<table>
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<tr>
<th>Fan Drive HICs</th>
<th>Model No.</th>
<th>Cavity</th>
<th>Description</th>
<th>Flow*</th>
<th>Pressure</th>
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<tr>
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<td>RFD-40-000</td>
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<td>Fan Drive HIC with Reversing Control</td>
<td>Up to 40 l/min [10.5 US gal/min] See performance chart</td>
<td>210 bar [3000 psi]</td>
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<td>210 bar [3000 psi]</td>
<td>14.16</td>
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* Flow ratings are based on a pressure drop of 7 bar [100 psi] unless otherwise noted. They are for comparison purposes only.
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

### 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.
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
- Fixed Pump fan drive circuits
- HIC provides modulating and reversing control with over-pressure protection/anti-cavitation

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)
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

Automatic cleaning sequence programmed using PLUS+1™:
- Manual or automatic activation
- Reference Sauer-Danfoss ‘Fan Drive Application Block’ information
- Service screen below illustrates an example reversing fan drive software setup

Service screen below illustrates an example reversing fan drive software setup
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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Rated pressure</td>
<td>210 bar [3000 psi]</td>
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<td>Flow</td>
<td>Up to 40 l/min [10.5 US gal/min]</td>
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<td>Weight</td>
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<td>Valves</td>
<td>DCV03, PVLP</td>
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<tr>
<td>Gauge Port Size</td>
<td>#4 SAE [1/4 BSP]</td>
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THEORETICAL PERFORMANCE

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

P108 294E
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-40-000

DIMENSION DRAWING

Dimensions mm [in]

SCHEMATIC

ORDERING INFORMATION

Reversing Fan Drive
RFD - 40-000-12L- DE - NP-250-8S

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
8S = AL #8 SAE
48 = AL 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 [3045 psi]
125 bar [1813 psi] 230 bar [3335 psi]
150 bar [2175 psi] 250 bar [3625 psi]
175 bar [2538 psi]

Proportional Relief Setting
NP = No PRV

P108 307E
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

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Rated pressure</td>
<td>210 bar [3000 psi]</td>
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<tr>
<td>Flow</td>
<td>Up to 80 l/min [21.5 US gal/min]</td>
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<tr>
<td>Weight</td>
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<td>Gauge Port Size</td>
<td>#4 SAE [1/4 BSP]</td>
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</table>

THEORETICAL PERFORMANCE

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

P108 306E
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-80-000

Dimensions mm [in]

**DIMENSION DRAWING**

**SCHEMATIC**

**ORDERING INFORMATION**

- 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**
- 8S = A1, #8 SAE
- 4B = A1, 1/2 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]

**Proportional Relief Setting**
- NP = No PRV

---

**RFD-80-000**
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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<td>Rated pressure</td>
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<td>Flow</td>
<td>Up to 120 l/min [31.7 US gal/min]</td>
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<td>Weight</td>
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<td>Gauge Port Size</td>
<td>#4 SAE [1/4 BSP]</td>
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THEORETICAL PERFORMANCE

![Pressure drop graph](P108_309E)
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Reversing Control
RFD-120-000

DIMENSION DRAWING

Dimensions mm [in]

SCHEMATIC

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

P108 310E

P108 311E

P108 312E
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 electrical 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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Rated pressure</td>
<td>210 bar [3000 psi]</td>
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<tr>
<td>Flow</td>
<td>Up to 40 l/min [10.5 US gal/min]</td>
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<td>See performance chart</td>
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<td>Weight</td>
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<td>Gauge Port Size</td>
<td>#4 SAE [1/4 BSP]</td>
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</table>

THEORETICAL PERFORMANCE

![Pressure vs Current](image1.png)

![Pressure drop](image2.png)

![Pressure drop](image3.png)
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-40-PRV

**DIMENSION DRAWING**

Dimensions mm [in]

**SCHEMATIC**

**ORDERING INFORMATION**

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

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

Ports

8S = AL 88 SAE
4B = AL 1/2 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]

Proportional Relief Setting

F = 45 bar [653 psi]
Q = 120 bar [1740 psi]
U = 185 bar [2683 psi]
I = 205 bar [2973 psi]
M = 100 bar [1450 psi] /
W = 235 bar [3363 psi]

P108 303E
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 electrical 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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Rated pressure</td>
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<tr>
<td>Flow</td>
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<td>See performance chart</td>
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<td>Weight</td>
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<td>Gauge Port Size</td>
<td>#4 SAE [1/4 BSP]</td>
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THEORETICAL PERFORMANCE

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

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

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

Bypass flow

Weight 8.35 kg [18.40 lb]
Valves DCV05, PRV12-1S2, PVLP
Gauge Port Size #4 SAE [1/4 BSP]
Cartridge Valves Technical Information
Fan Drive HICs
Fan Drive HIC with Proportional and Reversing Control
RFD-80-PRV

DIMENSION DRAWING

SCHEMATIC

ORDERING INFORMATION

Reversing Fan Drive

Ports

- Shock valve setting (Keep at least 25 bar higher than maximum control pressure)
  - Ports
  - 105 = AL #10 SAE
  - 120 = 12 VDC (Standard Coil)
  - 24D = 24 VDC (Standard Coil)

- Proportional Relief Setting
  - F=55 bar [796 psi]
  - G=125 bar [1813 psi]
  - U=185 bar [2683 psi]
  - I=85 bar [1233 psi]
  - Q=135 bar [1958 psi]
  - W=205 bar [2973 psi]
  - M=105 bar [1523 psi]
  - S=155 bar [2248 psi]
**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 electrical 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**

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<td>Gauge Port Size</td>
<td>#4 SAE [1/4 BSP]</td>
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**THEORETICAL PERFORMANCE**

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<th>psi</th>
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<th>psi</th>
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<th>Bypass flow</th>
<th>l/min</th>
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<th>bar</th>
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<td>160</td>
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</table>

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RFD-120-PRV

DIMENSION DRAWING

Dimensions mm [in]

SCHEMATIC

ORDERING INFORMATION

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

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

Ports
125 = AL #12 SAE
68 = 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]

Proportional Relief Setting
F=55 bar [798 psi] Q=125 bar [1813 psi] U=185 bar [2683 psi]
M=105 bar [1523 psi] S=155 bar [2248 psi]
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