ENGINEERING
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Technical Information

PVED-CC4 Series 7
Electro-hydraulic Actuator

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Revision history

Table of revisions

Date	Changed	Rev
October 2020	Updated version/revision number to match online catalog	0104
October 2020	Various technical changes, including replaced images	0103
April 2020	Some dimension drawings replaced, text changes	0102
Febraury 2020	First edition.	0101

Contents

PVE Electrical Actuator

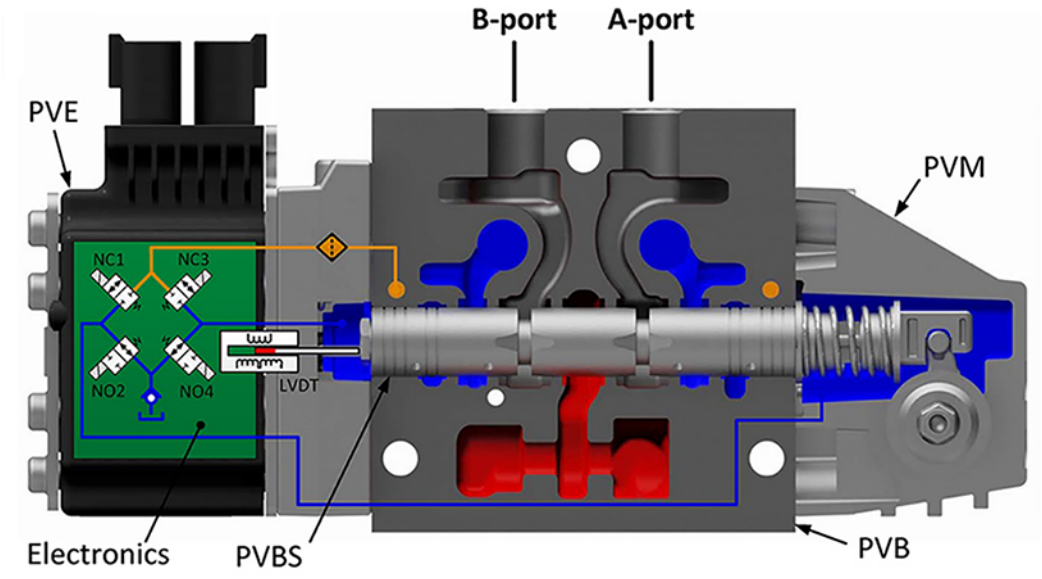
PVED-CC4 Series 7 Electro-hydraulic Actuator

The digital PVED-CC4 Series 7 will replace the existing Series 4 PVED-CC. The actuator is an electro-hydraulic actuator used to control a single work section of a PVG proportional valve group.

The actuator positions the main spool in a PVG work section in order to control either the flow or the pressure of the oil distributed to/from the work function. The CAN bus communication protocols are according to ISObus/J1939, enabling the user to operate the work function remotely by means of a joystick, a controller or similar.

The actuator positions the main spool by distributing pilot oil pressure to either side of it, pressurizing one side by pilot pressure while relieving the opposite side to tank and vice versa, as illustrated below. All proportional actuators feature a closed-loop spool control.

PVG 32 with PVED-CC4 Series 7



PVED-CC Cable kit

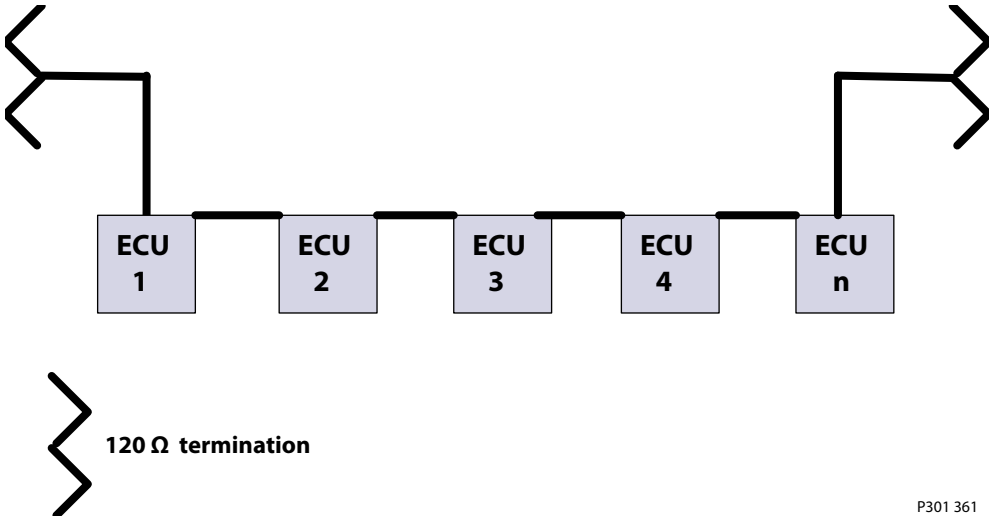
The cabling is one of the great advantages for CAN systems. It reduces the number of cables and gives a simpler system overview.

All units (ECU e.g. PVED) are connected by the CAN bus, a CAN high and a CAN low wire which are terminated at the ends. Power and ground wires can with respect to maximum current consumption follow the bus wires.

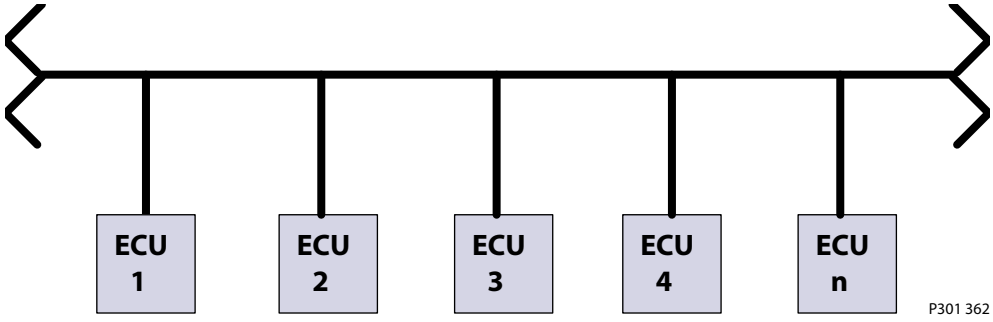
The bus can either be made as a daisy chain, where the stub from bus to ECU is inside the PVED

PVE Electrical Actuator

Daisy chain connection



or with stubs going to the ECU.



Both solutions have advantages and disadvantages. Danfoss supports the daisy chain solution with cables but the PVED-CC4 could easily be used with this solution.

PVED-CC4 Series 7 Variants Overview

The digital PVED Series 7 actuator program features the following main variants:

- PVED-CC4 – Proportional Spool Control Actuator for Very High Performance

Main Features

Features	PVED-CC4
Compatibility	PVG/Steering
Supply Voltage	11—32 V_{DC}
Pilot Pressure (Nominal)	13.5 bar
Actuation	Proportional
Control Principle	Closed Loop
Power Save	Yes
Connector	2x4 AMP (IP66) and 2x4 DEUTSCH (IP67)
Cabling Concept	Daisy Chain / Backbone
Solenoid Valve Configuration	2 x 2-WAY NC-S; 2 x 2-WAY NO
LVDT Design Architecture	PVE Series 7
Physical Dimension	PVES Series 7

PVE Electrical Actuator

PVED-CC4 Series 7 Specific Parameters

Configurable Transfer Functions

- Flow Ramping
- Progressivity
- Scaling
- Invert Ports
- Float Threshold
- Spool data

Configurable Timing and Delay

- Spool Timeout
  - General Timeout
  - Float Timeout
- AVC Timeout
- AVEF Transmit Time
- KWP2000 Message Timeout

Setup and Service Features

- Service Protocol
  - WebGPI
  - KWP2000
- PLUS+1 Service Tool Compatibility
  - Desktop/Laptop
- Embedded PLUS+1 Parameter File
- PLUS+1 GUIDE Compliance Blocks
  - AVC
  - AVEF
  - IDAutoChange

See PVED-CC, Series 4 Technical information for more information about parameters (BC152886483910).
PVED-CC Series 4 and PVED-CC4 Series 7 are compliant with each other.

PVED-CC4 Series 7 Functionality

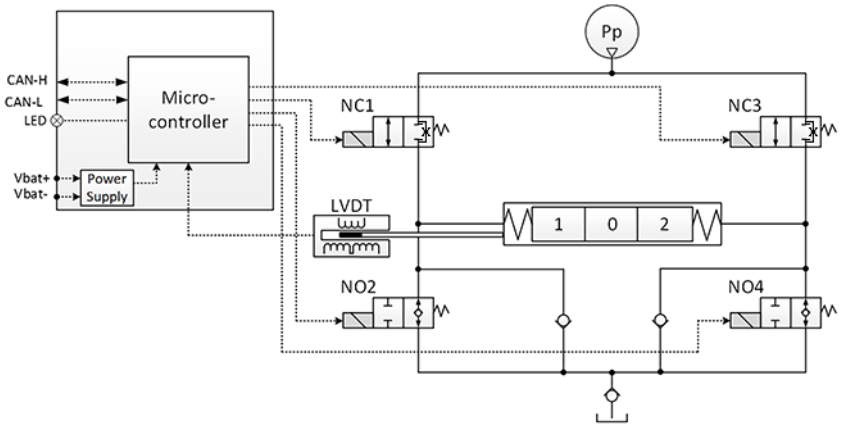
The PVED-CC4 Series 7 is a proportional control actuator with closed-loop spool control primarily used to control work functions with very high-performance requirements.

The PVED-CC4 Series 7 functionality includes an electric circuit with a closed-loop logic. An embedded micro-controller processes the CAN set points and the LVDT feedback signal and regulates the solenoid valves accordingly.

Features:

- Available timing options:
  - General Timeout
  - Float Timeout
  - Feedback transmitted time (AVEF)
  - Set-point timeout (AVC)
  - KWP2000 Message timeout
- 11–32 V_{DC} multi-voltage power supply, max. voltage ripple 5%
- Available with AMP and DEUTSCH connectors
- To be used with standard PVE pilot oil pressure of 13.5 bar
- Configurable active or passive recovery
- Configurable transfer functions
- LED indicating current state

PVED-CC4 Series 7 Functionality

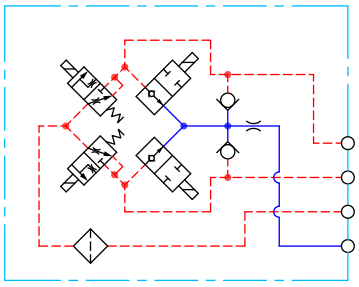


The heart of the hydraulic sub-system is the solenoid valve bridge. It consists of four poppet valves, the two upper ones are normally closed (NC-S) with a small bleed, the two lower ones are normally open (NO).

A continuous modulation of solenoid valves NC1 and NO4 together with a simultaneous energization of NO2 and de-energization of NC3 causes the main spool to move to the right direction and vice versa. When the main spool is stroked to the far right, a simultaneous energization of both NO2 and NO4 and de-energization of both NC1 and NC3 balances the main spool in its stroked position. An emergency stop activated when the spool is stroked will cause all solenoid valves to de-energize causing the main spool to move back to its neutral position by means of the main spool neutral spring and the hydraulic principle.

PVED-CC4 Series 7 Functionality

PVED-CC4 Series 7 Schematic



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Current Consumption

	12V	24V
Power Save	70 mA	40 mA
Operating	580 mA	300 mA

Technical Data

Operating Conditions

Description	Type	Value
Pilot Pressure	Nominal	13.5 bar [196 psi]
	Minimum	10.0 bar [145 psi]
	Maximum	15.0 bar [218 psi]
Oil Consumption	Neutral	0.3 l/min [0.05 gal/min]
	Locked position	0.3 l/min [0.05 gal/min]
	Actuating	0.8 l/min [0 .21 gal/min]
Storage Temperature	Ambient	-50 to +90°C [-58 to +194°F]
Operating Temperature	Ambient	-40 to +90°C [-40 to +194°F]
Oil Viscosity	Operating range	12 to 75 cSt [65 to 347 SUS]
	Minimum	4 cSt [39 SUS]
	Maximum	460 cSt [2128 SUS]
Oil Cleanliness	Maximum	18/16/13 (according to ISO 4406)

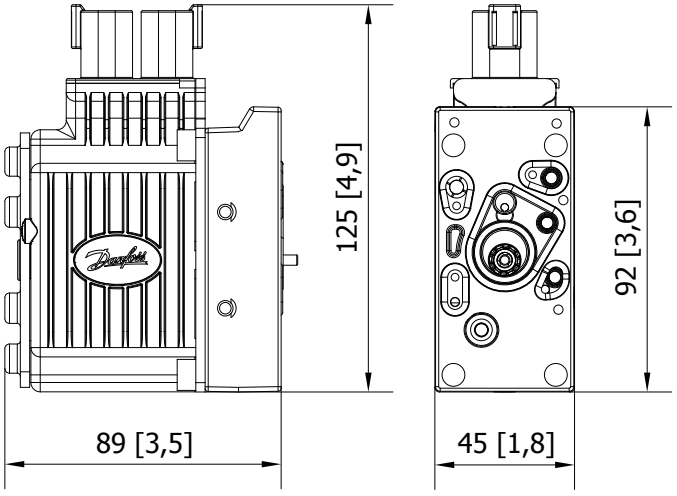
LED Characteristic

Color	LED Characteristic	Description
Green		No error - Actuating
Yellow		Power save
Yellow		Manual operation
Red		Error

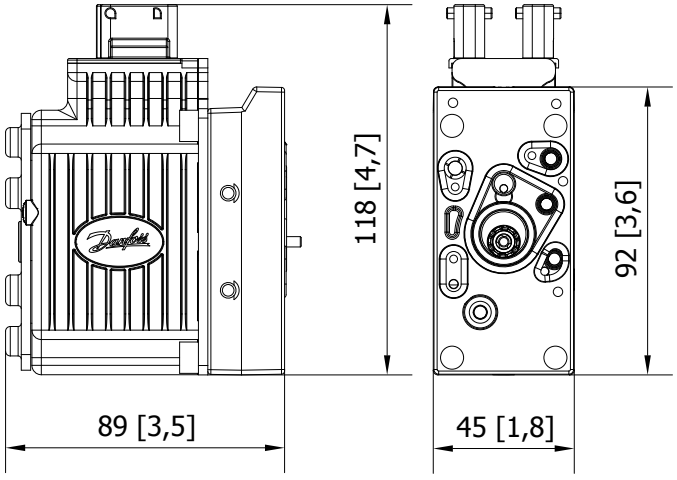
PVED-CC4 Series 7 Functionality

Dimensions

Dimensions - DEUTSCH connector



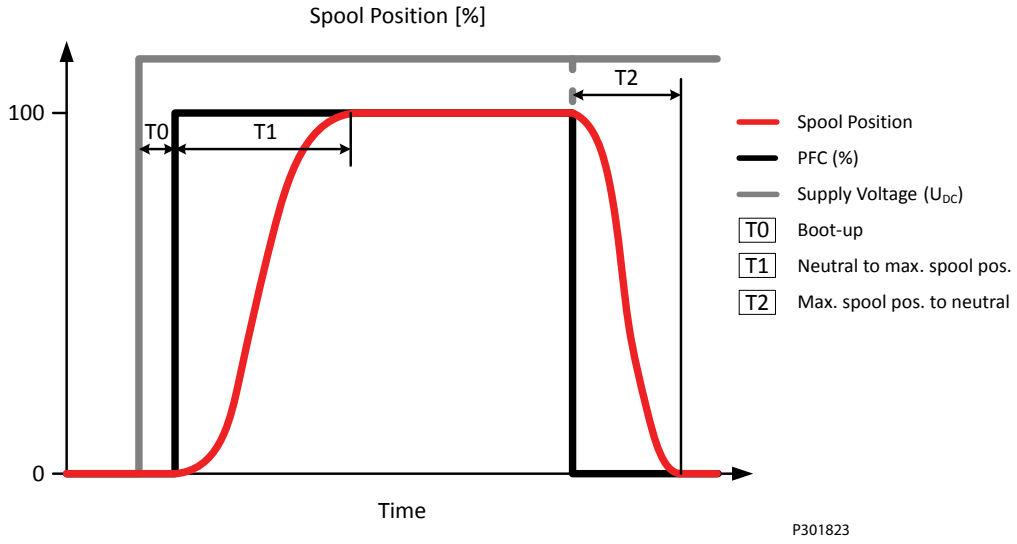
Dimensions - Amp. connector



PVED-CC4 Series 7 Functionality

Reaction Times

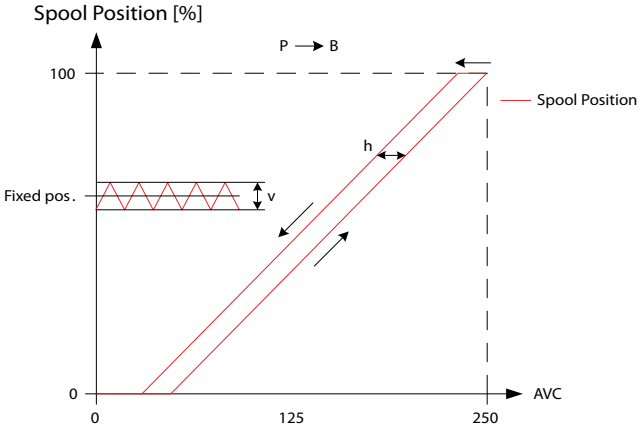
Reaction times



Reaction	PVED-CC4 S7 PVB32/100	PVED-CC4 S7 PVBZ32/100
T0 – Boot-up (ready for set point)	2100 ms	2100 ms
T1 – Neutral to max. spool stroke	120 ms	80 ms
T2 – Max. spool stroke to neutral @ Power on	60 ms	50 ms
T2 – Max. spool stroke to neutral @ Power off	90 ms	50 ms

Hysteresis and Ripple

Spool position vs. set point (AVC)



Hysteresis Rated (h)	Steady State Ripple – Rated @ fixed Us (v)
1 %	0.03 mm

PVED-CC4 Series 7 Functionality

PVED-CC4 Series 7 Variants for PVG

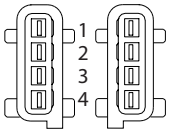
PVED-CC4 Series 7 Variants

Part No.	Connector	IP	U_{DC}
11235797	2x4 AMP	66	11–32 V_{DC}
11235804	2x4 DEUTSCH	67	

Connector Overview

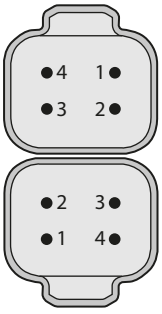
Connectors Overview

2 x 4 AMP



Legend:
1. CAN Low
2. U_{DC}
3. Ground
4. CAN High

2 x 4 pin DEUTSCH



Legend:
1. CAN High
2. CAN Low
3. U_{DC}
4. Ground

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