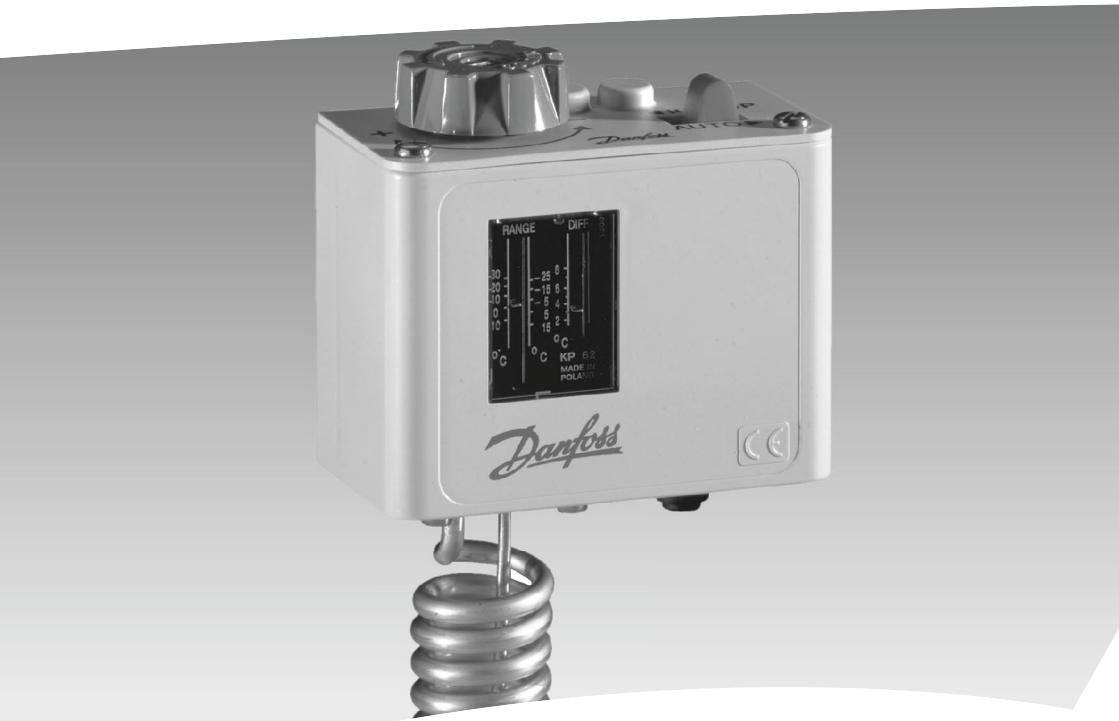


Thermostats

REFRIGERATION AND
AIR CONDITIONING

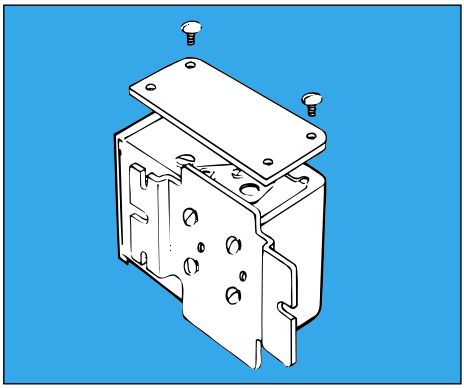
Fitters notes

Contents Page

Installation

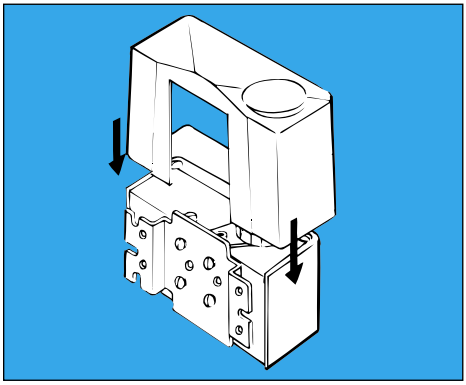
If the risk of water droplets or water spray is present, fit a top plate. The plate increases the grade of enclosure to IP 44 and is suitable for all KP thermostats. The top plate must be purchased separately (Code no.: for single unit, 060-109766; for dual unit, 060-109866).

To obtain IP 44, cover all holes in the backplate of the thermostat.



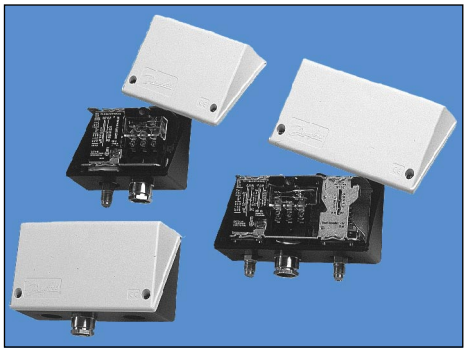
Aj0_0001

If the unit is to be used in dirty conditions or where it might be exposed to heavy spray it should be fitted with a protective cap. The cap can be used together with either an angle bracket (060-105666) or a wall bracket (060-105566).



Aj0_0002

If the unit risk being exposed to heavy water influence a better grade of enclosure can be achieved when mounting the product in a special IP 55 enclosure
The IP 55 enclosure is available for both single unit (060-033066) and dual unit (060-035066).

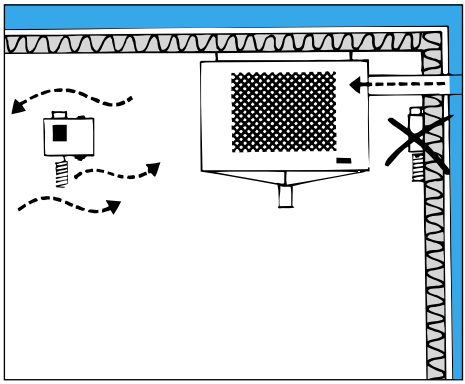


Ak0_0020

Remember that the differential is affected by air circulation around the sensor. Insufficient air circulation can increase the differential by 2-3°C.

Place the room thermostat so that air is able to flow freely around the sensor. At the same time, ensure that the sensor is not exposed to draughts from doors or radiation from the evaporator surface.

Never place the thermostat directly on a cold wall; this increases the differential. Instead, mount the unit on an insulating plate.



Aj0_0003

KP thermostat with air sensor

When placing the sensor: Remember that air must be able to circulate freely around the sensor. With control from, for example, return air temperature, the sensor must not touch the evaporator.

Ah0_0006

KP thermostat with cylindrical sensor

There are three ways of securing the sensor:

1) The pipe.
2) Between evaporator fins.
3) In a pocket.

When using a pocket: Always use heat-conductive compound (code no. 041E0110) to ensure good contact between sensor and medium.

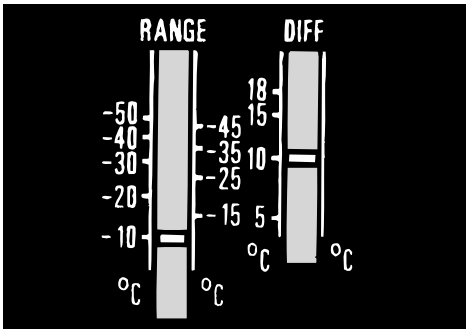
Setting

Thermostat with automatic reset

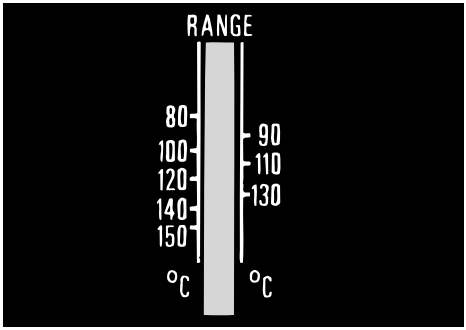
Always set the highest temperature on the range scale. Then set the differential on the DIFF scale.

The temperature setting on the range scale then corresponds to the temperature at which a refrigeration compressor will be started on rising temperature. The compressor will stop when the temperature corresponds to the value set on the DIFF scale.

For pre-setting of vapour charged thermostats, the graph curves stated in the customer instruction sheet should be used.
If the compressor will not stop when it is set for low stop temperatures: Check to see whether the differential has been set at too high a value.



Aj0_0004



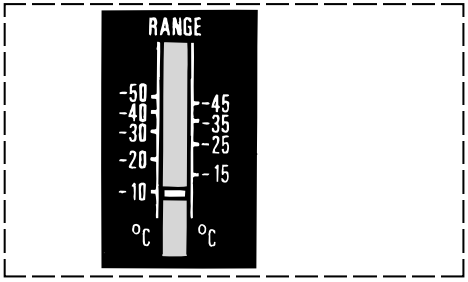
Aj0_0005

Thermostats with maximum reset

Set the highest temperature = stop temperature on range scale.
The differential setting is fixed. When the temperature on the thermostat sensor corresponds to the differential setting, the system can be restarted by pressing the "Reset" button.

Thermostats with minimum reset

Set the lowest temperature = stop temperature on range scale.
The differential setting is fixed.
When the temperature around the thermostat sensor has risen to the differential setting, the compressor can be restarted by pressing the “Reset” button.



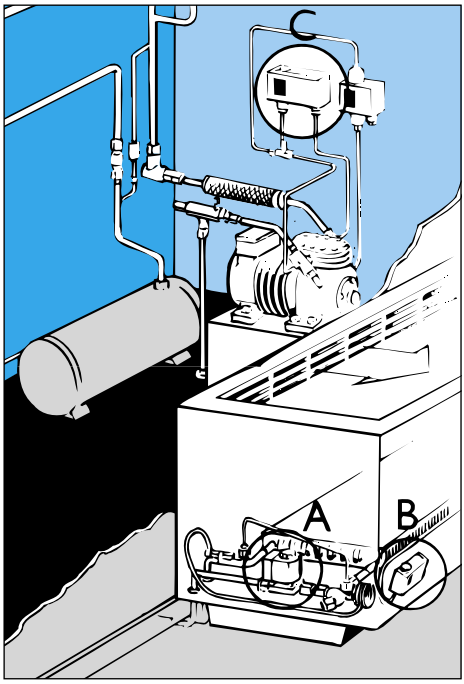
Aj0_0006

Setting example

The temperature in a deep freeze room is to be controlled by a thermostat that closes a solenoid valve. The system is of the pump-down type and is stopped via a low-pressure control.
Here, the pressure control must not be set to cut out at a pressure lower than necessary At the same time, it must cut in at a pressure corresponding to the cut-in temperature of the thermostat.

Example:

Deep freeze room with	R 22
Room temperature:	–20°C
Thermostat cut out temperature:	–20°C
Thermostat cut in temperature:	–15°C
Pressure control cut out pressure:	0.5 bar (–32°C)
Pressure control cut in pressure:	2.0 bar (–15°C)

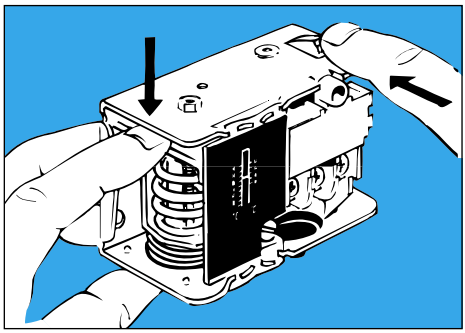


Aj0_0007

Test of contact function

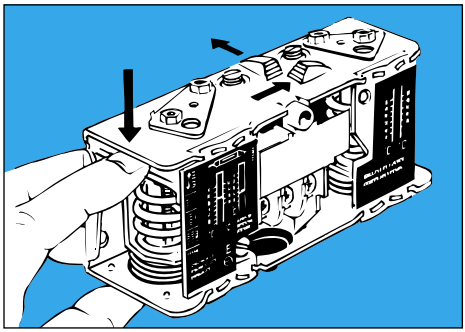
When the electrical leads are connected, the contact function can be tested manually. Depending on the sensor temperature and the thermostat setting, the test device must be pressed up or down. Any reset mechanism becomes inoperative during the test.

Use the test device at top left.


Aj0_0009

Warning!
The contact function on a KP single thermostat must never be tested by activating the device on the righthand side. If this warning is ignored, the thermostat might go out of adjustment. In the worst case, function can be impaired.

KP 98 dual thermostat
Use the test device on the lefthand side to test function on rising oil temperature and the test device at bottom right to test function on rising pressure gas temperature.



Aj0_0010

The correct thermostat for your refrigeration system

A thermostat must contain the correct charge, as described below.

Vapour charge

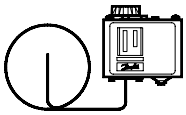
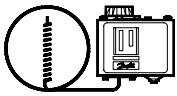
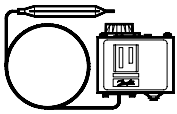
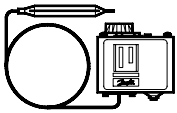
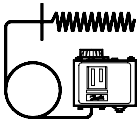
Low temperatures, coldest bellows, not enclosure-sensitive.

Thermostat with air coil: On gradual temperature rise and fall (less than 0.2K/min), e.g. in large, sluggish cold rooms containing many items, KP 62 with vapour charge is recommended.

Absorption charge

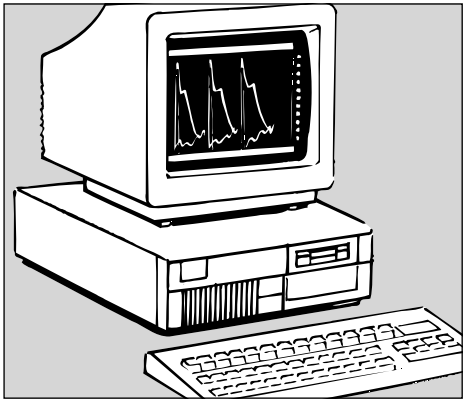
High temperatures, enclosure-sensitive. Bellows colder or warmer.

Thermostat with air coil: On fast changes in temperature (more than 0.2K/ min), e.g. in smaller cold rooms where the produce turnover rate is high, KP 62 with absorption charge is recommended.

Vapour charge	 Aj0_0008	Straight capillary tube
	 Aj0_0011	Remote air coil
	 Aj0_0013	Air coil (integral with thermostat)
Absorption charger	 Aj0_0016	Double contact remote bulb
	 Aj0_0016	Cylindric remote bulb
	 Aj0_0019	Air coil (integral with thermostat)
	 Aj0_0020	Remote air coil (for duct mounting)

Low voltage

For systems where KP is activated occasionally (alarm) and for systems where KP is the signal source for PLC, etc. (low voltage): Use KP with gold contacts; these give good contact at low voltages.



Aj0_0012

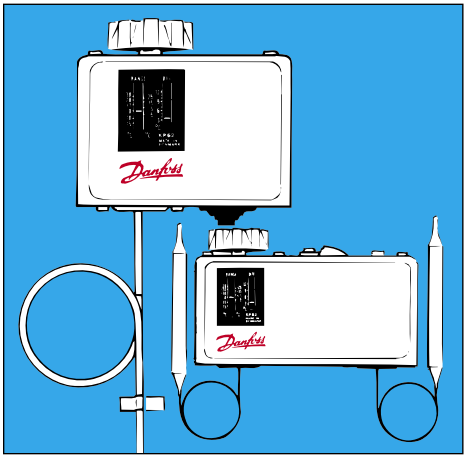
Placing of surplus capillary tube

Dual thermostat KP 98:

Surplus capillary tube can fracture if vibration occurs and might lead to loss of thermostat charge. It is therefore very important that the following rules be observed:

- When mounting direct on compressor: Secure the capillary tube so that the compressor/thermostat installation vibrates as a whole. Surplus capillary tube must be coiled and bound.
- Other types of mounting: Coil surplus capillary tube into a loose loop. Secure the length of capillary tube between compressor and loop to the compressor.

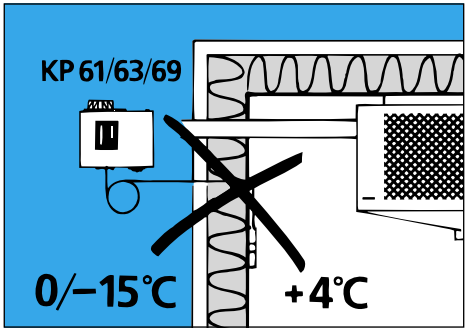
Secure the length of capillary tube between loop and thermostat to the base on which the thermostat is mounted.



Aj0_0017

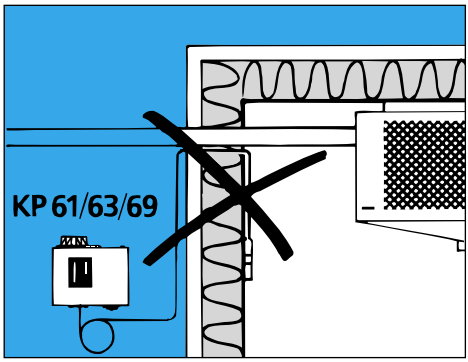
Thermostats with vapour charge

Never locate a KP thermostat with vapour charge in a room where the temperature is or can be lower than that in the cold room.



Aj0_0014

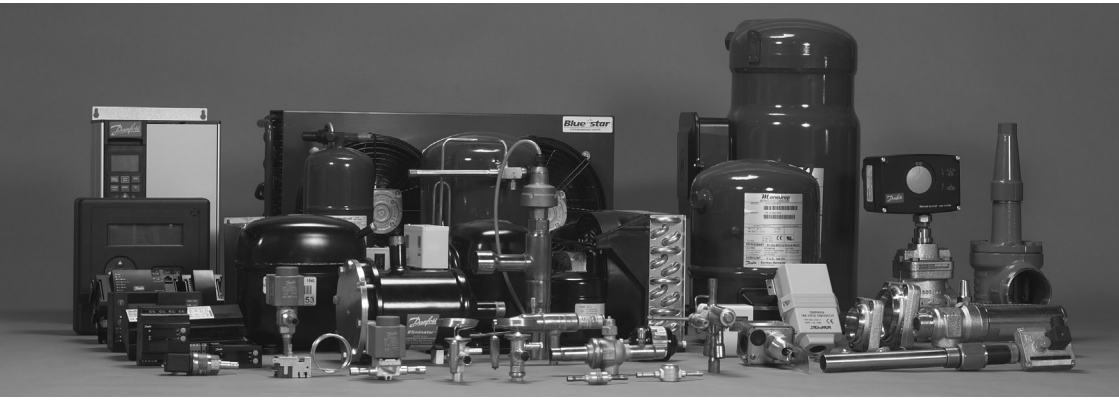
Never allow the capillary tube from a KP thermostat to run alongside of a suction line in a wall entry.



Aj0_0015

Fault location

Symptom	Possible cause	Remedy
Compressor running time too short and temperature in cold room too high. Refrigeration system runs with too high a temperature differential.	Capillary tube on thermostat with vapour charge touching evaporator, or suction line colder than sensor. a) Reduced air circulation around thermostat sensor. b) Refrigeration system temperature changes so fast that the thermostat can not keep pace. c) Room thermostat mounted on a cold wall in the cold room.	Locate capillary tube so that the sensor is **always** the coldest part. a) Find a better sensor location with higher air velocity or better contact with evaporator. b) Use a thermostat with a smaller sensor. Reduce the differential. Ensure that the sensor has better contact. c) Insulate the thermostat from the cold wall.
Thermostat does not start compressor, even when sensor temperature is higher than the set value. The thermostat does not react to hand-warming of the sensor.	a) Completely or partially lost charge because of fractured capillary tube. b) Part of the capillary tube in a thermostat with vapour charge is colder than the sensor.	a) Replace thermostat and mount sensor/capillary tube correctly. b) Find a better location for the thermostat so that the sensor is always the coldest part. Change to thermostat with adsorption charge.
Compressor continues to run, even when thermostat sensor is colder than the set value (range setting minus differential).	A thermostat with vapour charge has been set without taking account of graph curves in the instruction sheet.	At low range setting the differential of the thermostat is larger than indicated in the scale (See diagram in the instruction sheet).
Thermostat with absorption charge unstable in operation.	Large variation in ambient temperature gives enclosure-sensitivity.	Avoid ambient temperature variations around thermostat. If possible, use a thermostat with vapour charge (not sensitive to ambient temperature variations). Replace thermostat with unit having a larger sensor.
Differential spindle on single unit is bent and the unit does not function.	Tumbler action failure arising from attempt to test wiring manually from righthand side of thermostat.	Replace thermostat and avoid manual test in any way other than that recommended by Danfoss.



The Danfoss product range for the refrigeration and air conditioning industry

Appliance Controls
General temperature controls for the home appliance industry. The product range comprises CFC-free electromechanical and electronic thermostats for refrigerators and freezers produced to customer specifications as well as service thermostats for all refrigeration and freezing appliances.

Commercial Compressors
Large hermetic reciprocating and scroll compressor technologies for commercial air conditioning and refrigeration. The compressors and condensing units are used in a large array of applications in both businesses. This ranges from water chillers, large packaged air conditioners as well as medium and low temperature refrigeration systems for food storage and processing.

Danfoss Compressors
Hermetic compressors and fan-cooled condensing units for refrigerators, freezers and light commercial applications such as bottle coolers and display counters. Danfoss also produces compressors for heating pump systems as well as 12 and 24 volt compressors for refrigerators and freezers used in mobile applications and solar power. The division has a leading position within energy utilisation, noise filtering and know-how about environment-friendly compressors.

Refrigeration and air conditioning controls
A comprehensive and highly reputed range of self-acting valves, electronic valves and regulators as well as system protectors and line components for the refrigeration and air conditioning market. These products include thermostatic expansion valves, solenoid valves, thermostat and pressure controls, modulation pressure regulators, filter driers, shut-off valves, sight glasses, check valves, non-return valves and water valves. Decentralised electronic systems for full regulation and control of refrigeration applications are also developed and produced at Danfoss.

Industrial Controls
Products and customer specific solutions for industrial monitoring and controls systems based on the principles of pressure and temperature measurement, electrical power and fluid control. Products include a wide range of automatic controls for process control and regulation such as contactors and motor starters, electrically, pneumatically and temperature activated valves as well as temperature and pressure transmitters and switches.

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