

Data sheet

Pressure switch

Type KP-E



KP-E pressure switches for use in refrigeration and air conditioning systems are equipped with SPDT gold plated contacts and stainless steel bellows.

The high pressure switches are equipped with failsafe double bellows, whereas the low pressure switches are equipped with reduced bellow travel to enhance bellows life time. KP-E pressure switches are used to protect against excessively low suction pressure or excessively high discharge pressure.

The units are designed to operate in explosive zones acc. to 2014/34/EU, ATEX directive, explosive zone 2, surface equipment, category 3. KP-E pressure switches for HCFC, HFC and HC refrigerants are equipped with 1/4 in solder connection to ensure a hermetic installation.

Features

- Ultra-short bounce time thanks to snap-action function (reduces wear to a minimum and increases reliability)
- Manual trip function (electrical contact function can be tested without the use of tools)
- Vibration and shock resistant
- Compact design
- Bellows without any welding points
- 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 2014/68/EU, category IV, safety equipment

Ex II 3G Ex ic IIB T6 Gc in accordance with 2014/34/EU ATEX directive

Technical data

Ambient temperature		-20 – 60 °C
Max. working pressure		KP 1E: PS / MWP = 17.0 bar *) KP 6EW, KP 6EB: PS / MWP = 46.5 bar KP 7EW, KP 7EB: PS / MWP = 32 bar
Max. test pressure		KP 1E: P _e = 20 bar KP 6EW, KP 6EB: P _e = 46.5 bar KP 7EW, KP 7EB: P _e = 35 bar
Cable connection		Pg 13.5 screwed cable entry for 6 – 14 mm cable
Contact rating		Pi max: 1 W Ui max: 30 V Ii max: 0.1 A Ci max: 0.5 nF Li max: 0.2 µH
Wire dimensions	solid / stranded	0.75 – 2.5 mm ²
	flexible, without ferrules	0.7 – 2.5 mm ²
	flexible, with ferrules	0.7 – 2.5 mm ²
Tightning torque		max. 2 Nm
Rated impulse voltage		4 kV
Pollution degree		3
Short circuit protection, fuse		10 A
Insulation		400 V
Enclosure		IP30 / IP44

*) Low pressure protection

Enclosure
IP30 to EN 60529 / IEC 529
Enclosure IP30 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.

IP44 to EN 60529 / IEC 529
Enclosure IP44 is obtained when the units with 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. KP pressure switches with auto reset are supplied with top cover. For KP pressure switches with manual reset, the top cover must be separately ordered (**code no. 060-109766**)

Ordering
FOR R290, R32, R444B, R600, R600a, R1234ze, R1270

For complete list of approved refrigerants, visit www.products.danfoss.com and search for individual code numbers, where refrigerants are listed as part of technical data.



This product is validated in accordance to EN 60079-0:2012 + A11:2013.
Ignition risk is evaluated in accordance to EN 60079-11:2012.
See safety requirements on the next page.

Type	Pressure	Low pressure (LP)		High pressure (HP)		Reset		Contact system	Function *)	Code no.
		Regulating range	Differential Δp	Regulating range	Differential Δp	Low pressure LP	High pressure HP			Connection
		[bar]	[bar]	[bar]	[bar]					1/4 in. ODF solder
KP 1E	Low	-0.2 – 7.5	0.7 – 4.0	–	–	Auto	–	SPDT	PSL	060-530066
KP 1E	Low	-0.9 – 7.0	0.7	–	–	Man. (Min.)	–	SPDT	PZL	060-530266
KP 6EW	High	–	–	8 – 42	4 – 10	–	Auto	SPDT	PSH	060-522466
KP 6EB	High	–	–	8 – 42	4	–	Man. (Max.)	SPDT	PZH	060-522566
KP 7EW	High	–	–	8 – 32	4 – 10	–	Auto	SPDT	PSH	060-530466
KP 7EB	High	–	–	8 – 32	4	–	Man. (Max.)	SPDT	PZH	060-530666

*) PSL, PZL, PSH, PZH according to EN 12263:1998

Safety requirements



The KP-E can be applied on systems with R290, R32, R444B, R600, R600a, R1234ze, R1270 as the working fluid.

For countries where safety standards are not an indispensable part of the safety system Danfoss recommend the installer to get a third party approval of the system containing flammable refrigerant.

Note, please follow specific selection criteria stated in the datasheet for these particular refrigerants.

KP-E pressure switches comply with the requirements for explosive atmosphere 2014/34/EU, acc. to ATEX, zone 2.

Only apparatus designed, constructed and released by Danfoss must be used for application concerned. Danfoss can accept no responsibility in case of alterations made on the switches or the use of them against the Danfoss instructions. Original Danfoss spare parts approved for use in explosive atmosphere can only be used.

The application covers systems that must be located within the EU or EFTA and comply with the existing EU legislation, such as Pressure Equipment Directive (PED) 2014/68/EU, the directive concerning potential explosive atmosphere (ATEX) 2014/34/EU, and other related EU standards. The system where KPE is mounted must always comply with local directives, legislation or any other regulation applying in the area of installation. The Danfoss products comply with the requirements of ATEX directive, but Danfoss takes no responsibility for the classification of explosive zone.

Electrical connection

The KP-E pressure switch placed in explosive zone must always be wired through reliable Ex zener barrier, placed outside ex-zone, to ensure insufficient energy supply to cause the ignition of surrounding atmosphere by an electrical spark or the heating of components of circuitry.

The equipment to be used for electrical load limiting must always be approved for use in the zone concerned.

Cables and cable entries approved for the application must be used and can not be in contact with sharp edges. Cables must be connected with adequate stress relief that way that pulling forces can not be carried through the cable to the terminal.

Note:
A particular system can be classified in different zones, for different parts of the system.

Intrinsic safety protection method

EX - zone	Non EX - zone	Electrical data for intrinsically safe specification (for all KP-E types):
<p>KP-E</p>		<p>Pi max: 1 W Ui max: 30 V li max: 0.1 A Ci max: 0.5 nF Li max: 0.2 μH</p>

Must be used with certified Ex ic barrier (product matching) satisfying the input parameters

Installation and maintenance

Only authorised persons, who are certified in installing and maintaining the systems may do the installation, maintenance and change of the switch.

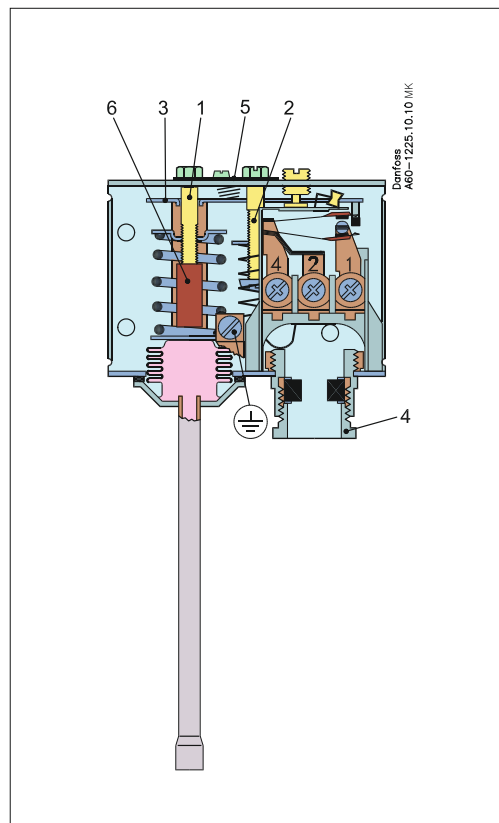
In the event of strong pulsation in the system, bellows must be protected against fatigue failure by use of damping coil.

The cycle frequency of the KP-E switch must be kept as low as possible. The vibration level must be kept as low as possible.

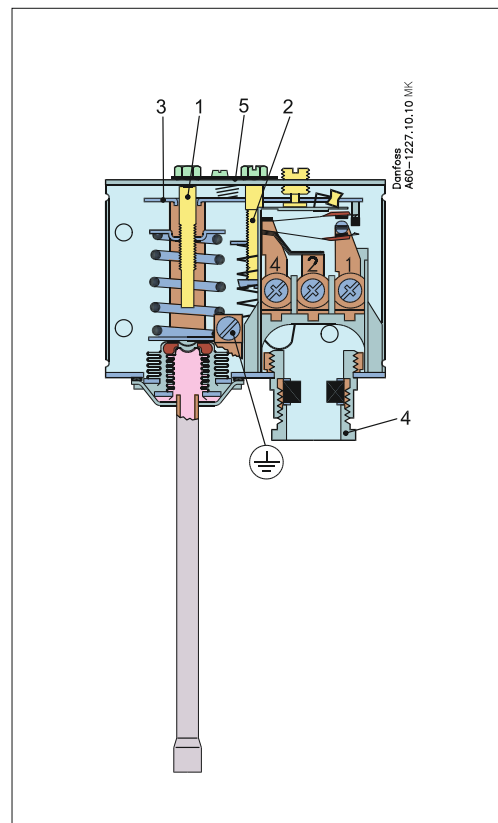
Any overload of the KP-E switch must be prevented. Overloaded or damaged apparatus must be exchanged.

Design / Function

KP 1E



KP 6EW, KP 7EW



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

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

The design of the KP-E 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 6EW, KP 6EB, KP 7EW and KP 7EB switches have been tested and approved by TÜV (Germany) in accordance with Directive 2014/68/EU.

KP 6E and KP 7E have a double bellows: an outer bellows and a regulating bellows. When system pressure exceeds the set value, the KP-E 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.

Setting

Pressure switches 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 switches 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 switches with manual reset:

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

High pressure switches can be manually reset when the pressure is equal to the stop pressure minus the differential.

Dimensions [mm] and weight [kg]

Solder connection, types KP 1E, KP 6EW, KP 6EB, KP 7EW, KP 7EB

