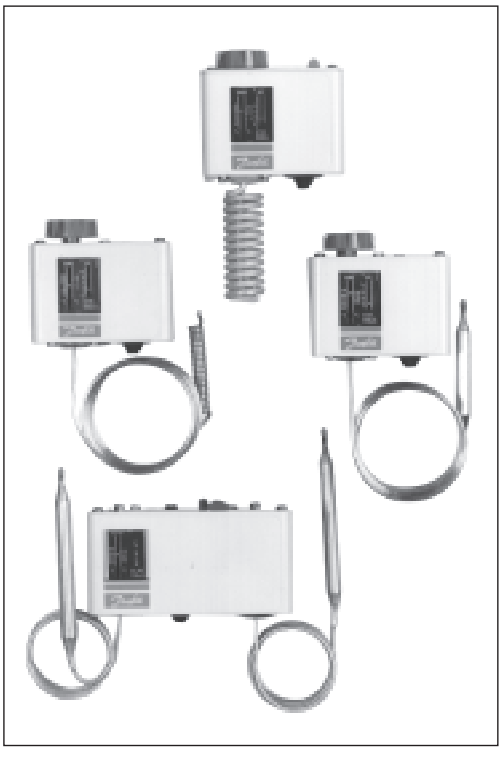
Termostatos, tipo KP

Introducción

Los termostatos KP son interruptores eléctricos controlados por temperatura y tienen un solo conmutador inversor unipolar (SPDT).

Los termostatos KP pueden conectarse directamente a motores monofásicos de c.a. de hasta 2 kW o montarse en serie en el circuito de control de motores de c.c. o de motores de c.a. de mayor potencia.
Los termostatos KP pueden utilizarse en la regulación, pero son sobre todo utilizados en los dispositivos de control de la seguridad. El principio electromecánico es de gran fiabilidad y es aquí donde muestra su superioridad.
Los termostatos KP están disponibles con carga de vapor o con carga de adsorción.
La carga de vapor permite obtener un diferencial muy pequeño, mientras que la carga de adsorción se aplica principalmente para la protección contra heladas.



Características

- *Amplia gama de regulación*
- *Pueden utilizarse en instalaciones de congelación, refrigeración y aire acondicionado*
- *Los fuelles soldados suponen una mayor fiabilidad*
- *Reducidas dimensiones*
  Fáciles de instalar en mostradores refrigerados o en cámaras frías
- *Acción de disparo del conmutador extremadamente corta*
  Proporciona una larga vida de funcionamiento, reduce el desgaste al mínimo y aumenta la fiabilidad
- *Versiones estándar con conmutador*
  Posibilidad de inversión de la función de los contactos o de conectar una señal
- *Conexiones eléctricas en la parte frontal del aparato*
  Facilita el montaje en bastidor
  Ahorra espacio
- *Adecuados para corriente alterna y continua*
- *Entrada de cable de material termoplástico blando para cables de 6 a 14 mm de diámetro*
- *Gama de gran amplitud*

Homologaciones

Marca CE según norma EN 60947-4/-5, para la venta en Europa.

F Germanischer Lloyd, Alemania

P Polski Rejestr Statków, Polonia

DnV, Det norske Veritas, Noruega

RINA, Registro Italiano Navale, Italia

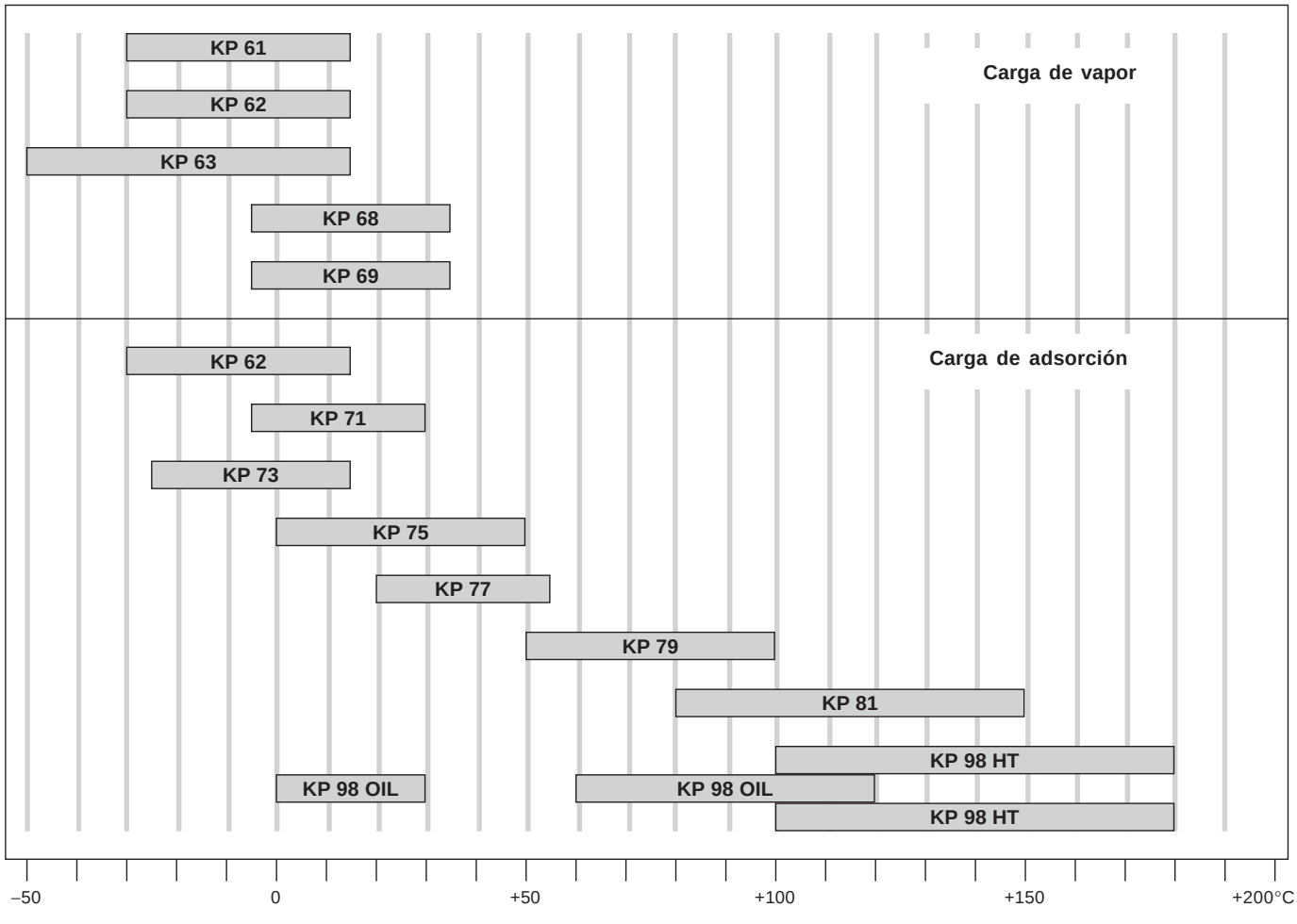
BV, Francia

LR, Inglaterra

MRS, Maritime Register of Shipping, Rusia

Bajo pedido, pueden suministrarse versiones homologadas por UL y CSA.

Gama de regulación



Datos técnicos

Temperatura ambiente
–40 → +65°C (+80°C para máx. 2 horas).

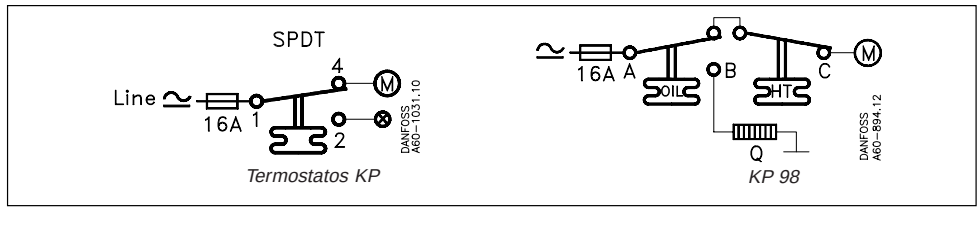
Sistema de contactos
Conmutador inversor unipolar (SPDT).

Carga de los contactos
Corriente alterna:
AC1: 16 A, 400 V
AC3: 16 A, 400 V
AC15: 10 A, 400 V
Corriente de arranque máx. (L.R.): 112 A, 400 V
Corriente continua:
Corriente de control DC13: 12 W, 220 V

Entrada de cable
La entrada de cable puede utilizarse para cable de 6 → 14 mm.
También puede utilizarse una entrada de cable roscada Pg. 13.5 para cable de 6 → 14 mm, y para cable de 8 → 16 mm puede utilizarse una entrada de cable roscada estándar Pg 16.

Caja de protección
IP 33 según IEC 529
Este grado de protección se obtiene cuando la unidad sin tapa protectora está montada en una superficie plana o en un soporte. El soporte debe estar sujeto en la unidad de tal manera que todos los agujeros no utilizados estén cubiertos.

Sistemas de contactos



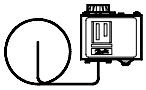
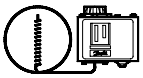
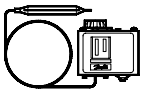
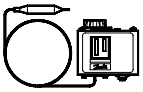
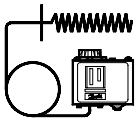
Pedidos

Carga	Tipo	Tipo de bulbo	Gama de regulación °C	Diferencial Δt		Rearme	Temp. máx. del bulbo °C	Longitud del tubo capilar m	Nº de código
				La temperatura más baja °C	La temperatura más alta °C				
Vapor [1]	KP 61	A	– 30 → 15	5.5 → 23	1.5 → 7	Aut.	120	2	**060L1100**
	KP 61	A	– 30 → 15	5.5 → 23	1.5 → 7	Aut.	120	5	**060L1101**
	KP 61	B	– 30 → 13	4.5 → 23	1.2 → 7	Aut.	120	2	**060L1102**
	KP 61	B	– 30 → 15	5.5 → 23	1.5 → 7	Aut.	120	2	**060L1103** [3]
	KP 61	B	– 30 → 15	5.5 → 23	1.5 → 7	Aut.	120	2	**060L1128** [3] [4]
	KP 61	A	– 30 → 15	Fijo 6	Fijo 2	Min.	120	5	**060L1104**
	KP 61	B	– 30 → 15	Fijo 6	Fijo 2	min.	120	2	**060L1105**
	KP 61	B	– 30 → 13	4.5 → 23	1.2 → 7	Aut.	120	3	**060L1180**
	KP 62	C 1	– 30 → 15	6.0 → 23	1.5 → 7	Aut.	120		**060L1106**
	KP 63	A	– 50 → – 10	10.0 → 70	2.7 → 8	Aut.	120	2	**060L1107**
	KP 63	B	– 50 → – 10	10.0 → 70	2.7 → 8	Aut.	120	2	**060L1108**
	KP 68	C 1	– 5 → 35	4.5 → 25	1.8 → 7	Aut.	120		**060L1111**
	KP 69	B	– 5 → 35	4.5 → 25	1.8 → 7	Aut.	120	2	**060L1112**
Adsor-ción [2]	KP 62	C 2	– 30 → 15	5.0 → 20	2.0 → 8	Aut.	80		**060L1110** [3] [4]
	KP 71	E 2	– 5 → 20	3.0 → 10	2.2 → 9	Aut.	80	2	**060L1113**
	KP 71	E 2	– 5 → 20	Fijo 3	Fijo 3	min.	80	2	**060L1115**
	KP 73	E 1	– 25 → 15	12.0 → 70	8.0 → 25	Aut.	80	2	**060L1117**
	KP 73	D 1	– 25 → 15	4.0 → 10	3.5 → 9	Aut.	80	2	**060L1118** [3]
	KP 73	D 1	– 25 → 15	Fijo 3.5	Fijo 3.5	min.	80	2	**060L1138**
	KP 73	D 2	– 20 → 15	4.0 → 15	2.0 → 13	Aut.	55	3	**060L1140**
	KP 73	D 1	– 30 → 15	3.5 → 20	3.25 → 18	Aut.	80	2	**060L1143**
	KP 75	F	0 → 35	3.5 → 16	2.5 → 12	Aut.	110	2	**060L1120**
	KP 75	E 2	0 → 35	3.5 → 16	2.5 → 12	Aut.	110	2	**060L1137**
	KP 77	E 3	20 → 60	3.5 → 10	3.5 → 10	Aut.	130	2	**060L1121**
	KP 77	E 3	20 → 60	3.5 → 10	3.5 → 10	Aut.	130	3	**060L1122**
	KP 77	E 2	20 → 60	3.5 → 10	3.5 → 10	Aut.	130	5	**060L1168**
	KP 79	E 3	50 → 100	5.0 → 15	5.0 → 15	Aut.	150	2	**060L1126**
	KP 81	E 3	80 → 150	7.0 → 20	7.0 → 20	Aut.	200	2	**060L1125**
	KP 81	E 3	80 → 150	Fijo 8	Fijo 8	Máx.	200	2	**060L1155**
	KP 98	E 2	OIL: 60 → 120	OIL: Fijo 14	OIL: Fijo 14	Máx.	150	1	**060L1131**
		E 2	HT: 100 → 180	HT: Fijo 25	HT: Fijo 25	Máx.	250	2	

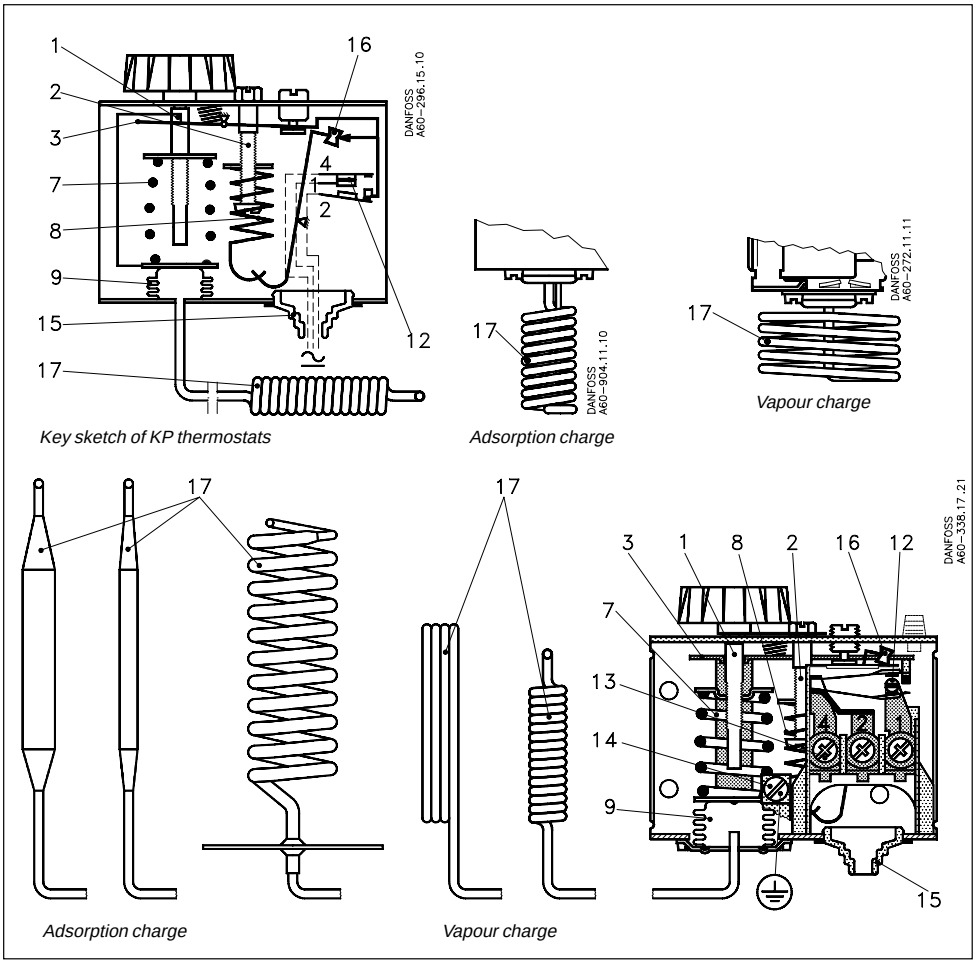
[1] El bulbo tiene que estar siempre más frío que la caja del termostato y el tubo capilar. En estas condiciones, el termostato regula con independencia de la temperatura ambiente.
[2] El bulbo puede estar más frío o más caliente que la caja del termostato y el tubo capilar, pero las variaciones en la temperatura ambiente respecto a +20 °C influirán en la precisión de la escala.
[3] Con conmutador manual, sin conmutador de aislamiento.
[4] Modelo para montaje en panel con placa superior.

Ordering
(continued)

Thermostat bulb types

A		Straight capillary tube
B		∅ 9.5 × 70 mm remote air coil
C		C1: ∅ 40 × 25 mm air coil C2: ∅ 25 × 67 mm air coil (integral with thermostat)
D		D1: ∅ 10 × 85 mm double contact remote bulb D2: ∅ 16 × 170 mm double contact remote bulb Note! Cannot be used in sensor (bulb) pocket
E		E1: ∅ 6.4 × 95 mm remote bulb E2: ∅ 9.5 × 115 mm remote bulb E3: ∅ 9.5 × 85 mm remote bulb
F		∅ 25 × 125 mm remote duct coil

Design
Function

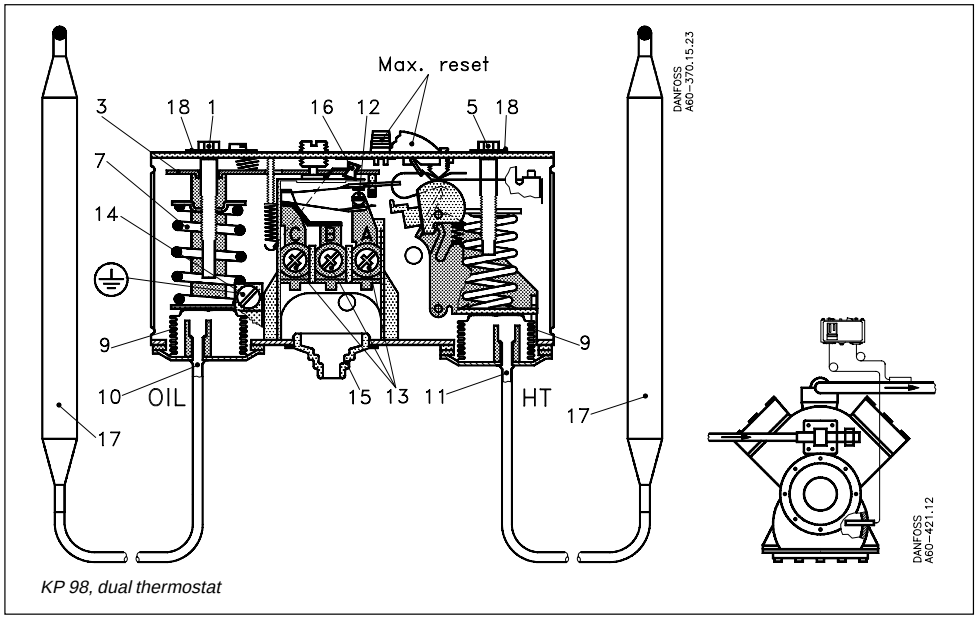


1. Temperature setting spindle
2. Differential setting spindle
3. Main arm
7. Main spring
8. Differential spring
9. Bellows
12. Switch
13. Terminals
14. Earth terminal
15. Cable entry
16. Tumbler
17. Sensor

The switch in the KP has a snap-action function and the bellows move only when the cutin or cut-out value is reached.

The design of the KP thermostat affords the following advantages:
- high contact load
- ultra-short bounce time
- vibration resistance up to 4 g in the range 0-1000 Hz
- long mechanical and electrical life.

Design
Function
(continued)



KP 98, dual thermostat

1. Temperature setting spindle, OIL
3. Main arm
5. Temperature setting spindle, HT
7. Main spring
9. Bellows
10. Capillary tube, OIL
11. Capillary tube, HT
12. Switch
13. Terminals
14. Earth terminal
15. Cable entry
16. Tumbler
17. Sensor (bulb)
18. Locking plate

Dual thermostat KP 98 is used as a protection against too high a discharge gas temperature and to ensure a suitable oil temperature in the compressor.
To avoid the temperature of the hot gas exceeding the maximum permissible value during extreme operating conditions (low evaporating pressure, high condensing pressure, high suction vapour superheat) a KP 98 thermostat can be used on the high temperature side (HT). If the temperature of the hot gas becomes too high the refrigerant will break down and the compressor discharge valve will become damaged.
The risk is greatest in refrigeration systems that operate on a high compression ratio (e.g. in systems with NH_3 or R 22) and in applications with hot gas bypass.
This unit has two separate thermostat functions. The HT sensor that controls the discharge gas temperature is fitted on the discharge tube immediately after the compressor.
For larger compressors, the sensor can be built into the discharge tube.
The OIL sensor that controls the oil temperature is located in the compressor oil sump.

KP 98 is available in two versions:
A. Protection against low oil temperature
Compressor manufactures recommend fitting a heating element in the crankcase to prevent refrigerant boiling out of the oil during start.
KP 98 is the correct thermostat for controlling this heating element.

Why a heating element?
During standstill, refrigerant is dissolved in the crankcase oil. If the oil is cold and the standstill period long a large amount of refrigerant can become dissolved. This leads to two problems:
1. When the compressor is started, the refrigerant will boil off. There is a high risk of liquid hammer and consequent compressor damage.
2. The oil loses its lubricating capability when it is thinned with refrigerant.

To avoid these problems a heating element controlled by a KP 98, **60L1132**, should be fitted in the crankcase to keep the oil warm. This then prevents dangerous amounts of refrigerant being dissolved in the oil.

B. Protection against high oil temperature
Compressor manufactures recommend that compressors used in connection with industrial heat pumps or refrigerating systems be equipped with a thermostat to give protection against too high an oil temperature in the crankcase.
In periods of peak load, too high an oil temperature leads to insufficient lubrication of the compressor, with the risk of compressor damage. KP 98, **60L1131**, monitors the oil temperature so that it cannot become too high.

Terminology

Differential
The differential is the difference between the make and break temperatures.
A differential is necessary for satisfactory automatic operation of the plant.

Mechanical differential (intrinsic differential)
The mechanical differential is the differential set by the differential spindle.

Operating differential (thermal differential)
The operating differential is the differential the plant operates on. Operating differential is the sum of the mechanical differential and the differential produced by the time constant.

Reset
1. Manual reset:
   Units with manual reset can only be restarted after the reset button has been activated.
   On min. reset units the set value is equal to the cut-out value for falling temperature.
   On max. reset units the set value is equal to the cut-out value for rising temperature.

2. Automatic reset:
   These units are automatically reset after operational stop.

Setting

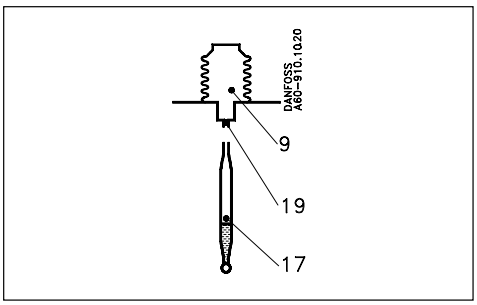
Thermostats with automatic reset
Set the upper activating temperature on the range scale.
Set the differential on the "DIFF" scale.
The temperature setting on the range scale will then correspond to the temperature at which the refrigeration compressor will be started on rising temperature. The compressor will be stopped when the temperature has fallen in relation to the differential setting.
Please note that the differential depends on the range setting. Therefore, the differential scale must only be used as guideline.
If with low stop temperature settings the compressor will not stop, check whether the differential is set at too high a value!

Thermostats with minimum reset
Set the stop temperature on the range scale.
The differential is a fixed setting.
The compressor can be restarted by pressing the "Reset button" after the temperature on the thermostat sensor has risen by a value equal to the fixed differential setting.

Thermostats with maximum reset
Set the stop temperature on the range scale.
The differential is a fixed setting.
The compressor can be restarted by pressing the "Reset button" after the temperature on the thermostat sensor has fallen to a value equal to the fixed differential setting.

Charges

1. Vapour charge



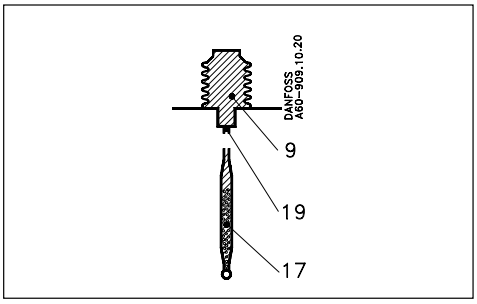
9. Bellows element
17. Sensor (bulb)
19. Capillary tube

Here the interdependence between the pressure and temperature of saturated vapour is utilized, i.e. the element is charged with saturated vapour plus a small amount of liquid.
The charge is pressure-limited; a further increase in pressure after evaporation of all the liquid in the sensor (17) will only result in a small pressure increase in the element.

This principle can be utilized in thermostats for low temperature, etc. where evaporation must be able to take place from the free liquid surface in the sensor (within the operating range of the thermostat), and where at the same time, the bellows must be protected against deformation when kept at normal ambient temperatures.
Since the pressure in the element depends on the temperature at the free liquid surface, the thermostat must always be placed so that the sensor is colder than the rest of the thermostatic element.
The evaporated liquid will recondense at the coldest point, i.e. the sensor. Thus, as intended, the sensor becomes the temperature-controlling part of the system.

Note: When the sensor is coldest, the ambient temperature has no effect on regulating accuracy.

2. Adsorption charge

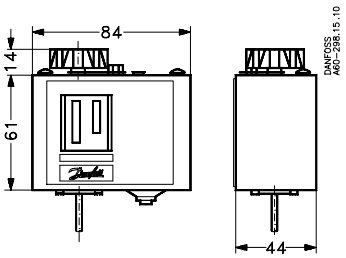


9. Bellows element
17. Sensor (bulb)
19. Capillary tube

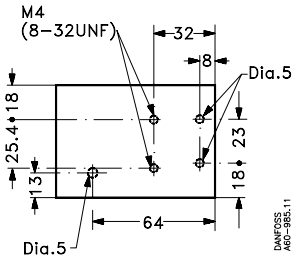
In this case the charge consists partly of a superheated gas and partly of a solid having a large adsorption surface.
The solid is concentrated in the sensor (17) and it is therefore always the sensor that is the temperature-controlling part of the thermostatic element.
The sensor can be placed warmer or colder than thermostat housing and capillary tube, but variations from +20°C ambient temperature will influence the scale accuracy.

Dimensions and weights

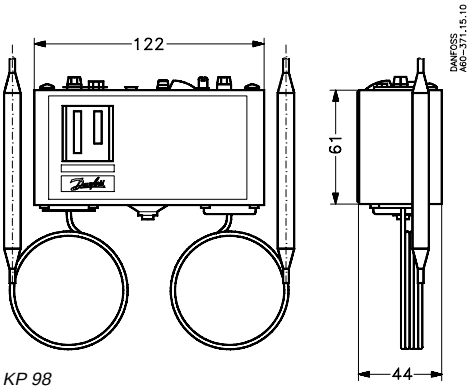
Weight
KP 61-81: approx. 0.4 kg
KP 98: approx. 0.6 kg



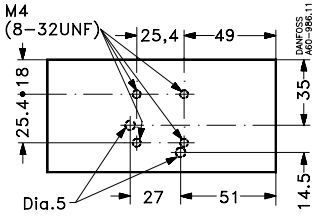
KP 61-81



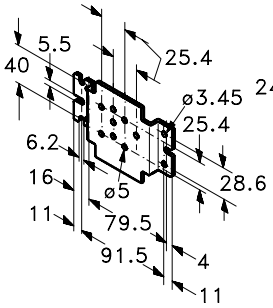
Mounting holes (back of KP)



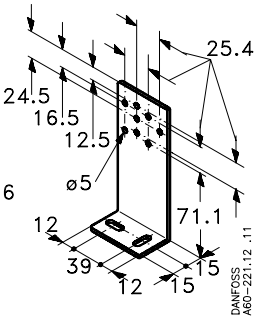
KP 98



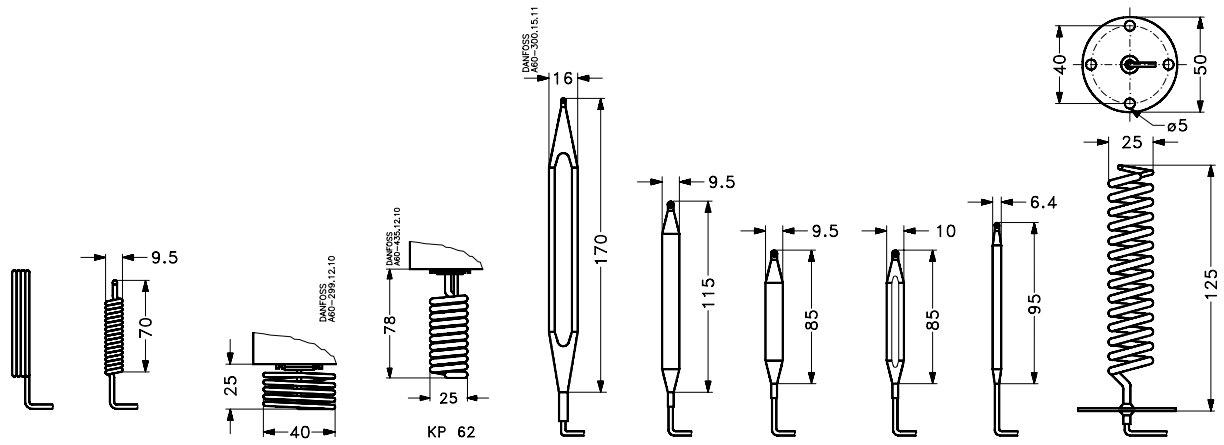
Mounting holes (back of KP)



Wall bracket



Angle bracket



A: KP 61, KP 63

B: KP 61, KP 63, KP 69

C1: KP 62, KP 68

C2: KP 62

D2: KP 73

E2: KP 71 KP 73 KP 75 KP 77 KP 98

E3: KP 77 KP 79 KP 81

D1: KP 73

E1: KP 73

F: KP 75