PSG Plus Cooler
MAK 10 Peltier

Application

The compact gas conditioning systems series **MAK 10 Peltier** are used for continuous extractive gas analysis. They serve primarily for exact constant lowering of the sample gas dew point and thus for drying of the humid sample gas flow. In this way water vapor cross sensitivities and volumetric errors are minimized and damages of the sensible analyzer are avoided. With optional components like condensate pumps, pre-separators, filters, liquid sensors, flow meters and sample gas pumps devices of series **MAK 10 Peltier** can be upgraded to complete compact quick and simple integrable conditioning systems. The flexible modular design guarantees an optimum adaption to every measuring task.

Technology

The precise temperature control with pulse width modulation in combination with the innovative corrosion resistant heat exchangers achieves low extremely constant dew points. Also load fluctuations and high thermal stress is compensated reliably. The hydrophobic corrosion resistant PTFE coating and the very short retention time in the heat exchanger ensure a lowest possible gas dissolution rate.

Functions

An electronic system controls dew point and cooling air temperature. Potential free alarm contacts allow remote monitoring of the device. Operating parameters are stored for diagnosis in a log. An operation hours counter controls the service intervals. Available housing versions are wall mounting housing, 19“-rack housing and very light-weight mobile versions with carrying handles. The mobile version with optional aluminum housing is especially light-weight.

- ✔ High performance peltier-cooler with two long lasting peltier-elements
- ✔ Precise outlet dew point even at significant load variations
- ✔ Corrosion resistant PTFE / PVDF heat exchanger
- ✔ Very compact design
- ✔ Digital display for temperature, alarms, logbook, operating hours counter and service interval indication
- ✔ Modular upgradeable and application dependently configurable
- ✔ 1 - 2 gas paths
- ✔ Integrable filters, flow meters, flow alarms, liquid sensors, gas pumps, pre-separators und acid dosing
- ✔ Wall mounting, 19“-rack, or mobile housing

State 05 / 2021 | Subject to change

AGT-PSG GmbH & Co.KG | Weißkirchener Str. 3 | D-61449 Steinbach
Phone +49 (0) 6171 9750-0 | Fax +49 (0) 6171 9750-30 | info@perfectsamplegas.de

PSG Perfect Sample Gas

Technical Data

Model					
Type		MAK10P-1	MAK10P-1 PS1	MAK10P-2	MAK10P-2 PS1
Part number		MAK10P-1101-4-00-F	MAK10P-1112-4-00-F	MAK10P-2502-4-00-F	MAK10P-2513-5-00-F
Number of gas paths		1		2	
Number of condensate pumps		1	2		3
Number of pre-separators		0	1	0	1
Docking Station		-	-	-	ja
Material of gas paths					
Cooling transmission / storage		aluminium-tube / block		aluminium- block	
Cooling surface		PTFE-coating		PVDF	
Housing / sealings		PVDF / FPM		PVDF	
Operating data					
Gas flow V_n[1)] at 65°C dp	l/hr	1 x 110	1 x 125	2 x 70	2 x 85
Gas flow V_n[1)] at 55°C dp	l/hr	1 x 150	1 x 170	2 x 90	2 x 110
Gas inlet temperature	°C	max. 140			
Ambient temperature	°C	+5 to +45			
Operating pressure	bar	0,2 to 2,2			
Outlet dew point[1)]	°C	3,0 ± 0,3 at constant conditions			
Dead space per gas path	ml	26		55	
Ready for start up	min	< 15			
Cooling capacity	KJ/hr	peltier-elements with modulating power supply: 2 x 124			
Design data					
Dimensions (W x H x D)	mm	310 x 266 x 321			449 x 266 x 321
Weight without options	kg	9,5	10,0	Weight without options	kg
Housing		wall mounting (19“- rack and mobile optional) / RAL 7035			
Connections		gas: PVDF DN 4/6 / condensate: PVDF DN 4/6			
Electrical data					
Mains connection		plug			
Digital display		temperature (outlet dew point resp. ambient), operating status, alarm and alarm storage, service control, operating hours, condensate pump control			
Alarm set-points	°C	< +2.0 / > +10.0			
Protection rate		IP 20 EN 60529 / EN 61010			
Conformity		CE			
Power supply		230V 50/60Hz or 115V 50/60Hz			
Power consumption	W	170 - 180			

[1)] at 25°C ambient temperature
dp = inlet dew point

Options

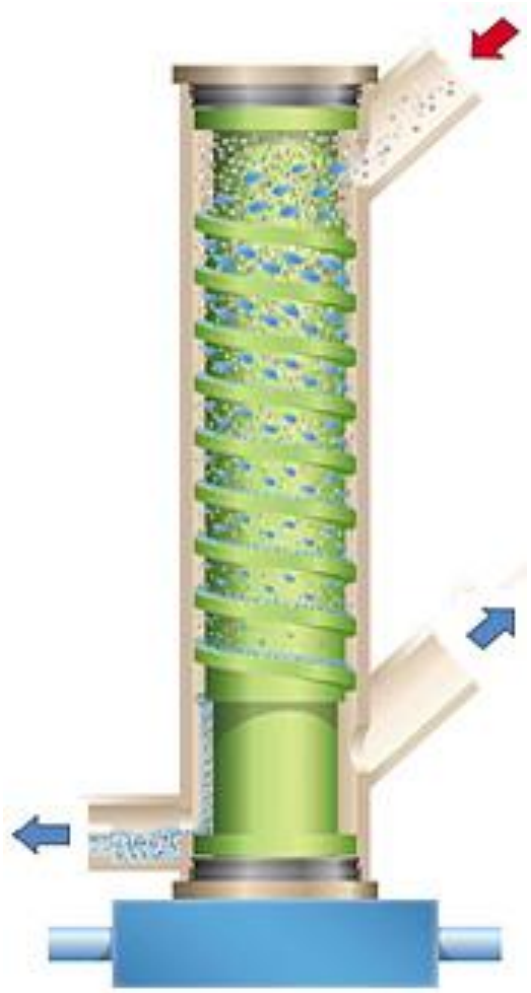
- Condensate pump
- PTFE or glass fiber depth filter, length 70mm or 90mm
- Sample gas pump N86 IP00 or IP20
- Flow meter for max. 150 or 250 or 500 l/h
- Flow meter with light barrier and electronic
- Liquid sensor internal or external incl. electronic
- Pre-separator incl. condensate pump
- Acid dosing incl. condensate pump
- Docking Station
- 19“-rack
- Portable housing
- Voltage 115V 50/60H

Due to the large number of options a big variety of individual configurations of the MAK10P is possible. Basically, devices with 3-4 condensate pumps, 1-2 sample gas pumps, 2 filters and 2 flow meters need additionally always the docking station. Thereby the housing width changes from 310mm to 449mm. For your individual configuration of a MAK10P please contact our sales team in Steinbach.

State 05 / 2021 | Subject to change

AGT-PSG GmbH & Co.KG | Weißkirchener Str. 3 | D-61449 Steinbach
Phone +49 (0) 6171 9750-0 | Fax +49 (0) 6171 9750-30 | info@perfectsamplegas.de

MAK 10 Heat-Exchanger System



More efficiency, no energy losses, even at high ambient temperatures

- Coldness transfer through Aluminium
- Good thermal conductance 204 W/m°K
- Double sided cold transfer with 2 peltier elements
- Extremely compact design
- Optimal shielding from the environment

High and constant dryness rate even at extreme load variations

- PTFE-coated, hydrophobic surface
- Immediate formation of large condensate droplets
- Spiral performing condensate stream goes downwards
- Consistent use of gravity
- Discharge of condensate at the lowest point
- Copper core and block as cold storage

Exceptionally low gas dissolution rates enable accurate analysis

- Very low dead volume
- Extremely short retention time of the gas in the system
- Small heat-exchanger surface
- Rapid saturation of the surface
- Reduced response-time of gas to condensate
- Minimized contact surface of sample gas and condensate
- On three sides evacuated condensate spiral stream
- Coating reduces electrostatics

Reliability and sustainability reduce time and efforts for maintenance

- Exchangeable heat-exchangers
- Optimum chemical resistance
- No abrasive wear-out
- Self-cleaning effects, no contamination
- Maintenance-free system
- Proven and safe technology
- Monitored quality
- More than 10.000 systems in successful operation

State 05 / 2021 | Subject to change

AGT-PSG GmbH & Co.KG | Weißkirchener Str. 3 | D-61449 Steinbach
Phone +49 (0) 6171 9750-0 | Fax +49 (0) 6171 9750-30 | info@perfectsamplegas.de

PSG Perfect Sample Gas

MAK 10 Peltier Model Examples

MAK10P-1

- 1 heat exchanger PTFE / PVDF
- 1 gas path (1 x 150 l/hr)
- 1 condensate pump
- 1 MAK-alarm contact

MAK10P-1 with pre-separator

- 1 heat exchanger PTFE / PVDF
- 1 gas path (1 x 170 l/h)
- 1 pre-separator
- 2 condensate pumps
- 1 depth filter
- 1 flow meter
- 1 sample gas pump
- 1 MAK alarm contact

MAK10P-2 with docking station

- 1 heat exchanger dual PVDF
- 2 gas paths (2 x 90 l/h)
- 2 condensate pumps
- 2 depth filters
- 2 liquid sensors with electronic
- 1 MAK- / 2 sensor alarm contacts

MAK10P-2 19“-rack version

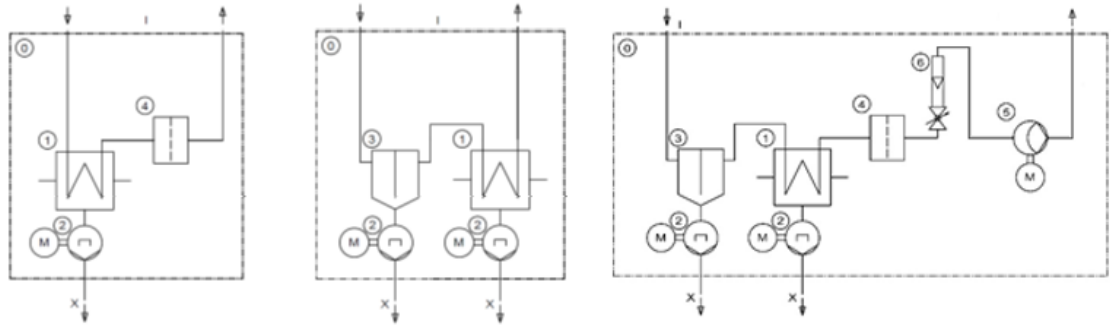
- 2 heat exchangers PTFE / PVDF
- 2 gas paths (2 x 150 l/h)
- 2 condensate pumps
- 1 depth filter
- 1 liquid sensor and electronic
- 1 flow meter
- 1 MAK- / 1 sensor alarm contact

State 05 / 2021 | Subject to change

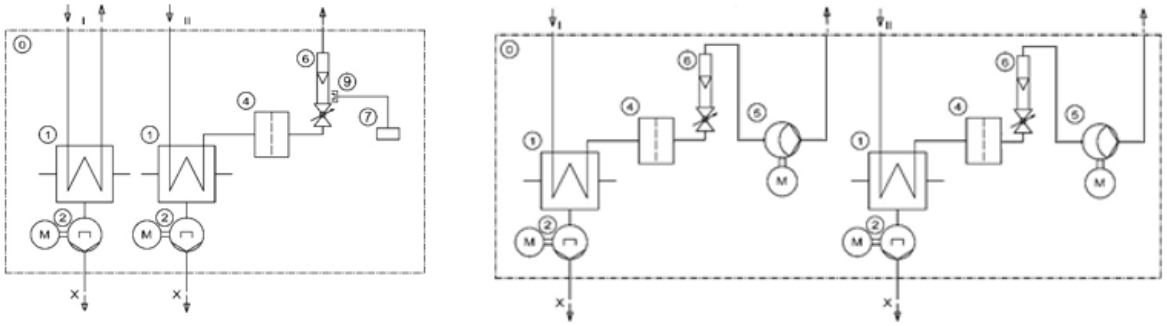
AGT-PSG GmbH & Co.KG | Weißkirchener Str. 3 | D-61449 Steinbach
Phone +49 (0) 6171 9750-0 | Fax +49 (0) 6171 9750-30 | info@perfectsamplegas.de

Configuration examples

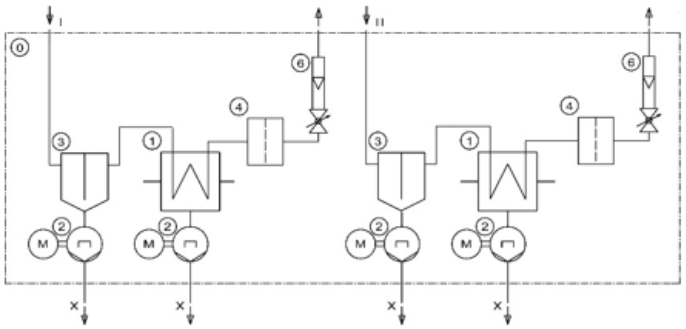
MAK10P-1



MAK10P-2



① Heat exchanger
② Condensate pump
③ Condensate pre-separator
④ Depth filter
⑤ Sample gas pump
⑥ Flow meter
⑦ Electronic
⑧ Liquid sensor
⑨ Light barrier



State 05 / 2021 | Subject to change

AGT-PSG GmbH & Co.KG | Weißkirchener Str. 3 | D-61449 Steinbach
Phone +49 (0) 6171 9750-0 | Fax +49 (0) 6171 9750-30 | info@perfectsamplegas.de

PSG Perfect Sample Gas

Integrated components / options

Condensate pump
- Reliable continuous condensate removal
- Low rotation speed, long lasting pump tube

Condensate pre-separator
- Separation of free condensate and solid particles
- Sample gas pre-cooling for inlet dew points >65°C

PTFE or glass fiber depth filter
- Reliable filtration of solid particles
- Quick and simple filter change

Flow meter
- Exact dosing, with fine adjustment needle valve
- Optional with light barrier

Liquid sensor
- Protects against condensate break through
- Reliable detection of smallest amounts of liquid

Electronic
- Control / alarm for liquid sensors / light barriers
- Potential free switch contact

Sample gas pump
- Pure pumping of sample gases
- Perfect integration in the sample gas cooler





State 05 / 2021 | Subject to change

AGT-PSG GmbH & Co.KG | Weißkirchener Str. 3 | D-61449 Steinbach
Phone +49 (0) 6171 9750-0 | Fax +49 (0) 6171 9750-30 | info@perfectsamplegas.de