

# *Instruction Manual*

## PVEK Valves

Chemtech Scientific provides access to this content as a courtesy.  
We do not own the content contained in this document.  
All rights and credit go directly to its rightful owners.

[www.chemtechsci.com](http://www.chemtechsci.com)

Call us at: 484-424-9415



Original instructions

# Declaration of Conformity

We, Edwards Limited,  
Crawley Business Quarter,  
Manor Royal,  
Crawley,  
West Sussex, RH10 9LW, UK

declare under our sole responsibility, as manufacturer and person within the EU authorised to assemble the technical file, that the product(s)

## Right-Angled Valves:

PV10EKA (220 V) C411-01-000	PV40EKA (110 V) C414-03-000
PV10EKA (110 V) C411-03-000	PV16EKS (220 V) C412-02-000
PV16EKA (220 V) C412-01-000	PV16EKS (110 V) C412-04-000
PV16EKA (110 V) C412-03-000	PV25EKS (220 V) C413-02-000
PV25EKA (220 V) C413-01-000	PV25EKS (110 V) C413-04-000
PV25EKA (110 V) C413-03-000	PV40EKS (220 V) C414-02-000
PV40EKA (220 V) C414-01-000	PV40EKS (110 V) C414-04-000

## In-Line Valves:

PV16EKA (220 V) C416-10-000	PV16EKS (220 V) C416-12-000
PV16EKA (110 V) C416-11-000	PV16EKS (110 V) C416-13-000
PV25EKA (220 V) C416-30-000	PV25EKS (220 V) C416-32-000
PV25EKA (110 V) C416-31-000	PV25EKS (110 V) C416-33-000
PV40EKA (220 V) C416-51-000	PV40EKS (220 V) C416-53-000
PV40EKA (110 V) C416-52-000	PV40EKS (110 V) C416-54-000

## Accessories:

Lead Assy PV Valve C411-01-090 (*Lead Assy is not within the scope of 2004/108/EC EMC Directive*).

to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

EN61010-1: 2010	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use. General Requirements
EN61326-1: 2013 (Class B Emissions, Basic Immunity)	Electrical equipment for measurement, control and laboratory Use. EMC requirements. General requirements
EN50581:2012	Technical Documentation for the Assessment of Electrical and Electronic Products with respect to the Restriction of Hazardous Substances

and fulfils all the relevant provisions of

2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Certain Hazardous Substances (RoHS) Directive

*Note: This declaration covers all product serial numbers from the date this Declaration was signed onwards.*

\_\_\_\_\_  
Larry Marini, Senior Technical Manager

07.07.2015, Eastbourne

\_\_\_\_\_  
Date and Place

*This product has been manufactured under a quality management system certified to ISO 9001:2008*

# Declaration of Incorporation

We, Edwards Limited,  
Crawley Business Quarter,  
Manor Royal,  
Crawley,  
West Sussex, RH10 9LW, UK

declare under our sole responsibility, as manufacturer and person within the EU authorised to assemble the technical file, that the machine(s)

## Right-Angled Valves:

PV10EKA (220 V) C411-01-000	PV40EKA (110 V) C414-03-000
PV10EKA (110 V) C411-03-000	PV16EKS (220 V) C412-02-000
PV16EKA (220 V) C412-01-000	PV16EKS (110 V) C412-04-000
PV16EKA (110 V) C412-03-000	PV25EKS (220 V) C413-02-000
PV25EKA (220 V) C413-01-000	PV25EKS (110 V) C413-04-000
PV25EKA (110 V) C413-03-000	PV40EKS (220 V) C414-02-000
PV40EKA (220 V) C414-01-000	PV40EKS (110 V) C414-04-000

## In-Line Valves:

PV16EKA (220 V) C416-10-000	PV16EKS (220 V) C416-12-000
PV16EKA (110 V) C416-11-000	PV16EKS (110 V) C416-13-000
PV25EKA (220 V) C416-30-000	PV25EKS (220 V) C416-32-000
PV25EKA (110 V) C416-31-000	PV25EKS (110 V) C416-33-000
PV40EKA (220 V) C416-51-000	PV40EKS (220 V) C416-53-000
PV40EKA (110 V) C416-52-000	PV40EKS (110 V) C416-54-000

to which this declaration relates is intended to be incorporated into other equipment and not to function independently. The machine(s) must not be put into service until the equipment into which it is incorporated has been brought into conformity with the provisions of the Machinery Directive, 2006/42/EC.

*The relevant essential requirements of the Machinery Directive 2006/42/EC Annex 1 have been applied and fulfilled so far as practicable for this partly completed machinery. The relevant technical documentation has been compiled in accordance with Annex VII Part B. In response to a reasoned request by the national authorities, Edwards Ltd undertakes to provide relevant information on the partly completed machinery (via email).*

*Note: This declaration covers all product serial numbers from the date this Declaration was signed onwards.*

\_\_\_\_\_  
Mr L Marini, Senior Technical Manager

25.09.2014, Eastbourne

\_\_\_\_\_  
Date and Place

*This product has been manufactured under a quality management system certified to ISO9001:2008*

# Contents

Section	Page
<b>1</b>	<b>Introduction</b> ..... 1
1.1	Scope and definitions ..... 1
1.2	Description ..... 1
1.3	Construction ..... 3
1.4	Operation ..... 3
<b>2</b>	<b>Technical data</b> ..... 5
2.1	Mechanical data ..... 5
2.2	Performance, operating and storage conditions ..... 5
2.3	Electrical data ..... 5
2.4	Materials ..... 5
2.5	Product Item Numbers ..... 8
2.5.1	Right-angled valves ..... 8
2.5.2	In-line valves ..... 8
<b>3</b>	<b>Installation</b> ..... 9
3.1	Unpack and inspect ..... 9
3.2	Install the valve ..... 9
3.3	Electrical connections ..... 9
3.3.1	Fit your own electrical supply cable ..... 12
3.3.2	Fit the electrical supply cable accessory ..... 12
3.3.3	Position indicator connections ..... 12
<b>4</b>	<b>Operation</b> ..... 15
4.1	General ..... 15
4.2	Position indicator ..... 15
<b>5</b>	<b>Maintenance</b> ..... 17
5.1	General ..... 17
5.1.1	Safety information ..... 17
5.1.2	Fluoroelastomers ..... 17
5.2	Dismantle and inspect the valve ..... 18
5.3	Replace the bellows/pole-piece assembly ..... 18
5.4	Replace the valve-body and pad 'O' rings ..... 20
5.5	Fault finding ..... 20
<b>6</b>	<b>Storage and disposal</b> ..... 21
6.1	Storage ..... 21
6.2	Disposal ..... 21
<b>7</b>	<b>Service, spares and accessories</b> ..... 23
7.1	Introduction ..... 23
7.2	Service ..... 23
7.3	Spares ..... 23
7.4	Accessories ..... 24

For return of equipment, complete the HS Forms at the end of this manual.

## Illustrations

Figure	Page
1 PVEK valve (PV10EK right-angled valve shown) .....	2
2 Right-angled valve dimensions .....	7
3 In-line valve dimensions .....	7
4 Electrical connectors .....	10
5 Electrical supply connections .....	11
6 Position indicator connections .....	13
7 Sectional view of PVEK valve .....	19

## Tables

Table	Page
1 Performance, operating and storage conditions .....	5
2 Electrical data .....	6
3 Mechanical data .....	6
4 Fault finding .....	20
5 Spares .....	23

# 1 Introduction

## 1.1 Scope and definitions

This manual provides installation, operation and maintenance instructions for the Edwards range of PVEK valves. You must use the valves as specified in this manual.

Read this manual before you install and operate the valve. Important safety information is highlighted as **WARNING** and **CAUTION** instructions; you must obey these instructions. The use of **WARNINGS** and **CAUTIONS** is defined below.



### **WARNING**

Warnings are given where failure to observe the instruction could result in injury or death to people.

---

### **CAUTION**

Cautions are given where failure to observe the instruction could result in damage to the equipment, associated equipment and process.

---

The units used throughout this manual conform to the SI international system of units of measurement.

The following symbols appear on the PVEK Valves:



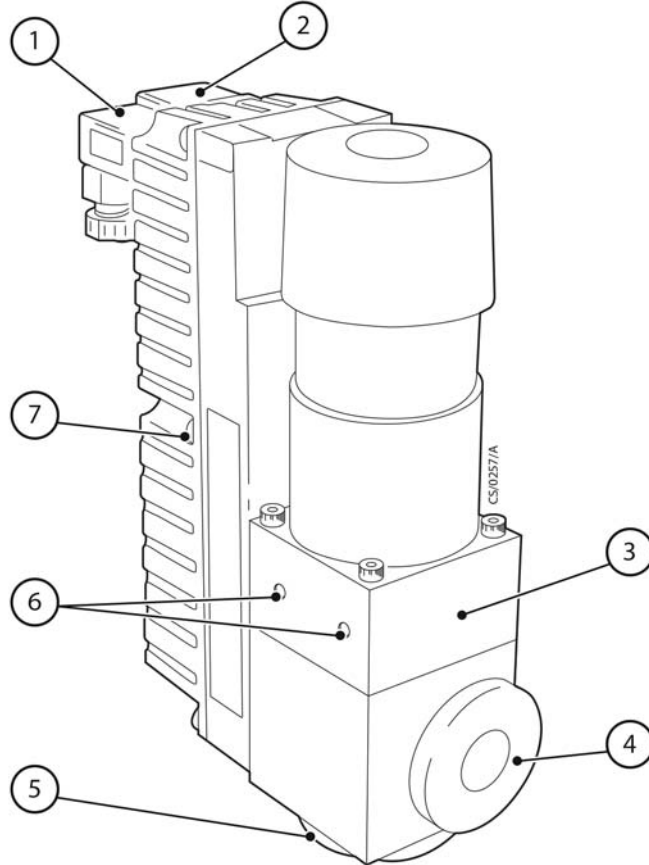
Warning - refer to accompanying documents.

## 1.2 Description

The PVEK valves are solenoid-operated vacuum-valves which are compact and lightweight. They are designed for low energy consumption, low operating temperatures and trouble-free operation. The PVEK valve enclosure provides protection to IP55 (as defined by EN60529).

The valves are available in right-angled and in-line versions (as shown in [Figures 2 and 3](#)); the in-line valves are designated IPVEK valves. The valves are available with either stainless steel or aluminium bodies and a range of valve-body and flange sizes is available to suit your system. In external appearance, the various models differ only in vacuum port configuration and valve-body and actuator-case size; the size of the electrical-box ([Figure 1](#), item 7) is identical in all valve models.

Figure 1 - PVEK valve (PV10EK right-angled valve shown)



1. Position indicator socket
2. Electrical supply socket
3. Valve-body
4. Valve-port
5. Valve-port
6. Mounting holes
7. Electrical-box

## 1.3 Construction

Refer to the sectional view of the PVEK valve in [Figure 7](#) to identify the item numbers in brackets.

The valve mechanism is a solenoid-operated moving pole with an integral valve-pad and bellows assembly (7). The vacuum system is isolated from atmosphere by a fluoroelastomer 'O' ring static seal (10) and a stainless steel bellows for dynamic sealing. The valve-pad also seals against the valve-body with a fluoroelastomer 'O' ring (12). The valve-body terminates in two ports with NW flanges.

A PCB inside the electrical-box (1) controls the valve actuation. A magnetic reed-switch positioned on the underside of the PCB provides position indication. The reed switch has changeover contacts and provides both normally open and normally closed position indications.

## 1.4 Operation

The solenoid coil in the valve has two windings. To open the valve, both windings are energised. Initially, the inner high energy or pulse winding provides a high transient force to open the valve and is then de-energised. The outer low energy or 'hold' winding remains energised to maintain the valve in the open position with minimum power.

The valve is closed by de-energising the solenoid coil. When the outer winding is de-energised, the action of the spring provides rapid positive closure.



## 2 Technical data

*Note: Unless otherwise specified, all data in this section refers to both right-angled and in-line valves.*

### 2.1 Mechanical data

Refer to Table 3.

### 2.2 Performance, operating and storage conditions

Refer to Table 1.

### 2.3 Electrical data

Refer to Table 2.

### 2.4 Materials

The valves are manufactured from the following materials:

Valve-body	
PVEKA Valve	HE30TF grade aluminium
PVEKS Valve	AISI 304 grade stainless steel
Bellows	AISI 316L stainless steel
'O' rings	Fluoroelastomer

Table 1 - Performance, operating and storage conditions

	PV10EK	PV16EK	PV25EK	PV40EK
Ambient temperature (operation)	5 - 45 °C	5 - 45 °C	5 - 50 °C	5 - 50 °C
Ambient temperature (storage)	-30 - 70 °C	-30 - 70 °C	-30 - 70 °C	-30 - 70 °C
Ambient humidity (operation)	80% decreasing linearly to 50% relative humidity at 40 °C			
Operating altitude/operating conditions	Up to 2000 m/For indoor use only			
Molecular conductance (right-angled valve)	3 l s <sup>-1</sup>	4 l s <sup>-1</sup>	10 l s <sup>-1</sup>	34 l s <sup>-1</sup>
Molecular conductance (in-line valve)	-	2 l s <sup>-1</sup>	6 l s <sup>-1</sup>	15 l s <sup>-1</sup>
Pressure range (valve open)	1 x 10 <sup>-9</sup> - 2.1 x 10 <sup>3</sup> mbar (absolute) 1 x 10 <sup>-7</sup> - 2.1 x 10 <sup>5</sup> Pa			
Maximum pressure differential (between flanges)	1 x 10 <sup>3</sup> mbar, 1 x 10 <sup>5</sup> Pa			
Leak rate	1 x 10 <sup>-9</sup> mbar l s <sup>-1</sup> , 1 x 10 <sup>-7</sup> Pa l s <sup>-1</sup>			
Maximum cycle frequency (per hour)	400	400	400	400
Nominal lift (mm)	2.5	2.5	3.8	6.0
Time to open (ms)	40	40	60	80
Time to close (ms)	100	100	100	120
Mean time to failure (cycles)	> 5 x 10 <sup>5</sup>	> 5 x 10 <sup>5</sup>	> 1.3 x 10 <sup>5</sup>	> 1.3 x 10 <sup>5</sup>

Table 2 - Electrical data

	PV10EK	PV16EK	PV25EK	PV40EK
Electrical supply voltage range 110 V nominal 240 V nominal Frequency	90 - 132 V 180 - 264 V 50 - 60 Hz			
Continuous power (W) 110 V a.c. 240 V a.c.	3.3 4.4	3.3 4.4	6.1 8.2	8.0 8.3
Peak power (VA) for 60 ms 110 V a.c. 240 V a.c.	450 560	450 560	940 1200	1400 2400
Reed-switch ratings Maximum voltage (peak, a.c. or d.c.) Maximum current (peak)/power (r.m.s.)	28 V 0.25 A/3 VA			
Electrical supply plug Cable diameter	6 - 8 mm			
Microswitch plug Maximum cable diameter	6.5 mm			

Table 3 - Mechanical data

Dimensions: mm (see Figures 2 and 3 for keys)	PV10EK	PV16EK	PV25EK	PV40EK	
A	30	40	50	65	
B	42	42	55	80	
C	20	20	20	40	
F	59 <sup>*</sup> - †	69 <sup>*</sup> 37.4 <sup>†</sup>	82 <sup>*</sup> 72.5 <sup>†</sup>	110 <sup>*</sup> 101.5 <sup>†</sup>	
H	150 <sup>*</sup> - †	160 <sup>*</sup> 142.9 <sup>†</sup>	182 <sup>*</sup> 172 <sup>†</sup>	230 <sup>*</sup> 222 <sup>†</sup>	
L	116 <sup>*</sup> - †	126 <sup>*</sup> 85 <sup>†</sup>	142 <sup>*</sup> 93 <sup>†</sup>	170 <sup>*</sup> 111 <sup>†</sup>	
M	-	40 <sup>†</sup>	50 <sup>†</sup>	65 <sup>†</sup>	
Mounting hole thread size and maximum depth	M4 x 7	M4 x 7	M4 x 7	M6 x 9	
Valve-port flange size	NW10	NW16	NW25	NW40	
IP ratings (as defined by EN60529): valve enclosure †	IP55	IP55	IP55	IP55	
Mass (kg)	PVEKA IPVEKA PVEKS IPVEKS	0.8 <sup>*</sup> - † 0.8 <sup>†</sup> 1.2 1.2 <sup>†</sup>	0.8 <sup>*</sup> 0.8 <sup>†</sup> 1.2 1.2 <sup>†</sup>	1.8 <sup>*</sup> 1.8 <sup>†</sup> 2.4 2.5 <sup>†</sup>	4.5 <sup>*</sup> 4.6 <sup>†</sup> 6.4 6.8 <sup>†</sup>

<sup>\*</sup> Right-angled valve

<sup>†</sup> In-line valve (note that there is no PV10EK in-line valve)

<sup>‡</sup> The electrical supply connector and the microswitch connector must be connected using the gasket supplied, and the correct cable diameters must be used, in order to meet the requirements of IP55.

Figure 2 - Right-angled valve dimensions

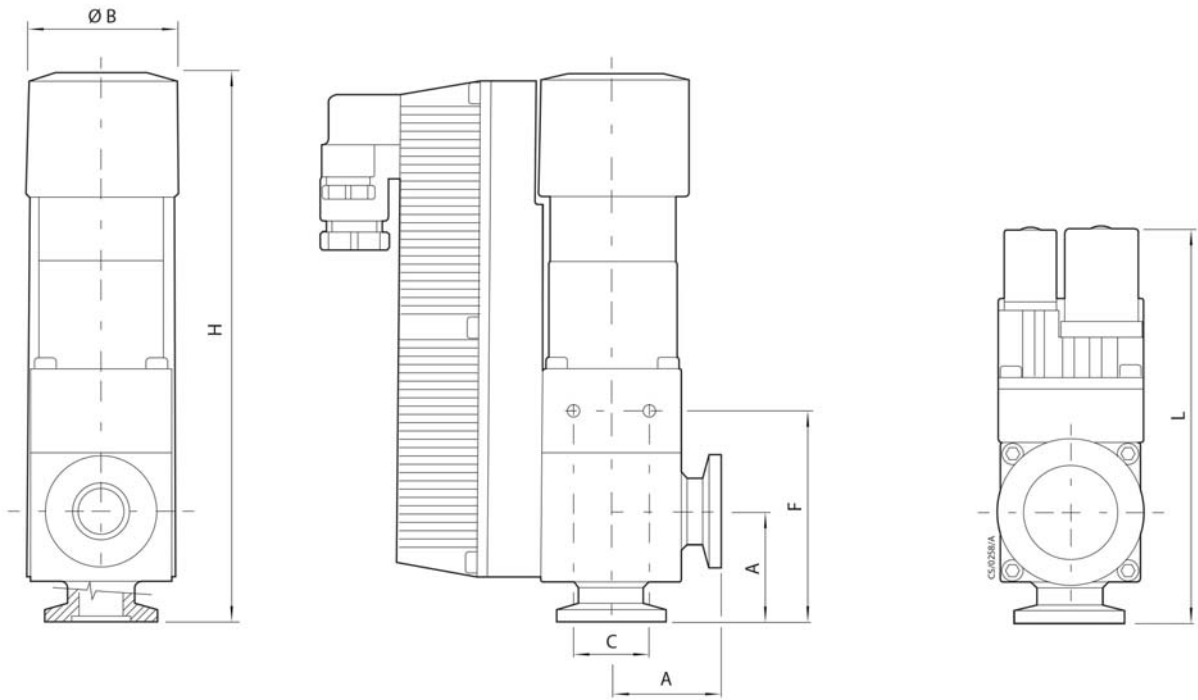
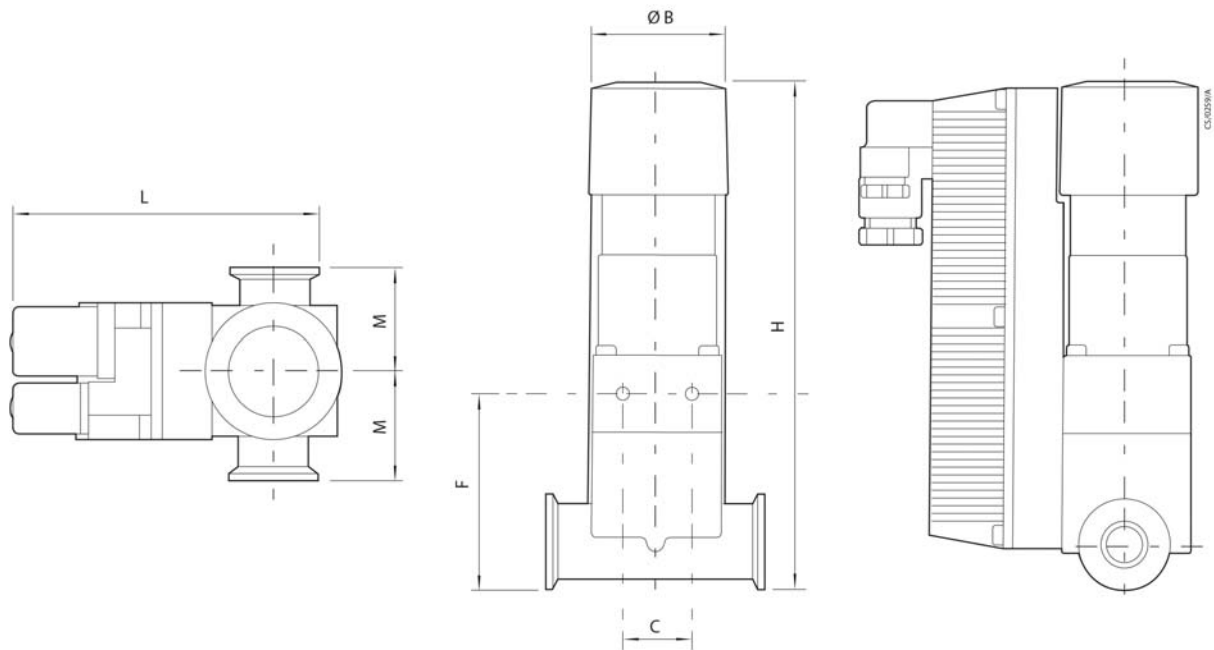


Figure 3 - In-line valve dimensions



## 2.5 Product Item Numbers

### 2.5.1 Right-angled valves

Product	Item Number
Aluminium bodies	
PV10EKA Valve (220 V)	C411-01-000
PV10EKA Valve (110 V)	C411-03-000
PV16EKA Valve (220 V)	C412-01-000
PV16EKA Valve (110 V)	C412-03-000
PV25EKA Valve (220 V)	C413-01-000
PV25EKA Valve (110 V)	C413-03-000
PV40EKA Valve (220 V)	C414-01-000
PV40EKA Valve (110 V)	C414-03-000
Stainless steel bodies	
PV16EKS Valve (220 V)	C412-02-000
PV16EKS Valve (110 V)	C412-04-000
PV25EKS Valve (220 V)	C413-02-000
PV25EKS Valve (110 V)	C413-04-000
PV40EKS Valve (220 V)	C414-02-000
PV40EKS Valve (110 V)	C414-04-000

### 2.5.2 In-line valves

Product	Item Number
Aluminium bodies	
PV10EKA Valve (220 V)	-
PV10EKA Valve (110 V)	-
PV16EKA Valve (220 V)	C416-10-000
PV16EKA Valve (110 V)	C416-11-000
PV25EKA Valve (220 V)	C416-30-000
PV25EKA Valve (110 V)	C416-31-000
PV40EKA Valve (220 V)	C416-51-000
PV40EKA Valve (110 V)	C416-52-000
Stainless steel bodies	
PV16EKS Valve (220 V)	C416-12-000
PV16EKS Valve (110 V)	C416-13-000
PV25EKS Valve (220 V)	C416-32-000
PV25EKS Valve (110 V)	C416-33-000
PV40EKS Valve (220 V)	C416-53-000
PV40EKS Valve (110 V)	C416-54-000

## 3 Installation

### 3.1 Unpack and inspect

Remove all the packing materials and protective covers and check the PVEK valve.

If the valve is damaged, notify your supplier and the carrier in writing within three days; state the Item Number of the valve together with your order number and your supplier's invoice number. Retain the packing materials for inspection. Do not use the valve.

If the valve is not to be used immediately, replace the protective covers. Store the valve in suitable conditions, as described in Section 6.

### 3.2 Install the valve



#### **WARNING**

Take appropriate safety precautions when you install the valve in a system in which dangerous process substances have been pumped.



#### **WARNING**

Fit a cover to any valve-port which is open to atmosphere. Access to open ports is dangerous.

#### **CAUTION**

We recommend that you provide additional support for a PV40EKA in-line valve. The valve flanges of an unsupported PV40EKA in-line valve may be distorted by the mass of the valve. Alternatively, fit a PV40EKS in-line valve.

The valve is normally supported by the pipeline it is fitted to and can be mounted in any orientation. Two threaded holes in the valve-body allow for additional support, if required; the dimensions of these holes are defined in Section 2. Do not exceed the specified maximum depth of thread or you will damage the valve. Connect the valve to your vacuum system with standard NW coupling components.

If necessary, you can rotate the valve-body from its standard position (in 90° steps for the right-angled valve and in 180° steps for the in-line valve). Remove the four screws which secure the solenoid actuating cylinder to the valve-body and reassemble with the cylinder turned in the required direction.

### 3.3 Electrical connections



#### **WARNING**

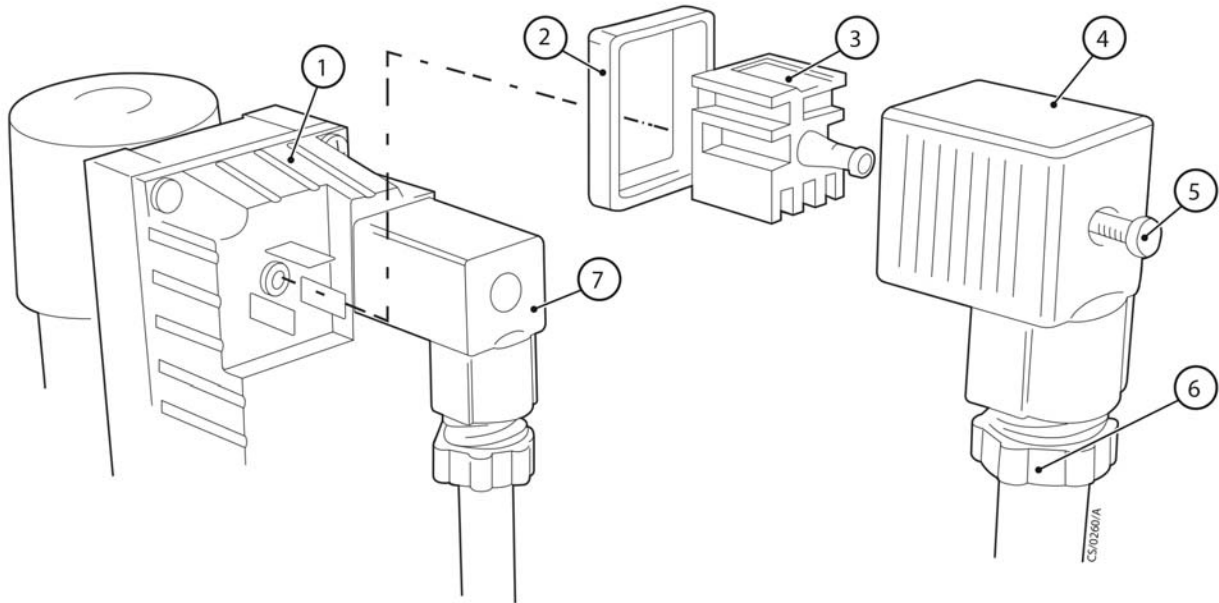
Ensure that the electrical installation of the PVEK valve conforms with your local and national safety requirements. It must be connected to a suitable fused and protected electrical supply and a suitable earth (ground) point.



#### **WARNING**

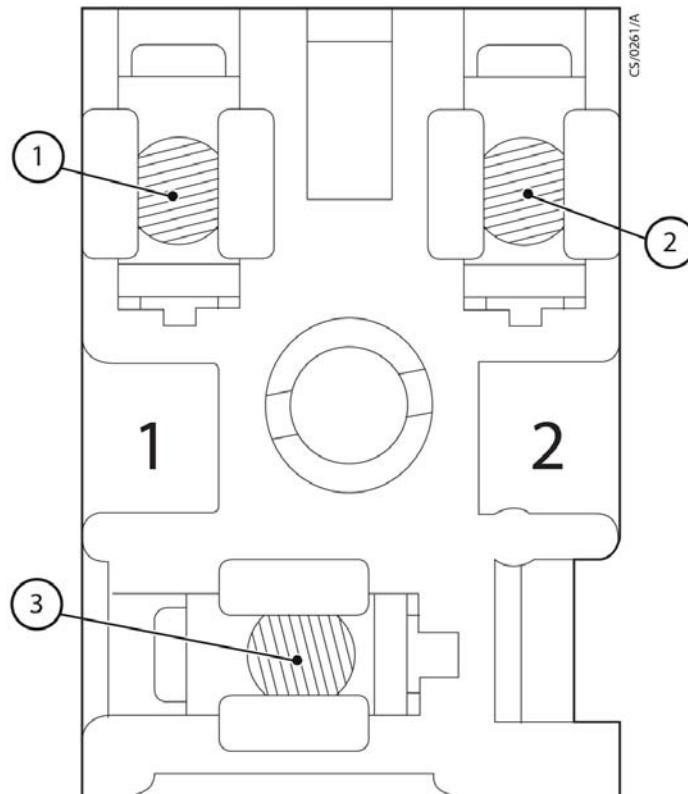
In order to comply with EN61010, the valve must be connected to a suitable 2 pole circuit breaker which is labelled appropriately and mounted in close proximity, within easy reach of the operator.

Figure 4 - Electrical connectors



- 1. Electrical-box
- 2. Sealing-gland
- 3. Connector block
- 4. Electrical supply socket
- 5. Socket retaining screw
- 6. Cable strain-relief nut
- 7. Position indicator socket

Figure 5 - Electrical supply connections



- 1. Live
- 2. Neutral
- 3. Earth (ground)

### 3.3.1 Fit your own electrical supply cable

Use the following procedure to fit your own electrical supply cable to the PVEK valve. Refer to [Figure 4](#) for item numbers in brackets.

1. Check that the electrical supply corresponds with the voltage stated on the valve label.
2. Undo the screw (5) and remove the electrical supply socket (4) from the electrical-box (1). Remove the sealing-gland (2) and prise out the connector block (3).
3. Loosen the strain-relief nut (6) and pass the electrical supply cable through the nut and into the socket. Refer to [Table 2](#) for information on the correct cable diameter.
4. Connect the electrical supply cable to the connector block as shown in [Figure 5](#). Ensure that the earth (ground) conductor is longer than the other conductors, so that if the cable is accidentally dragged, the earth (ground) conductor will be the last conductor to be pulled from the connector block.
5. Push the connector block (3) back into the socket; ensure that it is orientated correctly so that the sockets mate with the corresponding pins labelled on the electrical-box (1).
6. Gently pull on the cable to ensure that the cable is trapped inside the connector. Tighten the strain-relief nut (6).
7. Refit the sealing-gland (2) over the socket (4) and push the socket onto the three connector pins on the electrical-box.
8. Refit the retaining screw (5) and tighten; ensure that there is a slight compression of the sealing-gland.

### 3.3.2 Fit the electrical supply cable accessory

Use the following procedure to fit the electrical supply cable accessory. Refer to [Figure 4](#) for item numbers in brackets.

The accessory is supplied as a fully assembled cable, together with a new sealing-gland and socket retaining screw.

1. Undo the screw (5) and remove the existing electrical supply socket (4) from the electrical-box (1) on the valve.
2. Fit the new sealing-gland (2) to the socket (4) on the electrical supply cable accessory.
3. Push the socket (4) onto the three connector pins on the electrical-box.
4. Fit the new socket retaining screw (5) and tighten; ensure that there is a slight compression of the sealing-gland.
5. Fit the plug on the other end of the electrical supply cable accessory to a suitable electrical supply outlet.

### 3.3.3 Position indicator connections



#### **WARNING**

Do not use the position indicator as a safety interlock device. Under certain circumstances the position indicator may not operate correctly.

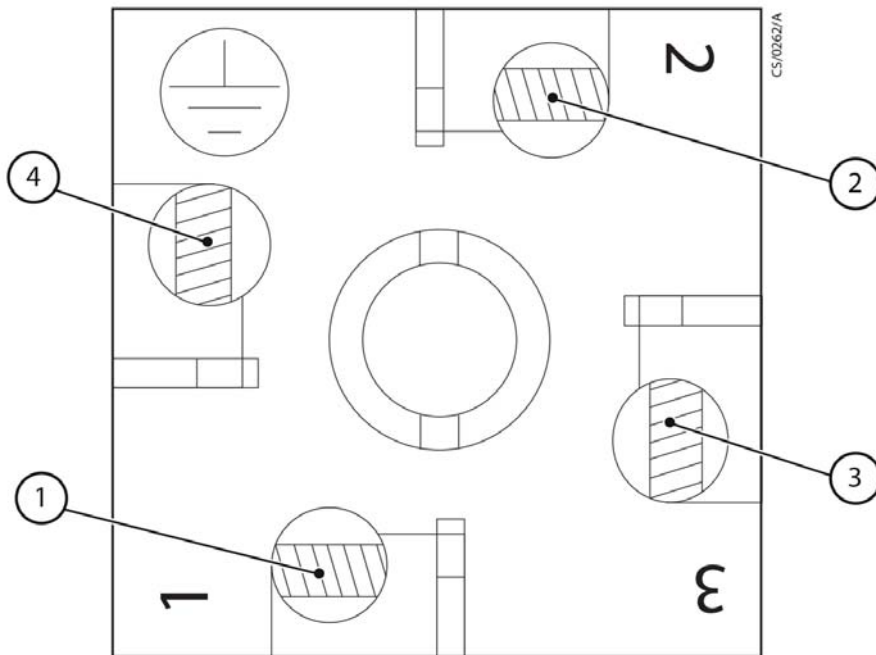
The reed switch position indicator has changeover contacts and provides both normally open and normally closed position indications. To use the reed switch position indicator, connect the terminals as described below.

1. Undo the screw and remove the position indicator socket ([Figure 4](#), item 7) from the electrical-box. Remove the sealing-gland, extract the connector block and loosen the strain-relief nut.
2. Connect the signal cable to the terminals in the connector block as shown in [Figure 6](#). Refer to [Table 2](#) for information on the correct cable diameter. Do not use the terminal marked with the earth (ground) symbol.



3. Refit the connector block to the socket and replace the socket. Note that the socket is not polarised and can be fitted in any of four possible positions. Ensure that the sockets mate with the corresponding pins labelled on the electrical-box.

Figure 6 - Position indicator connections



1. Normally closed
2. Normally open
3. Common
4. Not used

---

## 4 Operation

### 4.1 General

Once correctly installed, operation of the PVEK valve is dependent only upon the switching of the electrical supply to the valve.

### 4.2 Position indicator



#### **WARNING**

Do not use the position indicator as a safety interlock device. Under certain circumstances the position indicator may not operate correctly.

---

Do not rely entirely on the position indicator to indicate the state of the valve for the following reasons:

- In the event of low electrical supply voltage or a temporary loss of the electrical supply to the valve, it is possible for the valve to close but the position indicator to show the valve still open. This is because the stray magnetic flux which remains during a temporary loss of the electrical supply could be sufficient to hold the reed switch 'open'.
- If the valve is not able to close due to a physical obstruction, the position indicator will show the valve to be closed.

If it is essential to know the state of the valve for safety reasons, use additional indicators, such as pressure gauges in the pipelines on each side of the valve.

## 5 Maintenance

### 5.1 General

PVEK valves do not require routine maintenance during their normal operational life. If the valve is faulty, refer to the following sections.

#### 5.1.1 Safety information



#### **WARNING**

Obey the safety instructions given below and take note of appropriate precautions. If you do not you can cause injury to people and damage to equipment.

- Ensure that maintenance is done by a suitably trained and supervised technician. Obey your local and national safety requirements.
- Observe all appropriate safety precautions when you maintain a valve from a system in which dangerous process substances have been pumped.
- Isolate the valve from the electrical supply and your vacuum system before you start maintenance.
- Observe all appropriate safety precautions when you come into contact with solvents and fluoroelastomer 'O' rings.
- Ensure that you do maintenance in a well ventilated area.
- Do not use abrasive or reactive chemicals to clean the valve.
- Do not use solvents to clean 'O' rings.
- Safely dispose of all components which have been contaminated by dangerous process substances.

#### 5.1.2 Fluoroelastomers

The seals and 'O' rings used in the PVEK valve are made from a fluoroelastomer. Fluoroelastomers can decompose into very dangerous substances if they are heated to 260 °C and above. The valve may have overheated if your system has been misused, if it has malfunctioned or if the valve has been in a fire. If the valve has overheated, ensure that you observe the appropriate safety precautions to prevent contact with the seals and 'O' rings.

---

## 5.2 Dismantle and inspect the valve

---

### CAUTION

When you reassemble the valve, make sure that 'O' rings are seated properly in their locating grooves and are not trapped or pinched.

---

### CAUTION

Take care when dismantling the valve. The valve contains a spring under compression. Energy stored in the spring is released when the retaining screws are removed.

---

*Note:* The best type of grease to use is dependent on the gases pumped in your system. For 'clean' systems, we recommend that you use Fomblin.

Refer to [Figure 7](#) for item numbers shown in brackets.

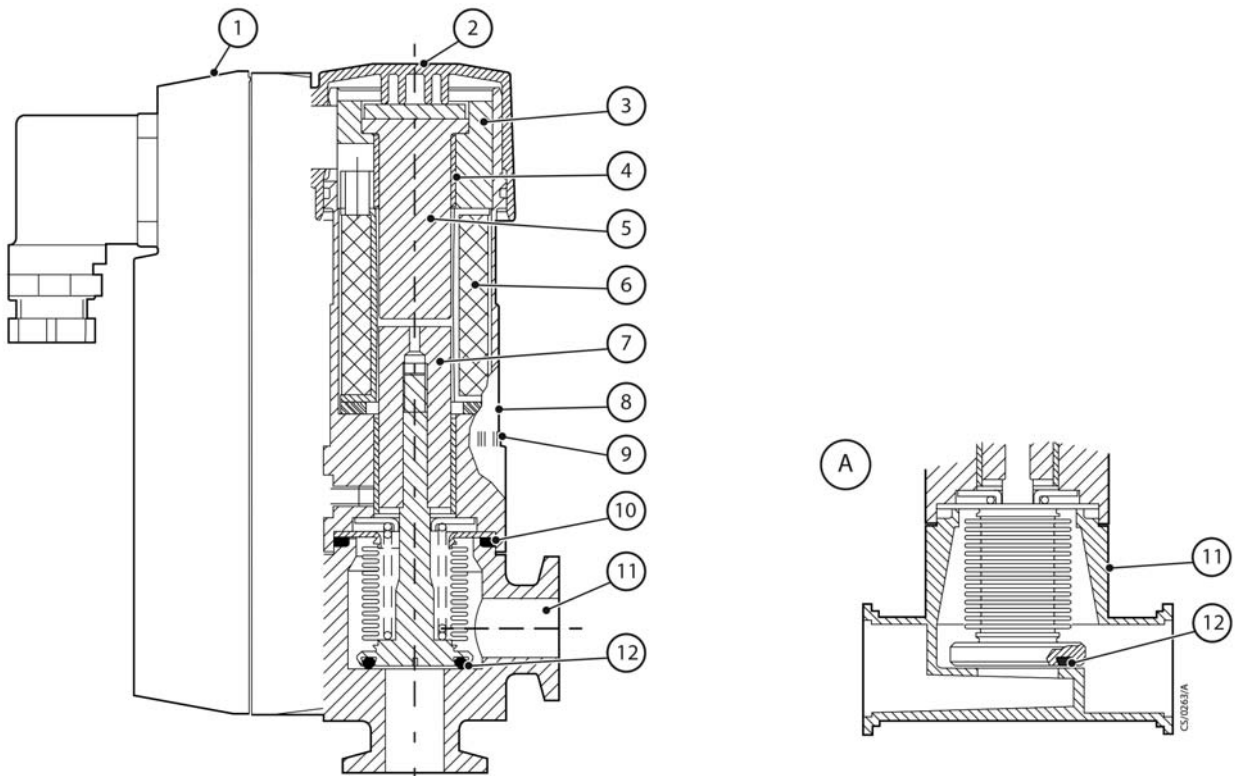
1. Isolate the valve from the electrical supply.
2. Undo the four retaining screws (9) and remove the valve-body (11) and the valve-body 'O' ring (10) from the valve.
3. Examine the bellows/pole-piece assembly (7), the valve-body 'O' ring (10) and the valve-pad 'O' ring (12) for damage and wear.
4. If necessary, replace any worn or damaged items as described in [Sections 5.3](#) and [5.4](#).
5. Refit the bellows assembly into the actuator-case; ensure free movement of the pole-piece in the actuator-case.
6. Refit the valve-body (11) to the valve; secure in place with the four retaining screws (9) and a suitable locking adhesive such as Loctite 222.

## 5.3 Replace the bellows/pole-piece assembly

Refer to [Figure 7](#) for item numbers shown in brackets.

1. Dismantle the valve as described in [Section 5.2](#).
2. Remove the old bellows/pole-piece assembly (7) and discard.
3. Fit the new valve-pad 'O' ring (12) to the new bellows assembly; apply a light wipe of high vacuum grease to ease the fit.
4. Fit the bellows assembly into the actuator-case; ensure free movement of the pole-piece in the actuator-case.
5. Reassemble the valve as described in [Section 5.2](#).

Figure 7 - Sectional view of PVEK valve



## A. Detail of in-line valve

1. Electrical box
2. Top cap
3. Sorbathane pad
4. Bearing assembly
5. Fixed pole
6. Coil
7. Bellows/pole-piece assembly
8. Actuator housing
9. Retaining screw
10. Valve-body 'O' ring
11. Valve-body
12. Valve-pad 'O' ring

## 5.4 Replace the valve-body and pad 'O' rings

Refer to [Figure 7](#) for item numbers shown in brackets.

1. Dismantle the valve as described in [Section 5.2](#).
2. Remove the valve-body 'O' ring (10) from the valve-body and discard.
3. Inspect the 'O' ring groove and contact surfaces. Refinish any surfaces which are damaged.
4. Fit the new valve-body 'O' ring (10) to the valve-body.
5. Remove the bellows/pole-piece assembly (7).
6. Remove and discard the valve-pad 'O' ring (12) from the bellows/pole-piece assembly.
7. Inspect the 'O' ring groove and contact surfaces. Refinish any surfaces which are damaged.
8. Fit the new valve-pad 'O' ring to the bellows/pole-piece assembly; apply a light wipe of high vacuum grease to ease the fit.
9. Refit the bellows/pole-piece assembly and reassemble the valve as described in [Section 5.2](#).

## 5.5 Fault finding

Table 4 - Fault finding

Symptom	Check	Action
The valve fails to operate.	Has the electrical supply failed?	Check the electrical supply and repair as necessary.
	Is there a loose connection in the electrical supply socket?	Remove the electrical supply socket, check the electrical supply cable to socket connections and repair as necessary (see <a href="#">Section 3.3.1</a> ).
	Is the valve obstructed?	Dismantle the valve (see <a href="#">Section 5.2</a> ) and remove the obstruction.
Incorrect position indication.	Is there a loose connection in the position indication socket?	Remove the socket, check the cable to socket connections and repair as necessary (see <a href="#">Section 3.3.1</a> ).
	Is the electrical supply voltage low?	Change the electrical supply (see <a href="#">Section 4.2</a> ).
	Is the valve obstructed?	Dismantle the valve (see <a href="#">Section 5.2</a> ) and remove the obstruction.
The valve leaks	Is the valve-body 'O' ring or seating groove damaged?	Dismantle the valve and check the 'O' ring and seating groove (see <a href="#">Section 5.2</a> ). Refinish and/or replace as necessary.
	Is the valve-pad 'O' ring or seating groove damaged?	Dismantle the valve and check the 'O' ring and seating groove (see <a href="#">Section 5.2</a> ). Refinish and/or replace as necessary.
	Is there a bellows leak?	Replace the bellows/pole-piece assembly (see <a href="#">Section 5.3</a> ).

---

## 6 Storage and disposal

### 6.1 Storage

Isolate the valve from the electrical supply and disconnect it from your vacuum system. Place protective covers over the valve-ports and store the PVEK valve in cool, dry conditions until it is required for use.

When required, prepare and install the valve as described in [Section 3](#).

### 6.2 Disposal

Dispose of the valve and any components removed from it safely in accordance with all local and national safety and environmental requirements.

Particular care must be taken with the following:

- Fluoroelastomers which may have been subjected to temperatures above 260 °C (see [Section 5.1.2](#)).
- Components which have been contaminated with dangerous process substances.

## 7 Service, spares and accessories

### 7.1 Introduction

Edwards products, spares and accessories are available from Edwards companies in Belgium, Brazil, China, France, Germany, Israel, Italy, Japan, Korea, Singapore, United Kingdom, U.S.A. and a world-wide network of distributors.

The majority of these centres employ Service Engineers who have undergone comprehensive Edwards training courses.

Order spare parts and accessories from your nearest Edwards company or distributor. When you order, please state for each part required:

- Model and Item Number of your equipment
- Serial number (if any)
- Item Number and description of the part

### 7.2 Service

Edwards products are supported by a world-wide network of Edwards Service Centres. Each Service Centre offers a wide range of options including: equipment decontamination; service exchange; repair; rebuild and testing to factory specifications. Equipment which has been serviced, repaired or rebuilt is returned with a full warranty.

Your local Service Centre can also provide Edwards engineers to support on-site maintenance, service or repair of your equipment.

For more information about service options, contact your nearest Service Centre or other Edwards company.

### 7.3 Spares

Table 5 - Spares

Valve type	'O' ring service kit		Bellows		Valve body	
	Right-angled valve	In-line valve	Right-angled valve	In-line valve	Right-angled valve	In-line valve
PV10EKA (220 V)	C411-01-800	-	C411-01-007	-	C411-01-816	-
PV10EKA (110 V)	C411-01-800	-	C411-01-007	-	C411-01-816	-
PV16EKA (220 V)	C411-01-800	C411-01-800	C411-01-007	C411-01-007	C412-01-816	C416-01-802
PV16EKA (110 V)	C411-01-800	C411-01-800	C411-01-007	C411-01-007	C412-01-816	C416-01-802
PV25EKA (220 V)	C413-01-800	C413-01-800	C413-01-007	C413-01-007	C413-01-816	C416-21-802
PV25EKA (110 V)	C413-01-800	C413-01-800	C413-01-007	C413-01-007	C413-01-816	C416-21-802
PV40EKA (220 V)	C414-01-800	C414-01-800	C414-01-007	C414-01-007	C414-01-816	C416-41-802
PV40EKA (110 V)	C414-01-800	C414-01-800	C414-01-007	C414-01-007	C414-01-816	C416-41-802
PV16EKS (220 V)	C411-01-800	C411-01-800	C411-01-007	C411-01-007	C416-02-801	C416-02-811
PV16EKS (110 V)	C411-01-800	C411-01-800	C411-01-007	C411-01-007	C416-02-801	C416-02-811
PV25EKS (220 V)	C413-01-800	C413-01-800	C413-01-007	C413-01-007	C416-22-801	C416-22-811
PV25EKS (110 V)	C413-01-800	C413-01-800	C413-01-007	C413-01-007	C416-22-801	C416-22-811
PV40EKS (220 V)	C414-01-800	C414-01-800	C414-01-007	C414-01-007	C416-42-801	C416-42-811
PV40EKS (110 V)	C414-01-800	C414-01-800	C414-01-007	C414-01-007	C416-42-801	C416-42-811



## 7.4 Accessories

Electrical supply cable accessory C411-01-090