

Hydrostatic Pump Repair

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Electrical Installation

Series 51 Motors

Electrohydraulic Proportional Control D7, D8, DA, DC



Revision history*Table of revisions*

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

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

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

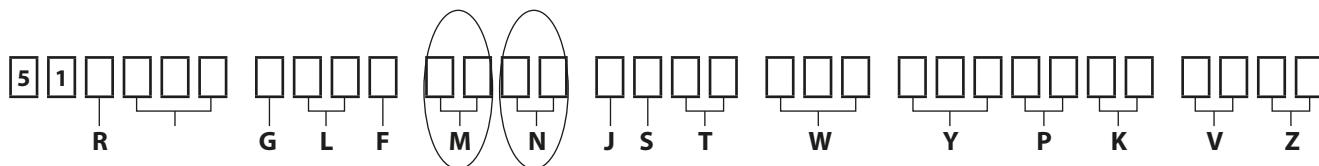
Product overview

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.

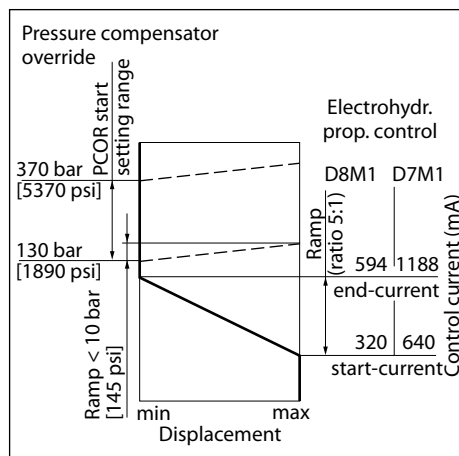
A shuttle valve ahead of the pressure compensator prevents operation in the deceleration direction (when motor is running in pump mode). This is designed to prevent rapid or uncontrolled deceleration while the vehicle/machine is slowing down. The shuttle valve must be controlled by a 2-line external 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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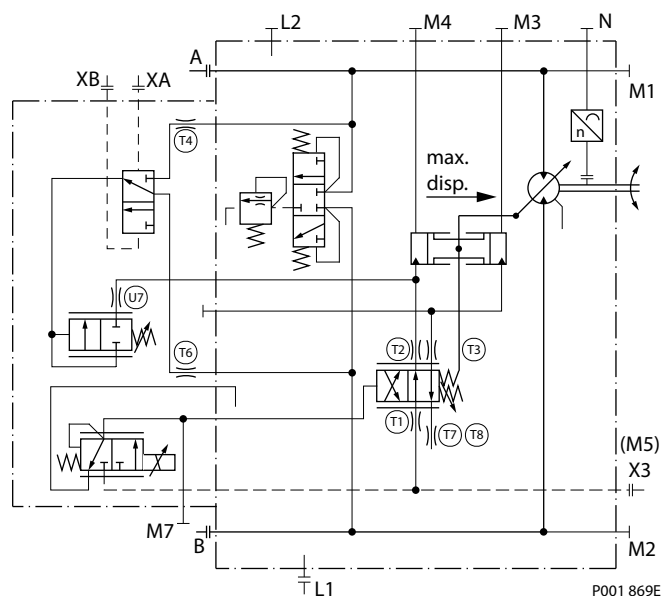
Product overview

⚠ 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

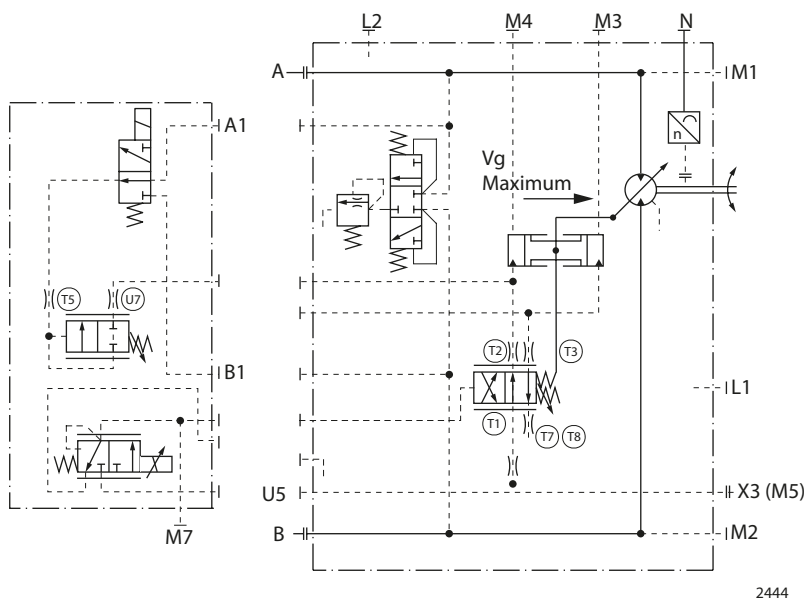


Ports:

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

Product overview

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


Ports:

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

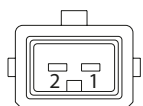
Electrical specifications
Electrohydraulic proportional solenoid

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

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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