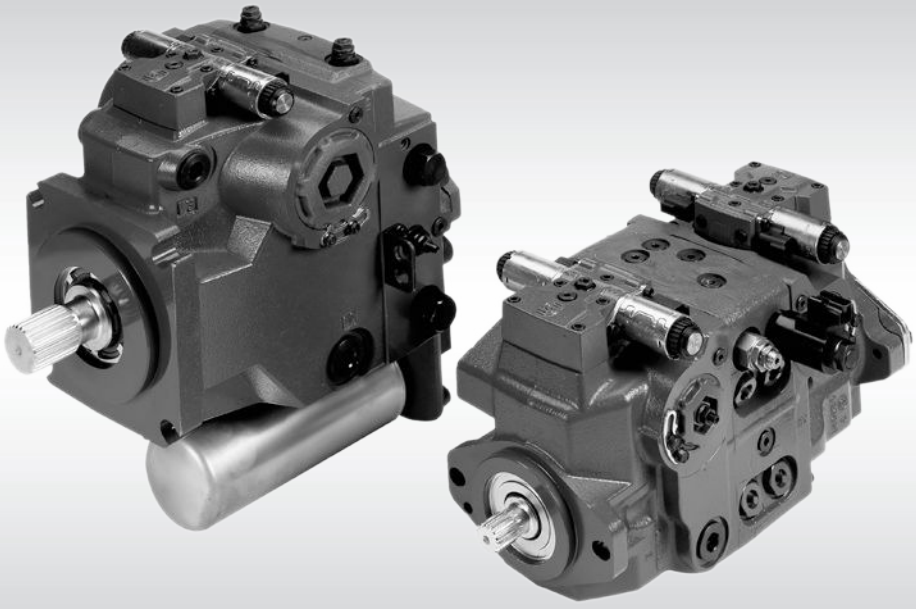
Danfoss

Electrical Installation

H1 Pump

Electrical Displacement Control (EDC)



Revision history

Table of revisions

Date	Changed	Rev
August 2015	Electrical specifications, minor edit; and Converted to Danfoss layout	BA
October 2010	D Module Control Options: Option A5 is 24V EDC, not 12V	AD
September 2007	Corrected spelling in table	AC
April 2007	Layout change only	AB

Contents

Literature references

H1 Pump EDC literature references

Literature title	Description	Literature number
H1 Single and Tandem Axial Piston Pumps, Basic Information	Complete product electrical and mechanical specifications	11062168

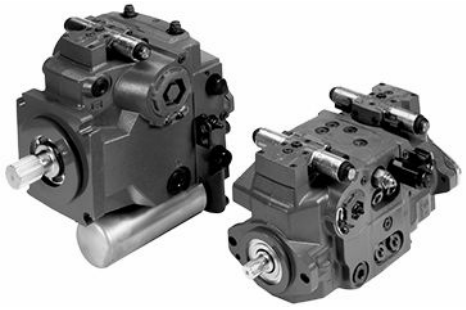
Latest version of technical literature

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

Product overview

Product image

H1 Pump EDC



Nomenclature

Single pump

	A	B	D	F	E	G	H	J	K	M	N	S	T	V	W	X	Y
H1 P		A					G								N N	N N N	N N N

Tandem pump

	A	B	C	D	F	E	G	H	J	K	M	N	P	R	S	T	V	W	X	Y
H1 T		A	N			N		F							N	P		N N	N N N	N N N

Code D Options

Option	Description
A2	Electrical Displacement Control, 12 V
A3	Electrical Displacement Control, 24 V
A4	Electrical Displacement Control, 12 V, manual override
A5	Electrical Displacement Control, 24 V, manual override

Only certain control options for the H1 pump utilize the Electrical Displacement Control (EDC). Please refer to the pump's nomenclature to determine if the pump is equipped with the proper option. The nomenclature can be found on the pump's nametag.

Product overview

Theory of operation

The Non Feedback Proportional Electric (NFPE) control is an electrical automotive control in which an electrical input signal activates one of two proportional solenoids that port charge pressure to either side of the pump servo cylinder. The NFPE control has no mechanical feedback mechanism.

The pump displacement is proportional to the solenoid signal current, but it also depends upon pump input speed and system pressure. This characteristic also provides a power limiting function by reducing the pump swashplate angle as system pressure increases.

EDC operation

H1 Electrical Displacement Control's (EDC) are current driven controls requiring a Pulse Width Modulated (PWM) signal. Pulse width modulation allows more precise control of current to the solenoids. The PWM signal causes the solenoid pin to push against the porting spool, which pressurizes one end of the servo piston, while draining the other. Pressure differential across the servo piston moves the swashplate. A swashplate feedback link, opposing control links, and a linear spring provide swashplate position force feedback to the solenoid. The control system reaches equilibrium when the position of the swashplate exactly balances the input command from the operator (solenoid). As hydraulic pressures in the operating loop change with load, the control assembly and servo/swashplate system work constantly to maintain the commanded position of the swashplate.

The EDC incorporates a positive neutral deadband as a result of the control spool porting, preloads from the servo piston assembly, and the linear control spring. Once the neutral threshold current is reached, the swashplate is positioned directly proportional to the control current. To minimize the effect of the control neutral deadband, we recommend the transmission controller or operator input device incorporate a jump up current to offset a portion of the neutral deadband.

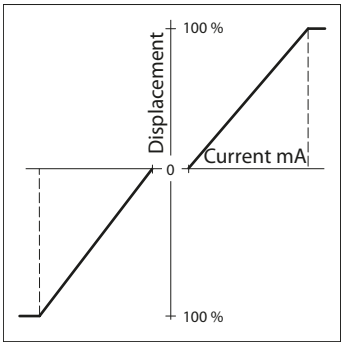
The neutral position of the control spool does provide a positive preload pressure to each end of the servo piston assembly.

When the control input signal is either lost or removed, or if there is a loss of charge pressure, the spring-loaded servo piston will automatically return the pump to the neutral position.

A serviceable 125 µm screen is located in the supply line immediately before the control porting spool.

An EDC is a displacement (flow) control. Pump swashplate position is proportional to the input command and therefore vehicle or load speed (excluding influence of efficiency), is dependent only on the prime mover speed or motor displacement.

EDC proportional actuation



Product overview

Hydrostatic drive line power

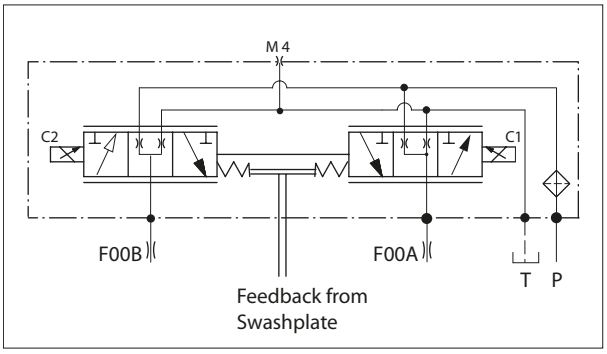
Warning

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.

Product overview

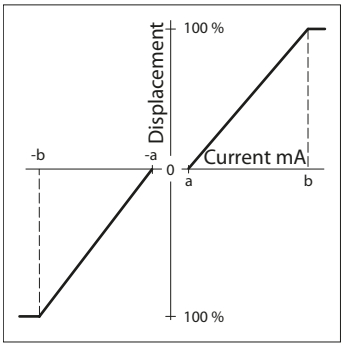
Hydraulic schematics

EDC



Electrical specifications

Pump displacement versus control current



H1 EDC electrical specifications

Voltage	**12V**	**24V**
Threshold current (-a, a)	640 mA	330 mA
End current (-b, b)	1640 mA	820 mA
Maximum current	1800 mA	920 mA
Rated power	18W	
Coil resistance at 20 °C [70 °F]	3.66 Ω	14.20 Ω
Coil resistance at 80 °C [176 °F]	4.52 Ω	17.52 Ω
PWM range	70 to 200 Hz	
PWM frequency*	100 Hz	
Inductance	33 mH	140 mH

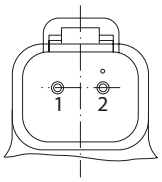
* PWM signal required for optimum control performance. Verify the PWM frequency is set correctly in the PLUS+1® controller. The default is set at 4000 Hz which will significantly reduce EDC performance.

Electrical installation

Pinout

DEUTSCH connector

Pin location



Pinout

Pin	Function
1	PWM signal
2	Ground

Pinout (alternative)

Pin	Function
1	Ground
2	PWM signal

Pin compatibility

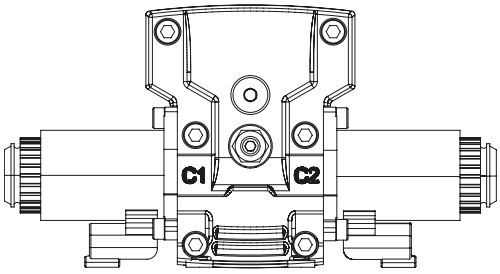
PLUS+1® module pin type

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

Electrical installation

Input/output matrix

H1 EDC C1 and C2 location



Single pump output flow direction versus control signal

Shaft rotation	CW		CCW	
Coil energized	**C2**	**C1**	**C2**	**C1**
Port A	in	out	out	in
Port B	out	in	in	out
Servo port pressurized	M5	M4	M5	M4

Tandem pump output flow direction versus control signal

Shaft rotation	CW				CCW			
	Front		Rear		Front		Rear	
Coil energized	**C2**	**C1**	**C2**	**C1**	**C2**	**C1**	**C2**	**C1**
Port A	in	out	—	—	out	in	—	—
Port B	out	in	—	—	in	out	—	—
Port C	—	—	in	out	—	—	out	in
Port D	—	—	out	in	—	—	in	out
Servo port pressurized	M5	M4	M5	M4	M5	M4	M5	M4

Mating connector

DEUTSCH connector parts list

Description	Quantity	Ordering number
Connector	1	DEUTSCH DT06-2S
Wedge lock	1	DEUTSCH W2S
Socket contact (16 and 18 AWG)	2	DEUTSCH 0462-201-16141
Mating connector kit	1	Danfoss K29657

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