

## Field Service Note

# Sensors for EKC Controllers & Thermostats



The introduction of EKC digital thermostats and controllers was accompanied with new types of sensor.

The sensors, although similar in appearance, have very different properties whereby their resistance value, at the same temperature, varies considerably.

The 2 types of sensor used with the EKC thermostats and controllers are,

- a. EKS111 This is a PTC sensor with a wider tolerance and lower cost.  
**This sensor must not be used for FOOD SAFETY logs or superheat control.**  
The PTC sensor resistance is 1,000  $\Omega$  @ 25°C.
- b. AKS 11,12 & 21 This is a Pt1000 sensor with high accuracy and a high cost.  
**This sensor can be used for FOOD SAFETY logs or superheat control.**  
The Pt1000 sensor resistance is 1,000  $\Omega$  @ 0°C.

As can be seen from above, at the same resistance reading, there is a variation of 25° between the sensor types. It is, therefore, crucial that the correct sensor is fitted to the EKC controller. Failure to fit the correct sensor will cause the controller to read 25° out of calibration. It is for this reason that many EKC thermostats and controllers have been returned, in error, under warranty.

The EKC 101 thermostat must only be fitted with the PTC sensor EKS 111 (084N1175).

The EKC 201 & 301 controllers can be used with either type of sensor. However, the controller must be programmed to recognise which sensor has been fitted.

- PTC sensor EKS 111 (084N1175)
- Pt1000 sensor AKS12 (084N0036) \*(AKS 11 & AKS 21 may also be used)

When using EKC 201 & 301 controllers they must be set to whichever sensor has been fitted. This setting can be found under miscellaneous in the controllers' parameter list, where the parameter o06 should be set to either PTC or Pt. For EKS 111 the parameter should be set to PTC and for AKS 11 / AKS 12 & AKS 21 the parameter should be set to Pt.

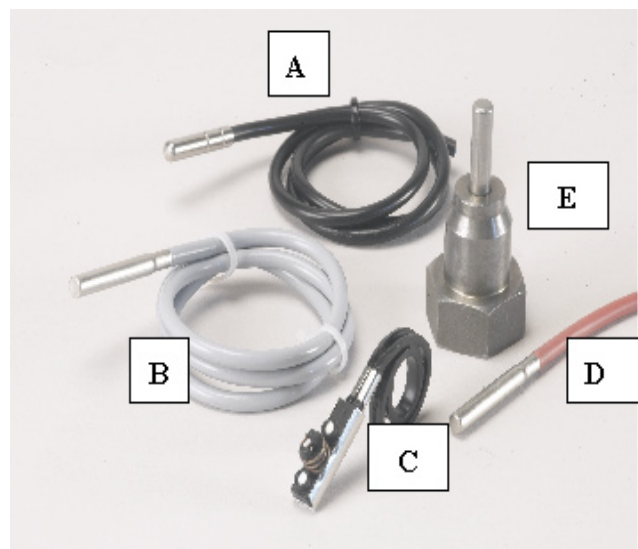
Section from the parameter list

Miscellaneous									
Delay of output signal after start-up	o01					0 s	600 s	5 s	
Digital input signals <sup>d</sup> ) (0 = not used. 1 = door alarm. 2 = defrost. 3 = bus. 4 = Main Switch)	o02							0	
Access Code	o05					OFF	100	OFF	
Used sensor type (Pt / PTC)	o06							Pt / PTC	
Real time clock (if fitted)									
Six start times for defrost All can be cut out by setting to OFF	t01-t02					0	23	OFF	
Hour setting	t07					0 hour	23 hour	0 hour	
Minute setting	t08					0 min	59 min	0 min	

To recognise the different sensors please see the table below

Sensor	Temperature @ 1000 Ω	Sensing bulb	Cable type and colour
EKS 111	25°C	Stainless steel	Round core, Black PVC
AKS 11	0°C	Stainless steel / Noryl	Flat core, Black PVC
AKS 12	0°C	Stainless steel	Round core, Light grey PVC
AKS 21	0°C	Stainless steel	Round core, Brown silicone

- (A) - PTC sensor EKS 111
- (B) - Pt1000 sensor AKS 12
- (C) - Pt1000 sensor AKS 11
- (D) - Pt1000 sensor AKS 21
- (E) - Pt1000 sensor pocket



Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequent changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.

## Temperature sensor EKS 111

### Introduction and application



The sensor is based on a PTC element with a resistance of 1000 ohm at 25°C.

The sensor can be used for measuring temperatures in the following areas:

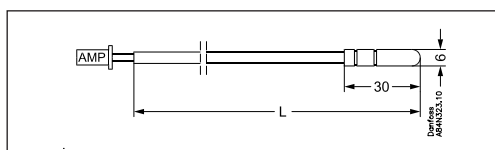
- Refrigeration
- Air conditioning
- Heating

- Primarily in combination with controllers types EKC 101, EKC 201 and EKC 301.

The sensor has a relatively big tolerance on the resistance. This means that the sensor cannot be employed for measuring values used for food safety logs or regulation of superheat.

### Technical data

Nominal resistance	1000 ohm at 25°C
Degree of accuracy	Class B (+/-1%)
Temperature range	-55 to 100°C
Temperature range for cable	-30 to 80°C
Cable material	PVC
Sensor tube	Stainless steel AISI 304
Time constant	30 seconds
Insulation resistance	DIN EN60751
Density	IP 67
AMP Plug	AMP ital mod 2, housing 280 358, Crimp contact 280 708-2



R (Typ.) Ohm	Temp. °C	Error K	Temp. °F	
1679	100	+/-3.5	212	
1575	90		194	
1475	80		176	
1378	70		158	
1286	60		140	
1196	50		122	
1111	40		104	
1029	30		86	
990	25		+/-1.3	77
951	20			68
877	10	50		
807	0	32		
740	-10	14		
677	-20	-4		
617	-30	-22		
562	-40	-40		
510	-50	+/-3.0		-58
485	-55			-67

### Ordering

Type	Sensor	Cable length (L)	Number	Code no.	
EKS 111	PTC	1000 ohm / 25°C	1.5 m	1	084N1178
				150	084N1161
			3.5 m	1	084N1179
				150	084N1163
			6 m	1	084N1180
				80	084N1173
			8.5 m	60	084N1168
				1.5 m with AMP-plug	1
			150		084N1174
			3.5 m with AMP-plug	1	084N1182
				150	084N1170
			6 m with AMP-plug	1	084N1177
				80	084N1171



**Temperature sensor  
NTC 10 Kohm  
type EKS 221**

## Introduction

NTC sensor for temperature measurements in the following areas:

- Refrigeration
- Air conditioning
- Heating

The sensor is available in two versions:

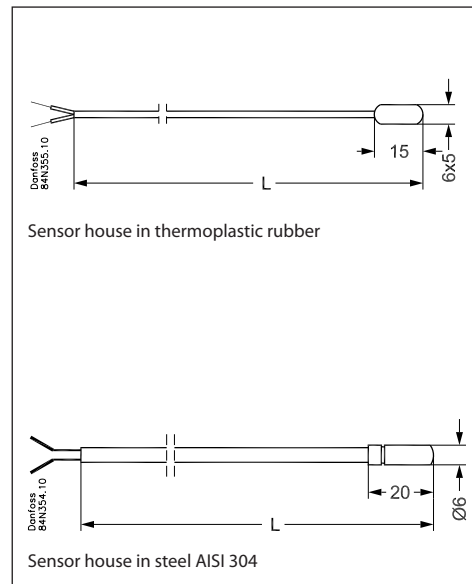
- Sensor house in thermo plastic rubber and flat cable
- Sensor house in steel and with round cable

The sensor characteristic is adjusted to:

- OPTYMA room controllers
- MCX unit controllers

## Technical data

Sensor house	Thermoplastic rubber	Steel AISI 304
Temperature range	-50 to 120°C	-50 to 110°C
Cable material	Thermoplastic rubber, flat, 2 x 0.25 mm <sup>2</sup>	Thermoplastic rubber, round, 2 x 0.25 mm <sup>2</sup>
Wire ends	Tin plated	Nipples
Time constant, water 2 m/s	10 seconds	10 seconds
IP Class	IP 67	IP 68
Nominal resistance	10000 ohm at 25°C	
Tolerance	+/- 1%	
Beta value	3435 at 25/85 °C	
Tolerance at beta value	+/- 1%	



R_nom Ohm	Temp. °C	Temp. °F
595	120	248
757	110	230
972	100	212
1265	90	194
1667	80	176
2228	70	158
3020	60	140
4160	50	122
5827	40	104
8313	30	86
10000	25	77
12091	20	68
17958	10	50
27278	0	32
42450	-10	14
67801	-20	-4
111364	-30	-22
188500	-40	-40

## Ordering

Type	Sensor element	Sensor house	Cable, L=	Number	Code no.
EKS 221	NTC 10000 ohm / 25°C	Thermo plastic rubber	1.5 m	150	<b>084N3205</b>
			3.5 m	150	<b>084N3206</b>
				1	<b>084N3210</b>
			5.5 m	80	<b>084N3207</b>
			8.5 m	50	<b>084N3208</b>
		1		<b>084N3209</b>	
		Steel AISI 304	1.5 m	150	<b>084N3200</b>
			3.5 m	150	<b>084N3201</b>
			5.5 m	80	<b>084N3202</b>
			8.5 m	50	<b>084N3203</b>
1	<b>084N3204</b>				