



TRAINING WEBINAR #5

PRESSURE SWITCHES

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Refrigeration pressure switches

- LP pressure switch
- HP pressure switch
- Combined HLP pressure switch
- Differential oil pressure switch
- cartridge pressure switches

First part



Plan of the presentation:

1. General
2. Description
3. Assembly
4. LP pressure switch
5. LP safety pressure switch Pressostat de régulation BP
6. Pressure switch regulation
7. Pump down regulation
8. HP pressure switch
9. HP safety pressure switch
10. HP regulation pressure switch
11. HLP combined pressure switch
12. Location and fixing of pressure switches
13. Setting
14. Oil differential pressure switch
15. Cartridge pressure switches



- Electric switch controlled by a variation of pressure.
- Controls low pressure, high pressure or differential pressure.
- Can be used as an organ of:
- Regulation: LP and HP pressure switches,
- Safety: LP and HP pressure switches, combined HBP pressure switch, differential pressure switches.

pressure switch basically consists of three parts: A pressostatic system (bellows, connector and springs), An electrical contact system (simple unipolar, reversing unipolar, etc.), A mechanical linking system.



A pressure switch basically consists of three parts:

- . A pressostatic system: bellows, connector and springs,
- . An electrical contact system (simple unipolar, reversing unipolar, etc.),
- . A mechanical linking system.

3. ASSEMBLY



- Preferably near the pressure tap.
- Can be connected to the manometric connections of the 3-way valves, but it is preferable, when possible, to connect them to the cylinder heads.



4. LP PRESSURE SWITCH

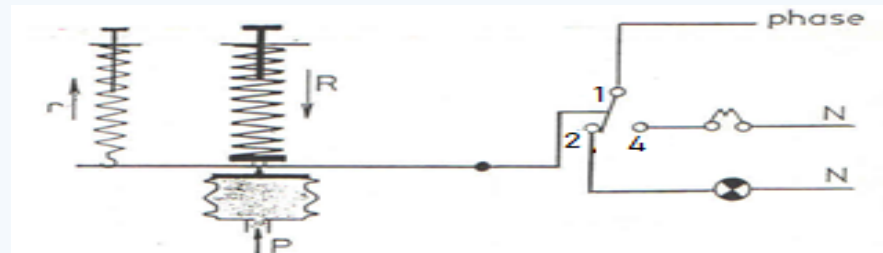
1. Function

They must :

- Trigger (open the control circuit), by pressure drop.
- [animation\pressostat 1.swf](#)
- Enclencher (fermer le circuit de commande), par augmentation de pression.

[animation\3.swf](#)

2. Functioning



P: Pressure to control.

A: Highest pressure setting spring (cut-in point).

r: Differential spring for lowest pressure setting (cut-off point).

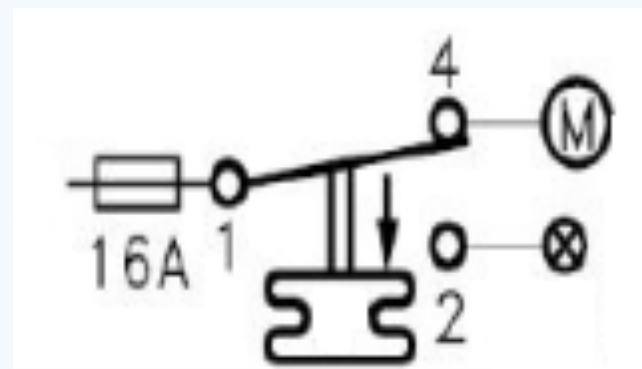
If $P > R$ the lever swings towards contact 4, the contact is closed in position 1 - 4, therefore 4 coil supply.

If $P < R$ the lever switches to contact 2, the contact opens between 1 and 4 and closes between 1 and 2, therefore 2 light or sound signal supply.

5. LP SAFETY PRESSURE SWITCH



Contact 1-4 is closed during normal operation; if the pressure drops below a preset value contact 1-4 opens, it will close again when the pressure has reached a preset value. On the pressure switch is displayed the pressure corresponding to the closing of contact 1-4, this is the set point as well as the pressure difference, between the closing of the contact and the opening, called differential. [animation\4.swf](#)



6. LP REGULATION PRESSURE SWITCH



a. Pressure switch regulation:

Set the differential spring to minimum.

Adjust the highest pressure (triggering point) using the adjustment spring placed opposite the bellows.

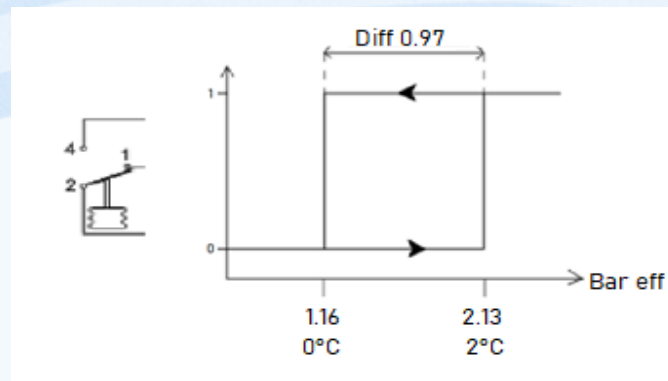
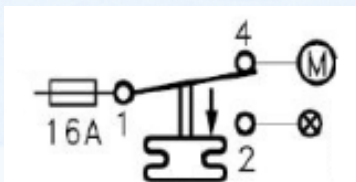
When the temperature in the chamber is at 0°C , the vaporization temperature of the fluid is at a certain value, this difference characterizes the installation (it is the Δt of the evaporator); suppose a difference of 8°C , the temperature of vaporization will therefore be -8°C . Let us look for 134 a the pressure - temperature relationship to obtain the cut-off pressure: i.e. 1.16 bar (effective).

The installation stops, the low pressure side of the installation will equilibrate with the temperature prevailing around the evaporator; the unit must start operating when the ambient temperature reaches $+2^{\circ}\text{C}$, i.e. for the 134 at a pressure of 2.13 bar (effective)

Final adjustment to be made:

Cut-in point.....2.13 bar (effective).

Cut-off point 1.16 bar (effective).



b) Regulation (vacuuming) (pump down)

This type of pressure switch regulation is also called pump down (vacuuming) the principle consists in stopping the compressor via the LP pressure switch after the temperature desired to be measured by a thermostat is reached. [animation\5.swf](#)

Description:



1- Cut:

- . The temperature set at the thermostat has been reached.
- . The thermostat cuts the power supply to the solenoid valve located on the liquid line.
- . The compressor still works, but the pressure goes down the fluid no longer supplying the evaporator.
- . The pressure switch detects a lack of pressure and stops the compressor.

2- The engagement

- . The temperature rises, the thermostat triggers the solenoid valve which releases the fluid. The evaporator is supplied and the fluid spreads in the installation.
- . The cut-in point of the pressure switch is reached and gives the order to the compressor to start.

EXEMPLE



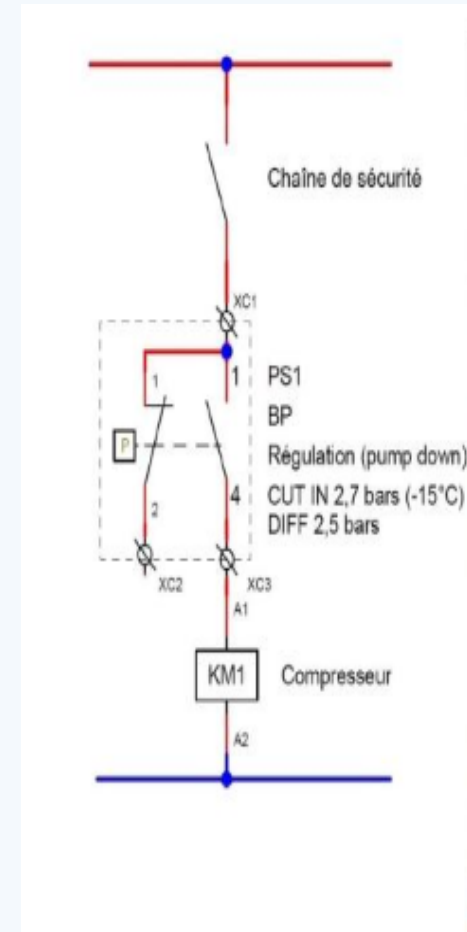
a) Stop

If the suction pressure LP is lower than the trigger pressure or cut-out pressure (CUT IN - DIFF pressure), ($2.7 - 2.5 = 0.2$ bar) the electrical contact changes from NC (**N**ormally **C**losed) 1 - 4 to NO (**N**ormally **O**pen) 1 - 2 the compressor **stops**.

b) Work

If the suction pressure LP is higher than the cut-in pressure (CUT IN pressure), the electrical contact switches from **NO** 1 - 2 to **NC** 1 - 4, the compressor starts. [animation\5.swf](#)

[animation\7.swf](#)



7. HP PRESSURE SWITCH



1. FONCTION

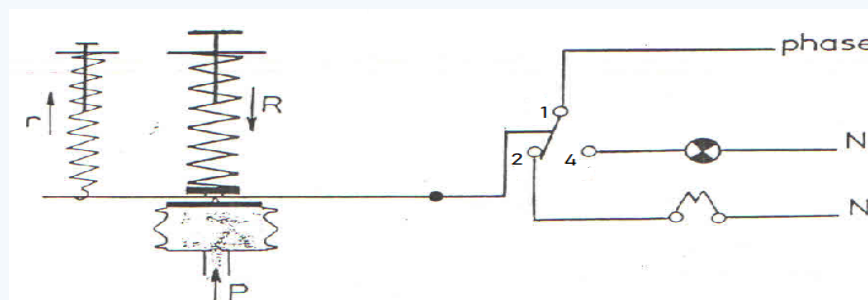
They must :

Trigger open the control circuit), by increasing the pressure .

[animation\2.swf](#)

Engage (close the control circuit), by pressure drop . [animation\6.swf](#)

2. FUNCTIONING



P: Pressure to be checked.

A: Highest pressure setting spring (i.e. cut-off point).

r: Differential spring for lowest pressure setting (i.e. cut-in point).

If $P > R$, the lever switches to contact 4, the contact is closed in position 1 - 4, therefore 4 light or sound signal supply

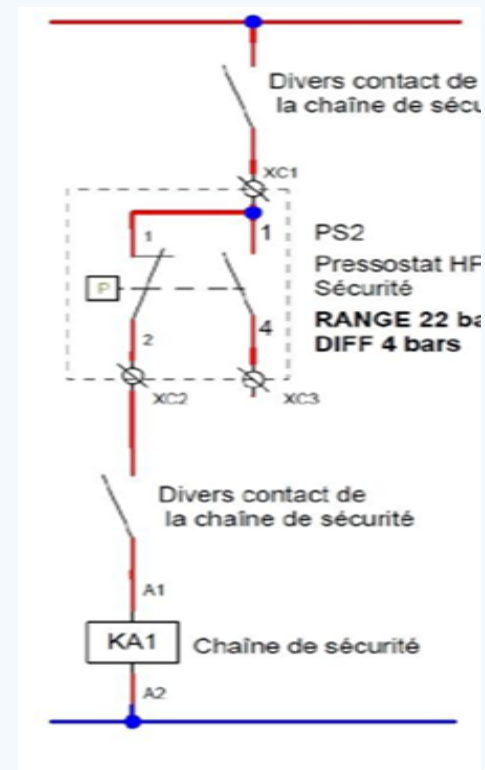
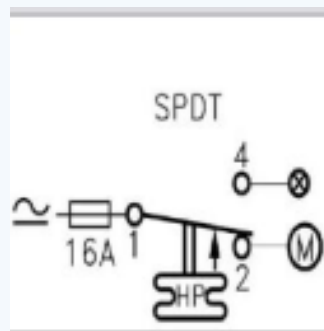
If $P < R - r$ the lever swings towards contact 2, the contact opens between 1 and 4 and closes between 1 and 2, therefore 2 coil supply



3. HP safety pressure switch animation\regulation ph.swf

If $P > R$ the lever swings upwards, on the contact side, the contact is closed in position 1 - 4, therefore 4. signal supply HP safety pressure switch animation\adjustment ph.swf

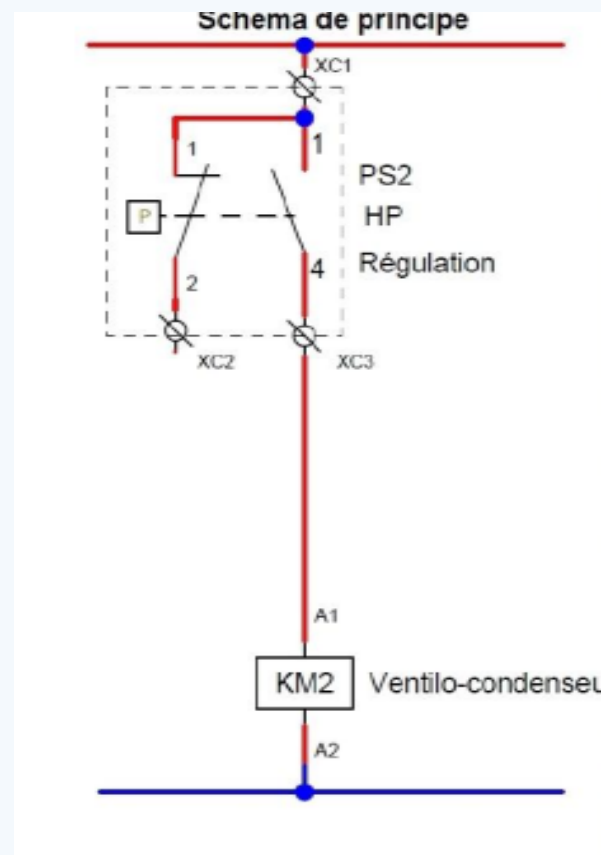
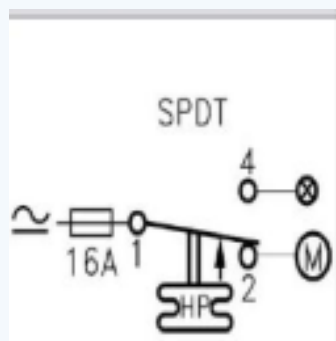
If $P > R$ the lever swings upwards, contact side, the contact is closed in position 1 - 4, therefore 4. light or sound signal supply



4. HP pressure switch used in regulation

Used for condensing pressure control for:

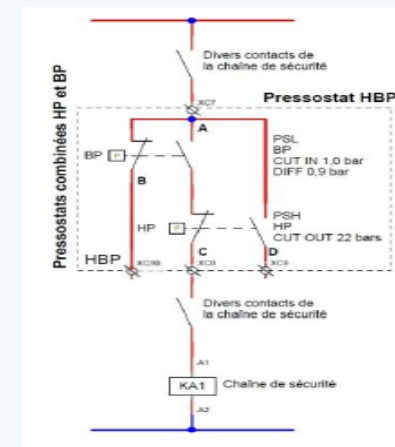
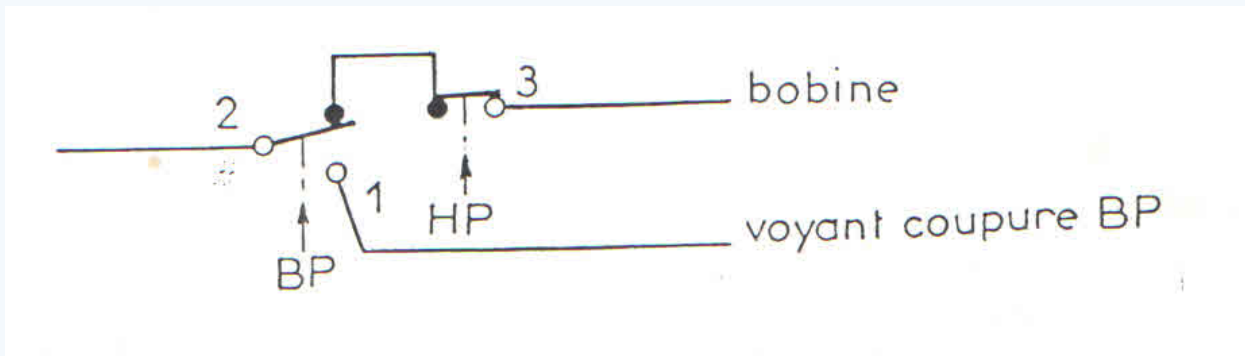
-Eliminate cascading fans.



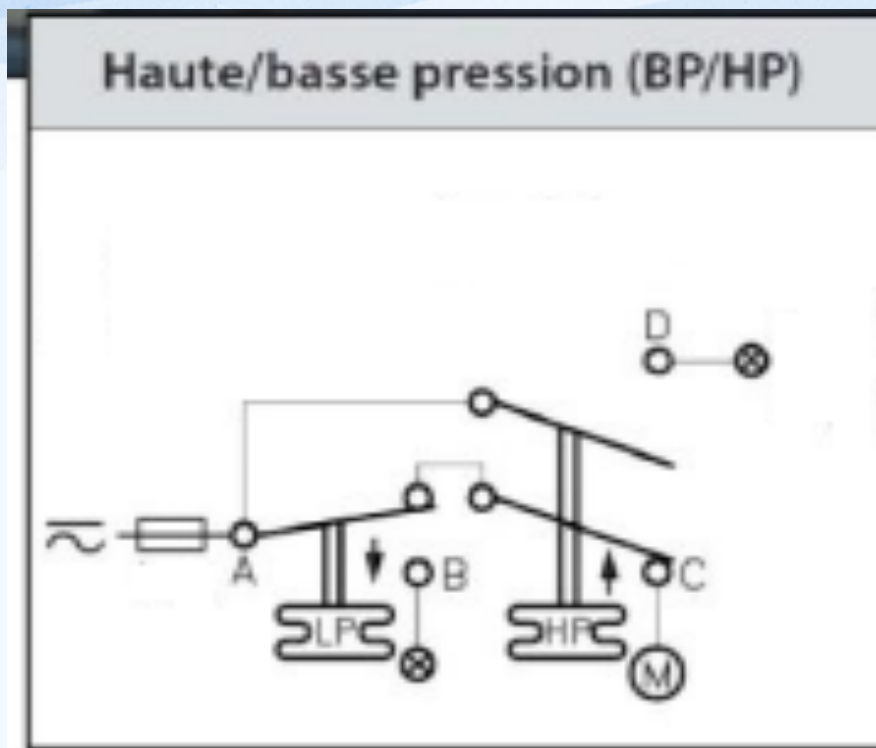
8. HLP COMBINED PRESSURE SWITCHES



1/ There are several types of manufacturing that can be divided into two groups:
Two pressure switch systems and two electrical contacts combined in a single box.
The 2 pressure switches will be adjusted as if they were separate pressure switches. The 2 contacts are or will be connected in series on the control of the coil



2/ Two pressure switch systems and a single electrical contact combined in the same box. This electrical contact must have the same movement for opposite functions depending on whether it is requested by high or low pressure (contact opening for pressure drop in LP or pressure increase in HP). To do this, the manufacturers have reversed the axes of articulation of the control levers with respect to the thrust mechanisms, the two levers being made mechanically integral.

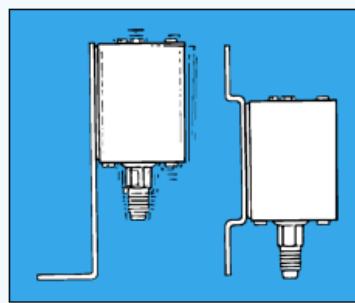
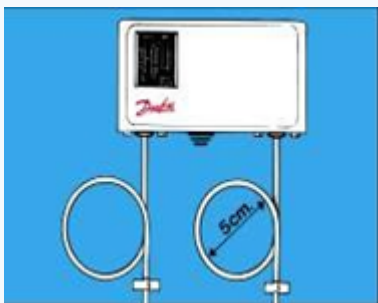
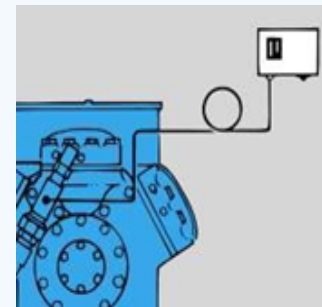
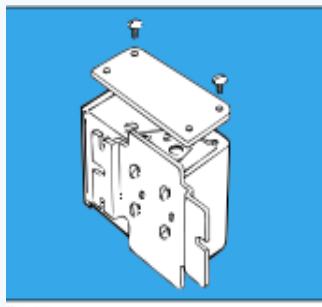
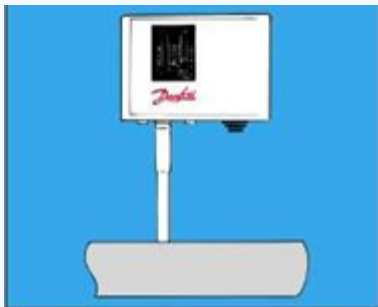


Nota : For the adjustment of these combined pressure switches, one can start either with high or low pressure, provided that the side that is not being adjusted is engaged.

9. LOCATION AND FIXING OF PRESSURE SWITCHES



- Can be fixed either on consoles, or on a board or wall.
- If possible, mount the bellows higher than the pressure tap in order to avoid the accumulation of oil or liquid in it.
- Avoid reverse slopes and oil pockets on the connection pipes.
- Use connection capillaries (lyres or coils).



10.SETTINGS



First adjust the pressure switches using a pressurized nitrogen bottle. Make sure that the changeover contacts are correctly connected for the desired function.

Low pressure control:

First set the cut-in pressure (CUT IN) on the range scale (A). Then set the differential pressure (DIFF) on the differential scale (B).

Trigger pressure = CUT IN minus DIFF

High pressure control:

First set the cut-out pressure (CUT OUT) on the range scale (A).

Then set the differential pressure (DIFF) on the differential scale (B).

Cut-in pressure = CUT OUT minus DIFF

Do not forget that the scales are only references!

11. DIFFERENTIAL OIL PRESSURE SWITCHES



Used on compressors where lubrication is provided by pump.

1. Role

Its role is to stop the operation of the compressor if its lubrication is not ensured.

Lubrication is assured if the oil pump's discharge pressure is greater than its suction pressure.

Most often, the pump sucks the oil into the compressor housing where the BP prevails which varies, so we cannot control this value nor the discharge pressure which is linked to it, on the other hand the gap, or differential, between these 2 values must remain constant and can thus be controlled.

Depending on the compressor manufacturers, this differential may vary according to the quality of the pumps from 0.6 bar to 4 bar (refer to the manufacturer's instructions).



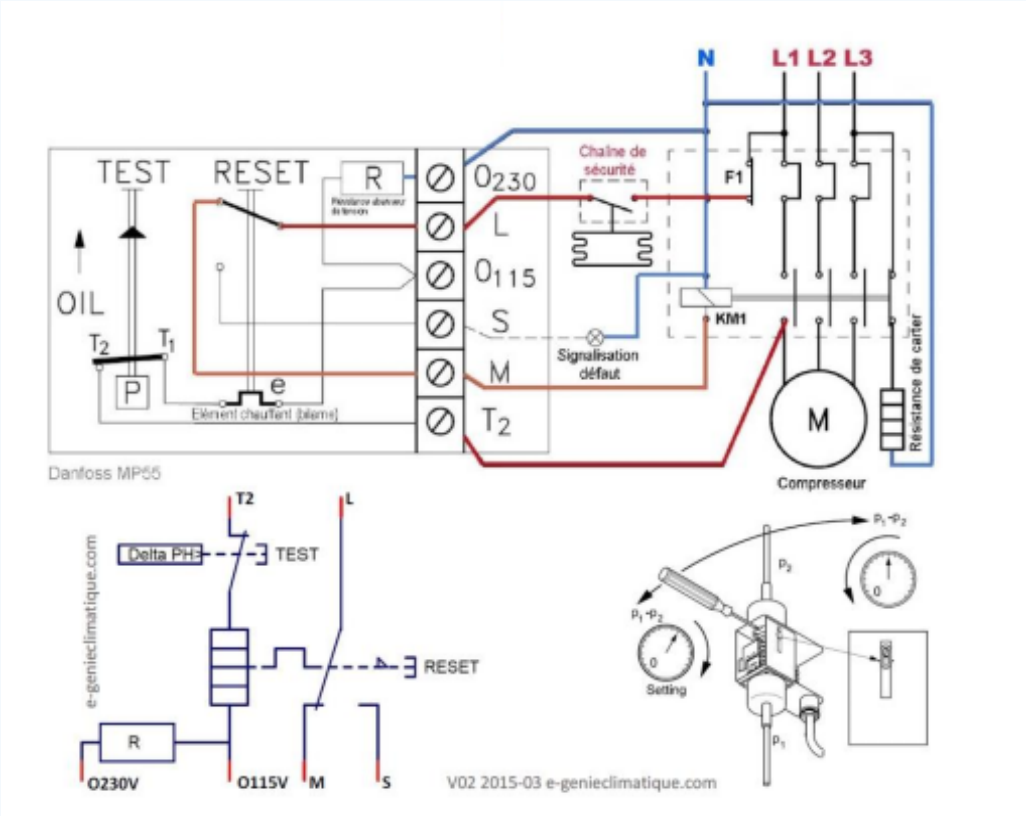
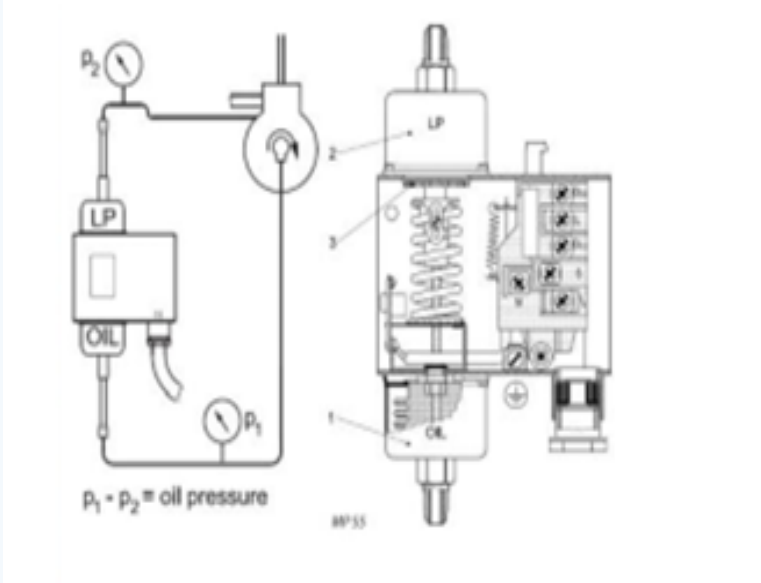
2. Functioning

The crankcase and oil pump discharge pressures act in opposition on a lever.

An adjustment spring makes it possible to modify the difference between these two pressures to cause an electrical contact to open if this difference is not reached.

When the compressor stops, there is no oil pressure since the pump is driven by the compressor shaft, the pressure switch is therefore faulty, a time delay system will allow the unit to start up and power up. oil pressure. This delay, depending on the manufacturers, varies from 60 - 90 to 120 seconds, and is obtained by a thermoelectric resistor or heater assembly + bimetal electrical contact holder. It is only if the oil pressure is not established after the time delay, that the group and the heater will stop.

Principle scheme:
animation\pressosDiffHuDia1.swf





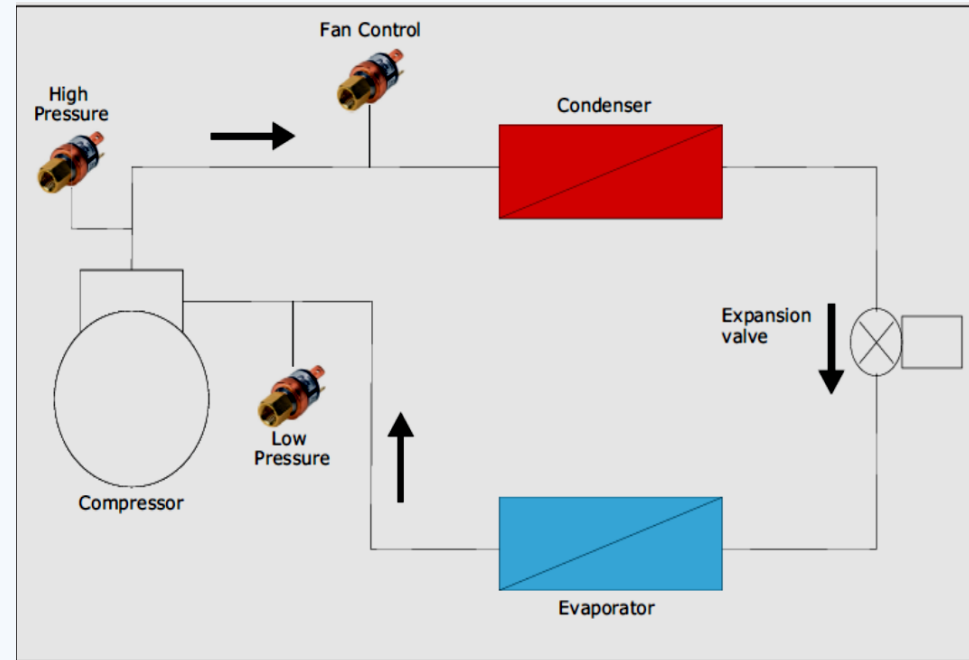
- These pressure switches are compact and of the fixed set point type.
- Use in refrigeration and air conditioning systems.
- They are of the automatic reset or manual reset limiting type.
- The small size, light weight and high degree of protection means they can be fitted directly to refrigeration systems.
- These cartridge pressure switches are available with different pressure settings and pressure connections to meet customer requirements.
- These features reduce installation costs and save space.





APPLICATION OF CARTRIDGE PRESSURE SWITCHES

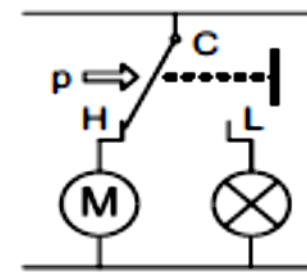
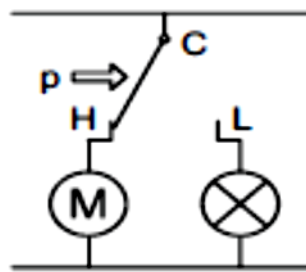
- Low pressure safety.
- Condenser fan control.
- ON/OFF control of the compressors.
- Compressor vacuum draw regulation.
- High pressure safety.



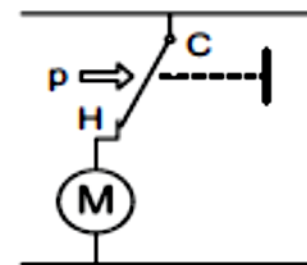
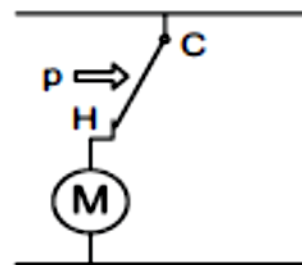
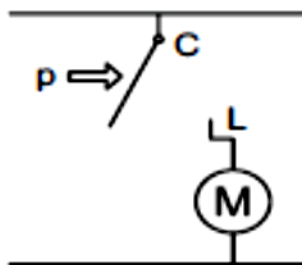


2- ELECTRICAL CONNECTION OF CARTRIDGE PRESSURE SWITCHES

WITH INVERTER CONTACT (3 POLES)
WITH MANUAL OR AUTOMATIC RESET



SINGLE CONTACT (2 POLES) WITH
MANUAL OR AUTOMATIC RESET



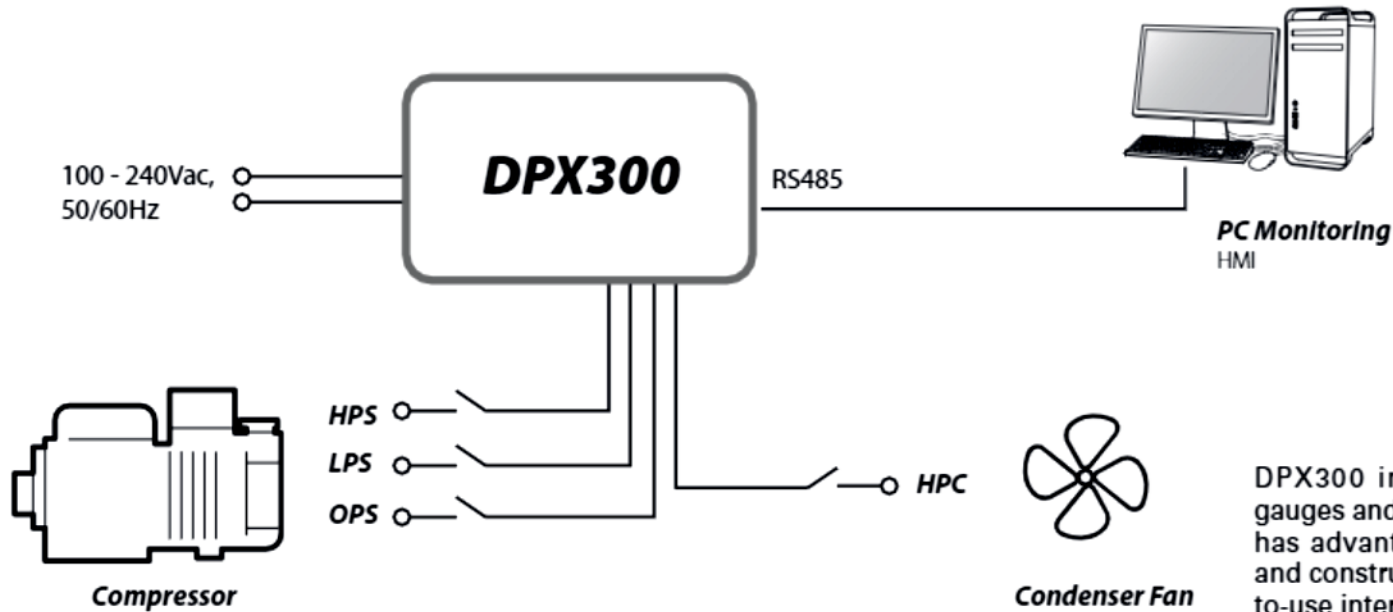
DIGITAL PRESSURE SWITCHES - DIGITAL PRESSURE SWITCH



- High pressure protection, low pressure protection, oil pressure protection.
- an integrated high-pressure fan control
- Automatic/manual reset.
- selection of different refrigerants-
- Precise pressure control, sensor offset, sensor error detection



ALL IN A SINGLE DIGITAL PRESSURE SWITCH “DPX 300 DOTECH »



DPX300 integrates high and low pressure gauges and Oil pressure protection switches and has advantages of time and cost saving(labor and construction), rapid maintenance, and easy-to-use interface.



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Low pressure,
High pressure Switch

Fan Switch

Oil pressure
rotection Switch

Low Pressure
gauge

High Pressure
gauge



Thank you for your participation