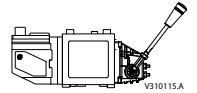


# Installation Guide

## Electrical Actuating Module PVE series 4 for PVG 32 and PVG 100



157R9915

157R9915

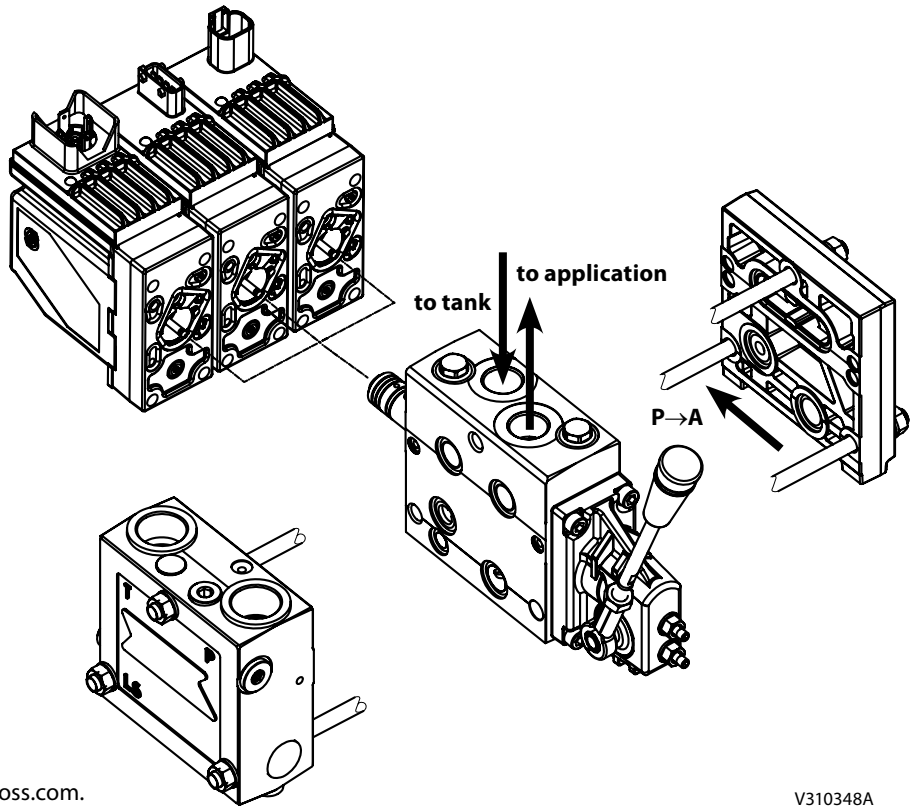
### PVE for PVG 32 and PVG 100:

Oliestrømmens retning for standard monterede grupper.

Oil flow direction for standard assembled groups.

Richtung des Ölstroms für Standard-Baugruppen.

Sens du débit pour ensembles standard.



For Technical Information, see Danfoss.com.

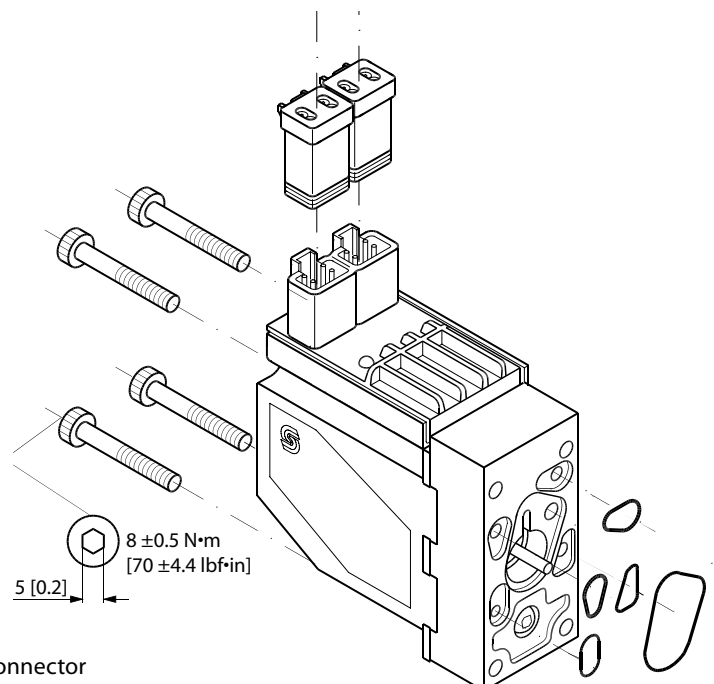
V310348A

### Mounting PVE

Instruktionen dækker  
Instruction covers  
Anleitung umfasst  
l'instruction couvre

Danfoss actuators PVEA, PVEH, PVEM, PVEO, PVEP, PVES, PVEU Variants -R, -DI, -SP, -F.  
Connectors Deutsch, AMP, DIN/Hirschmann.

For full documentation see [Technical Information, PVE Series 4 for PVG 32, PVG 100 and PVG 120, 520L0553](#) on [www.Danfoss.com](http://www.Danfoss.com)

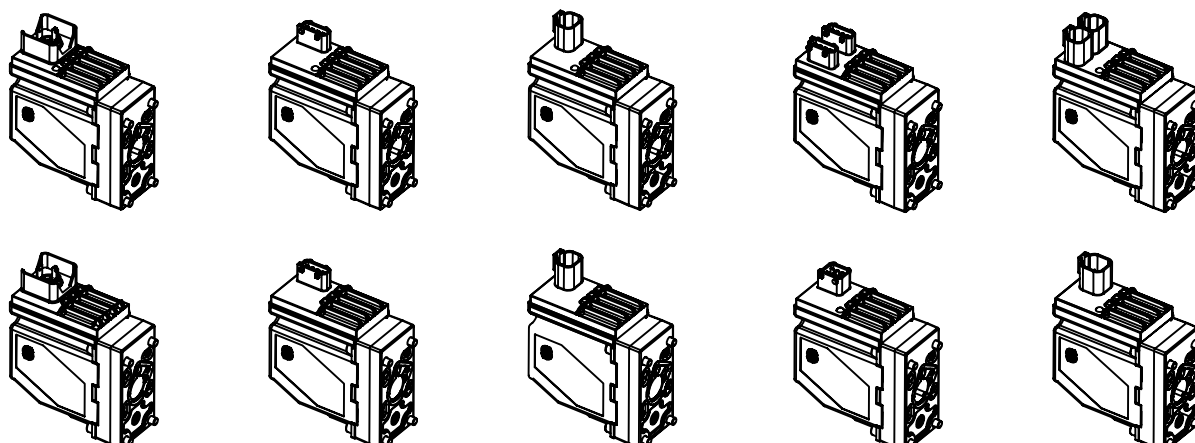


- Protect LVDT-pin if present
- Ensure O-rings are in place
- Ensure gasket when using AMP and DIN/Hirschmann connector
- Do not over torque

### ▲ Warning

PVEA is not for use on PVG 100.

### All PVE variants. PVEO and PVEO-R are without LVDT



### Version ON/OFF

- Ground pins are internally connected.
- Pin 3 is not connected on Hirschmann/DIN version of PVEO.
- $U_{DC2}$  supplies electronics for feedback signal on PVEO-DI.

### Connection PVEO with direction indication (DI)

Connector 1	A $U_{DC}$	B $U_{DC}$	Gnd	Gnd
AMP (grey)	p 1	p 2	p 3	p 4

Connector 2	DI-B	DI-A	Gnd	$U_{DC2}$
AMP (black)	p 1	p 2	p 3	p 4

### Connection PVEO standard

Connector	A	B
AMP/Hirschmann/DIN	pin 1	pin 2
Deutsch	pin 1	pin 4

Function	A (pin 1)	B (pin 2)
Neutral	0	0
Q: P → A	$U_{DC}$	0
Q: P → B	0	$U_{DC}$

### Control all PVEO

Connector	A	B
AMP	pin 1	pin 2
Hirschmann/DIN	pin 1	pin 2
Deutsch	pin 1	pin 4

### DI general note

Til DI udførelserne er det nødvendigt at have 2  $U_{DC}$ -tilslutninger ( $U_{DC}$  og  $U_{DC2}$ ):

- $U_{DC}$  forsyner elektronikken og
- $U_{DC2}$  forsyner magnetventilerne

De to jordforbundne stikket er internt forbundet.

Der kan med fordel anvendes to separate strømforsyninger (jvf. tekniske informationer for PVE serie 4)

On DI versions two  $U_{DC}$  connections ( $U_{DC}$  and  $U_{DC2}$ ) are necessary.

- $U_{DC}$  will supply the electronics and
- $U_{DC2}$  will supply the solenoid valves

The two ground pins are internally connected.

With advantages two separate power supplies can be used, see also Technical information for PVE series 4.

Die DI Ausführungen fordern zwei  $U_{DC}$ -Anschlüsse ( $U_{DC}$  und  $U_{DC2}$ ):

- $U_{DC}$  versorgt die Elektronik und
- $U_{DC2}$  versorgt die Magnetventile

De zwei Erdungsstecker sind intern verbunden.

Es kann mit Vorteil zwei separate Stromversorgungen verwendet werden (vgl. technische Informationen für PVE Serie 4)

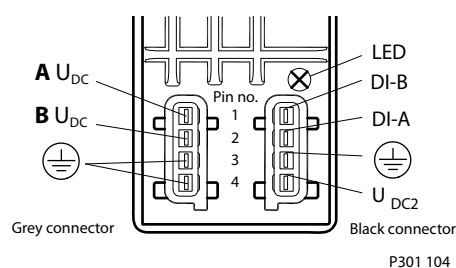
Pour les versions DI deux raccordements  $U_{DC}$  ( $U_{DC}$  et  $U_{DC2}$ ) sont nécessaires.

- $U_{DC}$  alimente l'électronique
- $U_{DC2}$  alimente les électro-distributeurs

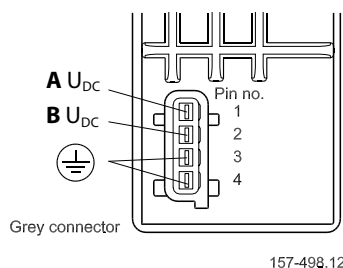
Les deux bornes masse sont reliées intérieurement.

L'emploi de deux sources d'alimentation séparées a des avantages, voir Information Technique pour PVE série 4

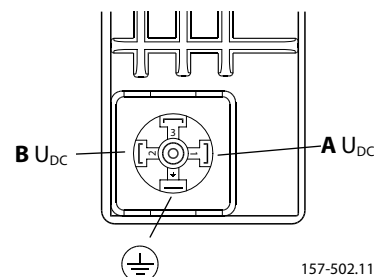
### AMP version of PVEO-DI



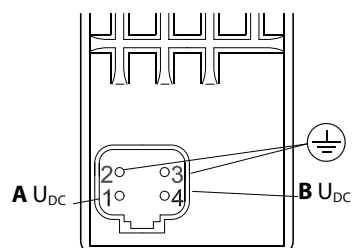
### AMP version of PVEO/PVEO-R



### Hirschmann/DIN version of PVEO / PVEO-R



### Deutsch version of PVEO / PVEO-R



**Proportional Version**

**Standard PVE**

Connection PVEA/PVEH/PVEM/PVES/PVEU - also with float B four pin

Connector	U <sub>s</sub>	U <sub>DC</sub>	Gnd	Error
AMP	pin 1	pin 2	pin 3	pin 4
Hirschmann/DIN	pin 2	pin 1	gnd	pin 3
Deutsch	pin 1	pin 4	pin 3	pin 2

- On PVEM the error pin is not used and not connected (pin 3 Hirschmann/DIN).
- Ground pins are internally connected.

Control (U<sub>s</sub>) for standard mounted PVEA/PVEH/PVEM/PVES

Function	Voltage relative	PWM
Neutral	0,5 • U <sub>DC</sub>	50%
Q: P → A	0,5 → 0,25 • U <sub>DC</sub>	50% → 25%
Q: P → B	0,5 → 0,75 • U <sub>DC</sub>	50% → 75%

Control (U<sub>s</sub>) for standard mounted PVEU

Function	PVEU
Neutral	5 V
Q: P → A	5 V → 2,5 V
Q: P → B	5 V → 7,5 V

Control (U<sub>s</sub>) for standard mounted PVEH/PVEM float B four pin version

Function	Voltage relative	PWM
Neutral	0,5 • U <sub>DC</sub>	50%
Q: P → A	0,5 → 0,34 • U <sub>DC</sub>	50% → 34%
Q: P → B	0,5 → 0,65 • U <sub>DC</sub>	50% → 65%
Float	0,75 • U <sub>DC</sub>	75%

**Standard PVE with DI**

Connection PVE with direction indication (DI)

Connector 1	U <sub>s</sub>	U <sub>DC1</sub>	Gnd	Error
AMP (grey)	p 1	p 2	p 3	p 4
Deutsch	p 1	p 4	p 3	p 2

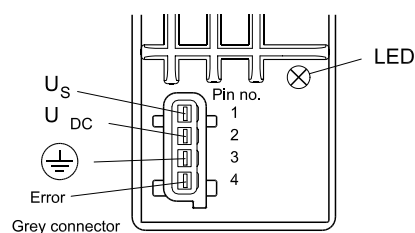
Connector 2	DI-B	DI-A	Gnd	U <sub>DC2</sub>
AMP (black)	p 1	p 2	p 3	p 4
Deutsch	p 4	p 3	p 2	p 1

Control (U<sub>s</sub>) for standard mounted PVEA-DI/PVEH-DI

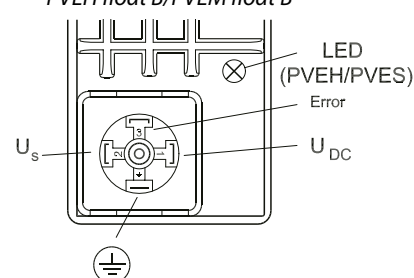
Function	U <sub>s</sub>	PWM
Neutral	0,5 • U <sub>DC</sub>	50%
Q: P → A	0,5 → 0,25 • U <sub>DC</sub>	50% → 25%
Q: P → B	0,5 → 0,75 • U <sub>DC</sub>	50% → 75%

- Ground pins are internally connected.
- U<sub>DC2</sub> only supplies electronics for feedback signal and error pin on PVEA-DI / PVEH-DI. Two separate power sources can be used.

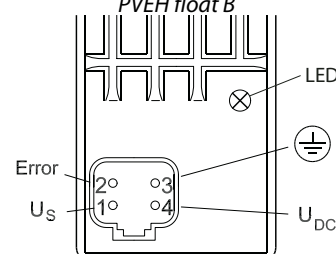
AMP version PVEA/PVEH/PVES/PVEU



Hirschmann/DIN version PVEH/PVEM/PVES/PVEH float B/PVEM float B

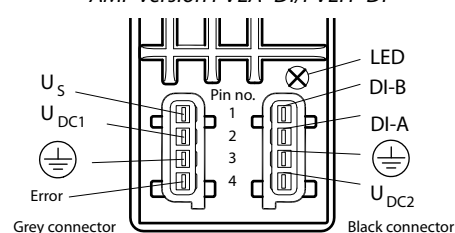


Deutsch version PVEA/PVEH/PVES/PVEU/PVEH float B

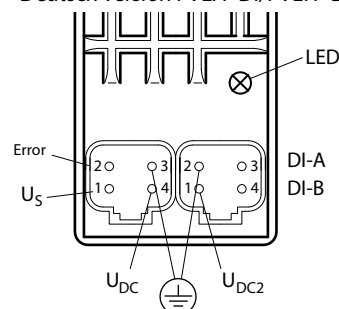


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AMP version PVEA-DI/PVEH-DI



Deutsch version PVEA-DI/PVEH-DI



### Proportional Version

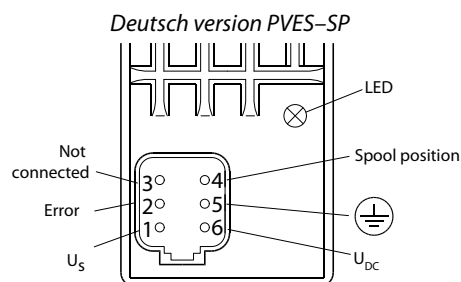
#### Standard PVE with SP

Connection PVE with Spool Position (SP)

Connector	U <sub>s</sub>	Error	SP	Gnd	U <sub>DC</sub>
Deutsch	p 1	p 2	p 4	p 5	p 6

Control (U<sub>s</sub>) for standard mounted PVES-SP

Function	U <sub>s</sub>	PWM
Neutral	0,5 · U <sub>DC</sub>	50%
Q: P → A	0,5 → 0,25 · U <sub>DC</sub>	50% → 25%
Q: P → B	0,5 → 0,75 · U <sub>DC</sub>	50% → 75%



#### PVE with separate Float pin

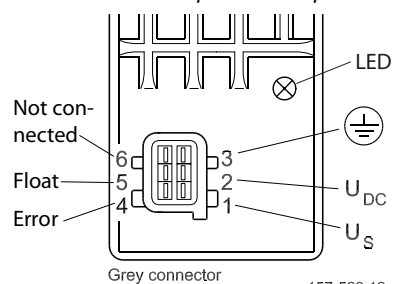
Connection PVEH with float A six pin

Connector	U <sub>s</sub> (control)	U <sub>DC</sub> (power)	Float	Ground	Error
AMP	pin 1	pin 2	pin 5	pin 3	pin 4
Deutsch	pin 1	pin 6	pin 3	pin 5	pin 2

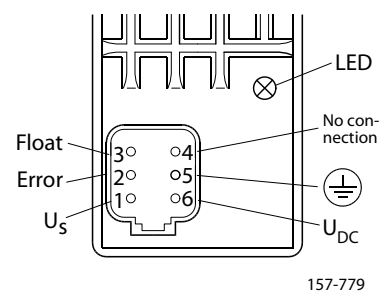
Control (U<sub>s</sub>) for standard mounted PVEH/PVEM float A six pin version

Function	Voltage relative	PWM
Neutral	0,5 · U <sub>DC</sub>	50%
Q: P → A	0,5 → 0,25 · U <sub>DC</sub>	50% → 25%
Q: P → B	0,5 → 0,75 · U <sub>DC</sub>	50% → 75%
Float	U <sub>DC</sub> on Float pin	

AMP with separate float pin



Deutsch version with separate float pin



#### PWM controlled PVE – PVEP

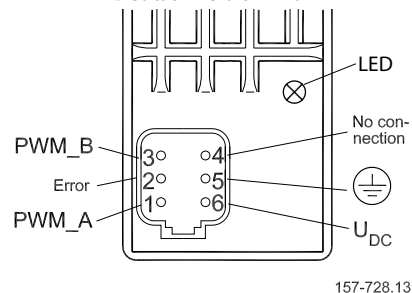
Connection PVEP

Connector	PWM A	Error	PWM B	Gnd	U <sub>DC</sub>
Deutsch	p 1	p 2	p 3	p 5	p 6

Control (U<sub>s</sub>) for standard mounted PVEP

Function	PWM A	PWM B
Neutral	< 10%	< 10%
Q: P → A	10% → 80%	< 10%
Q: P → B	< 10%	10% → 80%

Deutsch version with PVEP



## Safety and Monitoring

### Fault monitoring overview

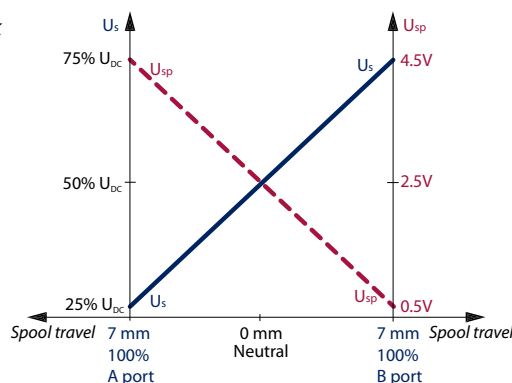
Type	Fault monitoring	Delay before error out	Error mode	Error output status	Fault output on PVE <sup>1)</sup>	LED light	Memory (reset needed)
PVEO PVEM	No fault monitoring	-	-	-	-	-	-
PVEA PVEH PVEP PVES PVEU	Active	500 ms (PVEA: 750 ms)	No fault	Low	< 2 V	Green	-
			Input signal faults	High	$\sim U_{DC}$	Flashing red	Yes
			Transducer (LVDT)			Constant red	
	Close loop fault	Low	< 2 V	Green	-		
	Passive	250 ms (PVEA: 750 ms)	No fault	Low	< 2 V	Green	-
			Input signal faults	High	$\sim U_{DC}$	Flashing red	No
Transducer (LVDT)			Constant red				
Close loop fault	High	$\sim U_{DC}$	Constant red	-			
PVE Float six pin	Active	500 ms	Float not active	High	$\sim U_{DC}$	Constant red	Yes
		750 ms	Float still active				

1) Measured between fault output pin and ground.

## Spool Position Feedback (-SP)

The -SP functionality is a 0,5V to 4,5V inverted feedback with 2,5V as neutral value.

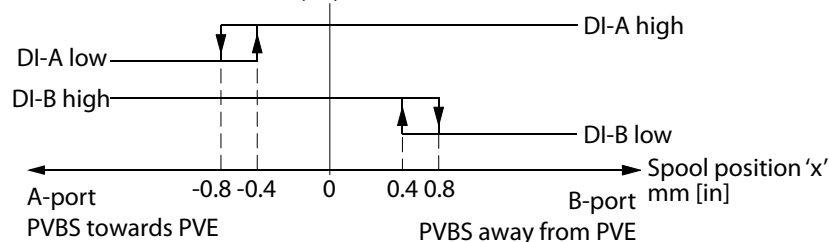
### Spool Position Feedback



## Direction Indication Feedback (-DI)

As shown in the figure, both "DI-A" and "DI-B" signals are "High" when the spool is in neutral position. When the spool is moving in the A direction, the "DI-A" signal goes "Low" and the "DI-B" signal stays "High". The reverse is true when the spool is moved in the B direction.

### Direction Indication Feedback (-DI)



157-435.10

**Both direction indication signals go low when the error indicator goes high.**

### Values for both Direction Indicators, pin A and pin B

<b>Transition to low from high</b>	0.8 ± 0.1 mm [0.031 in]
<b>Transition to high from low</b>	0.4 ± 0.1 mm [0.015 in]
<b>Transition to low both pins</b>	error pin goes high
<b>Maximum load of "DI-A", "DI-B"</b>	50 mA
<b>Voltage <math>U_{DC}</math> high by load 20 mA</b>	> $U_{DC} - 1.5 V$
<b>Voltage <math>U_{DC}</math> high by load 50 mA</b>	> $U_{DC} - 2.0 V$
<b>Voltage low</b>	< 0.2 V

## Technical data

Følgende tekniske data bygger på typiske testresultater. Der anvendes mineralsk olie med en viskositet på 21 mm<sup>2</sup>/s [102 SUS] og en temperatur på 50°C [122°F].

The following technical data are from typical test results. For the hydraulic system a mineral based hydraulic oil with a viscosity of 21 mm<sup>2</sup>/s [102 SUS] and a temperature of 50°C [122°F] were used.

Folgende technische Daten bauen auf typische Testergebnisse. Es wurde Mineralöl mit einer Viskosität von 21 mm<sup>2</sup>/s [102 SUS] und einer Temperatur von 50°C [122°F] verwendet.

Les caractéristiques techniques suivantes sont tirées de résultats de tests typiques. Pour le système hydraulique, on a utilisé une huile minérale d'une viscosité de 21 mm<sup>2</sup>/s [102 SUS] et à une température de 50°C [122°F].

### PVEO, PVEM

<b>Supply voltage U<sub>DC</sub></b>	rated	12 V DC	24 V DC
	range	11 V to 15 V	22 V to 30 V
	max. ripple	5%	
<b>Current consumption at rated voltage</b>		0.65 A @ 12 V	0.33 A @ 24 V
<b>Signal voltage (PVEM)</b>	neutral	0.5 x U <sub>DC</sub>	
	A-port ↔ B-port	0.25 • U <sub>DC</sub> to 0.75 • U <sub>DC</sub>	
<b>Signal current at rated voltage (PVEM)</b>		0.25 mA	0.50 mA
<b>Input impedance in relation to 0.5 • U<sub>DC</sub></b>		12 KΩ	
<b>Power consumption</b>		8 W	

### PVEA, PVEH, PVEP, PVES, PVEU

<b>Supply voltage U<sub>DC</sub></b>	rated / range	11 V to 32 V	
	max. ripple	5%	
<b>Current consumption at rated voltage</b>	<b>PVEH/PVEP/PVES/PVEU (PVEA)</b>	0.57 (0.28) A @ 12 V	0.3 (0.15) A @ 24 V
<b>Signal voltage</b>	PVEA/PVEH/PVES - neutral	0.5 x U <sub>DC</sub>	
	PVEA/PVEH/PVES - A-port ↔ B-port	0.25 • U <sub>DC</sub> to 0.75 • U <sub>DC</sub>	
	PVEU - neutral	5V	
	PVEU - A-port ↔ B-port	2.5V to 7.5V	
	PVEP - neutral	A < 10%, B < 10%	
	PVEP - A-port	10% < A < 80%, B < 10%	
	PVEP - B-port	A < 10%, 10% < B < 80%	
<b>Signal current at rated voltage</b>		0.25 mA to 0.70 mA	
<b>Input impedance in relation to 0.5 • U<sub>DC</sub></b>		12 KΩ	
<b>Input capacitor</b>		100 nF	
<b>Power consumption</b>	<b>PVEH/PVEP/PVES/PVEU (PVEA)</b>	7 (3.5) W	

### Oil viscosity

<b>Oil viscosity</b>	range	12 – 75 mm <sup>2</sup> /s [65 – 347 SUS]
	min.	4 mm <sup>2</sup> /s [39 SUS]
	max.	460 mm <sup>2</sup> /s [2128 SUS]

**Bemærk:** Maksimum opstartviskositet

**Note:** Max. start up viscosity 2500 mm<sup>2</sup>/s

**Beachte:** Maximale Viskosität bei Inbetriebnahme

**Remarque:** Viscosité maximale au démarrage 2500 mm<sup>2</sup>/s

### Filtering in the hydraulic system

<b>Required operating cleanliness level</b>	18/16/13 (ISO 4406, 1999 version)
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**Bemærk:** I særligt udsatte maskiner anbefales der beskyttelse med en skærm.  
**Beachte:** In besonders ausgesetzten Maschinen wird Schutz in Form von elektrischer Abschirmung empfohlen.  
**NB:** In particularly exposed applications, protection by screen is recommended.  
**Remarque:** Pour les applications particulièrement exposées, il est recommandé d'installer une protection par écran.

### Oil temperature

<b>Oil temperature</b>	range	30 – 60°C [86 – 140°F]
	min.	-30°C [-22°F]
	max.	90°C [194°F]

### Operating temperature

<b>Ambient</b>	-30 – 60°C [-22 – 140°F]
<b>Stock</b>	-40 – 90°C [-40 – 194°F]
<b>Recommended long time storage in packaging</b>	10 – 30°C [50 – 86°F]

### Pilot pressure

<b>Pilot pressure (relative to T pressure)</b>	nom.	13.5 bar [196 psi]
	min.	10 bar [145 psi]
	max.	15 bar [217 psi]

### Grade of enclosure\*

<b>Connector version</b>	
AMP JPT	IP 66
Hirschmann	IP 65
Deutsch	IP 67

\* According to the international standard IEC 529.

### Udluftning

Hvis gruppen er monteret vertikalt, anbefales det at udlufte ved justerskruer (Pos.A)  
 Bemærk: Ved PVEA kan det, pga.dens hydrauliske opbygning, være påkrævet at foretage udluftning.

### Bleeding

If the group is installed vertically, it is recommended to bleed it at the adjusting screws (Pos.A)  
 Note: Because of the hydraulic build-up of PVEA, it may be necessary to bleed the PVEK.

### Entlüftung

Wenn die Gruppe vertikal montiert ist, empfehlen wir an den Justierschrauben zu entlüften (Pos.A)  
 Beachte: Wegen des hydraulischen Aufbaus von PVEA kann eine Entlüftung erforderlich sein.

### Purge

Si l'ensemble est monté verticalement, il est recommandé de le purger au moyen des vis d'ajustage (Pos.A)  
 Nb! En raison du système hydraulique des PVEAs il peut s'avérer nécessaire de purger.

### Beskyttelse

Alle PVE-moduler overholder tætheddsgrad IP65 i henhold til IEC 529. Det anbefales dog, at PVE'en på særligt udsatte steder beskyttes i form af en afskærmning eller lignende.

### Schutzart

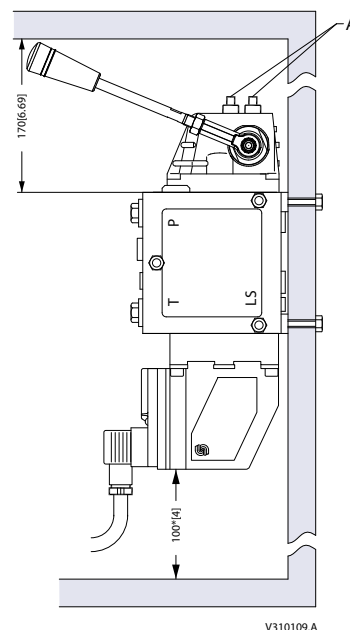
Alle PVE-Module erfüllen die Schutzart IP65 gemäß IEC 529. Es ist jedoch empfehlenswert, der PVE in besonders ausgesetzten Einsatzbereichen mit einer Abschirmung oder dergleichen zu schützen.

### Protection

All PVE modules comply with protection class IP65 in accordance with IEC 529. However, in particularly exposed applications protection in the form of screening is recommended.

### Protection

Tous les modules PVE possèdent le degré de protection IP65 conformément à la IEC 529. Dans les zones particulièrement exposées, il est cependant conseillé de protéger le PVE à l'aide d'un écran ou d'un dispositif similaire.



### ⚠ Warning

Alle mærker og typer af retningsventiler – også proportional ventiler – kan svigte og forårsage alvorlig skade. Det er derfor vigtigt at analysere maskinen i alle enkeltheder.  
 Da proportionalventiler anvendes under mange forskellige driftsbetingelser og i mange forskellige maskiner, er det alene maskinproducentens ansvar at træffe det endelige produktvalg og sikre at samtlige maskinens krav til ydelse, sikkerhed og advarsler er opfyldt.  
 Ved valg af reguleringssystem – og sikkerhedsniveau – kan man f.eks. støtte sig til EN954-1 (sikkerhedsrelaterede bestanddele i reguleringssystemet.)

Alle Fabrikate und Typen von Wegeventilen – einschließlich Proportionalventile – können versagen und schlimme Unfälle verursachen. Es ist daher wichtig, die Anwendung in allen Details zu analysieren.  
 Weil Proportionalventile unter vielen unterschiedlichen Arbeitsbedingungen und in vielen verschiedenen Anwendungen benutzt werden, trägt allein der Maschinenhersteller die Verantwortung für seine endgültige Wahl von Produkt, und er ist ebenfalls dafür verantwortlich, dass alle Leistungs-, Sicherheits- und Warnungsanforderungen an seine Maschine erfüllt sind.  
 Zur Wahl vom Reglersystem und Sicherheitsniveau kann man sich z.B. auf EN954-1 stützen.

All marks and brands of valves – inclusive proportional valves – can fail and cause serious damage. It is therefore important to analyse all aspects of the application.  
 Because the proportional valves are used in many different operation conditions and applications, the manufacturer of the application is alone responsible for making the final selection of the products – and assuring that all performance, safety and warning requirements of the application are met.  
 The process of choosing the control system – and safety level – could e.g. be governed by EN 954-1 (Safety related parts of control system). See also Technical information for PVE series 4.

Tous les distributeurs - y compris les distributeurs proportionnels - peuvent tomber en panne et entraîner de sérieux dommages. C'est la raison pour laquelle il est important d'analyser chaque aspect de l'application. Les vannes proportionnelles étant utilisées dans de nombreuses conditions d'exploitation et applications différentes, le fabricant de l'application porte l'entière responsabilité de la sélection finale des produits et du respect des exigences en matière de rendement, de sécurité et d'avertissement. Le choix du système de commande – et du niveau de sécurité – peut être fait par exemple sur la base de la norme EN 954-1 (parties du système de commande relatives à la sécurité). Se reporter également à Information technique pour PVE série 4.

**Accessories**
*Connector code numbers*

Part number	Name	
<b>157B4992</b>	AMP CONNECTING KIT (GREY)	4 pin with housing, contact and wire sealing
<b>157B4993</b>	AMP CONNECTING KIT (BLACK)	4 pin with housing, contact and wire sealing
<b>984L3165</b>	EL-PLUG, ON-OFF black	Hirschmann DIN connector set*

*Set of seals code numbers*

Part number	Name	Actuator
<b>157B4997</b>	Set of seals	PVE for PVG 32/ PVG 100
<b>155G8519</b>	Set of seals	PVE for PVG 120
<b>11061235</b>	Set of seals	PVHC for PVG 32/ PVG 100

*Cables code numbers*

Feature		Wire colors						Length	Code number
Connector		pin 1	pin 2	pin 3	pin 4	pin 5	pin 6		
<b>Deutsch</b>	4 pin	white	blue	yellow	red	—	—	4 m	11007498
	6 pin	white	blue	yellow	red	black	green	4 m	11007513
<b>AMP</b>	4 pin	white	blue	yellow	red	—	—	4 m	157B4994
	6 pin	white	red	black	yellow	green	blue	5 m	157B4974
<b>AMP/black coding</b>	4 pin	white	blue	yellow	red	—	—	4 m	157B4995