



Thermostat

KPS

Description

The KPS series consists of a series of pressure and temperature controlled switches. In this series, special attention has been given to meeting demands for a high level of enclosure, robust and compact construction, and resistance to shock and vibration.

For KPS thermostats the position of the contacts depends on the temperature of the sensor and the set scale value.

The series covers most outdoor as well as indoor application requirements and is suitable for use in monitoring alarm and control systems in factories, diesel plants, compressors, power stations and on board ships.

Features & benefits

- A high level of enclosure
- Adjustable differential
- Robust and compact construction
- Resistance to shock and vibration
- Available with all major marine approvals

Ordering

Product code numbers

Type	Temperature range [°C] [min]	Temperature range [°C] [max]	Diff. @ Min. range setting [°C] [min]	Diff. @ Min. range setting [°C] [max]	Max. sensor temperature [°C]	Capillary tube length [mm]	Sensor type	Sensor pocket length min. [mm]	Code number
KPS76	-10	30	3.0	10.0	80	2000	Remote bulb	75	060L311266
KPS76	-10	30	3.0	10.0	80	5000	Remote Sensor w.armoured tube	110	060L417666
KPS76	-10	30	3.0	10.0	80	2000	Remote bulb	75	060L311366
KPS77	20	60	3.0	14.0	130		Rigid Sensor Rigid sensor	110	060L310066
KPS77	20	60	3.0	14.0	130	2000	Remote bulb	75	060L310166
KPS77	20	60	3.0	14.0	130	2000	Remote bulb	75	060L310266
KPS77	20	60	3.0	14.0	130	2000	Remote bulb	75	060L417066
KPS77	20	60	3.0	14.0	130	5000	Remote bulb	110	060L311966
KPS77	20	60			130	2000	Remote Sensor w.armoured tube	75	060L324966
KPS77	20	60	3.0	14.0	130		Rigid Sensor Rigid sensor	75	060L311866
KPS77	20	60	3.0	14.0	130		Rigid sensor Rigid Sensor	75	060L410366
KPS77	20	60	3.0	14.0	130		Rigid sensor Rigid Sensor	160	060L313666
KPS79	50	100	4.0	16.0	200	8000	Remote bulb	110	060L312466
KPS79	50	100	4.0	16.0	200		Rigid Sensor Rigid sensor	75	060L417266
KPS79	50	100			200		Rigid Sensor Rigid sensor	250	060L315066
KPS79	50	100	4.0	16.0	200	2000	Remote bulb	75	060L310566
KPS79	50	100	4.0	16.0	200	5000	Remote bulb	110	060L312266
KPS79	50	100	4.0	16.0	200	2000	Remote bulb	75	060L310466
KPS79	50	100	4.0	16.0	200		Rigid Sensor Rigid sensor	110	060L310366
KPS79	50	100	4.0	16.0	200		Rigid Sensor Rigid sensor	110	060L416366
KPS79	50	100			200	2000	Remote Sensor w.armoured tube	75	060L324766
KPS79	50	100			200	2000	Remote bulb	75	060L412266
KPS79	50	100	4.0	16.0	200	2000	Remote bulb	75	060L417166
KPS79	50	100	4.0	16.0	200	3000	Remote bulb	75	060L314366
KPS79	50	100	4.0	16.0	200		Rigid Sensor Rigid sensor	75	060L312166
KPS79	50	100	4.0	16.0	200		Rigid Sensor Rigid sensor	160	060L313766
KPS79	50	100	4.0	16.0	200		Rigid Sensor Rigid sensor	75	060L410266
KPS80	70	120	4.5	18.0	220	8000	Remote bulb	110	060L313266
KPS80	70	120	4.5	18.0	220		Rigid sensor Rigid Sensor	110	060L312766
KPS80	70	120	4.5	18.0	220		Rigid Sensor Rigid sensor	160	060L313866
KPS80	70	120	4.5	18.0	220	10000	Remote bulb	110	060L318566
KPS80	70	120	4.5	18.0	220	2000	Remote bulb	75	060L312866
KPS80	70	120	4.5	18.0	220	2000	Remote bulb	75	060L417366
KPS80	70	120	4.5	18.0	220	2000	Remote bulb	75	060L410766
KPS80	70	120	4.5	18.0	220		Rigid sensor Rigid Sensor	200	060L315766
KPS80	70	120	4.5	18.0	220	5000	Remote bulb	110	060L313066
KPS80	70	120	4.5	18.0	220	2000	Remote bulb	75	060L312966
KPS80	70	120	4.5	18.0	220	3000	Remote bulb	75	060L315666
KPS80	70	120	4.5	18.0	220		Rigid sensor Rigid Sensor	75	060L312666
KPS81	60	150	5.0	25.0	250		Rigid Sensor Rigid sensor	75	060L414966
KPS81	60	150	5.0	25.0	250	2000	Remote bulb	75	060L310666
KPS81	60	150	5.0	25.0	250	2000	Remote bulb	75	060L310766
KPS81	60	150	5.0	25.0	250		Rigid sensor Rigid Sensor	200	060L311066
KPS81	60	150	5.0	25.0	250	5000	Remote bulb	110	060L313466
KPS81	60	150	5.0	25.0	250	8000	Remote bulb	110	060L311166



KPS81	60	150	5.0	25.0	250		Rigid sensor Rigid Sensor	75	060L314966
KPS83	100	200			300	2000	Remote bulb	75	060L313966
KPS83	100	200	6.5	30.0	300	2000	Remote bulb	75	060L310966
KPS83	100	200	6.5	30.0	300	5000	Remote bulb	110	060L415766
KPS83	100	200	6.5	30.0	300	2000	Remote bulb	75	060L310866

Accessories code numbers

Figure: Sensor pocket. Supplied without gland nut, gaskets and washer

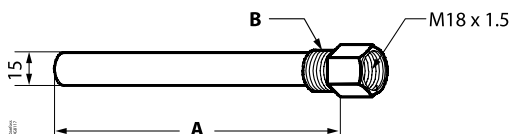


Table: Sensor pockets

Brass sensor pocket			Steel 18/8 sensor pocket		
A	B	Code number	A	B	Code number
[mm]	Thread		[mm]	Thread	
65	½ NPT	060L326566	–	–	–
75	½ NPT	060L326466	75	G ½ A	060L326766
75	G ½ A	060L326266	–	–	–
75	G ¾ A	060L326666	–	–	–
75	G ½ A	060L328166	–	–	–
110	½ NPT	060L328066	110	G ½ A	060L326866
110	G ½ A	060L327166	110	½ NPT	060L327066
110	G ½ A	–	–	–	–
110	G ¾ A	060L340366	–	–	–
160	G ½ A	060L326366	160	G ½ A	060L326966
200	G ½ A	060L320666	–	–	–
200	G ½ A	060L340866	–	–	–
250	G ½ A	060L325466	–	–	–
330	G ½ A	060L325566	–	–	–

Table: Accessories

Part	Figure	Description	Code no.
Clamping band		For KPS thermostats with remote sensor (L = 392 mm)	017-420466
W Heat-conductive compound (4.5 cm ² tube)		For KPS thermostats with sensor fitted in a sensor pocket. Compound for filling sensor pocket to improve heat transfer between pocket and sensor. Application range for compound: between pocket and sensor. Application range for compound: -20 – 150 °C, momentarily up to 220 °C.	041E0115
Gasket set		For KPS thermostats without armored capillary tubes	060L327366
Gasket set		For KPS thermostats with armored capillary tubes	060L036666

Overview

Product portfolio

Figure: Thermostat portfolio

[°C]								Range P _e [°C]	Type
-50		0	50	100	150	200	250		
								-10 – 30	KPS 76
								20 – 60	KPS 77
								50 – 100	KPS 79
								70 – 120	KPS 80
								60 – 150	KPS 81
								100 – 200	KPS 83

Functions

Selection of differential

To ensure that the plant functions properly, a suitable differential is necessary. Too small a differential will give rise to short running periods with a risk of hunting. Too high a differential will result in large temperature variations.

Differentials

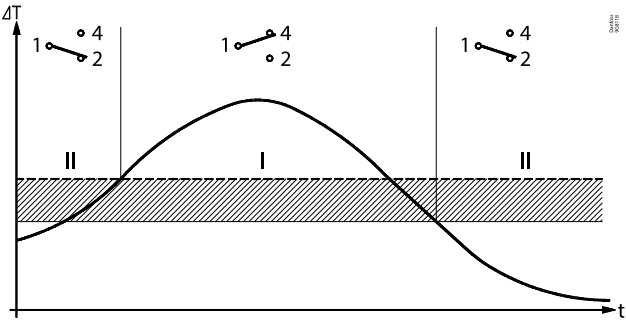
The mechanical differential is the differential that is set by the differential spindle in the temperature control. The thermal differential (operating differential) is the differential the system operates on. The thermal differential is always greater than the mechanical differential and depends on three factors:

- 1. the flow velocity of the medium,
- 2. the temperature change rate of the medium,
- 3. the heat transmission to the sensor.

Thermostat function

Contacts 1 – 4 make while contacts 1 – 2 break when the temperature rises above the scale setting. The contacts changeover to their initial position when the temperature falls to the scale setting minus the differential.

Figure: KPS thermostats



I	Alarm for rising pressure given at the set range value
II	Alarm for falling pressure given at the set range value minus the differential
---	Scale setting
▨	Differential



Product details

General data

Table: Technical data

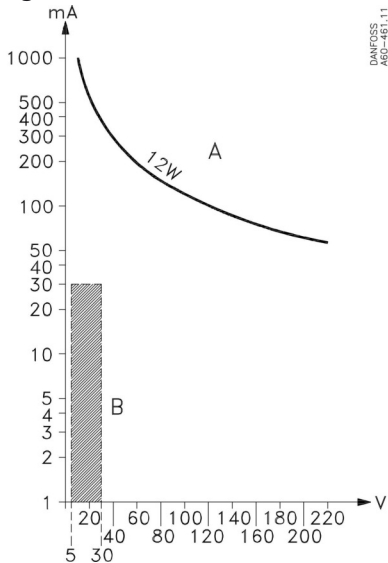
Switch	Single pole changeover (SPDT)		Contact material: Gold-plated silver contact	
Contact load (when Au surface is burnt away)	Alternating current	Ohmic	10 A, 440 V, AC-1	
		Inductive	6 A, 440 V, AC-3	
			4 A, 440 V, AC-15	
			Starting current	
	Direct current	12 W, 220 V, DC-13		
Ambient temperature	-40 – 70 °C			
Vibration resistance	Vibration-stable in the range 2 – 30 Hz, amplitude 1.1 mm og 30 – 300 Hz, 4 G.			
Enclosure	IP67 to EN 60529 / IEC 60529. The thermostat housing is enamelled pressure die cast aluminium (GID-AISI 12). The cover is fastened by four screws which are anchored to prevent loss. The enclosure can be sealed with fuse wire.			
Cable entry	Cable diameters from 5 – 14 mm.			
Identification	The type designation and code no. of the unit is stamped in the side of the housing.			

Table: Scale accuracy and settings drift

Types	Scale accuracy ⁽¹⁾	Snap point variation after 400 000 operations
	[°C]	[°C]
KPS 76	±3	max. drift 2
KPS 77	±3	max. drift 2
KPS 79	±3	max. drift 2
KPS 80	±3	max. drift 2
KPS 81	±6	max. drift 2
KPS 83	±6	max. drift 2

⁽¹⁾ Scale values are indicative only. Results given in table are measured in laboratory conditions for factory set values (scale center). The scale accuracy for min and max positions could differ significantly. There are many factors which could influence on product working and scale accuracy.

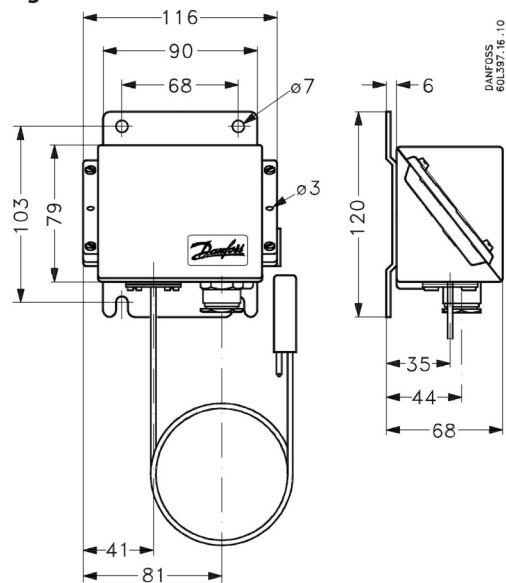
Figure: Direct current (DC) load



A	Gives the maximum load
B	Acceptable load for the gold plating of the contact

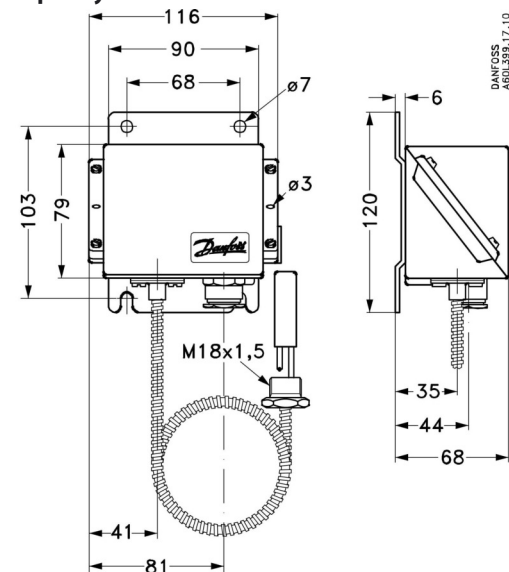
Dimensions

Figure: KPS thermostats with remote sensor



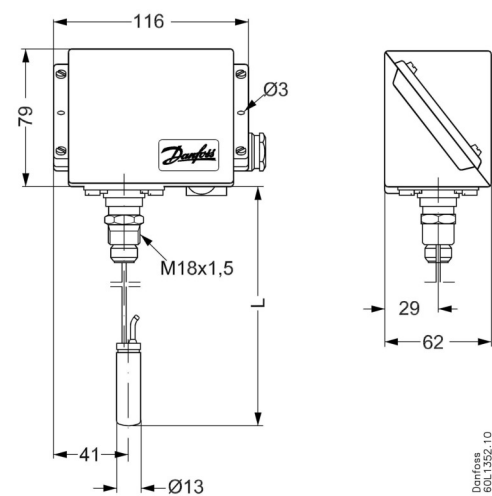
Net weight: ca 1.2 kg (incl. 2 m capillary tube)

Figure: KPS thermostats with remote sensor and armored capillary tube



Net weight: ca 1.4 kg (incl. 2 m capillary tube)

Figure: KPS thermostats with rigid sensor



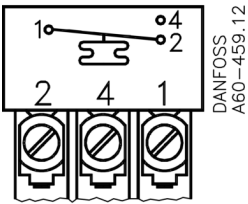
Net weight: ca 1.0 kg

Table: Sensor pocket

Sensor pocket length "A"	Sensor length "L"
75	105
110	138
160	190
200	230

Connections

Figure: Electrical connection



KPS thermostats are fitted with a screwed cable entry suitable for cables from 5 – 14 mm.

Installation

Installation

Location of unit: KPS thermostats are designed to withstand the shocks that occur, e.g. in ships, on compressors and in large machine installations. KPS thermostats with remote sensor are fitted with a base of 3 mm steel plate for fixing to bulkheads, etc. KPS thermostats with bulb sensor are self-supporting from the sensor pocket.

Resistance to media

Material specifications for sensor pockets

Sensor pocket, brass

The tube is made of Ms 72 to DIN 17660, the threaded portion of So Ms 58Pb to DIN 17661.

Sensor pocket, stainless steel

18/8 Material designation 1.4305 to DIN 17440.

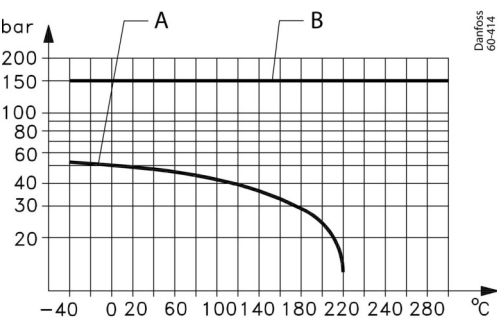
Sensor position

As far as possible the sensor should be positioned so that its longitudinal axis is at right angles to the direction of flow. The active part of the sensor is $\varnothing 13$ mm $\times$ 50 mm long on thermostats with rigid sensors and 2 m capillary tube. The active length on the other thermostats is 70 mm (5 m and 8 m capillary tubes).

The medium

The fastest reaction is obtained from a medium having high specific heat and high thermal conductivity. It is therefore advantageous to use a medium that fulfills these conditions (provided there is a choice). Flow velocity of the medium is also of significance. (The optimum flow velocity for liquids is about 0.3 m/s).

Figure: Permissible media pressure on the sensor pocket as a function of temperature



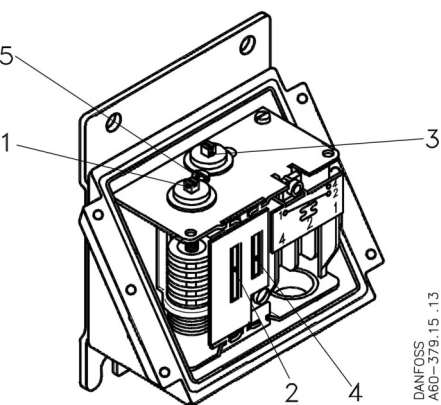
A	Brass
B	Stainless steel



Setting

When the thermostat cover is removed, and the locking screw is loosened, the range can be set with the spindle (1) while at the same time the scale (2) is being read. In units having an adjustable differential, the spindle (3) can be used while the scale (4) is being read.

Figure: KPS



1	Range spindle
2	Range scale
3	Differential spindle
4	Differential scale
5	Locking screw

Scale correction

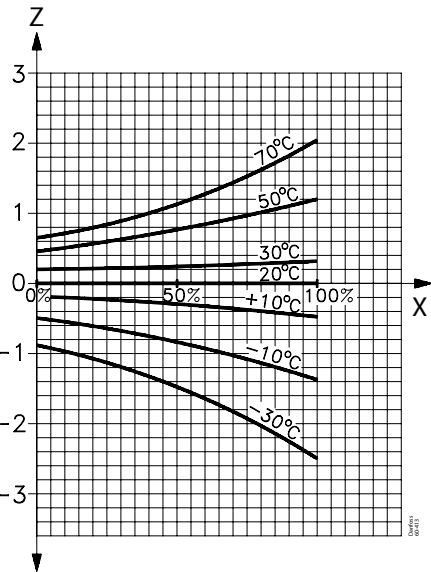
The sensor on KPS thermostats contains an adsorption charge. Therefore function is not affected whether the sensor is placed warmer or colder than the remaining part of the thermostatic element (bellows and capillary tube). However, such a charge is to some extent sensitive to changes in the temperature and bellows and capillary tube. Under normal conditions this is of no importance, but if the temperature control is to be used in extreme ambient temperatures there will be a scale deviation.

The deviation can be compensated for as follows:

Scale correction = $Z \times a$

Z can be found from Figure: Scale, while a is the correction factor from the table below.

Figure: Scale



X	Relative scale setting in [%]
Z	Factor for setting point deviation

Table: Correction factor for thermostats

Type	Regulation range [°C]	Correction factor for thermostats		
		with rigid sensor	with 2 and 5 m cap. tube	with 8 m cap. tube
KPS 76	-10 – 30	–	1.1	–
KPS 77	20 – 60	1.0	1.4	–
KPS 79	50 – 100	1.5	2.2	2.9
KPS 80	70 – 120	1.7	2.4	3.1
KPS 81	60 – 150	–	3.7	–
KPS 83	100 – 200	–	6.2	–

Example 1

A diesel engine with cooling water temperature of 85 °C (normal). An alarm must be triggered if the cooling water temperature exceeds 95 °C. Choose a KPS 80 thermostat (range 70 – 120 °C). Main spindle setting: 95 °C. Differential spindle setting: 5 °C. The required alarm function is obtained by connecting to thermostat terminals 1–4. After the system has been in operation, assess the operating differential and make a correction if necessary.

Example 2

Find the necessary scale correction for a KPS 80 set at 95 °C in 50 °C ambient temperature. The relative scale setting Z can be calculated from the following formula:

$$\frac{\text{Setting value} - \text{min. scale value}}{\text{max. scale value} - \text{min. scale value}} \times 100 = \%$$

Relative scale setting: $\frac{95-70}{120-70} \times 100 = 50\%$

Factor for scale deviation, $Z \approx 0.7$

Correction factor a (Table: Correction factor for thermostats) = 2.4

Scale correction = $Z \times a = 0.7 \times 2.4 = 1.7$ °C

The KPS must be set at $95 + 1.7 = 96.7$ °C

Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Issuer	Approval topic
Electrical Safety Certificate	UL E73170	UL - Underwriters Laboratories inc.	
Manufacturer's Declaration	Danfoss MD 060-9639.AB	Danfoss	China RoHS
CCC Declaration	Danfoss CCC 2020970305003454	Danfoss	
Electrical Safety Certificate	EAC KZ 7100841.01.01.01391	EAC - Eurasian Customs Union	EMC
UA Declaration	Danfoss UA 2023-01-10 Regulators PL01 PL04	Danfoss	PED
Pressure Safety Certificate	LLC CDC EURO-TYSK UA.TR.089.1015.05-22	LLC CDC EURO TYSK - Ukraine	Pressure
Marine Certificate	CCS GB23PTB00006_02	CCS - China Classification Society	Marine
Marine Certificate	DNV TAA000026E Rev.01	DNV	Marine
Marine Certificate	NKK TA24043M	ClassNK - The Japanese Marine Association	Marine
UA Declaration	Danfoss UA 2024-07-25 cooling sensors	Danfoss	EMC
CCC Declaration	Danfoss CCC 2024010305641305	Danfoss	CCC
Marine Certificate	BV 04265-J0 BV	BV - Bureau Veritas	
EU Declaration	Danfoss EU 060-9680.AC	Danfoss	LVD
Marine Certificate	ABS 25-0336468-PDA	ABS - American Bureau of Shipping	
Export Control Declaration	Pressure switches & Thermostats	Danfoss	
Marine Certificate	RINA ELE290225XG	RINA - Registro Italiano Navale	

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