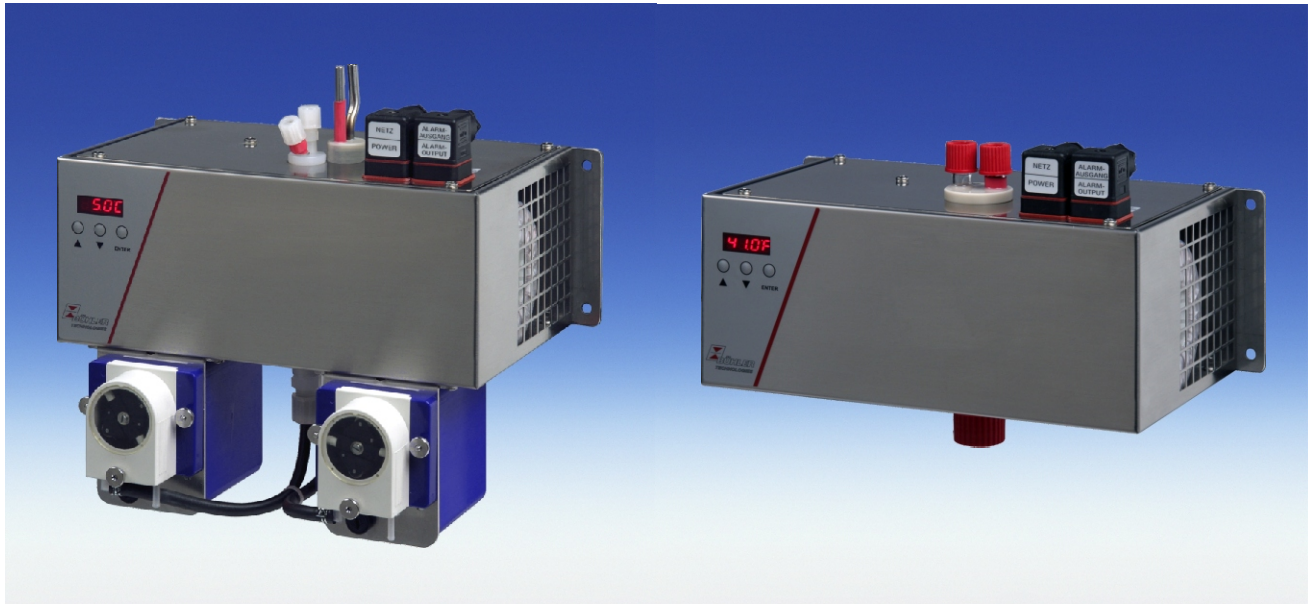


## Sample Gas Cooler PKE 5



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-efficiency heat exchanger made of stainless steel, DURAN-glass or PVDF.

The PKE 5 is designed for moderate ambient and gas temperatures (2.5 lpm at @ 158°F) and an inlet dew point of about 104°F. (approx. 5% vol). For higher ambient temperatures up to a maximum of 122°F order the PKE 52x.

The dew point of 41°F is regulated by an electronic controller. The temperature (in °F or °C) of the cooling block is shown on an LED-display. The status is indicated by a flashing display which shows 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 85/95 Btu/hr**
- **Dew point stability 0.2 °F**
- **Status display and output**
- **Cooling temperature display**
- **Model available for high ambient temperatures**

## Model Overview

The PKE 5 Peltier cooler family includes several models which may be distinguished 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. Please extract the part number for the cooler fulfilling your requirements from the type code on page 4.

Application:	Standard		
<b>Max. ambient temperature:</b>	104 °F	122 °F	
<b>1 heat exchanger</b>	PKE 511	PKE 521	3rd no.=1
<b>2 heat exchanger</b>	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.

## 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 within a range of 36.-68°F. It is factory preset to 41°F.

Warning limits for high or low temperature can be set relative to the chosen outlet dew point  $\tau_a$ . For low temperature the range is  $\tau_a - 2 - 5$  °F (minimum 34°F). For high temperature it is  $\tau_a + 2 - 13$  °F. Factory preset for both is 5 °F.

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

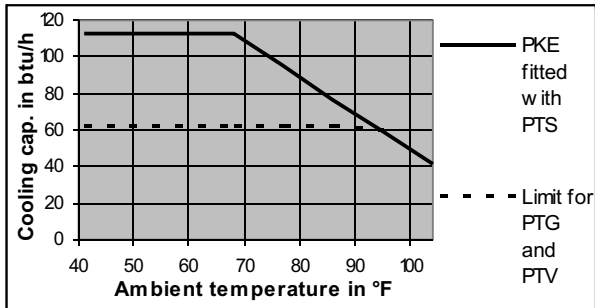
## Technical Specifications for All Models

Ready for application	after max. 10 Minutes
Ambient temperature	41 - 104°F/ 122°F
Factory set dew point	41°F
Protection class	IP 20
Material of housing	Stainless steel
Packing dimensions appr.	13.8" x 8.7" x 8.7"
Weight including heat exch.(s)	approx. 14 lb.
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 Potentialfrei
Electrical connectors	
Standard applications	
(PKE 511, 512, 521, 522) Plugs:	DIN 43650

## One heat exchanger

### Model PKE 511

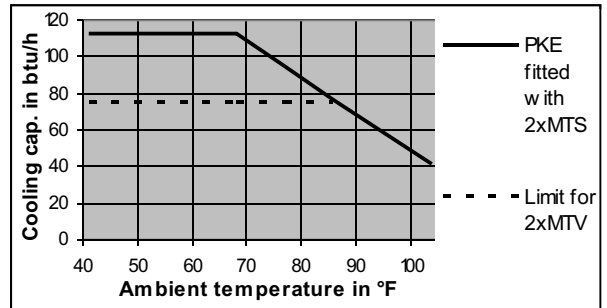
Nominal cooling capacity (at 77 °F)	95 Btu/hr
Max. ambient temperature	104 °F
Dew point noise static	± 0.18 °F
Drift over full range	± 2.7 °F



## Two heat exchangers

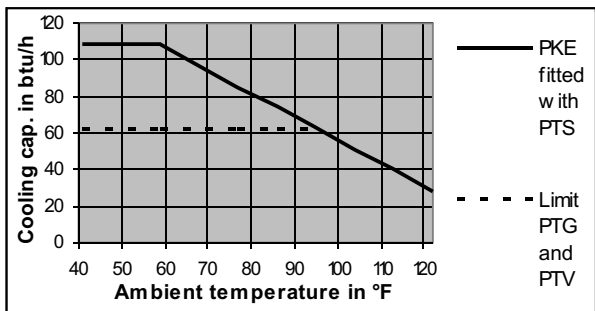
### Model PKE 512

Nominal cooling capacity (at 77 °F)	95 Btu/hr
Max. ambient temperature	104 °F
Dew point noise static	± 0.18 °F
Drift over full range	± 2.7 °F
Temperature differential between heat exchangers	< 0.9 °F



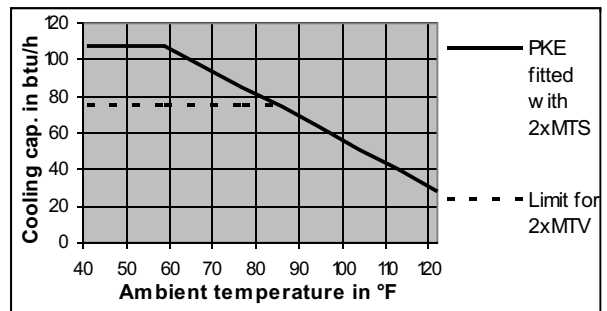
### Model PKE 521

Nominal cooling capacity (at 77 °F)	85 Btu/hr
Max. ambient temperature	122 °F
Dew point noise static	± 0.18 °F
Drift over full range	± 2.7 °F



### Model PKE 522

Nominal cooling capacity (at 77 °F)	85 Btu/hr
Max. Ambient temperature	122 °F
Dew point noise static	± 0.18 °F
Drift over full range	± 2.7 °F
Temperature differential between heat exchangers	< 0.9 °F



**Note:** The limits in the diagrams for the PTG, PTV respectively MTV are for a dew point of 104 °F.

## Heat Exchanger

The energy content of the sample gas and, as a result, the required cooling capacity of the gas cooler is determined by 3 parameters: gas temperature  $\vartheta_G$ , dewpoint  $\tau_o$  (moisture content) and flow  $v$ . The outlet dew point rises 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:  $\tau_o=120^\circ\text{F}$  and  $\vartheta_G=160^\circ\text{F}$ . Indicated is the  $v_{\max}$  in lpm 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 <sup>3)</sup>	MTV <sup>3)</sup>
Flow rate $v_{\max}$ <sup>1)</sup>	7.5 lpm	4.2 lpm	4.2 lpm	5 lpm	3.2 lpm
Inlet dew point $\tau_{e,\max}$ <sup>1)</sup>	150 °F	150 °F	150 °F	150 °F	150 °F
Gas inlet temp. $\vartheta_{G,\max}$ <sup>1)</sup>	356 °F	284 °F	284 °F	284 °F	284 °F
Max. cooling capacity $Q_{\max}$	142 Btu/hr	85 Btu/hr	85 Btu/hr	90 Btu/hr	57 Btu/hr
Gas pressure $p_{\max}$	2320 psi	43 psi	29 psi	363 psi	29 psi
Pressure drop $\Delta p$ ( $v=2.5$ lpm)	0.15 psi	0.15 psi	0.15 psi	0.29 psi	0.26 psi
Dead volume	1.8 cu. in.	1.8 cu. in.	3.5 cu. in.	1.2 cu. in.	1.0 cu. in.
Sample gas connections	Swagelok 6 mm	GL 14	DN 4/6	tube 6 mm	DN 4/6
Condensate outlet connection	G 3/8" j <sup>2)</sup>	GL 25	G3/8" i	G1/4" i	G 1/4" i

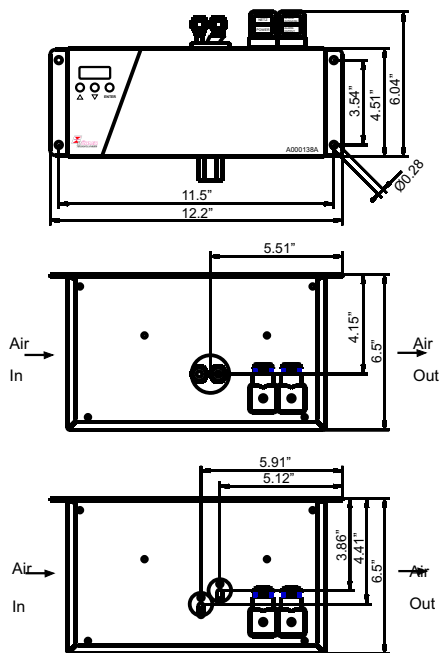
<sup>1)</sup> consider the maximum cooling capacity of cooler

<sup>2)</sup> NPT-threads upon request

<sup>3)</sup> Heat exchangers MTS and MTV cannot be automatically drained.

## Dimensions (mm)

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



### Please indicate with order

Please extract the part number for the cooler fulfilling your requirements from the type code below.

**Please note:** Each gas path should be equipped with a peristaltic pump or an automatic condensate drain.

4	4	6								0	0	
<b>Types with one Heat Exchanger</b>												
		5	1	1							PKE 511: Standard ambient temperature 40 °C	
		5	2	1							PKE 521: Standard ambient temperature 50 °C	
<b>Material Heat Exchanger / Version</b>												
				1							Stainless steel / PTS	
				2							Glass / PTG	
				3							PVDF / PTV	
<b>Power Supply</b>												
				1							115V	
				2							230V	
<b>Condensate Discharge</b>												
				0							None	
				1							One peristaltic pump	
4	4	6								0	0	
<b>Types with two Heat Exchangers</b>												
		5	1	2							PKE 512: Standard ambient temperature 40 °C	
		5	2	2							PKE 521: Standard ambient temperature 50 °C	
<b>Material Heat Exchanger / Version</b>												
				1							Stainless steel / MTS	
				3							PVDF / MTV	
<b>Power Supply</b>												
				1							115V	
				2							230V	
<b>Condensate Discharge</b>												
				0							None	
				2							Two peristaltic pumps	

<sup>1)</sup> Heat exchangers MTS and MTV cannot be drained by automatic drainers.

## Accessories

Part No.	Description
45 100 08	Automatic condensate drain type AK 5.2
44 100 05	Glass vessel GL 1
91 240 300 27	Spare tube for peristaltic pump, right angle terminals