

INTRODUCTION

This manual contains operating instructions and maintenance schedules for the breathing air CO₂ absorber

The logo for Aero-Guard is centered on the page. It features the text "Aero-Guard" in a bold, sans-serif font. The text is superimposed on a background of a halftone dot pattern, which is itself set against a light, textured background that resembles a map or a technical drawing.

All instructions should be observed and carried out in the order laid down to prevent damage and premature wear to the equipment.

The manufacturer and the supplier void all responsibility for damage or injury resulting from failure to follow these instructions.

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ANNEX

Drawing					79015
Mounting scheme					Aero-Guard

A. DESCRIPTION

1. DESIGN AND APPLICATION

1.1. General

The **Aero-Guard System** is used to reduce the CO₂ contents in compressed breathing air. It guarantees to reach a value within the required max. CO₂ concentration of 500 ppmV according to DIN / EN 12021, even on sites where this value is already exceeded in the surrounding air.

The carbon-dioxide absorber binds the CO₂ by a chemical reaction before it enters the intake of the compressor.

Aero Guard can be mounted to every compressor model, where it is placed next to the compressor and connected to the intake manifold of the compressor by means of a suitably sized hose. To connect the system to a **BAUER** compressor unit, a variety of specially designed hoses, adaptors, and feed-through bushings for sound-proof compressors (e.g. the Verticus 5), are available as optional extras.

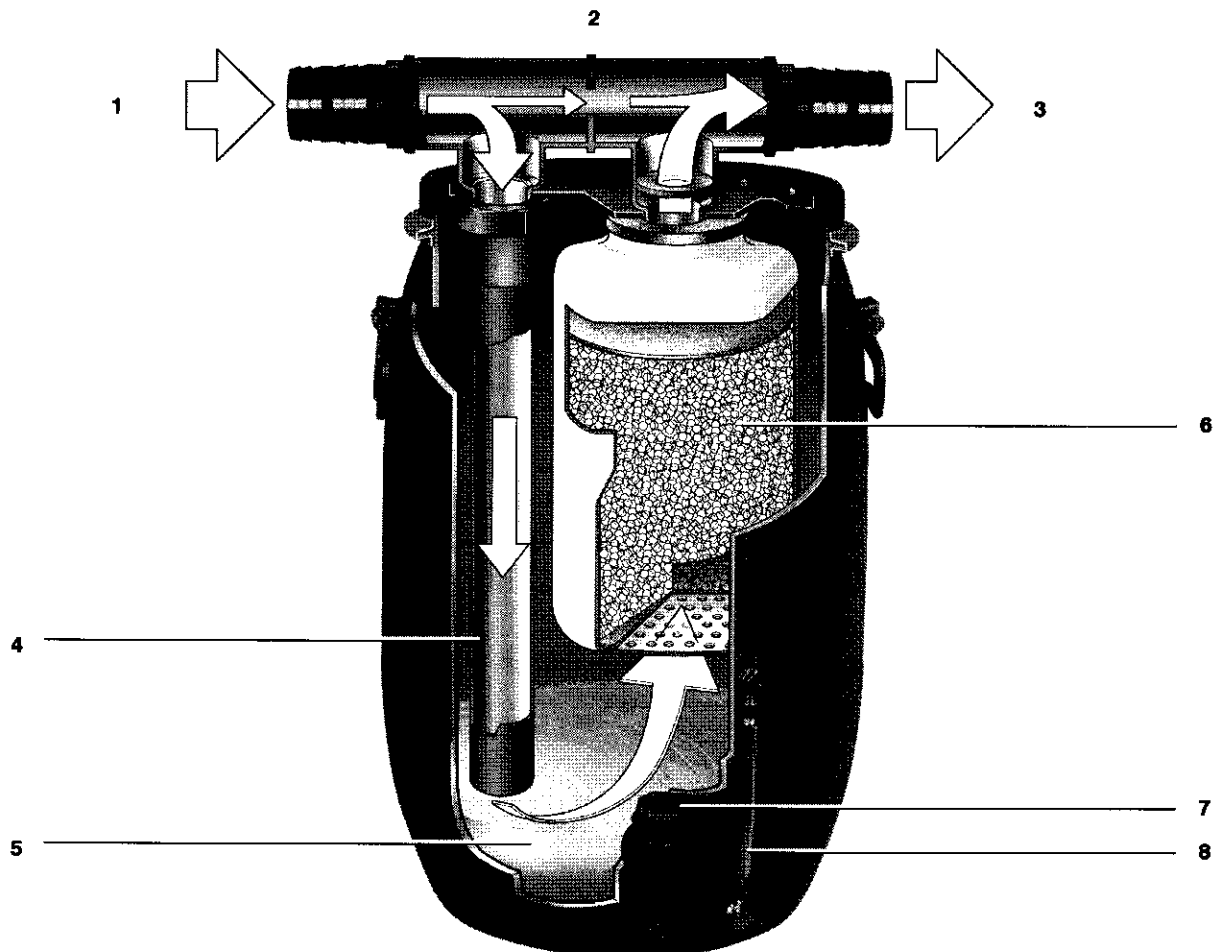


Fig. 1 Aero-Guard System

- 1 Air inlet
- 2 By-pass shutter
- 3 Air outlet to compressor intake
- 4 Down pipe
- 5 Water fillung
- 6 Filter cartridge
- 7 Filler neck
- 8 Water sight gauge

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At the intake of the filter a hose can be connected as well, e.g. to make it possible to take in air from the outside of a building. The various possibilities are shown on drawing "AERO-GUARD" in the annex of this manual. Please observe that the maximum lengths of the hoses under no circumstances must be exceeded, the hose diameter must not be smaller than indicated in the drawing.

Before taking the filter into operation, the reservoir has to be filled with 10 liters of water, and one water sterilization tablet will be added. About every two months a new tablet should be added, because the old one would lose its effectiveness. For this purpose, 10 water sterilization tablets for 10 l ea. are provided with every filter cartridge .

During operation, the carbon dioxide contents of the air being taken in by the compressor will be reduced to approx. 1/3 of the original value of the air.

When the filter lifetime is expired, the filter cartridge has to be changed. The lifetime varies according to the delivery of the compressor. The water filling in the reservoir has to be changed with every filter cartridge change as well and replaced by 10 liters of fresh water.

1.2. Authorized use

The unit is built according to state of the art technology and established safety technical regulations. Nevertheless, its use can cause danger to life and limb of the operator or third parties or damage to the machine and other equipment.

Operate the unit only in technically perfect condition in accordance with regulations and safety and danger notices detailed in the instruction manual! In particular, immediately correct faults (or have them corrected) which can impair safety!

The unit is exclusively for the purpose specified in chapters 1.3. "Technical data" and the instructions given in chapter C. Any other medium or use outside that specified is not authorized. The manufacturer / supplier is not liable for damage resulting from this. The user alone is responsible for this risk. Authorization for use is also under the condition that the instruction manual is complied with and inspection and maintenance requirements are enforced.

2. FUNCTION

2.1. Intake air quality

At routine tests, CO₂ values beyond the permissible values are noted from time to time. Closer investigations often show that the compressed air is taken from rooms in which one or more persons are working. At insufficient ventilation, the CO₂ value in the surrounding air can increase quite fast because of the exhaling of CO₂. CO₂ values from 1,000 to 5,000 ppm_v in workrooms are not unusual (MAK-value (max. workroom concentration) is 5,000 ppm_v). Another additional increase is caused by cigarette smoking, producing approx. 2g CO₂ (≈ 2,000 ppm_v) per cigarette. These pollutions add up to the basic pollution of approx. 400 ppm_v. The technically caused excessive increase of CO₂ during the filling process and the CO₂ peak at taking the unit into operation (see next chapter). **Because of the reasons stated above and for your own security, the filling of breathing air bottles is not allowed in rooms used as workrooms.**

2.2. Principles of operation

The air stream into the absorber is split by two shutters in the intake tube. 2/3 of the air are guided through the down-tube to the surface of the water contained in the reservoir. Thereby the humidity is increased to an extent inhibiting dehydration of the absorbing agent in the filter cartridge. Under these favourable conditions all the CO₂ contained in the air is absorbed. Downstream of the filter cartridge the 2/3 of CO₂-free air is mixed with the 1/3 of air which has been lead through the shutters in the bypass line. The resulting carbon dioxide concentration of the air flowing to the intake of the compressor is 1/3 of the contents upstream of the filter.

Using the bypass line, the filter lifetime is extended by 50%.

Moistening the air before it passes through the filter cartridge prevents dehydration of the absorbent and therefore again prolongs the lifetime of the filter cartridge. A completely dry agent would not bind any CO₂.

At standstill the filter cartridge is isolated from the surroundings by a membrane valve at the intake to prevent saturation with CO₂ from the ambient air. If the connecting hose to the compressor should be removed, the outlet of the filter has to be plugged as well to prevent air getting in from that side.

CAUTION: The CO₂ peak at the compressor outlet resulting from desorption of CO₂ from the high pressure drying filter cartridge cannot be prevented by the Aero-Guard. Therefore, all respective safety precautions, especially scavenging of the system, have to be observed. Refer to the compressor unit instruction manual.

2.3. Effects on the compressor

- The CO₂ absorber produces a pressure loss of approx. 20 mbar in the compressor intake manifold. In some cases this may result in a slight increase in oil consumption.
- The relative humidity of the air taken in by the compressor will be increased in the absorber. This produces a slightly higher amount of condensate after the 1st and 2nd stage of the compressor.

3. DESIGN

The Aero-Guard system consists of the following assemblies:

- Intake tube and connecting hoses
- Water container
- Filter cartridge

The design of the unit is shown in the drawing in the annex of the manual.

3.1. Models

The holes in the shutters are designed to match the FAD (free air delivery) of the compressor unit in order to guarantee an optimum partition of the air streams and at the same time a minimum of pressure loss.

The available sizes are:

S:	100 ... 140 l/min F.A.D.
M:	150 ... 210 l/min F.A.D.
L:	220 ... 300 l/min F.A.D.
XL:	310 ... 430 l/min F.A.D.
XXL:	440 ... 630 l/min F.A.D.

Besides the shutters, there is no difference between the absorbers for different FAD's. Since there is one size of filter cartridge only, the lifetime of the lower FAD units will increase accordingly.

Under no circumstances a unit designed for a specific FAD must be used for smaller or greater FAD's, because in this case safe operation of the system would not be guaranteed. Furthermore, due to the higher pressure loss, damage to the compressor could result.

3.2. Accessories

Filter cartridge with 9 kg absorbent including 10 water sterilization tablets for 10 hrs. ea.

Various connecting hoses, adaptors and wall feed-through bushings according to drawing "AERO-GUARD" in the annex.

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4. TECHNICAL DATA

CO ₂ output concentration:	1/3 of the intake concentration, i.e. 330 ppm-vol for an intake concentration of max. 1000 ppm-vol
Lifetime:	50h (at 630 l/min FAD and an intake concentration of max. 1000 ppm-vol). The cartridge has to be changed after one year at the latest, even if the lifetime has not been expired.
Pressure loss:	approx. 20 mbar
Maximum daily operating time:	5 h
Cartridge filling:	approx. 9 kg special carbon-dioxide absorbent
Air connections:	Inlet and outlet connection for hose with 60 mm I.D.
Dimensions:	50 x 46 x 72 cm (length x width x height)
Weights:	
Dry weight w/o cartridge:	6,5 kg
Cartridge weight:	9,5 kg
Weight of water vol. (10 liters)	10 kg
Operating weight incl. cartridge and water:	26 kg
Colouring:	
Container:	blue
Lid:	black + silver (untreated stainless sheet metal)
PVC tubes:	grey RAL 7011

5. OPERATING LIMITS

Delivery (FAD)	100 to 630 l/min.
Ambient temperature	+5 °C to +45°C
Air inlet temperature	+15 °C to +60°C
Rel. humidity of inlet air:	15 to 100%
CO inlet concentration:	max. 1000 ppm-vol
Max. allowable inclination	15°
Max. allowable operating height	0 to 2000 m above sea level

B. SAFETY MEASURES

1. IDENTIFYING THE SAFETY NOTICES

Important instructions concerning the endangerment of personnel, technical safety and operating safety will be specially emphasised by placing the following signs before the instructions.



This notice is used with maintenance work and operating procedures and must be adhered to exactly in order to avoid endangering personnel.



This notice must be complied with in order to avoid damage to or destruction of the machine or its equipment.



This notice advises of technical requirements which the operator must take particular note of.

2. FUNDAMENTAL SAFETY NOTICES

2.1. Authorised use

- The unit is built according to state of the art technology and established safety technical regulations. Nevertheless, its use can cause danger to life and limb of the operator or third parties or damage to the machine and other equipment.
- Operate the unit only in technically perfect condition in accordance with regulations and safety and danger notices detailed in the instruction manual! In particular, immediately correct faults (or have them corrected) which can impair safety!

2.2. Organisational measures

- Keep the instruction manual at hand near the unit at all times in the relevant holder.
- In addition to the instruction manual, observe and comply with universally valid legal and other obligatory regulations regarding accident prevention and environment protection. This can involve, for example, contact with hazardous substances or the provision /wearing of personal protective equipment.
- In addition to the instruction manual, provide supplementary instructions for supervision and monitoring duties taking into consideration exceptional factors e.g. with regard to organisation of work, production, personnel employed.
- Personnel engaged to operate the machine must have read the instruction manual before beginning work, especially the safety notices chapter. When work is already underway it is too late. This is particularly relevant for temporary personnel, e.g. maintenance personnel.
- At the very least, supervise temporary personnel's work in accordance with the instruction manual, taking into account safety and danger factors.

- Observe all safety and danger notices on the unit.
- Keep all safety and danger notices on the unit complete and in readable condition.
- If there are any modifications to the unit or operating conditions which may affect safety, stop the unit immediately and inform the department/person responsible of the fault.
- No modifications may be made to the unit which could impair safety without obtaining permission from the suppliers first. This is also the case with regard to installation and adjustment of safety devices and valves as well as welding of piping and reservoirs.
- Spare parts must always comply with the technical requirements specified by the manufacturer. This is always guaranteed with original spare parts.
- Intervals stipulated or given in the instruction manual for recurring checks/inspections must be adhered to.
- Zur Durchführung von Instandhaltungsmaßnahmen ist eine der Arbeit angemessene Werkstattausrüstung unbedingt notwendig.
- It is absolutely essential that the workplace is appropriately equipped for maintenance measures.
- Make sure location and operation of fire extinguishers is known. Pay attention to fire warning and fire fighting procedures.

2.3. Qualification, fundamental duties

- Work on/with the unit may only be carried out by reliable personnel. Observe the legal minimum age permissible.
- Only employ trained personnel, clearly establish responsibility of personnel for operation, maintenance and repair work.
- Ensure that only trained personnel work with the machine.
- Establish the responsibilities of the machine operator and establish a procedure for him to inform a third person of unfavourable safety conditions.
- People who are being trained or introduced to the job should only be allowed to work with the unit under constant supervision of an experienced person.
- Work on the electrical equipment of the unit may only be carried out by a qualified electrician or by an instructed person under the direction and supervision of a qualified electrician according to electrotechnical regulations.

2.4. Safety notices for operation

- Do not carry out any work if safety is questionable.
- Meet all requirements demanding that the unit is only operated in safe and good working order. Only operate the machine if all protective and safety equipment, e.g. all detachable protective equipment, emergency shut-down devices, soundproofing is provided and in good working order.
- At least once every day, check the unit externally for damage and faults. Inform the department/person responsible immediately if anything is not as it should be (including operation). If necessary, shut the machine down immediately and make it safe.
- If there any malfunctions, shut the unit down immediately and make it safe. Correct faults immediately (or have them corrected).
- Observe switching on and off processes and monitoring indications according to the instruction manual.

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- Carry out the setting, maintenance and inspection processes at the intervals specified in the instruction manual, including replacement of parts/equipment. This work may only be carried out by qualified personnel.
- Before carrying out any exceptional work or repair work, operating personnel should be informed. Call the supervisor.
- For all work concerning operation, change in production, conversion or regulating of the unit and its safety measures such as inspection, maintenance and repair work, observe the switching on and off processes in the instruction manual and the notices for maintenance work.
- Always retighten any screw connections loosened for maintenance or repair work.
- If it is necessary to remove safety devices for maintenance and repair work, these must be replaced and checked immediately after completion of the maintenance or repair work.
- Ensure safe and environmentally friendly disposal of consumables and old parts.

2.5. Particular areas of danger

- The electrical equipment of a unit must be regularly checked. Defects, such as loose screw connections or burnt wires, must be rectified immediately.
- Only carry out welding, burning and grinding work on the unit when specifically approved. There can, for example, be a risk of fire or explosion.
- Depressurise system and pressure lines before commencing repair work.

3. GENERAL SAFETY NOTICES



Maintenance should only be carried out by the manufacturer or a competent person who is qualified to maintain these kinds of units.



The instruction manual must be always available for the employees to consult

C. INSTALLATION, OPERATION**1. GENERAL**

Retrofitting of the Aero-Guard has to be performed by qualified personnel, only.

1.1. OPERATING ROOM

- The compressor room must be clean, dust-free, dry and as cool as possible.
- Avoid direct exposure to sunlight; if possible, choose north side of building.
- Additional heat producing units or line systems should not be installed in the same room or should be well isolated.
- The floor must be capable of taking the load of the system weight.
- Locate the unit level; refer to technical data for max. allowable inclination.
- Ensure adequate ventilation. Remember: room temperature = cooling air temperature !
Min. = +5 °C, max. = +45 °C.

2. INSTALLATION, CONNECTION

Installation and connecting the Aero-Guard is performed according to the drawings in the annex of the instruction manual.

Correct installation: on a level, vibration-free area without inclination, not in passages, hoses to be fixed properly.



Since the Aero-Guard-System does not remove gases except carbon-dioxide, especially not carbon-monoxide, observe the installation instructions for compressor units driven by petrol engines.

Take in air from a suitable location. The CO₂ concentration of the intake air must not exceed 1000 ppmV. Therefore take care not to use:

- closed rooms where permanently many people are present, especially if there will be smoked.
- places where highly increased CO₂ concentration may be present caused by incineration or fermentation processes or combustion engines. If in doubt, the CO₂ concentration of the intake air should be monitored with a suitable test unit.

Hoses are mounted to the absorber and the adaptors with regular hose clamps. The wall feed-through bushings are compatible to the **BAUER-Verticus 5** bushings. On all Verticus 5 units they can therefore be mounted to the openings on top of the unit using three mounting screws. On older **BAUER Verticus** units and other closed compressor units an opening has to be cut out at a convenient location.

3. OPERATION**3.1. General**

Observe the arrows for direction of air flow at the Aero-Guard. The hose connection between Aero-Guard and compressor unit has to be air-tight.

Take special care when changing the filter cartridge, since an improper fitting of the cartridge could lead to decreased effectiveness. It is recommended to check the effectiveness of the new cartridge by measuring the CO₂ contents of the air (e.g. with DRÄGER tubes). It is also recommended to check the CO₂ contents of the air at regular intervals.

The operating hours for the filter cartridges listed in Section D. must not be exceeded, because of a serious decrease of the effectiveness after this period. It is recommended to note date and no. of operating hours on the cartridge label before installation to avoid confusion.

Do not forget to fill the container with 10 ltrs. of water, otherwise a serious lack of effectiveness of the unit would result.

3.2. Scavenging the compressor unit

CO₂ is present in the atmosphere with a natural amount of 350 - 400 ppm_v. The molecular sieve used in the purifiers of the compressor unit for drying the breathing air is, as well as other capabilities, able to adsorb CO₂ which is accumulated in the cartridge. After shutdown of the compressor, adsorbed CO₂ may be desorbed again due to the partial pressure decrease. The now free CO₂ gets washed out of the cartridge when the compressor is started again.

To avoid increased CO₂ contents in the compressed breathing air, we recommend scavenging the compressor unit **before connecting** and filling the air bottles, i.e. let the compressed air escape into the open air by opening the filling valves for about 1 to 2 minutes.

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D. MAINTENANCE

1. CARTRIDGE LIFETIME

Delivery of the compressor	Cartridge lifetime
[Liters/min]	[operating hours]
100	300
120	250
140	214
160	188
180	167
200	150
220	136
240	125
260	115
280	107
300	100
320	94
340	88
360	83
380	79
400	75
420	71
440	68
460	65
480	63
500	60
520	58
540	56
560	54
580	52
600	50
620	48
630	48

Note: The operating hours given above are valid only for a CO₂ inlet concentration of max. 1000 ppm-vol.

2. CARTRIDGE CHANGE

WARNING Use original BAUER spare cartridges, only. Never use other cartridges or self refilled ones. Risk of severe damaging to health or damage to the compressor unit.

WARNING The absorbent contained in the filter cartridges is irritant to skin and eyes.



Caution when changing the filter cartridge: avoid crushing fingers while closing the locking ring.



Never remove replacement cartridge from packaging prior to actual use otherwise the highly sensitive absorbent will absorb water vapour from surrounding air and cartridge saturated and thus be ruined.

3. WATER CHANGE

Change the water filling in the reservoir at least every 2 months.

Add a new sterilization tablet. Only use the tablets delivered with the filter cartridge.

WARNING Do not use different tablets because they could contain chlorine. Risk of severe damaging to health or damage to the compressor unit.



During operation the water in the reservoir can turn slightly basic. Protect eyes from splashes when changing the water. Remove splashes by flushing with plenty of fresh tap water.

4. CLEANING THE SYSTEM

Clean the complete system, especially the inside of the reservoir at least once a year.

WARNING Do not use cleaning agents which are harmful to respiration. Flush with plenty of fresh tap water after cleaning.

5. CHECKING THE TIGHTNESS

Check tightness of all connections regularly. Check hoses and tubes for cracks. Replace leaking parts.



Only use hoses and tubes with same length and diameter for replacement.

E. TROUBLESHOOTING

Trouble	Cause	Remedy
Pressure loss of Aero-Guard too high	Delivery of the compressor too high for the selected Aero-Guard size	Check that the selected Aero-Guard size is suitable for the compressor delivery
	Aero-Guard not connected properly, air flow in wrong direction	Check setup according to arrows on unit
	Filter cartridge not fitted correctly	Mount filter cartridge in correct way
	Water level in tank too high	Check water level and drain if necessary
	Diameter of intake hose too small or intake hose too long	Fit hose with larger diameter or shorten hose
	Foreign particles in Aero-Guard or in intake hose	Remove any particles
CO ₂ concentration after the filter still too high	Cartridge lifetime exceeded	Change cartridge
	Aero-Guard has been operated without water filling, cartridge dried out	Change cartridge
	Cartridge stored unpacked outside of Aero-Guard, saturated with CO ₂ from the ambient air	Change cartridge
	Hose between Aero-Guard and compressor leaking	Check air-tightness of hose
	CO ₂ concentration of air at inlet of Aero-Guard is higher than 1000 ppm-vol	Check CO ₂ concentration of air taken in, change location if necessary.

Do you have any problems with maintenance or repair work?

 **Techn. customer service** Tel: (089) 78049-175 or -176
Fax: (089) 78049-103

F. ANNEX

- **Schematic diagram**
- **Unit drawing**
- **Attachment drawings**