



Technical brochure

# Pressure controls for hydro carbons, zone II applications, Type KPE



KPE pressure controls for use in refrigeration and air conditioning systems with **hydrocarbons** are equipped with SPDT gold plated contacts and stainless steel bellows. The high pressure controls are equipped with failsafe double bellows, whereas the low pressure controls are equipped with reduced bellow travel to enhance bellows life time.

The controls are used to protect against excessively low suction pressure or excessively high discharge pressure.

KPE pressure controls for **hydrocarbons** are equipped with 1/4 in. solder connection to ensure a hermetic installation

## Features

- Ultra-short bounce times  
Reduces wear to a minimum and increases reliability
- Manual control  
Electrical contact function can be tested without the use of tools
- Vibration and shock resistant
- Compact design
- Fully welded bellows element
- Stainless steel bellows
- High reliability both electrically and mechanically

**Approvals**

CE-marked in accordance with EN 60947-4/-5 for sale in Europe  
 CE marked in accordance with PED 97/23/23EC, category IV, safety equipment

**Ship approvals**

Germanischer Lloyd, GL  
 DIN 32733, Germany  
 Polski rejestr Statków, Poland  
 Demko: 02Atex 132887 x (Directive 94/9/EC).  
 YII 3G, EEXnLICT6

Det norske Veritas, DNV  
 Registro Italiano Navale, RINA  
 Bureau Veritas, BV  
 Lloyd's Reg. of Shipping, LR  
 Maritime Register of Shipping, MRS

**Technical data**

*Ambient temperature*  
 -40 → +65°C (+80°C for max. 2 hours)

*DIN-approved units:*  
 -25 → +65°C (+80°C for max. 2 hours)

*Max. working pressure*  
 KP 1E: PB = 8.0 bar  
 KP 7EW: PB = 32.0 bar  
 KP 7EB: PB = 32.0 bar

*Max. test pressure*  
 KP 1E: p' = 9.5 bar  
 KP 7EW: p' = 35.0 bar  
 KP 7EB: p' = 35.0 bar

*Contact load*  
 Must be used with reliable means of limiting the voltage and current to prevent sparks between the contact surfaces. This could be zener diodes or Ex barriers. For max. load we refer to EN 50021 figures A1, A2, A3, and A4.

*Cable connection*  
 Pg 13.5 screwed cable entry for 6 → 14 mm cable.

*Properties according to EN 60947:*

<i>Wire dimensions</i>	
solid/stranded	0.75 - 2.5 mm <sup>2</sup>
flexible, w/out ferrules	0.7 - 2.5 mm <sup>2</sup>
flexible, with ferrules	0.7 - 2.5 mm <sup>2</sup>
Tightning torque	max. 2 NM
Rated impulse voltage	4 kV
Pollution degree	3
Short circuit protection, fuse	10 Amp
Insulation	400 V
IP	30/44

*Enclosure*  
 IP 30 to EN 60529 / IEC 529  
 Enclosure IP 44 is obtained when the units without top cover are mounted on a flat surface or bracket. The bracket must be fixed to the unit so that all unused holes are covered.

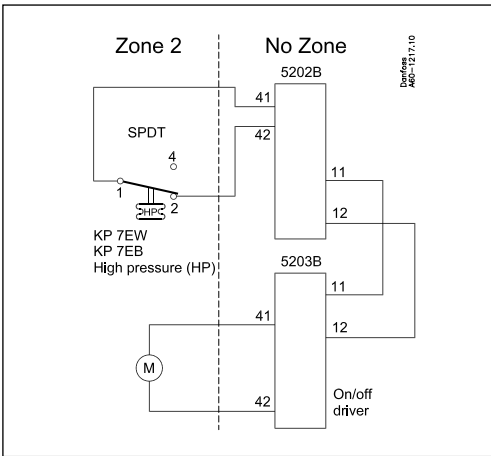
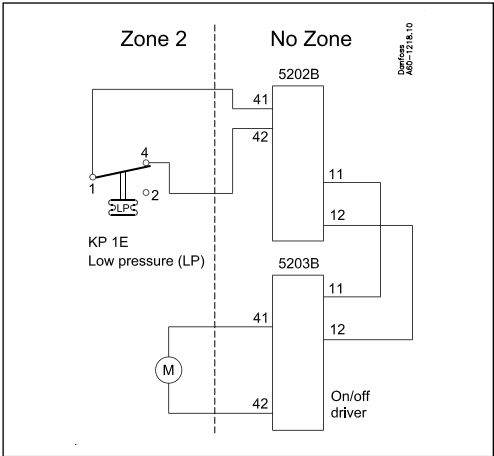
**Electrical connections**

The power across the contacts must always be limited to prevent sparks between the contact surfaces.

The equipment to be used for current/ voltage limiting must always be approved for use in the zone concerned, e.g. impulse insulator type 5202B and ON/OFF driver type 5203B from: PR Electronics A/S, Rønde Denmark (www.prelectronic.com).

Cables and cable entries approved for the application must be used. Cables must not be in contact with sharp edges.

The cable must be connected with adequate stress relief in order to prevent that pulling forces can be carried through the cable to the terminal.





**Ordering**

Pressure	Type	Low pressure (LP)		High pressure (HP)		Reset		Contact system	Code no.
		Regulating range bar	Differential Δp bar	Regulating range bar	Differential Δp bar	Low pressure LP	High pressure HP		1/4 in. ODF solder
For hydro carbons									
Low	KP 1E	-0.2 → 7.5	0.7 → 4.0			Aut.		SPDT	<b>060-530066</b>
Low	KP 1E	-0.9 → 7.0	fixed 0.7			Man.			<b>060-530266</b>
High	KP 7EW			8 → 32	1.8 → 6.0		Aut.		<b>060-530466</b>
High	KP 7EB			8 → 32	Fixed 4		Man.		<b>060-530666</b>

For other accessories: see "Spare parts and accessories". RK.OX.G2.02

**Flammable / toxic refrigerants**

R290, R 600, R 600a and R1270

**Terms of delivery**

It should be noted that special terms of delivery apply to Danfoss controls for HC and corresponding flammable refrigerants as described in the delivery agreement, Danfoss document number RZ0ZM.

Delivery agreements on components can only be entered into within the EU or EFTA, and the export and re-export of plants or sections of plants containing Danfoss components are also limited to the EU and EFTA.

**Product technology**

The use of Danfoss MPE pressure controls for R290, R600, R600a and R1270 in refrigeration plants is subject to explosion protection regulations for danger zone 2 (only rare or short term explosion risk).

The Danfoss controls are, therefore, developed for this above-mentioned requirement.

**Fire hazard**



KPE pressure controls complies with the requirements for explosive atmospheres (94/9/EC) ac. ATEX zone 2.

KPE pressure controls complies with the requirements in the Pressure Equipment Directive (PED) (97/23/EC) fluid group I (flammable/toxic media).

KPE pressure controls are marked with a label that indicates fire hazard (B.3.2 / ISO 3864). Only Danfoss valves and controls released for use with flammable hydrocarbons must be used with these substances. The actual medium must be stated in the product data sheet and / or on the product.

Only original Danfoss spare parts approved for use with flammable hydrocarbons may be used.

**Technical safety requirements**

The refrigeration system must be located within the EU or EFTA and comply with the existing EU legislation, such as the Pressure Equipment Directive (PED) (97/23/EC), the directive concerning potential explosive atmospheres (ATEX) (94/9/EC), EN 378, and other relevant EU

legislation. The refrigeration system must always comply with any local directive, legislation, and any other regulation applying in the area of installation.

**Installation and maintenance**

Only authorized persons, who are certified in installing and maintaining refrigeration plant containing flammable hydrocarbons, may do the installation and maintenance.

All requirements from local authorities, regarding use of hydrocarbons in refrigeration systems, must be fulfilled.

The refrigeration system must be designed in such a way that no abnormal impact (e.g. abnormal vibration, liquid hammer, or pressure

pulsations) can create risk for damage of the refrigeration system during operation. KP should be installed protected against direct sunlight.

Only original Danfoss spare parts approved for use with flammable hydrocarbons may be used.

The Danfoss products comply with the requirements in accordance with the ATEX directive, but Danfoss takes no responsibility for the classification of the refrigeration system.

**Design / Function**

The switch in the KPE has a snap-action function when the cut-in or cut-out value is reached.

The design of the KPE affords the following advantages:

- ultra-short bounce time
- vibration resistance up to 4 g in the range 0-1000 Hz
- long mechanical and electrical life

The KP 1E, KP 7EW and KP 7EB controls have been tested and approved by J (Technischer Überwachungsverein, (Germany) in accordance with DIN 32733.

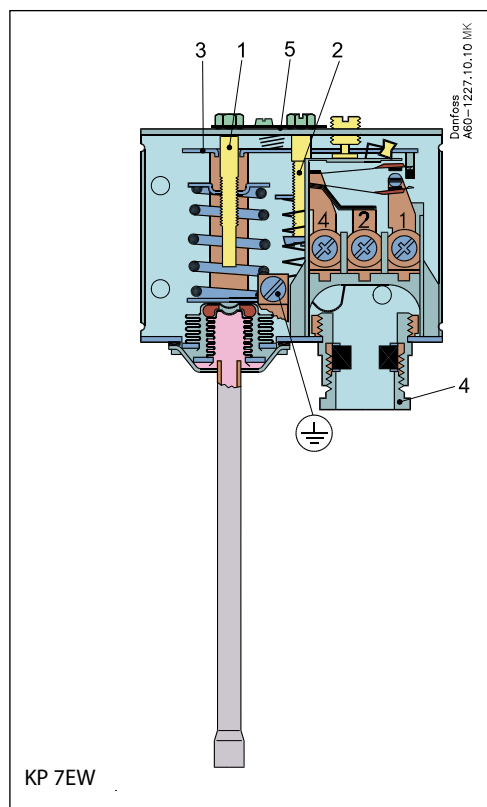
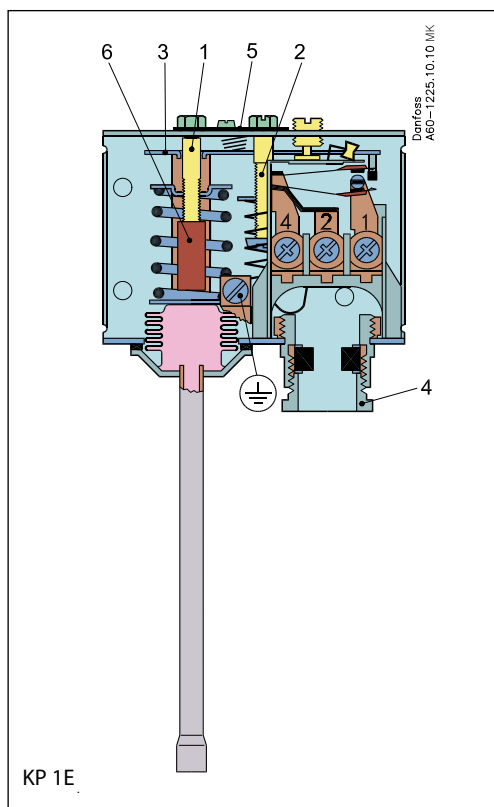
- W = Wächter (pressure control)
- B = Begrenzer (pressure control with external reset)

KP 7E has a double bellows: an outer bellows and a regulating bellows. When system pressure exceeds the set value, the KPE will automatically stop the plant. The double bellows system prevents loss of charge in the event of bellows rupture.

A rupture in the outer bellows will cause the control cut-out pressure to fall to about 3 bar under the set value, thus providing a fail-safe function.

Versions with designation W cut in again automatically when the pressure has fallen to the set value minus the differential.

Versions with designation B can be cut in manually with the external reset button when the pressure has fallen 4 bar under the set value.



- 1. Pressure setting spindle
- 2. Differential setting spindle
- 3. Main arm
- 4. Cable entry
- 5. Locking plate
- 6. Bellows travel reducer (only KP 1E)

**Setting**

*Pressure controls with automatic reset - LP:*  
 Set the LP start pressure on the "CUT-IN" scale (range scale).  
 One rotation of the low pressure spindle ~ 0.7 bar.  
 Set the LP differential on the "DIFF" scale. One rotation of the differential spindle ~ 0.15 bar. The LP stop pressure is the LP start pressure minus the differential.

**Note:**

The LP stop pressure must be above absolute vacuum ( $p_e = -1$  bar)!

If with low stop pressure the refrigeration compressor will not stop, check to ensure that the differential value has not been set too high!

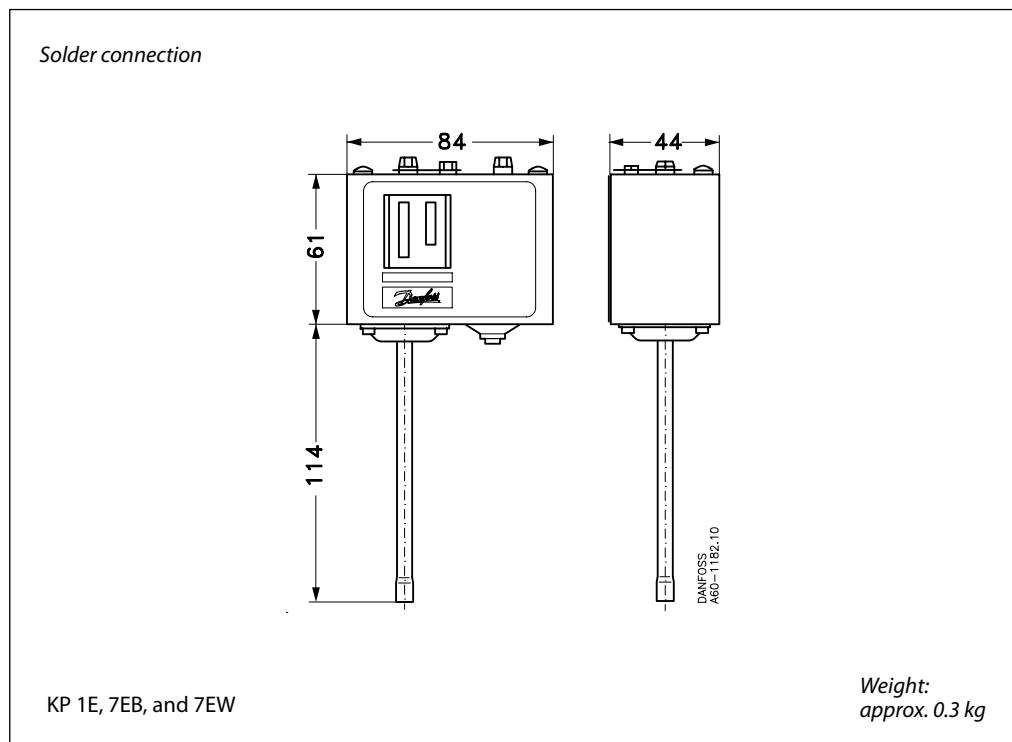
*Pressure controls with automatic reset - HP:*

Set the HP pressure on the "CUT-OUT" scale.  
 One rotation of the HP spindle ~ 2.3 bar.  
 Set the HP differential on the "DIF" scale.  
 One rotation of the differential spindle ~ 0.3 bar.  
 The HP start pressure is the HP stop pressure minus the differential.  
 Start and stop pressures for both the LP and HP sides of the system should always be checked with an accurate pressure gauge.

*Pressure controls with manual reset:*

Set the stop pressure on "CUT-OUT" scale (range scale).  
 Low pressure controls can be manually reset when the pressure is equal to the stop pressure plus the differential.  
 High pressure controls can be manually reset when the pressure is equal to the stop pressure minus the differential.

**Dimensions and weight**



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