BCR05
Sample Gas Cooler

Operating Manual  Spare Part List
Model / Type

EG Declaration of Conformity and CE Marking

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

Product: BCR05 Sample Gas Cooler
Model-/Articlenumber BCR05-xxxx-x-xx-x
Marking: Marking: EX II 2G Ex pxb de [ia] IIC T4 Gb
Examining Journal: BVS 12 ATEX E 155

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), 2014/34/EU (ATEX) 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
- EN 60079-0/A11, Ex general requirements
- EN 60079-1, Ex flameproof enclosure „d“
- EN 60079-2, Ex pressurized enclosure „p“
- EN 60079-7, Ex increased safety „e“
- EN 60079-11, Ex intrinsic safety „i“

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

Jörg Schamar
ATEX-Responsible
Introduction

Dear Customer,

Thanks that you have decided to buy our BCR05 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 appliance specific 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 cause by improper use or overload of the cooler, damages cause 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. Only skilled workers of the manufacturer are authorized to work on the cooling system. 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 regulary.

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 may be maintained and repaired exclusively in a non-explosive area considering the instructions of the manufacturer.

**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 and guaranty. Only skilled workers of the manufacturer are authorized to work on the cooling system.

**CAUTION! Refrigerant!** The sample gas cooler contains FCKW-free refrigerant fluid. Please notice local and national rules for handling refrigerants.

**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.

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.

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**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 +45°C.
- Specific humidity: 20-70%, non-condensing.
- **Console mounting mandatory.** For the wall mounting, the wall has to be perfect vertical. Ideally you use the optional console-set of the manufacturer or a comparable construction. The brackets must hold 4 times the given weights. Only use the existing fastening points at the bottom of the housing. The cooler 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. Convection cooling: Free space required above and below the unit.

**CAUTION! Ambient conditions!** Do not install the cooler in areas of extreme dust and dirt or in corrosive environment. The cooler is designed for indoor using, not for outdoor using.

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

We recommend a wall/console mounting of the device. Ideally you use the optional console-set of the manufacturer or a comparable construction. For an operation in enclosed housings, such as analytic cabinets, we recommend a suitable ventilation or air conditioning.

The sample gas cooler is only to lift or move at its bottom panel (2 persons needed). Handle with care. Heavy blows could cause irreparable damage.

**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.
Assembly and Installation

Console-Set (optional)

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

The console-set ensures a save and stable mounting of the sample gas cooler. It is a complete set with all needed installation and mounting materials. Notice the advices of the chapter „Installation Site“.

- Fasten mounting rails 1 and 2 in perfect vertical position at the wall. The fastening points 3 und 4 need an exact distance of 365mm.
- Mount the console rails 5 and 6 with identical high in horizontal position. The high itself is variable.
- Fasten the sample gas cooler on the console rails. Therefore carefully dismount the right side panel and the front panel of the sample gas cooler. Bold the bottom plate together with the console rails. Therefore use the two bores in the front area of the bottom plate. Finally remount all dismounted housing parts.

![Diagram of console-set installation]
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 1-2 heat exchangers (PVDF, glass or SS316) 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

The feed lines of the numerous possible heat-exchanger types (material PVDF/glass/SS316, construction mono/dual, condensate connection top/bottom – see chapter “Technical Data”) may have different designs. Coolers without condensate pumps are equipped with heat-exchangers with condensate outlet at bottom (pipe, 12mm outer diameter, without thread).

The picture above shows two SS316 mono-HEs with condensate connection at the bottom.
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 (see chapter “Technical Data”) 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.

**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.

**Before you build up the electrical connections you have to disconnect any power supply.**

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

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.
Assembly and Installation

Electrical Supply Line

The electrical supply line needs to be applied to the rail-mounted terminals in the shielded enclosure “Advanced Security” (X1:04-05-06, notice circuit diagram).

Dismantle the right side panel of the cooler. Lay the electrical supply line through one of the cable feedthroughs at the side-panel or back-panel of the cooler. Use a suitable cable gland type M20x1,5. Dismantle the cover plate of the shielded enclosure “Advanced Security” (gray polyester box). Lay the line through one of the free cable feedthroughs at the bottom of the shielded enclosure. Therefore only use the pre-mounted cable gland. Apply the electrical supply line to the corresponding rail-mounted terminals. Remount accurately all dismantled components.

Remote Monitoring Connection

The device has a remote monitoring option, i.e. a floating collective fault notification. The remote monitoring line needs to be applied to the rail-mounted terminals in the shielded enclosure “Advanced Security” (X1:01-02-03, notice circuit diagram).

Proceed with the installation according to the instructions for installing the electrical supply line.

**WARNING! Overcharge!** Maximum rated load for the remote monitoring connection is 250V, 50Hz, 40VA.
Assembly and Installation

Shielded Enclosure „Advanced Security“

The electrical lines need to be applied exclusively to the rail-mounted terminals in the shielded enclosure "Advanced Security" (X1:04-05-06, notice circuit diagram).

1. X1 Rail-mounted terminals
2. X1:01-02-03 3-pole remote monitoring connection
3. X1:04-05-06 Electrical supply line (L1-N-PE)
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. After switching on the power supply the cooler will start automatically.
- 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 will 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.). During the operation, the refrigerating compressor will run continuously. 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 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.**

**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. The chilling fluid contains droplets of lubrication oil released by the refrigerating compressor. Do not dispose this fluid in the environment. It has to be discharged from the dryer with a suitable device and then delivered to a collection centre where it will be processed to make it reusable.

**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

Temperature-Monitoring

The monitoring unit displays the measured cooling temperature of the sample gas (black hand) as well as the defined lower and upper limits (green and red hands).

**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.). If the dew point goes under 0°C or over +10°C a malfunction is reported over the potential free alarm contact.

![Temperature Monitoring Diagram]

1. Sample gas cooling temperature (black hand)
   Reference value: +3 to +7°C
2. Lower limit 0°C (green hand)
3. Upper limit +10°C (red hand)

Error-Diagnosis / Checklist

<table>
<thead>
<tr>
<th>Fault</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure of sample gas cooler</td>
<td>Interrupted power supply</td>
<td>Re-establish the power supply</td>
</tr>
<tr>
<td></td>
<td>Protective switch activated</td>
<td>Check operating conditions, reset protective switch manually</td>
</tr>
<tr>
<td></td>
<td>Defective refrigerant circuit</td>
<td>Contact AGT Service</td>
</tr>
<tr>
<td>Sample gas flow blocked</td>
<td>Gas paths contaminated</td>
<td>Contamination may occur due to dust or sublimate. Ensure pre-separation</td>
</tr>
<tr>
<td></td>
<td>Gas paths frozen</td>
<td>Adhere to operation data</td>
</tr>
<tr>
<td>Condensate in gas outlet</td>
<td>Gas inlet/outlet connected incorrectly</td>
<td>Connect gas inlet/outlet correctly</td>
</tr>
<tr>
<td></td>
<td>Condensate outlet blocked</td>
<td>Clear condensate outlet, check installation</td>
</tr>
<tr>
<td>Temperature &gt; +10°C</td>
<td>Sample gas cooler overloaded</td>
<td>Check operating conditions, ensure proper cooling air circulation, condensor cleaning</td>
</tr>
<tr>
<td></td>
<td>Defective refrigerant circuit</td>
<td>Contact AGT Service</td>
</tr>
<tr>
<td>Temperature &lt; 0°C</td>
<td>Too low ambient temperature</td>
<td>Adhere to operation data</td>
</tr>
<tr>
<td></td>
<td>Defective performance regulation</td>
<td>Contact AGT Service</td>
</tr>
</tbody>
</table>
Protection Switches / Safety Devices

General

The sample gas conditioner is equipped with the following protection switches and safety devices. After an activation they need an manual reset.

- **Protection switch refrigerant compressor**
  mounted in the pressure resistant encapsulated housing

- **High-pressure and low-pressure limiter**
  right side of the housing, bottom/right

- **Safety temperature limiters**
  right side of the housing, bottom/left

Before resetting protection switches and safety devices the sample gas cooler needs a correct decommissioning (notice chapter "Decommissioning").

**DANGER: Explosive Area!** The reset of protection switches and safety devices may be processed exclusively in a non-explosive area considering the instructions of the manufacturer. Any other tampering the safety and security devices is not permissible.

**WARNING! Open housing!** Never operate equipment with panels removed. Remount accurately all dismantled components before re-commissioning the sample gas cooler (notice chapter “Commissioning”).

Notice the advices of the chapters „Functional Characteristics of the Refrigerant Circuit“, „Functional Characteristics of the EEx-Protection“ and „EEx-Protection and Electrical Components“. Please also notice RI flow schema and electrical diagrams.

Only qualified personnel should perform the reset of protection switches. Before processing the reset the reason for the activation of the protection switch has to be detected and eliminated. Check assembly and installation of your sample gas conditioner. Ensure permissible operating conditions. Check your sample gas cooler for possible defects.

If you cannot eliminate the cause for the activation of the protection switch, decommission the device at once (notice chapter "Decommissioning")! Contact the manufacturer AGT-PSG!

If you are not sure how to reset a protection switch, contact the manufacturer AGT-PSG.
Protection Switches / Safety Devices

Reset Protection Switch Refrigerant Compressor

Pre-conditions: The sample gas cooler is correctly decommissioned (notice chapter „Decommissioning”). The sample gas cooler is in a non-explosive area.

**DANGER: Explosive Area!** The reset of protection switches and safety devices may be processed exclusively in a non-explosive area considering the instructions of the manufacturer.

**DANGER! Supply voltage!** Be sure that no part of the sample gas cooler is powered.

Notice the advices of the attached operation instruction: BARTEC Ex d Control Station Type 07-4C40 01-4000-7D0001/C-05/17-STVT-375605.

Dismantle the right panel and the top panel of the sample gas cooler. Open the encapsulated control unit (20.0). Reset the device protection switch (F1). Remount accurately all dismantled components.

1. Encapsulated control unit (20.0)
2. Protection switch refrigerant compressor (F1)
Protection Switches / Safety Devices

Reset High-Pressure and Low-Pressure Limiter

Pre-conditions: The sample gas cooler is correctly decommissioned (notice chapter „Decommissioning”). The sample gas cooler is in a non-explosive area.

**DANGER: Explosive Area!** The reset of protection switches and safety devices may be processed exclusively in a non-explosive area considering the instructions of the manufacturer.

**DANGER! Supply voltage!** Be sure that no part of the sample gas cooler is powered.

Dismantle the right panel of the sample gas cooler. Reset the low-pressure and high-pressure limiter (20.1). Remount accurately all dismantled components.
Protection Switches / Safety Devices

Reset Safety Temperature Limiters

Pre-conditions: The sample gas cooler is correctly decommissioned (notice chapter „Decommissioning”). The sample gas cooler is in a non-explosive area.

**DANGER:** Explosive Area! The reset of protection switches and safety devices may be processed exclusively in a non-explosive area considering the instructions of the manufacturer.

**DANGER! Supply voltage!** Be sure that no part of the sample gas cooler is powered.

Dismantle the right panel of the sample gas cooler. Reset the safety temperature limiters (20.2/20.3). Remount accurately all dismantled components

![Image](image_url)

1. Safety switch refrigerant compressor (20.2)
2. Safety switch refrigerant pressure line (20.3)
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.

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.

Check – daily or every 12 hours of operation:
- Verify that the displayed dew point is correct.

Check – monthly or every 250 hours of operation:
- Verify the condenser for cleanliness.
- Check the proper operation of the condensate drain.

Maintenance – monthly or every 3000 hours of operation:
- Verify for tightness all the screws of the electric system, inspect the cables.
- Cleaning of the condenser.
- Visual inspection of heat-exchanger unit and insulation.
- Inspect refrigerating circuit for signs of oil and refrigerant leakage.
- Maintenance of the encapsulated control unit.

DANGER: Explosive Area! This sample gas cooler may be maintained and repaired exclusively in a non-explosive area considering the instructions of the manufacturer.

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

DANGER! Hot surfaces! Some components can reach high temperature during operation. Avoid contact until system or component has dissipated heat.

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 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.

**Marking on the refrigerant compressor housing:**
CAUTION: THIS HOUSING IS PROTECTED BY STATIC PRESSURIZATION. THIS HOUSING MAY BE FILLED EXCLUSIVELY IN A NON-EXPLOSIVE AREA CONSIDERING THE INSTRUCTIONS OF THE MANUFACTURER.

**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. Visual inspection of the refrigerant compressor and its power connection for damages. Check all components of the refrigerating circuit for possible corrosion.

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:

<table>
<thead>
<tr>
<th>Refrigerant</th>
<th>Chemical Formula</th>
<th>TLV</th>
<th>GWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>R134a - HFC</td>
<td>CH2FCF3</td>
<td>1000 ppm</td>
<td>1300</td>
</tr>
</tbody>
</table>

Maintenance Operation on the Condenser Unit

The degree of contamination of the condenser can adversely affect the performance of the device. Clean the air-cooled condensers using a soft brush or do a very careful air cleaning. Additional cleaning may be required apart from maintenance intervals depending on the degree of contamination and operating conditions.

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 Encapsulated Control Unit

Notice the advices of the attached operation instruction: BARTEC Ex d Control Station Type 07-4C40 01-4000-7D0001/C-05/17-STVT-375605.

The encapsulated control unit is defective if the flameproof encapsulation is damaged, or if one of the components does not function any longer. In this case decommission the device at once (notice chapter “Decommissioning”!)

AGT-PSG GmbH & Co.KG
Errors and printing mistakes excepted

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Service

Spare Parts

Control Unit 230V 50/60Hz

<table>
<thead>
<tr>
<th>Article-Description</th>
<th>RI Flow Schema</th>
<th>Circuit Diagram</th>
<th>Artikel-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete EEx Control Unit</td>
<td>20.0</td>
<td></td>
<td>8813042</td>
</tr>
<tr>
<td>Protective switch refrigerant compressor</td>
<td></td>
<td></td>
<td>KTA2100659</td>
</tr>
<tr>
<td>Switch relay refrigerant compressor</td>
<td></td>
<td>F1</td>
<td>KTA6100069</td>
</tr>
<tr>
<td>On delay startup relay</td>
<td></td>
<td>K2</td>
<td>KTA6100072</td>
</tr>
<tr>
<td>Startup capacitor</td>
<td></td>
<td>C1</td>
<td>KTA2100651</td>
</tr>
</tbody>
</table>

Control Unit 115V 50/60Hz

<table>
<thead>
<tr>
<th>Article-Description</th>
<th>RI Flow Schema</th>
<th>Circuit Diagram</th>
<th>Artikel-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete EEx Control Unit</td>
<td>20.0</td>
<td></td>
<td>8813043</td>
</tr>
<tr>
<td>Protective switch refrigerant compressor</td>
<td></td>
<td></td>
<td>KTA6300021</td>
</tr>
<tr>
<td>Switch relay refrigerant compressor</td>
<td></td>
<td>K1</td>
<td>KTA6100170</td>
</tr>
<tr>
<td>On delay startup relay</td>
<td></td>
<td>K2</td>
<td>KTA6100171</td>
</tr>
<tr>
<td>Startup capacitor</td>
<td></td>
<td>C1</td>
<td>KTA2100651</td>
</tr>
</tbody>
</table>

Temperature Monitoring and Protective Switches

<table>
<thead>
<tr>
<th>Article-Description</th>
<th>RI Flow Schema</th>
<th>Circuit Diagram</th>
<th>Artikel-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature display / Contact thermometer</td>
<td></td>
<td>B1</td>
<td>6501042</td>
</tr>
<tr>
<td>Combined safety pressure limiter</td>
<td>20.1</td>
<td>F2/F3</td>
<td>KTA6300039</td>
</tr>
<tr>
<td>Safety temperature limiter</td>
<td>20.2/20.3</td>
<td>F4/F5</td>
<td>KTA2100662</td>
</tr>
</tbody>
</table>

Heat-Exchanger

<table>
<thead>
<tr>
<th>Article-Description</th>
<th>RI Flow Schema</th>
<th>Artikel-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Exchanger PVDF Mono</td>
<td>7</td>
<td>8410948</td>
</tr>
<tr>
<td>Heat Exchanger PVDF Duo</td>
<td>7</td>
<td>8410951</td>
</tr>
<tr>
<td>Heat Exchanger Glass Mono</td>
<td>7</td>
<td>8410949</td>
</tr>
<tr>
<td>Heat Exchanger Stainless-Steel Mono</td>
<td>7</td>
<td>8410950</td>
</tr>
<tr>
<td>Heat Exchanger Stainless-Steel Duo</td>
<td>7</td>
<td>8410942</td>
</tr>
<tr>
<td>Thermal transmission paste tube 50g</td>
<td></td>
<td>6938110</td>
</tr>
<tr>
<td>Thermal transmission paste tube 250g</td>
<td></td>
<td>6938111</td>
</tr>
</tbody>
</table>

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**DANGER: Explosive Area!** This sample gas cooler may be maintained and repaired exclusively in a non-explosive area considering the instructions of the manufacturer.

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:

  ![Icon 1](image1) ![Icon 2](image2) ![Icon 3](image3) ![Icon 4](image4)

- 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 partner (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 / Articlenumber / 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:

☐ Explosives  ☐ Acute toxicity  ☐ Flammable  ☐ Oxidizing

☐ Environmental hazard  ☐ Corrosive  ☐ Irritant toxicity  ☐ Health hazard

☐ Liquid  ☐ Solid  ☐ Powdery  ☐ Gaseous

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

Company, Contact

Location, Date, Stamp, Signature
RI Flow Schema
Electrical Components Details
Circuit Diagram

![Circuit Diagram Image]
### Functional Characteristics of the Refrigerant Circuit

- Depending on operating condition, the **refrigerant compressor 1** 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 2**. The fluid refrigerant is passed through the **refrigerant dryer 3** to the **flue damper 4**.

- The fluid refrigerant is expanded by the **flue damper 4** from high pressure (condensation pressure) 1100kPa to low pressure (evaporation pressure) 210kPa. This expanded and fluid refrigerant flows through the **heat-exchanger pipes 6** of the **evaporator 5**. By energy input of the exchangeable **heat-exchanger 7** the fluid refrigerant evaporates and cools down the passed through sample gas to a temperature of +3°C. Over the **liquid separator 10** the **refrigerant compressor 1** sucks again the vaporous refrigerant.

- Over the **power regulator 9.0** 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 temperature- and pressure-controlled **power regulator 9.0** keeps the sample gas chilling temperature constant to +3°C. The integrated **thermometry 9.1** of the regulator does a precision adjustment to the temperature of the sample gas. This prevents any alternation of dew points.

- The **temperature control unit 21.0** monitors the dew point temperature. It provides an alarm at unacceptable exceeding or undercut of temperature.
Functional Characteristics of the EEx-Protection

**Point 20.0**  
**Explosion-protected control unit for the refrigerant compressor**

Explosion protection acc. EN60079/ff; EEx de (ia) IIC T6  
Protection rate acc. EN60529: IP54

Composed of pressure resistant encapsulated housing (Ex d) and shielded enclosure "Advanced Security" (Ex e). The shielded enclosure "Advanced Security" contains rail-mounted terminals to apply the electrical connection cables. Between pressure resistant encapsulated housing (Ex d) and shielded enclosure "Advanced Security" (Ex e) special line bushing for EEx-area are installed. The pressure resistant encapsulated housing (Ex d) contains:

- EEx - i – Switch amplifier, relay output (A1)
- Protection switch (F1)
- Switch relay (K1)
- Startup relay (K2)
- Startup capacitor (C1)

**Point 20.1**  
**High-pressure and low-pressure limiter**

The high-pressure limiter monitors the pressure of the refrigerant. If the pressure rises over the permitted maximum pressure, it switches off the refrigerant compressor – defined acting point 20bar. After problem solving it needs a manual reset.

The high-pressure limiter monitors the pressure of the refrigerant. If the pressure falls below the permitted minimum pressure, it switches off the refrigerant compressor – defined acting point 1bar. After problem solving it needs a manual reset.

**Point 20.2**  
**Safety temperature limiter 01**

The safety temperature limiter is mounted on the pressure line at the outlet of the refrigerant compressor. It monitors the operating temperature of the refrigerant compressor. If the temperature rises over the permitted maximum temperature, it switches off the refrigerant compressor – defined acting point 85°C. After problem solving it needs a manual reset.

**Point 20.3**  
**Safety temperature limiter 02**

The safety temperature limiter is mounted on the housing of the refrigerant compressor. It monitors the operating temperature of the refrigerant compressor. If the temperature rises over the permitted maximum temperature, it switches off the refrigerant compressor – defined acting point 85°C. After problem solving it needs a manual reset.
EEx-Protection and Electrical Components

**Point 20.0**  
Explosion-protected control unit for the refrigerant compressor

Explosion protection acc. EN60079/ff; EEx de (ia) IIC T6  
Protection rate acc. EN60529: IP54

Composed of pressure resistant encapsulated housing (Ex d) and shielded enclosure "Advanced Security" (Ex e). The shielded enclosure "Advanced Security" contains rail-mounted terminals to apply the electrical connection cables. Between pressure resistant encapsulated housing (Ex d) and shielded enclosure "Advanced Security" (Ex e) special line bushing for EEx-area are installed. The pressure resistant encapsulated housing (Ex d) contains:

- EEx - i – Switch amplifier, relay output (A1)
- Protection switch (F1)
- Switch relay (K1)
- Startup relay (K2)
- Startup capacitor (C1)

**A1**  
**EEx-i Double switch amplifier, relay output**  
mounted in the pressure resistant encapsulated housing

The first switch amplifier provides an intrinsically-safe circuit, that connects the switching contacts of the safety devices F2/F3 (20.1), F4 (20.3) and F5 (20.2) in a series. If one of the contacts opens, the switch relay K1 is switched off over the relay output of the switch amplifier so that the refrigerant compressor stops working.

The second switch amplifier provides an intrinsically-safe circuit to the temperature control unit B1 and switches a changeover contact. This changeover contact is potential-free and can be used as an alarm- or operation notification.

**F1**  
**Protection switch, refrigerant compressor**  
mounted in the pressure resistant encapsulated housing

At too high current consumption this device protection directly switches off the refrigerant compressor. After problem solving it needs a manual reset.

**K1**  
**Switch relay, refrigerant compressor**  
mounted in the pressure resistant encapsulated housing

The switch relay puts through the charging current of the refrigerant compressor and is controlled by the switch amplifier (A1)

**K2**  
**On delay startup relais**  
mounted in the pressure resistant encapsulated housing

At the startup of the refrigerant compressor the time relay provides power to the starting winding. After performed startup of the refrigerant compressor it automatically switches off.

**C1**  
**Startup capacitor**  
mounted in the pressure resistant encapsulated housing

With its electric charging the startup capacitor boots the power to the starting winding and provides a higher engine starting torque to the refrigerant compressor. The startup capacitor is equipped with a discharge resistor that discharges the capacitor by the switch-off of the time relay.
# Technical Data

<table>
<thead>
<tr>
<th>Gas paths</th>
<th>1</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat exchanger</td>
<td>1 x MONO</td>
<td>2 x MONO</td>
<td>2 x DUAL</td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td>PVDF</td>
<td>Glass</td>
<td>SS316</td>
</tr>
<tr>
<td><strong>Gas flow</strong></td>
<td>L/h</td>
<td>250</td>
<td>300</td>
</tr>
<tr>
<td><strong>max. inlet dew point</strong></td>
<td>°C</td>
<td>65</td>
<td>70</td>
</tr>
<tr>
<td><strong>max. inlet temperature</strong></td>
<td>°C</td>
<td>130°C</td>
<td></td>
</tr>
<tr>
<td><strong>Outlet temperature</strong></td>
<td>°C</td>
<td>3°C +/-0.5°C</td>
<td></td>
</tr>
<tr>
<td><strong>Pmax with cond. pump</strong></td>
<td>bar</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pmax without cond. pump</strong></td>
<td>bar</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Gas connection</strong></td>
<td>mm</td>
<td>Gas inlet/outlet DN4/6, condensate outlet D12</td>
<td></td>
</tr>
<tr>
<td><strong>Dead space</strong></td>
<td>ml</td>
<td>67</td>
<td>98</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>°C</td>
<td>+5°C to +45°C</td>
<td></td>
</tr>
<tr>
<td><strong>Cooling power</strong></td>
<td>W</td>
<td>300W at 25°C ambient temperature</td>
<td></td>
</tr>
<tr>
<td><strong>Protection rate</strong></td>
<td>IP20 acc. EN 60529 / EN 61010</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Certifications</strong></td>
<td>ATEX EX II 2G Ex px de [a] IIIC T4 Gb, for Zone 1 and 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td>Console mounting / RAL 7035</td>
<td></td>
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</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>mm</td>
<td>440 x 350 x 470 (WxHxD)</td>
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<tr>
<td><strong>Temperature monitoring</strong></td>
<td>Analog display and isolated alarm relay contacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>230V 50/60Hz or 115V 50/60Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>W</td>
<td>220W at 230VAC – starting current 6.3A</td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>kg</td>
<td>38.5kg</td>
<td>40.5kg</td>
</tr>
</tbody>
</table>

*1 at standard conditions, dew point 65°C inlet temperature, 10-25°C ambient temperature*