MAK SAMPLE GAS CONDITIONING

Outstanding performance, reliability, and stustainability
for extractive analytics

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With over 35.000 units installed worldwide AGT Thermotechnikis for more than 40 years a leader in gas conditioningequipment that is based on refrigeration technique.

Sample Gas Conditioners for stack-gas analysis and Compressed Air Dryers for pneumatic applications arecost-effective solutions with proven performance, reliabilityand sustainability.

Previously AGT was the producer of gas conditioners for VIA, H&B and Alfa Laval. The former models MAK 6 / 8, CGEK 4 / 5 and SCC are still available.

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MAK
SAMPLE GAS CONDITIONING

Outstanding performance, reliability and sustainability for extractive analytics.

- Continuously dehumidify gas sample streams and rapidly separate condensable liquids with a very low dissolution rate.
- Provide clean dry sample gases to extractive analysers in continuous emission monitoring, process control and engine testing applications.
- Optimise industrial burning processes and protect the environment.

APPLICATIONS

- ■Power Plants
- ■Waste Incinerators
- ■Cement Manufacturing
- ■Chemical Production Plants*
- ■Gas Production Plants*
- ■Glass manufacturing
- ■Timber Processing
- ■Food Processing

* not for highly combustible areas

Teflon-depth filter

Integrated electronic controlx

Moisture sensor with flow chamber

What makes the new MAK 10 Sample Gas Conditioners so reliable?

Innovative solutions

The new MAK 10 offers precision, safety and long-termstability for extractive analytics. The unique cooling and separating technology of the newly designed coolers attains low, constant dew points of +3°C and compensates for operating data fluctuations as well as high thermal loads.

The very low gas dissolution rate is attained thanks to the new cooler technology (Patents applied). Both the permanent separation of the condensate from the gas phase, as well as the shorter contact time of the gas in the system, plays important roles.

The new coolers incorporate an advanced structural design. The new housings are available in wall-mount, 19"- rack, and mobile design. The coolers can be integrated in the analysis cabinet without having to leave space at theside for a cooling air outlet.

Preventative monitoring

An electronic system not only monitors the dew point, but also the ambient temperature. The fan motor speed is cooling air temperature dependent controlled. The operation of the condensate pumps can be adjusted demandoriented. A service interval alarm and a precautionary alarm are both issued before an emergency stop takes place.

Which additional gas conditioning tasks can be performed by the MAK 10??

Sample gas cleaning

Reliable filtration of particles down to 0.1 micron takes place in the Teflon-depth filter. A view port allows you to see when the filter needs changing.

Moisture break-through monitoring

An externally installed moistuAn externally installed moisture sensor controlled by an integrated electronic control monitors the function of the cooling system and the condensate pump. Analysers are protected from condensate breakthrough.

Measurement and adjustment of sample gas flow

With the flow meter and needle valve the sample gas flow can be adjusted and precisely measured.

Pre-cooling of sample gas with inlet dew point > 65°C

The integrated air-cooled pre-cooler preseparates free condensate and solid particles which are discharged through the additional condensate pump.

Elimination of SO3-Aerosols, HCL-, NO2-Concentrations

Samples containing additional water and acid injection can be accommodated.

Model: MAK 10-2

- Two gas paths
- Two heat-exchangers
- Two condensate pumps
- One 3-pole alarm contact MAK

Order No.: MAK 10-2202-4-00-F

Model: MAK 10-1-TF1-EC1-FM1 mobile

- One gas path
- One heat-exchanger
- One condensate pump
- One Teflon-depth filter
- One 3-pole alarm contact MAK
- One electronic control with one 3-pole
- alarm contact for ext. moisture sensor
- One flow meter with needle valve
- Two handles for mobile operations

Order No.: MAK 10-1101-8-1F-F

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Further options and configurations available.

Model: MAK 10-2-PS2-TF2-EC2

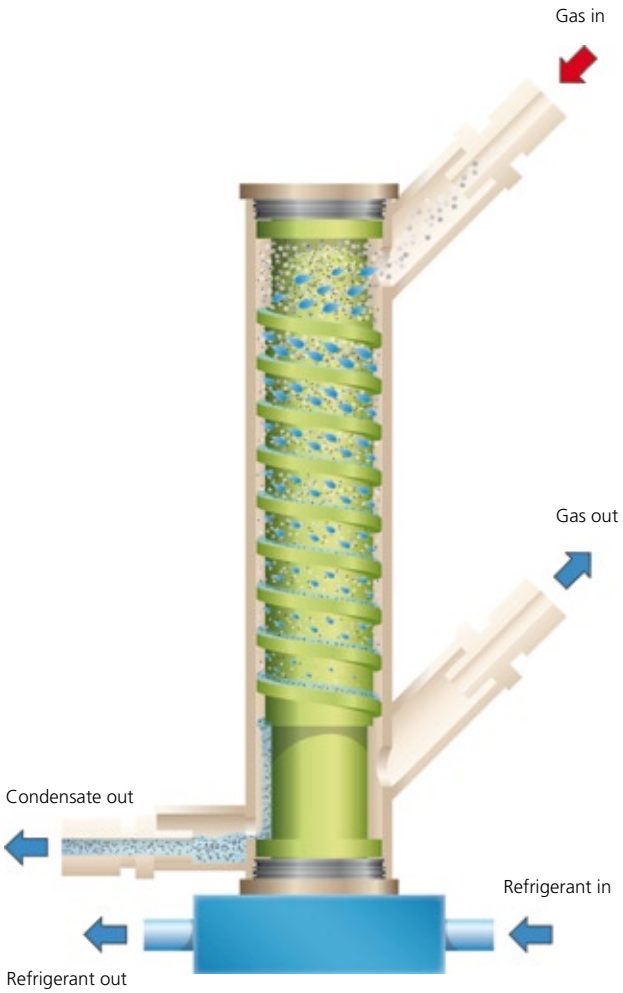
- Two gas paths
- Two pre-separators for Dp in > 65°C
- Two heat-exchangers
- Four condensate pumps
- Two Teflon-depth filters
- One 3-pole alarm contact MAK
- Two electronic controls with two 3-pole alarm contacts for external moisture sensors

Order No.: MAK10-2224-5-22-F

Model: MAK 10-2-PS2-TF1-EC1-FM1

- Two gas paths
- Two pre-separators for Dp in > 65°C
- Two heat-exchangers
- Four condensate pumps
- Two Teflon-depth filters
- One 3-pole alarm contact MAK
- One electronic control with one 3-pole alarm contactfor ext. moisture sensor
- One flow meter with needle valve

Order No.: MAK 10-2224-7-1F-F MAK 10



Unique cooler and separating technologies proven by comprehensive testing

MAK 10 outstanding in Performance, Reliability, Sustainability.

1.More efficient and no energy loss even in high ambient emperatures

- Coldness transfer through copper and aluminium
- Thermal conductance values 300 and 204 W/m°K
- Coldness transferred from the inside outwards

2. High and constant dryness rate even at extreme load changes

- Hydrophobic surface through PTFECoating
- Large condensate drops are formed immediately
- Spiral performing stream goes downwards
- Discharge of condensate at the lowest point

3.Low dissolution rate a contribution to more environmental protection

- Very small dead space, 26 ml
- Extremely short response time of gas to liquid
- Large drops have a smaller surface to content ratio
- PTFE-Coating with low electrostatic current Condensate spiral stream separated
- from 3 sides

4.Key's to reliability

- Chemical resistance thanks to the PTFE-Coating
- No clogging due to the self cleaningfeature

5.Comprehensive testing procedures guarantee equipment reliability.

- Providing of true inlet dew-points
- Automatic control of gas mixture at inlet
- Trace gas measuring by infra-red analyser
- Data processing and storing
- Availability of test certificates

Technical Data xs					
Model	**MAK 10-1**	**MAK 10-2**	**MAK 10-4**	**MAK 10-1-PS1**	**MAK 10-2-PS2**
Number of gas paths	1	2	4	1	2
Pre-separator (PS)	–	–	–	1	2
Operation data					
Gas flow per gas path	125 Nl/h	125 Nl/h	100 Nl/h	150 Nl/h	150 Nl/h
	2.0 lpm	2.0 lpm	1.7 lpm	2.5 lpm	2.5 lpm
- dew-point at inlet -	65°C				
Gas flow per gas path	175 Nl/h	175 Nl/h	140 Nl/h	200 Nl/h	200 Nl/h
	2.9 lpm	2.9 lpm	2.3 lpm	3.3 lpm	3.3 lpm
- dew-point at inlet -	55°C				
Gas temperature at inlet	140°C				
- maximum -	140°C				
Ambient temperature	5 – 45°C				
Operating pressure (abs.)	0,5 – 2,2 bar				
Gas dew-point at outlet	3°C +/- 0,3				
Press. drop per gas path	5 mbar (V = 125 Nl/h)				
Dead space per gas path	26 ml				
Ready for start-up	< 5 min.	< 10 min.	< 15 min.	< 5 min.	< 10 min.
Cool. capacity ta = 45°C	220 W	220 W	300 W	220 W	220 W
Material of gas paths					
Cooling transfer tube	Aluminium				
Cooling surface	PTFE -Coating				
Housing / Sealings	PVDF / Viton				
Design data					
Width	310 mm	310 mm	449 mm	310 mm	449 mm
Height	266 mm	266 mm	266 mm	266 mm	266 mm
Depth	321 mm	321 mm	321 mm	321 mm	321 mm
Weight	16 kg	18 kg	23 kg	17 kg	20 kg
Housing	Wall-mount				
Housing 19”	Option				
Colour	RAL 7035				
Gas connection	PVDF DN 4/6				
Condensate connection	PVDF DN 4/6				
Electrical data					
Mains connection	Plug				
3-pole alarm contact	25 V AC, 2A				
Alarm set points	< + 2°C / > + 10°C				
Housing protection class	IP 20 EN 60529 / EN 61010				
Power supply	230 V, 50 / 60 Hz; -15% / +15%				
Power consumption max.	170/185 W	170/185 W	235/275 W	170/185 W	170/185 W
Power supply	115 V, 50/60 Hz; -10% / + 10%				
Power consumption	170/195 W	170/195 W	230/275 W	170/195 W	170/195 W

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