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Reversing Hydraulic Fan Drives

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Benefits/Requirements for a Reversing Hydraulic Fan Drive

Benefits
Increased fan efficiency
Increased machine uptime

For 15-45 kW Systems
25 kW Focus

Requirements
Returns to forward in the event of a control signal loss
Minimal impact on power availability for work functions
Minimal usage of space on machine
Minimal impact on machine reliability/downtime

Show Owners

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Review major system design considerations

Review two current typical reversing hydraulic fan drives

Two “new” options to consider

- System Design Considerations
  - Power loss due to the reversing function
  - Machine space required for the reversing function
  - Installed (component and installation) cost
  - Operating costs
  - System reliability
    - Number of components and potential failure points (including leaks) along with the ability to diagnose and service
  - System flexibility
    - Number of and size of components, maximum operating pressures, potential to use pump flow for other functions, reversing controllability

Table Data Based on 25kW Fan Power System

Parameter for Consideration	Open Circuit Type 1	Open Circuit Type 2	Closed Circuit	Open Circuit Type 3
kW Loss - reversing Peak Average				
Volume (cm^3) Full system Reversing function				
Installed Cost				
Operating Costs				
System Reliability				
System Flexibility				

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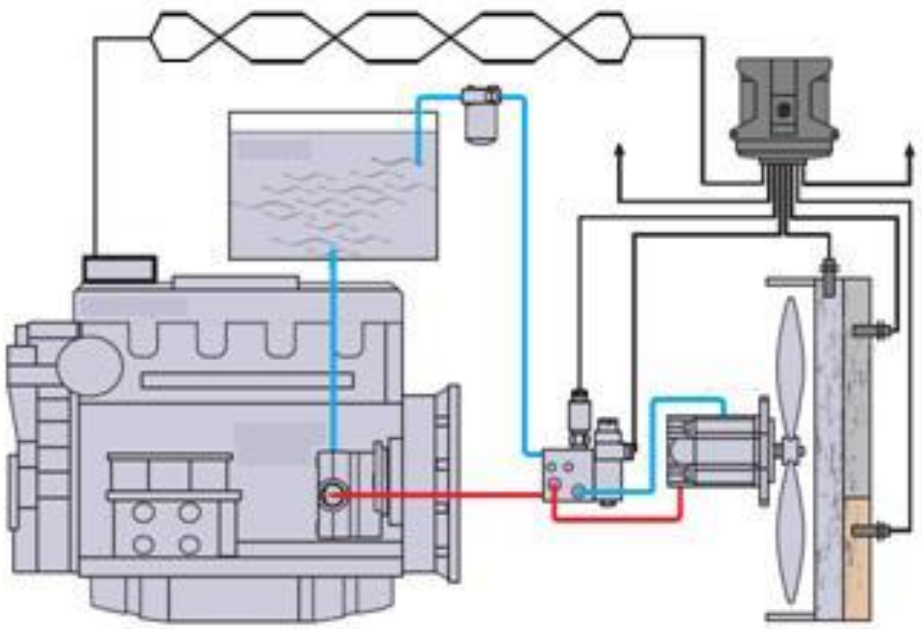
Open Circuit System 1

- Fixed displacement pump(s)
- Fixed displacement motor
- Speed control valve (variable pressure relief valve)
- Reversing valve (directional control valve)



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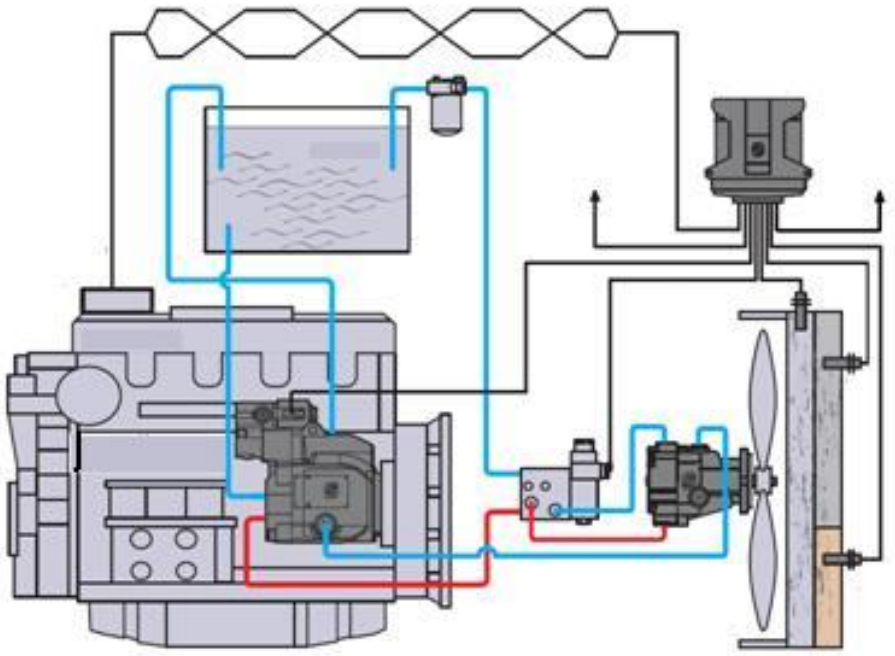
Open Circuit System 2

- Variable displacement pump
- Fixed displacement motor
- Reversing valve (directional control spool valve)



One Common Thread – Directional Control Valve

Increases cooling system load on the engine, along with operating costs

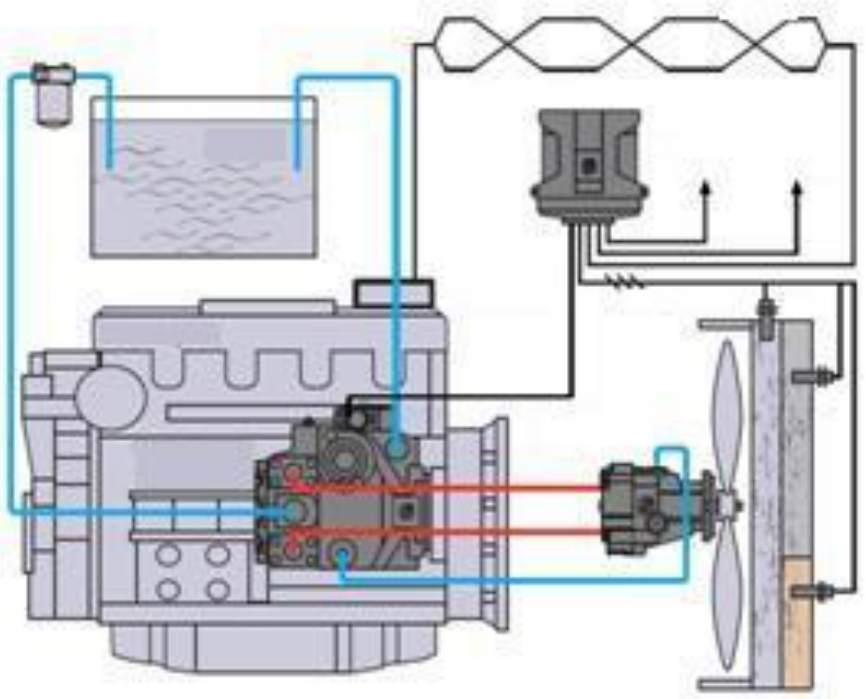
Increases required capacity for cooling system along with installed cost and space

Adds to system complexity, can reduce reliability and ability to service.

Table Data Based on 25kW Fan Power System

Parameter for Consideration	Open Circuit Type 1	Open Circuit Type 2	Closed Circuit	Open Circuit Type 3
kW Loss - reversing Peak Average	 2.8 1.1	 2.0 0.8		
Volume (cm^3) Full system Reversing function	 5000-15000 1000-3000	 9000-16000 1000-3000		
Installed Cost	1 – 1.2	1.1 – 1.4		
Operating Costs				
System Reliability				
System Flexibility				

- Closed Circuit System
  - Variable Displacement Pump with Fan System Control
  - Fixed Displacement Motor



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Open Circuit System 3

- Variable displacement pump
- Reverse displacement motor

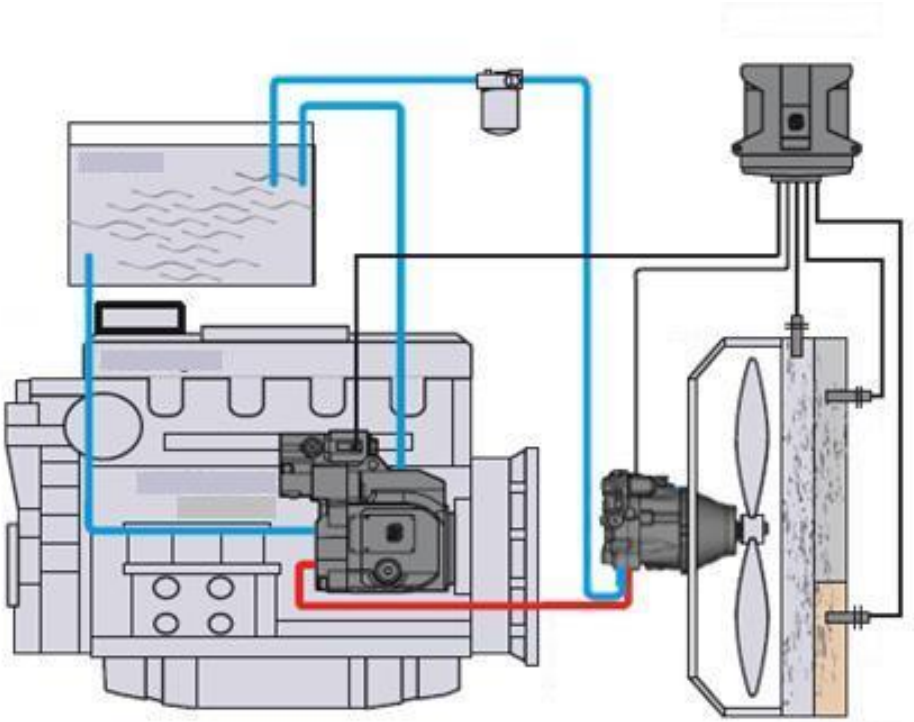

Table Data Based on 25kW Fan Power System

Parameter for Consideration	Open Circuit Type 1	Open Circuit Type 2	Closed Circuit	Open Circuit Type 3
kW Loss - reversing				
Peak	2.8	2.0	0	0
Average	1.1	0.8	0	0
Volume (cm^3)				
Full system	5000-15000	9000-16000	11300-16200	7500-11900
Reversing function	1000-3000	1000-3000	0	1500
Installed Cost	1 – 1.2	1.1 – 1.4	1.3 – 1.4	1.1 – 1.2
Operating Costs				
System Reliability				
System Flexibility				

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