



Electrical Installation

Series 51 Motors

**Electrohydraulic Proportional  
Control D7, D8, DA, DC**



**Revision history***Table of revisions*

<b>Date</b>	<b>Changed</b>	<b>Rev</b>
August 2015	Corrections to layout only	CA
July 2015	Converted to Danfoss layout	BA
April 2007	First edition	AA

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**Electrical Installation      S51 Electrohydraulic Proportional Control D7, D8, DA, DC**

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**Literature references****S51 electrohydraulic proportional control D7, D8, DA, DC literature references**

Literature title	Description	Literature number
<i>S51 and 51-1 Bent Axis Variable Displacement Motors Technical Information</i>	Complete product electrical and mechanical specifications	520L0440
<i>S51 D Proportional Controls Function Block User Manual</i>	Compliant function block set-up information	11022921
<i>On/Off Functions Function Block User Manual</i>	Compliant function block set-up information	11022918

**Latest version of technical literature**

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Danfoss product literature is online at: <http://powersolutions.danfoss.com/literature/>

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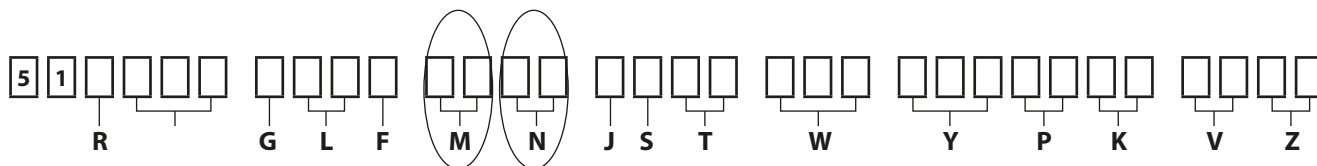
**Product overview**

**Product image**

*S51 electrohydraulic proportional control D7, D8, DA, DC*



**Nomenclature**



*Code M and N options*

M	Description	N	Description
D7	Electrohydraulic proportional control, 12 Vdc	M1	Hydraulic brake pressure defeat
D8	Electrohydraulic proportional control, 24 Vdc		
DA	Electrohydraulic proportional control, 24 Vdc, in combination with EBPD	M4	Electric brake pressure defeat (EBPD), 24 Vdc
DC	Electrohydraulic proportional control, 12 Vdc, in combination with EBPD	M6	Electric brake pressure defeat (EBPD), 12 Vdc

Only certain control options for the S51 motor utilize the Electrohydraulic Proportional Control. The combination of the M and N modules define the motor control's functionality. Please refer to the motor's nomenclature to determine if the motor is equipped with the proper options. The nomenclature can be found on the motor's nametag.

**Product overview**

**Theory of operation**

**Proportional displacement control**

Displacement can be changed electrohydraulically under load in response to an electrical signal from minimum displacement to maximum displacement and vice versa. The displacement changes proportional to the electrical signal.

- Solenoid not energized = maximum displacement
- Solenoid energized = minimum displacement

**PCOR**

The control can be overridden by Pressure Compensator Override (PCOR) using high loop pressure. When the PCOR activates, the motor displacement increases toward maximum. Pressure ramp from PCOR start pressure (with motor at minimum displacement) until maximum displacement is reached is less than 10 bar [145 psi]. This ensures optimal power utilization throughout the entire displacement range of the motor. PCOR start pressure is adjustable from 110 to 370 bar [1600 to 5370 psi].

**D7M1, D8M1**

Pressure compensator configuration: D7M1, D8M1 with hydraulic brake pressure defeat.

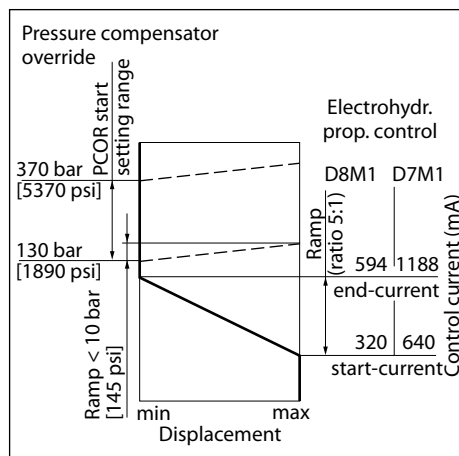
A shuttle valve ahead of the pressure compensator prevents operation in the deceleration direction (when motor is running in pump mode). This is designed to prevent rapid or uncontrolled deceleration while the vehicle/machine is slowing down. The shuttle valve must be controlled by a 2-line external signal, based on direction of motor rotation, based on the following table. Pressure compensator override with brake pressure defeat is mainly used in systems with pumps having electric or hydraulic proportional controls or automotive controls.

**DAM4, DCM6**

Pressure compensator configuration: DAM4 and DCM6 with electric brake pressure defeat.

A solenoid-switched valve ahead of the pressure compensator prevents operation in the deceleration direction (when motor is running in pump mode). This is designed to prevent rapid or uncontrolled deceleration while the vehicle/machine is slowing down. The solenoid valve must be controlled by an external electric signal, based on direction of motor rotation.

**Control operation D7M1, D8M1**



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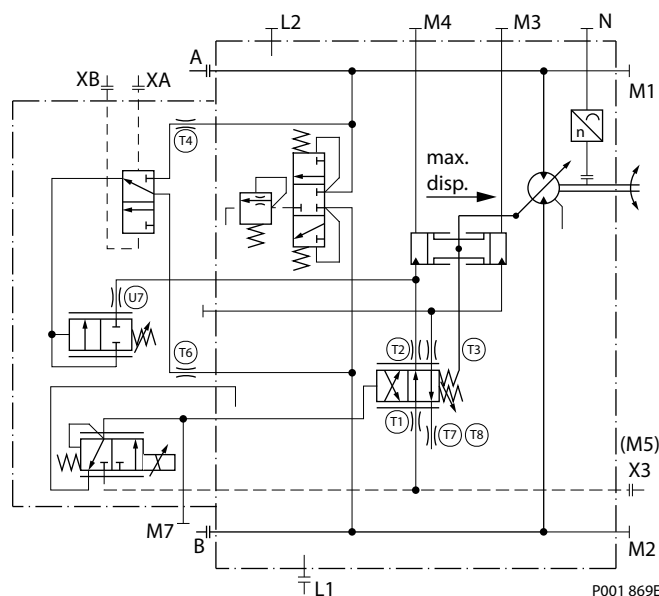
**Product overview**

**⚠ Warning**

Unintended vehicle or machine movement hazard. The loss of hydrostatic drive line power, in any mode of operation (forward, neutral, or reverse) may cause the system to lose hydrostatic braking capacity. You must provide a braking system, redundant to the hydrostatic transmission, sufficient to stop and hold the vehicle or machine in the event of hydrostatic drive power loss.

**Hydraulic schematics**

*Motor with Electrohydraulic Proportional Control D7M1, D8M1 with Pressure Compensator (PCOR) and Hydraulic Brake Pressure Defeat*

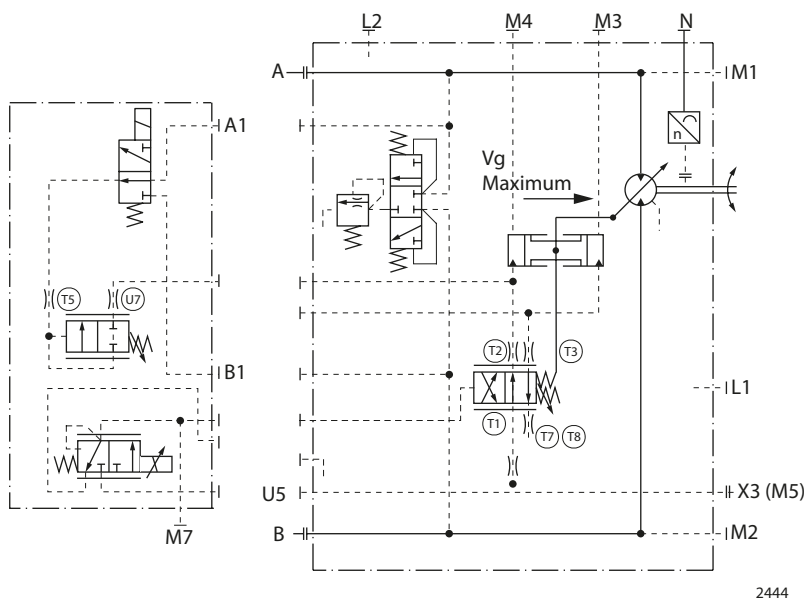


**Ports:**

<b>A, B</b>	Main pressure lines	<b>M7</b>	Gage port control pressure
<b>L1, L2</b>	Drain lines	<b>XA, XB</b>	Control pressure ports, hydraulic brake pressure defeat
<b>M1, M2</b>	Gage port A and B	<b>T1, T2, T3, T4, T6, T7, T8, U7</b>	Optional orifices
<b>M3, M4</b>	Gage port servo pressure	<b>N</b>	Speed sensor
<b>X3 (M5)</b>	Servo pressure supply		

**Product overview**

*Electrohydraulic Proportional Control with Pressure Compensator Override to Maximum Angle Electrical Brake Pressure Defeat*


**Ports:**

<b>A, B</b>	Main pressure lines	<b>X3 (M5)</b>	Servo pressure supply
<b>L1, L2</b>	Drain lines	<b>M7</b>	Gage port control pressure
<b>M1, M2</b>	Gage port main pressure, ports A and B	<b>N</b>	Speed sensor
<b>M3, M4</b>	Gage port servo pressure		

**Electrical specifications**
*Electrohydraulic proportional solenoid*

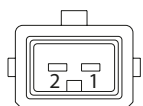
M-option	D7, DC	D8, DA
<b>Voltage</b>	12 Vdc	24 Vdc
<b>Start Current</b>	640 mA	320 mA
<b>End Current</b>	1188 mA	594 mA
<b>Maximum Current</b>	1500 mA	750 ma
<b>Nominal Resistance at 20°C [68°F]</b>	5.7 Ω	21.2 Ω
<b>PWM frequency range*</b>	100 to 200 Hz	100 to 200 Hz
<b>Recommended PWM frequency*</b>	100 Hz	100 Hz

\* Verify the PWM frequency is set correctly in the PLUS+1® controller. The default is set at 4000 Hz which will significantly reduce performance.

*Electric brake pressure defeat solenoid*

M-option	M6	M4
<b>Voltage</b>	12 Vdc	24 Vdc
<b>Rated power</b>	32 W	32 W



**Electrical installation**
**Pinout**
**AMP Junior Power Timer connector**
*Pin location*

*Pinout*

Pin	Function
1	PWM signal
2	Ground

*Pinout (alternative)*

Pin	Function
1	Ground
2	PWM signal

**Pin compatibility**
*PLUS+1® module pin type/ Electric proportional solenoid pin compatibility*

Pin	Function
1, 2	PWMOUT/DOUT/PVG Power supply*
1, 2	PWMOUT/DOUT/PVGOUT*
1, 2	Power ground -

\* Use output pins with configurable PWM frequency.

*PLUS+1® module pin type/ Electric brake pressure defeat solenoid*

Pin	Function
1,2	DOUT
1,2	DOUT/PVG Power
1,2	PWMOUT/DOUT/PVG Power supply
1,2	PWMOUT/DOUT/PVGOUT
1,2	Power ground -

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**Electrical Installation      S51 Electrohydraulic Proportional Control D7, D8, DA, DC**


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**Electrical installation**
**Pressure compensator logic**
**Hydraulic brake pressure defeat**

Motor rotation	High pressure port	Control pressure on port*	PCOR function
CW	A	XA	yes
CW	A	XB	no
CCW	B	XA	no
CCW	B	XB	yes

\* Differential control pressure between port XA/XB:

$\Delta p_{\min} = 0.5 \text{ bar [7 psi]}$

$\Delta p_{\max} = 50 \text{ bar [725 psi]}$

**Electric brake pressure defeat**

Rotation	High pressure port	Solenoid	PCOR function
CW	A	Energized	Yes
CW	A	Non-energized	No
CCW	B	Energized	No
CCW	B	Non-energized	Yes

**Mating connector**
**AMP connector parts list**

Description	Quantity	Ordering number
Two pin connector	1	Tyco Electronics 282189-1
Contacts	2	Tyco Electronics 929940-1
Seal plugs	2	Tyco Electronics 828904-1
Mating connector kit	1	Danfoss K19815





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