Gold Cup Control Response & Accuracy

Control Options

GOOD

- 9A – Standard electro-hydraulic displacement control
  - Hydro-mechanical cam feedback (no closed loop electric FB)

BETTER

- 9A Hi-Response – 9A with higher servo and less restrictive flow paths
  - Hydro-mechanical cam feedback (no closed loop electric FB)

BEST

- 7Q8 - Digital DF+ valve with RVDT feedback
  - Electric closed loop feedback of cam position

Response comparison

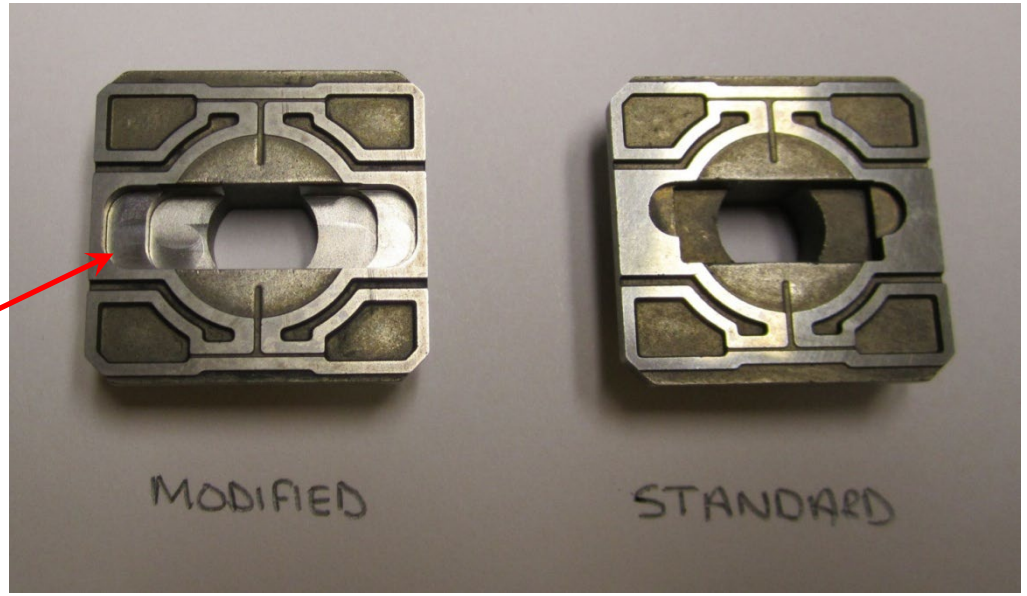
9A	High Response 9A	Hi-IQ (Dfplus / Servo valve)
1.8s	<500ms	300ms / 360ms

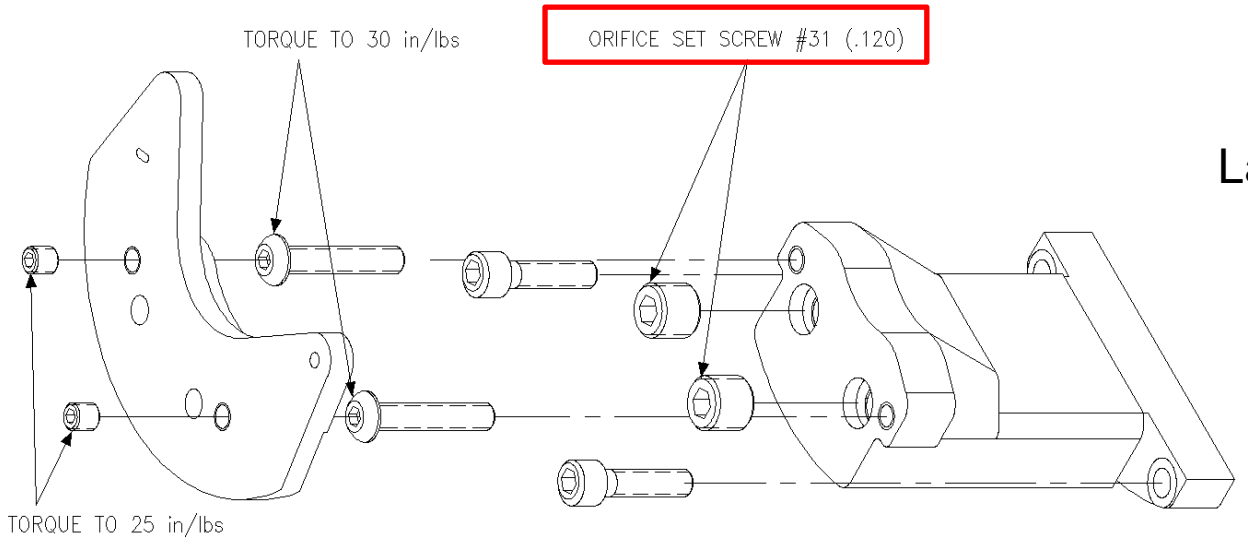
- Response times noted are typical to stroke a P30 pump from zero to full displacement.
- Hi-response 9A
  - Estimate 400-500 ms for P11/P14 size units.
  - Achieved with elevated servo
- Applications that might use this option.
  - Cylinder Control (smooth and accurate reversal)….concrete pumper
  - Ship steering
  - Heave compensation

Gold Cup: High Response 9A

- S23-17600-0
  EHS 9A* *00 Hi Response

- Component changes:
  - Different “feed” shear seal
  - Larger servo stem orifices
    - Standard orifices (.062)



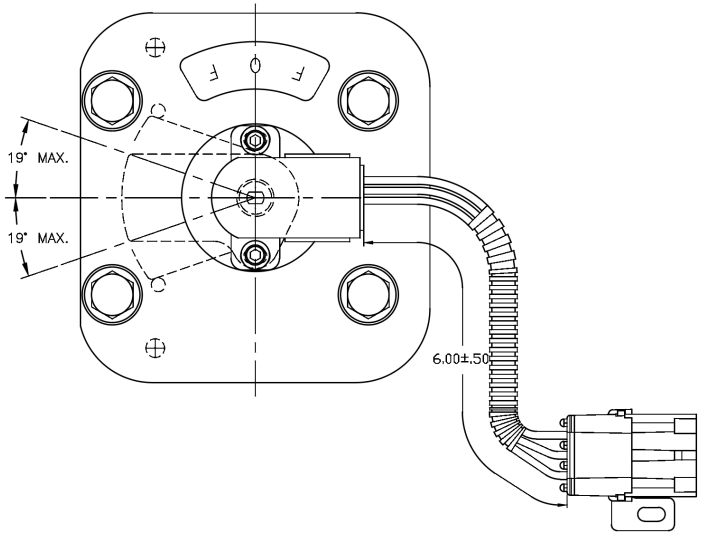


Larger flow paths allow faster stroking

NEW

**9 Secondary Control Option

(Electronic Cam Feedback)

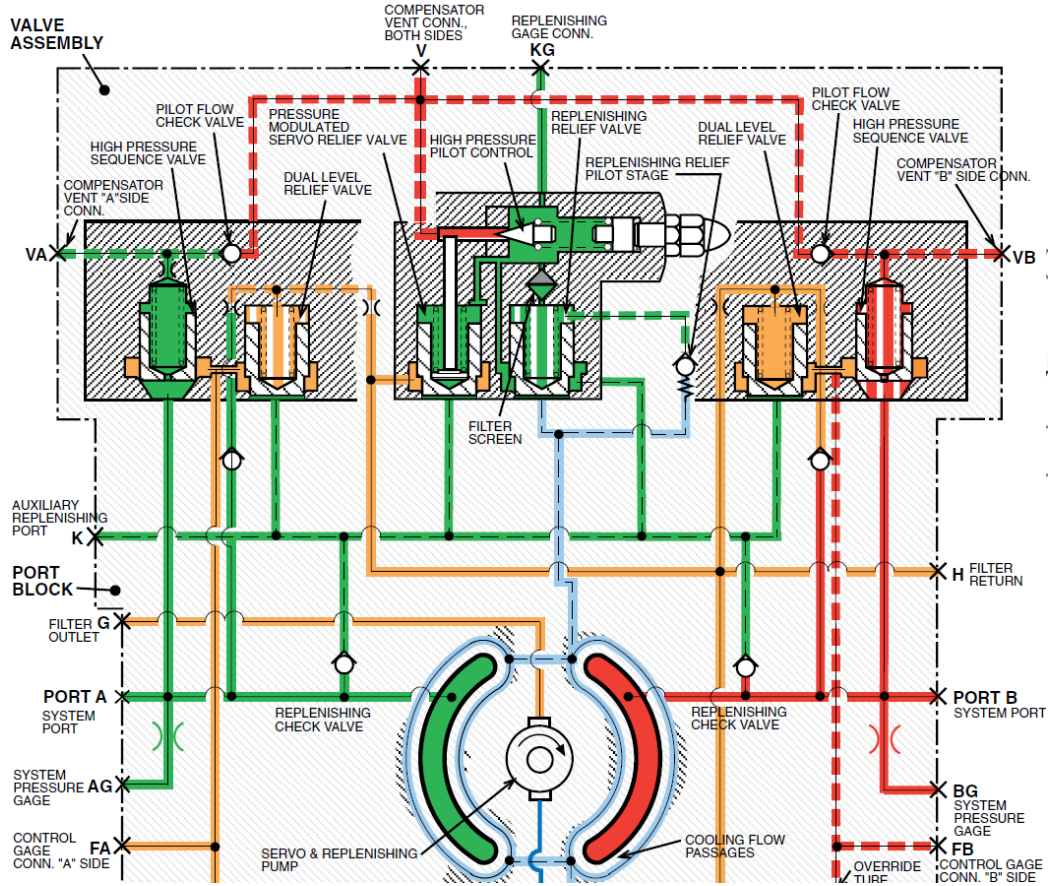


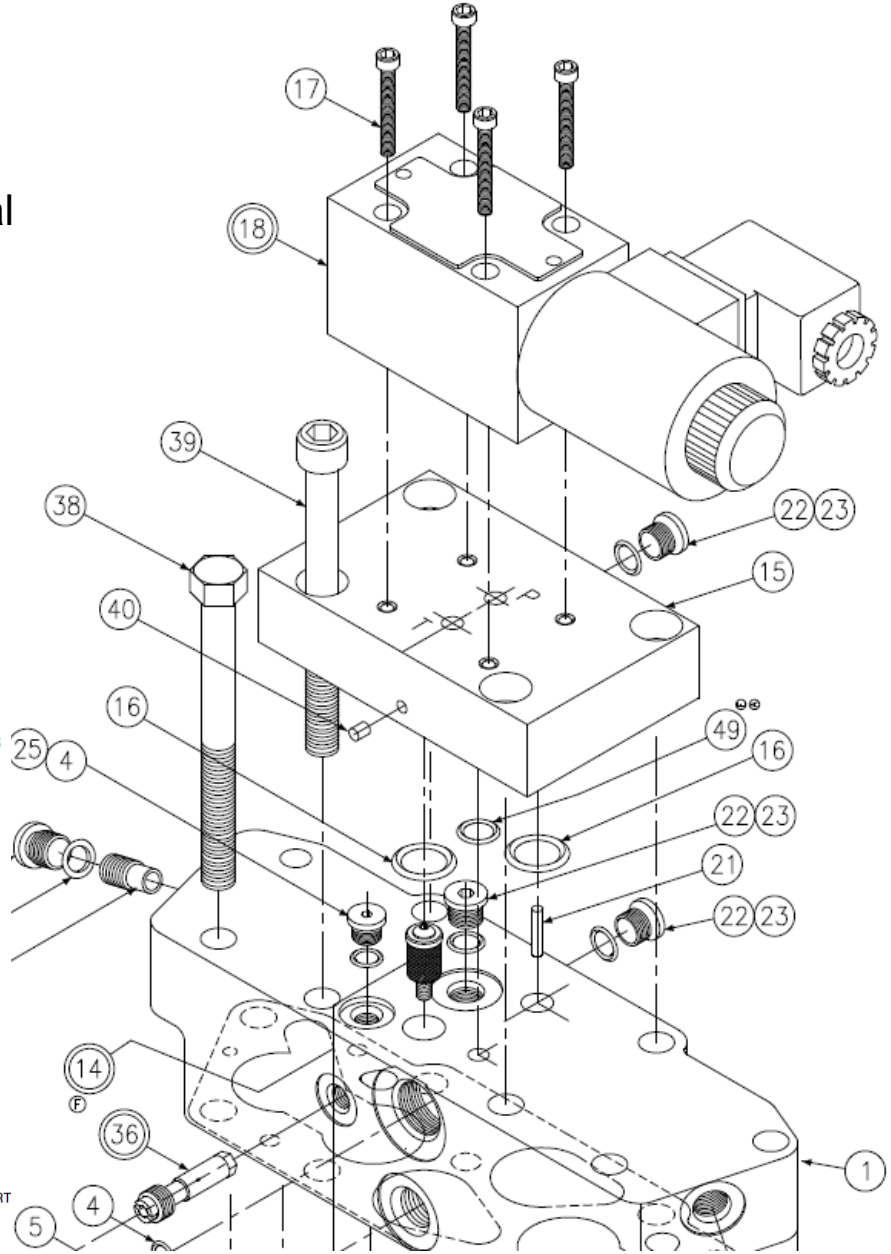
Hull effect sensor – provides voltage output proportional to pump displacement (+/- 19 degrees of motion)

Output: 2.5 +/- 1.8V

Electronic Pressure Control

The Electronic pressure valve functions in parallel with the mechanical compensator (cone, spring, and seat). The “P” port communicates to the same passage as the “V” port (or tip of the “high pressure pilot control” cone. The “T” port will exit the back side of the adapter block (item#15) and be tubed directly to the pump case.

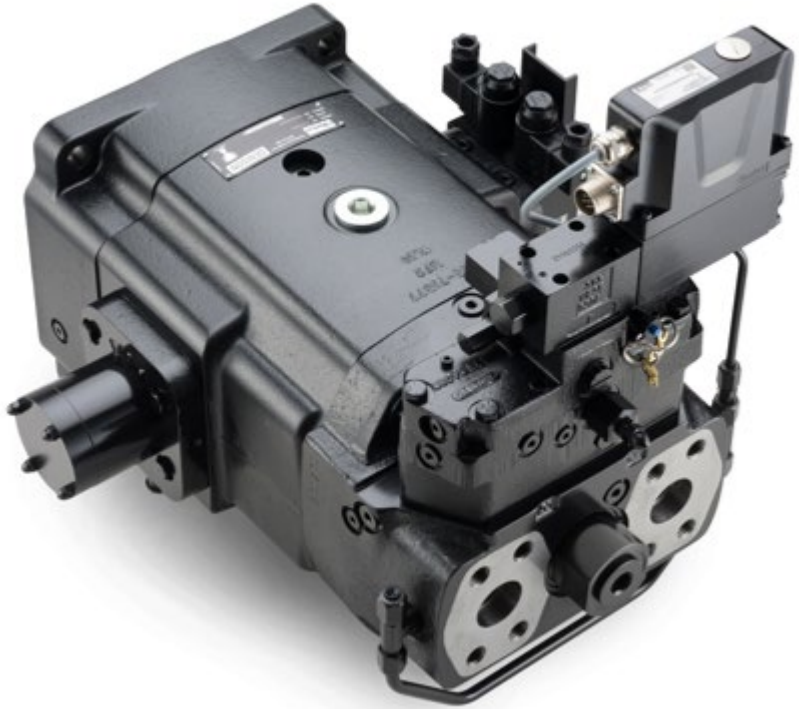




NEW

7Q and 7R Control Options

Highly responsive and commonly used in applications such as ship steering and cylinder-type controls.



7Q and 7R Control Options

Integrated

Control is integrated into the pump; no additional control card or components/wiring are needed (only power and an input command signal).

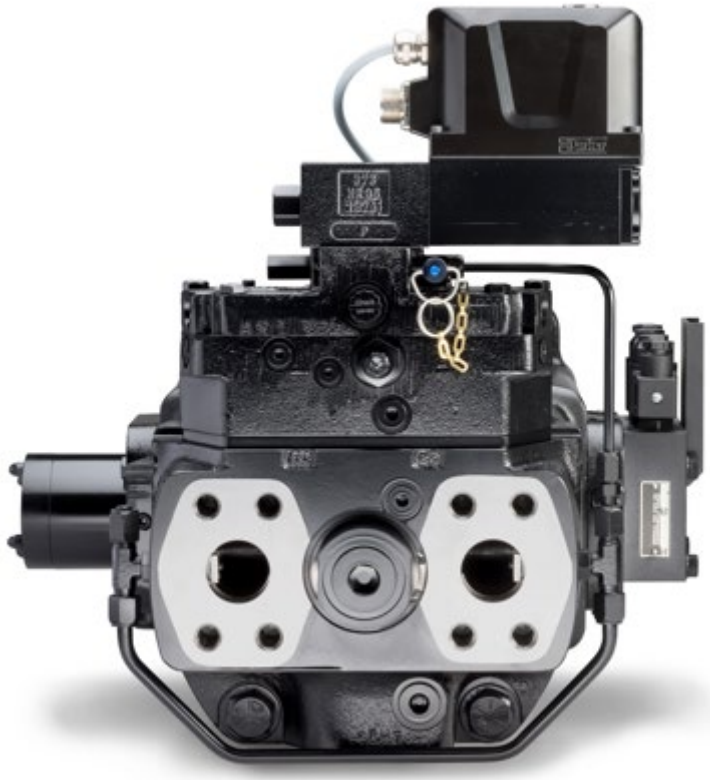
Cost Effective

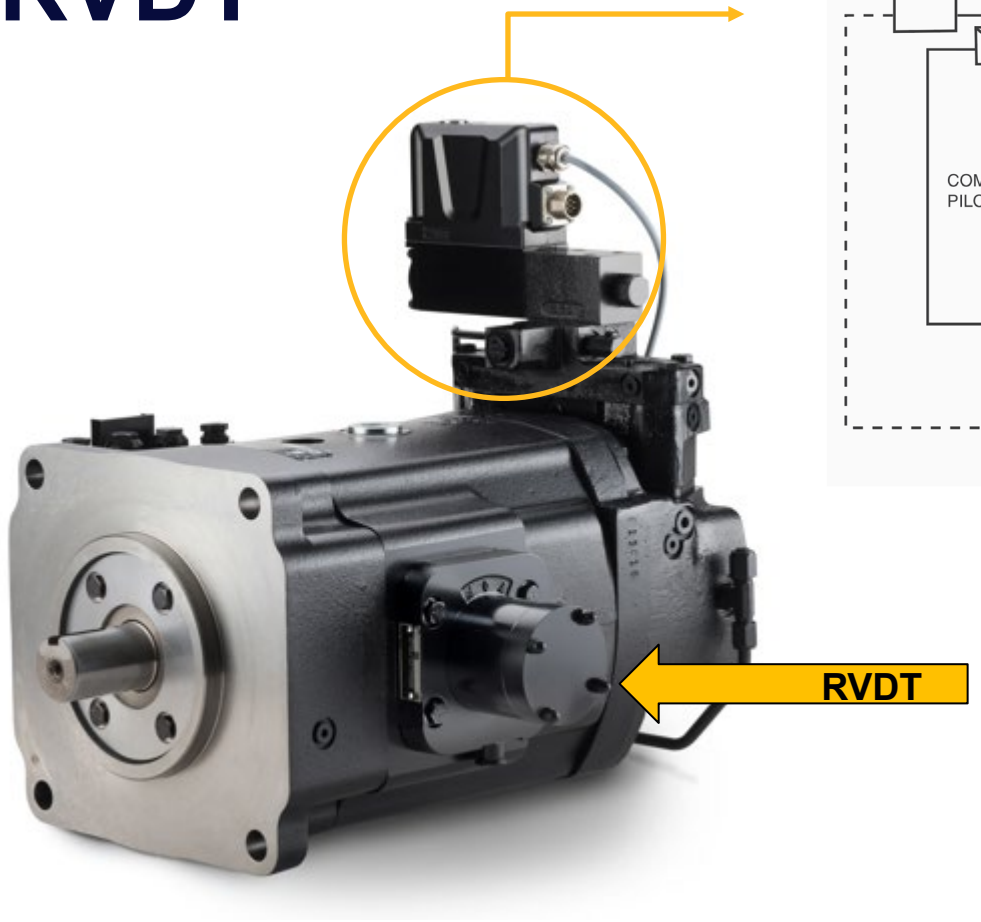
Provides same level of performance as 7J and 7K, but doesn't require additional components and hardware.

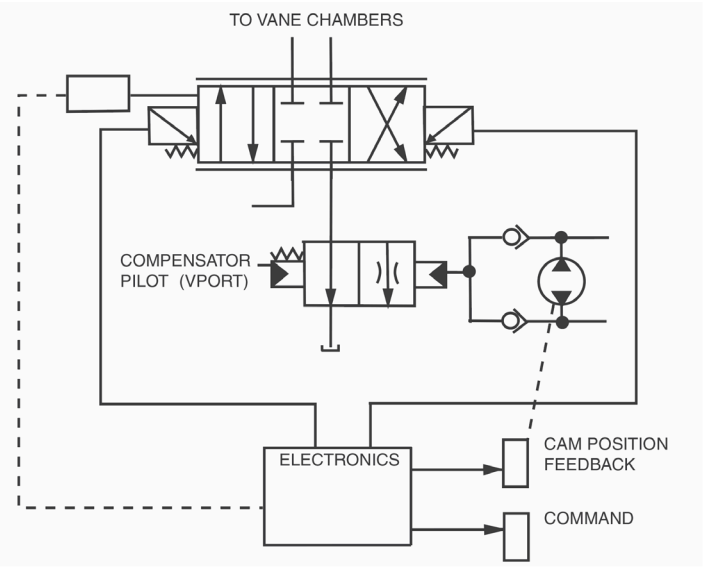
Closed Loop

Valve feedback has been integrated with the RVDT cam position of the pump for closed loop control.

7Q and 7R with RVDT







- Military grade
- Proven reliability
- Higher Resolution

Modified proportional valve, allowing closed loop control on pump displacement (via the RVDT) instead of it's own spool position.

System Accuracy

- Variables that impact accuracy without closed loop control are…
  - Fluid viscosity / temperature
  - Hysteresis
  - Fluid volume / Compressibility
  - Internal leakage

- Precise system accuracy is best achieved via external loop closure on the actuator (monitoring speed, torque, position, etc).

BEST

  - 7Q8 control with customer integrated external closed loop for P/Q control