

## Installation guide

## Pressure switch

## KPU

## Application

KPU dual pressure switches are for use on commercial refrigeration and air conditioning systems to protect compressor against excessively low suction pressure or excessively high discharge pressure.

KPU dual pressure switches are compatible with refrigerants listed below. KPU16W and KP16B are fail safe switches for high pressure refrigerants. Standard enclosure is ~ NEMA 1.

## Refrigerants:

R22, R134a, R404A, R407A, R407C, R407F, R410A\*, R422B, R422D, R438A, R448A, R449A, R450A, R452A, R507A, R513A

replace with:

For complete list of approved refrigerants, visit [www.products.danfoss.com](http://www.products.danfoss.com) and search for individual code numbers, where refrigerants are listed as part of technical data. /

\*) R410A only for KPU 16W and KPU 16B

KPU dual pressure switches are fitted with the Single-Pole, Single-Throw (SPST) or Single-Pole Double-Throw (SPDT) switches, suitable for direct as well as indirect (with a contactor) control.

Three versions of switch operation are available:

- automatic on LP and HP sides
- automatic on LP and manual reset on HP

– convertible manual or automatic on LP and HP sides.

## Manual reset

The manual reset mechanism does not allow the pressure switch to automatically reset after the switch has cut out. So the pressure switch must be manually reset by the user to enable restart of the equipment. Manual reset is possible to operate only after return of pressure to cut in level. Before releasing the reset it is recommended to investigate what caused the shutdown.

## Convertible reset

The convertible reset feature allows to change the operation from automatic to manual by turning the selecting plate. The selecting plate is located between two push buttons at the top of the switch.

Please refer to instruction below demonstrating how to select reset function.

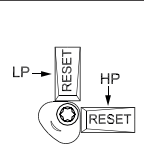
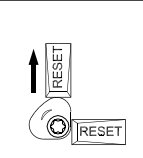
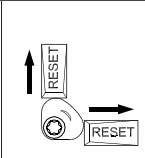
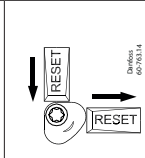
## Product Specification

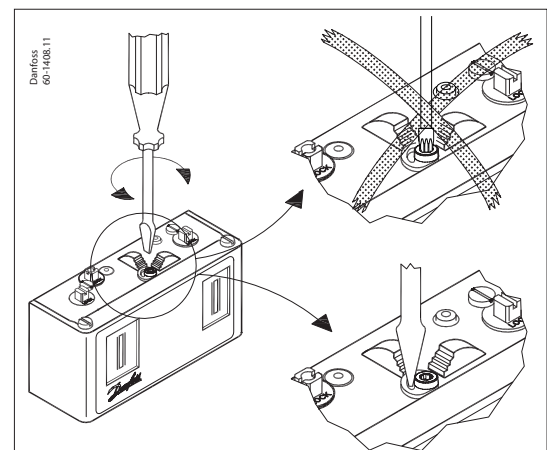
Type	Code no.		Low pressure (LP)		High pressure (HP)		Reset		Contact system
	¼ in male flare	3/8 in cap. tube w. ¼ in flare nut	Regulating range [inHg] [psig]	Differential Δp [psi]	Regulating range [psig]	Differential Δp [psi]	Low pressure	High pressure	
KPU 15	060-5247	060-5248	6 in – 108	10 – 60	100 – 465	60	Automatic	Automatic	SPST (NO + NC)
KPU 15B	060-5249	060-5250	6 in – 108	10 – 60	100 – 465	60	Automatic	Man (Max.)	
KPU 16W	060-5251	060-5252	6 in – 108	10 – 60	100 – 600	60	Automatic	Automatic	SPDT with LP/HP signal
KPU 16B	060-5253	060-5254	6 in – 108	10 – 60	100 – 600	60	Convertible	Convertible	

Max. working pressure:	LP side: 250 psig	HP side KPU 15: 510 psig	HP side KPU 16: 675 / 610* psig
Max. test pressure:	LP side: 290 psig	HP side KPU 15: 530 psig	HP side KPU 16: 725 psig
* 610psig - MWP for products used according to 2014/68/EU PED directive		Ambient temperature: -40 – 122 °F (175 °F for max. 2 hours)	

## Convertible reset:

Selection of reset function on dual pressure switches with convertible reset – turn plate to desired reset configuration. Insert a screwdriver into the slot on the lock disc and turn it to desired reset configuration. Do not turn the screw on the lock disc as it may damage the convertible reset mechanism.

			
LP man.	LP auto.	LP auto.	LP man.
HP man.	HP man.	HP auto.	HP auto.



## Installation

Select an accessible location, where the switch and pressure connection line will not be subject to damage.



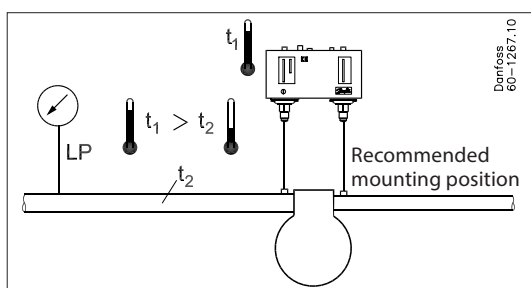
### IMPORTANT:

Mount the pressure switch in a position that will allow drainage of liquids away from switch bellows. Pressure connection of the switch must always be located on the top side of the refrigerant line. This reduces the possibility of oil, liquids, or sediment collecting in the bellows, which could cause the switch malfunction.



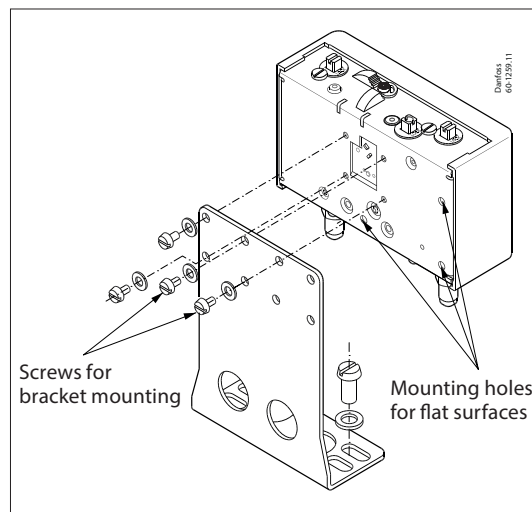
### IMPORTANT:

Ensure the ambient temperature for the dual pressure switch on LP side is higher than the refrigerant line as that will prevent liquid migration and accumulation in the bellows.



Mount the KPU pressure switch on a bracket or on a completely flat surface. Mounting to an uneven surface might cause improper switch operation.

For bracket mounting use only the 10-32x3/16 screws provided with the switch. If other screws are used, function of the pressure switch might be disturbed (they should not protrude into the switch more than 1/8 in).



Use only the mounting holes provided; no other holes are to be added to the switch.

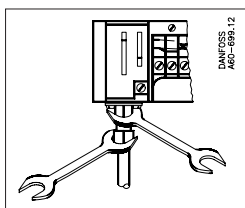


### IMPORTANT:

Pressure pulsations in the refrigeration system reduce life time of the bellows and might disturb switch function. Pressure pulsations should always be effectively damped e.g. by connection the pressure switches to the refrigeration system through a capillary tube.

## Recommendations for capillary tube and flare connections:

1. Ensure self-draining of the capillary tube to minimize clogging.
2. Coil excess capillary tube into smooth, circular coils (approx. 3 inch diameter). The coiled tube should be securely fastened in order to prevent possible damage due to vibration.
3. Leave a little slack in the capillary tube as it helps to damp mechanical vibrations.
4. Avoid sharp bends as well as re-bending of the capillary tube on the same point as it weakens the material, increasing the risk of crack.
5. Never allow for contact between the capillary tube and sharp or abrasive objects as during vibrations the tube could be damaged due to friction.
6. Purge the piping before connecting pressure switches.
7. Always use two wrenches tightening the flare nut on the pressure switch. One wrench should support the connector while the second wrench is used to tighten the nut.
8. Do not over tighten flare nuts as it may damage the threads causing leaks.
9. Protect the capillary tube from damage caused by vibrations from compressor:
  - when the switch unit is mounted directly on the compressor, the capillary must be secured to the compressor so that everything vibrates as a whole.
  - when the switch is mounted remote from the compressor, make the pressure connections away from the compressor.
  - when the switch is mounted remote from the compressor and the pressure connections have to be on the compressor, then damping coils must be used between the compressor and the pressure switch.

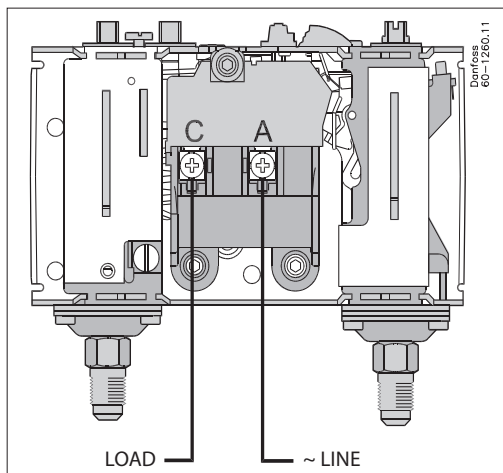


### NOTE:

After installing the pressure switch, evacuate the plant in accordance with applicable EPA and other regulations, to remove air, moisture, and other contaminants.

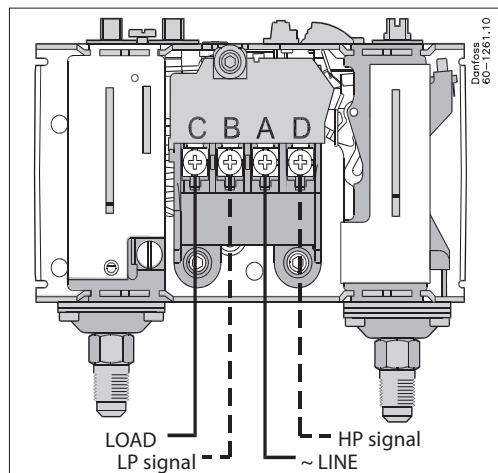
### Wiring Option A:

– KPU 15 Pressure Switch (SPST (NO + NC))



### Wiring Option B:

– KPU 16 Pressure Switch (SPDT with LP/HP signal)



## Wiring

### Electrical ratings according to UL regulations

Contacts	Motor ratings	120 V AC	240 V AC
A – B	FLA	24	24
	AC LRA make only	144	144
A – C	NIA	24	24
	Pilot Duty 12 W, 120/240 V DC		
A – D	Pilot Duty 50 VA, 240 V AC		

### European electrical ratings according to EN 60947

AC1	AC3	AC15	LR	DC13
16 A	16 A	10 A	112 A	12 W
400 V				220 V

The terminal block as well as grounding screw are accessible after dismounting of the front cover.

Wire dimensions: 10 AWG max.

Cable entry: 7/8 inch cable entry for 1/2 inch male pipe thread connection (conduit boss) or similar (Pg 13.5 or Pg 16) screwed cable entry.



### CAUTION:

Disconnect power supply before wiring connections are made or service to avoid possible electrical shock or damage to equipment.  
Do not touch live parts with your fingers or with any tool.



### NOTE:

All wiring should conform to the National Electrical Code and local regulations.  
Use copper wire only.  
Use terminal screws furnished in the contact block.  
Do not exceed tightening torque 20 lb. in (2.3 Nm).  
Do not exceed electrical ratings for the switch.

### Contact function test (Manual trip)

When the electrical leads are connected the contact function can be manually tested regardless of pressure conditions in the system. For LP side testing use the trip lever located in the left side of the dual KPU. The lever must be operated with fingers only. Do not use screwdriver as it will damage the switch. For HP side testing use lever located at bottom of right side of the dual KPU. The lever must be carefully operated with a screwdriver.



### NOTE:

While operating the manual trip on KPU switches with manual reset it is necessary to push the reset knob.

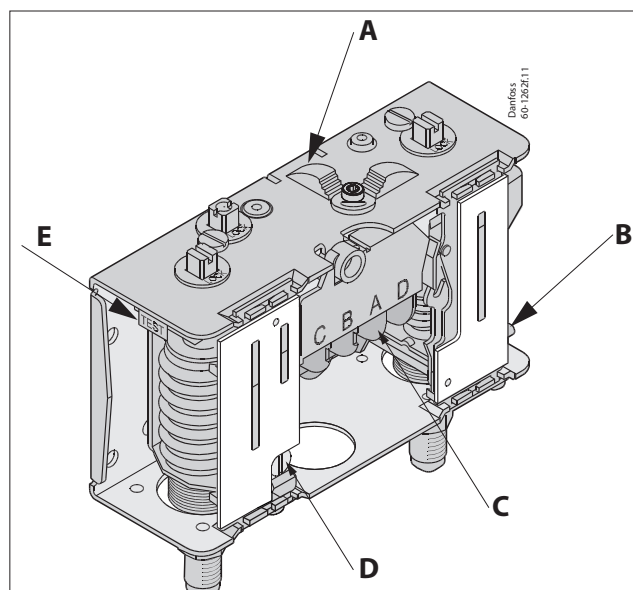
**A:** Manual reset button (available only on switches with manual/convertible reset function)

**B:** HP Manual trip. Press the lever up. Use screwdriver only!

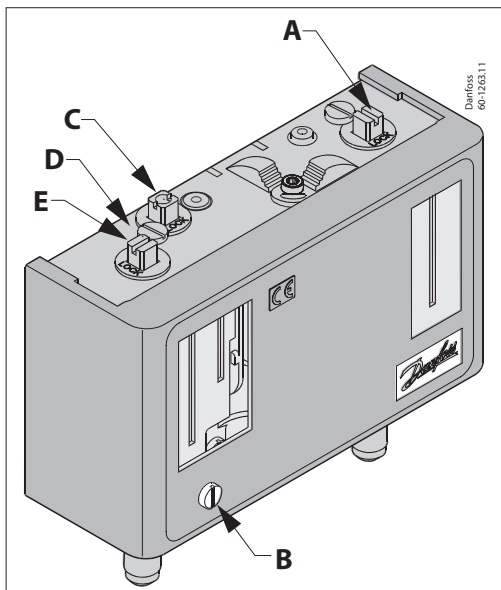
**C:** Terminal block

**D:** Grounding screw

**E:** LP Manual trip. Press the lever up. Use fingers only!



## Adjustment



- A:** HP Range adjusting screw  
**B:** Cover screw  
**C:** LP Differential adjusting screw  
**D:** Locking plate  
**E:** LP Range adjusting screw

Before adjustment, loosen the locking plate.  
 For setting use the Universal Refrigeration Wrench.

Set Cut In/ Cut Out by adjusting range screw:

- On LP Side turn the range screw clockwise to lower the Cut In.
- On HP Side turn the range screw clockwise to rise the Cut Out.

Set differential by adjusting differential screw:

- On LP Side turn the differential screw clockwise to increase the differential.



### NOTE:

Adjust the pressure switch with settings specified by the manufacturer of the controlled equipment.

Do not exceed the pressure ratings of the controlled equipment or any of its components when checking pressure switch operation or operating the controlled equipment.

Do not adjust pointers beyond the highest or lowest indicator marks on the scale plate, as this may cause inaccurate switch operation.



### IMPORTANT:

The scale plate is only for reference and for more precise setting a pressure gauge should be used.

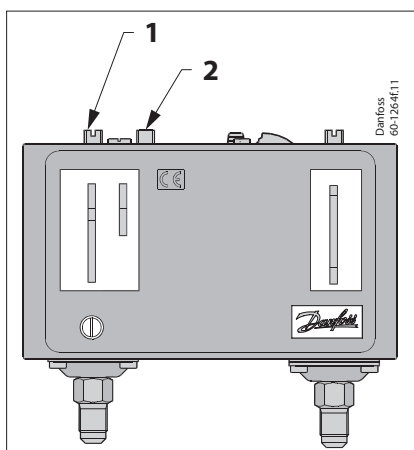


### IMPORTANT:

After installing and adjusting pressure switch run the controlled equipment several times (at least three cycles) at normal operating conditions.

## Low Pressure Side Setting Cut Out on pressure fall.

Scale plate directly indicates the Cut In and the Differential set points.



1. Turn the range screw to adjust the Cut In set point.
2. Then turn the differential screw to adjust the Differential
3. The Cut Out setting equals the Cut In less the Differential:  

$$\text{CUT OUT} = \text{CUT IN} - \text{DIFFERENTIAL}$$



### NOTE:

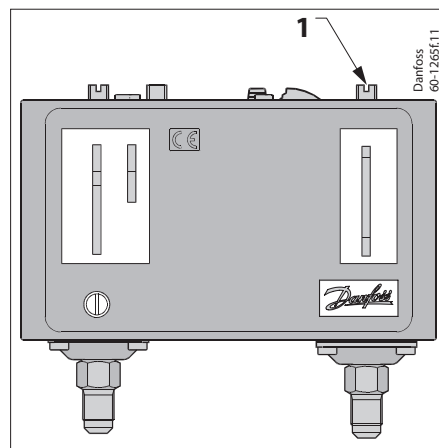
Cut Out set point must be above absolute vacuum!  
 If the Differential is set too high then the switch will not stop the compressor.

## High Pressure Side Setting Cut Out on pressure rise.

Scale plate directly indicates the Cut Out set point.

There is no pointer for the Differential.

The Differential pressure value is fixed and printed on the scale plate.



1. Turn the range screw to adjust the Cut Out set point.
2. The Cut In setting equals the Cut Out less the Differential:  

$$\text{CUT IN} = \text{CUT OUT} - 60 \text{ psi}$$