PSG Plus Cooler

MAK 10 Portable

Application

The compact gas conditioning systems series **MAK 10 Portable** are used for continuous extractive gas analysis at different locations. 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 Portable** can be upgraded to complete compact quick and simple integrable conditioning systems.

Technology

The precise proportional temperature control in combination with the long-lasting hot-gas bypass system and 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. The operating parameters are stored in a log book for diagnosis. An operation hours counter controls the service intervals.

- ✔ High performance compressor cooler
- ✔ For mobile applications
- ✔ Long lasting hot-gas bypass system without switching the compressor
- ✔ Corrosion resistant PTFE / PVDF heat exchanger
- ✔ Very compact design
- ✔ Digital display for temperature, alarms, logbook, operating hours counter and service interval indication
- ✔ Modular upgradeable
- ✔ 1 - 2 gas paths
- ✔ Integrable filters, flow meters, flow alarms, liquid sensors, gas pumps, pre-separators und acid dosing

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PSG Perfect Sample Gas

Technical Data

Model			
Type		MAK10-1	MAK10-2
Part number		MAK10-1101-8-00-F	MAK10-2202-8-00-F
Number of gas paths		1	2
Number of condensate pumps		1	2
Number of pre-separators		0	
Docking Station		-	
Material of gas paths			
Cooling transmission / storage		aluminium tube / copper rod	
Cooling surface		PTFE coating	
Housing / sealings		PVDF / FPM	
Operating data			
Gas flow V_n[1)] at 65°C dp	l/hr	1 x 125	2 x 125
Gas flow V_n[1)] at 55°C dp	l/hr	1 x 175	2 x 175
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	
Ready for start up	min	< 5	< 10
Cooling capacity	KJ/hr	792	
Design data			
Dimensions (W x H x D)	mm	310 x 266 x 321	
Weight without options	kg	16,0	18,0
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 /cMETus	
Power supply		230V 50/60Hz or 115V 50/60Hz	
Power consumption	W	170 - 195	

[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
- Voltage 115V 50/60Hz

Due to the large number of options a big variety of individual configurations of the MAK10 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 MAK10 please contact our sales team.

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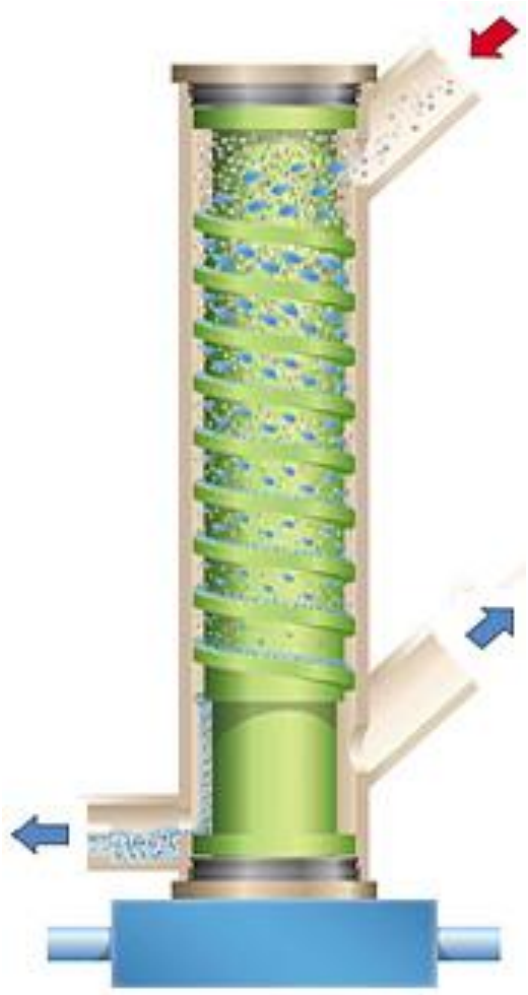
MAK 10 Heat-Exchanger System



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

- Coldness transfer through copper and aluminum
- Best thermal conductance values 300/204 W/m°K
- Coldness transferred from the inside outwards
- Extremely compact design
- Optimal shielding from the environment

High and constant dryness rate even at extreme load changes

- PTFE-coated, hydrophobic surface
- Immediate formation of large condensate droplets
- Spiral performing stream goes downwards
- Consistent use of gravity
- Discharge of condensate at the lowest point
- Inner copper rod 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

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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

Electronics

- ✔ Control / Alarm for humidity sensors / light barrier
- ✔ Potential-free switching contact

Sample gas pump

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







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