



MAK10 Sample Gas Conditioner



Installation Manual
Operating Manual

Maintenance Manual
Spare Part List

Model / Type

EC Declaration of Conformity and CE Marking

Manufacturer: **AGT-PSG GmbH & Co.KG**
Richard-Lucas-Straße 6, 41812 Erkelenz, Germany

Product: **MAK10 Sample Gas Conditioner**
Model-/Artikelnummer **MAK10-xxxx-x-xx-x**

The sample gas cooler is developed, designed and manufactured following the guidelines **2006/42/EG** (machines), **2014/35/EU** (low voltage guideline), **2014/30/EU** (EMC), **2014/68/EU** (pressure equipment) and **93/68/EWG** (CE-marking guideline). It corresponds to the essential requirements of these guidelines.

The following harmonized standards in actual revision have been used:

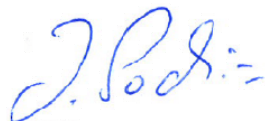
- **DIN EN ISO 12100-1 /-2**, security of machines
- **EN 983**, security of pneumatics
- **EN 378-1 bis 4**, refrigerant plants and heat pumps
- **EN 60335-2-34**, electrical security engine compressors
- **EN 61326-1**, EMC general requirements
- **EN 61000-6-2**, EMC interference resistance
- **EN 61000-6-4**, EMC interference emission
- **EN 60204-1**, electrical equipment for industry machines

The following national standards and specifications are used:

- **BVG D4**, refrigerant plants, heat pumps and cooling units

A technical documentation is completely present with the manual.

Erkelenz, 08.05.2017



Jochen Podiwin
Managing Director

Introduction

Dear Customer,

Thanks that you have decided to buy our MAK10 Peltier sample gas cooler. You have chosen one of the most progressive appliances, which will facilitate a durable and trouble-free operation, if installation and operating is correct.



Before installation and initial operation, please read the following instructions very carefully and follow our indications! Only if you observe our regulations and instructions for the sample gas cooler, a perfect functioning and so, a reliable compressed air conditioning will be guaranteed. Installation and initial start of operation has to be done through qualified and skilled staff only, and under usual proceedings within the gas analysis technology. Here from resulting general rules for the proper installation and operation could possibly not be taken completely into this instruction. We are not liable for non appliancespecific regulations and instructions. If statements in this instruction are contrary to legal or other valid regulations, so they have to be replaced accordingly. Other statements remain untouched. Due to the continuous technical evolution, we reserve the right to introduce any necessary change without giving previous notice.



This manual must be maintained available in any moment for future references and it has to be intended as inherent part of the sample gas cooler.

These operating instructions must be continuously available at the site where the sample gas cooler is used. We recommend to prepare a copy and keep the same in a safe and freely available place next to the sample gas cooler. Keep the original document in a safe place.

Notes on supplementary documents: Supplementary documents such as operation manuals for options or pertaining components must always be heeded. They contain additional information, e.g. regarding maintenance, and are therefore necessary for safe operation of the plant.

Target Groups of these Operating Instructions



These operating instructions are intended for all persons working on and using the sample gas cooler. We assume that all such persons are specialist personnel, e.g. electricians, analysis or cooling technicians, respectively instructed personnel.

We assume the following points:

- There are appropriate operating instructions for the application intended by the operator.
- The staff has been instructed how to handle the sample gas and is aware of the involved risks and the general danger prevention measures.
- The staff has experience in handling sample gas as well as in handling electrical and refrigerated devices.

Warranty

Warranty Conditions

According to legal regulations you get a 12-month warranty concerning material defects and manufacturing errors for this product starting from invoice date. The warranty service covers free repair in the workshop or free replacement of the device that has been sent to the place of application free of charge. Return deliveries must take place in suitable and sound protective packing.

Please contact directly the manufacturer AGT-PSG if the sample gas cooler fails.

Basis for all warranty claims is the purchase receipt and the undamaged model identification plate. In case of queries we need the model type, serial number and year of construction (model identification plate).

Damages caused through non-observance of the installation and operation instructions are not covered through the warranty. In particular from the warranty are excluded: Wear parts and operating supplies, damages caused by improper installation, damages caused by improper use or overload of the cooler, damages caused by lack of service, damages caused by events, which are not within the sphere of influence of the manufacturer.

Tampering the safety and security devices is not permissible. In the case of warranty claims the sample gas cooler has to be in its original condition.

Purpose of Use

Proper Use of the Sample Gas Cooler

The sample gas cooler is used in the sequence of sample gas conditioning, wherein cross-sensitivity may not be observed in case of analyzers due to low and constant dew points. At no subsequent point does the dew point decrease. The analyzer is protected from the moist sample gas.



WARNING! Improper use! The purpose of the machine is the cooling of sample gas as well as the separation and discharging of condensate. If you use the sample gas cooler for other purpose or other media, any warranty of the manufacturer will expire. This sample gas cooler is not suitable for the treatment of dirty gas or of gas containing solid particles.



CAUTION! Toxic and explosive gases! Corresponding guidelines must be adhered to while operating with toxic and explosive gases.

Important Advices

General

This manual contains indications and instructions about the operation and service of sample gas coolers under consideration of safety instructions. Depending on gas flow, inlet temperature, inlet dew point and ambient temperature, the sample gas cooler can achieve a dew point between 2°C and 10°C.

Local and national rules for accident prevention must be noticed! The rules for disposal of condensate have to be observed. In case of non observance of the safety devices and the indications in this operation instruction, the producer is not liable. This is applicable for the operation as well as service and maintenance of sample gas cooler, even though this operation instruction does not explicit refer to it. Interventions into safety devices are not allowed. During the warranty period, only skilled workers of the producer are authorized to work on the refrigeration system. After this, through well experienced staff according DIN EN 378.

The operator of the sample gas cooler must keep it in good condition, operate it correctly, monitor and maintain it regularly.

Safety Indications



DANGER! Supply voltage! Only qualified personnel are authorized to maintain and to operate electrically powered devices. Before attempting maintenance, the following pre-conditions must be satisfied: Ensure that main power is off, machine is locked out, tagged for service and power cannot be restored during service operations.



DANGER: Explosive Area! This sample gas cooler should not be operated in explosion-prone areas.



WARNING! Unauthorized interference! Warranty does not apply to any unit damaged by accident, modification, misuse, negligence or misapplication. Unauthorized alterations will immediately void the warranty und guaranty. Only skilled workers of the manufacturer are authorized to work on the cooling system.



CAUTION! No water! In case of fire, use an approved fire extinguisher. Never use water to extinguish fire (or near the sample gas cooler or directly to the sample gas cooler directed water).

Transport

Transport, Delivery and Storage

After arrival of the delivery, the goods must inspect immediately in regard of completeness and damage. In the case of damage or loss, the freight forwarder has to report all details to the insurer for the assertion of compensation. Only if an appropriate documentation (i.e. photos) is available, damages can be claimed.

If a damage appears which could cause further damages, the customer is committed to restrict the damages to a minimum. For damage and consequential damage which could be prevented, there is no liability.



WARNING! Possible damage! Even when packaged, keep the machine protected from severity of the weather. Keep the dryer always in vertical position when transported or stored. Turning it upside down some parts could be irreparably damaged. If not in use, the dryer can be stored in its packaging in a dust free and protected site at a temperature of 2-65°C and a non-condensing specific humidity of 20-80%. Should the stocking time exceed 6 months, please contact the manufacturer.



NOTICE: Recycling! The packaging materials are recyclable. Dispose of material in compliance with the rules and regulations in force in the destination country.



If damages are discovered after initial operation, the user is committed to undertake any action to avoid consequential damage.



First actions could be to stop the load with sample gas and to switch off the main power connection. Unplug the sample gas cooler!

Check for visible loss or damage, if no visible damage is found place the unit near to the installation point and unpack the contents.

- It is recommended to move the still packaged unit using suitable trolleys or hoists. We advise against any manual transport. Notice weight and dimensions of the sample gas cooler (model identification plate / technical data sheet).
- Always keep the sample gas cooler in the upright vertical position. Damage to components could result if unit is laid on its side or if placed upside down.
- Handle with care. Heavy blows could cause irreparable damage.



Only upright vertical position!



Lying horizontal position forbidden!

Assembly and Installation

Installation Site

The main dimensions are shown at the dimensioned drawing of the sample gas cooler. The weight is mentioned on the model identification plate.

Failure to install the sample gas cooler in the proper ambient conditions will affect the sample gas coolers ability to condense refrigerant gas. This can cause higher loads on the compressor, loss of cooler efficiency and performance, electrical component failure and cooler failure due to the following: Compressor loss and electrical component failure. Failures of this type will affect warranty considerations.

The layout of the compact sample gas conditioner guarantees a problem-free integration into the analysis systems.

Minimum installation requirements:

- Select a clean dry area, free from dust, and protected from atmospheric disturbances. Avoid direct solar radiation.
- Minimum ambient temperature +5°C, maximum ambient temperature +40°C.
- Specific humidity: 20-70%, non-condensing.
- For the wall mounting, the wall has to be perfect vertical. The brackets must hold 4 times the given weights. Only use the existing fastening points of the housing. The dryer has to be mounted in perfect upright position.
- Ensure unhindered cooling air circulation while installing the sample gas cooler. Do not install the sample gas cooler directly over, under or beneath possible sources of heat.



CAUTION! Ambient conditions! Do not install the cooler in areas of extreme dust and dirt or in corrosive environment.



CAUTION! Min. 80mm free space for ventilation and bleeding! The required free space at front- and side-plates for ventilation and bleeding the sample gas conditioner must be maintained for smooth functioning.



We recommend a wall mounting of the device. For an operation in enclosed housings, such as analytic cabinets, we recommend a suitable ventilation or air conditioning.



If your sample gas cooler is equipped with handles (mobile version), please use exclusively these handles to lift or move the cooler. Otherwise the cooler is only to lift or move at its bottom panel (1-2 persons needed).



WARNING! Possible damage! Handle with care. Heavy blows could cause irreparable damage.



WARNING! Possible damage! Protect the display during installation of the cooler or during mounting work. The display is very fragile.

If your sample gas cooler is equipped with condensate connectors at the bottom, always put the housing on ca. 5cm high rails when mounting or moving the cooler. Otherwise protruding condensate connectors at the bottom of the housing can be damaged.

Assembly and Installation

Feed Lines



All operations mentioned below to be performed by qualified personnel only.

As a standard, medium connections of the sample gas cooler have been designed for a 6/4mm hose. The sample gas cooler is equipped with 1-4 heat-exchangers (PTFE/PVDF) and provides 1-4 gaspaths. The following feed lines must be connected:

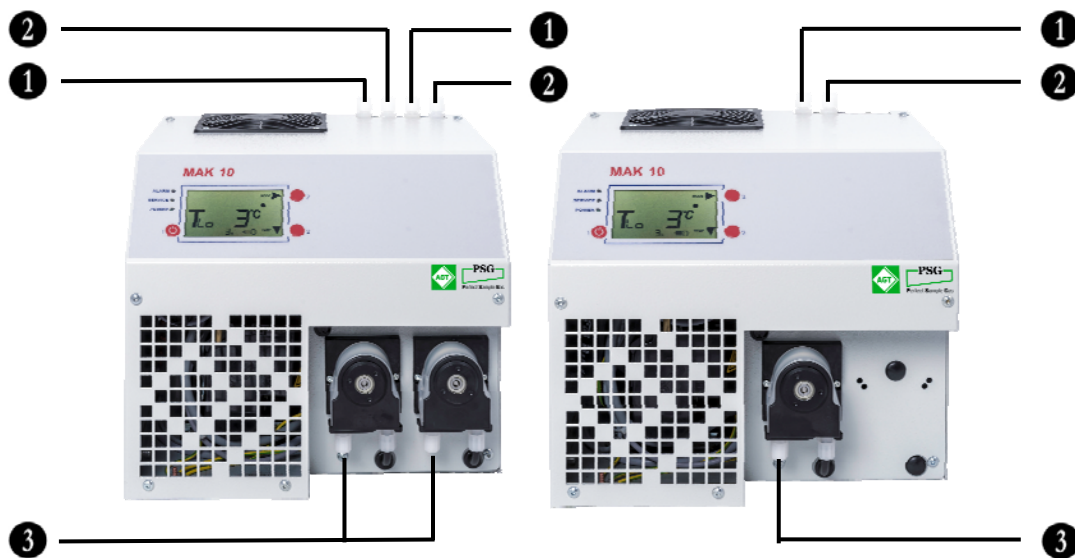
- Sample gas pipelines to the gas inlet connections
- Analyzers to the gas outlet connections
- Condensate pumps/tanks to the condensate outlet connections



Marking
Gas inlet



Marking
Gas outlet



1 Gas inlet (left)

2 Gas outlet (right)

3 Condensate outlet



Depending on model type, your sample gas cooler can be equipped with/without condensate pumps. Some model types can be equipped with special heat exchangers with condensate outlet at the bottom (pipe, 12mm outer diameter, without thread). In this case, always put the housing on ca. 5cm high rails when mounting or moving the cooler. Otherwise protruding condensate connectors at the bottom of the housing can be damaged.

Assembly and Installation

Feed Lines

The sample gas cooler is equipped with a flexible/modular sample gas connection system. The media connections can be on the top panel (standard housing) or on the rear panel (19"-rack housing).

As a standard the media connections are designed as PVDF screwed joints for 6/4mm hose (drawing A). Optionally they can be designed as stainless-steel bolt joints for 6/4mm hose (drawing B). Beyond that several other connection variants are optionally available.



**Marking
Gas inlet**



**Marking
Gas outlet**

A



B



Assembly and Installation

Feed Lines



DANGER! Condensate may be toxic or corrosive! Please wear sufficient protective clothing (for example safety gloves, face mask, safety goggles etc.).



CAUTION! Toxic and explosive gases! Corresponding guidelines must be adhered to while operating with toxic and explosive gases.



NOTICE: Environment protection! Don't dispose the condensate in the environment. Don't drain the condensate into the sewage system without treating it first. Dispose the condensate in compliance with the local rules.



Regardless of the type of heat exchanger system always mount an appropriate, pneumatically tight drainage (eg. peristaltic pump, float drain, condensate tank, etc.). For each gas path and condensate outlet a separate drain must be provided. Without suitable condensate drainage the device will not function properly.



Lay the condensate drain line outside the device with an adequately dimensioned gradient and without counter pressure. Avoid unwanted pipe bends and level differences as well.



If the dew point in the sample gas pipeline between the outlet probe and the sample gas conditioner inlet falls, the sample gas pipeline must be equipped with a steam trace to avoid condensate waste. Connect heated discharge lines to the cooler with suitable thermal decoupling.



In case of condensation in the sample line, a suitable pre-separator needs to be installed before the cooler. We also recommend to use a pre-separator in case of measuring points at high inlet temperatures and high inlet dew points greater than 65°C. The capacity of heat exchangers is thus affected favorably.

Assembly and Installation

Electrical Connections



All operations mentioned below to be performed by qualified personnel only.

The electrical connections of the sample gas cooler are on the right side panel (standard housing) or on the rear panel (19"-rack housing).

A cold device coupling and a Schuko connector are used for supplying power at 230 V, cold device coupling and a Nema connector are used for supplying power at 115 V.

The sample gas cooler has to be installed as shown at the circuit diagram. The cross section of the power supply cables must comply with the consumption of the dryer, while keeping into account also the ambient temperature, the conditions of the mains installation, the length of the cables, and the requirements enforced by the local power provider.

Also requirements of VDE 0100 as well as relevant standards and guidelines must be adhered to while setting up high-voltage devices with rated voltages of up to 1000V. The local protection of the sample gas cooler is provided by the customer. The technical data is mentioned on the model type plate and in the technical data sheet.



DANGER! Supply voltage! Be sure to check the local codes in your area. The electrical connection and the safety systems have to apply. Before connecting the unit to the electrical supply, verify carefully the data nameplate for the proper electrical information.



WARNING! Automatic start! After you built up the electrical connections, the cooler can start automatically.



- ① Remote monitoring connection ② Electrical connection / Power supply

Assembly and Installation

Remote Monitoring Connection



The device has a remote monitoring option, i.e. a floating collective fault notification.



WARNING! Overcharge! Maximum rated load for the remote monitoring connection: 1,5A



WARNING! Wrong connection! For special models the assignment of the contact strip can be different. Please check the exact labeling of the contact strip before connecting components.

Connecting the contact strip:

Contact 11-13

Operational monitoring of moisture guard 2 (optional)

Contact 9-10

Connection of external moisture guard 2 (optional)

Contact 6-8

Operational monitoring of moisture guard 1 (optional).

Contact 4-5

Connection of external moisture guard 1 (optional)

Contact 1-3

Standard operational monitoring of the sample gas cooler.

Alarmkontakt Sensor 2	13
	12
Alarmkontakt Sensor 2	11
<hr/>	
Sensor 2	10
Sensor 2	9
<hr/>	
Alarmkontakt Sensor 1	8
	7
Alarmkontakt Sensor 1	6
<hr/>	
Sensor 1	5
Sensor 1	4
<hr/>	
Betriebsüberwachung	3
	2
Operation monitoring	1



Contacts 4-8 are only active if your cooler model is equipped with an electronic control unit for moisture guards (option). Contacts 9-13 are only active if your cooler is equipped with an additional second electronic control unit (option).

If your cooler model is equipped with internal moisture guards, the supply contacts for external moisture guards 4-5 and 9-10 are not active.

Components

Condensate-Discharge / Pump(s)

The sample gas is cooled down to +3°C in the heat exchanger. Water vapor condenses along the dew point line as a result of the cooling. Condensate is separated from the sample gas and collected in the condensate separator of heat exchanger. Condensate is continuously discharged by the connected condensate pump (3,4ml/min @ 5U/min - N3,2x1,6mm).

FEATURES SR25

- Self-suctioning peristaltic pump
- Reliable continuous condensate removal
- Synchronous motor, gearbox with return stop
- Slow speed, hose with long service life
- Can operate in any installed position



Filter (optional)

In gas analytic systems occurring solid contaminants, especially fine particles up to 0,1 micron, are reliably filtrated by this teflon depth filter. The large filter surface of ca.67 m² of the cylindrical filtercartridge ensures a reliable micro-filtration and a long service life with low pressure drop. The contamination level of the filter can be visually checked through the large porthole. A change of the filtercartridge is extremely fast and easy to perform. The filter can operate in any installed position.

FEATURES TF70/TF90

- Reliable filtration of solid particles (0,1 micron)
- Optic check of the filtercartridge condition
- Quick filtercartridge exchange
- Small dead space
- Can operate in any installed position



Components

Flowmeter (optional)

The highly corrosion-resistant flowmeter with needle valve is used for flow control of aggressive gas media. It consists of a flared top glass tube in which a float can move freely up and down. The gas flows from the bottom up through the tube and thereby lifts a float. For a precise adjustment the flow meter is supplied with an integrated fine adjustment valve. Optionally, the flowmeter can be equipped with a one-shot sensor light barrier. In combination with an appropriate electronic control the gas flow can be accurately monitored. The flow meter has a measuring range of 14 to 140 l/h for wall-mounted devices (45° installation position) and 15 to 150 l/h for 19"-rack models (90° installation position)

FEATURES FM140/FM150

-
- Dosage of aggressive gaseous media
- With fine adjustment valve
- High chemical resistance
- Optional light barrier
- Optional electronic control



Condensate Pre-Separator (optional)

Condensate pre-separators can be used for measuring points at high inlet temperatures of up to 160 °C and high inlet dew points greater than 65 °C. The capacity of heat exchangers is thus affected favorably. The sample gas is pre-cooled in condensate pre-separators by the ambient air. On reaching the dew point, water vapor condenses along the dew point line as a result of the cooling. Condensate is separated from the sample gas and collected in the condensate separator of the pre-separator. Condensate is continuously discharged by the connected condensate pump (3,4ml/min @ 5U/min - N3,2x1,6mm).

FEATURES PS

- Separation of free condensate and solid particles
- Sample gas pre-cooling for inlet dew points >65°C
- Improved performance of the sample gas cooler
- Suitable for high temperatures
- with condensate pump



Components

Moisture Sensor (optional)

The moisture sensor protects downstream analyzers against humidity. This monitoring device reliably signals a condensate breakthrough in case of failure of cooling devices or failure of condensate drains, thus avoiding costly downtime and high repair costs. In case of an alarm, sample gas pumps can be switched off and shut-off valves can be activated. The moisture sensor operates according to the principle of electric conductivity. Its design ensures that any condensate in the sample gas flow gets directly to the sensor surface by gravitational force. Even smallest amounts of liquid will trigger a fast and reliable alarm. Control/alert served by an appropriate electronic control.

FEATURES MS

- Protection against condensate break-through
- Reliable detection of smallest amounts of liquid
- Line break monitoring
- High chemical resistance
- Optional electronic control



Electronic Control Unit (optional)

The electronic control unit serves moisture sensors and light barriers of flowmeters and analyses their signals. The electronic control unit is equipped with a potential-free directional contact, which triggers an alarm notification or which switches e.g. a sample gas pump or a shut-off valve. The switch-point of the electronic control unit can be adjusted by a potentiometer. Standard setup: Function type FS 0,5s release delay, responsivity 75 K Ω .

FEATURES EC72.01

- Control/alarm for moisture sensor
- Control alarm for flowmeter light barrier
- Potential-free directional contact
- Adjustable switch-point
- LED for operation/alarm notification



Components

Acid Injection (optional)

This equipment optimizes the reduction of SO₂ loss during cooling/drying process of the sample gas. SO₂ solubility errors become more reproducible and measurement equipment can be better calibrated. By injecting dosed amounts of an acid (e.g. H₂PO₄ or H₂SO₄, 5%) or of an aqueous solution of salt (e.g. NaHSO₄ or KHSO₄, 10%) in the gas flow, you can raise the PH value of the forming condensate so high, that the solubility of SO₂ decreases. The equipment can also be used for washing alkaline gases (e.g. NH₃ or NH₄Cl).

The acid/solution is continuously injected by a peristaltic pump. The pump operates continuously, but can also be controlled externally (option). Different pump hoses allow following dosages: N1,6x1,6mm - 12ml/h, N3,2x1,6mm - 42ml/h. Before entering the heat-exchanger, acid and gas are thoroughly mixed in a swirl line.

FEATURES AI

- Reduction of SO₂ loss
- Washing of alkaline gases
- Acid dosage by peristaltic pump
- Dosage: 12ml/h or 42ml/h
- Injection with swirl line



Sample Gas Pump (optional)

Into the cooler integrated sample gas pumps transport continuously and reliably the sample gas through the whole system. There are several pump model types available, optimized for different applications. All pumps operate oil-free and ensure a straight and uncontaminated transport of the gas. You can exactly dose and monitor the performance of the pump respectively the gas flow rate by an integrated flowmeter (option). Possible discontinuities in the gas flow can be monitored by a light barrier (option). Please notice the attached product information and technical data of the pumps.

The sample gas pumps start automatically after reaching the cooling temperature. At temperature alarms or alarms triggered by moisture sensors the pumps are automatically stopped. Due to this feature your subsequent analyzers are optimally protected.

FEATURES SAMPLE GAS PUMPS

- Uncontaminated flow
- Chemically resistant, maintenance-free
- Application-optimized model types
- Start/Stop-automatic
- Perfect integration into the cooler



Commissioning

General Instructions / Pre-Conditions

Pre-conditions: The sample gas conditioner is correctly mounted. The feed lines are connected. The electrical connection is built up. Notice chapter „Assembly and Installation“!

If damages are discovered after initial operation, the user is committed to undertake any action to avoid consequential damage. First actions could be to switch off the sample gas flow and the main power connection.



Qualified personnel must perform the start-up. When installing and operating this equipment, comply with all national electrical code and any applicable federal, state and local codes. Who is operating the unit is responsible for the proper and safe operation of the cooler.



CAUTION! Exceeding of operating parameters! Verify that the operating parameters match with the nominal values stated on the data nameplate of the cooler (voltage, frequency, gas flow rate, gas inlet temperature, ambient temperature, etc.).



WARNING! Open housing! Never operate equipment with panels removed.

Commissioning

Sequence of Operations



This procedure should be followed on first start-up, after periods of extended shutdown or following maintenance procedures. Qualified personnel must perform the start-up. The technician who performs the start-up has to use suitable tools and has to follow all local safety instructions and danger prevention measures.

Step-1 – Checks before initial start:

- Remove packaging and material which could obstruct the area around the cooler.
- Ensure that all the steps of the chapter "Assembly and Installation" have been observed.
- Ensure that the connections of the sample gas connectors and pipes are suitably fixed and supported.
- Ensure that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Ensure that the sample gas feed is switched off.

Step-2 – Cooler start-up:

- Switch on the power supply.
- Then switch on the on/off-switch of the cooler. After switching on the on/off-switch the cooler will start.
- Wait some minutes until the cooler reached its operating temperature.

Step-4 – Sample gas feed:

- Slowly load the cooler with sample gas. Check the connections and the piping for gas leakage. Ensure that the condensate draining works.



WARNING! Automatic start! After switching on the power supply the cooler can start automatically.



CAUTION! Follow system and process-specific safety measures! System and process-specific safety measures must be followed before commissioning.



CAUTION: The number of starts must be no more than 6 per hour. The cooler must stop running for at least 10 minutes before being started up again. The user is responsible for compliance with these rules. Frequent starts may cause irreparable damage.



NOTICE: Temperature display! A dew point within 0°C and +10°C displayed on the control unit is correct according to the possible working conditions (gas flow-rate, gas inlet temperature, gas inlet dew point, ambient temperature, etc.). The cooler must work during the full period of sample gas feed.

Decommissioning

Sequence of Operations



Qualified personnel must perform the decommissioning. The technician who performs the shut-down has to use suitable tools and has to follow all local safety instructions and danger prevention measures.

Step-1 – Stop sample gas feed:

- Slowly reduce the sample gas feed, then stop is completely.

Step-2 – Cool-down-time:

- After the sample gas feed is stopped, continue with cooler operation for min. 10 minutes.

Step-3 – Cooler shut-down:

- Switch off the on/off-switch of the cooler.
- Then switch off the power supply.



Double-check very carefully Step-1 and Step-3. Ensure that the sample gas feed is stopped and the power supply is really switched off.



Unplug the sample gas cooler!



CAUTION! Follow system and process-specific safety measures! System and process-specific safety measures must be followed before decommissioning.

Dismantling

Dismantling of the Sample Gas Cooler

If the cooler is to be dismantled, it has to be split into homogeneous groups of materials.



NOTICE! Environment protection! We recommend to comply with the safety rules in force for the disposal of each type of material.



DANGER! Condensate may be toxic or corrosive! Please wear sufficient protective clothing (for example safety gloves, face mask, safety goggles etc.).



CAUTION! Toxic and explosive gases! Corresponding guidelines must be adhered to while operating with toxic and explosive gases.

Temperature-Monitoring and Error-Diagnosis

Digital Display/Control MAK10

The digital display/control MAK10 controls all the operations, the alarms and the operational setting of the cooler. MAK10 has a multi-function LCD display, 3 operation status indicators (ALARM, SERVICE, POWER) and 3 buttons (ON/OFF, MODE, SET).



CAUTION! Warranty lost! A change of the original setup may lead to a total loss of warranty.

ALARM



SERVICE



POWER



Temperature-Monitoring and Error-Diagnosis

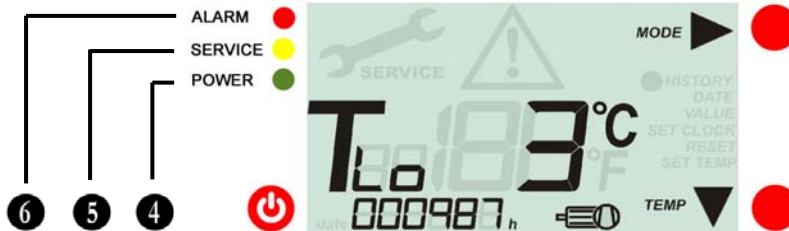
Operation Buttons



<p>1</p>	<p>On/Off switch Is used to switch the sample gas cooler on or off.</p>
<p>2</p>	<p>Temperature selector switch (TEMP) Display of gas cooling temperature TLo or cooling air temperature TA.</p>
<p>3</p>	<p>Operation mode button (MODE) For display and change of operation modes.</p>
	<p>Displaying operation modes:</p> <ul style="list-style-type: none"> • Press once = display of the operating hours during which a fault occurred. Last faults can be displayed when button 2 is pressed one or more times. • Press twice = display of temperatures of the previously set fault. Different temperatures of faults can be displayed when button 2 is pressed one or more times. • Press 3 times = mode for displaying the switch-on time of the condensate pumps. • Press 4 times = mode for displaying the switch-off time of the condensate pumps. • The TLo temperature is displayed again if a keypad input is not given within 10 seconds.
	<p>Changing operation modes:</p> <ul style="list-style-type: none"> • Press the button once for 2 seconds = mode for changing the switch-on time of the condensate pumps. The switch-on time of the condensate pump can be changed when button 2 is pressed one or more times. Setting range 2 - 10 min. • Press the button once for 2 seconds and then press it once = mode for changing the switch-off time of the condensate pumps. The switch-off time of the condensate pump can be changed when button 2 is pressed one or more times. Setting range 0 - 10 min. • Press the button once for 2 seconds and then press it twice = mode for changing from °C to °F. When button 2 is pressed once, the temperature display changes from °C to °F or vice versa. • Press the button once for 2 seconds and then press it three times = mode for changing the switch-on and switch-off time of the condensate pumps to default settings. Condensate pumps are reset to default settings by activating the mode for changing the switch-on and switch-off time of the condensate pumps: 5 min On, 0 min Off. • The TLo temperature is displayed again if a keypad input is not given within 10 seconds.

Temperature-Monitoring and Error-Diagnosis

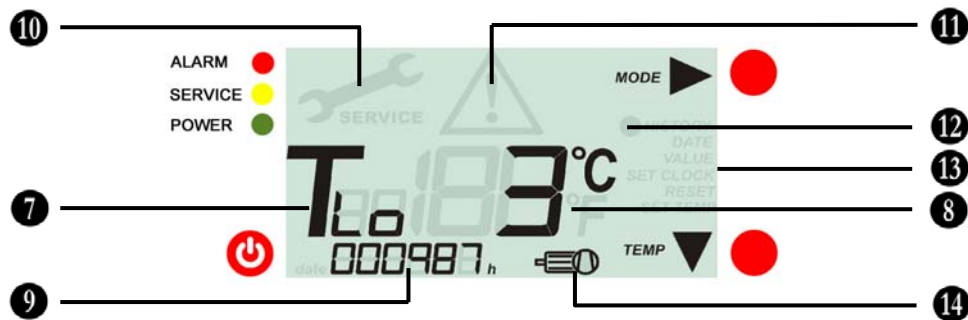
Operation Status Indicators



4	<p>Green LED (POWER) The sample gas cooler is switched on and is working.</p>
5	<p>Yellow LED (SERVICE) Service-Reminder: Over 4500 operating hours.</p>
	<ul style="list-style-type: none"> <u>Reset Service-Reminder:</u> By simultaneously pressing (2 sec.) the operation buttons 2-TEMP and 3-MODE the operating hours counter can be reset to zero. The service LED turns off. This action should take place only after proper maintenance of the cooler.
6	<p>Red LED (ALARM) Temperature alarm (TLo/TA) or extreme exceed of maintenance interval.</p>
	<ul style="list-style-type: none"> <u>Service-Alarm:</u> When the red, yellow and the green LEDs light up, it indicates that the service interval has exceeded twice the scheduled service period (over 9000 operating hours). The potential-free alarm contact (remote monitoring connection) is activated. <u>Temperature-Alarm:</u> A temperature overshoot (TLo < 0,5°C/34°F or > 10,0°C/50°F, TA < 5,0°C/41°F or > 45,0°C/113°F) has been recorded if red and green LEDs light up. The potential-free alarm contact (remote monitoring connection) is activated. If the exceeded temperature is compensated, the alarm is switched off. But the LCD display indicates that an alarm has been logged (see chapter "LCD Display", point 12). <u>Sample Gas Pump (Option):</u> A temperature alarm simultaneously switches off the integrated sample gas pump. The sample gas pump starts automatically after annulment of the alarm.

Temperature-Monitoring and Error-Diagnosis

LCD Display



7	Temperature display Gas cooling temperature = TLo, Cooling air temperature = TA
8	Temperature display in °C Celsius or °F Fahrenheit
9	Operating hours counter Permanent display.
	<ul style="list-style-type: none"> <u>Reset operating hours counter:</u> By simultaneously pressing (2 sec.) the operation buttons 2-TEMP and 3-MODE the operating hours counter can be reset to zero. This action should take place only after proper maintenance of the cooler.
10	Service required The sample gas cooler must be serviced.
11	Alarm Service or temperature alarm has been activated.
12	Alarm log An alarm notification has been activated.
	<ul style="list-style-type: none"> <u>Alarm log indicator:</u> The indicator is switched off, as soon as all new logged alarm notifications are viewed/acknowledged: See chapter „Operation buttons / Operation mode button (MODE) / Displaying operation modes“).
13	Operating mode Displays the current operating mode. See chapter „Operation buttons“.
14	Condensate pump(s) Condensate pump(s) working.

Temperature-Monitoring and Error-Diagnosis

Error-Diagnosis / Checklist

Fault	Cause	Remedy
Failure of sample gas cooler	Interrupted power supply	Re-establish the power supply
	Sample gas cooler switched off	Check power supply, switch on the sample gas cooler
	Defective fuse	Check power supply, replace fuse
	Defective cooling circuit	Contact AGT-PSG Service
Sample gas flow reduced or blocked	Gas paths contaminated	Contamination may occur due to dust or sublimate, ensure pre-separation
	Gas paths frozen	Adhere to operation data
	Condensate drainage leaking, not or incorrectly connected	Check installation and condition of condensate pumps and tanks
	Valve of flowmeter (option) closed	Open valve
	Filtercartridge (option) contaminated	Replace filtercartridge
Condensate in gas outlet	Gas inlet/outlet connected incorrectly	Connect gas inlet/outlet correctly
	Condensate outlet blocked	Clear condensate outlet, check installation
	Condensate in gas inlet	Ensure pre-separation, check installation
	Too high gas flow rate	Reduce gas flow rate, adhere to operation data
Temperature > +10°C	Sample gas cooler overloaded	Check operating conditions, ensure proper cooling air circulation, clean condenser
	Defective cooling circuit, Defective performance regulation	Contact AGT-PSG Service
Temperature < 0°C	Too low ambient temperature	Adhere to operation data
	Defective performance regulation	Contact AGT-PSG Service
Condensate pump(s) not working	Cooler in start-up phase	Wait for the start-up phase, adjust the time delay of the pump start
	Defective condensate pump(s)	Contact AGT-PSG Service
Sample gas pump (option) not working	Cooler in start-up phase	Wait for the start-up phase
	Temperature-alarm or condensate-alarm (option)	Find and clear causes of the alarm
	Defective sample gas pump	Contact AGT-PSG Service

Service

Check and Maintenance

Maintenance is more economic than repairs. It helps in identifying malfunctions in time, ensures continuous operation and longer service life of the device. Maintain and check the following assemblies and components repeatedly, at the latest after every 12 months as described.

After 4500 operating hours the cooler automatically signals a service reminder. This is a maximum value. We recommend a service after 3000 operating hours or 12 months, whichever comes first. After 9000 operating hours a service alarm is activated (see chapter "Temperature Monitoring and Error Diagnosis / Operation Status Indicators").

Depending on operating conditions and operating hours the tubes of the condensate pumps will show different degrees of wear. We recommend replacement of the pump hoses after every 3 months as a precautionary measure.

Depending on the sample gas quality the filter (option) will show different degrees of contamination. We recommend replacement of the filter cartridge every 3 months as a precautionary measure.



Only qualified personnel should perform troubleshooting, maintenance or repair operations. Make sure that maintenance personnel have read and understand the safety and operation instructions in this manual.

Before attempting any maintenance operation on the cooler, shut it completely down (notice chapter „Decommissioning“) and wait at least 10 minutes.



DANGER! Supply voltage! Prior to performing any maintenance or service, be sure that no part of the machine is powered.



DANGER! Condensate may be toxic or corrosive! Please wear sufficient protective clothing (for example safety gloves, face mask, safety goggles etc.).



CAUTION! Follow system and process-specific safety measures! System and process-specific safety measures must be followed before performing maintenance.



CAUTION! Toxic and explosive gases! Corresponding guidelines must be adhered to while operating with toxic and explosive gases.



WARNING! Open housing! Never operate equipment with panels removed.

Service

Maintenance Plan

**Check – daily or every 12 hours of operation:**

- Verify that the displayed dew point is correct. Check the alarm log of the digital control unit / LCD display.

**Check – monthly or every 250 hours of operation:**

- Verify the cooling units/fins for cleanliness.
- Check the proper operation of the condensate drain.
- Check the function of the condensate pumps, especially the condition of the pump hoses.
- Check the filter (option) for contamination.

**Maintenance – yearly or every 3000 hours of operation:**

- Verify for tightness all the screws of the electric system, inspect the cables. Replace the fuse.
- Clean the cooling units/fins. Visual inspection of heat-exchanger unit and insulation.
- Replace the pump hoses, if necessary replace roller carriers and conveying belts, too.
- Replace the filter cartridge (option).
- Visual inspection for cleanliness and tightness of pre-separator, moisture sensor, flowmeter (options).
- **After service work is done, reset service interval / operating hours counter and acknowledge possible notifications of the alarm log** (see chapter "Temperature-Monitoring and Error-Diagnosis").

Service

Maintenance Operation on the Refrigerating Circuit



WARNING! Unauthorized interference! Tampering the safety and security devices is not permissible. Only skilled workers of the manufacturer are authorized to work on the cooling system.



NOTICE! Environment protection! Do not dispose this fluid in the environment. It has to be disposed according to legal regulations.



Visual inspection of the refrigerating circuit for signs of oil and refrigerant leakage.

This sample gas cooler comes ready to operate and filled with R134a type refrigerant fluid. In case of refrigerant leak contact directly the manufacturer of the sample gas cooler. The room is to be aired before any intervention. Data of the use refrigerant liquids:

Refrigerant	Chemical Formula	TLV	GWP
R134a - HFC	CH ₂ FCF ₃	1000 ppm	1300

Maintenance operation on the heat-exchanger unit



Inspect the heat exchange unit and its insulation visually for damage or condensate formation. The formation of condensate indicates damaged insulation and refrigeration loss. The consequences can be increased energy consumption and reduced performance of the device.

Maintenance operation on the condensate pump(s)



When the condensate pump is operated for a long time, the pump hose eventually wears out. Condensate and sample gas may leak from the pump hose. There is also the risk of external air being sucked from porous points. This may lead to wrong measurement results. In this case the pump hose must be replaced immediately. We recommend replacement of the pump hose after every 3 months as a precautionary measure. When processing the replacement please check the condition of roller carriers and conveying belts, too.

Replacing the fuse



The fuse holder of the device fuse is located at top-left of the left condensate pump. The lock of the fuse holder is opened using a screwdriver in the anticlockwise direction. The fuse holder can then be removed along with the fuse. The fuse holder is fixed after replacing the fuse and locked in the clockwise direction.

Service

Replacing the filter cartridge (optional)



Cartridge must be replaced in case of contamination. The sample gas pump must be switched off before changing it. The clamping nut of the filter casing can then be removed. Notice: The filter glass may slip out of the clamping nut. Protect the filter glass from falling! After unscrewing the clamping nut, the filter cartridge can be replaced by taking it out and inserting a new one. The clamping nut must now be fixed along with the filter glass.

Reset the operating hours counter



By simultaneously pressing (2 sec.) the operation buttons 2-TEMP and 3-MODE the operating hours counter can be reset to zero. The service LED turns off. This action should take place only after proper maintenance of the cooler.

Service

Spare Parts

Digital-Display/Control

Article-Description	Type	Article-No.
Digital-Display/Control MAK10	230V 50/60Hz	8813040
Digital-Display/Control MAK10	115V 50/60Hz	8813041
Front film for digital-display/control	Standard housing	7880637
Front film for digital-display/control	19" Housing	7880642
Temperature sensor set - 2 sensors		6501091

Fuse/Motor Protection

Article-Description	Article-No.
Device fuse 6,3A	5805040
Compressor start relays	5801085
Compressor overload protection	5802002

Fan

Article-Description	Type	Article-No.
Fan with connection cable	230V 50/60Hz	6600364
Fan with connection cable	115V 50/60Hz	6600365

Condensate Pump

Article-Description	Type	Article-No.
Complete condensate pump SR25 5u/min - installation version		6406008
Replacement hose set N3,2x1,6mm with bolted joint – 210ml/h	Standard	8600002
Replacement hose set N4,1x1,6mm with bolted joint – 210ml/h	Special	8600004
Replacement roller carrier		6406053
Replacement conveying belt		6406061

Filter (Option)

Article-Description	Type	Article-No.
Complete filter TF70 with sight glass and filter cartridge	70mm	6400084
Complete filter TF90 with sight glass and filter cartridge	90mm	6400087
Spare teflon filter cartridge	70mm	6400085
Spare teflon filter cartridge	90mm	6400088
Sight glass		6400086
Straight screwed coupling PVDF G1/8" DN4/6		6353979

Moisture Sensor (Option)

Article-Description	Type	Article-No.
Complete moisture sensor set for external mounting	PVDF	8440225
Complete moisture sensor set for external mounting	Glass	8440224
Flow chamber	PVDF	6353952
Flow chamber	Glass	6404050
Sensor		5700000
Electronic control unit EC72.01 for moisture sensor		5201047

Service

Spare Parts

Pre-Separator (Option)

Article-Description	Article-No.
Complete pre-separator set with condensate pump SR25 for external mounting	8480101
Flow/separation chamber	6404000

Flowmeter (Option)

Article-Description	Type	Article-No.
Flowmeter with needle valve / wall-mounted devices	14-140NI/h, 45° position	6507009
Flowmeter with needle valve / 19"-rack-models	15-150NI/h, 90° position	6507005
Lightbarrier for flowmeter		5702010
Electronic control EC72.01 unit for lightbarrier		5201047
Straight screwed coupling PVDF G1/8" DN4/6		6353979

Acid Injection (Option)

Article-Description	Type	Article-No.
Complete condensate pump SR25 1u/min - installation version		6406008
Replacement hose set N3,2x1,6mm with bolted joint – 42ml/h	Standard	8600002
Replacement hose set N1,6x1,6mm with clamps – 12ml/h	Special	8480177
Replacement roller carrier		6406053
Replacement conveying belt		6406061

Heat-Exchanger

Article-Description	Article-No.
Heat-exchanger MAK10 PVDF/PTFE	8410779
Viton connecting hose	4410312
Hose clamp	6940580
Bulkhead connector for gas inlet/outlet PVDF	6353978
Thermal transmission paste tube 50g	6938110
Thermal transmission paste tube 250g	6938111



Only qualified personnel should perform troubleshooting, maintenance or repair operations.



Please contact directly the manufacturer AGT-PSG if the sample gas cooler fails. Tampering the safety and security devices is not permissible.

Return / Maintenance and Repair

Packaging and Shipping

If you want to send a device for maintenance or repair to AGT-PSG, please note the following information on packaging and shipping:

- Please use the original packaging of the device. If this is not available, use another stable packaging in which the cooler is well protected from the weather and mechanical damage. Handle with care. Heavy blows could cause irreparable damage.
- AGT-PSG will only accept deliveries that are not physically damaged. Ensure a transport in perfect upright position. Turning it upside down some parts could be irreparably damaged. It is best to tie down the individual package on a pallet. Do not stack. Mark your package with appropriate icons:



- Fill in this form and the subsequent declaration of decontamination completely. Send the device along with the forms DDP (Delivery Duty Paid – AGT-PSG will only accept deliveries if freight and customs are fully paid) to:

AGT-PSG GmbH & Co.KG
Richard-Lucas-Straße 6
41812 Erkelenz
Germany

- Inform AGT-PSG by email (info.agt@agt-psg.de) about the shipment of the cooler and the approximate delivery date. Please attach scans of the filled in documents.

Sender-/Return-Delivery- Address and Contact Partner

Sender:

Return-delivery to:

same address as sender

Contact (name, email, phone):

Return / Maintenance and Repair

Declaration of Contamination Status









Legal regulations prescribe to fill in and sign the declaration of contamination status and send it back. This information is used to protect our employees. Please attach the declaration to the packing. Otherwise your repair cannot be processed.

Device / Articulenumber / Serialnumber:

Reason for return:

I herewith declare that the device specified above has been properly cleaned and decontaminated and that there are no risks present when dealing with the device.

In other cases, please describe the hazards in detail:

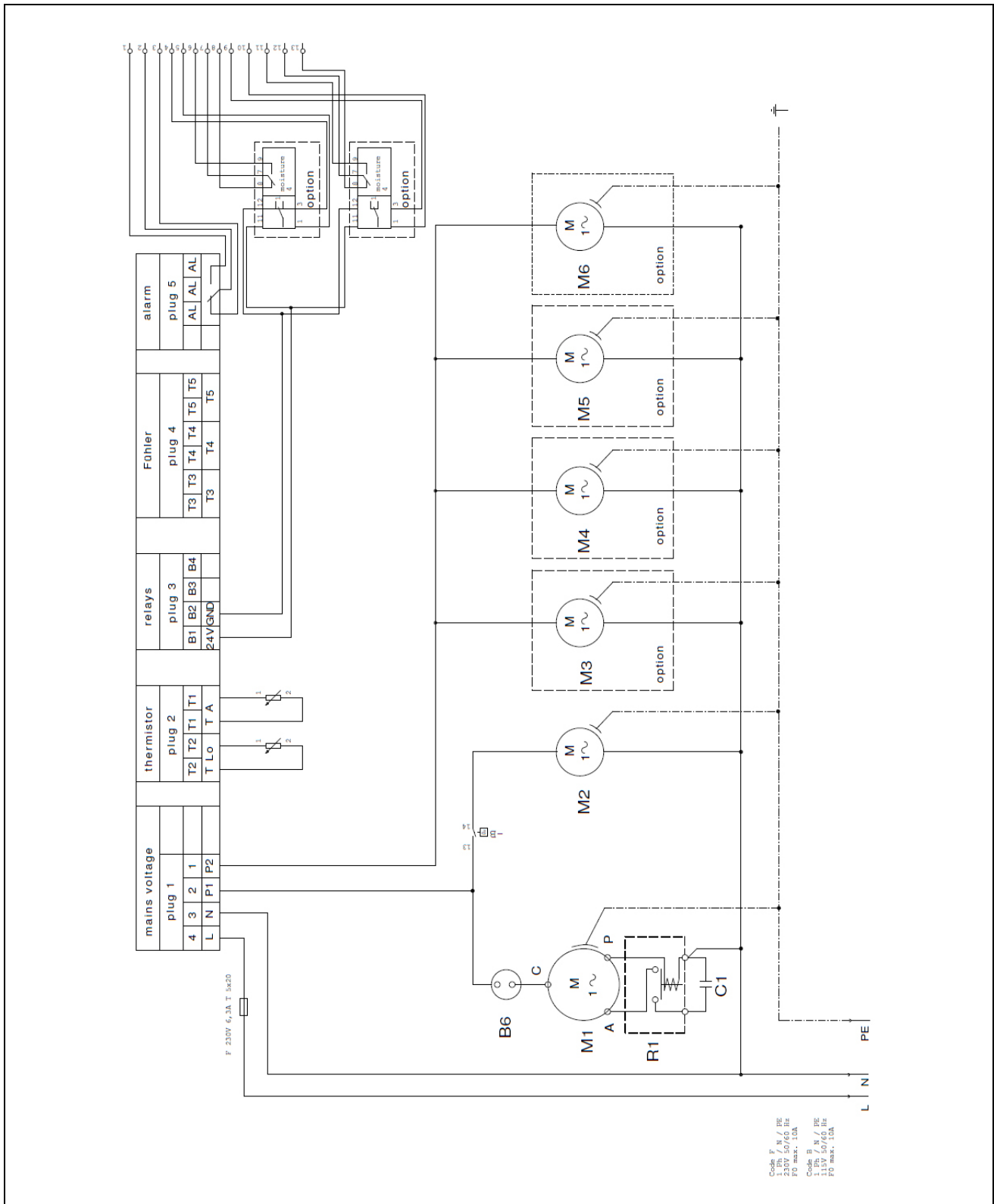
			
<input type="checkbox"/> Explosives	<input type="checkbox"/> Acute toxicity	<input type="checkbox"/> Flammable	<input type="checkbox"/> Oxidizing
			
<input type="checkbox"/> Environmental hazard	<input type="checkbox"/> Corrosive	<input type="checkbox"/> Irritant toxicity	<input type="checkbox"/> Health hazard
<input type="checkbox"/> Liquid	<input type="checkbox"/> Solid	<input type="checkbox"/> Powdery	<input type="checkbox"/> Gaseous

Please include the current material safety data sheet of the hazardous material!

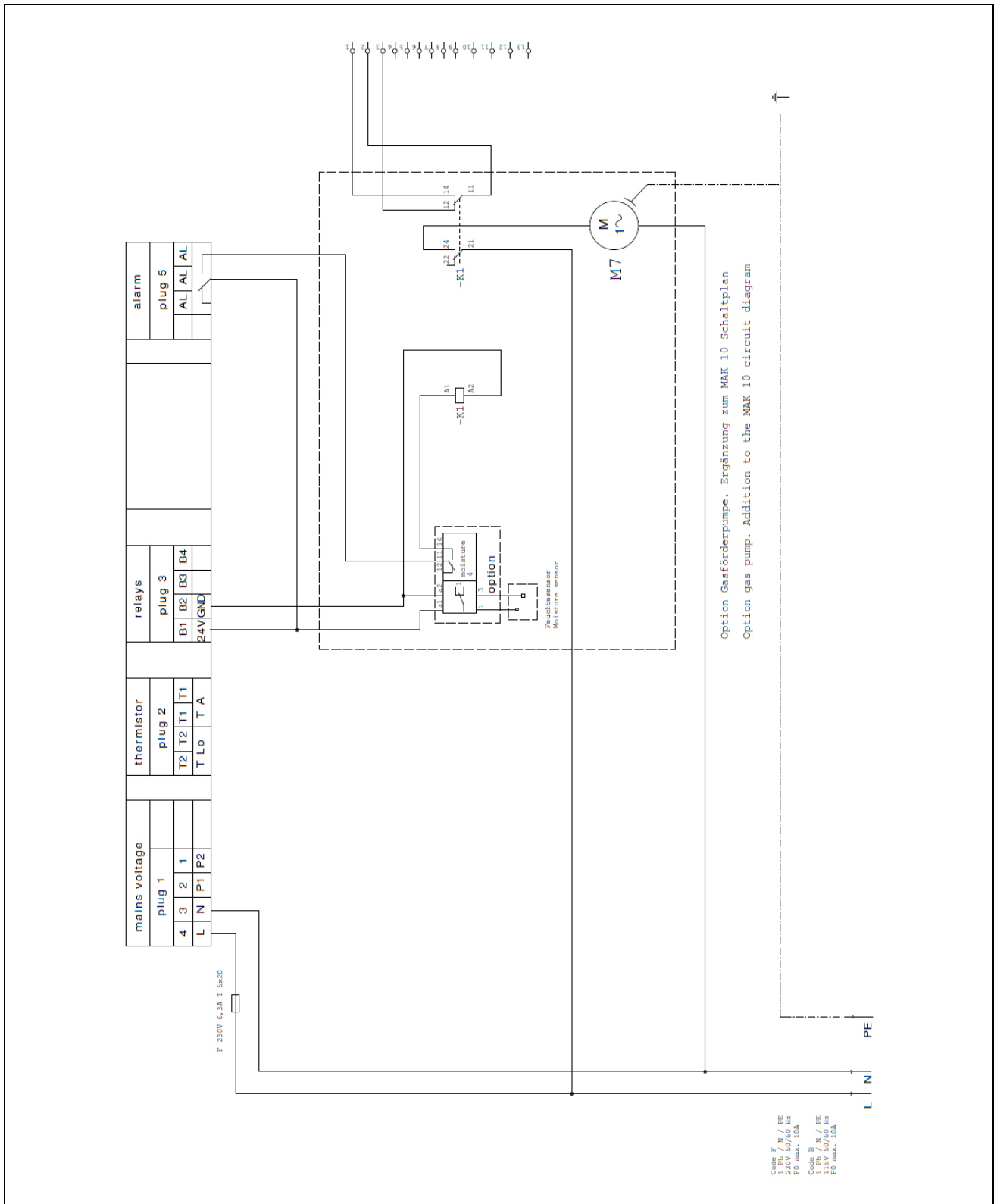
Company, Contact

Location, Date, Stamp, Signature

Circuit Diagram 230V 50/60Hz and 115V 50/60Hz



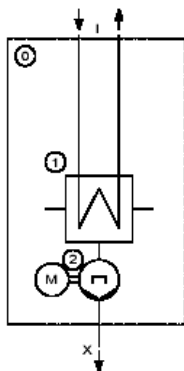
Circuit Diagram Addendum for Sample Gas Pump Option



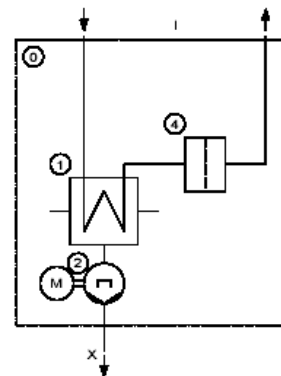
RI Flow Schema

- | | | |
|-----------------------------|-------------------|-------------------|
| ① Scope of supply of MAK10P | ① Heat-exchanger | ② Condensate pump |
| ③ Pre-separator | ④ Filter | ⑥ Flowmeter |
| ⑦ Electronic control unit | ⑧ Moisture sensor | |

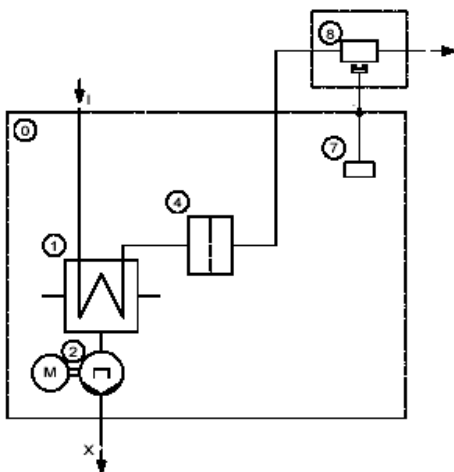
MAK10-1101-X-00-X



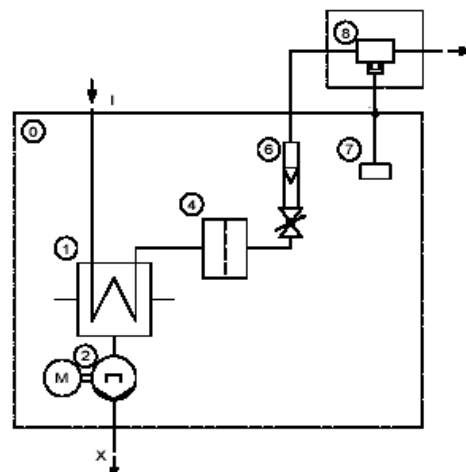
MAK10-1101-X-10-X



MAK10-1101-X-11-X



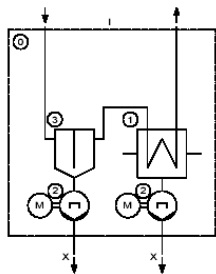
MAK10-1101-X-1F-X



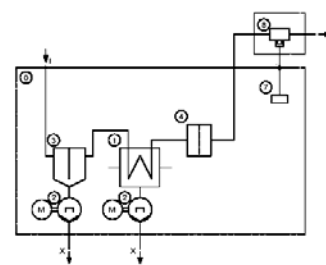
RI Flow Schema

- | | | |
|-----------------------------|-------------------|-------------------|
| ① Scope of supply of MAK10P | ① Heat-exchanger | ② Condensate pump |
| ③ Pre-separator | ④ Filter | ⑥ Flowmeter |
| ⑦ Electronic control unit | ⑧ Moisture sensor | |

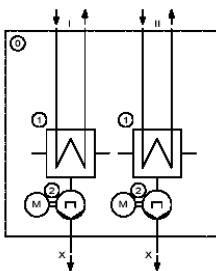
MAK10-1112-X-00-X



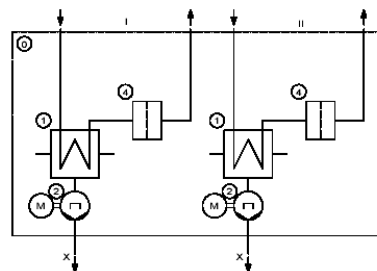
MAK10-11121-X-11-X



MAK10-2202-X-00-X



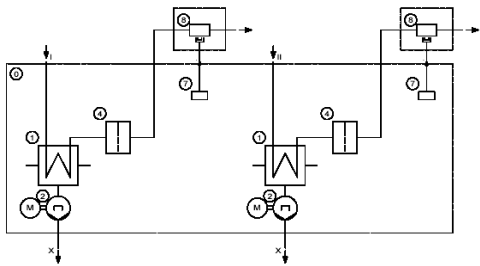
MAK10-2202-X-20-X



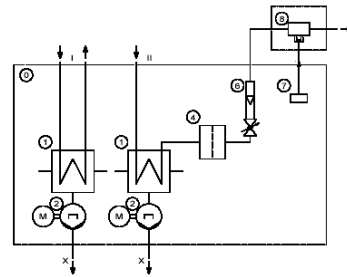
RI Flow Schema

- | | | |
|------------------------------------|--------------------------|--------------------------|
| 0 Scope of supply of MAK10P | 1 Heat-exchanger | 2 Condensate pump |
| 3 Pre-separator | 4 Filter | 6 Flowmeter |
| 7 Electronic control unit | 8 Moisture sensor | |

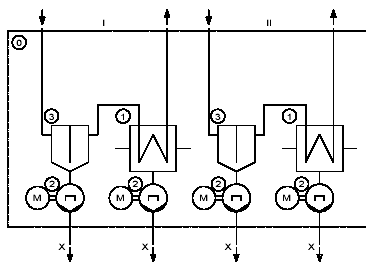
MAK10-2202-X-22-X



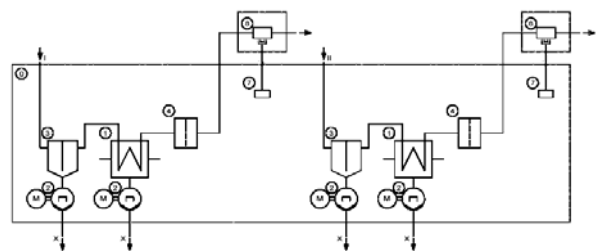
MAK10-2202-X-1F-X



MAK10-2222-X-00-X



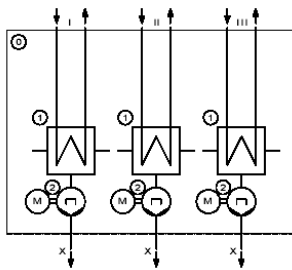
MAK10-2224-X-22-X



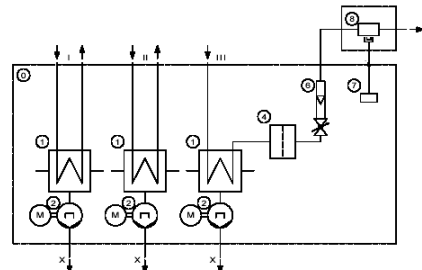
RI Flow Schema

- | | | |
|------------------------------------|--------------------------|--------------------------|
| 0 Scope of supply of MAK10P | 1 Heat-exchanger | 2 Condensate pump |
| 3 Pre-separator | 4 Filter | 6 Flowmeter |
| 7 Electronic control unit | 8 Moisture sensor | |

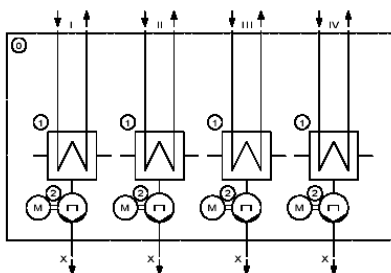
MAK10-3303-X-00-X



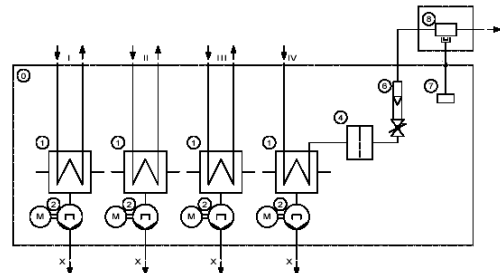
MAK10-3303-X-1F-X



MAK10-4404-X-00-X



MAK10-4404-X-1F-X

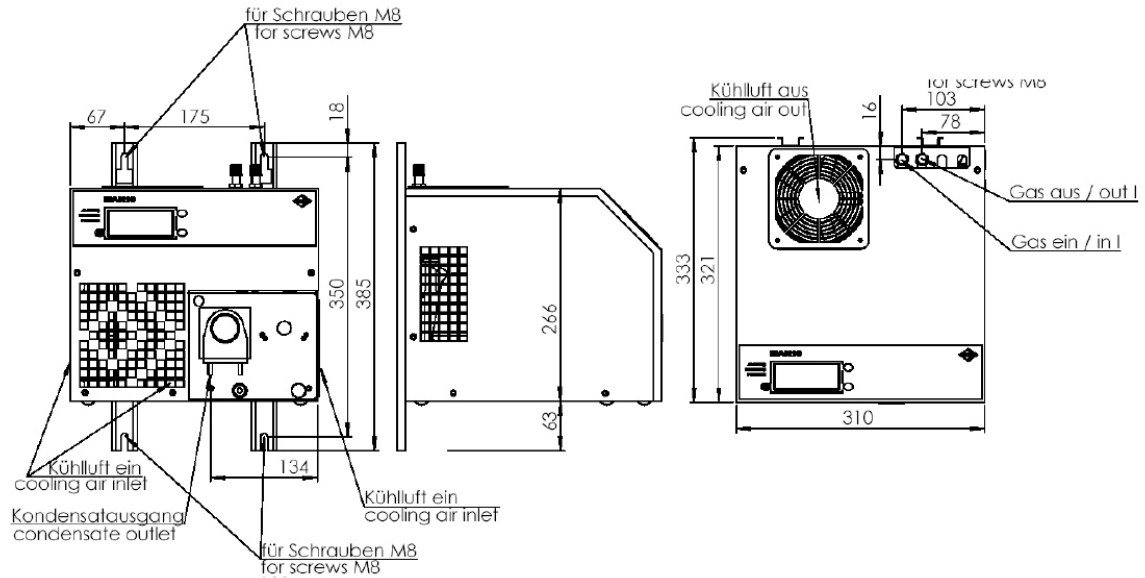


Functional Characteristics of the Refrigerant Circuit

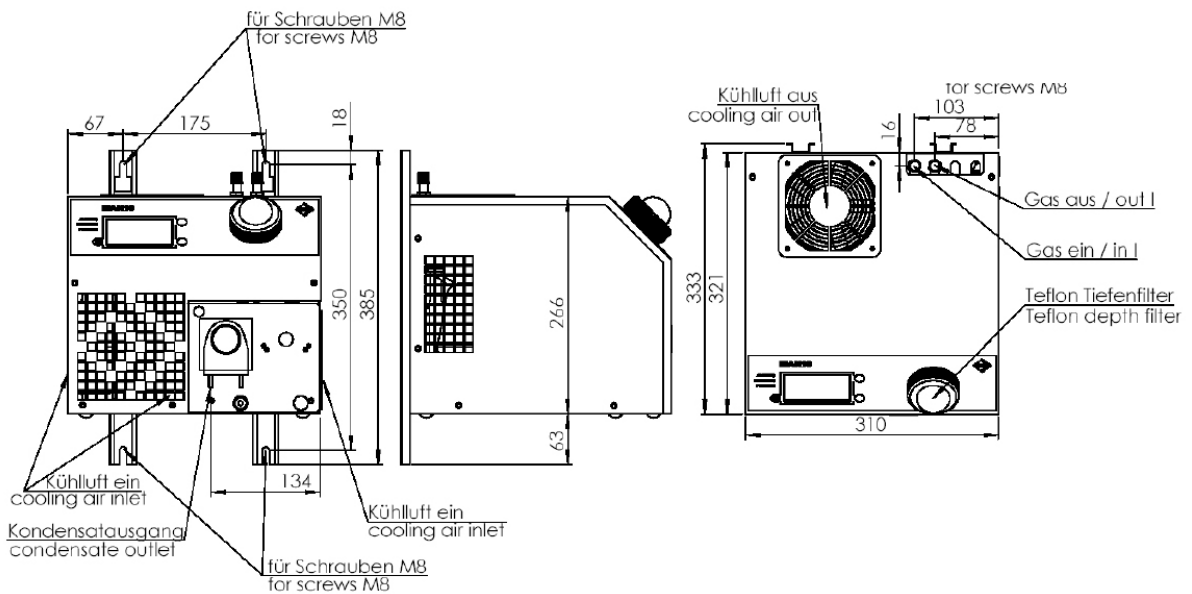
- Depending on operating condition, the **refrigerant compressor** compresses the vaporous refrigerant from the inlet pressure of approximately 210kPa (=2,1bar) to the condensation pressure of 800-1700kPa (=8-17bar).
- The vaporous refrigerant is liquefied by cooling in the subsequent **refrigerant condenser**. The fluid refrigerant is passed through the **refrigerant dryer** to the **flue damper**.
- The fluid refrigerant is expanded by the **flue damper** from high pressure (condensation pressure) 1100kPa to low pressure (evaporation pressure) 210kPa. This expanded and fluid refrigerant flows through the **evaporator** of the **heat-exchanger**. By energy input of the heat-exchanger the fluid refrigerant evaporates and cools down the passed through sample gas to a temperature of +3°C. Over the **steam dome** the **refrigerant compressor** sucks again the vaporous refrigerant.
- Over the **power regulator** the sample gas conditioner performs a self-adjustment to alternating gas flows, inlet temperatures and dew points. With a by-pass from the pressure- to the suction-site the pressure- and temperature-controlled **power regulator** keeps the sample gas chilling temperature constant to +3°C.
- The **temperature control unit** monitors the ambient and the dew point temperature but it does not access the power regulation. It provides an alarm at unacceptable exceeding or undercut of temperature as well as at exceeding service intervals. It logs all malfunctions of the cooler.

Dimension Sheets

MAK10-1101-4-00-X

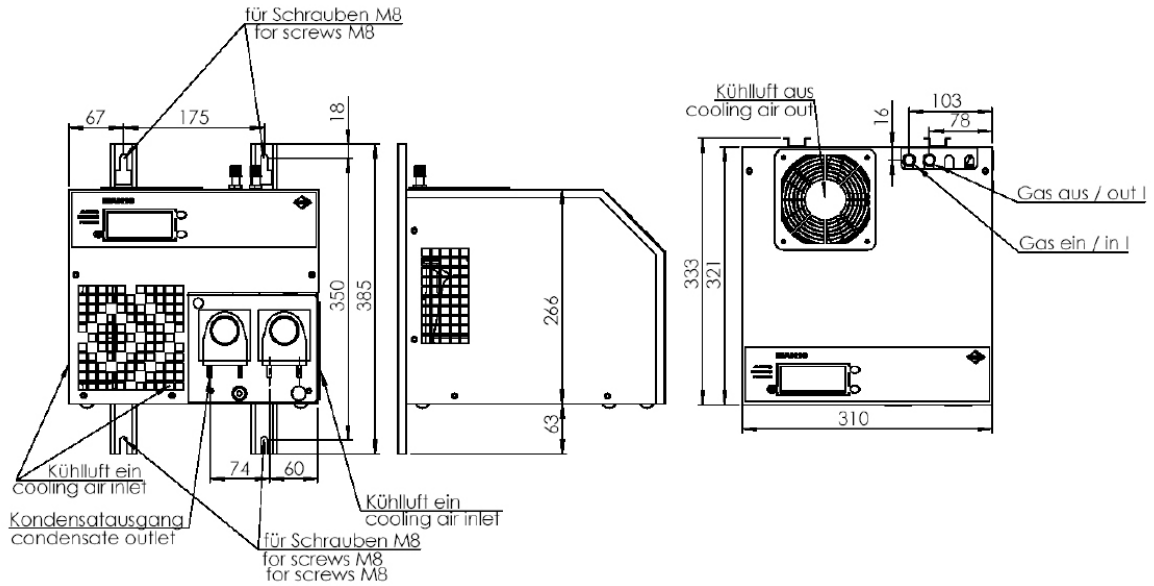


MAK10-1101-4-10-X / MAK10-1101-4-11-X

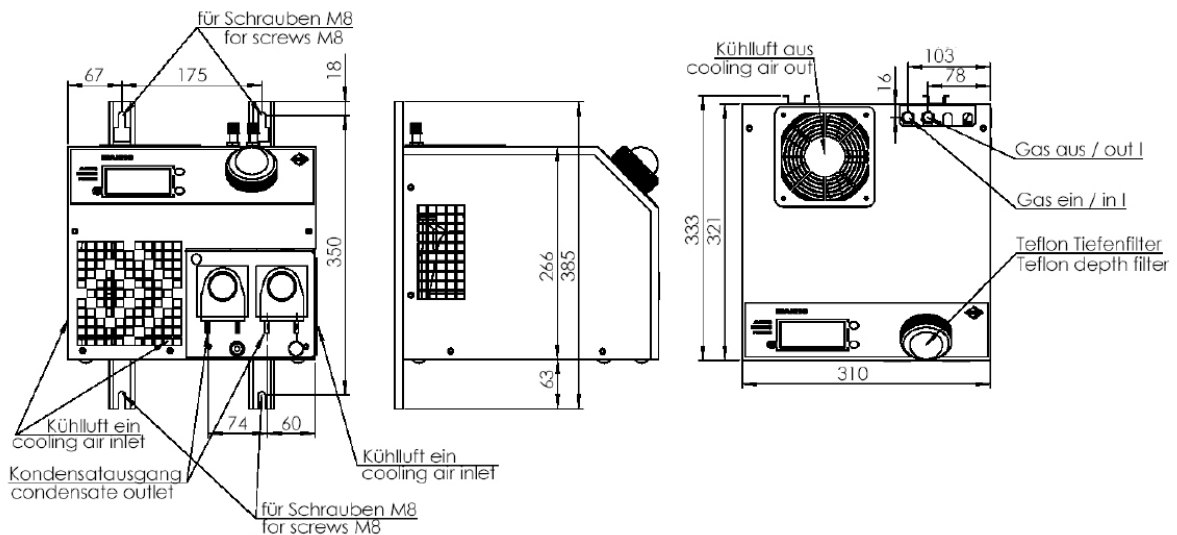


Dimension Sheets

MAK10-1112-4-00-X

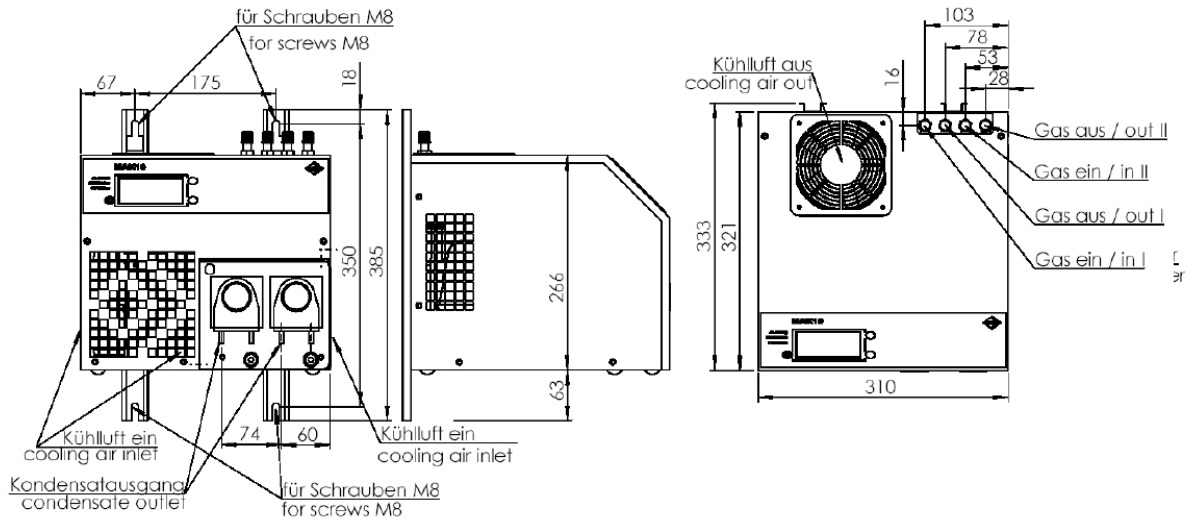


MAK10-1112-4-11-X

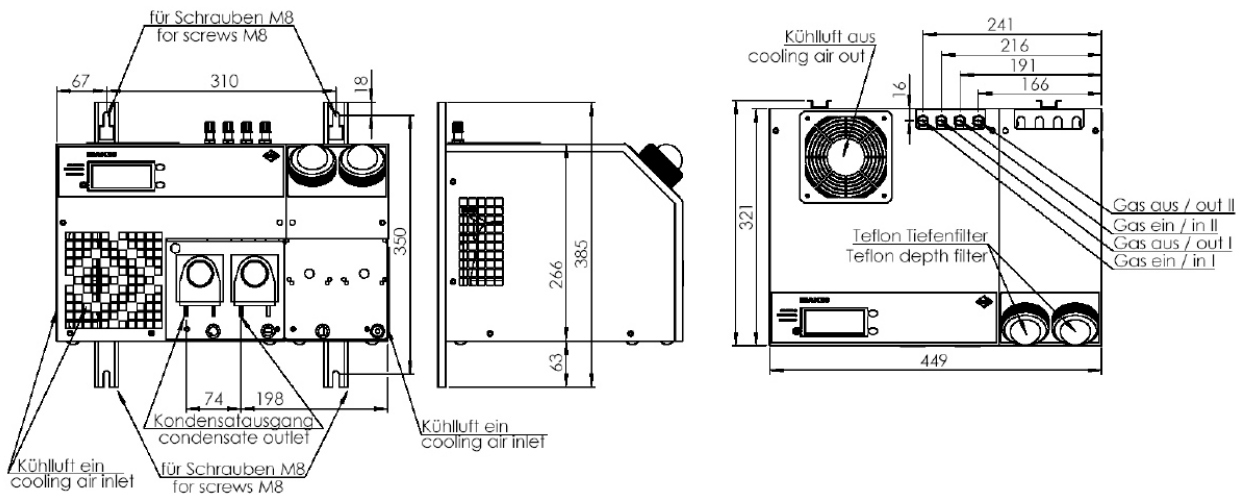


Dimension Sheets

MAK10-2202-4-00-X

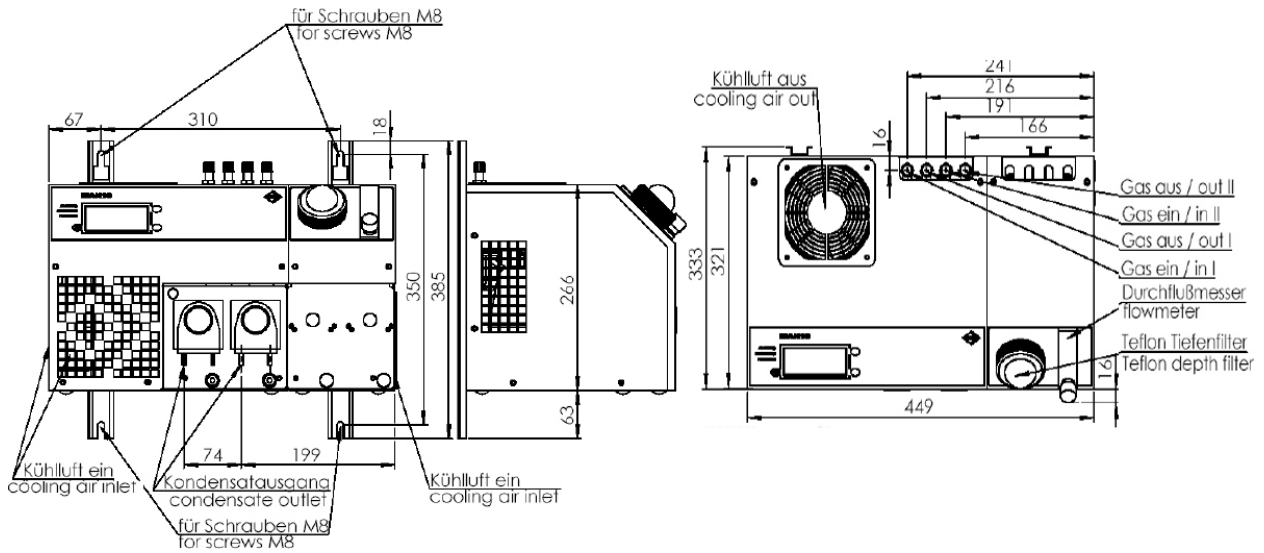


MAK10-2202-5-20-X / MAK10-2202-5-22-X

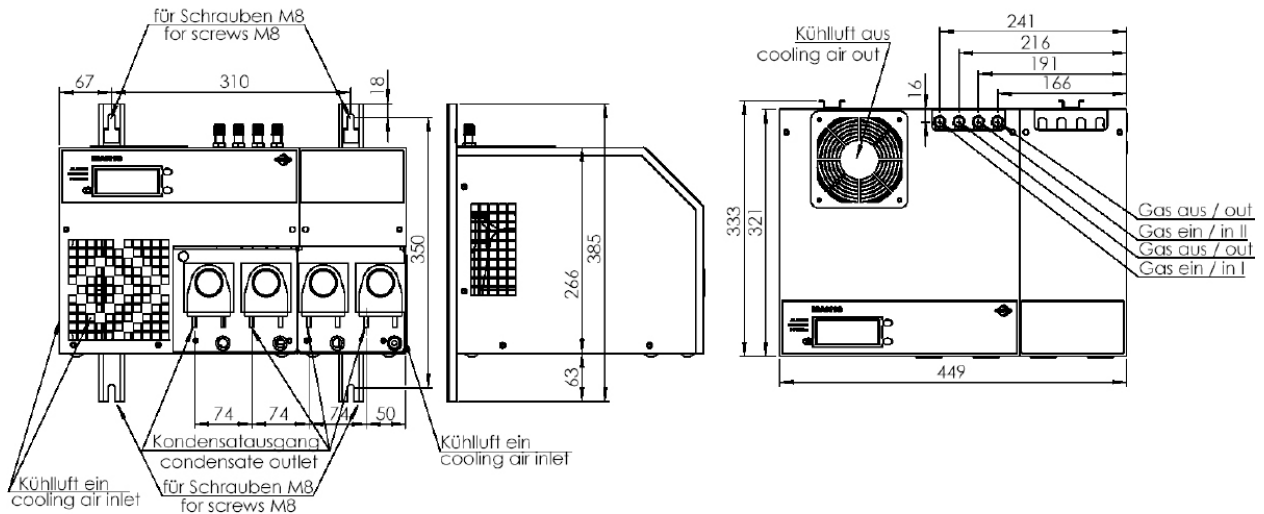


Dimension Sheets

MAK10-2202-5-1F-X

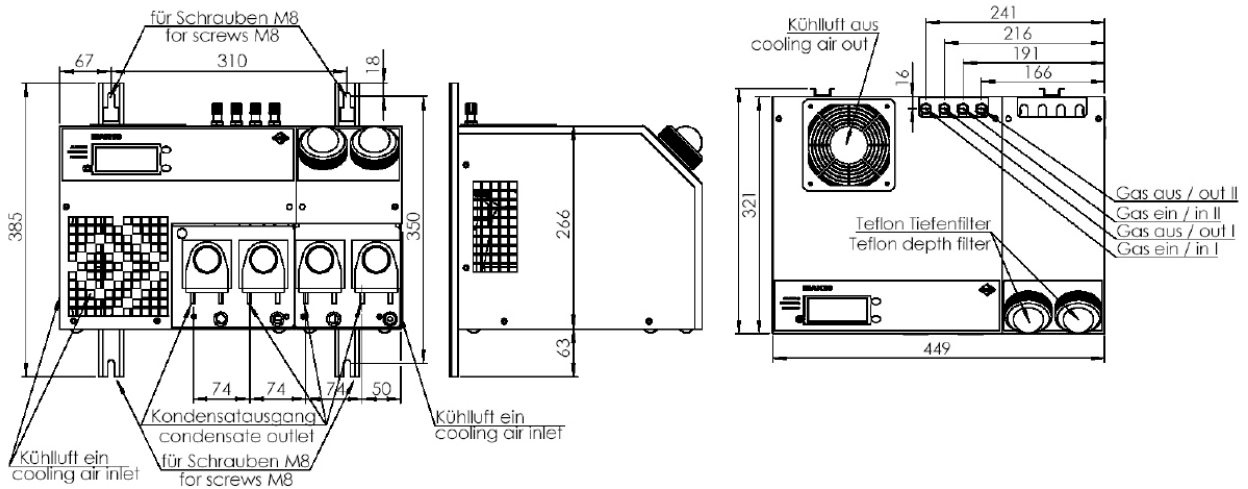


MAK10-2224-5-00-X

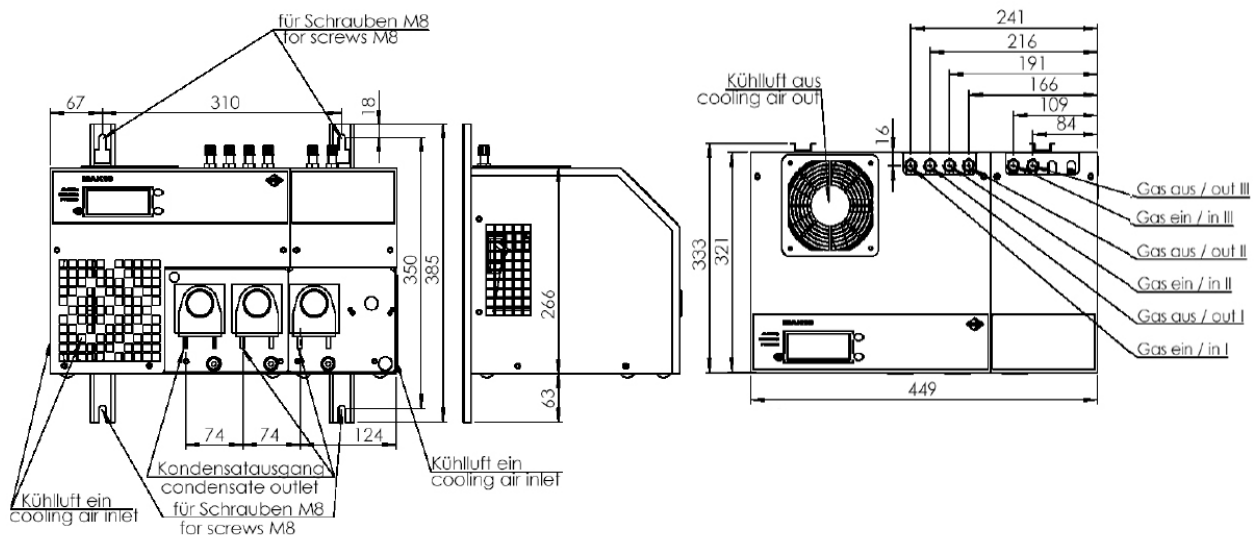


Dimension Sheets

MAK10-2224-5-22-X

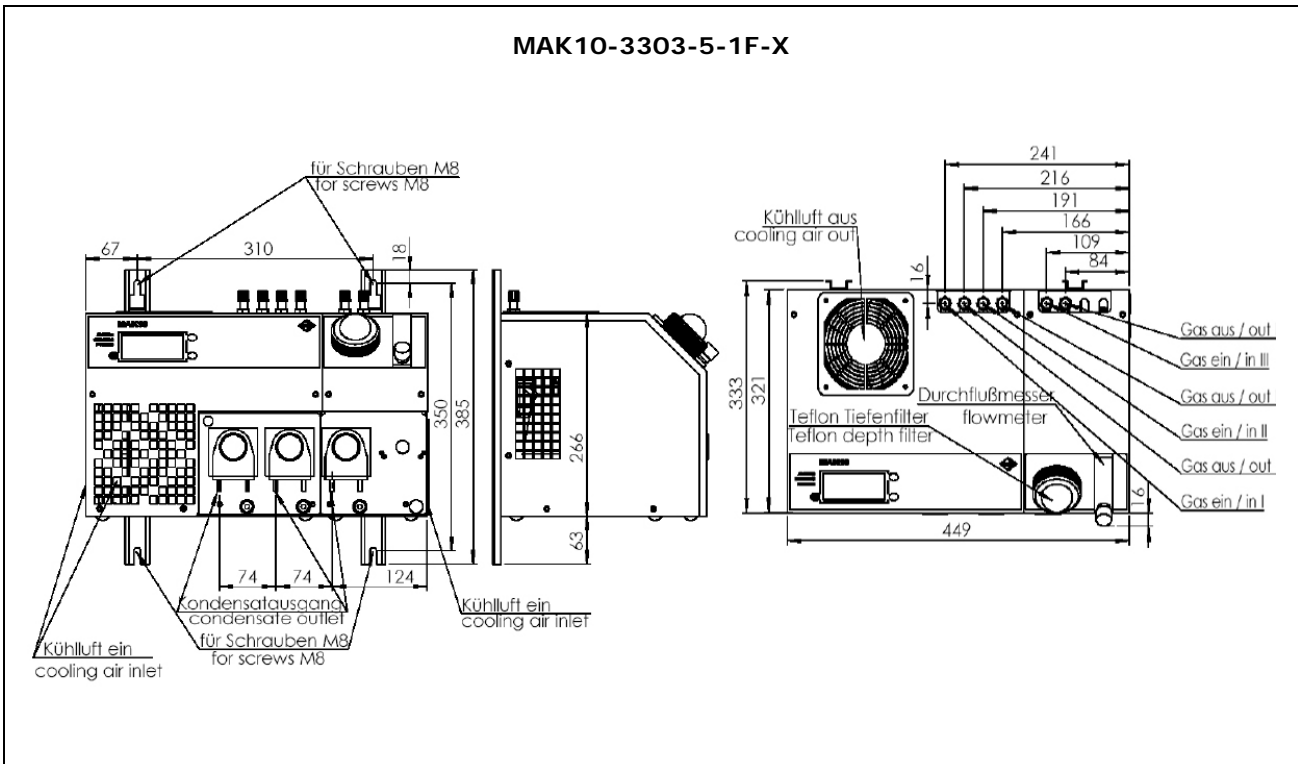


MAK10-3303-5-00-X

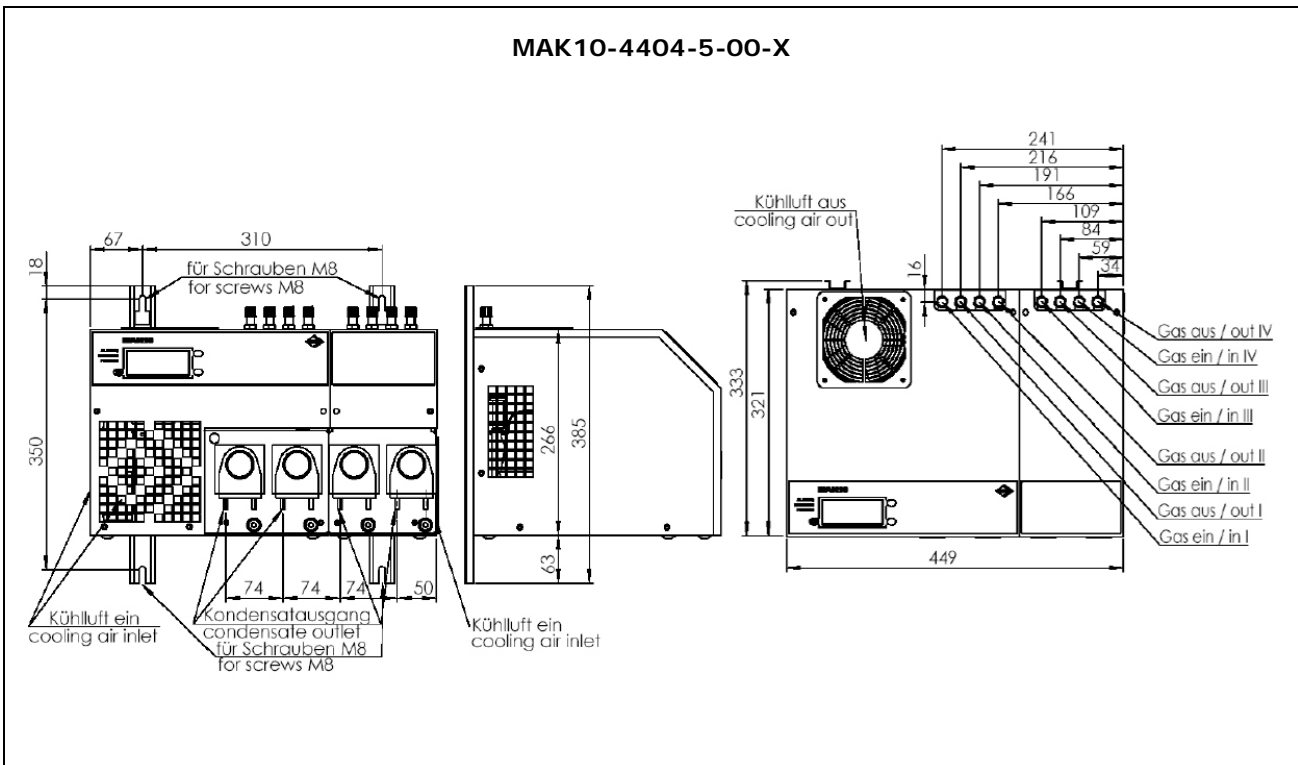


Dimension Sheets

MAK10-3303-5-1F-X

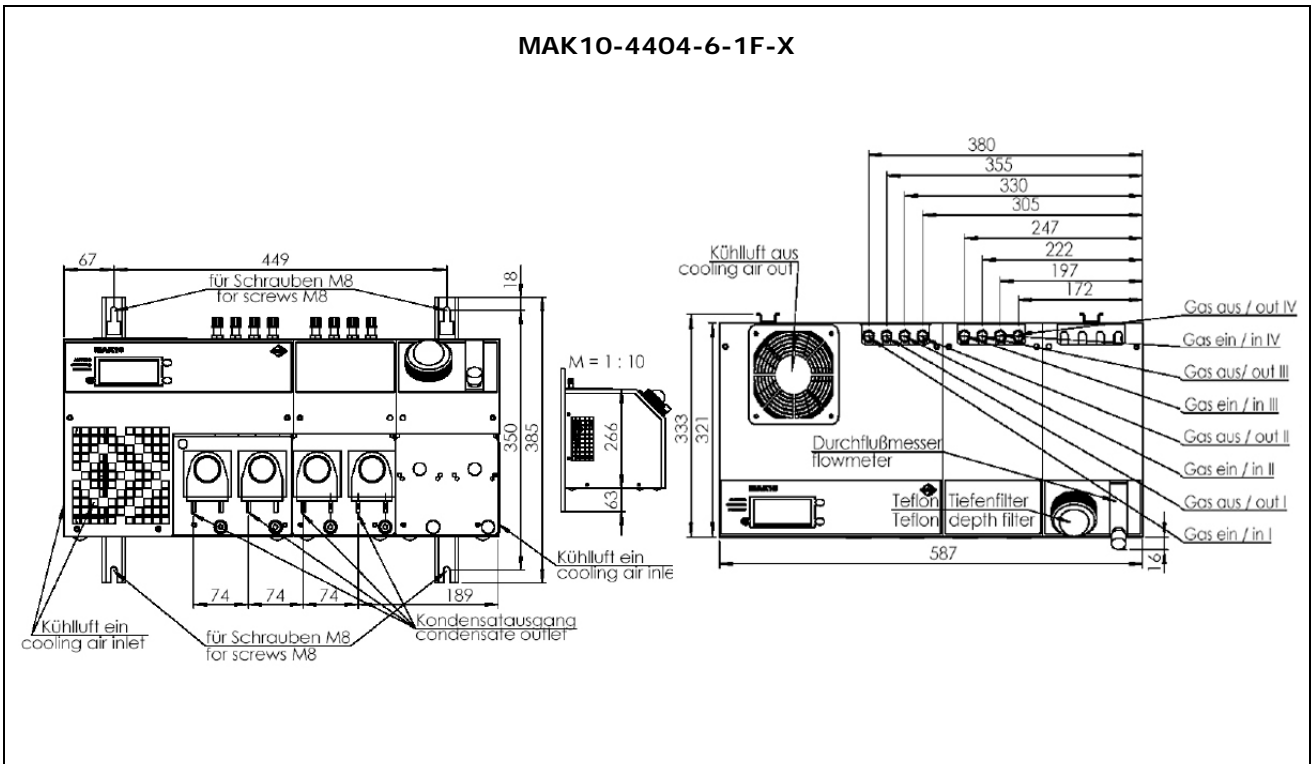


MAK10-4404-5-00-X

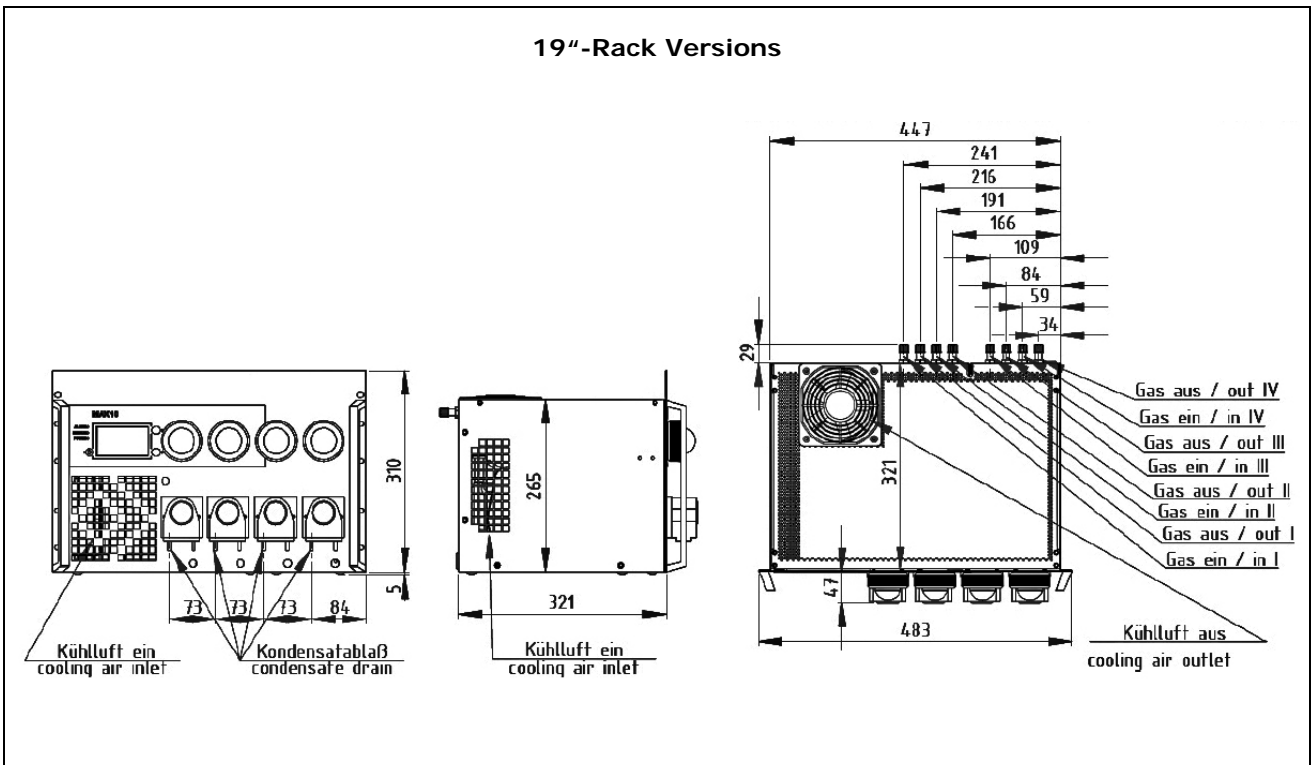


Dimension Sheets

MAK10-4404-6-1F-X



19"-Rack Versions



Technical Data

Model-Specific Data

Model		
Type	MAK10-1101-4-00-X	MAK10-1101-4-10-X
Number of gas paths	1	1
Number of condensate pumps	1	1
Number of pre-separators	-	-
Number of teflon filtes	-	1
Number of flowmeters	-	-
Number of electronic controls	-	-
Operation data		
Gas flow per gas path at 65°/55°tp	125NI/h 2.0lpm / 175NI/h 2.9lpm	
Ready for start-up	< 5min	
Design data		
Dimensions (BxHxT)	310mm x 266mm x 321mm	
Weight without options	16,8kg	17,1kg
Electrical data		
Power consumption	220W (ta=45°C)	

Model		
Type	MAK10-1101-4-11-X	MAK10-1101-4-1F-X
Number of gas paths	1	1
Number of condensate pumps	1	1
Number of pre-separators	-	-
Number of teflon filtes	1	1
Number of electronic controls	1	1
Number of flowmeters	-	1
Operation data		
Gas flow per gas path at 65°/55°tp	125NI/h 2.0lpm / 175NI/h 2.9lpm	
Ready for start-up	< 5min	
Design data		
Dimensions (BxHxT)	310mm x 266mm x 321mm	
Weight	17,3kg	17,4kg
Electrical data		
Power consumption	220W (ta=45°C)	

General Data

Operation data	
Gas temperature at inlet	max. 140°C
Ambient temperature	5-45°C
Operating pressure (abs.)	0.5-2.2bar
Gas dew-point at outlet	3.0°C +/-0.3°C
Pressure loss per gas path	5mbar (V=125NI/h)
Dead space per gath path	26 ml
Material of gas paths	
Cooling transfer tube	Aluminium
Surface / Housing / Sealings	PTFE-Coating / PVDF Housing / Viton Sealings
Design data	
Connections	Gas: PVDF DN 4/6 / Condensate: PVDF DN 4/6
Approvals	CE / cMETus
Electrical data	
Mains connection / power supply	Plug / 230V 50/60Hz +/-15% / 115V 50/50Hz +/-10%
Communication / Alarm set points	Potential-free alarm-contact / < +2.0°C / > +10.0°C
Housing protection class	IP 20 EN 60529 / EN 61010

Technical Data

Model-Specific Data

Model		
Type	MAK10-1112-4-00-X	MAK10-1112-4-11-X
Number of gas paths	1	1
Number of condensate pumps	2	2
Number of pre-separators	1	1
Number of teflon filtes	-	1
Number of electronic controls	-	1
Number of flowmeters	-	-
Operation data		
Gas flow per gas path at 65°/55°tp	150NI/h 2.5lpm / 200NI/h 3.3lpm	
Ready for start-up	< 5min	
Design data		
Dimensions (BxHxT)	310mm x 266mm x 321mm	
Weight without options	17,4kg	17,9kg
Electrical data		
Power consumption	220W (ta=45°C)	

Model		
Type	MAK10-2202-4-00-X	MAK10-2202-5-1F-X
Number of gas paths	2	2
Number of condensate pumps	2	2
Number of pre-separators	-	-
Number of teflon filtes	-	1
Number of electronic controls	-	1
Number of flowmeters	-	1
Operation data		
Gas flow per gas path at 65°/55°tp	125NI/h 2.0lpm / 175NI/h 2.9lpm	
Ready for start-up	< 10min	
Design data		
Dimensions (BxHxT)	310mm x 266mm x 321mm	449mm x 266mm x 321mm
Weight	18,2kg	20,6kg
Electrical data		
Power consumption	220W (ta=45°C)	

General Data

Operation data	
Gas temperature at inlet	max. 140°C
Ambient temperature	5-45°C
Operating pressure (abs.)	0.5-2.2bar
Gas dew-point at outlet	3.0°C +/-0.3°C
Pressure loss per gas path	5mbar (V=125NI/h)
Dead space per gath path	26 ml
Material of gas paths	
Cooling transfer tube	Aluminium
Surface / Housing / Sealings	PTFE-Coating / PVDF Housing / Viton Sealings
Design data	
Connections	Gas: PVDF DN 4/6 / Condensate: PVDF DN 4/6
Approvals	CE / cMETus
Electrical data	
Mains connection / power supply	Plug / 230V 50/60Hz +/-15% / 115V 50/50Hz +/-10%
Communication / Alarm set points	Potential-free alarm-contact / < +2.0°C / > +10.0°C
Housing protection class	IP 20 EN 60529 / EN 61010

Technical Data

Model-Specific Data

Model		
Type	MAK10-2202-5-20-X	MAK10-2202-5-22-X
Number of gas paths	2	2
Number of condensate pumps	2	2
Number of pre-separators	-	-
Number of teflon filtes	2	2
Number of electronic controls	-	2
Number of flowmeters	-	-
Operation data		
Gas flow per gas path at 65°/55°tp	125NI/h 2.0lpm / 175NI/h 2.9lpm	
Ready for start-up	< 10min	
Design data		
Dimensions (BxHxT)	449mm x 266mm x 321mm	
Weight without options	20,6kg	21,0kg
Electrical data		
Power consumption	220W (ta=45°C)	

Model		
Type	MAK10-2224-5-00-X	MAK10-2224-5-22-X
Number of gas paths	2	2
Number of condensate pumps	4	4
Number of pre-separators	2	2
Number of teflon filtes	-	2
Number of electronic controls	-	2
Number of flowmeters	-	-
Operation data		
Gas flow per gas path at 65°/55°tp	150NI/h 2.5lpm / 200NI/h 3.3lpm	
Ready for start-up	< 10min	
Design data		
Dimensions (BxHxT)	449mm x 266mm x 321mm	
Weight	21,1kg	22,0kg
Electrical data		
Power consumption	220W (ta=45°C)	

General Data

Operation data	
Gas temperature at inlet	max. 140°C
Ambient temperature	5-45°C
Operating pressure (abs.)	0.5-2.2bar
Gas dew-point at outlet	3.0°C +/-0.3°C
Pressure loss per gas path	5mbar (V=125NI/h)
Dead space per gath path	26 ml
Material of gas paths	
Cooling transfer tube	Aluminium
Surface / Housing / Sealings	PTFE-Coating / PVDF Housing / Viton Sealings
Design data	
Connections	Gas: PVDF DN 4/6 / Condensate: PVDF DN 4/6
Approvals	CE / cMETus
Electrical data	
Mains connection / power supply	Plug / 230V 50/60Hz +/-15% / 115V 50/50Hz +/-10%
Communication / Alarm set points	Potential-free alarm-contact / < +2.0°C / > +10.0°C
Housing protection class	IP 20 EN 60529 / EN 61010

Technical Data

Model-Specific Data

Model		
Type	MAK10-3303-5-00-X	MAK10-3303-5-1F-X
Number of gas paths	3	3
Number of condensate pumps	3	3
Number of pre-separators	-	-
Number of teflon filtes	-	1
Number of electronic controls	-	1
Number of flowmeters	-	1
Operation data		
Gas flow per gas path at 65°/55°tp	100NI/h 1.7lpm / 140NI/h 2.3lpm	
Ready for start-up	< 15min	
Design data		
Dimensions (WxHxT)	449mm x 266mm x 321mm	
Weight without options	20,8kg	21,3kg
Electrical data		
Power consumption	300W (ta=45°C)	

Model		
Type	MAK10-4404-5-00-X	MAK10-4404-6-1F-X
Number of gas paths	4	4
Number of condensate pumps	4	4
Number of pre-separators	-	-
Number of teflon filtes	-	1
Number of electronic controls	-	1
Number of flowmeters	-	1
Operation data		
Gas flow per gas path at 65°/55°tp	100NI/h 1.7lpm / 140NI/h 2.3lpm	
Ready for start-up	< 15min	
Design data		
Dimensions (BxHxT)	449mm x 266mm x 321mm	587mm x 266mm x 321mm
Weight	22,6kg	25,1kg
Electrical data		
Power consumption	300W (ta=45°C)	

General Data

Operation data	
Gas temperature at inlet	max. 140°C
Ambient temperature	5-45°C
Operating pressure (abs.)	0.5-2.2bar
Gas dew-point at outlet	3.0°C +/-0.3°C
Pressure loss per gas path	5mbar (V=125NI/h)
Dead space per gath path	26 ml
Material of gas paths	
Cooling transfer tube	Aluminium
Surface / Housing / Sealings	PTFE-Coating / PVDF Housing / Viton Sealings
Design data	
Connections	Gas: PVDF DN 4/6 / Condensate: PVDF DN 4/6
Approvals	CE / cMETus
Electrical data	
Mains connection / power supply	Plug / 230V 50/60Hz +/-15% / 115V 50/50Hz +/-10%
Communication / Alarm set points	Potential-free alarm-contact / < +2.0°C / > +10.0°C
Housing protection class	IP 20 EN 60529 / EN 61010

AGT-PSG GmbH & Co.KG

Richard-Lucas-Str. 6, D-41812 Erkelenz, Deutschland
 Tel: +49 (0)2431/9627-0, Fax: +49 (0)2431/9627-31
 www.agt-psg.de, info.agt@agt-psg.de

