MAK Sample Gas Conditioners

Outstanding Sample Gas Conditioning for Extractive Analytics

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

Sample Gas Conditioners for stack-gas analysis and Compressed Air Dryers for pneumatic applications are cost-effective solutions with proven performance, reliability and 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.

MAK Sample Gas Conditioners

Outstanding Sample Gas Conditioning 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

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

Innovative solutions

The new MAK 10 offers precision, safety and long-term stability 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 stuctural design. The new housing is available in both wall-mount and 19" rack versions. The coolers can be integrated in the analysis cabinet without having to leave space at the side for a cooling air outlet. The condensate pumps have been positioned within the housing geometry.

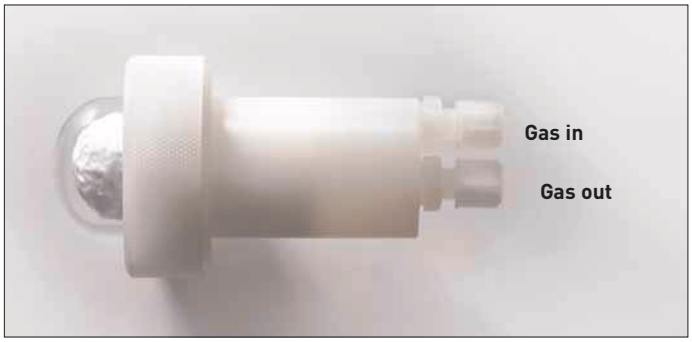
Preventative monitoring

An electronic system not only monitors the dew point, but also the ambient temperature. The condensate pumps are controlled on a demand-oriented basis. A service interval alarm and a precautionary alarm are both issued before an emergency stop takes place.

What additional variants can be realised by the MAK 10 PLUS?

Clean sample gas

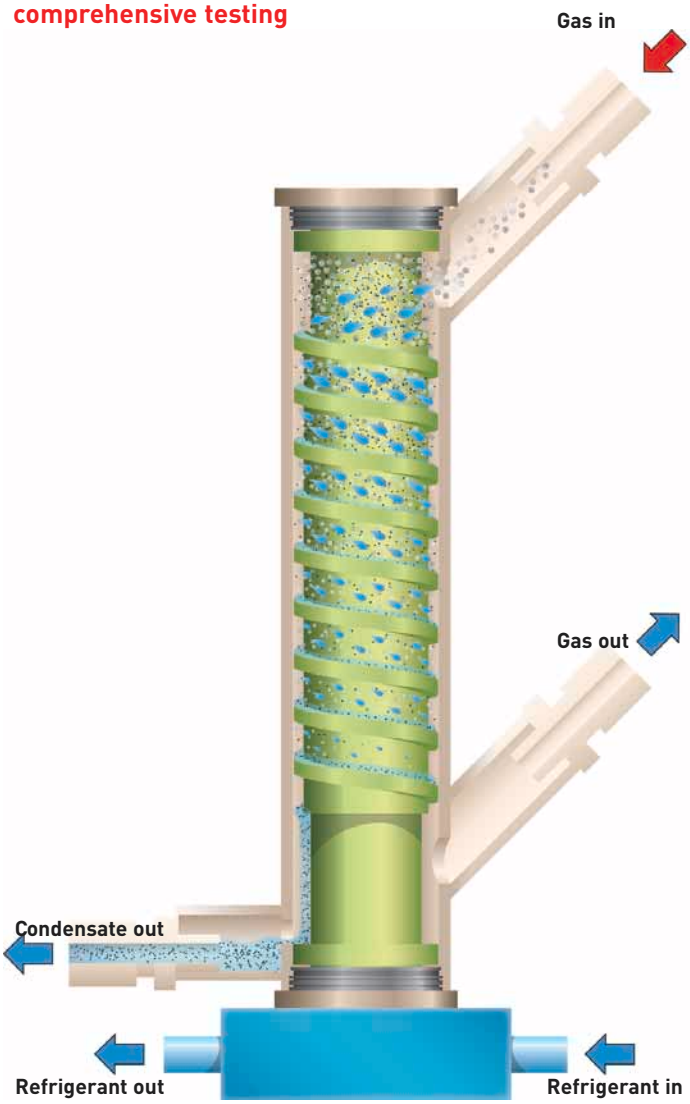
Reliable filtration of particles down to 0.1 micron takes place in the Teflon depth filter. The very large surface reduces pressure loss, and a view port allows you to see when the filter needs changing.



Moisture monitoring

A moisture sensor monitors the function of the cooling system and the condensate pump. Analysers are protected from condensate breakthrough. In case of an alarm a separate fault signal is sent.

Unique cooler and separating technologies proven by comprehensive testing



AGT testing unit in operation based on a TÜV certified calibration gas generator

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

- 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 PTFE-Coating
- 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 cleaning feature

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

MAK 10 outstanding

Performance,
Reliability,
Sustainability.

MAK 10 and MAK 10 PLUS advantages of the modular design

Model: MAK 10-2

- Two gas paths
- Two heat-exchangers
- Two condensate pumps
- One bipolar alarm contact

Order No.: MAK 10-2202-1-00-F

Model: MAK 10-4

- Four gas paths
- Four heat-exchangers
- Four condensate pumps
- One bipolar alarm contact

Order No.: MAK 10-4404-2-00-F

Model: MAK 10-2 PLUS

- Two gas paths
- Two pre-separators for high inlet dew-points
- Two heat-exchangers
- Four condensate pumps
- Two Teflon depth filter
- Two moisture sensors (integrated)
- One bipolar alarm contact
- Two moisture sensor alarm contacts

Order No.: MAK 10-2224-2-22-F

Model: MAK 10-2 PLUS in a 19" rack

- Two gas paths
- Two pre-separators for high inlet dew-points
- Two heat-exchangers
- Four condensate pumps
- Two Teflon depth filter
- Two moisture sensors (integrated)
- One bipolar alarm contact
- Two moisture sensor alarm contacts

Order No.: MAK MAK 10-2224-3-22-F

MAK Sample Gas Conditioners	Technical Data					
Model	**Modell**	**MAK 10-1**	**MAK 10-2**	**MAK 10-4**	**MAK 10-1-PS1**	**MAK 10-2-PS2**
Number of gas paths	Anzahl der Gaswege	1	2	4	1	2
Pre-separator (PS)	Vorabscheider (PS)	–	–	–	1	2
Operation data	**Betriebsdaten**					
Gas flow per gas path	Gasvolumen pro Gasweg	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	- Taupunkt am Eintritt			65°C		
Gas flow per gas path	Gasvolumen pro Gasweg	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	- Taupunkt am Eintritt			55°C		
Gas temperature at inlet	Gastemperatur am Eintritt			140°C		
- maximum	- maximal			140°C		
Ambient temperature	Umgebungstemperatur			5 – 45°C		
Operating pressure (abs.)	Betriebsdruck (abs.)			0,5 – 2,2 bar		
Gas dew-point at outlet	Gastaupunkt am Austritt			3°C +/- 0,3		
Press. drop per gas path	Druckverlust pro Gasweg			5 mbar (V = 125 Nl/h)		
Dead space per gas path	Totvolumen pro Gasweg			26 ml		
Ready for start-up	Betriebsbereitschaft	< 5 min.	< 10 min.	< 15 min.	< 5 min.	< 10 min.
Cool. capacity ta = 45°C	Kühlleistung tu = 45°C	220 W	220 W	300 W	220 W	220 W
Material of gas paths	**Material der Gaswege**					
Cooling transfer tube	Kälteübertragungsrohr			Aluminium		
Cooling surface	Kühlfläche			PTFE -Coating / -Beschichtung		
Housing / Sealings	Gehäuse / Dichtungen			PVDF / Viton		
Design data	**Konstruktionsdaten**					
Width	Breite	310 mm	310 mm	449 mm	310 mm	449 mm
Height	Höhe	266 mm	266 mm	266 mm	266 mm	266 mm
Depth	Tiefe	271 mm	271 mm	271 mm	271 mm	271 mm
Weight	Gewicht	16 kg	17 kg	20 kg	17 kg	20 kg
Housing	Gehäuse			Wall-mount / Wandmontage		
Housing 19"	19" Gehäuse			Option		
Colour	Farbe			RAL 7032		
Gas connection	Gasanschluss			PVDF DN 4/6		
Condensate connection	Kondensatanschluss			PVDF DN 4/6		
Electrical data	**Elektrische Daten**					
Mains connection	Netzanschluss			Plug / Netzstecker		
Alarm: cable open-end	Alarm: Anschlusskabel			250 V, 2 A, 50 VA		
Alarm set points	Alarmgrenzwerte			< + 2°C / > + 10°C		
Housing protection class	Gehäuseschutzart			IP 20 EN 60529 / EN 61010		
Power supply	Stromversorgung			230 V, 50 Hz; -15% / +15%		
Power consumption max.	Leistungsaufnahme max.	152 W	152 W	214 W	152 W	152 W
Power supply	Stromversorgung			230 V, 60 Hz; -10% / + 10%		
Power consumption	Leistungsaufnahme	182 W	182 W	256 W	182 W	182 W
Power supply	Stromversorgung			115 V, 50/60 Hz; -10% / + 10%		
Power consumption	Leistungsaufnahme	190 W	190 W	265 W	190 W	190 W

AGT Thermotechnik GmbH
Richard-Lucas-Str. 6
41812 Erkelenz
Telefon +49 (0) 2431 9627-0
Telefax +49 (0) 2431 9627-31

info@agt-thermotechnik.de
www.agt-thermotechnik.de

Änderungen vorbehalten.

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