Electrical Installation

Series 90 Pump

Electrical Displacement Control (EDC)
## Revision history

### Table of revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Changed</th>
<th>Rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2015</td>
<td>Minor correction to layout</td>
<td>BB</td>
</tr>
<tr>
<td>August 2015</td>
<td>Converted to Danfoss layout</td>
<td>BA</td>
</tr>
<tr>
<td>September 2010</td>
<td>PWM frequency recommendation</td>
<td>BA</td>
</tr>
<tr>
<td>September 2007</td>
<td>Maximum current specification corrected in table</td>
<td>AB</td>
</tr>
<tr>
<td>April 2007</td>
<td>First edition</td>
<td>AA</td>
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Literature references

**S90 Pump EDC literature references**

<table>
<thead>
<tr>
<th>Literature title</th>
<th>Description</th>
<th>Literature number</th>
</tr>
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<tbody>
<tr>
<td>S90 Axial Pumps Technical Information</td>
<td>Complete product electrical and mechanical specifications</td>
<td>520L0603</td>
</tr>
<tr>
<td>S90 EDC Control Compliant Function Block User Manual</td>
<td>Compliant function block set-up information</td>
<td>11022912</td>
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</table>

**Latest version of technical literature**

Danfoss product literature is online at: [http://powersolutions.danfoss.com/literature/](http://powersolutions.danfoss.com/literature/)
Product overview

Product image

*S90 Pump EDC*

Nomenclature

![Nomenclature diagram](image)

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA</td>
<td>Electrical Displacement Control</td>
</tr>
<tr>
<td>KP</td>
<td>Electrical Displacement Control</td>
</tr>
</tbody>
</table>

Only certain control options for the Series 90 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 name tag.
Theory of operation

The electric displacement control uses an electrohydraulic Pressure Control Pilot (PCP) valve to control the pilot pressure. The PCP converts an electrical input signal to a hydraulic input signal to operate a 4-way servo valve, which ports hydraulic pressure to either side of a double acting servo piston. The servo piston tilts the cradle swashplate, thus varying the pump's displacement from full displacement in one direction to full displacement in the opposite direction.

The control has a mechanical feedback mechanism which moves the servo valve in relation to the input signal and the angular position of the swashplate. The electrical displacement control is designed so the angular rotation of the swashplate (pump displacement) is proportional to the electrical input signal. Due to normal operating force changes, the swashplate tends to drift from the position preset by the machine operator. Drift, sensed by feedback linkage system connecting the swashplate to the control valve, will activate the valve and supply pressure to the servo piston, maintaining the swashplate in its preset position.

Pump displacement versus control current

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

Electric Displacement Control schematic

Electrical specifications

Pump displacement versus threshold and end current

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold current (-a, a)</td>
<td>14 mA</td>
</tr>
<tr>
<td>End current (-b, b)</td>
<td>85 mA</td>
</tr>
<tr>
<td>Maximum current</td>
<td>100 mA</td>
</tr>
<tr>
<td>Rated power</td>
<td>18 W</td>
</tr>
<tr>
<td>A - B Coil resistance at 24°C (75°F)</td>
<td>20Ω</td>
</tr>
<tr>
<td>C - D Coil resistance at 24°C (75°F)</td>
<td>16Ω</td>
</tr>
<tr>
<td>Recommended PWM frequency*</td>
<td>200 Hz</td>
</tr>
</tbody>
</table>

* Verify the PWM frequency is set correctly in the PLUS+1® controller. A PWM frequency of 200 Hz or higher is recommended, including the default frequency of 4000 Hz.
Electrical installation

Pinout

MS connector pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PWM signal</td>
</tr>
<tr>
<td>B</td>
<td>Ground</td>
</tr>
<tr>
<td>C</td>
<td>Ground</td>
</tr>
<tr>
<td>D</td>
<td>PWM signal</td>
</tr>
</tbody>
</table>

Delphi Weather-Pack connector pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PWM signal</td>
</tr>
<tr>
<td>B</td>
<td>Ground</td>
</tr>
<tr>
<td>C</td>
<td>Ground</td>
</tr>
<tr>
<td>D</td>
<td>PWM signal</td>
</tr>
</tbody>
</table>

Pin compatibility

PLUS+1® module pin type

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, D</td>
<td>PWMOUT/DOUT/PVG Power supply</td>
</tr>
<tr>
<td>A, D</td>
<td>PWMOUT/DOUT/PVGOUT</td>
</tr>
<tr>
<td>B, C</td>
<td>Power ground-</td>
</tr>
</tbody>
</table>

* Use output pins with configurable PWM frequency.

⚠️ Warning

Unintended vehicle or machine movement hazard. Verify the wiring harness to ensure the correct PLUS +1® pin is properly connected to each control pin.
Electrical installation

**S90 EDC input/output matrix**

<table>
<thead>
<tr>
<th>Input shaft rotation</th>
<th>Clockwise</th>
<th>Counterclockwise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive current to term</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Port A flow</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>Out</td>
<td>In</td>
<td></td>
</tr>
<tr>
<td>Port B flow</td>
<td>In</td>
<td>Out</td>
</tr>
<tr>
<td>In</td>
<td>Out</td>
<td></td>
</tr>
<tr>
<td>Service cylinder</td>
<td>MS</td>
<td>M4</td>
</tr>
<tr>
<td>MS</td>
<td>M4</td>
<td></td>
</tr>
</tbody>
</table>

**Mating connector**

**MS connector parts list**

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Ordering number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS connector</td>
<td>1</td>
<td>SG3108E-14S-2S-SR</td>
</tr>
<tr>
<td>Mating connector kit</td>
<td>1</td>
<td>Danfoss K08106</td>
</tr>
</tbody>
</table>

**Delphi Weather Pack connector parts list**

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Ordering number</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 way black Weather Pack tower sealed female connector assembly</td>
<td>1</td>
<td>12015797</td>
</tr>
<tr>
<td>Female terminals (18 to 20 AWG)*</td>
<td>4</td>
<td>15408312</td>
</tr>
<tr>
<td>Cable seals (2.03 to 2.85 mm cable diameter)*</td>
<td>4</td>
<td>12015323</td>
</tr>
<tr>
<td>Mating connector kit</td>
<td>1</td>
<td>Danfoss K03384</td>
</tr>
</tbody>
</table>

* Contact Delphi for proper components if using different wire size than listed.
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