

Sample Gas Cooler PKE 5



Accurate measurement of gases requires gas samples with stable dew points even under harsh ambient conditions. The PKE Models feature a semiconductor Peltier cooling system with an aluminum cooling block. Fitted into the block is a removable high efficient heat exchanger made of stainless steel, DURAN-glass or PVDF.

The PKE 5 is designed for moderate ambient and gas temperatures (150 l/h @ 70°C) and an inlet dew point of about 40 °C (approx. 5 Vol%). For higher ambient temperatures up to a maximum of 50 °C order the PKE 52x.

The dew point of 5 °C is regulated by an electronic controller. The temperature (in °C or °F) of the cooling block is shown on a LED-display. The status is indicated by a flashing display which shows too high or low temperature and operates together with a relay in fail-safe mode.

Condensate is removed by peristaltic pumps, automatic condensate drains or condensate vessels.

- **Compact design**
- **Easy installation**
- **No maintenance required**
- **Low noise**
- **Efficient heat exchangers made of stainless steel, DURAN-glass or PVDF**
- **Nominal cooling capacity 90/100 kJ/h**
- **Dew point stability 0.1 °C**
- **Status display and -output**
- **Cooling temperature display**
- **Model available for high ambient temperatures**

Model Overview

The PKE 5 Peltier cooler family includes several types which may be categorised by two criteria:

- 1) Cooling capacity and maximum ambient temperature
- 2) Number of heat exchangers

These criteria can be specified in the model number as shown in the table below.

Application:	Standard		
Max. ambient temperature:	40 °C	50 °C	
1 heat exchange	PKE 511	PKE 521	3rd no. = 1
2 heat exchanger	PKE 512	PKE 522	3rd no. = 2
	2nd no. = 1	2nd no. = 2	

The general specifications can be found in the table below. On the next page are the performance curves and the specifications for each cooler. In the table below that there is an overview of the heat exchanger's data.

Description

The PKE coolers are controlled by a microprocessor. The different operating characteristics of the heat exchangers are established at the factory.

Menu-guided with three keys it is easily possible to adapt settings to the specific requirements of any application.

The outlet dew point can be set in a range of 2 to 20 °C (36..68°F). It is factory preset to 5°C (41°F).

Warning limits for high or low temperature can be set relative to the chosen outlet dew point τ_a . For low temperature the range is $\tau_a - 1..3^\circ\text{C}$ (minimum 1°C / 34°F). For high temperature it is $\tau_a + 1..7^\circ\text{C}$. Factory preset for both is 3°C.

When the warning limits are exceeded (e.g. at start-up) this is signalled by a flashing display and the status contact.

The status contact could be used to control the sample gas pump so that the gas flow is turned on when the cooler reaches the desired temperature.

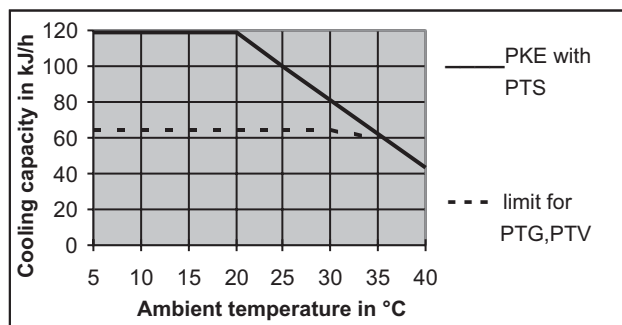
Technical Specifications for All Models

Ready for application	after max. 10 Minutes
Ambient temperature	+5...40°C/ 50°C
Factory set dew point	5°C
Protection class	IP 20
Material of housing	Stainless steel
Packing dimensions appr.	350 x 220 x 220 mm
Weight including heat exchanger(s)	appr. 6,5 kg
Power supply	115 or 230V 50/60 Hz
Power consumption	max. 120 VA
Status output	max. 230V AC, 150 V DC 2A, 50 VA, dry
Electrical connectors	
Standard applications	
(PKE 511, 512, 521, 522) Plugs according to DIN 43650	

One heat exchanger

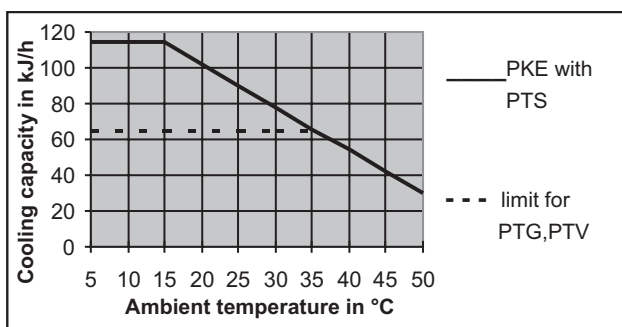
Type PKE 511

Nominal cooling capacity (at 25 °C)	100 kJ/h
Max. ambient temperature	40 °C
Dew point noise static	± 0.1 K
Drift over full range	± 1.5 K



Type PKE 521

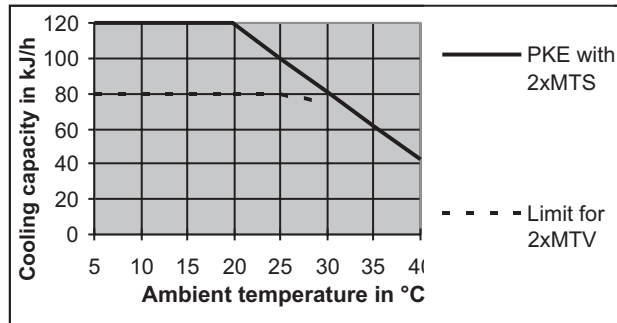
Nominal cooling capacity (at 25 °C)	90 kJ/h
Max. Ambient temperature	50 °C
Dew point noise static	± 0.1 K
Drift over full range	± 1.5 K



Two heat exchangers

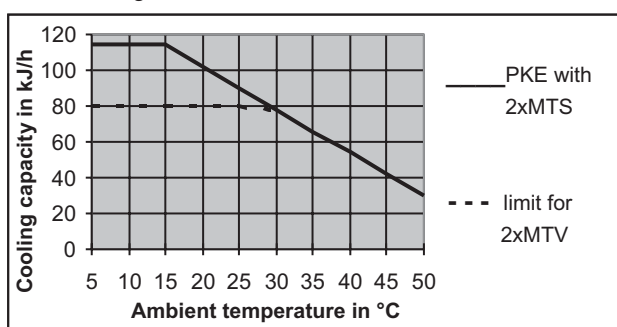
Type PKE 512

Nominal cooling capacity (at 25 °C)	100 kJ/h
Max. ambient temperature	40 °C
Dew point noise static	± 0.1 K
Drift over full range	± 1.5 K
Temperature differential between heat exchangers	< 0.5 K



Type PKE 522

Nominal cooling capacity (at 25 °C)	90 kJ/h
Max. Ambient temperature	50 °C
Dew point noise static	± 0.1 K
Drift over full range	± 1.5 K
Temperature differential between heat exchangers	< 0.5 K



Note: The limits in the diagrams for the PTG, PTV respectively MTV are for a dew point of 40°C.

Heat exchanger

The energy content of the sample gas and, as a result, the required cooling capacity of the cooling system is determined by 3 parameters: gas temperature ϑ_G , dew point τ_e (moisture content) and flow v .

The outlet dew point raises with increasing energy content (heat) of the gas. The required cooling capacity is determined by the maximum acceptable level of the outlet dew point.

The following table shows cooler performance assuming the following conditions: $\tau_e=40^\circ\text{C}$ and $\vartheta_G=70^\circ\text{C}$. Indicated is the v_{\max} in l/h cooled air (i.e. after the moisture has condensed). With other dew points and gas inlet temperatures the values may differ.

Please contact one of Buhler's application specialists for assistance and further information.

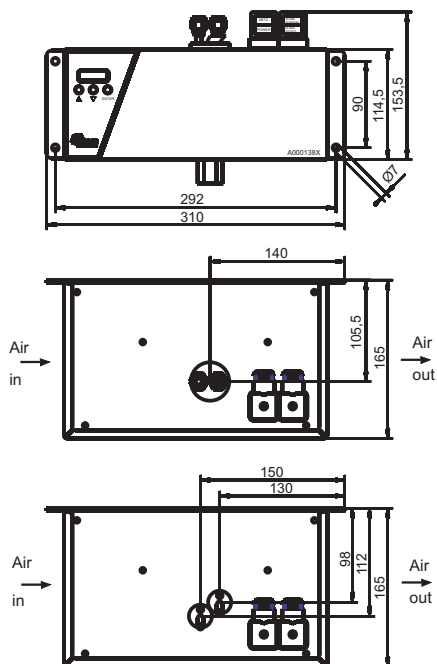
Heat exchanger	PTS	PTG	PTV	MTS	MTV
Flow rate v_{\max} ¹⁾	450 l/h	250 l/h	250 l/h	300 l/h	190 l/h
Inlet dew point $\tau_{e,\max}$ ¹⁾	65 °C	65 °C	65 °C	65 °C	65 °C
Gas inlet temp. $\vartheta_{G,\max}$ ¹⁾	180 °C	140 °C	140 °C	140 °C	140 °C
Max. Kühlleistung Q_{\max}	150 kJ/h	90 kJ/h	90 kJ/h	95 kJ/h	60 kJ/h
Gas pressure p_{\max}	160 bar	3 bar	2 bar	25 bar	2 bar
Pressure drop Δp ($v=150$ l/h)	10 mbar	10 mbar	10 mbar	20 mbar	18 mbar
Dead volume	29 ml	29 ml	57 ml	19 ml	17 ml
Sample gas connections	Swagelok 6 mm	GL 14	DN 4/6	Rohr 6 mm	DN 4/6
Condensate out connection	G 3/8" i	GL 25	G3/8" i	G1/4" i	G 1/4" i

¹⁾ consider the maximum cooling capacity of cooler

Remark: Heat exchangers MTS and MTV cannot be drained by automatic drainers.

Dimensions

Models for standard applications (PKE 51x und 52x)



Ordering hints

In the following table, replace the x by the codes above the part number. The tt is replaced by the basic type number and the y is replaced by the number of peristaltic pumps to be mounted.

				1		Power supply	115V
				2			230V
				1		Material of heat exchanger	SS
				2			Glas (not for types with 2 heat exchangers)
				3			PVDF
44 6	ttt	x	x	y	00		
	511 521					Types with 1 heat exchanger	
						PKE 511: Standard	Ambient temperature 40°C
						PKE 521: Standard	Ambient temperature 50°C
					0	Peristaltic pumps	none
					1		one
	512 522					Types with 2 heat exchangers	
						PKE 512: Standard	Ambient temperature 40°C
						PKE 522: Standard	Ambient temperature 50°C
					0	Peristaltic pumps	none
					1		one
					2		two

Accessories

Part No.

45 10 008

44 10 005

9124030027

Description

Automatic condensate drain type AK 5.2

Glass vessel GL 1

Spare tube for peristaltic pump, right angle terminals