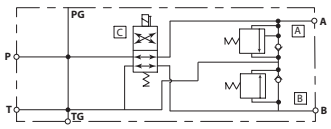
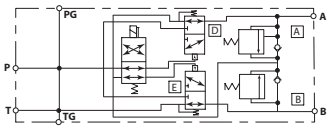
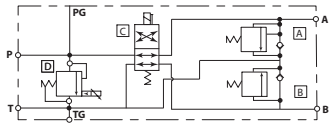
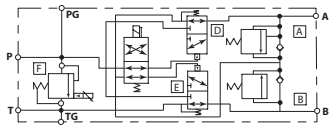
Comatrol
RESPONSIVENESS IN MOTION
MEMBER OF THE SAUER-DANFOSS GROUP

Cartridge Valves Technical Information
Fan Drive HICs
Quick Reference

Fan Drive HICs	Model No.	Cavity	Description	Flow*	Pressure	Page
 P108 200E	RFD-40-000	none	**Fan Drive HIC with Reversing Control**	Up to 40 l/min [10.5 US gal/min] See performance chart	210 bar [3000 psi]	14.6
	RFD-80-000	none		Up to 80 l/min [21.1 US gal/min] See performance chart	210 bar [3000 psi]	14.8

Fan Drive HICs	Model No.	Cavity	Description	Flow*	Pressure	Page
 P108 199E	RFD-120-000	none	**Fan Drive HIC with Reversing Control**	Up to 120 l/min [31.7 US gal/min] See performance chart	210 bar [3000 psi]	14.10

Fan Drive HICs	Model No.	Cavity	Description	Flow*	Pressure	Page
 P108 198E	RFD-40-PRV	none	**Fan Drive HIC with Proportional and Reversing Control**	Up to 40 l/min [10.5 US gal/min] See performance chart	210 bar [3000 psi]	14.12
	RFD-80-PRV	none		Up to 80 l/min [21.1 US gal/min] See performance chart	210 bar [3000 psi]	14.14

Fan Drive HICs	Model No.	Cavity	Description	Flow*	Pressure	Page
 P108 201E	RFD-120-PRV	none	**Fan Drive HIC with Proportional and Reversing Control**	Up to 120 l/min [31.7 US gal/min] See performance chart	210 bar [3000 psi]	14.16

* Flow ratings are based on a pressure drop of 7 bar [100 psi] unless otherwise noted. They are for comparison purposes only.

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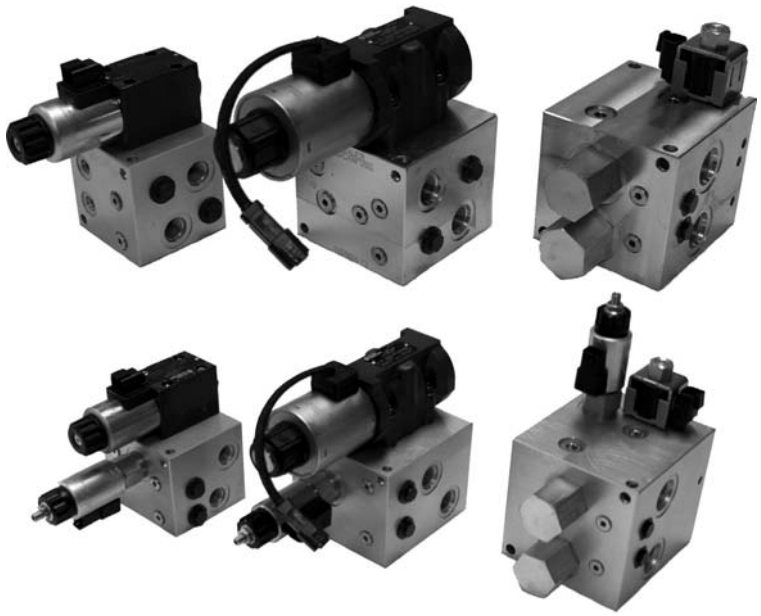
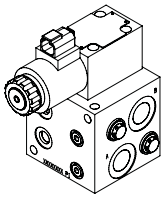
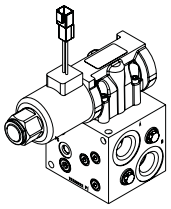
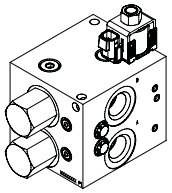
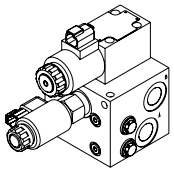
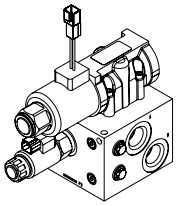
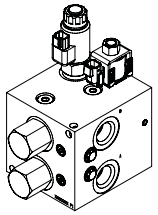
Cartridge Valves Technical Information
Fan Drive HICs
Application notes

OVERVIEW

Off-highway mobile machinery OEMs and distributors can choose from six pre-engineered Hydraulic Integrated Circuits (HICs) designed to provide speed control and reversing for hydraulic modulating fan drive motors in open circuit hydraulic fan drive systems. The program includes:

- 40, 80, and 120 LPM Frame Sizes
- Variable piston pump or fixed pump circuits
- Over-Pressure Protection / Anti-Cavitation is standard
- Viton O-rings are standard



	40 LPM	80 LPM	120 LPM
	RFD-40-000	RFD-80-000	RFD-120-000
Variable pump fan drive circuits: - Provide reversing control and over-pressure protection/anti-cavitation			
Fixed pump fan drive circuits: - Provide modulating and reversing control with over-pressure protection/ anti-cavitation			
	RFD-40-PRV	RFD-80-PRV	RFD-120-PRV

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Cartridge Valves Technical Information
Fan Drive HICs
Application notes

Functions

Proportional relief valve:
- Regulates fan speed by controlling pressure drop across fan motor
- Normally closed to ensure full fan speed in the absence of electrical signal
- PLUS+1® compliant

Solenoid reversing valve:
- Reverses flow to the fan motor to reverse fan direction
- Open transition spool to reduce the likelihood of pressure spikes during reversals
- Sized to minimize parasitic losses due to pressure drop

Dual shock valve with anti-cavitation checks:
- Trims the maximum motor torque by absorbing pressure spikes (shock effects) at the work ports
- Anti-cavitation feature allows additional flow to the motor through the tank port when motor overruns the pump
- PVLP shock valves (from PVG) allow for a compact design

Custom designs available upon request.

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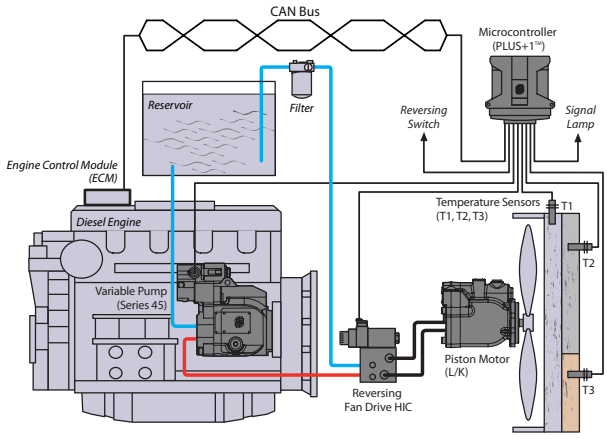
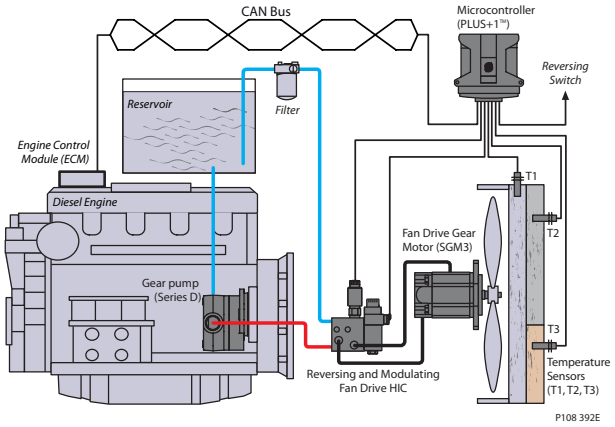
Cartridge Valves Technical Information
Fan Drive HICs
Application notes

Circuits - Variable Pump or Fixed Pump





RFD-xx-**000**
- Variable Pump fan drive circuits
- HIC provides reversing control and over-pressure protection/anti-cavitation
- Variable pump provides modulation (speed control)

RFD-xx-**PRV**
- Variable Pump fan drive circuits
- HIC provides reversing control and over-pressure protection/anti-cavitation
- Variable pump provides modulation (speed control)

Features

Integrated and compact design with customer flexibility in mind:
- Designed and tested specifically for fan drive systems
- Configurable for quick availability

Proportional control allows the engine temperature to be controlled within narrow limits:
- Helps meet the requirements of new emissions legislation
- The engine can be run more efficiently - improving fuel economy and reducing emissions

Increased design flexibility and scalability:
- Multiple frame sizes that allow you to match to your flow and pressure drop requirements for multiple machines and their respective fan requirements
- HIC valve can be placed in the most suitable location on the machine
- Reduce parasitic losses by limiting flow to and from the fan drive motor
- The gear motor is shorter compared to a fan motor with integrated valve
- Two sets of mounting holes for mounting flexibility (SAE and Metric compatible)

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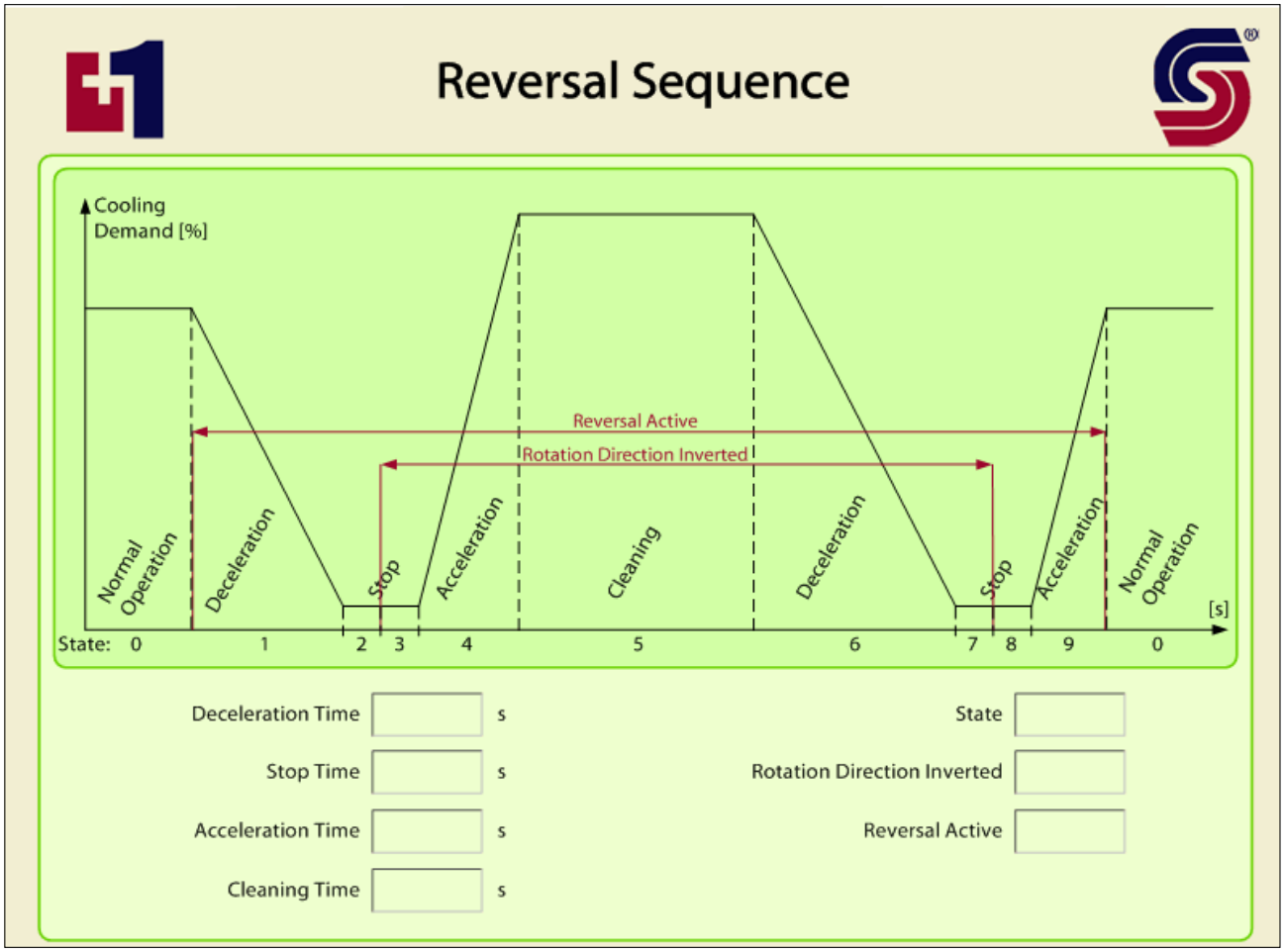
Cartridge Valves Technical Information
Fan Drive HICs
Application notes

Features (continued)

Increased productivity:
- Fan is reversible to purge (de-clog) coolers and radiators
- Prevents overheating with purged cooler
- More power available for useful work when radiator is not clogged

Electrically-actuated cleaning sequence programmed using PLUS+1™:
- Manual or automatic activation
- Reference Sauer-Danfoss 'Fan Drive Subsystem Application System Description' **11076673**.
- Service screen below illustrates an example reversing fan drive software setup

Service screen below illustrates an example reversing fan drive software setup



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Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-40-000

OPERATION

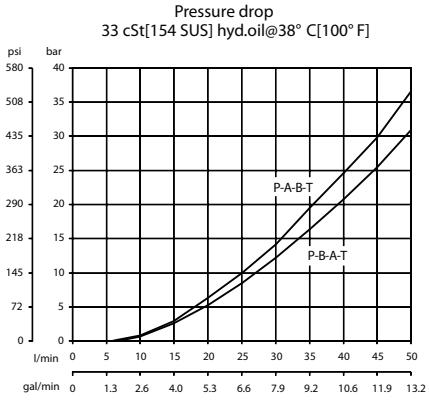
This valve reverses flow to the fan motor to reverse fan direction. It includes an open transition spool to reduce pressure spikes during reversals.

It trims the maximum motor torque by absorbing pressure spikes at the work ports. An anti-cavitation feature allows additional flow to the motor when the motor over-runs the pump.

SPECIFICATIONS

Rated pressure	210 bar [3000 psi]
Flow	Up to 40 l/min [10.5 US gal/min] See performance chart
Weight	3.23 kg [7.11 lb]
Valves	DCV03, PVLP
Gauge Port Size	#4 SAE [1/4 BSP]

THEORETICAL PERFORMANCE



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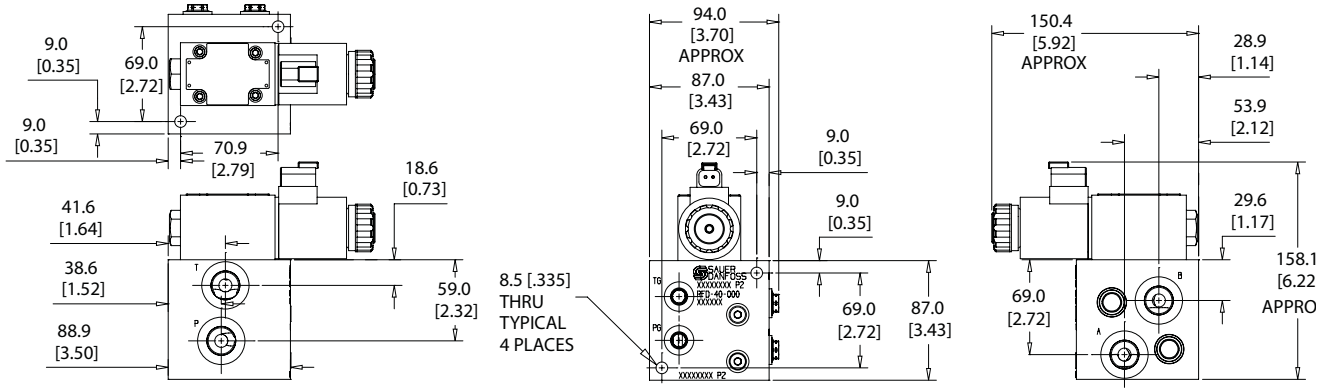
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-40-000

DIMENSION DRAWING

Dimensions mm [in]



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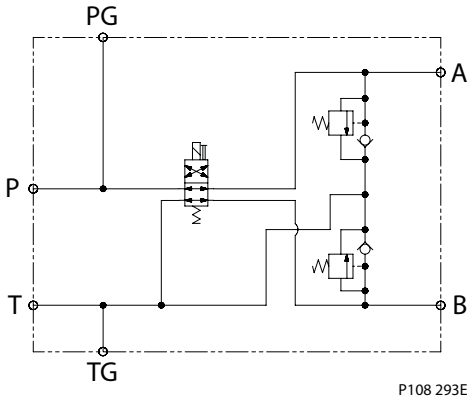
SCHEMATIC



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ORDERING INFORMATION

RFD - 80-000-12L- DE- NP-250-10S

- Reversing Fan Drive
- Size
- Proportional valve
  000 = No valve
- Coil voltage (All Coils)
  12D = 12 VDC (Standard Coil)
  24D = 24 VDC (Standard Coil)
- Coil termination (All Coils)
  DE = Deutsch
- Ports
  10S = Al, #10 SAE
  6B = Al, 3/4 BSP
- Shock valve setting (Keep at least 25 bar higher than maximum control pressure)
  80 bar [1160 psi]
  100 bar [1450 psi]
  125 bar [1813 psi]
  150 bar [2175 psi]
  175 bar [2538 psi]
  180 bar [2755 psi]
  210 bar [3045psi]
  230 bar [3335 psi]
  250 bar [3625 psi]
- Proportional Relief Setting
  NP = No PRV

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MEMBER OF THE SAUER-DANFOSS GROUP

Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-80-000

OPERATION

This valve reverses flow to the fan motor to reverse fan direction. It includes an open transition spool to reduce pressure spikes during reversals.

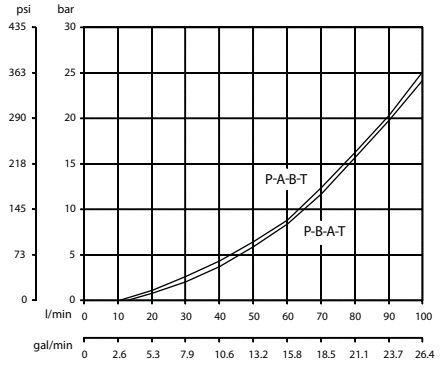
It trims the maximum motor torque by absorbing pressure spikes at the work ports. An anti-cavitation feature allows additional flow to the motor when the motor over-runs the pump.

SPECIFICATIONS

Rated pressure	210 bar [3000 psi]
Flow	Up to 80 l/min [21.5 US gal/min] See performance chart
Weight	6.74 kg [14.86 lb]
Valves	DCV05, PVLP
Gauge Port Size	#4 SAE [1/4 BSP]

THEORETICAL PERFORMANCE

Pressure drop
33 cSt[154 SUS] hyd.oil@38° C[100° F]



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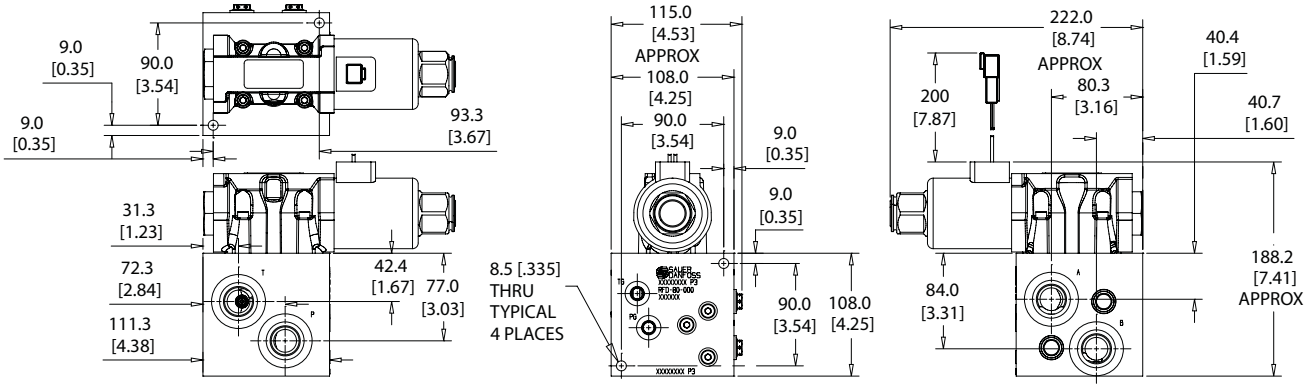
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-80-000

DIMENSION DRAWING

Dimensions mm [in]



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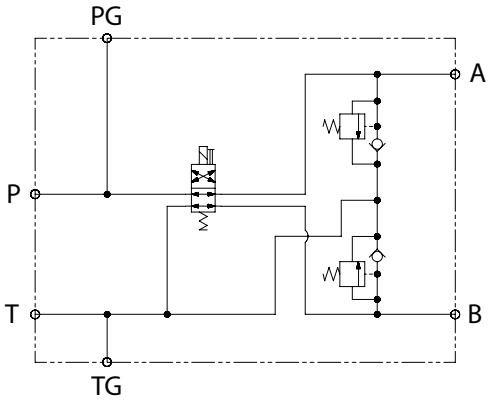
SCHEMATIC



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ORDERING INFORMATION

RFD - 40-000-12L -DE-NP-250 -8S

- Reversing Fan Drive
- Size
- Proportional valve
  - 000 = No valve
- Coil voltage (All Coils)
  - 12D = 12 VDC (Standard Coil)
  - 24D = 24 VDC (Standard Coil)
- Coil termination (All Coils)
  - DE = Deutsch
- Proportional Relief Setting
  - NP = No PRV
- Shock valve setting (Keep at least 25 bar higher than maximum control pressure)
  - 80 bar [1160 psi]
  - 100 bar [1450 psi]
  - 125 bar [1813 psi]
  - 150 bar [2175 psi]
  - 175 bar [2538 psi]
  - 180 bar [2755 psi]
  - 210 bar [3045psi]
  - 230 bar [3335 psi]
  - 250 bar [3625 psi]
- Ports
  - 8S = Al, #8 SAE
  - 4B = Al, 1/2 BSP

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Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-120-000

OPERATION

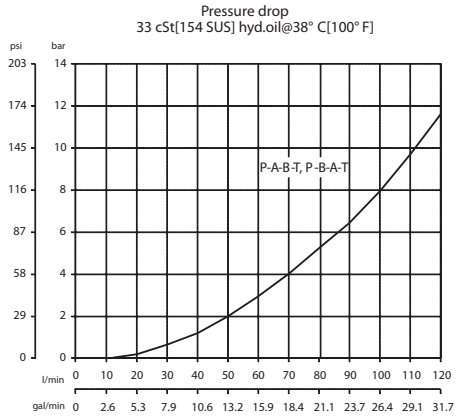
This valve reverses flow to the fan motor to reverse fan direction. It includes an open transition spool to reduce pressure spikes during reversals.

It trims the maximum motor torque by absorbing pressure spikes at the work ports. An anti-cavitation feature allows additional flow to the motor when the motor over-runs the pump.

SPECIFICATIONS

Rated pressure	210 bar [3000 psi]
Flow	Up to 120 l/min [31.7 US gal/min] See performance chart
Weight	4.26 kg [9.40 lb]
Valves	CP722-5, SV08-24-01, PVLP
Gauge Port Size	#4 SAE [1/4 BSP]

THEORETICAL PERFORMANCE



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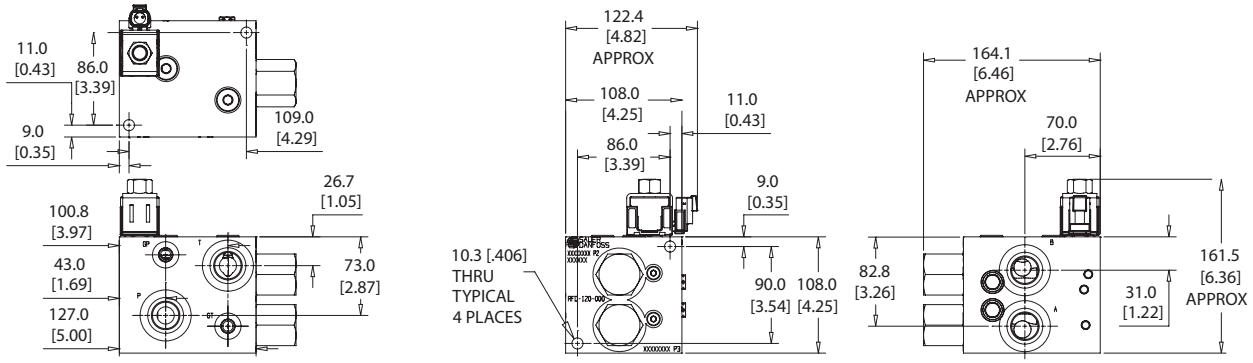
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-120-000

DIMENSION DRAWING

Dimensions mm [in]



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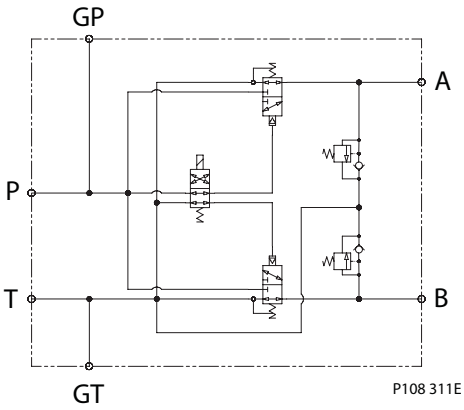
SCHEMATIC



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ORDERING INFORMATION

RFD - 120-000-12L -DE-NP-250 -12S

Reversing Fan Drive

Size

Proportional valve
000 = No valve

Coil voltage (All Coils)
12D = 12 VDC (Standard Coil)
24D = 24 VDC (Standard Coil)

Coil termination (All Coils)
DE = Deutsch

Proportional Relief Setting
NP = No PRV

Shock valve setting (Keep at least 25 bar higher than maximum control pressure)

80 bar [1160 psi]	180 bar [2755 psi]
100 bar [1450 psi]	210 bar [3045psi]
125 bar [1813 psi]	230 bar [3335 psi]
150 bar [2175 psi]	250 bar [3625 psi]
175 bar [2538 psi]	

Ports
12S = Al, #12 SAE
6B = Al, 3/4 BSP

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Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-40-PRV

OPERATION

This valve regulates fan speed by controlling pressure drop across the fan motor. It operates in a normally closed configuration in the absence of an electrrical signal.

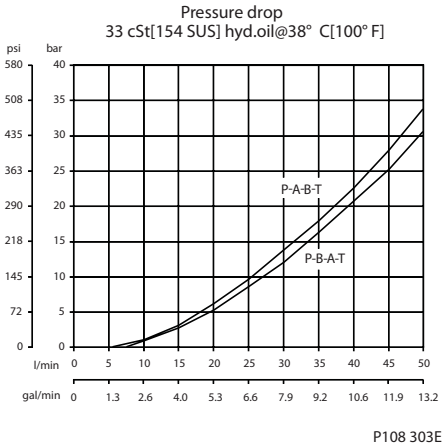
The valve reverses flow to the fan motor to reverse fan direction. It includes an open transition spool to reduce pressure spikes during reversals.

It trims the maximum motor torque by absorbing pressure spikes at the work ports. An anti-cavitation feature allows additional flow to the motor when the motor over-runs the pump.

SPECIFICATIONS

Rated pressure	210 bar [3000 psi]
Flow	Up to 40 l/min [10.5 US gal/min] See performance chart
Weight	4.52 kg [9.96 lb]
Valves	DCV03, PRV10-IS2, PVLP
Gauge Port Size	#4 SAE [1/4 BSP]

THEORETICAL PERFORMANCE



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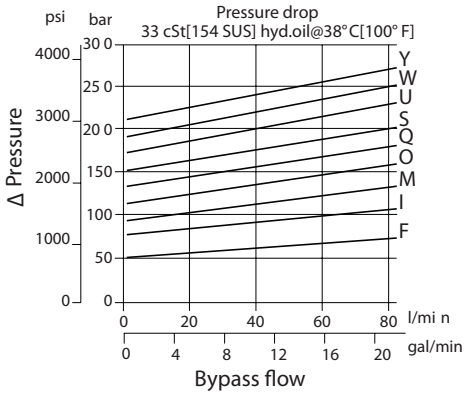

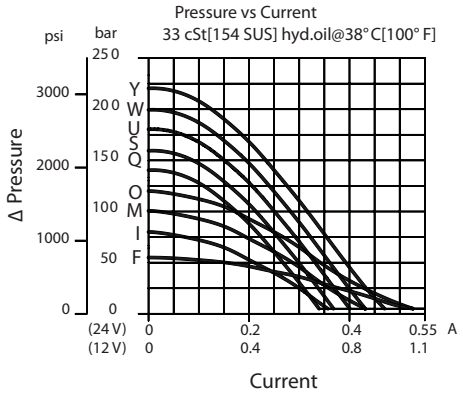

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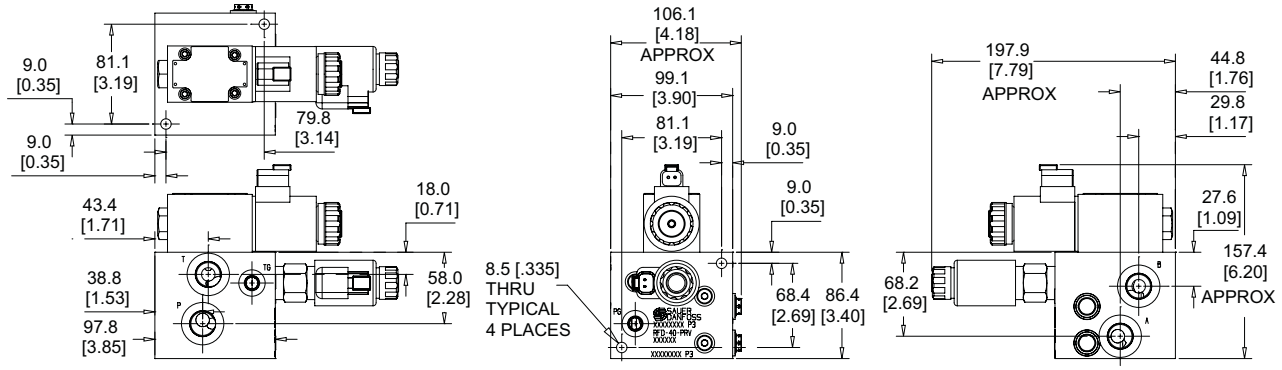
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-40-PRV

DIMENSION DRAWING

Dimensions mm [in]



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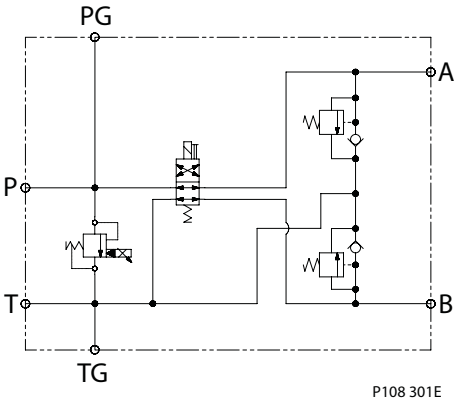
SCHEMATIC



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ORDERING INFORMATION

RFD- 40 -PRV -12L -DE-Y -250 -8S

Reversing Fan Drive

Size

Proportional valve
PRV=Proportional Relief Valve
000 = No valve

Coil voltage (All Coils)
12L = 12 VDC (Standard Coil)
24L = 24 VDC (Standard Coil)

Coil termination (All Coils)
DE = Deutsch

Ports
8S = AI, #8 SAE
4B = AI, 1/2 BSP

Shock valve setting (Keep at least 25 bar higher than maximum control pressure)

80 bar [1160 psi]	180 bar [2755 psi]
100 bar [1450 psi]	210 bar [3045psi]
125 bar [1813 psi]	230 bar [3335 psi]
150 bar [2175 psi]	250 bar [3625 psi]
175 bar [2538 psi]	

Proportional Relief Setting

F=55 bar[789 psi]	O=145 bar[2103 psi]	U=165 bar[2393 psi]
I=75 bar[1088 psi]	Q=115 bar[1668 psi]	W=195 bar[2828 psi]
M=95 bar[1378 psi]	S=125 bar[1813 psi]	Y=205 bar[2973 psi]

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RESPONSIVENESS IN MOTION
MEMBER OF THE SAUER-DANFOSS GROUP

Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-80-PRV

OPERATION

This valve regulates fan speed by controlling pressure drop across the fan motor. It operates in a normally closed configuration in the absence of an electrrical signal.

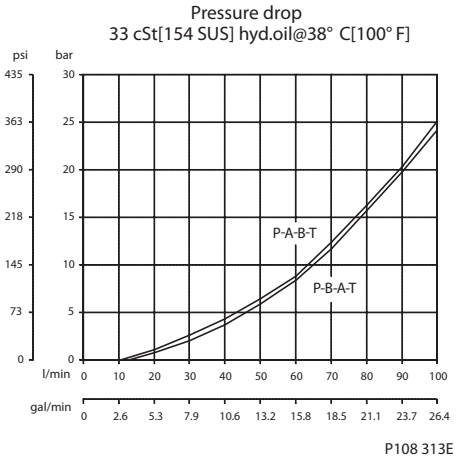
The valve reverses flow to the fan motor to reverse fan direction. It includes an open transition spool to reduce pressure spikes during reversals.

It trims the maximum motor torque by absorbing pressure spikes at the work ports. An anti-cavitation feature allows additional flow to the motor when the motor over-runs the pump.

SPECIFICATIONS

Rated pressure	210 bar [3000 psi]
Flow	Up to 80 l/min [21.7 US gal/min] See performance chart
Weight	8.35 kg [18.40 lb]
Valves	DCV05, PRV12-IS2, PVLP
Gauge Port Size	#4 SAE [1/4 BSP]

THEORETICAL PERFORMANCE



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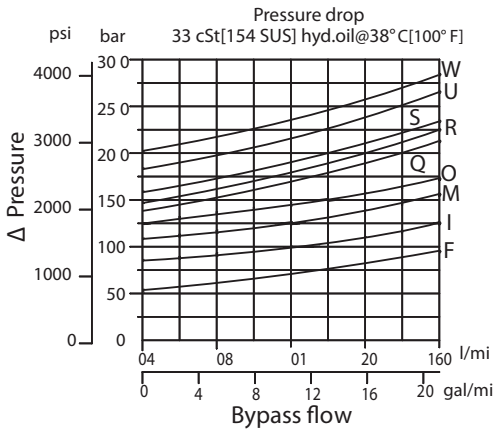

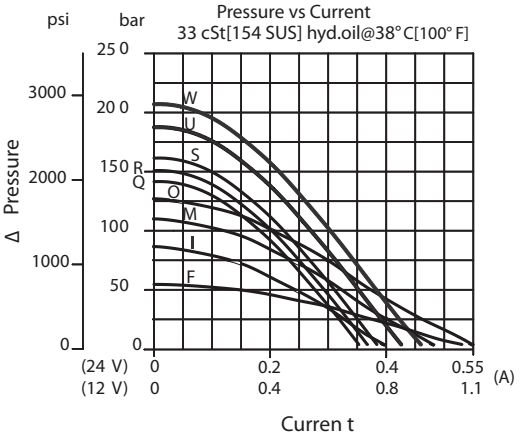

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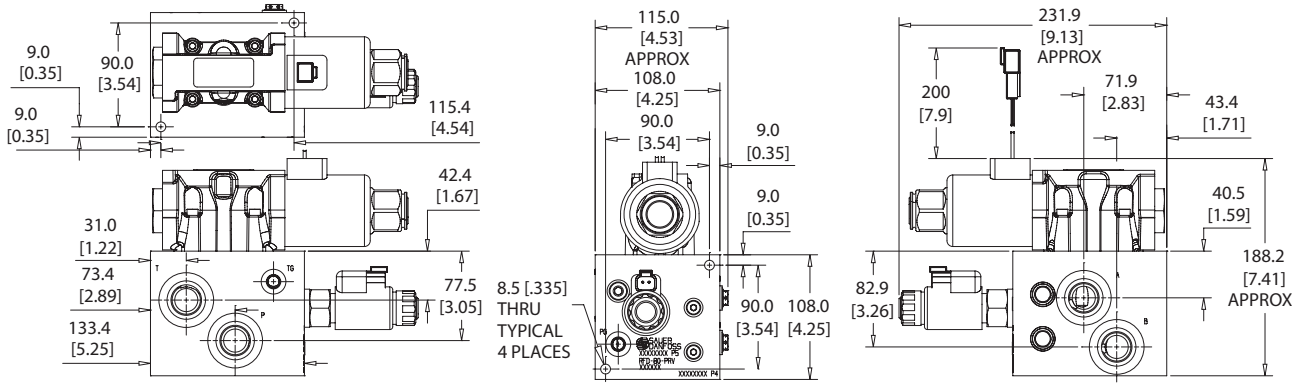
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-80-PRV

DIMENSION DRAWING

Dimensions mm [in]



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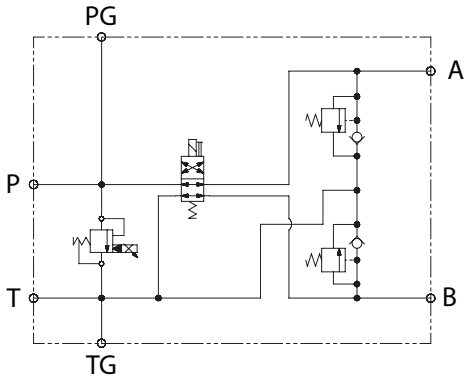
SCHEMATIC



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ORDERING INFORMATION

RFD -80- PRV- 12L -DE-W-250-10S

Reversing Fan Drive

Size

Proportional valve
PRV=Proportional Relief Valve
000 = No valve

Coil voltage (All Coils)
12D = 12 VDC (Standard Coil)
24D = 24 VDC (Standard Coil)

Coil termination (All Coils)
DE = Deutsch

Ports
10S = Al, #10 SAE
6B = Al, 3/4 BSP

Shock valve setting (Keep at least 25 bar higher than maximum control pressure)
80 bar [1160 psi]
100 bar [1450 psi]
125 bar [1813 psi]
150 bar [2175 psi]
175 bar [2538 psi]
180 bar [2755 psi]
210 bar [3045psi]
230 bar [3335 psi]
250 bar [3625 psi]

Proportional Relief Setting
F=55 bar[789 psi] O=125 bar[1813 psi] U=185 bar[2683 psi]
I=75 bar[1088 psi] Q=135 bar[1858 psi] W=205 bar[2973 psi]
M=105 bar[1523 psi] S=155 bar[2248 psi]

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Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-120-PRV

OPERATION

This valve regulates fan speed by controlling pressure drop across the fan motor. It operates in a normally closed configuration in the absence of an electrrical signal.

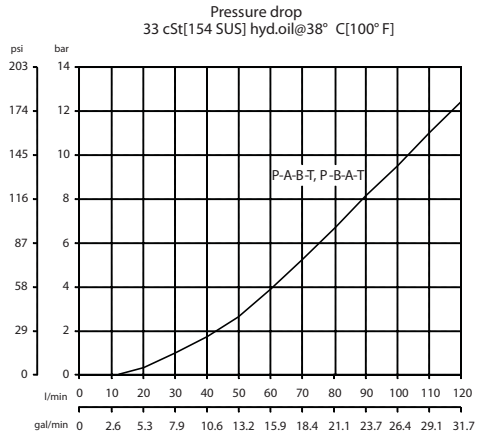
The valve reverses flow to the fan motor to reverse fan direction. It includes an open transition spool to reduce pressure spikes during reversals.

It trims the maximum motor torque by absorbing pressure spikes at the work ports. An anti-cavitation feature allows additional flow to the motor when the motor over-runs the pump.

SPECIFICATIONS

Rated pressure	210 bar [3000 psi]
Flow	Up to 120 l/min [31.7 US gal/ min] See performance chart
Weight	15.7 kg [6.93 lb]
Valves	CP722-5, SV08-24-01, PRV12-IS2, PVLP
Gauge Port Size	#4 SAE [1/4 BSP]

THEORETICAL PERFORMANCE



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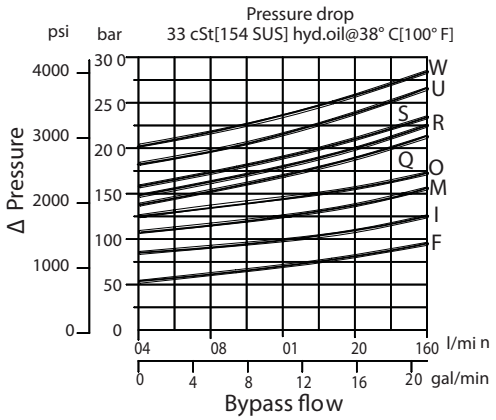

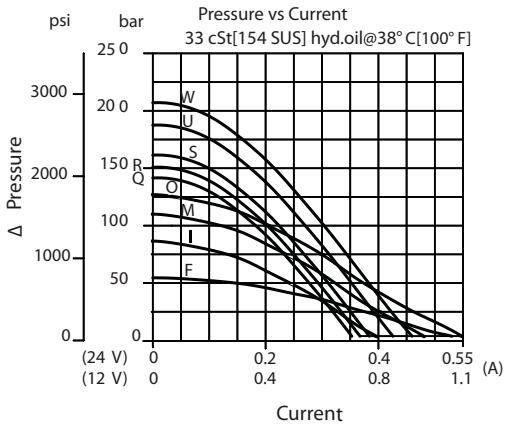

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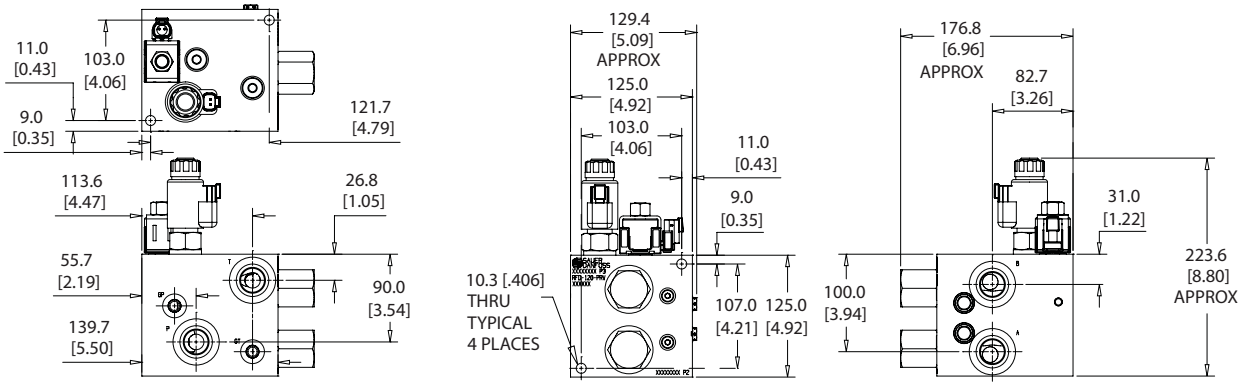
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-120-PRV

DIMENSION DRAWING

Dimensions mm [in]



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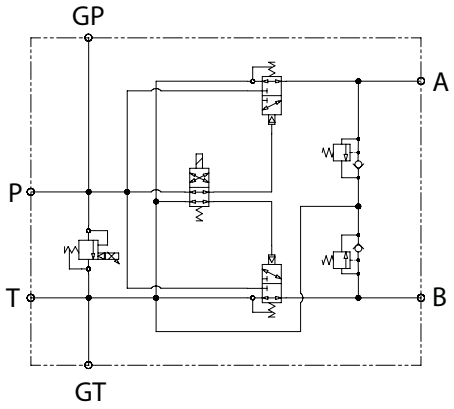
SCHEMATIC



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ORDERING INFORMATION

RFD -120 -PRV -12L -DE-W-250-12S

Reversing Fan Drive

Size

Proportional valve
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Cartridge Valves Technical Information
Fan Drive HICs
Notes