electric control)

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A. NORMAL OPERATION

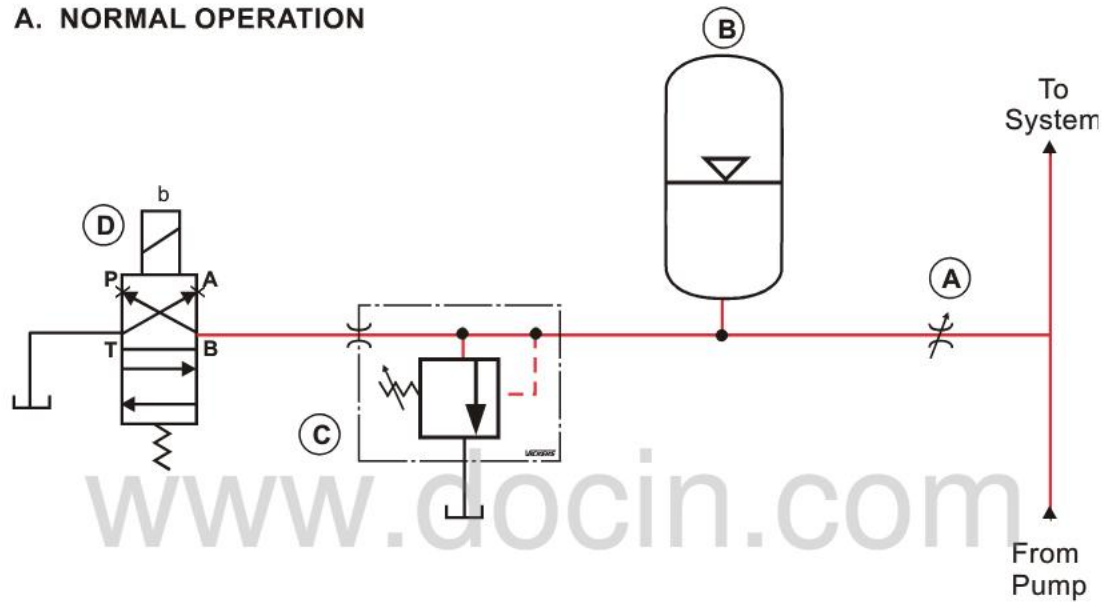


Figure 18-4 (A) Accumulator bleed-off circuit

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B. BLEED OFF

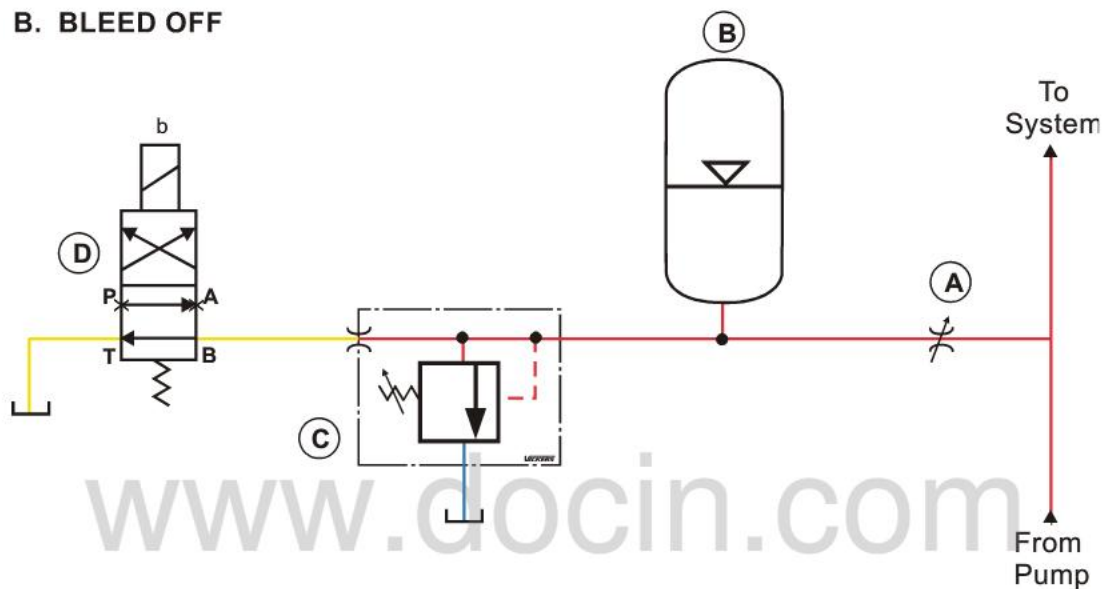


Figure 18-4 (B) Accumulator bleed-off circuit

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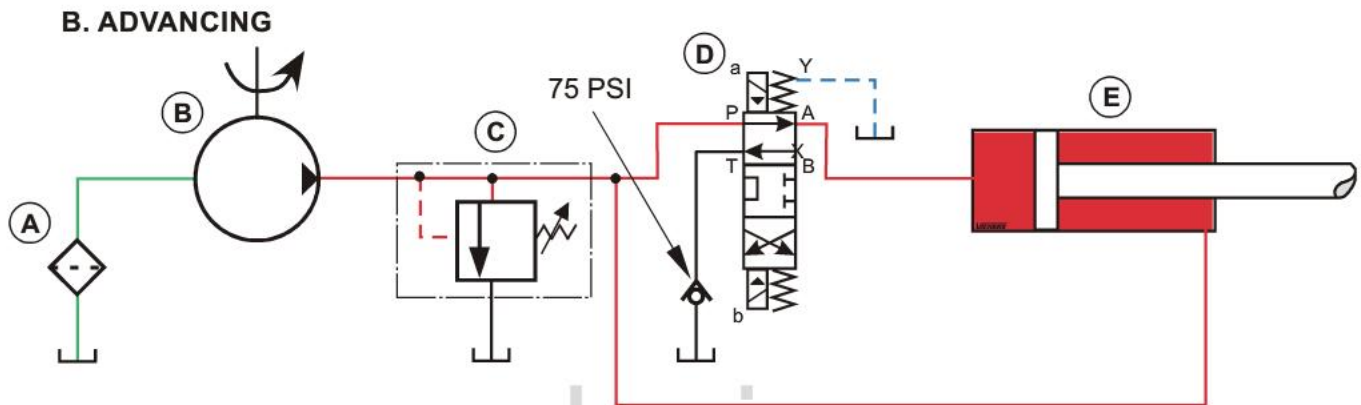


Figure 18-5 (B) Regenerative Circuit

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C. RETRACTING

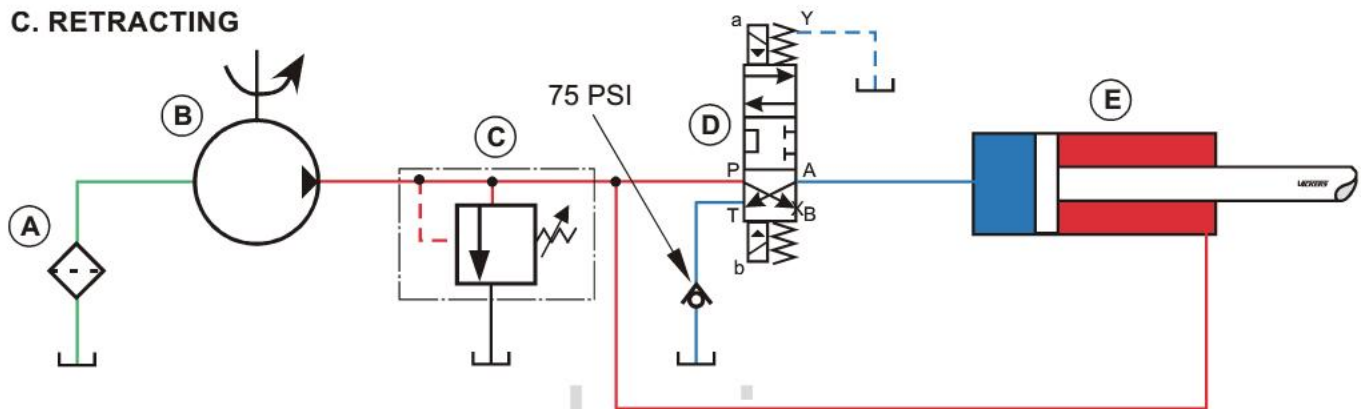


Figure 18-5 (C) Regenerative Circuit

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A. IDLE CONDITION

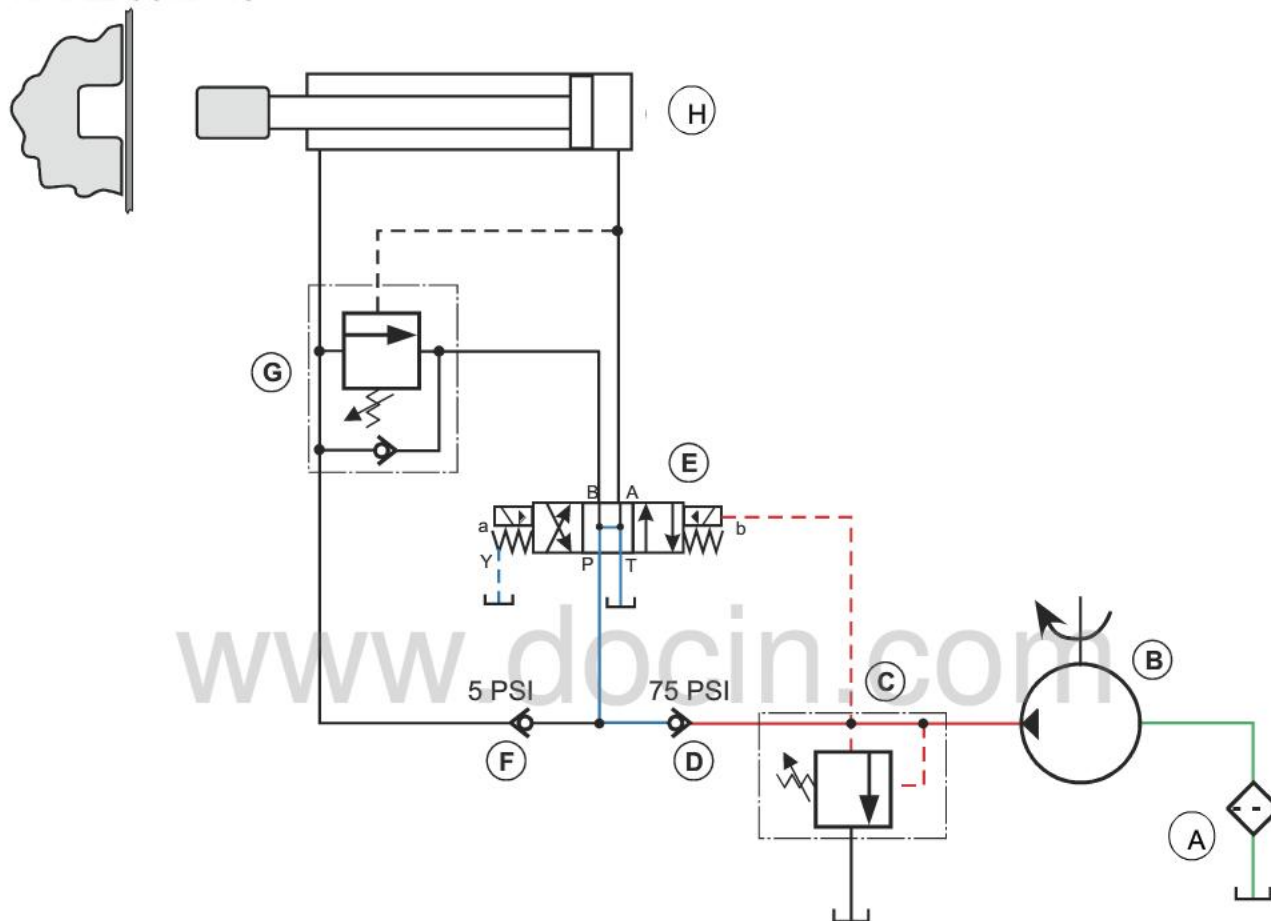


Figure 18-6 (A) Idle condition

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B. REGENERATIVE ADVANCE

The diagram illustrates a hydraulic circuit for a regenerative advance. The circuit consists of a pump (A), a directional control valve (B) in the regenerative position, a pressure-reducing valve (C) set to 5 PSI, a check valve (D), a pressure-reducing valve (E) set to 75 PSI, a directional control valve (F) in the forward position, and a cylinder (G). The regenerative connection is made between the cap end (B) and the rod end (A) of the cylinder. The rod end (A) is connected to the cap end (B) through the pressure-reducing valve (E) and check valve (D). The cap end (B) is connected to the pump (A) through the pressure-reducing valve (C) and check valve (D). The rod end (A) is connected to the tank through the pressure-reducing valve (E) and check valve (D). The directional control valve (F) is controlled by a solenoid (G).

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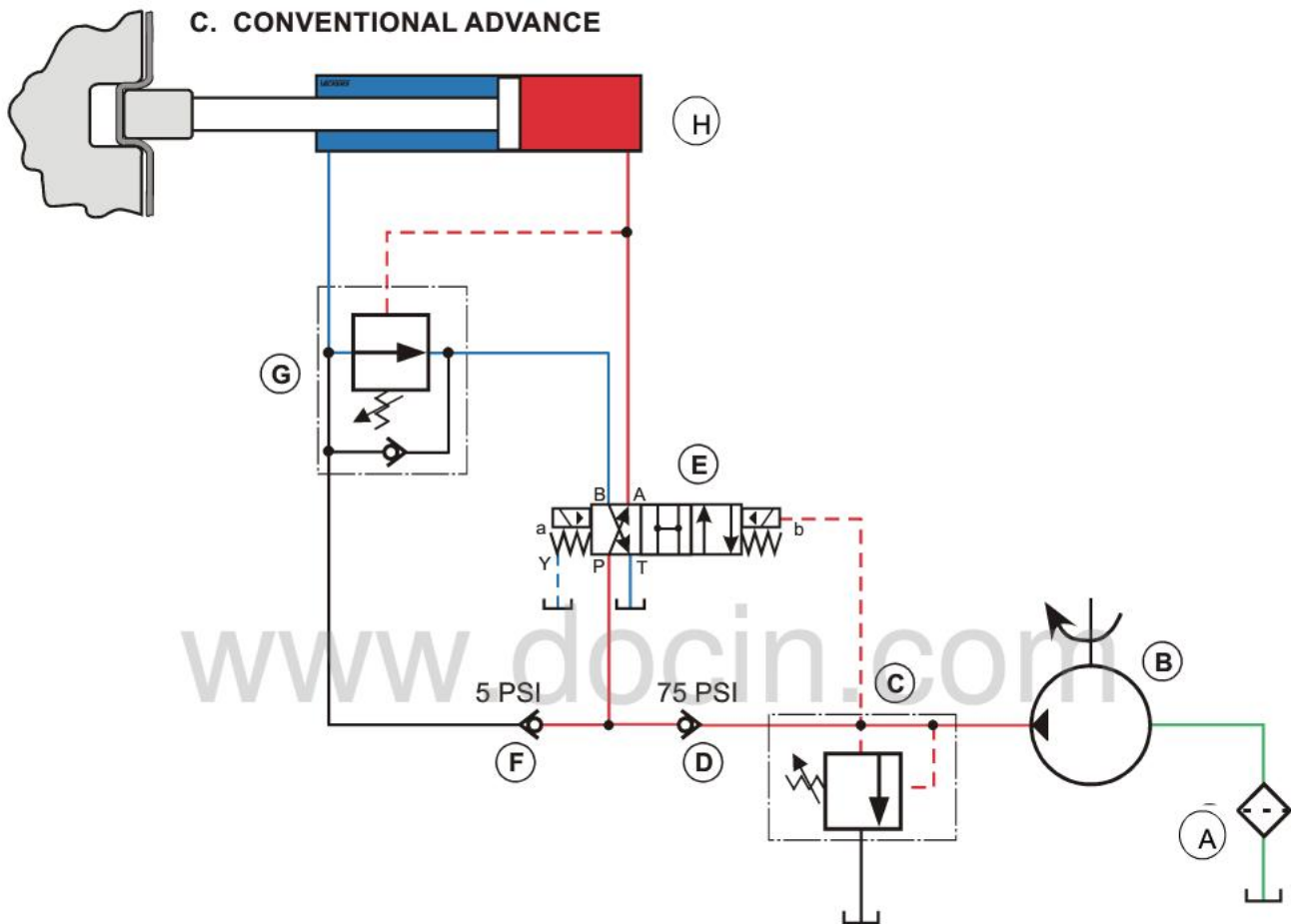


Figure 18-6 (C) Conventional advance

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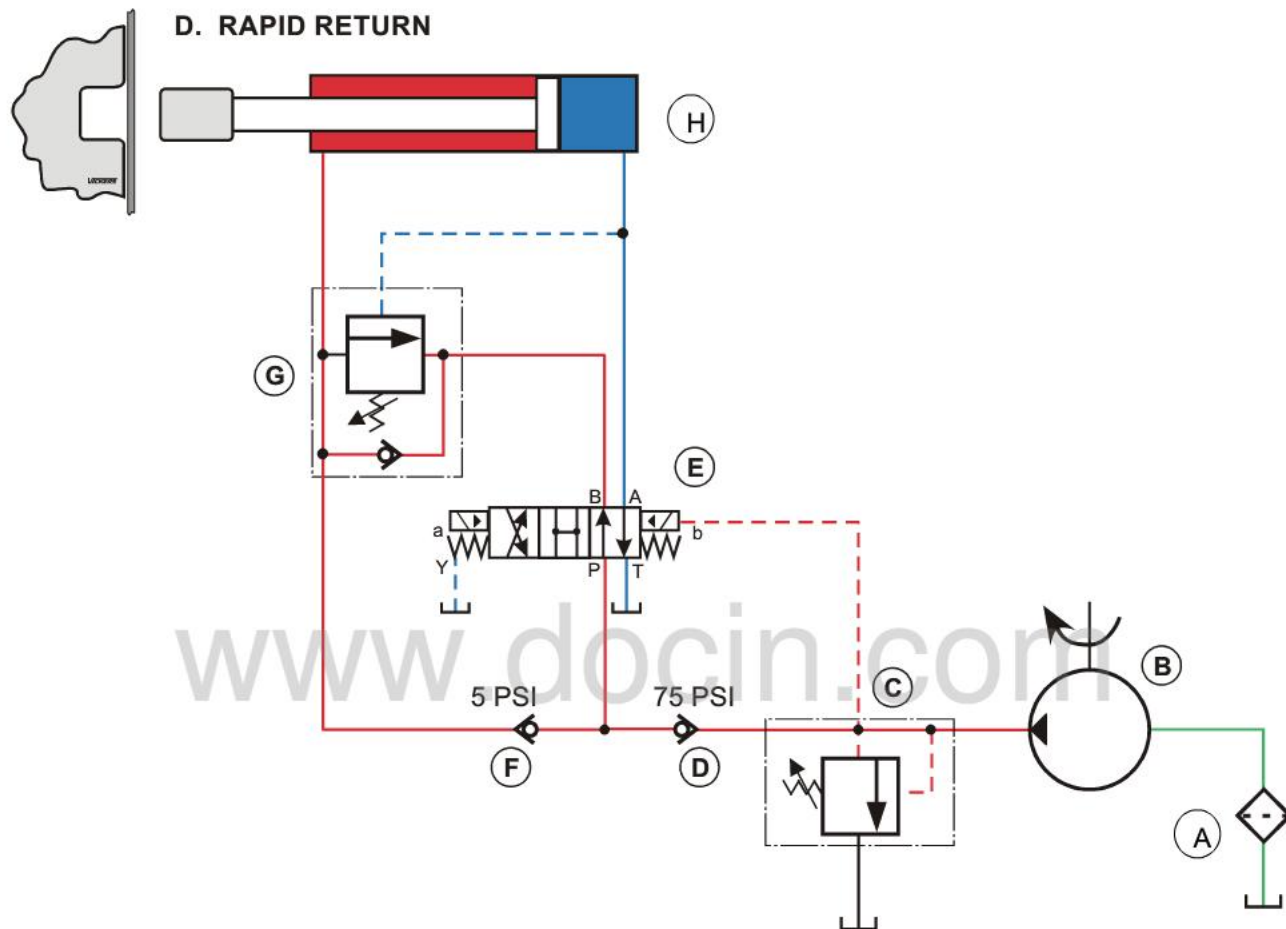


Figure 18-6 (D) Rapid return
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A. IDLE CONDITION

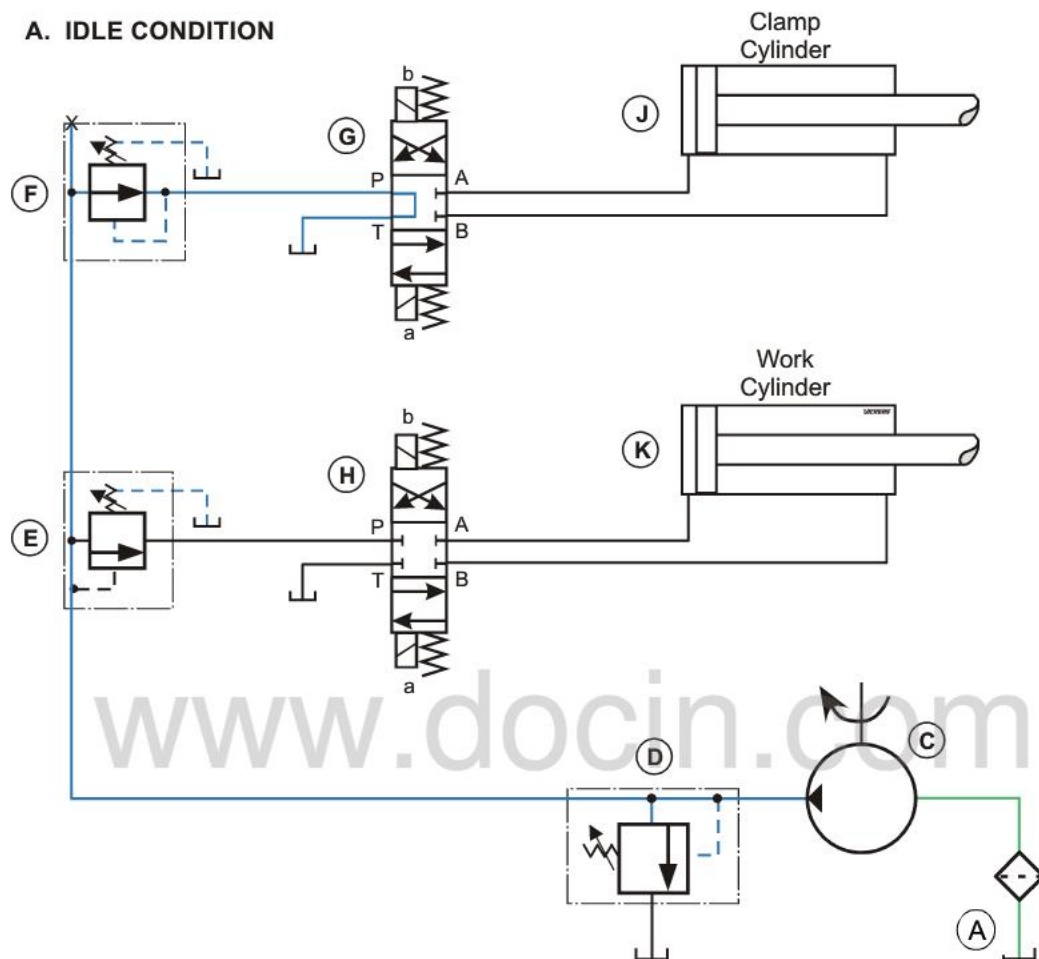


Figure 18-7 (A) Controlled pressure clamping circuit

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B. EXTENDING CLAMP CYLINDER

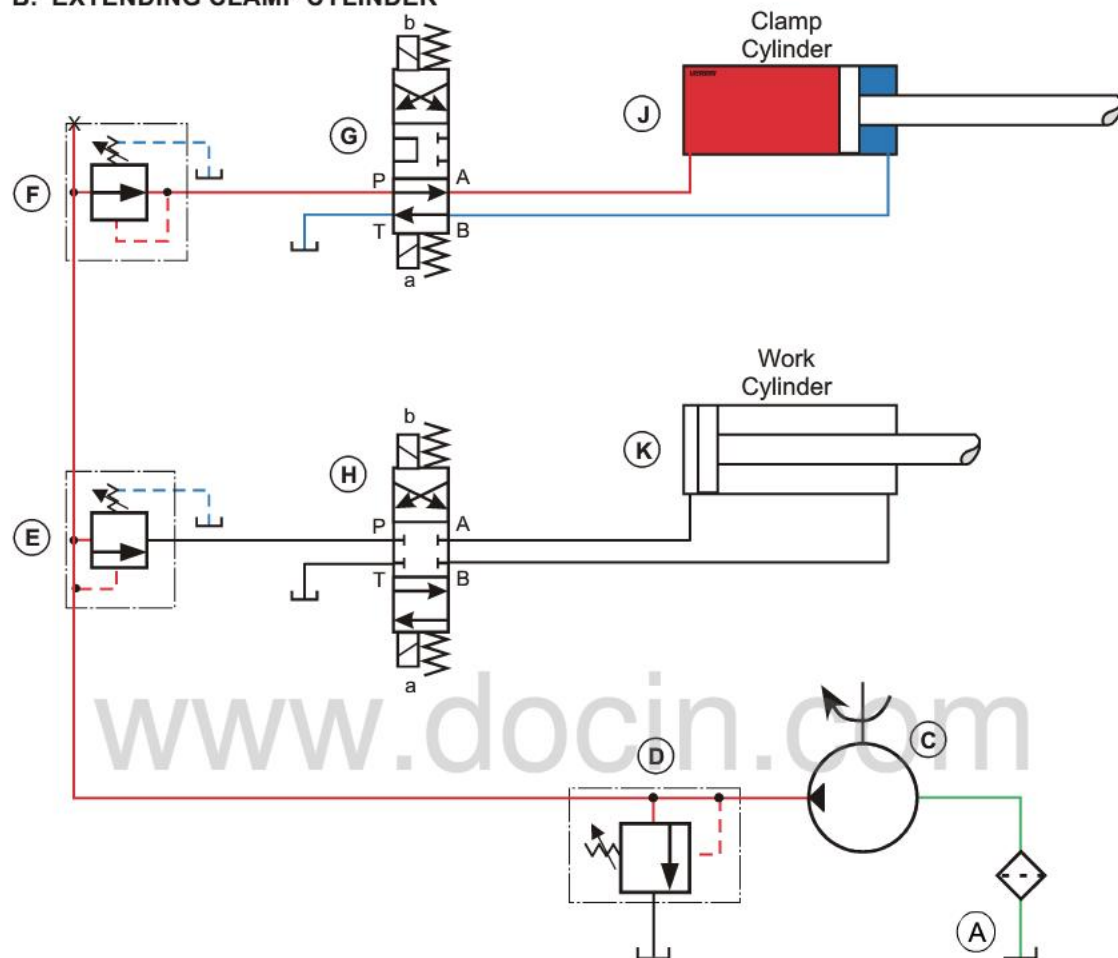


Figure 18-7 (B) Controlled pressure clamping circuit

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C. EXTENDING WORK CYLINDER

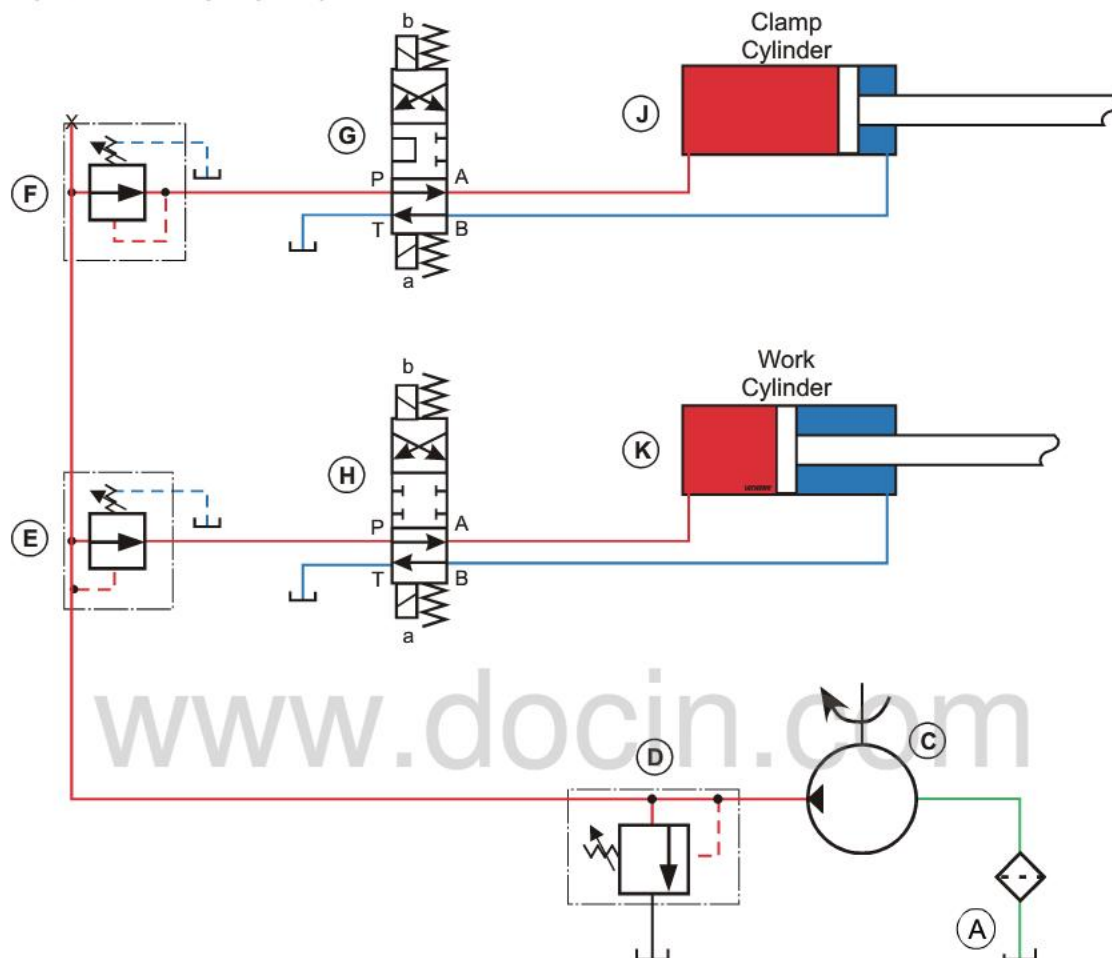


Figure 18-7 (C) Controlled pressure clamping circuit

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D. LIMITING MAXIMUM CLAMPING PRESSURE

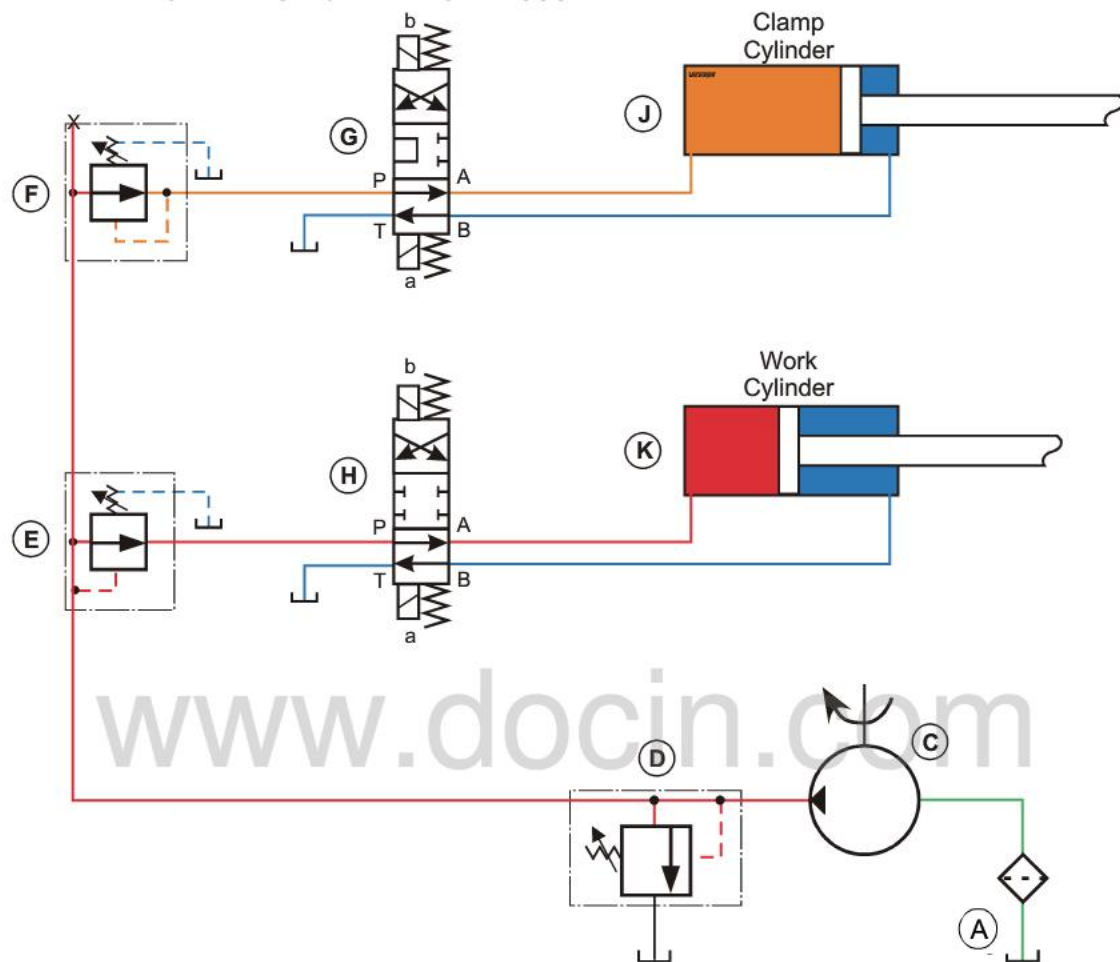


Figure 18-7 (D) Controlled pressure clamping circuit

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E. RETRACTING WORK CYLINDER

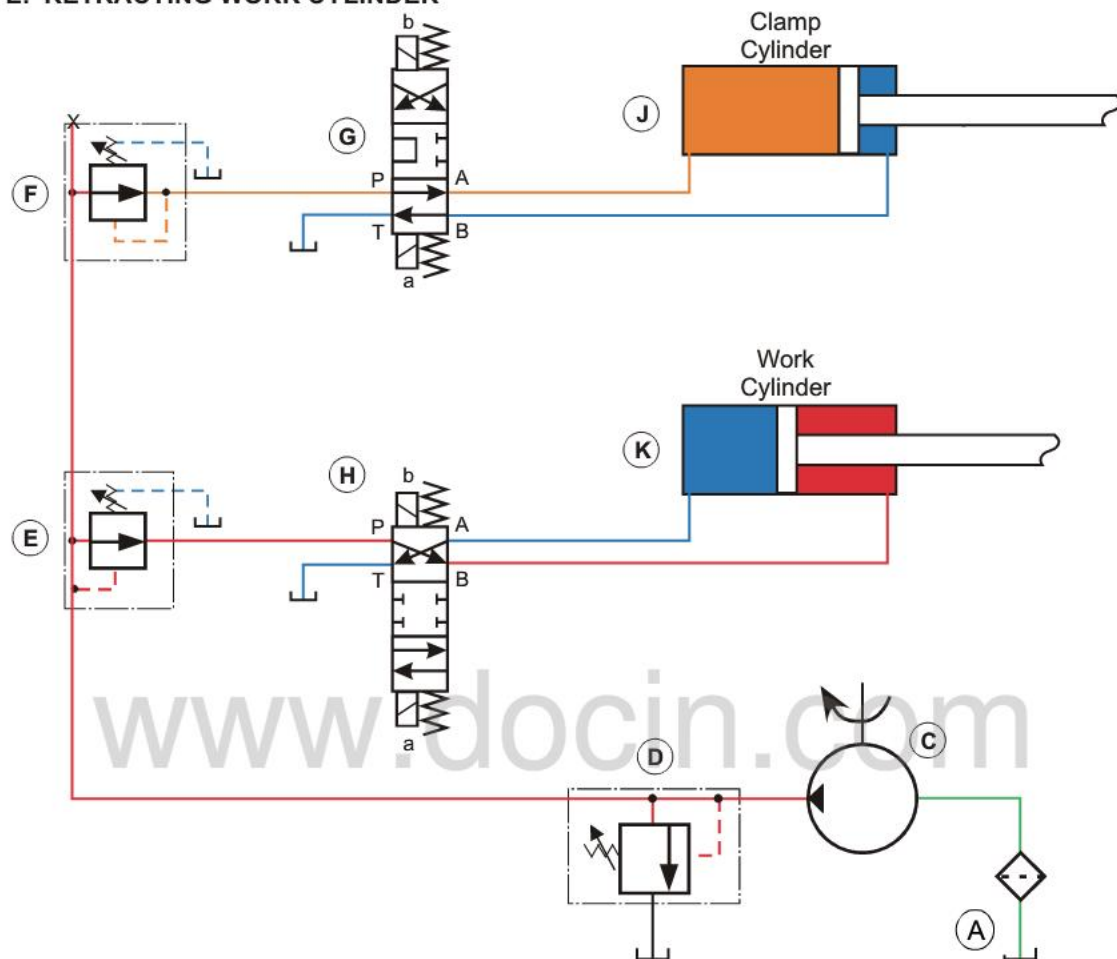


Figure 18-7 (E) Controlled pressure clamping circuit

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F. RETRACTING CLAMP CYLINDER

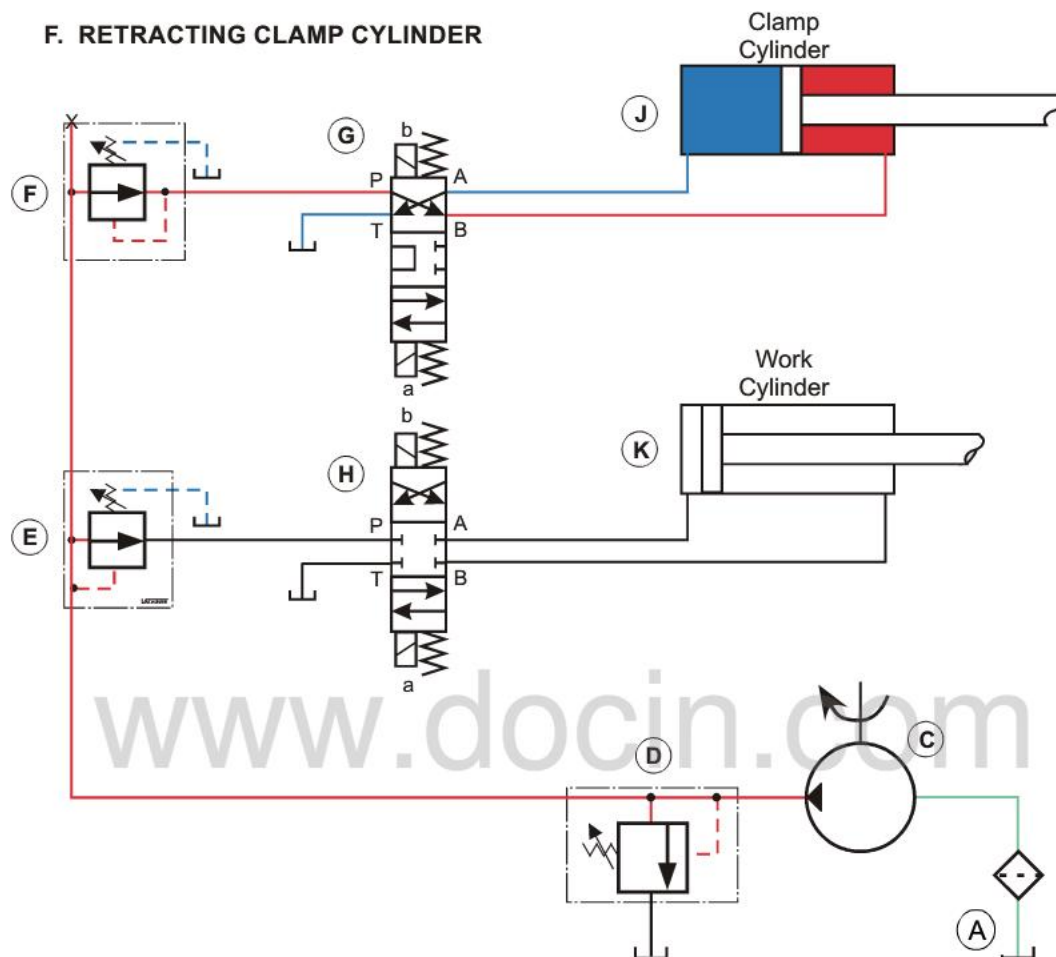


Figure 18-7 (F) Controlled pressure clamping circuit

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B. FULL SPEED RUNNING WITH AN OPPOSING LOAD

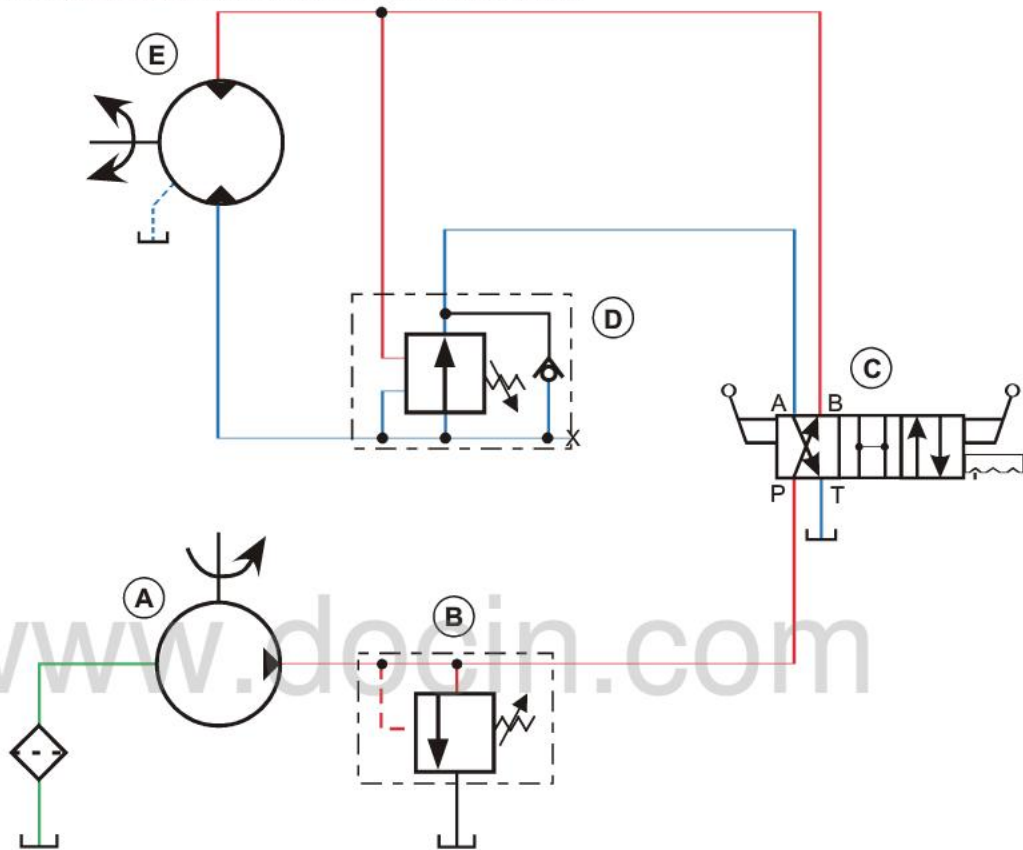


Figure 18-8 (B) Brake circuit
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D. BRAKING

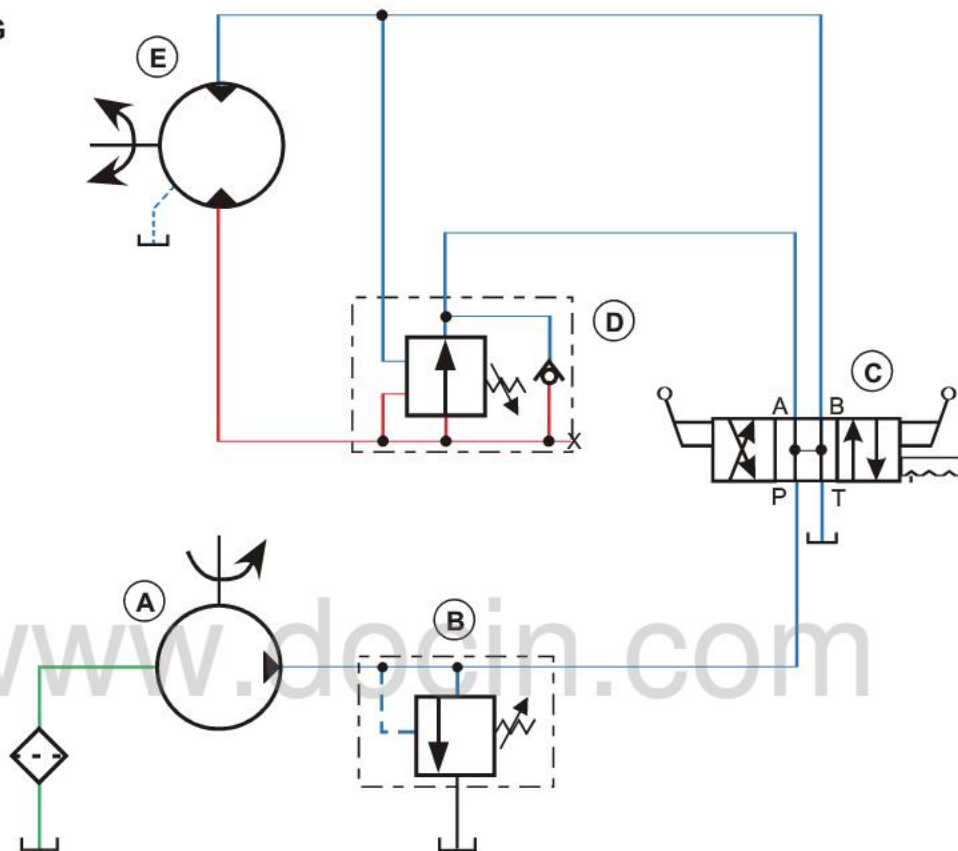


Figure 18-8 (D) Brake circuit

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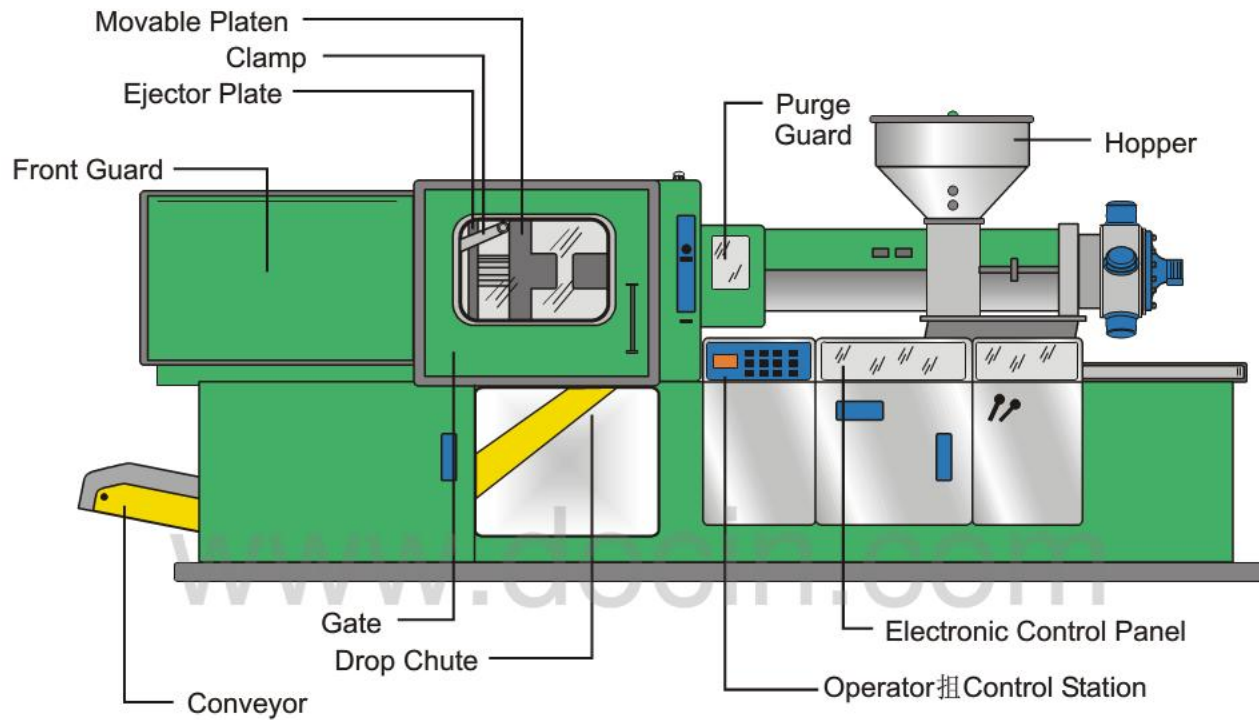


Figure 18-9 Horizontal injection molding machine

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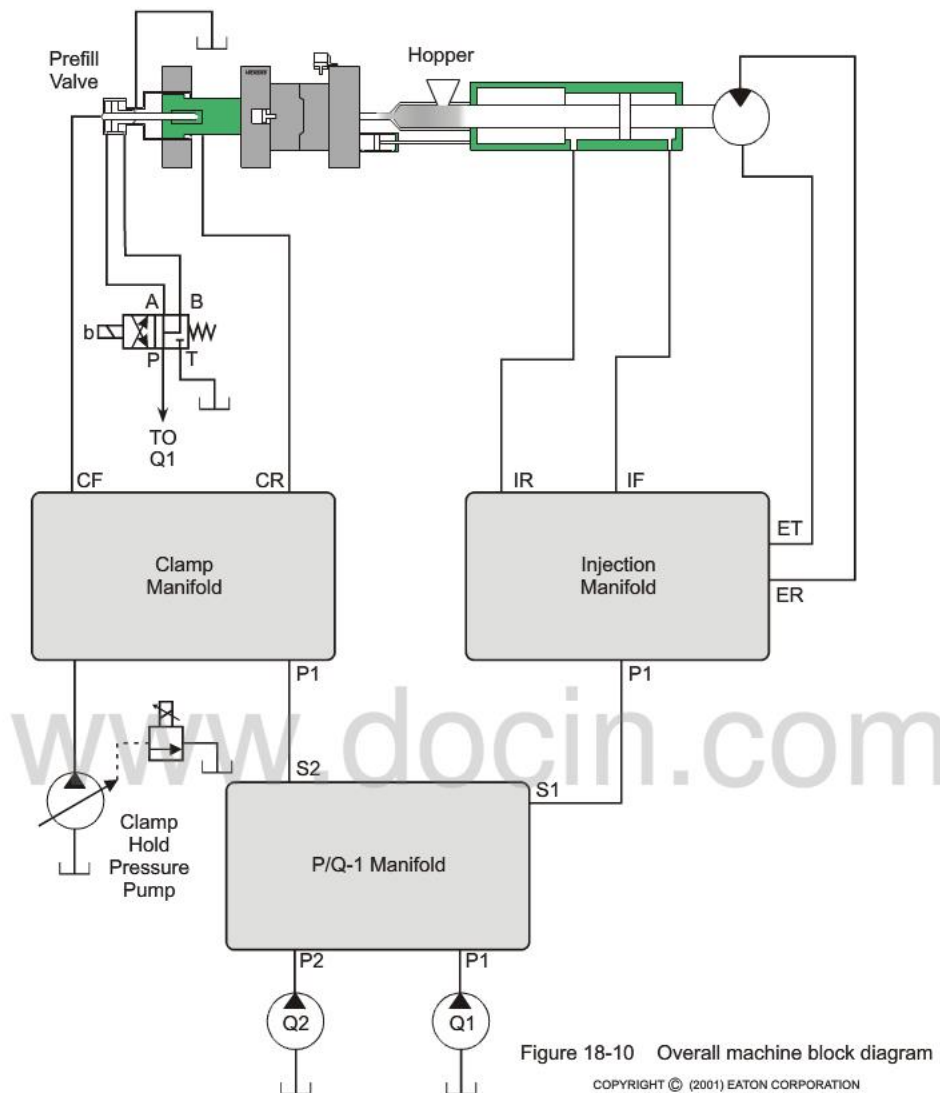
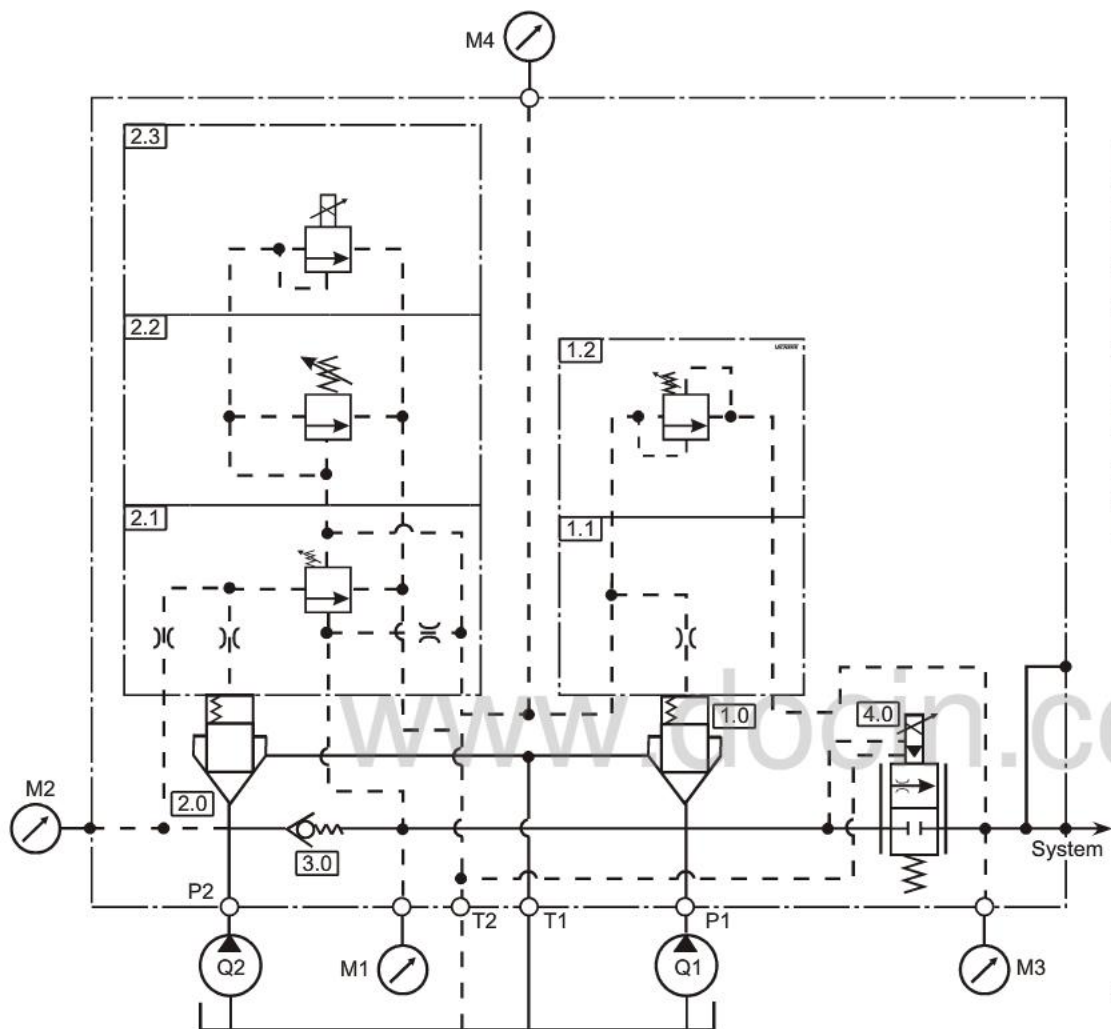


Figure 18-10 Overall machine block diagram

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ITEM NAME

- 1.0** Relief/Hydrostat Cartridge Valve
- 1.1** Cartridge Valve Cover
- 1.2** Pressure-Balancing (Load Sensing) Cont
- 2.0** Relief/Hydrostat Cartridge Valve
- 2.1** Second Stage PQ Control Valve
- 2.2** Maximum-Pressure Control Valve
- 2.3** Electrohydraulic Proportional Pilot-Pressure Control Valve
- 3.0** Check Valve Cartridge
- 4.0** Electrohydraulic Proportional Throttle Valve

Figure 18-11 P/Q manifold circuit diagram

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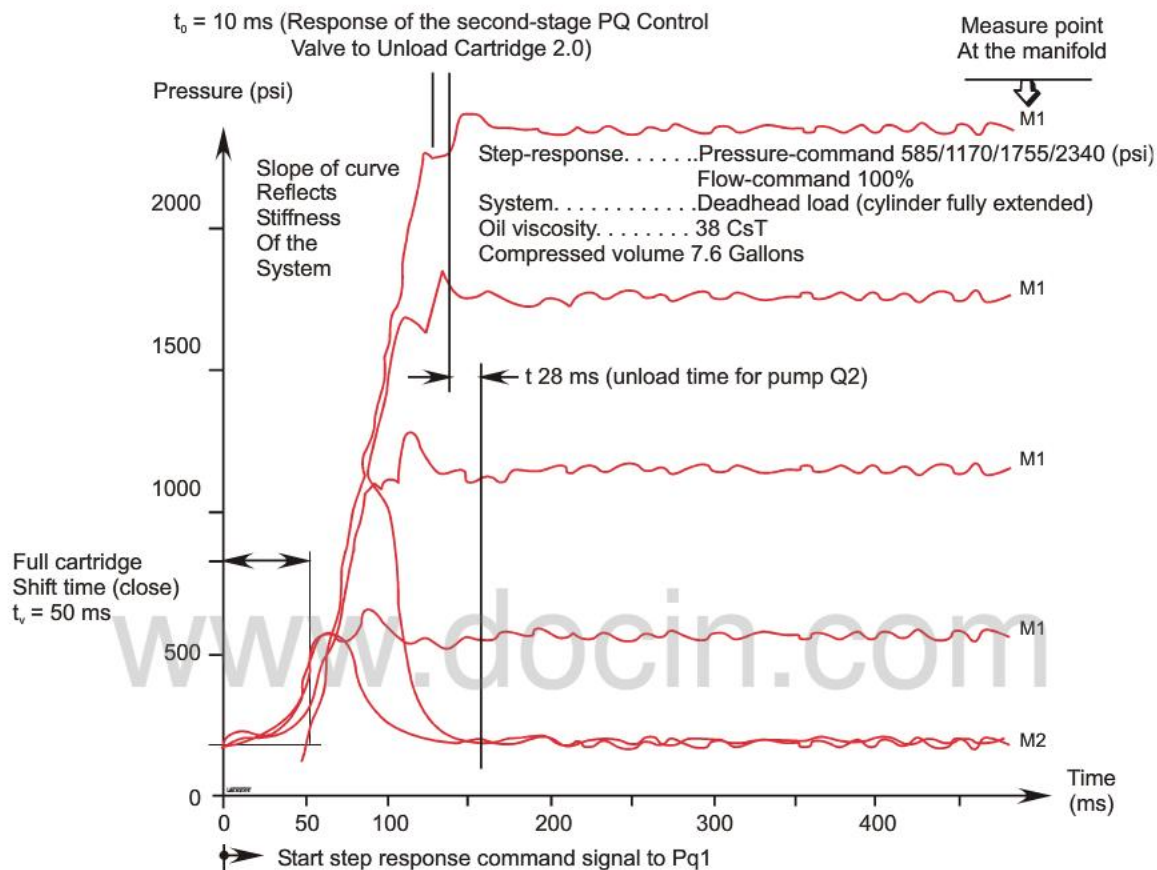


Figure 18-12 Pump onloading/pressure step response

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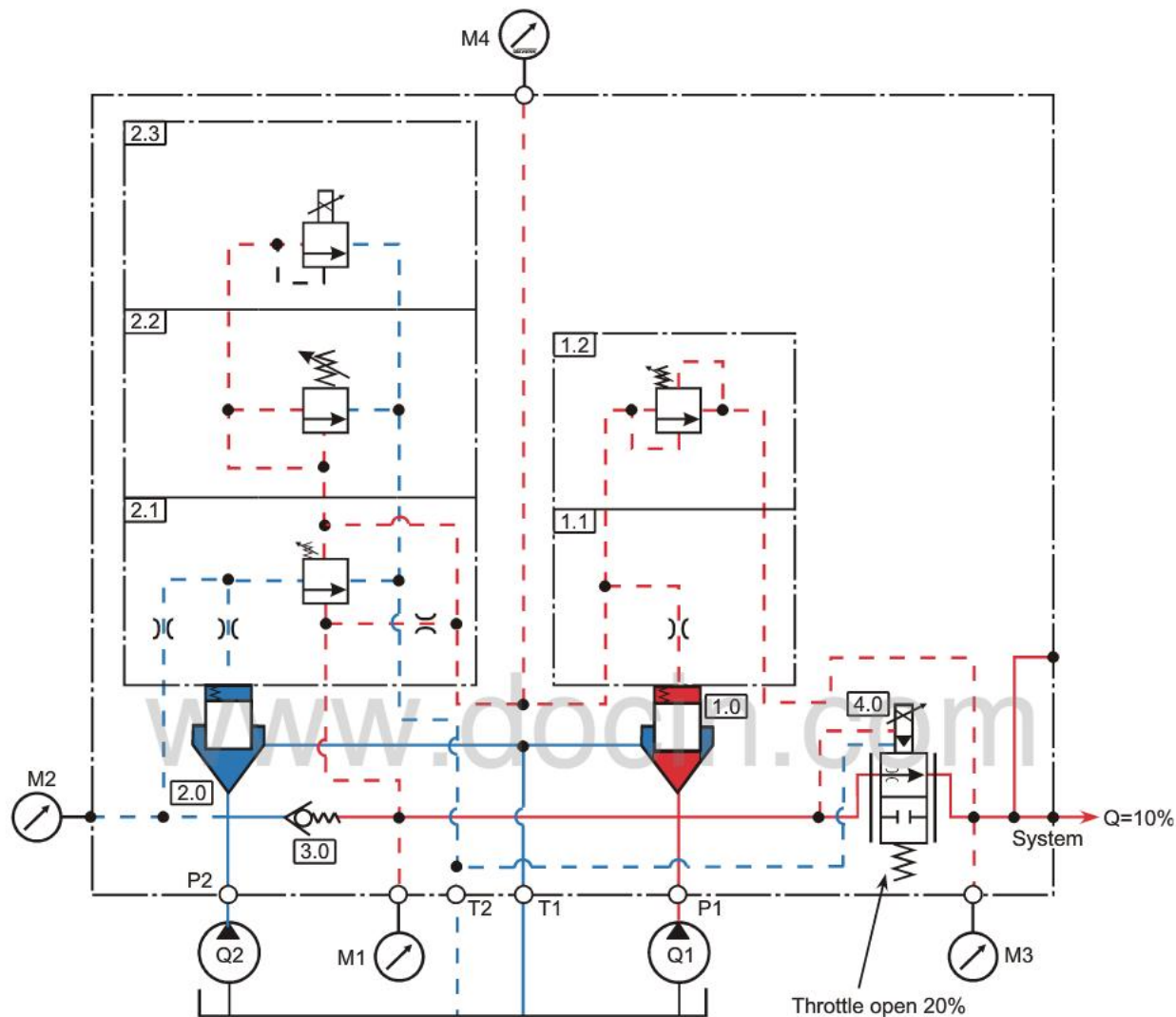
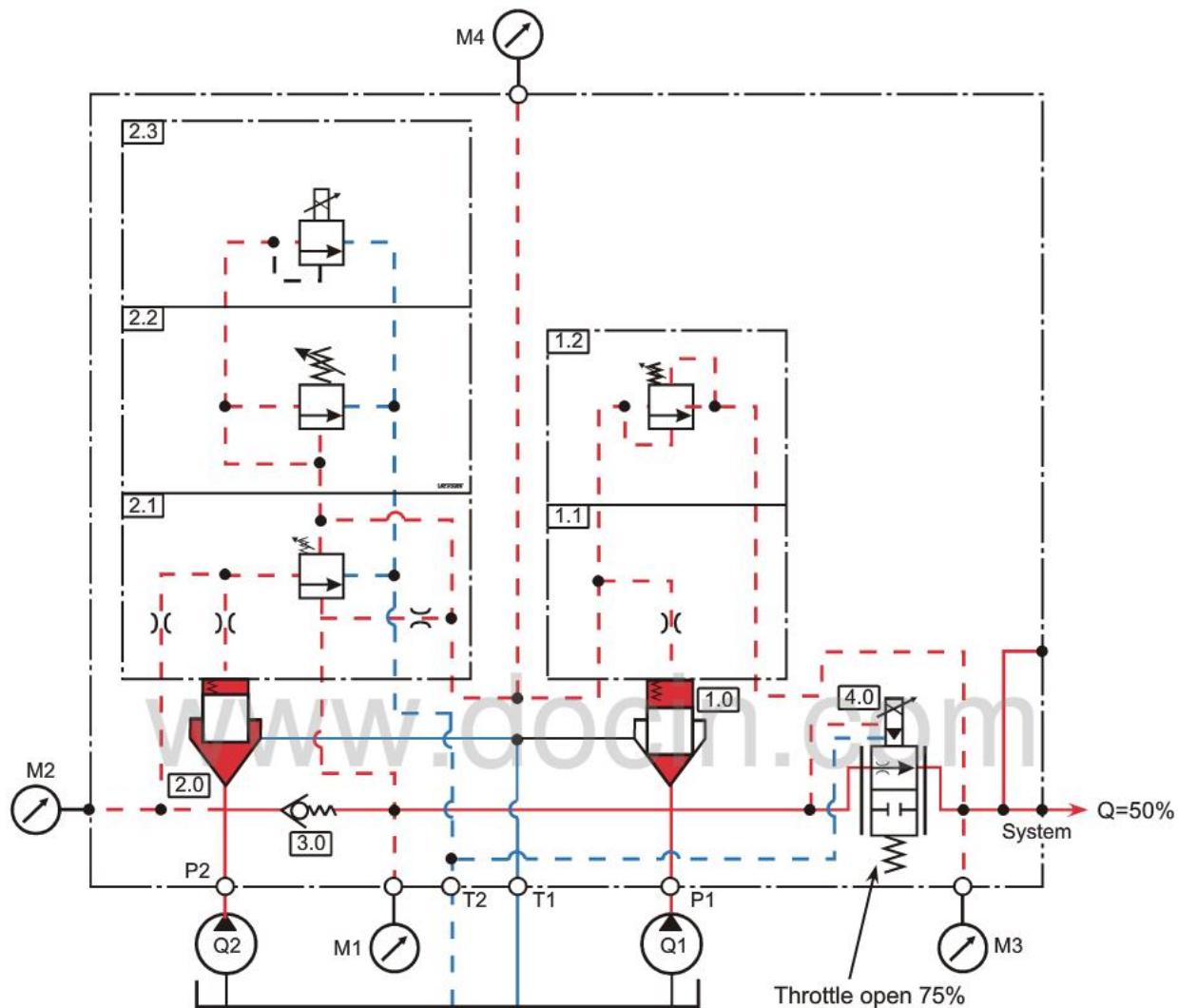


Figure 18-13 Pressure control function system flow less than pump Q1 outlet



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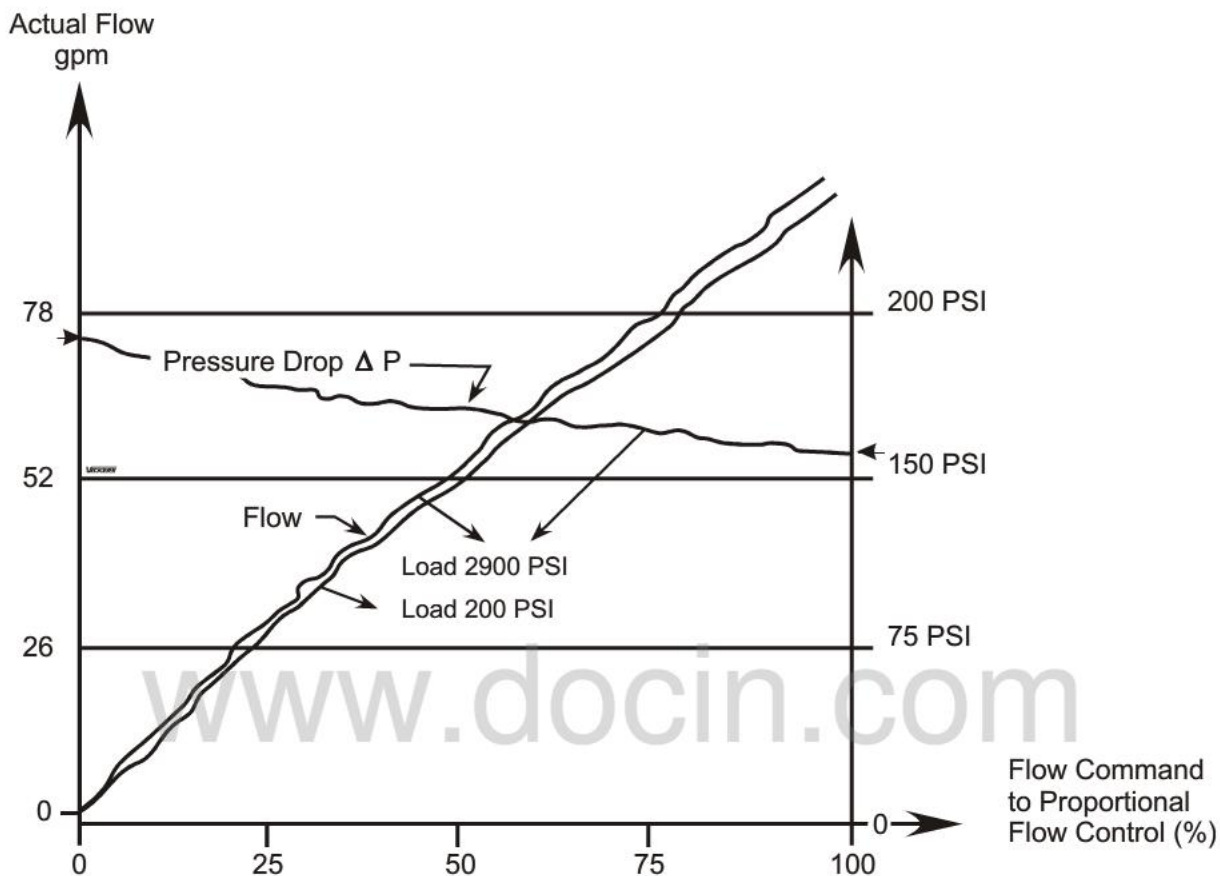


Figure 18-15 Flow and pressure drop vs. flow command

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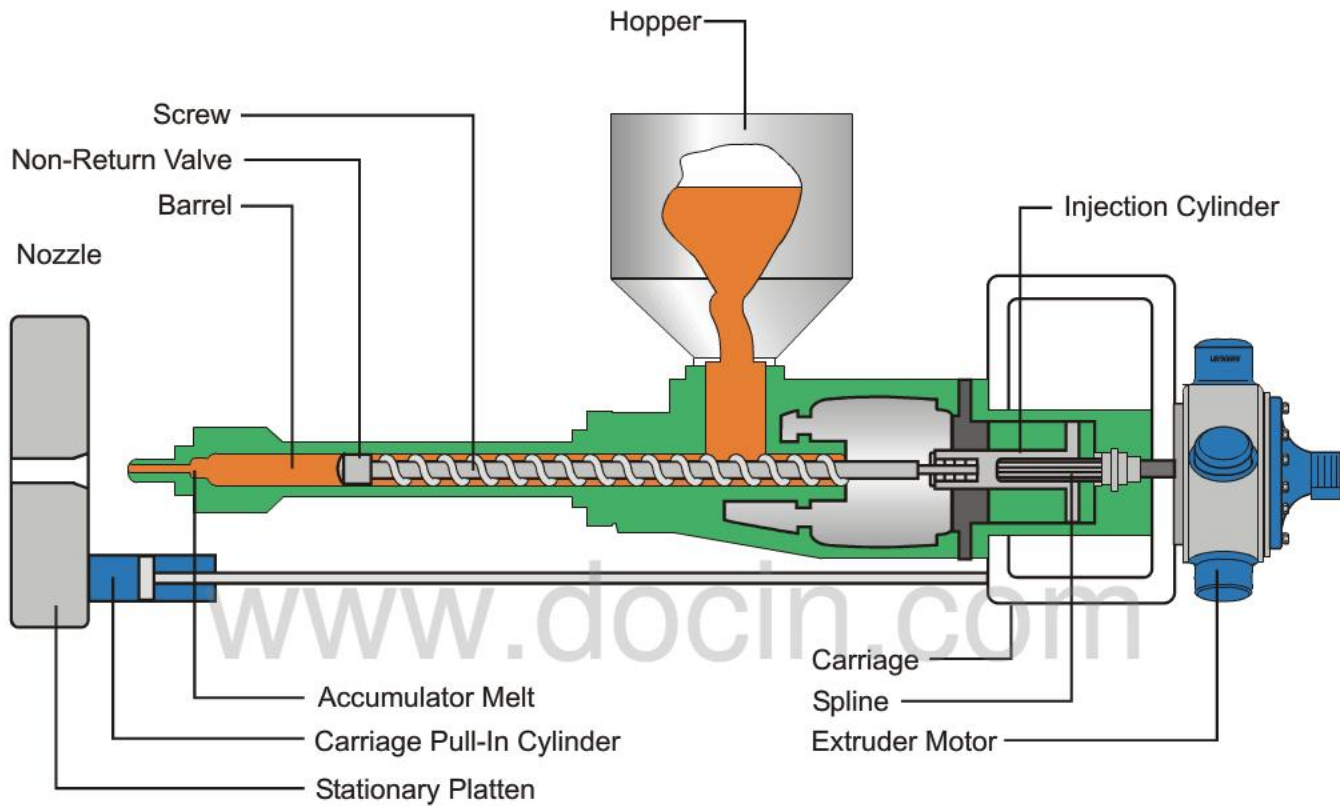


Figure 18-16 Injection unit pictorial diagram

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SOLENOID	Y1	Y2	Y3	Y4	Y5
EXTRUDER-RUN/BACKPRESSURE	X				X
INJECTION RETRACT		X			X
INJECTION FORWARD			X		X
CARRIAGE RETURN				X	
CARRIAGE FORWARD & HOLD					X

Solenoid Y1 (Valve 1) = Extruder-Run Cartridge Valve

Solenoid Y2 (Valve 2) = Injection-Back Cartridge Valve

Solenoid Y3 (Valve 3) = Injection-Forward Cartridge Valve

Solenoid Y4 (Valve 7) = Carriage Pull-In Direction Valve

Valve 1 = Extruder-Run Cartridge Valve (Solenoid Y1)

Valve 2 = Injection-Back Cartridge Valve (Solenoid Y2)

Valve 3 = Injection-Forward Cartridge Valve (Solenoid Y3)

Valve 4 = Pilot Shuttle Valve

Valve 5 = 4:1 Back pressure Cartridge Valve

Valve 6 = Tank Cartridge Valve

Valve 7 = Carriage Pull-In Direction Valve

Figure 18-17 Injection cycle solenoid chart

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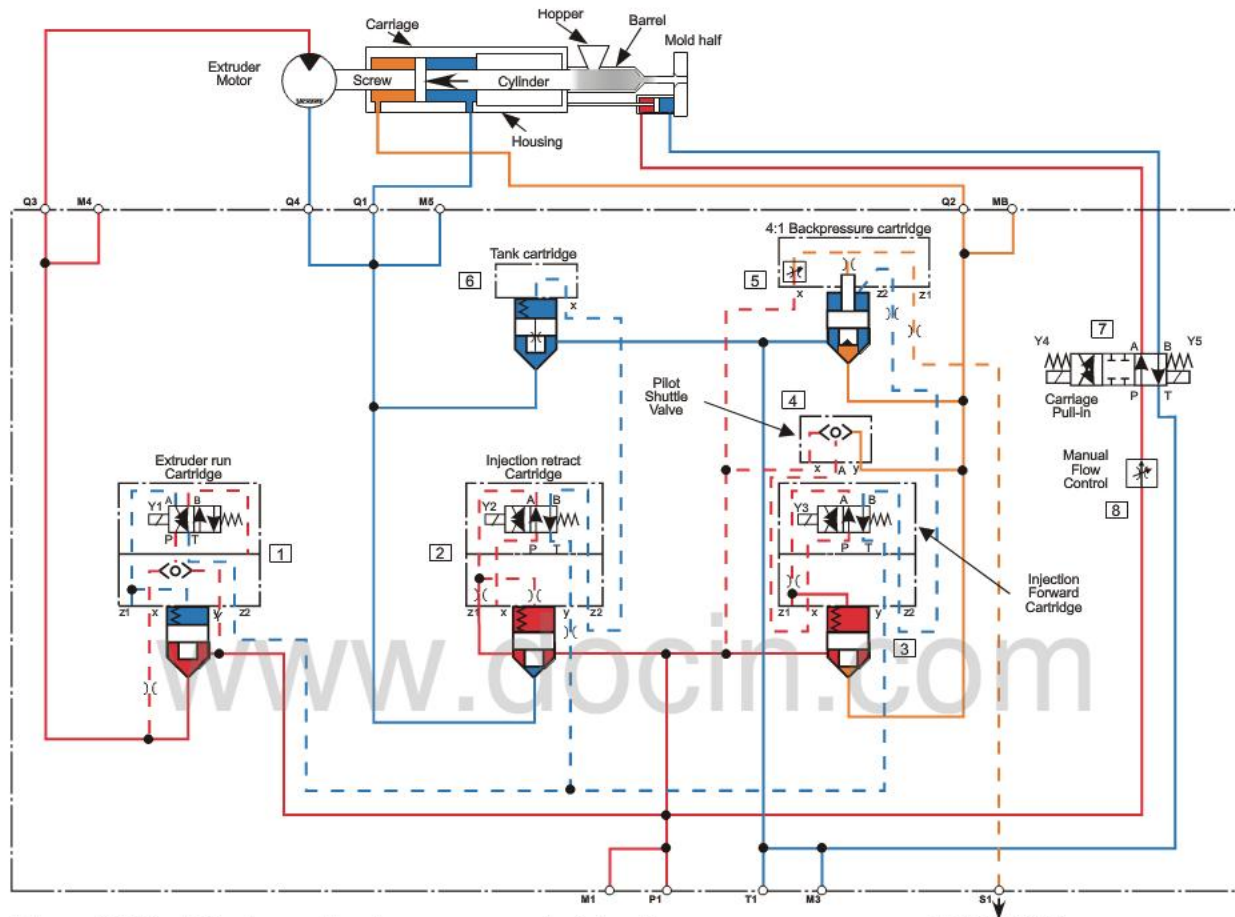


Figure 18-18 Extruder run/back pressure control circuit

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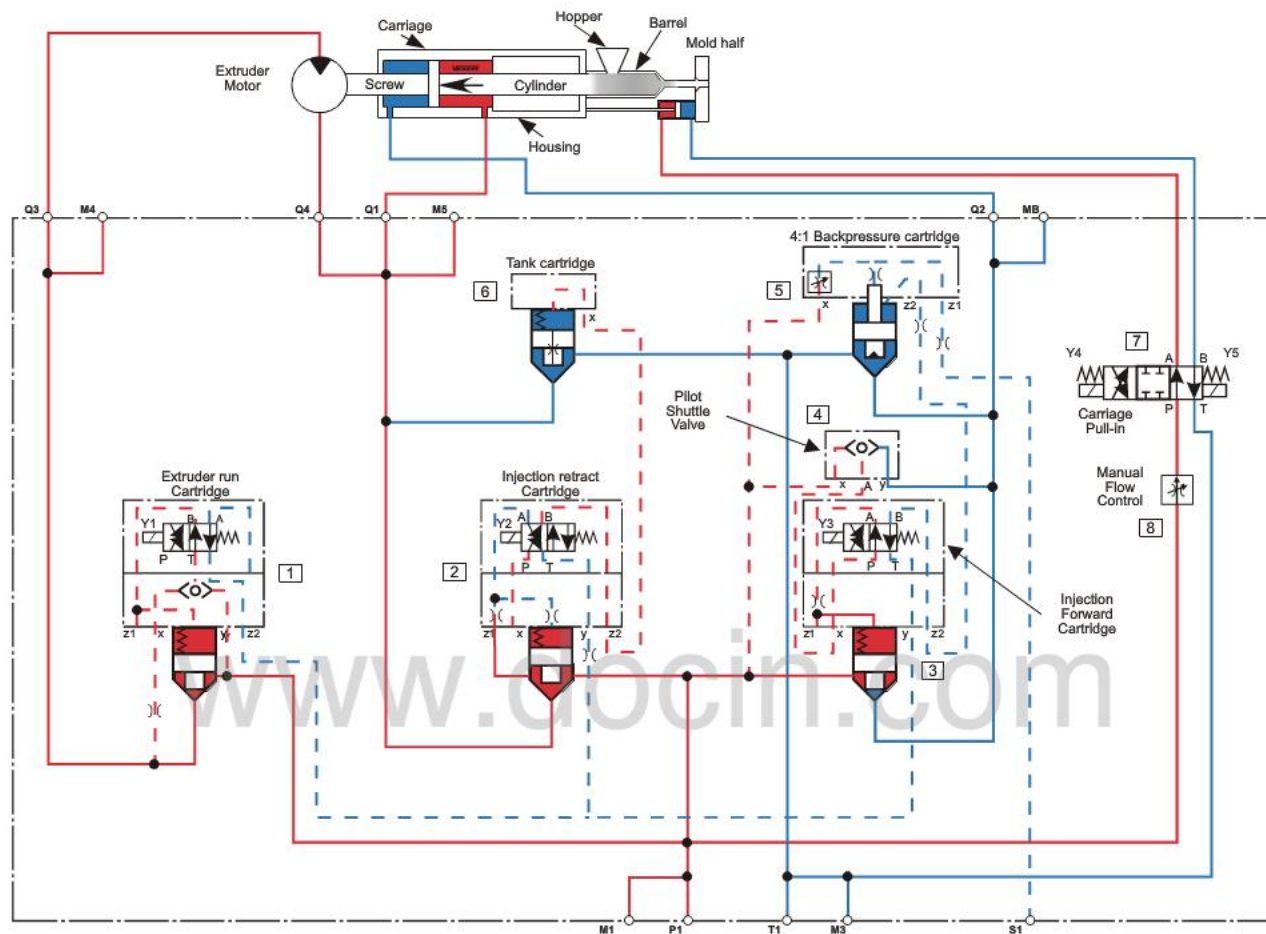


Figure 18-19 Melt decomposition control circuit

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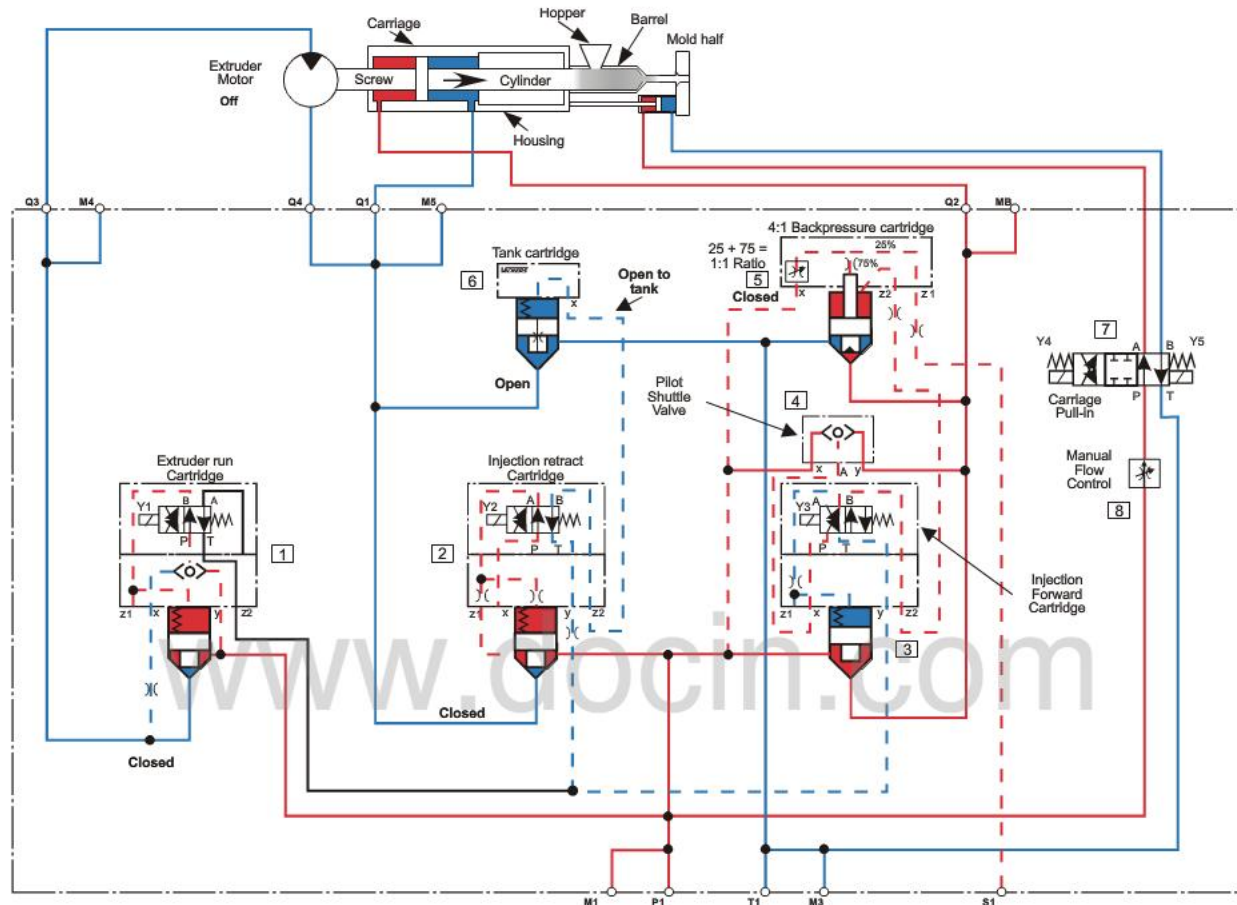


Figure 18-20 Injection forward control circuit
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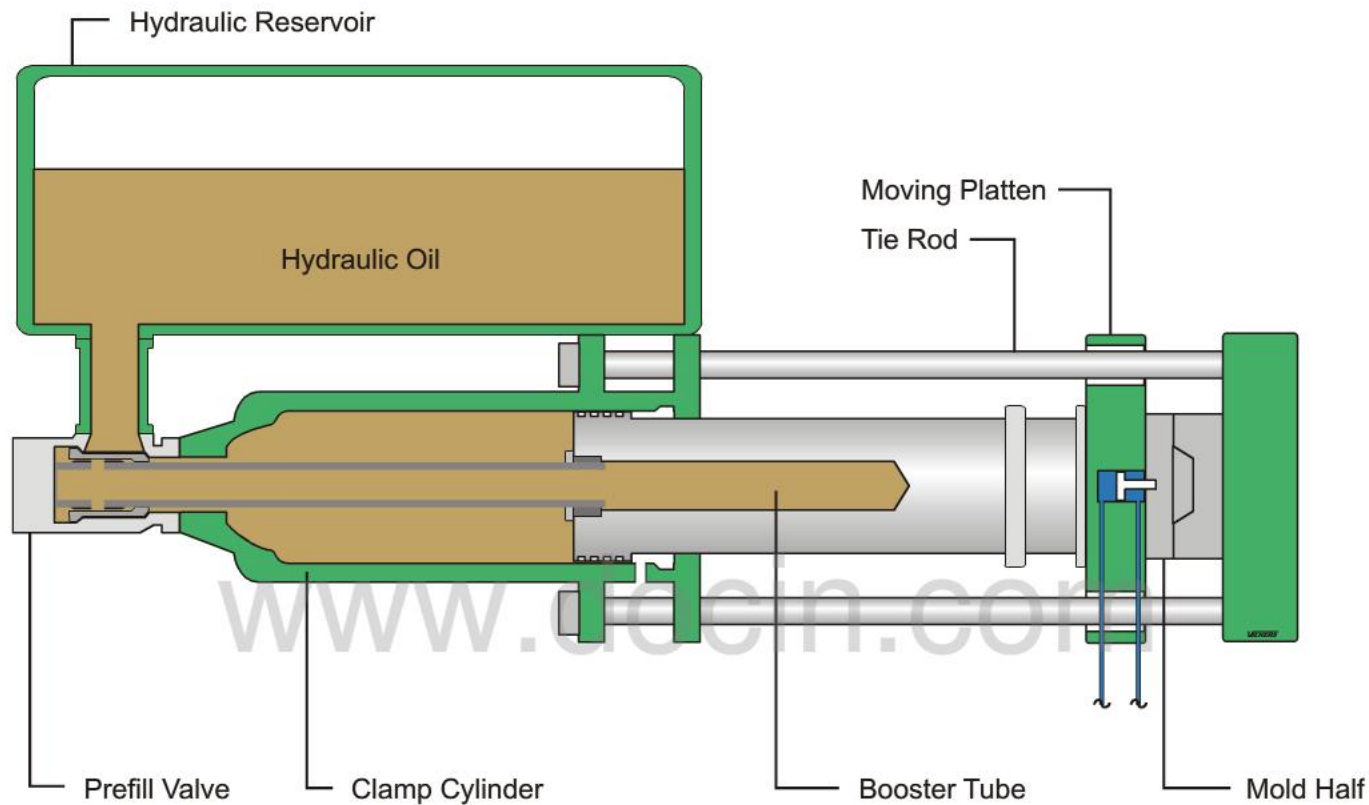


Figure 18-21 Clamp unit pictorial diagram

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SOLENOID	Y1	Y2	Y3	Y4	Y5	Y6	Y7
CLAMP CLOSE		X		X	X		
LPMP		X		X	X	X	
PRESSURIZATION		X		X	X		X
DECOMPRESSION							X
CLAMP OPEN/REGEN	X		X	X			

Solenoid Y1 (Valve 6) = Clamp Open Regenerative Pilot Valve

Solenoid Y2 (Valve 4) = Counterpressure Selection Direction Valve

Solenoid Y3 (Valve 3) = Clamp Open Cartridge

Solenoid Y4 (Valve 9) = Clamp Open to Tank Cartridge

Solenoid Y5 (Valve 1) = Clamp Close Cartridge

Solenoid Y6 (Valve 11) = Low-Pressure Mold-Protection Valve

Solenoid Y7 (Valve 10) = Prefill Shift Valve

Valve 1 = Clamp Close Cartridge (Solenoid Y5)

Valve 2 = Main Stage Interlock Cartridge

Valve 3 = Clamp Open Cartridge (Solenoid Y3)

Valve 4 = Counterpressure Selection Direction Valve (Solenoid Y2)

Valve 5 = Intensification Relief Valve

Valve 6 = Regenerative Pilot Valve (Solenoid Y1)

Valve 7 = Clamp Close to Tank Cartridge

Valve 8 = Regenerative Cartridge

Valve 9 = Clamp Open to Tank Cartridge (Solenoid Y4)

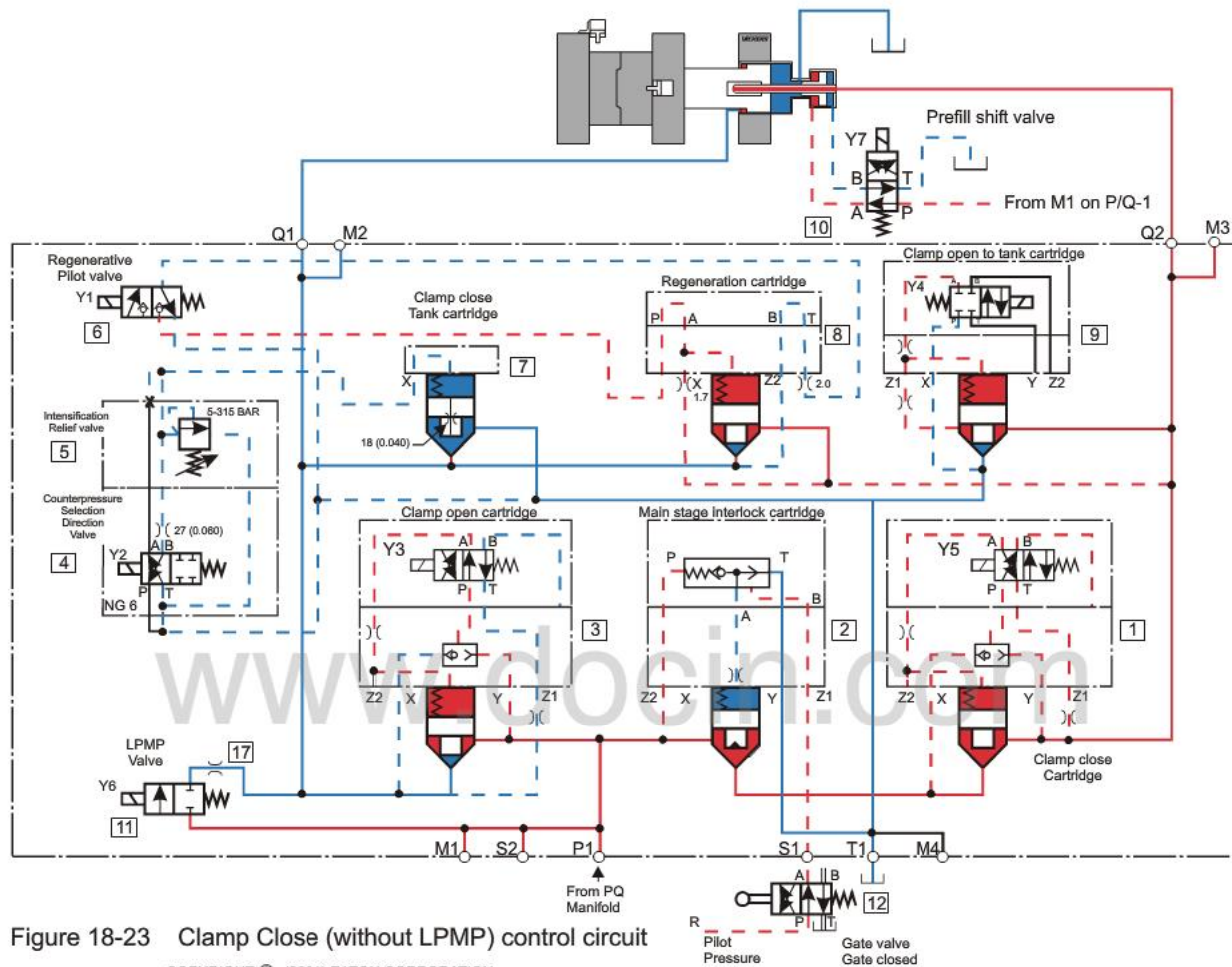
Valve 10 = Prefill Shift Valve (Solenoid Y7)

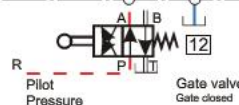
Valve 11 = Low-Pressure Mold Protection Valve (Solenoid Y6)

Valve 12 = Gate Valve

Figure 18-22 Clamp motion solenoid chart

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Pressure to shift prefill valve closed - blocks path between main clamp area and reservoir

- Opens path (not shown) between booster ram & main area to pressurize
- Pressure control comes from PQ block (micro processor controlled)

