User manual

Exhaust air cleaning system Pollo

Code No. 99-94-0775 GB

Edition: 02/21

Overview of changes / updates

Name of chapter	Type of change / update	Product information / *Code of the person in charge*	Date of edition	Page
3.8.4 ”Water supply”	Chapter added	AMa	[02/2021]	15

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EG Konformitätserklärung

In Übereinstimmung mit Maschinenrichtlinie 2006/42/EG – Anlage II-A
(Übersetzung des Originaltextes)

Bezeichnung : Chemische Abluftreinigungsanlage Pollo-M / Pollo-L

Inno⁺ B.V. bestätigt, dass oben genanntes Produkt den europäischen Bestimmungen nachstehender Richtlinien entspricht:

- Maschinenrichtlinie 2006/42/EG (inkl. Änderungen)
- EMV-Richtlinie 2004/108/EG (inkl. Änderungen)

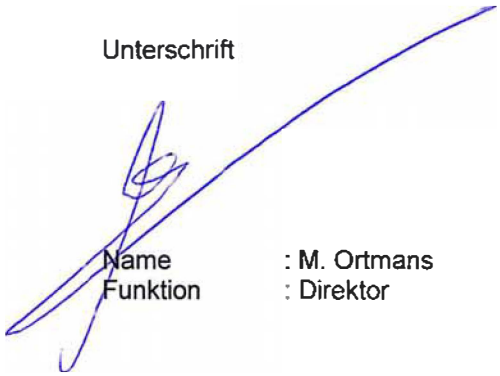
Die technische Dokumentation kann im Namen (und Adresse) des Herstellers durch den Unterzeichnenden dieser Erklärung zusammengestellt werden.

Das Produkt entspricht nachstehenden harmonisierten Normen:

EN-ISO 12100:2010	Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze – Risikobeurteilung und Risikominderung
EN-IEC 60204-1:2006	Sicherheit von Maschinen – Elektrische Ausrüstung von Maschinen – Teil 1: Allgemeine Anforderungen

Panningen, Niederlande
Datum: 02-01-2016 (Tag-Monat-Jahr)

Unterschrift



Name : M. Ortmans
Funktion : Direktor

1 About this manual

Observe the instructions in this manual to ensure correct and safe use of the system.

Keep this manual safe for future use.

All persons assembling, operating, cleaning and servicing this system must be familiar with the contents of this manual.

These persons must always have access to the manual. Keep this manual in the immediate vicinity of the system for this reason.

Observe the comprised safety instructions!

If this manual is damaged or lost, request a new copy from **Big Dutchman**.

The documentation for Exhaust air cleaning system Pollo must be used together with the following documents:

a) Wiring diagram

b) Commissioning certificate

c) Safety data sheets for sulfuric acid and anti-foaming agent

d) List of spare parts

e) Manual operating records

NOTICE!

The photos and drawings in this manual apply to all design variants of this system. Figures and wiring diagrams in this manual may deviate from the actual situation on non-relevant points. All available exhaust air cleaning system options are described in this manual. Therefore, not all information in this manual may apply to your system.

The contents of this manual may be altered without prior notice.

If you find mistakes or unclear information in this manual, please do not hesitate to let us know.

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1.1 Structure of the safety instructions

DANGER!

This indicates risks that will lead to personal injury resulting in death or to serious injuries.

WARNING!

This indicates risks that could lead to personal injury resulting in death or to serious injuries.

CAUTION!

This indicates risks or insecure procedures that could lead to moderate or minor injuries.

NOTICE!

This indicates notes preventing property damage and leading to an effective, economic and environmentally-conscious handling of the system.

1.2 Supplier's documentation

The supplier's documentation includes all instructions for components that are supplied by **Big Dutchman** but not manufactured by **Big Dutchman**, for example motors. These instructions are usually supplied with the respective component. If this is not the case or if the language of the corresponding country is not included, please request this documentation from **Big Dutchman** .

It is essential to observe the instructions in the supplier's documentation!

2 For your information

2.1 Warranty

In accordance with the order, the manufacturer provides a warranty for the system that includes components and labour. The warranty is only valid if the system is kept in impeccable condition in accordance with the guidelines in this manual. Operational activities must always be performed by trained and qualified personnel. Parts liable to wear and non-durable parts are not covered by the warranty.

2.2 Disclaimer

The manufacturer is not liable for any unsafe situation, accidents or damage resulting from:

- any damage or loss of any nature that result from the system or in connection with the use or inability to use the system, or the documentation;
- ignoring warnings or regulations stated on the system or in this documentation;
- the use of the system for purposes or situations other than those indicated in this documentation;
- any modifications made to the system that have not been agreed upon in writing by the manufacturer;
- the use of non-original parts and/or deviating additives/chemicals;
- required regular maintenance not carried out in time. This also applies to situations where the filter packages become very heavy because they are not cleaned properly. The additional weight may damage the system structure;
- water and/or chemical damage to the technical room, buildings or animals as a result of leaks or delayed cleaning;
- damage to the environment (e.g. buildings and crops) as a result of a malfunctioning system;
- maintenance, settings or repairs carried out by unauthorised persons;
- disassembled, by-passed or deactivated safety devices;
- lightning strikes.

3 Safety

3.1 General safety regulations

Only work with suitable tools and observe the local accident prevention regulations.

⚠ WARNING!

Live parts may be bare when performing different types of tasks. Touching live parts can lead to injuries caused by electric shock and short circuits.

- ► Set the main switch to "Off" before starting any repair or maintenance tasks.
- ► Secure the system against reactivation.
- ► Attach a fixed sign to indicate that maintenance and repair tasks are in process!
- ► Never touch bare electrical components.
- ► Equipment with bare electrical components must not be used by the operating staff.

Check safety and function control devices to ensure safe and accurate operation after carrying out any tasks.

Observe the regulations of local water distribution and power supply companies.

⚠ WARNING!

Defective or disassembled safety devices can lead to serious injuries or to death!

- ► It is strictly forbidden to remove or put out of operation any safety device.
- ► If safety devices are damaged, immediately put the system out of operation. Lock the main switch in zero position and eliminate any damage.
- ► Make sure that all safety devices are properly mounted and function after work on the system has been completed and before putting the system into operation (again).

⚠ WARNING!

- ► Parts lying about on the system and in its vicinity can cause persons to stumble and / or fall and thus risk injuring themselves by contact with system components.
- ► Parts lying about in or on the components can lead to serious damage of the system.
- ► Never deposit objects (e.g. spare parts, replaced parts, tools, cleaning tools etc.) in the accessible areas of the system or in the surrounding areas after having worked on the system!
- ► **Before** putting the system into operation again, assure yourself that all loose or replaced parts have been removed from the system components!

⚠ DANGER!

Persons may be electrocuted or suffer serious electrical injuries if water from leaking hoses, seals and pipes reaches live parts.

- ► Disconnect the main power supply.
- ► Interrupt the main water supply.
- ► Only now may you enter the part of the house where large quantities of water have escaped.

NOTICE!

Leaking hoses, seals and pipes can cause structural damage or destroy electrical systems by short circuits.

- ► Check regularly whether large quantities of water are escaping and eliminate the leaks as soon as possible.

⚠ WARNING!

Children must not access the system. The safety distances for the system are not designed for children. A risk of injury cannot be excluded, even for supervised children.

3.2 Operator's responsibility

The operator is subject to the legal obligations regarding occupational safety and is responsible for the staff's safety. All safety, accident prevention and environmental protection regulations applicable for the area of use of the system must be observed. The following is especially important:

The operator must clearly specify responsibilities for operation, maintenance and cleaning.

The operator must provide the staff with the necessary personal protective equipment.

The operator is responsible for

- using the system in compliance with the designated use;
- ensuring that the system is only operated in an excellent state from the technical point of view and that maintenance intervals are observed;
- ensuring that his staff is trained to use the system;
- ensuring that operation instructions are prepared for the system.

3.3 Designated use

The **Big Dutchman** system may only be used for the purpose for which it is designated.

The exhaust air cleaning system has been designed exclusively for the cleaning of livestock house air that may contain ammonia.

Any deviating use is considered non-designated use. The manufacturer shall not be liable for any damage resulting from such non-designated use. The user alone bears the risk. The designated use also includes the exact compliance with operating, maintenance and assembly requirements of the manufacturer.

3.4 Ordering of spare parts

⚠ CAUTION!

For you own safety, use original **Big Dutchman** spare parts only. For third-party products that have not been released or recommended and for modifications (e.g. software, control units), judging whether there is a safety risk in connection with **Big Dutchman** systems is not possible.

NOTICE!

The exact description of the spare parts to be ordered can be found by means of the position number in the spare parts list.

Indicate the following when ordering spare parts:

- the code number and description of the spare part;
- the customer number or order number;
- the current supply, e.g. 230 / 400 V – 3 Ph – 50 / 60 Hz.

3.5 Staff qualifications

Staff must consist of qualified persons who can be expected to perform their tasks reliably. Persons whose ability to respond is impaired, e.g. by alcohol, drugs or medication, must not work on the system. The operator is responsible for which persons he employs. **Big Dutchman** does not assume any liability for personal injury and property damage caused by insufficiently qualified staff.

3.6 Personal protective equipment

⚠ WARNING!

The following instructions apply to any task carried out on the system.

- ► Wear **close-fitting protective clothing** and **protective footwear**.
- ► Use **protective gloves** where there is a risk of hand injuries and **safety goggles** where there is a risk of eye injuries.
- ► Do not wear **any rings, necklaces, watches, scarves, ties or other items** which could get caught in parts of the system.
- ► Make sure that **long hair is always tied back**. Hair can get caught in driven or rotating working units or parts of the system, resulting in serious injuries.
- ► When working underneath the system **always** wear a **hard hat**!

A safety cabinet is included in the delivery of the exhaust air cleaning system. This cabinet contains the personal protective equipment that must be worn when working with sulfuric acid.

NOTICE!

Replace protective equipment that has had contact with sulfuric acid since the equipment may lose its resistance.

Check the cabinet regularly for completeness and functionality of the equipment. Make sure that all persons working with sulfuric acid know how to use the equipment and where the cabinet is located.

Wear the personal protective equipment as indicated below:

When working with sulfuric acid	Face shield or eye protection in combination with respiratory protection
	Suitable gloves We recommend using the gloves in the safety cabinet.
	Corrosion-resistant protective clothing We recommend using the apron in the safety cabinet.
	Acid-resistant boots

When working with the anti-foaming agent	Safety goggles with side shields
	Suitable gloves that protect from mechanical damage
	Fluid-resistant protective clothing
When working near the exhaust air cleaning system These instructions apply to all areas where exhaust air and/or wash water (or fog) may be present, especially: • in the pressure chamber; • in the area near the filter package sprinklers; • in the area below the filter packages; • in the area above the filter packages.	Face shield or eye protection in combination with respiratory protection and ammonia filter (e.g. FFABEK1P3D). Check the expiration date of the mask when the packaging is open!
	Suitable gloves We recommend using the gloves in the safety cabinet.
	Corrosion-resistant protective clothing We recommend using the protective clothing in the safety cabinet.
	Acid-resistant boots with non-slip soles
	Hearing protection

3.7 Safety instructions when operating electrical appliances

NOTICE!

Only qualified electricians may install and work on electric parts / assembly groups in accordance with electro-technical regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).

⚠ WARNING!

If an electric part is open, dangerous electric tensions are bare. Be aware of the danger and keep staff of other professions away from the danger zone.

NOTICE!

Do not install control devices directly in the house but in the service room to prevent corrosion caused by e.g. ammonia gas.

3.7.1 Protective-equipotential bonding (earthing) of the system

The system must be earthed professionally by the operator or a company commissioned by him at suitable points and according to the valid local guidelines and standards (e.g. IEC 60364-7-705 mod. 2006 / DIN VDE 0100-705: Low-voltage electrical installations – part 7-705: Requirements for special installations or locations – Agricultural and horticultural premises) for protective-equipotential bonding.

The earthing points must be connected with the foundation earth electrode.

Recommended earthing points:

1 x per system row near the foundation earth electrode.

The material required for earthing is not included in the Big Dutchman delivery.

3.8 System-specific safety regulations

The system is designed according to the state of technology and meets current safety requirements. Nevertheless, there are residual risks, which can be prevented as follows.

The exhaust air cleaning system is a system with very few mechanical processes. However, the system requires the use of chemicals, which involves certain risks. All persons working near or with the exhaust air cleaning system must therefore strictly follow the recommendations and working procedures described in this manual.

Additionally, comply with local regulations regarding the personal protective equipment, hygiene and the environment.

3.8.1 Safety instructions

Observe the following safety instructions:

- Especially vulnerable or impaired persons are not permitted to enter the system, including e.g.:
  - children;
  - ill and elderly persons;
  - immunocompromised and pregnant persons or
  - persons affected by medications or other substances.
- Entering the process room is only permitted during error-free operation.
- Entering the process room is not permitted if an error occurred with the pH regulation within the past 24 hours.
- If there are no deviating instructions: Completely switch off the water control during maintenance and lock the main switch with a padlock.
- Keep the work area and the technical room clean.
- During normal operation, keep the technical room and the control cabinet closed and locked.
- Store the sulfuric acid in an approved, closed room with sufficient ventilation.
- When cleaning the system, at least two persons must always be present.
- Ensure regular and correct maintenance (see chapter 7 ”Maintenance”, page 67).

  If the filter packages are excessively contaminated, the water does not drain sufficiently. The resulting large weight gain may pose a risk to the stability of the structure.
- Keep access ways and stairs clear and dry to prevent freezing and/or slipping.
- Observe local regulations regarding disposal of drain water and water produced during cleaning of the system.
- Clean up any spilled chemicals as described in chapter 3.12 and chapter 3.13. Make sure that there is always plenty of absorbent material available. Immediately consult your supplier to take further measures.

Observe the following safety instructions, especially when working in or with the exhaust air cleaning system:

- Never eat, drink or smoke at the workplace!

- **When working with sulfuric acid and near the exhaust air cleaning system:** After work, keep the gloves on and wash your hands thoroughly. Remove the gloves and wash your bare hands again.
- **When working with the anti-foaming agent:** Wash your hands thoroughly before each break and after work.

Note that the following actions are forbidden:

- Do not use any chemicals other than those described in this manual or chemicals with a different concentration than indicated here in the exhaust air cleaning system.
- Do not perform any work at the chemical lines or at the components in the technical room differently than described in this manual.

  If you have questions, doubts or problems, contact the manufacturer.
- Never climb onto the exhaust air cleaning system.
- Persons under the age of 16 or persons who can reasonably be deemed to be unable to recognise the risks involved in the operation of the exhaust air cleaning system and the chemicals are not allowed to operate the system.
- During operation of the exhaust air cleaning system and/or the pressure chamber, persons must limit their presence in or near the system. Excessive vapours and gases can cause hazardous situations.
- The technical room and the control computer contain settings that ensure proper operation and the safety of the exhaust air cleaning system. Never change any of the cleaning or process settings not described in this manual.
- Never add chemicals to the wash water by yourself.
- Never carry out any repairs or modify the measuring devices or piping of the exhaust air cleaning system. This can interrupt the process and cause hazardous situations. Never repair leaking sulfuric acid lines.
- Mechanical work on the exhaust air cleaning system or the piping, e.g. drilling of holes, can damage the system or release hazardous chemicals under pressure.
- Do not use acid containers that deviate from the regulation in chapter 3.12.3.
- Make sure that safety devices are accessible.

3.8.2 Other responsibilities of the operator

The following aspects are not part of the delivery, but the operator's responsibility. These aspects affect the safe use of the exhaust air cleaning system, however:

- The system must be protected against unauthorised access and labelled according to the instructions in chapter 3.11.
- The technical room must be equipped with a mechanical ventilation system. As a reference value, the air in the room must be exchanged five times per hour.
- The operator must reliably prevent overflowing of the storage containers or take measures for collecting and/or draining the overflowing wash water.
- The shut-off valve of the desludge container must be protected against accidental or unauthorised opening.
- The large amount of dirty water can pose a risk to humans and the environment if the tank drains unexpectedly or uncontrolled. The exhaust air cleaning system, the supply lines and the desludge container must be protected against external hazards, e.g. by safety bumper guards and frost protection.
- The exhaust air cleaning system must be illuminated sufficiently (maintenance area/process room with 50 lux, technical room with 200 lux).

3.8.3 Statutory provisions

The control cabinet is equipped with a memory module (data logger). Different external signals and system signals are stored here for the respective period. The exact parameters depend on the local statutory provisions. chapter 4.4.2 shows a general overview.

Check once per week whether the data are stored correctly.

3.8.4 Water supply

⚠ CAUTION!

According to DIN EN 1717, water sources in technical systems for livestock management must be assigned the highest possible hazard because they pose a health hazard for humans due to microbes and viruses or chemical and biological substances. This means that within the scope of DIN EN 1717, a direct connection to the public water distribution network is not permitted under any circumstances.

Additionally, all water sources not intended for extraction of water for human use must be equipped with a corresponding sticker or prohibitory sign according to ISO 7010, P005 ("Not drinking water"). The stickers can be purchased from Big Dutchman.

Code no.	Description
00-00-2128	Sticker: Logo – Not drinking water

Also comply with the regulations of local water distribution and power supply companies.

3.9 Safety contrivances

To comply with statutory provisions and to guarantee safe working conditions, multiple safety devices are installed on this system and described in the following chapters.

⚠ WARNING!

Maintaining these devices and ensuring their functionality is essential to prevent injuries and damage to the environment!

3.9.1 Lockable technical room

Only open the technical room to replace the anti-foaming agent and for maintenance (see chapter 7 ”Maintenance”, page 67). During normal operation, keep the technical room closed and locked to prevent unauthorized persons from accessing.

⚠ WARNING!

Only open the technical room under the supervision and responsibility of personnel who are familiar with the risks of the used chemicals and who can be expected to handle these chemicals with caution.

The control cabinet may only be opened when necessary and by qualified electricians.

3.9.2 Double pH meter

The pH sensors are subject to constant wear. With time, this leads to incorrect readings and can thus cause the system to malfunction.

To be able to guarantee a mostly safe operation, the exhaust air cleaning system has been equipped with two pH sensors that monitor each other. If the control system registers a difference between the two measured values, an alarm message is generated.

Despite this redundant configuration, both pH sensors must be calibrated every four weeks. The sensors have a limited life span and must be replaced every year.

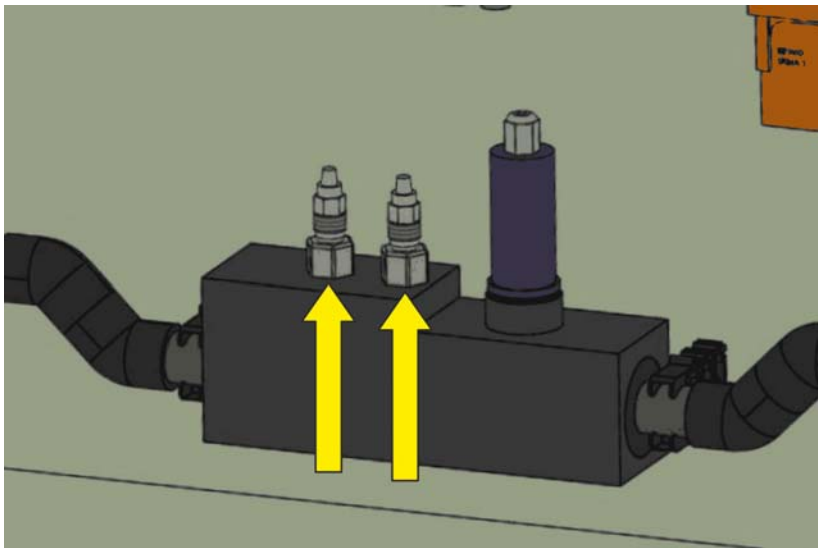


Figure 3-1: pH sensors

3.9.3 Safety valve with self-testing function

The fresh water supply line has an additional safety valve. The reservoir moreover contains an emergency floater.

If the reservoir level control function fails, the emergency floater closes the safety valve.

Every time the reservoir is refilled after draining, the control system tests whether the safety valve functions correctly. This works as follows:

- The water supply valve is opened and the safety valve is closed.
- For a specific period (1 minute), no water flow may be measured.
- After this 1-minute period, the safety valve is re-opened and the water control returns to normal operation.

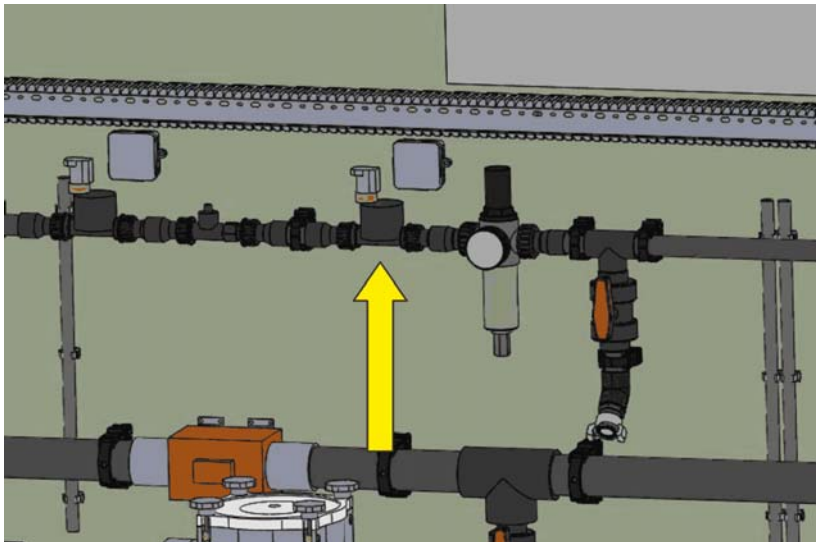


Figure 3-2: Safety valve

The emergency floater and the safety valve are directly connected.

3.9.4 Water supply check valve

The plastic line directly behind the connection for fresh water supply contains a check valve. This valve ensures that no water can return from the exhaust air cleaning system to the water system.

Additionally, the operator must implement possibly necessary measures such as the installation of a system separator.

3.9.5 Protection of the sulfuric acid supply

The line feeding the sulfuric acid from the storage container to the exhaust air cleaning system must not be damaged.

As an additional safeguard, the line has been placed in a rugged PVC pipe on which safety symbols have been affixed.

The sulfuric acid pump is located in a drip tray. The drip tray contains a switching contact. If a leak is detected, the acid pump switches off and an alarm message is generated.

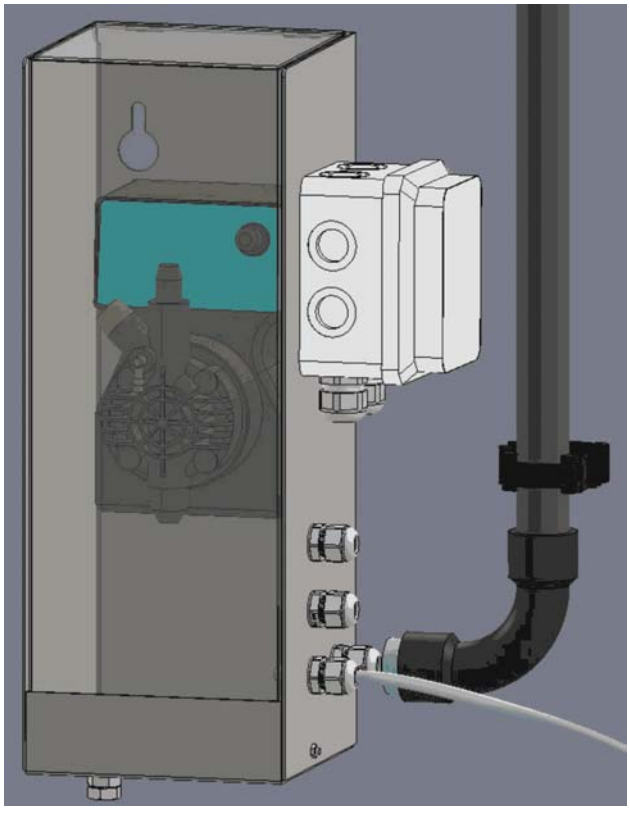


Figure 3-3: Acid pump

A metal cover is installed around the acid pump connection. This cover ensures that no sulfuric acid can spray into the surroundings in case of a leak.

3.9.6 Emergency shower and safety cabinet

The room with the sulfuric acid store contains an emergency shower to be able to flush an injured person immediately in case of a sulfuric acid accident. The shower is connected to the water distribution system. The users are responsible for keeping the main valve open and for preventing freezing of the line.

The emergency shower must be operated shortly once per week to check functioning and to flush the line.

Additionally, delivery includes a safety cabinet with personal protective equipment that must be worn when working with sulfuric acid.

The safety cabinet contains the following protective equipment:

- safety cap;
- safety gloves;
- protective clothing;
- eye wash bottle.

The safety cabinet must be installed at a fixed location near the sulfuric acid store.

Figure 3-4: Emergency shower and safety cabinet

3.10 Safety symbols on the system

NOTICE!

Safety symbols and instructions on the system must always be easily visible and undamaged.

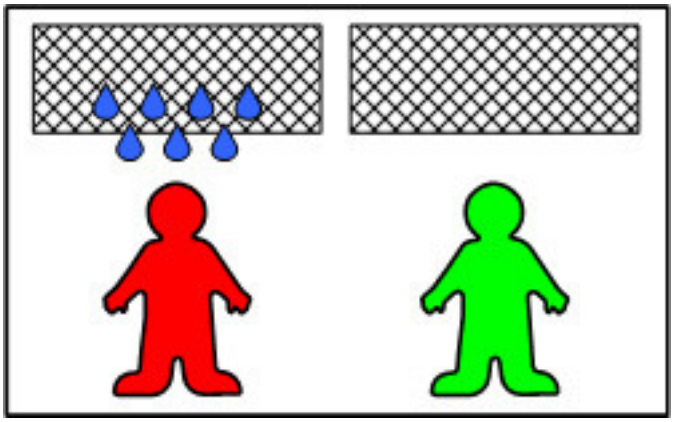
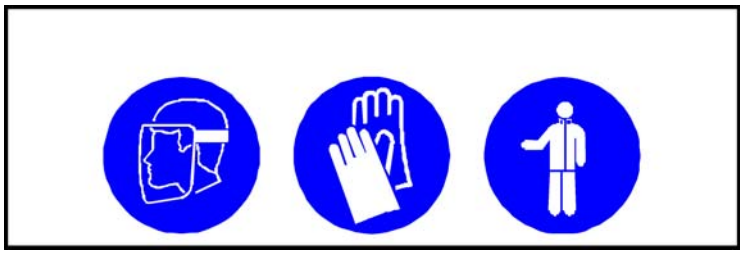
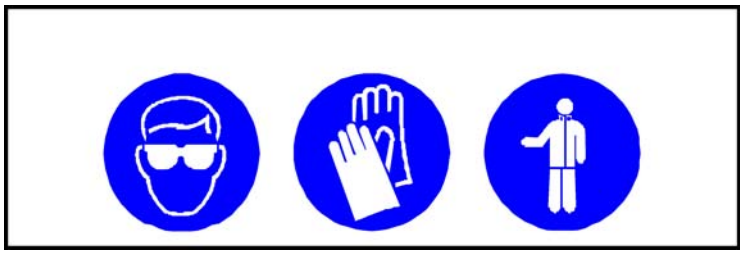
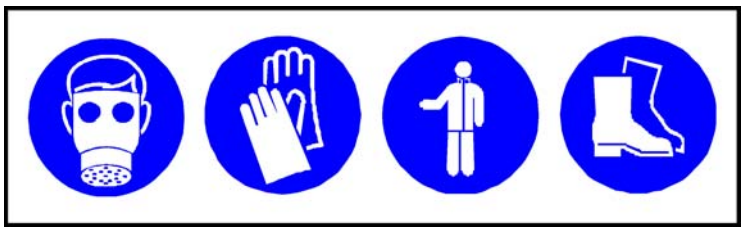
► Clean safety symbols in case they are dirty, e.g. due to dust, animal excrement, feed remains, oil or grease.

► Immediately replace damaged, lost or illegible safety symbols.

► If a safety symbol or instruction is fixed to a part to be replaced, ensure that it will be fixed to the new part as well.

The following safety symbols are attached on and near the exhaust air cleaning system:

Safety symbol		Location
	**Dangerous electric voltage**	• On the control cabinet's exterior in the technical room • On the cabinet of the safety cut-out in the technical room • At the control computer
	**Corrosive, causes serious injuries to eyes, skin, airways and the gastrointestinal tract**	• Near the storage location of the acid containers • Near the dosing pump for sulfuric acid • Near the place where acid is fed into the reservoir
	**Used chemicals:** • **H_2SO_4** = sulfuric acid 96 %	• Near the storage location of the acid containers • Near the dosing pump for sulfuric acid • Near the place where acid is fed into the reservoir • On the supply line between the sulfuric acid store and the exhaust air cleaning system (every meter)

Safety symbol	Location
 **Meaning:** Never enter the area below the filter packages while the exhaust air cleaning system is in operation. The filter packages may be saturated with water and thus become very heavy (especially with excessive contamination). In exceptional situations, the structure might collapse.Switch off the system and wait until no more water flows from the filter packages.	• In front of the area below the filter packages
	• Near the acid containers and the acid pump • On the lid of the acid container and on the filter cover
	• Near the anti-foaming agent supply
	• Near the exhaust air cleaning system (at the filter package sprinklers and below the filter packages, depending on the situation on site)

3.11 Safety symbols to be affixed by the operator

If the fans are located in the same room as the exhaust air cleaning system and unshielded, we recommend affixing the below safety symbol.

	**Danger due to rotating fans**

Attach the safety sign shown in figure 3-5 at the following locations:

- all access points to the technical room;
- all access points to the sulfuric acid store;
- the access point to the pressure chamber;
- all access points to the risk areas of the exhaust air cleaning system, such as
  - the area near the filter package sprinklers;
  - the area below the filter packages (draining of wash water);
  - the area above the filter packages (where the cleaned air leaves the exhaust air cleaning system).

Figure 3-5: Safety sign for the sulfuric acid room

The safety sign indicates the following:

- Corrosive fluid!
- No naked flame and no smoking!
- 80 = hazard identification number for sulfuric acid (corrosive substance); this code is especially important for the transport of chemicals.
- 1830 = UN number (material number) for sulfuric acid.
- No entry to unauthorised persons! Keep the room locked!

3.12 Safety information regarding sulfuric acid

The following warnings required by law apply when working with 51 % to 96 % sulfuric acid (EC no. 231-639-5):

Table 3-1: Warnings sulfuric acid

R35	Causes severe burns.
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S30	Never add water to this product.
S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).

⚠ WARNING!

Also observe the warnings on the packaging and the supplier's safety data sheets. They include first aid and safe storage precautions.

3.12.1 Actions to be taken in the event of a sulfuric acid accident

⚠ WARNING!

Never dilute the acid by adding water. Always add the acid to the water.

In case of inhalation:

- Never inhale sulfuric acid. When the smell is perceivable, the exposure limit has already been exceeded!
- Remove victim to fresh air, place them in a half-seated position and provide artificial respiration, if necessary. Transport to hospital immediately.

In case of contact with eyes:

- Immediately rinse with plenty of water for 15 minutes (remove contact lenses, if applicable). Take victim to ophthalmologist and continue rinsing during transport.

In case of contact with skin:

- Remove contaminated clothing and shoes. In case of skin burns, do not tear off clothing stuck to the skin.
- Rinse affected skin immediately with plenty of water.
- Seek medical advice and transport to hospital, if necessary.
- Do not use (chemical) neutralisation agents, cover wounds with sterile material.

In case of ingestion:

- Rinse mouth, do not induce vomiting.
- Give two glasses of water to drink and transport to hospital immediately.

3.12.2 Cleaning of spilled sulfuric acid

- Wear the prescribed personal protective equipment (see chapter 3.6).
- The spilled product must be confined.
- Absorb the liquid with an inert absorbent material (e.g. sand, but not sawdust) or neutralise it with sodium bicarbonate (e.g. soda; caution: chemical reaction).

NOTICE!

An inert substance does not or only barely reacts with nearly all other fluids.

- Remove the reaction product with plenty of water.
- Drain the cleaning water into the sewage system.
- Label any containers and dispose of them in accordance with local regulations.

3.12.3 Double-walled acid tanks

Only use double-walled acid containers (contact the manufacturer for specifications). The manufacturer inspects these containers for safety every year.

The acid containers are equipped with a built-in suction lance and have chemical quick couplers to connect the suction line.

Figure 3-6: Double-walled acid container

3.13 Safety information regarding the anti-foaming agent

Under normal conditions of use, the anti-foaming agent is not dangerous to humans and the environment. Nevertheless, the following recommendations apply:

- Avoid contact with the skin.
- Avoid contact with the eyes.
- Do not ingest the agent.
- Ensure good ventilation in confined spaces.

First aid measures:

- In case of contact with skin: Wash off with soap and water.
- In case of contact with eyes: Rinse eyes with plenty of water.
- In case of ingestion: Do not induce vomiting. Give one or two glasses of water to drink. Seek medical advice, if necessary.

Environmental precautions:

- Do not drain into surface water or sewage system.
- In case of fire: Collect contaminated firewater separately, do not drain into the sewage system.

Cleaning of spilled liquids:

- Absorb with absorbent material (e.g. sand, acid binder, universal binder, sawdust).

  NOTICE!

  An inert substance does not or only barely reacts with nearly all other fluids.

- Fill into a suitable container for disposal.

Storage:

- Store in closed packaging in a dry and well-ventilated place.
- The temperature must not fall below 0 °C.

4 System description

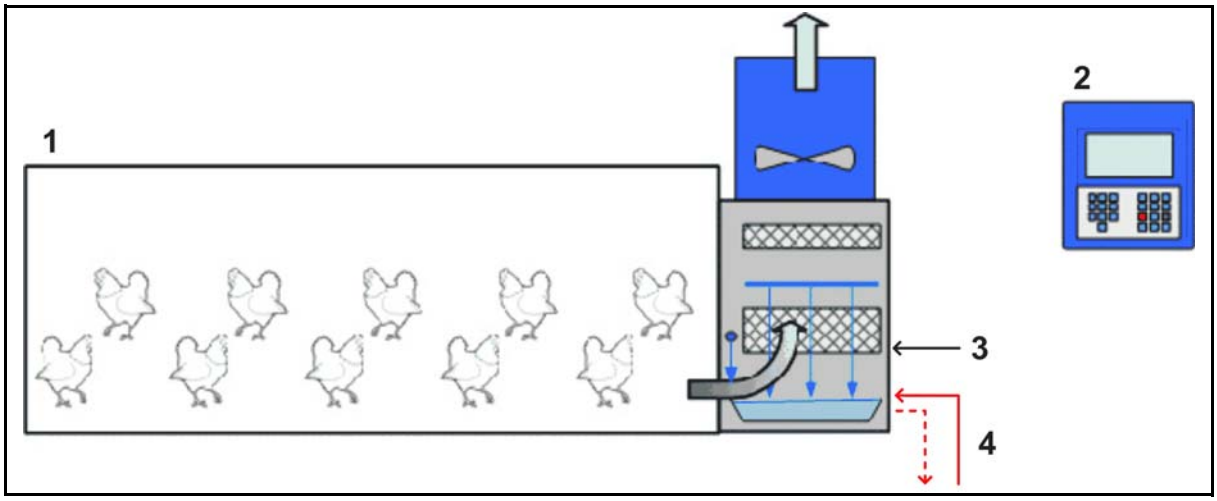
4.1 Structure

The exhaust air cleaning system cleans the exhaust air from livestock buildings so most of the ammonia, odorous substances and fine dust in the air can be filtered.

For this purpose, the contaminated air is pressed from the barn's pressure chamber through the exhaust air cleaning system's filter package. A large quantity of slightly acid water flows through the filter package, binding the ammonia and forming salts as a reaction. The process water returns to the reservoir and is then pumped back to the filter package.

The air that leaves the exhaust air cleaning system is mostly free from ammonia, odorous substances and fine dust. The separation rate depends on the requirements for which the system has been designed (e.g. 70 % or 95 %).

As soon as the wash water has reached a certain conductivity, i.e. its cleaning ability is reduced, the system automatically drains the contaminated wash water.



1	House	3	Exhaust air cleaning system
2	Computer	4	Additives and drain water

Figure 4-1: Process in a livestock building

The exhaust air cleaning system is equipped with a supply system for chemicals and fresh water. The technical room contains a control cabinet with computer. figure 4-1 shows the entire system. During operation, the sulfuric acid container and, if applicable, the anti-foaming agent must be replaced regularly. Additionally, the filter packages and the water reservoir require cleaning from time to time.

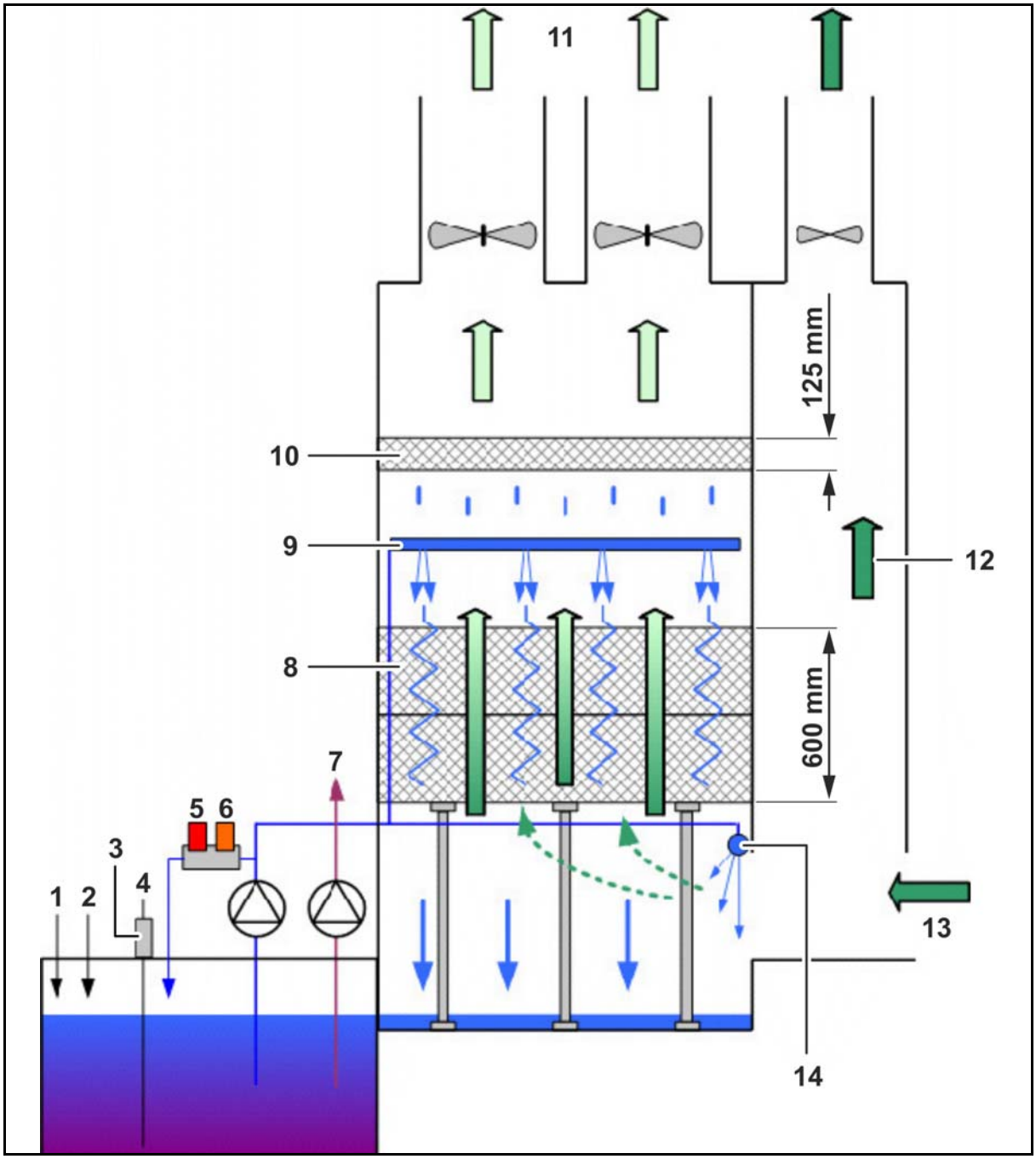
The exhaust air cleaning system consists of multiple rooms:

- **Process room:** This is where the actual cleaning process takes place. The room contains the water reservoir and the filter packages (see figure 4-2). Additionally, the sulfuric acid is added to the water to maintain the correct water composition here.

Figure 4-2: Filter package with sprinkler pipe

The exhaust air enters at one side of the process room. The cleaned air leaves the room at the top and passes through the droplet separator. The droplet separator collects the condensation and returns it to the filter package or the wash water. The air blown outside may have an increased level of humidity.

- **Technical room:** This is where the cleaning process is monitored and the anti-foaming agent is added to the water. The room also contains the circulation pump and the drain pump, the pH meters, the conductivity meter, the dosing pump for the anti-foaming agent and the water valves. A control cabinet including the system control is also located here (see chapter 4.2 ”System control”, page 34).
- Storage of sulfuric acid container(s) with dosing pump (see chapter 4.3.2 ”Sulfuric acid supply”, page 41).



1	Anti-foaming agent	8	Filter package
2	Acid	9	Package sprinklers
3	Water level measuring	10	Droplet separator
4	Fresh water	11	Clean gas
5	pH value	12	Bypass
6	Conductivity	13	House air
7	Desludge container	14	Primary sprinkler

Figure 4-3: General structure of the exhaust air cleaning system

figure 4-4 shows the control and regulation devices for the wash water.

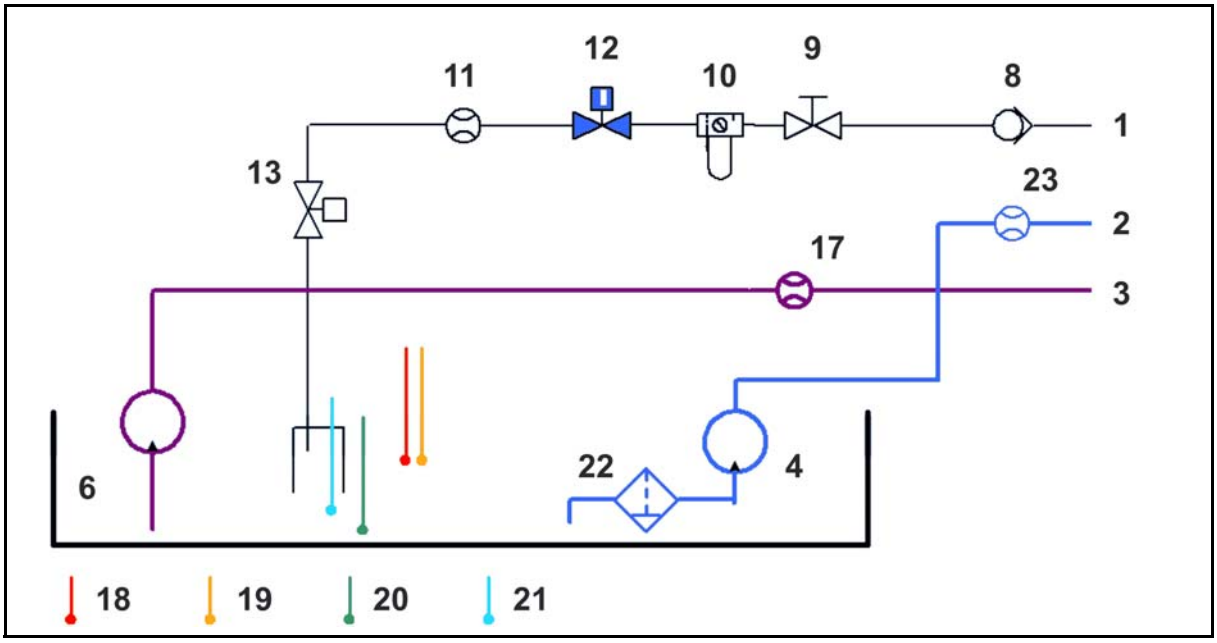


Figure 4-4: Control and regulation devices

1	Tap water supply	
2	Wash water, from the circulation pump to the primary sprinklers and package sprinklers	
3	Drain line, to the desludge container	
4	Circulation pump	This pump ensures constant circulation of the wash water from the reservoir to the filter packages and primary sprinklers.
6	Drain pump	When the wash water is too contaminated, this pump drains the water, e.g. into a desludge container. The amount of drain water is measured and saved automatically.
8	Check valve	This valve prevents process water from returning to the water distribution network (required by law).
9	Manual valve	
10	Pressure reducing valve with filter and manometer	This valve reduces a possibly too high pipe pressure to a maximum of 3 bar.
11	Water meter to read the total consumption	
12	Safety valve	If the water level in the reservoir exceeds the absolute maximum, this valve closes the water pipe (error).
13	Solenoid valve that fills the reservoir with clean water	The control system ensures that the water level remains as constant as possible.

17	Drain water meter	This meter indicates the flow volume and transmits these data to the central computer for legally required storage.
18	Sensor for pH value measuring (double)	This sensor constantly measures the water's level of acidity to ensure that sulfuric acid is regularly added to the reservoir. The sensor has a limited life span (1 to 2 years) and must be replaced at regular intervals.
19	Conductivity sensor	This sensor is connected to the conductivity meter. The wash water is drained at a specific time based on the conductivity.
20	Emergency floater	If the water level reaches this switch (i.e. the level is too high, possibly due to incorrect process control), the safety valve is deactivated.
21	Water level sensor	This sensor constantly reports the water level to the control system so the control system fills the reservoir with clean water, if necessary.
22	Water filter for circulation pump	
23	Water meter	The circulation amount is read here (m^3/h). When the amount is below 20 %, the pump switches off (dry running protection).

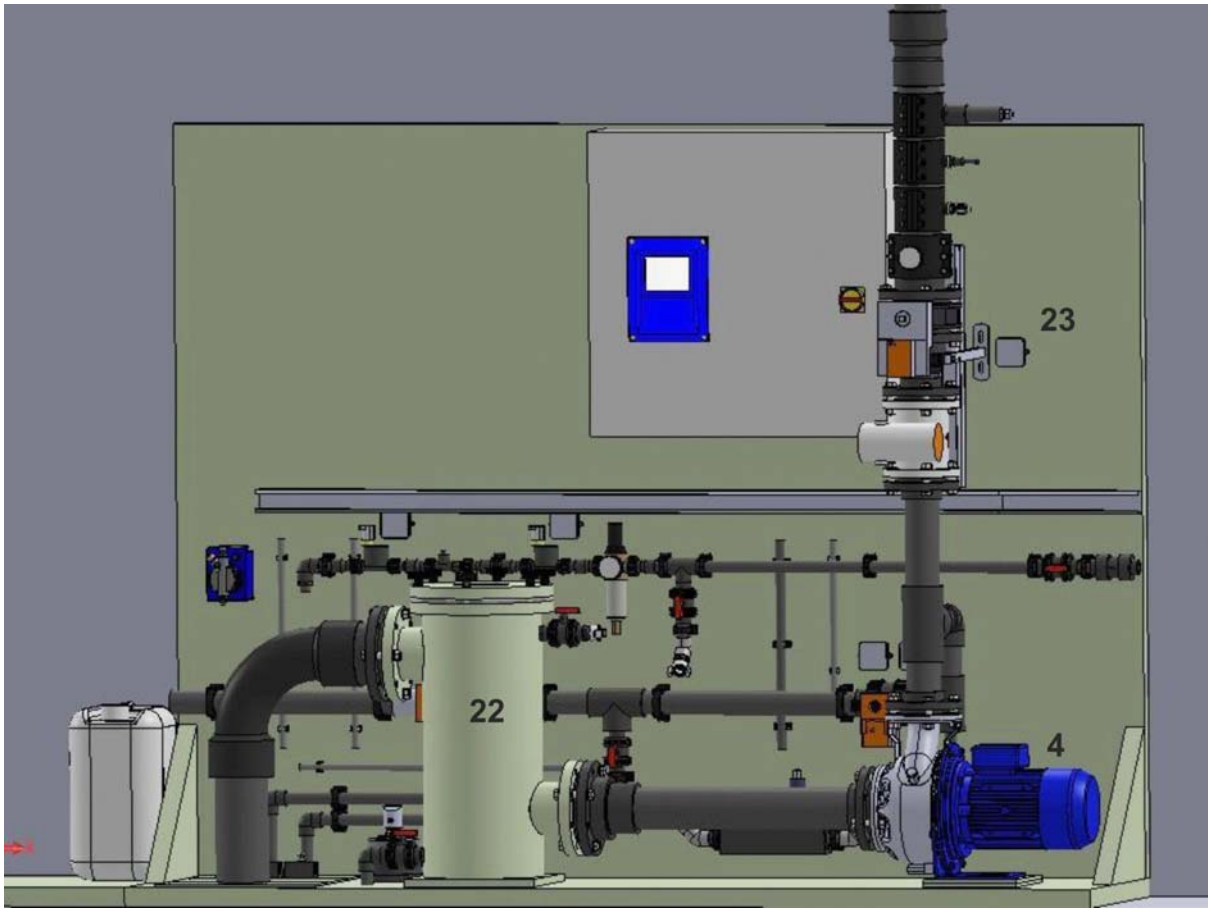
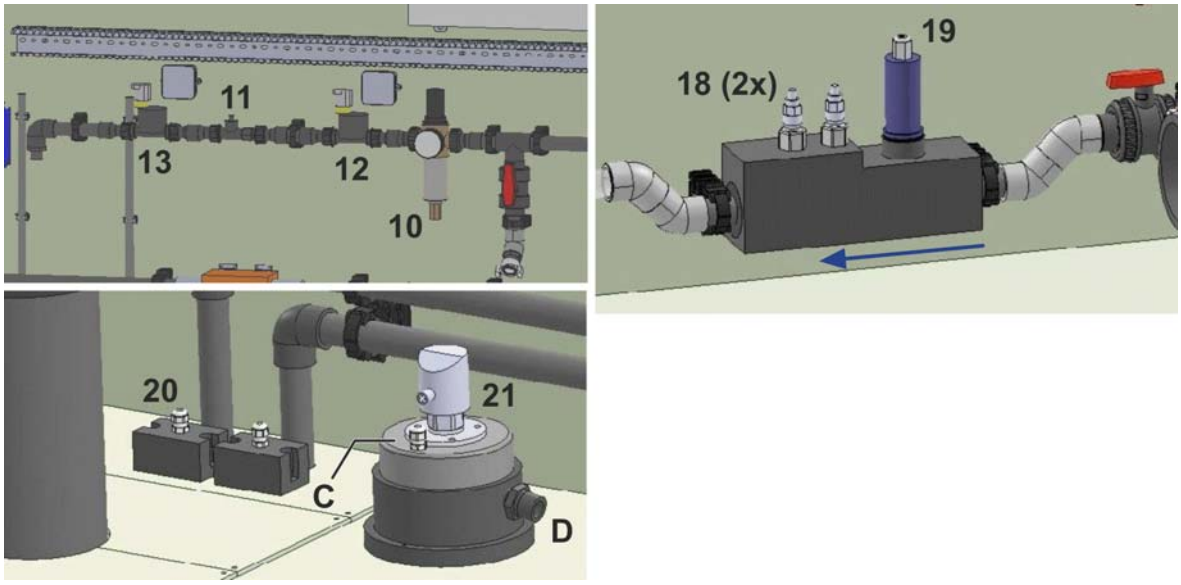


Figure 4-5: Technical room with process control (key figure 4-4)



	Fresh water supply		
10	Water filter and pressure reducing valve	12	Safety valve
11	Water meter	13	Solenoid valve for water supply
	Water level measuring and liquid supply		
20	Emergency floater	C	Point of supply for anti-foaming agent
21	Water level sensor	D	Point of supply for fresh water (from solenoid valve 13)
	Water quality measuring		
18	pH sensor (2 units)		
19	Conductivity sensor		

Figure 4-6: Details technical room

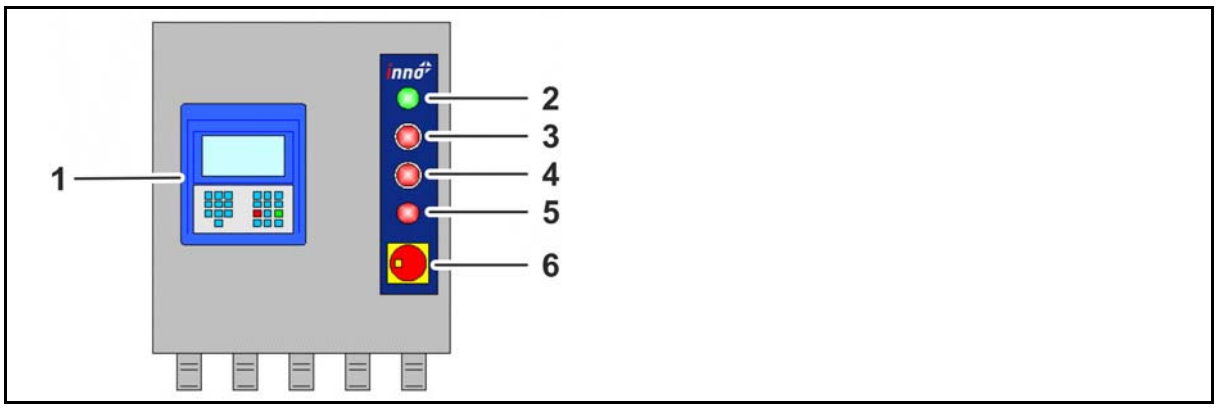
Other components in the process room:

- **Container with anti-foaming agent:** For example a container with a volume of 5 L or 25 kg that is easy to replace. The container is not equipped with fill level monitoring.
- **Dosing pump for anti-foaming agent:** This dosing pump adds the anti-foaming agent to the reservoir at regular times. The amount added per pump cycle is set by means of a manual switch at the pump. The pump can also be activated manually (manual operation, see chapter 5.12.2 ”Manual function control”, page 62).
- **Conductivity meter:** Electronic unit to which the conductivity sensor is connected. This unit is connected to the control cabinet.

- **Control cabinet with computer:** All electrical and electronic components of the technical room are connected to this cabinet. The computer receives data from all sensors and controls pumps and valves.

4.2 System control

The system is controlled at the control cabinet in the technical room (operation see chapter 5 ”Operation”, page 46).



1	Computer	4	High water (with reset button)
2	Logging active	5	Alarm
3	Filter package contaminated (with reset button)	6	Main switch

Figure 4-7: Control cabinet in the technical room

The cabinet is equipped with the following components:

- **Computer:** All processes are set and controlled here. The display shows various information.
- **Main switch** for electrical connection of the entire exhaust air cleaning system. The switch can be locked with a padlock to prevent accidental activation.
- **Lamp [Alarm]:** This lamp is lit in case of an error.

NOTICE!

The lamp [Alarm] only reacts to alarm groups that have been set to On.

- **Push button with lamp [High water]:** If this lamp is lit, the system has been switched off because the water level is too high.

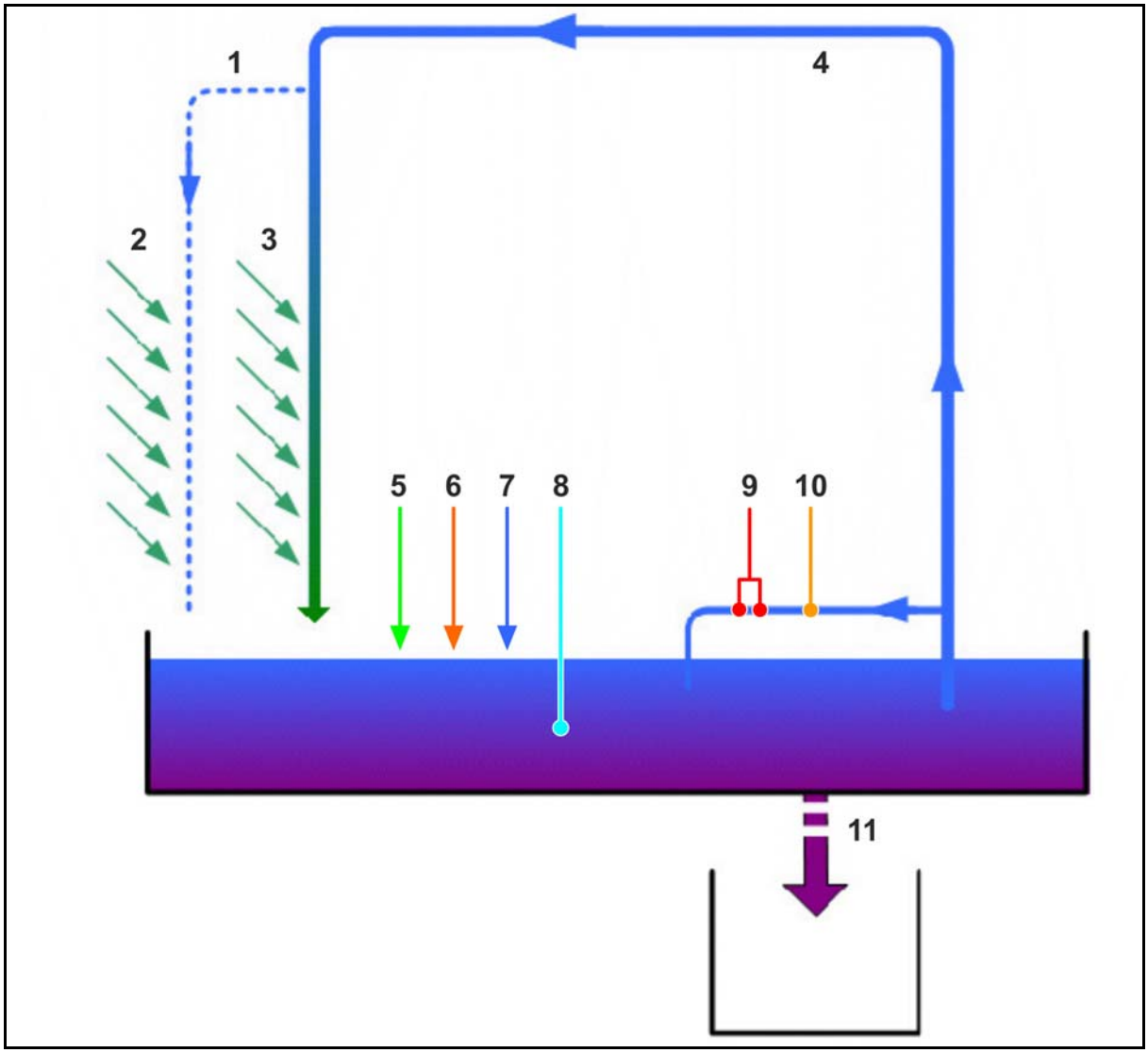
- **Push button with lamp [Filter package contaminated]:** This lamp is lit when the filter packages are contaminated so much that they require cleaning (calculated by the computer based on the ventilation capacity and the pressure loss above the packages).
- **Lamp [Logging]:** This lamp is lit when automatic data recording is active.

The control cabinet also contains the network interface and the motor protection switches.

4.3 Function

4.3.1 Chemical process

figure 4-8 shows in a diagram how the cleaning process works.



1	Primary sprinkling	7	Clean water supply
2	Dust	8	Water level measuring
3	Ammonia	9	pH value measuring
4	Wash water	10	Conductivity measuring
5	Anti-foaming agent supply	11	Drain water
6	Sulfuric acid supply		

Figure 4-8: Liquid flows

The exhaust air cleaning system's reservoir is filled with tap water. Chemicals are added to this water:

- sulfuric acid to lower the level of acidity (pH value) and
- anti-foaming agent to prevent foaming of the wash water.

The wash water from the reservoir is sprayed continuously and evenly onto the filter packages.

The contaminated house air flows into the process room and is humidified by a primary sprinkler. This humidifying process ensures that most of the dust in the air is separated and collected in the water reservoir.

The air is then blown upwards through the wet filter package. The air (which contains ammonia) thus comes into contact with the wash water. Due to this contact, the ammonia reacts to ammonia hydroxide and flows back into the reservoir, together with the wash water.

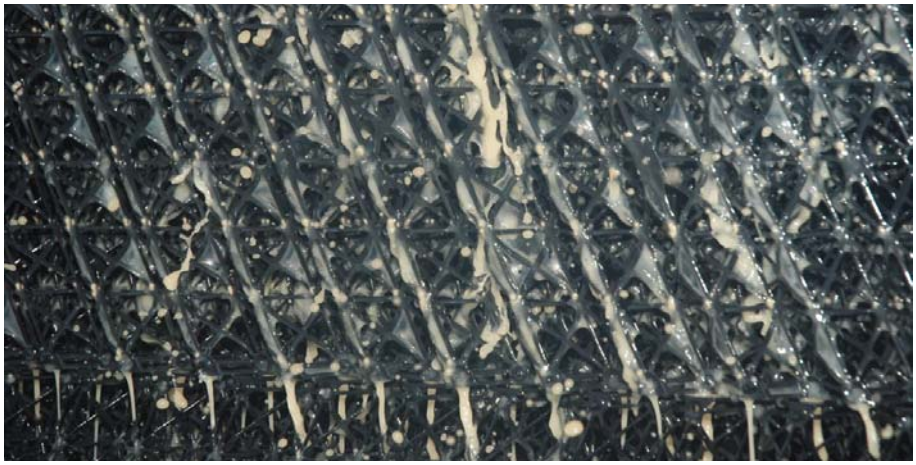


Figure 4-9: Wash water on the filter package

The lower the pH value of the wash water, the better the ammonia is absorbed from the air.

Part of the house air flows directly outside through the bypass and is thus not cleaned.

In the reservoir, the ammonia reacts with the sulfuric acid and forms a salt (ammonium sulfate). If the system is in operation for a longer period, more and more salt collects in the reservoir, creating a thick substance with time.

Since there is less and less sulfuric acid in the reservoir due to the formation of salt, the wash water can absorb less and less ammonia from the air. To prevent this, an acid pump automatically and permanently adds new sulfuric acid to the reservoir.

As soon as excessive amounts of salt form in the reservoir, preventing ideal cleaning with the wash water, the water is drained and the reservoir re-filled with tap water.

* Before this draining phase, the control system will stop the supply of sulfuric acid, which causes a higher level of acidity (e.g. from 4 to 6). The water may only be drained after the wash water is relatively neutral again (pH = 6). This neutralisation phase may take up to 3 hours (depending on the system's size).

NOTICE!

pH = level of acidity. Pure water has a pH value of 7 (= neutral). A pH value below 7 means that the water is acidic. Acidic water therefore has a low level of acidity. A pH value above 7 indicates that the water is alkaline (basic). pH values range from 0 (extremely acidic) to 14 (extremely alkaline).

During draining, the circulation pump continues to move the remaining wash water through the filter packages.

During the normal cleaning process, water is lost through evaporation, but also because part of it leaves the building together with the air. A water level regulation ensures that clean water is added when necessary and that the water level remains constant.

NOTICE!

The process specifications mostly depend on the respective system and are indicated in the delivery certificate. Some reference values:

► pH value during the cleaning process: 3 - 5

► Conductivity of clean water: 0 - 1 mS/cm

► Conductivity when saturated (start of draining): 170 mS/cm

To be able to control the process well, the following meters are installed in the technical room:

- **pH meters:** These meters check the wash water's level of acidity. When the pH value is too high (and ammonia absorption drops), more acid is added.
- **Conductivity meter:** This meter controls the wash water's salt content. As soon as a specific level is reached, the water is too contaminated and neutralisation (followed by draining) is activated.
- **Water level meter:** This meter provides the information required to maintain the water level and to finish the draining.

* Optional. Not compliant with the German Agricultural Society (DLG). Not permitted in Germany!

The following reaction takes place:

$$NH_3 + H_2SO_4 + xxx \rightarrow (NH_4)_2SO_4 + xxx$$

- **NH_3** = ammonia
- **H_2SO_4** = sulfuric acid
- **$(NH_4)_2SO$** = ammonium sulfate
- **xxx** = various other elements of air and water

figure 4-10 shows a schematic diagram of the entire process.

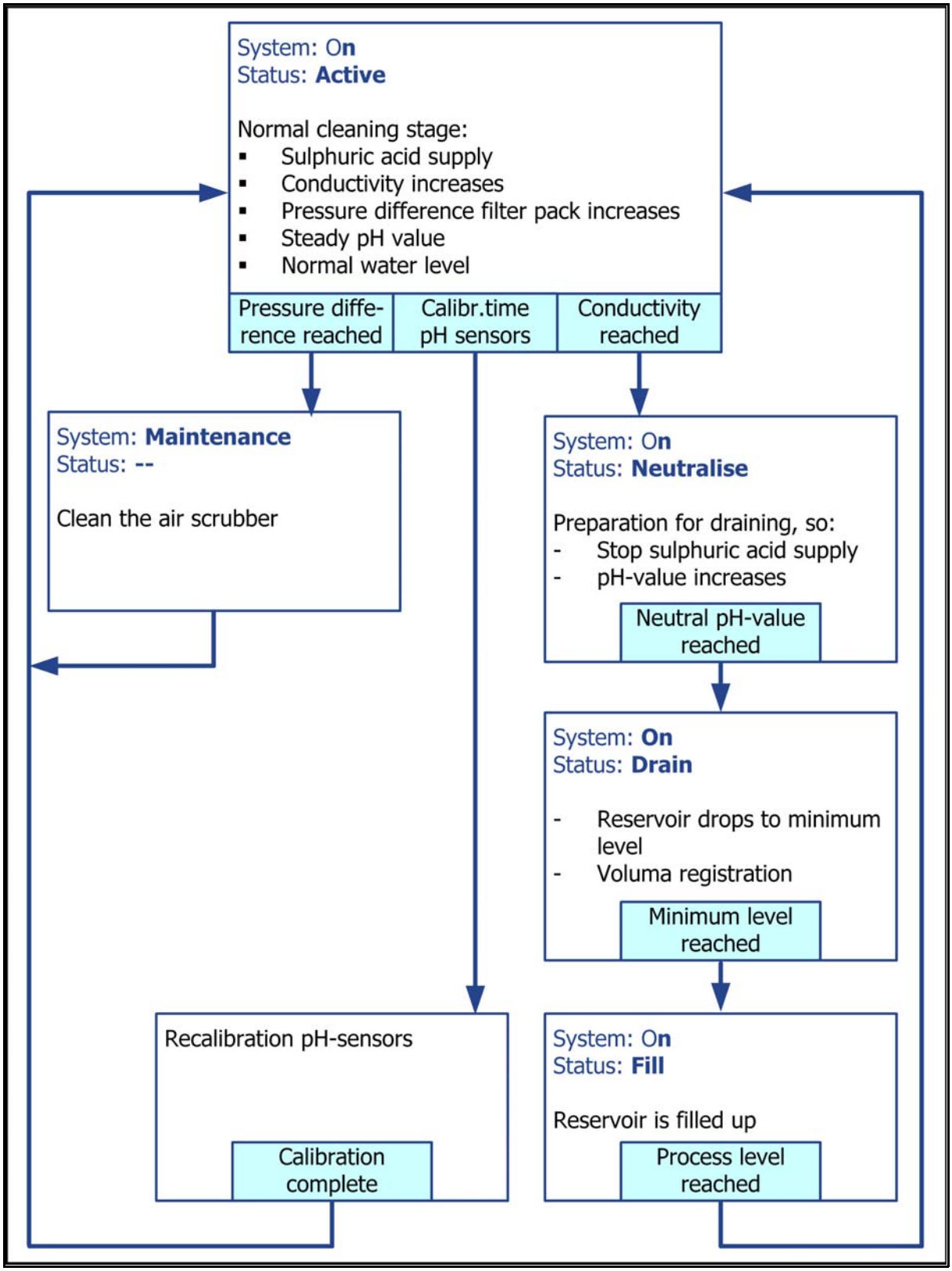
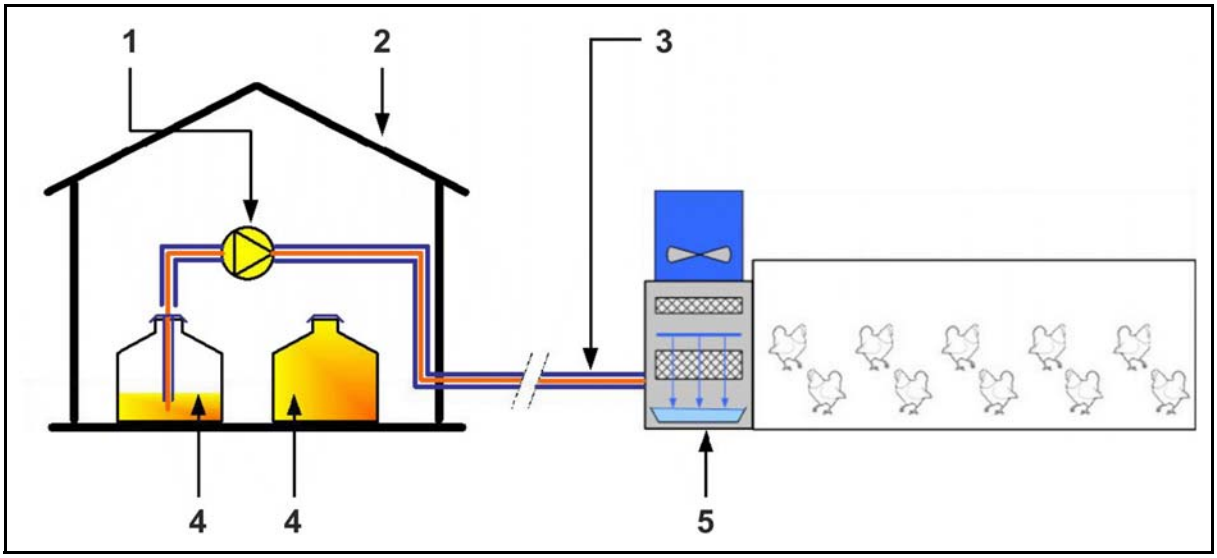


Figure 4-10: Process in the exhaust air cleaning system

4.3.2 Sulfuric acid supply

figure 4-11 shows how the sulfuric acid is supplied to the exhaust air cleaning system if the system is equipped with a container replacement system.



1	Acid pump	4	Shielded acid line
2	Frost-free storage	5	Exhaust air cleaning system
3	Acid container		

Figure 4-11: Supply of sulfuric acid

⚠ WARNING!

Sulfuric acid is very aggressive.

Sulfuric acid can cause serious injuries and environmental damage.

► Keep the storage room tightly locked.

⚠ WARNING!

When water comes into contact with the acid, this causes strong reactions and vapours that are hazardous to the health.

► Always prevent water from coming into contact with the concentrated acid.

► The problems will not occur if (a small quantity of) the acid is added to a large amount of water.

The most important points:

- The acid containers must be stored in a well-ventilated, covered and locked room with acid-resistant and impermeable floor.

Figure 4-12: Acid container

- The temperature in the storage room must be at least 5 °C.
- Storage at too low temperatures can cause problems when pumping the acid into the exhaust air cleaning system.
- The acid pump is installed directly next to the containers. A drip tray is installed below the acid pump. The drip tray contains a sensor that sends an alarm message to the computer in case of leaking.

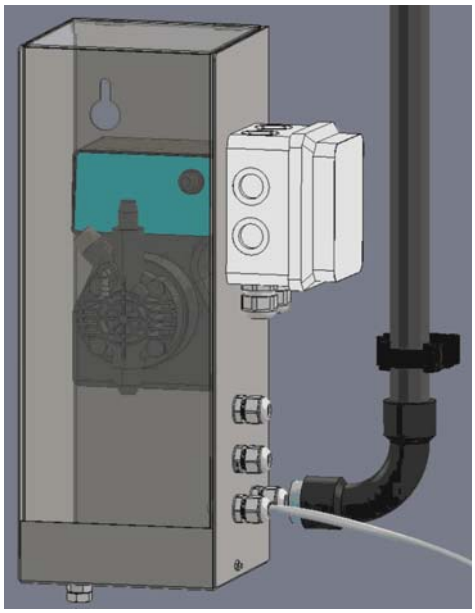


Figure 4-13: Acid pump

- The acid pump is connected via a connector to a wall socket that is part of the exhaust air cleaning system's control system. When the main switch of the control system is switched off, the acid pump also switches off automatically and immediately.
- A check valve in the acid container prevents the acid from flowing back from the line into the container.
- The sulfuric acid line starts in the exhaust air cleaning system's reservoir.

  The outlet is located below the water level.
- The outlet is equipped with an injector.

  This ensures that no water can return to the acid line.

Figure 4-14: Outlet injector

- The acid line to the exhaust air cleaning system may be very long and is laid in a stable PVC pipe to prevent mechanical influence. Pictographs affixed to the pipe indicate that this is a sulfuric acid line.

NOTICE!

Observe the instructions on how to clean up spilled sulfuric acid in chapter 3.12.2.

4.4 Technical data

4.4.1 General specifications

The following specifications apply for the exhaust air cleaning system:

Table 4-1: Technical data – general specifications

Data	Value
Main dimensions	system-specific
Framework material	stainless steel / PP / PE
Connection voltage	3 x 400 V / 50 Hz + neutral + PE
Max. energy consumption	see delivery certificate
Water consumption	see delivery certificate
Sound level measured at a distance of 1 m from the exterior, around the entire cabin	70 dB(A)
Sulfuric acid to be used (H_2SO_4)	concentration 96 % to 98 %
Consumption of sulfuric acid (H_2SO_4)	see delivery certificate
Anti-foaming agent to be used	Antifoam Inno+
pH value inside the exhaust air cleaning system	2 to 7 (depending on the process stage)
Cleaning capacity	see delivery certificate
Storage temperature anti-foaming agent	> 0 °C
Storage temperature sulfuric acid	> 5 °C

4.4.2 Logging data

The SD card of the memory module (data logger) contains an Excel document. The following data are saved in this file:

- pH value
- Conductivity [mS]
- Pressure difference above exhaust air cleaning system [Pa]
- Pressure monitoring for signal "exhaust air cleaning system contaminated" [1 = contaminated, 0 = OK]
- Energy consumption of exhaust air cleaning system [kWh]
- Clean water consumption of exhaust air cleaning system [m^3]
- Registered desludge amount [m^3]
- Operating hours of exhaust air cleaning system
- Maintenance hours of exhaust air cleaning system
- Idle hours of exhaust air cleaning system
- Air temperature inside barn
- Air temperature of exhaust air cleaning system
- Wash water temperature
- Wash water flow rate of acid pump [m^3/h]
- Pump runtime based on "min flow pomp" [h]
- Ventilation flow rate per fan group / fan [m^3/h (excluding bypass ventilation)
- Total ventilation flow rate [m^3/h] for frequency-controlled (group 1) and switched ventilation (group 2) together (excluding bypass ventilation)
- Operating hours bypass (ventilation around the exhaust air cleaning system) per group / fan [m^3/h]

5 Operation

5.1 Safety

⚠ WARNING!

Hazard to the health in the process room

- ► Only enter the process room during error-free operation!
- ► Do not enter the process room if an error occurred with the pH regulation within the past 24 hours!
- ► Wear the personal protective equipment as described in chapter 3.6.

⚠ CAUTION!

Danger of slipping and tripping in the process room

- ► Open the doors to the process room carefully!
- ► Wear the personal protective equipment as described in chapter 3.6.

5.2 Introduction

The exhaust air cleaning system is operated by the computer at the control cabinet in the technical room. The following chapters describe how to operate the system.

5.3 Display and buttons

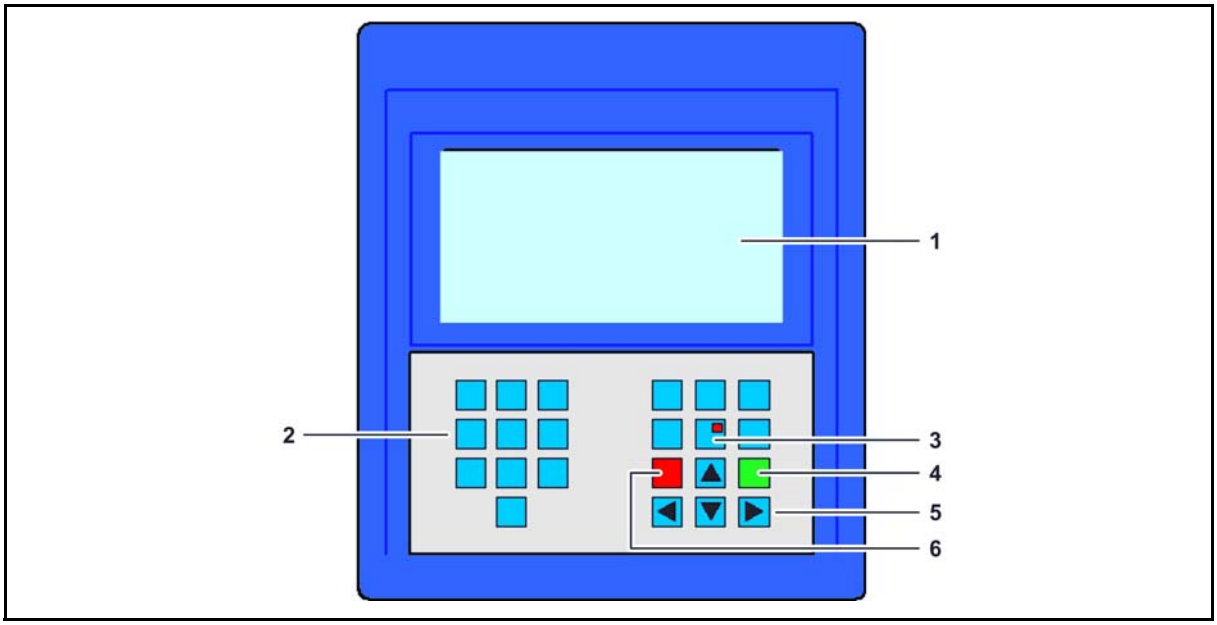


Figure 5-1: Computer

1	**Display**	Shows all information in menus so that the user can view the status of the exhaust air cleaning system, the active alarms, etc.
2	**Numeric keypad**	Use this keypad e.g. to enter the access code or the jump to a menu row shown on the display.
3	**Alarm button with LED display**	Press this button to go directly to the menu **Alarm status**. • **LED off:** No active alarm, system works correctly (provided the power supply is on). • **LED on:** There is an active error. Press this button for more details. • **LED flashes:** There is an error in an alarm group that was switched off manually. Press this button for more details.
4	**Enter button (green)**	Press this button to activate the row with the cursor. Use the button to change values, to confirm an input or to switch to a submenu.
5	**Arrow keys**	Use these keys to navigate through the rows and fields of the displayed menu. These keys can also be used to increase or reduce a value (as soon as the corresponding field has been activated with the Enter button and the cursor is transparent).
6	**Return button (red)**	Use this button to return to a superior menu. If the menu field has been activated, this can be undone by pressing this button.

Observe the following notes for operation:

- There are two options to reach a submenu:
  - Use the arrow keys and press the Enter button.
  - Enter the number of the correct row.
- Press the Return button to return to a superior level.

NOTICE!

If no buttons are pressed for a specific period, the Overview menu opens automatically.

5.4 Menu structure

figure 5-2 shows the menu structure of the exhaust air cleaning system.

Overview			
	Main menu		
		1 - Air cleaner	
			11 - pH regulation
			12 - Level regulation
			13 - Drain regulation
			...
		2 - Overviews	
			21 - pH
			22 - Water usage
			...
			29 - Metering counters
		3 - Alarms	
			31 - Alarm status
		4 - Manual control	
		5 - System	
			51 - Operation

Figure 5-2: General menu structure

5.5 Overview menu

The standard display menu is the **Overview** menu. This menu is displayed if no buttons have been pressed for some time or if the Return button was pressed multiple times. figure 5-3 shows the menu.

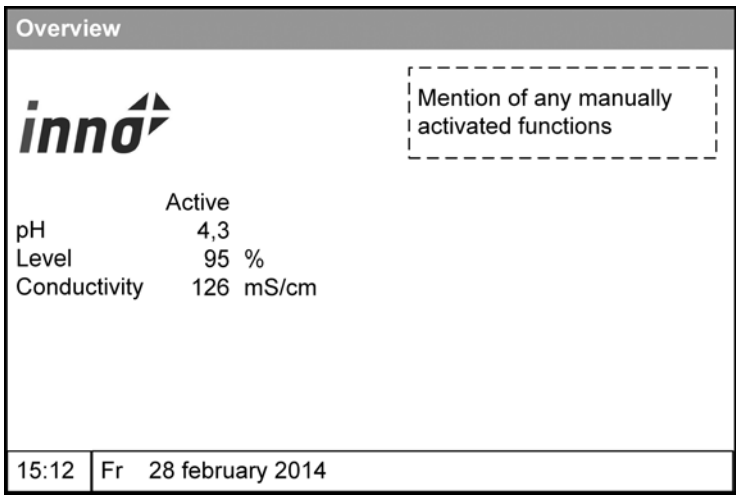


Figure 5-3: Overview menu

The **Overview** menu contains the following information:

Status	Possible statuses are: • Active (most common status) • Neutralise • Drain • Test safety valve • Fill The system automatically passes through these statuses, see the explanation in chapter 4.3.1.
pH	Shows the current level of acidity of the reservoir's water. Normal values are: • Status "Active": pH initially drops from 7 to approx. 2 to 4 and then remains constant. • Status "Neutralise": pH increases up to 6. • Status "Drain": pH = 6 • Status "Fill": pH increases up to 7.
Level (%)	Shows the water level in the reservoir. Normal values are: • Status "Active" and "Neutralise": The control range is approx. 95 % to 105 %. • Status "Drain": The value drops to 0 % to 10 %. • Status "Fill": The value increases to 95 % to 105 %.

Conductivity (mS/cm)	Shows the current conductivity value; this value will increase during the cleaning process (status "Active") as a result of salt formation. Normal values are: • Status "Active": Value increases up to max. 170. • Start neutralising followed by draining at a value of 170. • Status "Fill": Value between 5 and 30.
Pressure difference (Pa)	This is the pressure difference above the filter package. The measured value indicates the degree of contamination of the filter package. Normal values are: • Status "Active": between 0 and approx. 60 to 70 Pa • Alarm limit: 80 Pa

Press the Enter button to return to the main menu.

5.6 Main menu

The **main menu** does not show actual content information, but is mainly used to select specific details the user wants to see (see figure 5-4).

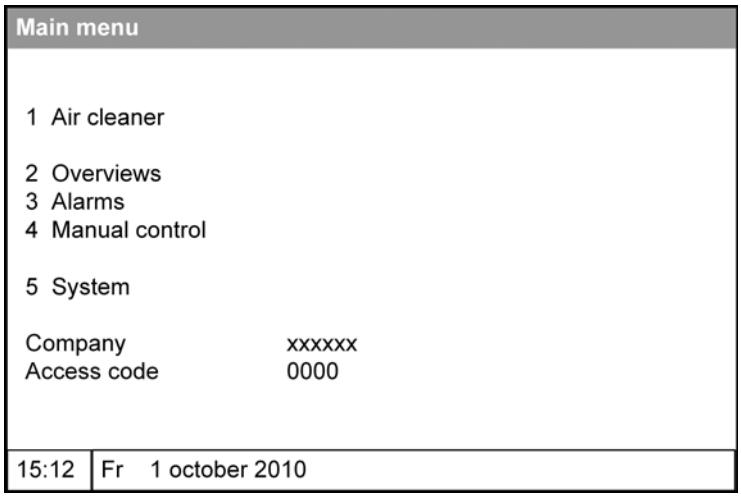


Figure 5-4: Main menu

Activate one of the shown menus (by using the arrow keys and the Enter button or by entering a number) to access the selected submenu.

Air cleaner	Indicates the general status of the system in brief. It is also possible to open submenus to view the process settings (see chapter 5.9 ”Detailed status information”, page 53).
Overviews	This submenu shows various usage information (see chapter 5.10 ”Overviews of stored values”, page 59).
Alarms	For information regarding the alarms, see chapter 8 ”Troubleshooting”, page 92.
Manual control	For switching specific functions into manual mode (see chapter 5.12 ”Manual mode”, page 62).
System	"System" refers to the operation of the computer (see chapter 5.13 ”System settings”, page 63).
Company	Enter the code provided by the manufacturer here.
Access code	Enter a personal code here (only applicable if this code was actually defined by the main user; see chapter 5.14 ”Access codes”, page 64).

NOTICE!

If no company code (and possibly no access code) is entered, opening the menus and reading the system's status, here the process values, is still possible. However, settings cannot be configured or changed.

5.7 Switching on the system

1. Switch on the main switch.
2. Open the **main menu**.
3. Go to the row **System**.
4. Use the arrow keys to move the cursor into the right-hand column (to **Off**).
5. Press the Enter button. The cursors turns transparent.
6. Press the arrow keys to change the text to **On**.
7. Press the Enter button to confirm the new status.

5.8 Switching off the system

If you need to switch off the exhaust air cleaning system (e.g. for extensive maintenance), proceed as follows:

1. Open the **main menu**.
2. Go to the row **System**.
3. Use the arrow keys to move the cursor into the right-hand column (to **On**).
4. Press the Enter button. The cursors turns transparent.
5. Press the arrow keys to change the text to **Off**.
6. Press the Enter button to confirm the new status.

5.9 Detailed status information

Use the menu **Air cleaner** (1) to view current settings of the exhaust air cleaning system and the status of the different sensors, pumps, etc. (see figure 5-5).

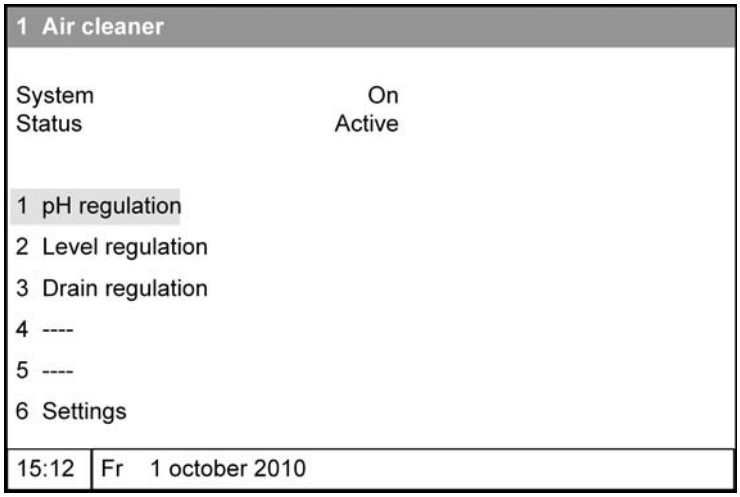


Figure 5-5: Air cleaner menu

5.9.1 System and Status

The exhaust air cleaning system can be in one of the following situations:

- **On** = Normal operation
- **Off** = All processes have been stopped, i.e. there is no circulation, draining or chemical supply.
- **Maintenance** = All processes have been stopped, i.e. there is no circulation, draining or chemical supply. Select this system situation if the exhaust air cleaning system was stopped for maintenance.

The system situation must be set manually (see chapter 5.11 ”Setting the system situation”, page 61).

NOTICE!

"Off" and "Maintenance" are identical situations for the system, but the computer registers them as different situations.

The **status** depends on the process inside the exhaust air cleaning system. The following statuses are possible:

- **Active:** The exhaust air cleaning system is in the normal cleaning phase (and system = **On**).
- **Neutralise:** Sulfuric acid supply is stopped and the reservoir will be drained shortly (and system = **On**).
- **Drain:** The reservoir's water is drained to the desludge container (and system = **On**).
- **Test safety valve:** After the water has been drained, the correct functioning of the safety valve is checked for a short period (and system = **On**).
- **Fill:** After draining, the reservoir is refilled with fresh water (and system = **On**).

The **status** cannot be set manually.

NOTICE!

The system situation and the status are also indicated in the process in figure 4-10.

5.9.2 pH regulation menu (11)

Overview			
	Main menu		
		1 - Air cleaner	
			11 - pH regulation
			12 - Level regulation
			13 - Drain regulation
			...
			16 - Settings

The following information is displayed:

- **pH value:** The level of acidity maintained in the reservoir is displayed. If the current value exceeds the set value, sulfuric acid is added.
- **pH measuring value:** Current level of acidity.
- **Calibration date:** The last calibration date of both sensors is displayed.
- **Start of use:** The installation date of both sensors is displayed.
- **Chemicals pump:** Indicates whether sulfuric acid is currently being added or not.

5.9.3 Level regulation menu (12)

Overview			
	Main menu		
		1 - Air cleaner	
			11 - pH regulation
			12 - Level regulation
			13 - Drain regulation
			...
			16 - Settings

The following information is displayed:

- **Level:** The current water level in the reservoir. During normal operation, the level varies between 95 % and 105 %.
- **Supply valve:** Indicates whether fresh water is currently being added to the system or not.
- **Current:** If the supply valve is open, you can see here how much water is currently being added (mean value: approx. 20 L/min, depending on the water pressure on site).

5.9.4 Drain regulation menu (13) (optional)

NOTICE!

Not compliant with the German Agricultural Society (DLG). Not permitted in Germany.

Overview			
	Main menu		
		1 - Air cleaner	
			11 - pH regulation
			12 - Level regulation
			13 - Drain regulation
			...
			16 - Settings

The following information is displayed:

- **pH draining:** If the pH value increases to this level during neutralisation, draining starts.**

  pH measuring value: The current level of acidity.

  Conductivity: If the conductivity increases to this level during the active phase, the system switches to neutralisation (to prepare for draining).

  Conductivity measuring value: The current conductivity value.

  Drain pump: Indicates whether the drain pump is currently switched on or not (this can take between 20 minutes and up to 3 hours, depending on the system's size).

  Flow: If the drain pump is active, the current drain amount is displayed here (mean value amounts to 30 L/min).

  Drain dates: The last two dates of draining are indicated here.

** Set pH draining to 1 for DLG-compliant operation.

5.9.5 Settings menu (16)

Overview			
	Main menu		
		1 - Air cleaner	
			11 - pH regulation
			12 - Level regulation
			13 - Drain regulation
			...
			16 - Settings

Use this menu to set how much anti-foaming agent is added to the wash water (runtime and interval of the dosing pump).

Additionally, the pH sensors can be calibrated in this menu.

5.10 Overviews of stored values

Use the menu **Overviews** (2) to view the different consumption data and stored values over a longer period for each main group (see figure 5-6).

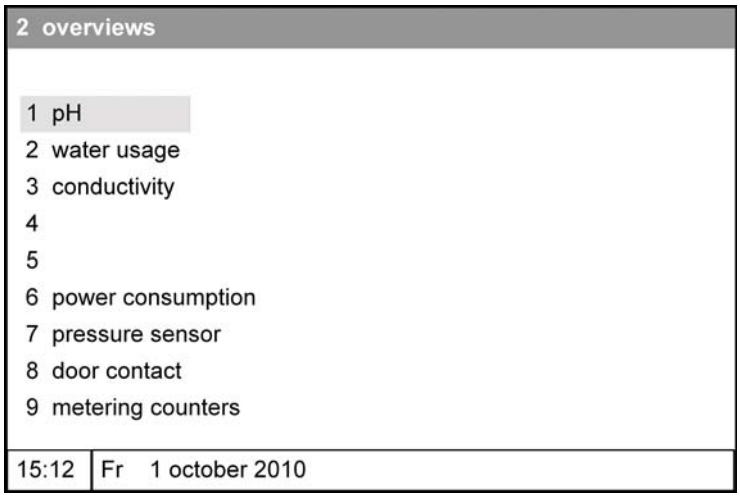


Figure 5-6: Overviews menu

Activate one of the indicated menus for access to the selected submenu.

pH	• Minimum and maximum values measured over the past 24 hours. • Minimum and maximum values measured in the past week. • Date on which a new acid container was first used, and the content of the container (manual input). • Calculated, daily acid consumption.
Water usage	• Daily consumption of the past week in m^3 • Weekly water consumption in m^3
Conductivity	• Minimum and maximum values measured over the past 24 hours. • Minimum and maximum values measured in the past week. • Date on which the reservoir was drained (automatically or manually), the corresponding quantity in litres and the total litre amount of the past 12 months
Power consumption	• The power consumption of the past 8 months and the total value for the last year.

Pressure sensor	• Measured minimum and maximum values of the past 24 hours with the times at which these values occurred. • Minimum and maximum values measured in the past week. • Minimum and maximum values per week (over the past 2 months).
Door contact	• The days and times at which the door to the pressure chamber was open and closed.
Metering counters	• Display of the overall consumption of electricity, shaft rinsing circulation pump, shaft lubrication drain pump, water intake and drain amount. • Display of all times during which the exhaust air cleaning system's situation was **Off**, **On** and **Maintenance**.

All values apply from initial operation of the exhaust air cleaning system (or from replacement of a sensor) and cannot be reset to 0.

5.11 Setting the system situation

1. Enter the company code or the personal access code, if applicable, in the **main menu**.
2. Open the menu **Air cleaner** (1):

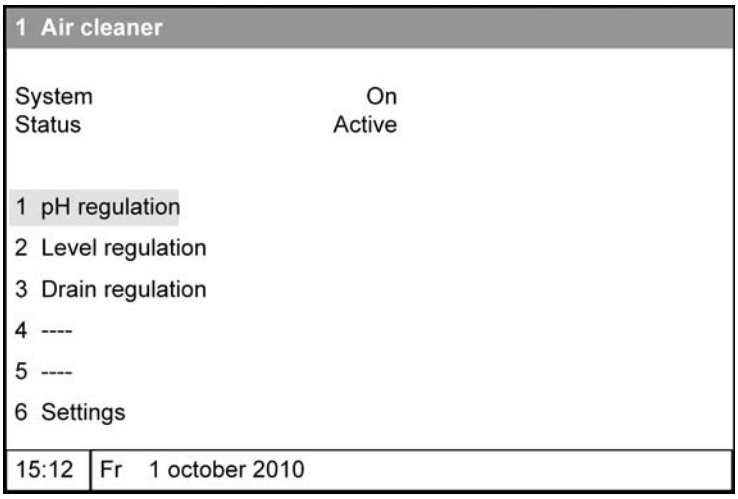


Figure 5-7: Air cleaner menu

3. Use the arrow keys to move the cursor into a position behind **[System]**.
4. Press the Enter button. The cursors turns transparent.
5. Press the arrow keys until **[System]** shows the correct situation.
6. Press the Enter button to confirm the situation.

⚠ WARNING!

You are responsible for checking what happens. Remember to switch all functions back into automatic mode in the end!

NOTICE!

If a function has been switched on or off using manual mode, the overview menu will display the following text: Manual computer or Manual extern(al).

5.12 Manual mode

5.12.1 General

⚠ CAUTION!

If a function is switched on or off using manual mode, this may impair the functionality of the cleaning system!

In the exhaust air cleaning system, all pumps and valves are generally switched automatically based on the measured values.

In specific situations, however, it may be necessary to bridge a function manually for a short period, i.e. to switch it on or off. From this point, the function is no longer controlled automatically.

Use the computer to control this function.

5.12.2 Manual function control

Cleaning functions can be switched on an off manually as follows:

1. Enter the company code or the personal access code, if applicable, in the **main menu**.
2. Go to row **[4 Manual control]**.
3. Use the arrow keys to navigate to the correct row. The cursor remains in the row **[On / Off / Auto]**.

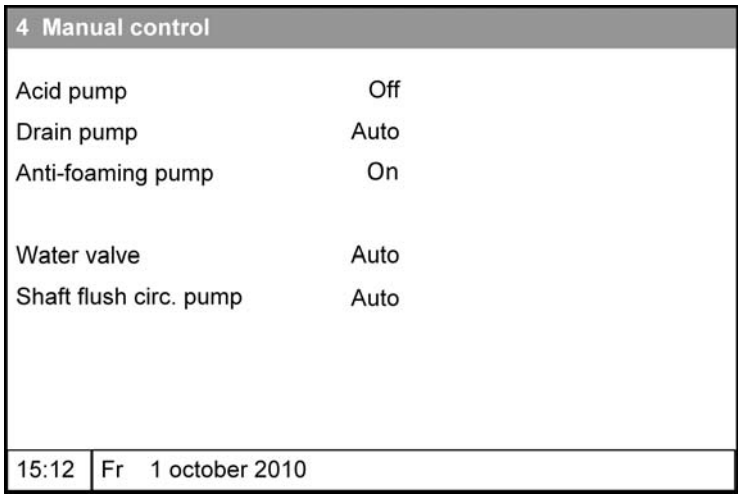


Figure 5-8: Manual control menu

4. Press the Enter button. The cursors turns transparent.
5. Press the arrow keys to change the setting.

6. Press the Enter button to confirm the setting.
7. Leave the menu by pressing the Return button.

5.13 System settings

The menu **System** (5) shows a list of general information. Moreover, it is possible to adjust parameters that can improve use and readings of the computer:

- **Software details:** Version and date of the control computer's software.
- **Time, year, month and day:** Current time settings (only accessible with the main user's access code).

Moreover, it is possible to adjust parameters that can improve use and readings of the computer:

- Menu **Operation** (51): Language selection, brightness and backlight duration of the display.
- Menu **Access code** (52): Create or change access codes (see chapter 5.14 ”Access codes”, page 64).

5.14 Access codes

5.14.1 General

Anyone who wants to configure settings or make changes at the computer needs to enter the company code or log in using their personal access code.

The computer is able to create a large number of user access codes so every person can have their own code. This is important to see who changed specific settings.

There are two types of users:

- **Main user (owner):** Manages all codes.
- **Sub-users (2 to 31):** Cannot change any codes.

The main user can change their own access code as well as the access codes of all sub-users.

NOTICE!

If no company code (and possibly no access code) is entered, opening the menus and reading the system's status, here the process values, is still possible. However, settings cannot be configured or changed.

5.14.2 Changing the main user's access code

1. Go to the **main menu**.
2. Go to **[Access code]** and enter your personal access code.
3. Go to row **[5 System]**.
4. Go to row **[2 Access code]**.
5. Go to row **[2 Main user]**.
6. Press the Enter button. The cursors turns transparent.
7. Use the numeric keypad to enter the new access code.
8. Press the Enter button to confirm the setting.
9. Leave the menu by pressing the Return button.

⚠ CAUTION!

Remember the access code! Without the access code, you can no longer access certain parts of the system.

5.14.3 Setting or changing a sub-user's access code

1. Go to the **main menu**.
2. Go to **[Access code]** and enter the sub-user's access code.
3. Go to row **[5 System]**.
4. Go to row [2 Access code].
5. Go to row **[1 Users 2-31]**.
6. Use the arrow keys to navigate to the correct user.
7. Press the Enter button. The cursors turns transparent.
8. Use the numeric keypad to enter the new access code.
9. Press the Enter button to confirm the setting.
10. Leave the menu by pressing the Return button.

6 Putting the system out of operation

If the exhaust air cleaning system is not used for a longer period (several weeks), we recommend taking a number of preventive measures to prevent dirt accumulation and sensor damage.

Proceed as follows:

1. Switch the system to **Off** (see chapter 5.8 ”Switching off the system”, page 53).
2. Clean the entire system very thoroughly (see chapter 7.5.1 ”Cleaning the entire system”, page 89).
3. Clean the conductivity sensor and the pH sensors (see chapter 7.4.2 ”Cleaning the sensors”, page 81).
4. Fill the system with fresh water.
5. Let the circulation pump run for several hours to flush the system well.
6. Switch off the main switch in the technical room.

7 Maintenance

7.1 Safety

⚠ WARNING!

Hazard to the health in the process room

► Only enter the process room during error-free operation!

► Do not enter the process room if an error occurred with the pH regulation within the past 24 hours!

► Wear the personal protective equipment as described in chapter 3.6.

⚠ CAUTION!

Danger of slipping and tripping in the process room

► Open the doors to the process room carefully!

► Wear the personal protective equipment as described in chapter 3.6.

⚠ WARNING!

Wear the prescribed personal protective equipment specified in the individual sections.

⚠ CAUTION!

Even if only relatively little water is added to the sulfuric acid, this causes violent reactions.

► Never flush sulfuric acid with water!

Unless otherwise indicated, always comply with the below provisions when servicing the system:

- Always dispose of unused chemicals at a disposal site for chemical waste, in accordance with local regulations.

  Clean up any spilled chemicals immediately using a special absorbent material, as described in chapter 3.12 and chapter 3.13. Dispose of them in accordance with local regulations as well.

  Remember that there might be fans near the exhaust air cleaning system!

7.2 Maintenance plan

The maintenance plan stipulates the below intervals:

- **W** – weekly
- **M** – monthly
- **A** – annually

Table 7-1: Maintenance plan

Maintenance task	Chapter	W	M	A
Checking the emergency shower for functionality and rinsing its supply line (operate emergency shower for a short while)	—	■		
Checking the data recording	7.3.1	■		
Checking the overall cleaner situation and quick cleaning	7.3.2	■		
Checking and replacing the sulfuric acid	7.3.3	■		
Replacing the anti-foaming agent	7.3.4	■		
Checking safety devices	7.3.5	■		
Calibrating the pH sensors of the pH meters	—		■	
Cleaning the technical room	7.4.1		■	
Cleaning the sensors	7.4.2		■	
Cleaning the filter before the circulation pumps	7.4.3		■	
Other checks	7.4.4		■	
Cleaning the entire system	7.5.1			■
Major maintenance by the manufacturer (with maintenance and service agreement)	---			■

7.3 Weekly maintenance

7.3.1 Checking the data recording

Specific system data is saved every hour. The operator is obliged to check every week whether this process works correctly.

The memory module (data logger) is located in the control cabinet.

1. Check whether the green lamp at the cabinet is lit.

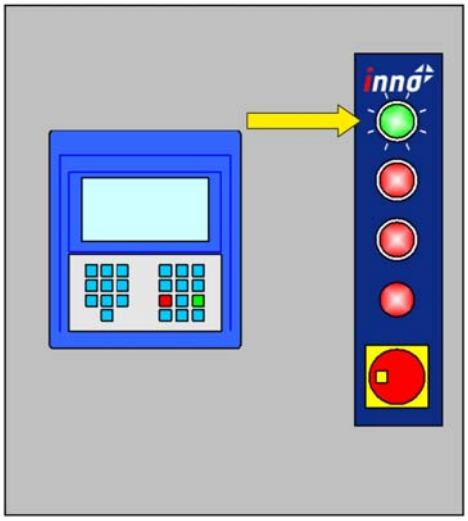


Figure 7-1: Lamp for the data logger

2. If this is not the case, check why the data are not recorded.

   Possible causes include:

   – The supply voltage is not switched on.
   – The safety cut-out has failed.
   – There is no SD card or it has not been inserted far enough into the PLC.
   – The SD card is defective.

NOTICE!

If the green lamp is not lit, no data will be recorded.

► Contact the manufacturer if the data cannot be recorded.

Every month, a new Excel file is automatically created on the SD card.

Check for correct functioning as follows:

1. Open the control cabinet.
2. Press gently on the SD card so it disengages.

Figure 7-2: Data logger with SD card in the control cabinet

3. Remove the SD card from the PLC.
4. Close the control cabinet.
5. Insert the SD card into a computer on which Microsoft Excel is installed.
6. Open the most recent file.
7. Check whether the data were added for every day of the past week (see chapter 4.4.2 ”Logging data”, page 45 shows an example list of recorded data).

If you want to save the recorded data yourself, e.g. because an authority demands this, you have the following options:

- Create a PDF file.
- Print the file.
- Make a copy of the Excel file for your own network.

NOTICE!

► Save a copy of the data at least once per month for you own administration.

► The PLC of the data logger saves the data of the past 12 months.

► If the data on the SD card are deleted or changed, the data is automatically restored as soon as the card is inserted into the data logger.

Making the data logger ready for use again:

1. Remove the SD card from the computer and insert it into the data logger.
2. Push the SD card gently so it remains inside the reader.
3. Close the control cabinet.
4. Check whether the green lamp is lit.

7.3.2 Checking the overall cleaner situation and quick cleaning

Check the water both on the inflow and the outflow side. Check the exhaust air cleaning system according to the following points:

- Is there excessive foaming in the wash water?
- Can you see any slime and/or dust deposits on the filter packages?
- Is the water evenly distributed over the filter packages?
- Check the sprinklers above the filter packages and the primary sprinklers. Are the sprinklers clogged?
- Check the water reservoir for excessive contamination. Remove particles larger than 5 mm since they can damage the pumps.
- Check the water meter. If the flow rate is low, filters and sprinklers are contaminated. Clean them in time.

Figure 7-3: Water inflow side clean (left) and excessively contaminated (right)

To keep the exhaust air cleaning system in a good condition, clean it superficially at regular intervals, e.g. once a week. Wash any encrusted or caked dirt off the filter packages. This is possible while the system is in operation and improves the cleaning quality and increases the system's life span. It also improves working conditions and prevents errors and damage.

Record the results in the manual operating records.

NOTICE!

Check the general condition of the exhaust air cleaning system approx. twice a day at the beginning. Over time, this interval can be reduced to once a week based on personal experience and insights.

⚠ WARNING!

Wear the personal protective equipment as described in chapter 3.6.

⚠ WARNING!

A second person must be present and able to to come to the rescue if the first person should become unwell. The second person must not get under the packages during maintenance and must be able to call for external help quickly.

⚠ CAUTION!

- ► Do not use a high-pressure cleaner or a steam cleaner. This can damage the filter packages. Always use a maximum water pressure of approx. 10 bar.
- ► Do not step on the pipes.

For a superficial cleaning of the exhaust air cleaning system, proceed as follows:

Preparation:

1. Enter the company code or the personal access code, if applicable, in the **main menu**.
2. Open the menu **Manual control** (4).

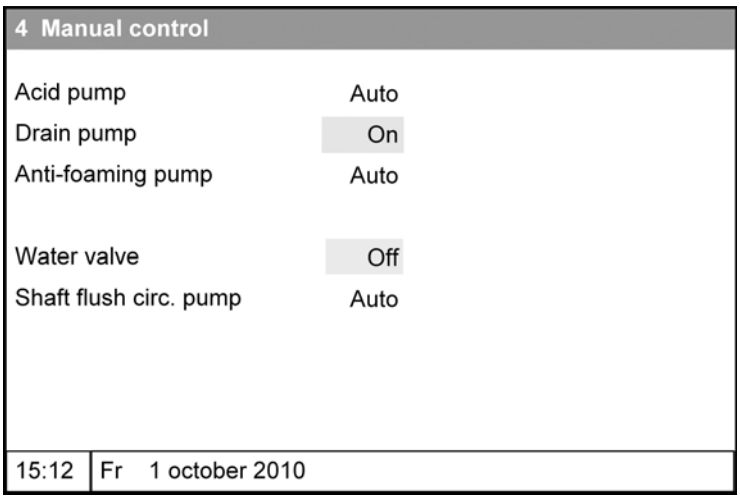


Figure 7-4: Manual control menu

3. Switch the water valve to **Off** so that the reservoir is no longer refilled automatically.
4. Switch the drain pump to **On** to drain the reservoir.
5. Switch the drain pump off as soon as the reservoir is empty.
6. Switch the cleaning system to **Off** (see chapter 5.8 ”Switching off the system”, page 53).

7. Also switch the main switch off and secure it against unintentional restart.

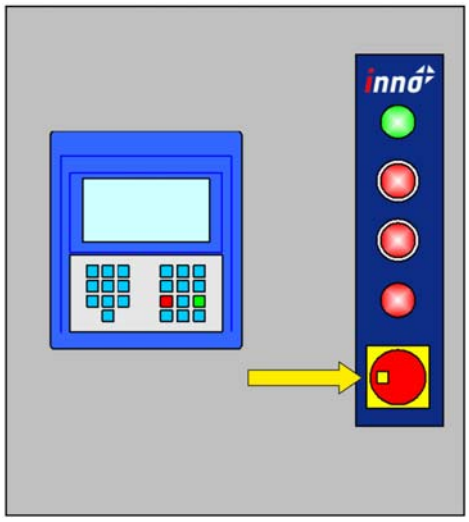


Figure 7-5: Main switch

8. Wait until all water has drained from the filter packages.

⚠ WARNING!

Never step below the filter packages as long as the exhaust air cleaning system is still in operation or as long as water is still dripping from it!

Procedure:

We recommend using a water connection with GEKA coupling, if available.

Top

⚠ CAUTION!

► Use plenty of water at a low pressure.

► Keep a safe distance to the filter packages.

► Spraying the filter packages at a high pressure may cause damage.

9. Rinse the filter packages evenly.
10. Hose down all sprinklers.

Bottom

11. Spray away all dirt on the filter packages. Use plenty of water at a low pressure.
12. Clean the primary sprinklers thoroughly.
13. Remove excess dirt from the floor below the filter packages.
14. Skim hard, coarse dirt from the water.

The additional rinsing water can lead to an increased water level in the reservoir, causing an alarm.

15. Drain the water manually to lower the water level in the reservoir and to remove the dirt.
16. Go to the menu **Manual control** (4) and switch on the drain pump or open the drain valve.

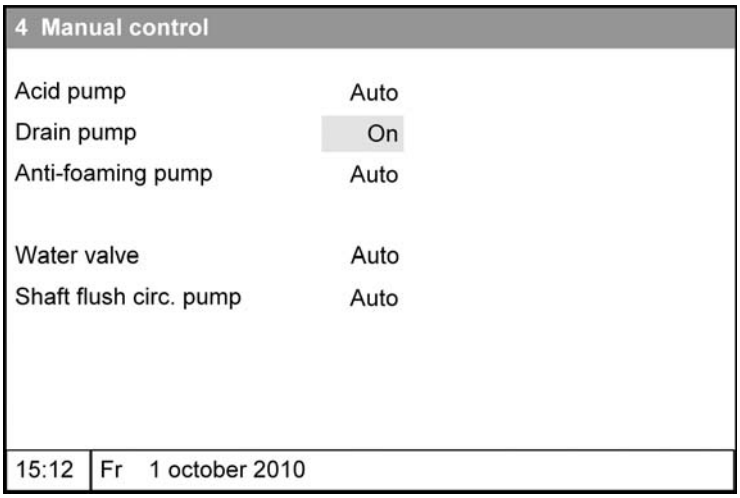


Figure 7-6: Manual control menu

17. Remember to switch off the drain pump again in time or to close the valve.

NOTICE!

All contaminations and solid parts must be removed from the system.

7.3.3 Checking and replacing the sulfuric acid

⚠ CAUTION!

Wear the personal protective equipment (see chapter 3.6).

- ► Face shield in combination with respiratory protection
- ► Suitable gloves
- ► Corrosion-resistant protective clothing

NOTICE!

The sulfuric acid container must be located at least 2 m away from the emergency shower. Otherwise, water droplets from the shower may reach the acid. There must be markings on the floor that indicate the correct distance.

NOTICE!

For notes regarding the cleaning of spilled sulfuric acid, see chapter 3.12.2 ”Cleaning of spilled sulfuric acid”, page 26.

Proceed as follows to replace an empty sulfuric acid container.

1. Place the new container as close as possible to the empty container.

   The acid container must stand flat on the floor, i.e. not on a pallet or other platform!
2. If applicable, remove the protective caps from the couplings.
3. Disconnect the quick couplers of the empty acid container.

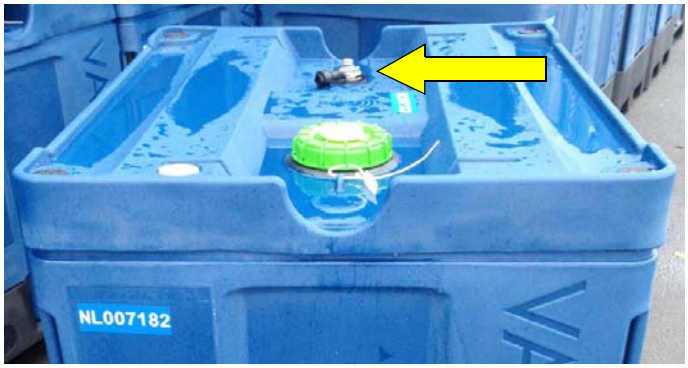


Figure 7-7: Quick coupler of acid container

4. Connect the hoses to the new acid container.
5. Remove the cover of the acid pump.
6. Check for sulfuric acid in the drip tray below the pump.
7. Replace the cover.

In case of leaking:

8. Read chapter 3.12.2 for information on how to clean up spilled sulfuric acid.
9. Contact the manufacturer to eliminate the cause for the leak.

   At the control computer

10. Open the **main menu** and enter the company code and the personal access code, if applicable.
11. Open the menu **Acid usage**.

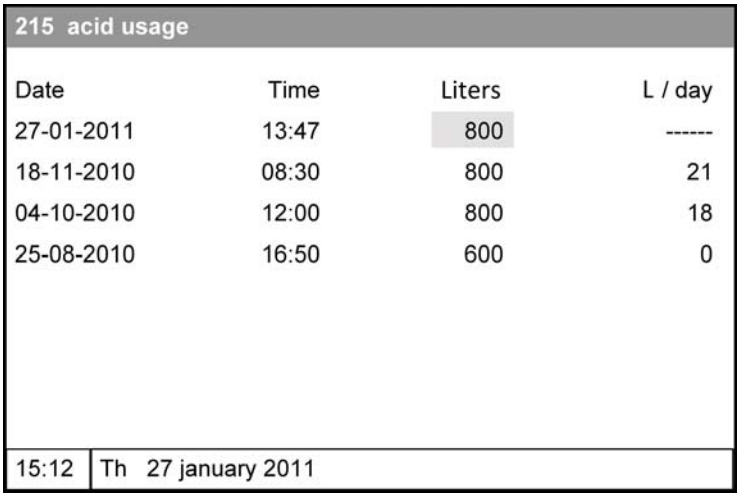


Figure 7-8: Acid usage menu

12. Go to the top line and enter the net acid weight of the new tank under "Liters".

⚠ CAUTION!

Leaking or defects of the pump can cause acid splashes.

► Install the cover! The cover blocks acid splashes.

7.3.4 Replacing the anti-foaming agent

⚠ CAUTION!

Wear the personal protective equipment (see chapter 3.6).

- ► Face shield in combination with respiratory protection
- ► Suitable gloves
- ► Corrosion-resistant protective clothing

NOTICE!

For notes regarding the cleaning of spilled anti-foaming agent, see chapter 3.13 ”Safety information regarding the anti-foaming agent”, page 27.

Proceed as follows to replace an empty anti-foaming agent container.

1. Place the new container as close as possible to the empty container.
2. Remove the lid of the new container.
3. Move the suction hose from the empty to the new container.

If the hose was completely empty, the pump may not be able to suck from the container. Proceed as follows in this case:

4. Open the knob (see figure 7-9) by turning it.

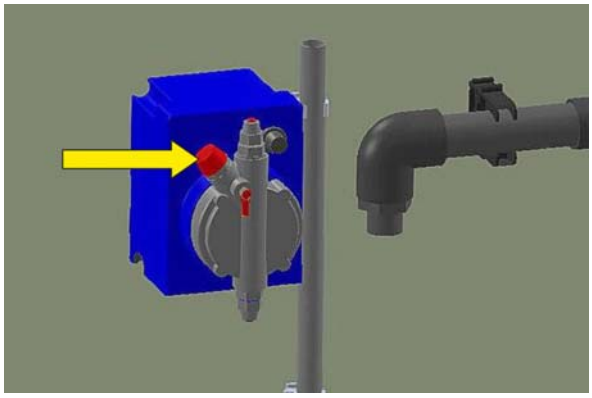


Figure 7-9: Knob at acid pump

5. Switch on the anti-foaming pump via manual control.
6. Wait until the pump head is filled with liquid. The liquid returns to the container through a different hose.
7. Close the knob again.
8. Switch the pump back to **Auto**.

7.3.5 Checking safety devices

1. Check whether the emergency shower works correctly.
2. Make sure that the supply valve is open.
3. Check the contents of the safety cabinet.

7.4 Monthly maintenance

7.4.1 Cleaning the technical room

⚠ WARNING!

Keep both feet firmly on the ground. Remember that parts of the frame and pipes can be wet and therefore slippery!

⚠ CAUTION!

- ► Do not use a high-pressure cleaner or a steam cleaner!
- ► Keep the control cabinet locked!
- ► Keep all electrical components and motors dry!
- ► Do not step on the pipes.

1. Clean the technical room with a soft brush and a damp cloth.
2. Dry wet components immediately.
3. Clean up any spilled chemicals in accordance with the precautions described in chapter 3.
4. Check the pipes for leaks. Leaks must be repaired by qualified personnel only.
5. Check the fins and the intake grille of the pump motors for excessive dust accumulation (see figure 7-10). Wipe them clean with a brush.

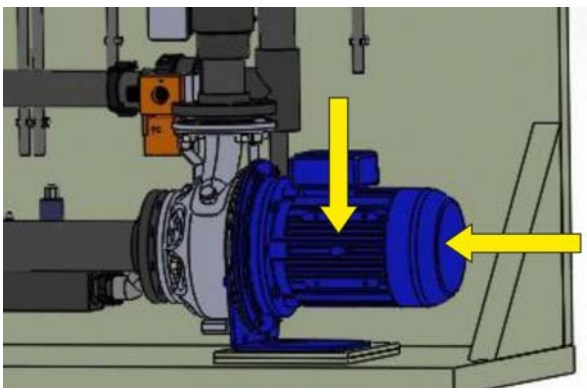


Figure 7-10: Fins and intake grille of the pump motor

6. Check the water filter for contamination.

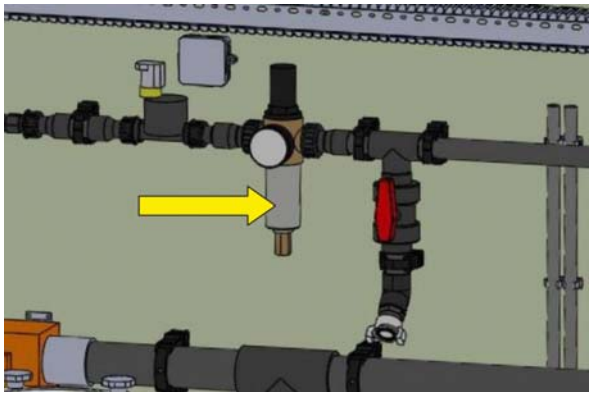


Figure 7-11: Water filter

If the filter element is dirty, clean it as follows:

a) Close the manual valve (see also figure 4-4, pos. 9).

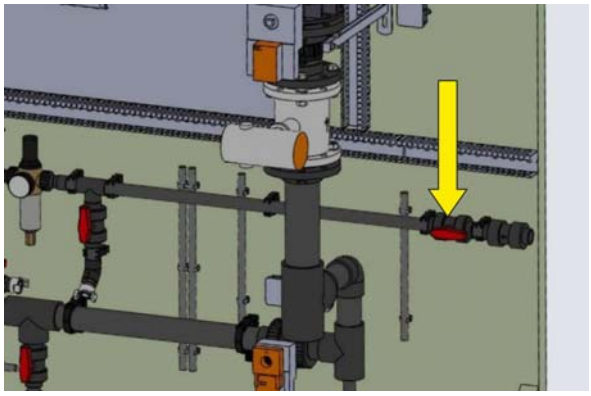


Figure 7-12: Manual valve

b) Open the valve below the water filter to release the residual pressure (see figure 7-13).

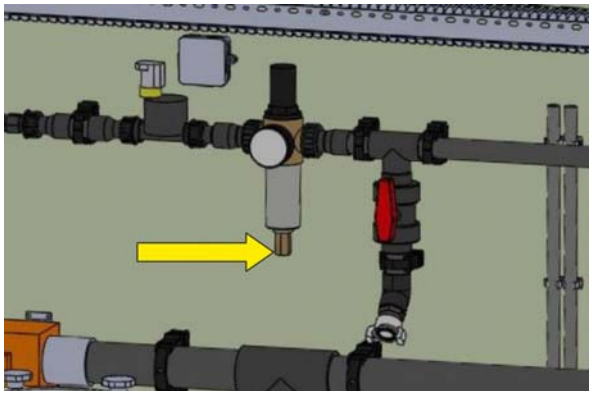


Figure 7-13: Valve below water filter

c) Use the supplied plastic spanner to remove the filter cup.

d) Clean the filter element with a fine brush and warm water.

e) Replace the filter element and mount the filter cup.

f) Close the valve below the water filter.

g) Open the main valve.

7.4.2 Cleaning the sensors

1. In the menu **Air cleaner** (1), set the system to **Maintenance**.

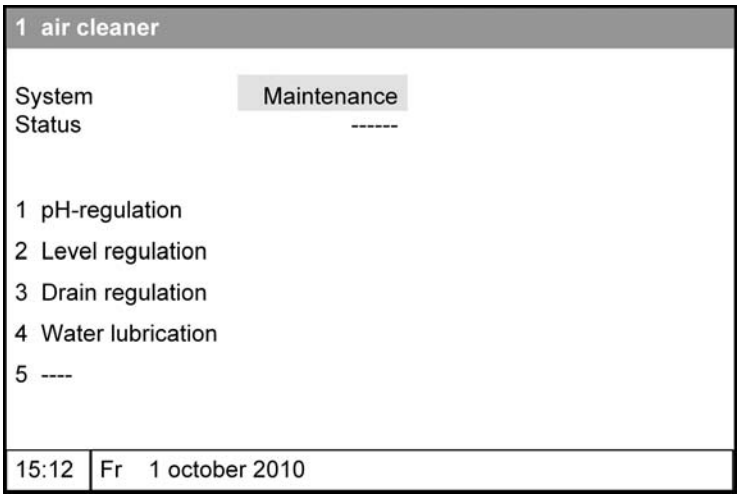


Figure 7-14: Air cleaner menu – maintenance mode

2. **pH sensors:**

⚠ CAUTION!

The pH sensors are made of glass and therefore very fragile!

a) Loosen the swivel nut.

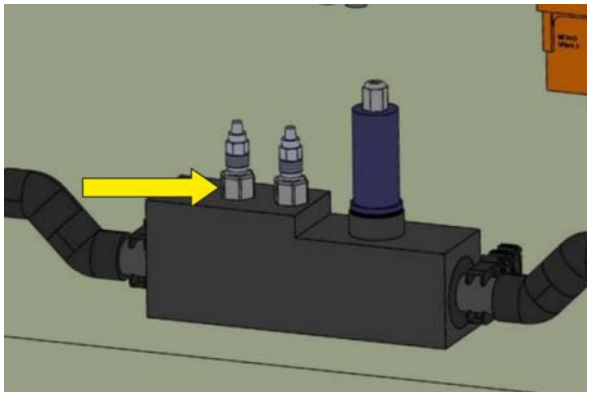


Figure 7-15: Swivel nut pH sensors

b) Remove the sensors from their seat.

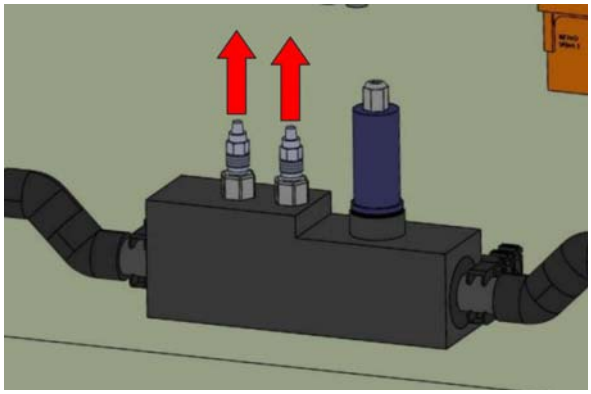


Figure 7-16: Removing the pH sensors

c) Clean the sensors with a damp cloth.

d) Put the sensors carefully back into their seat.

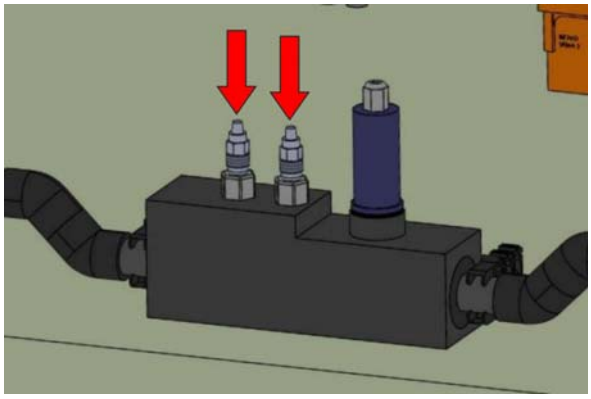


Figure 7-17: Inserting the pH sensors

e) Tighten the swivel nuts manually.

3. **Conductivity sensor:**

a) Loosen the large swivel nut.

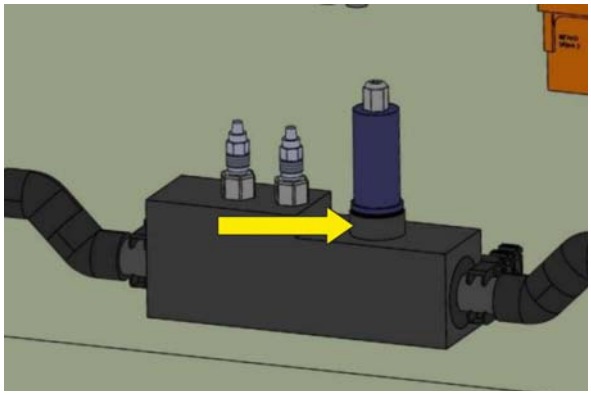


Figure 7-18: Swivel nut conductivity sensor

b) Remove the sensor from its seat.

c) Do not lose the seal ring located between the sensor and the seat block!

d) Carefully clean the sensor with a damp cloth.

e) Place the seal ring around the sensor.

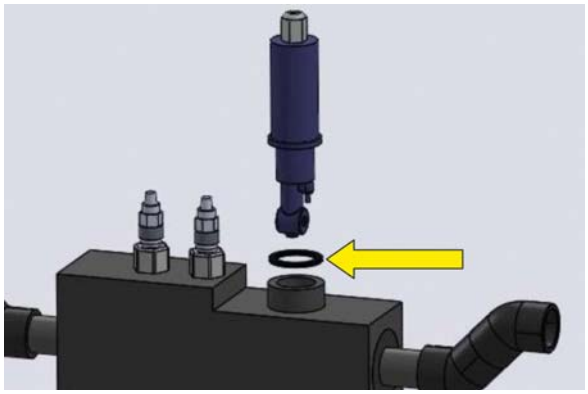


Figure 7-19: Seal ring of the conductivity sensor

f) Put back the sensor and observe the following:

– Check the flow direction. It is indicated by a red arrow in figure 7-20.

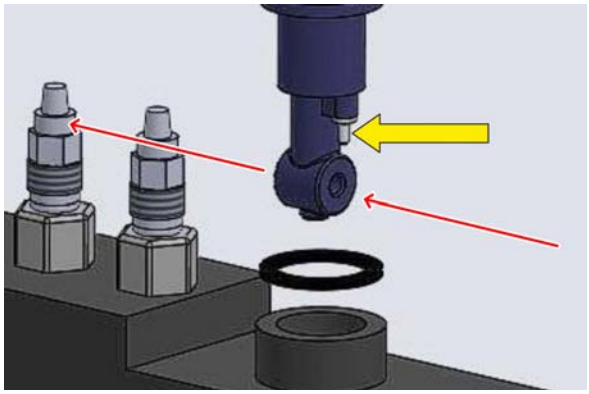


Figure 7-20: Inserting the conductivity sensor

– Hold the sensor in such a way that the channel in the sensor tip matches the flow direction.

– Align the metal part of the sensor (yellow arrow) with the inflow side.

g) Put the sensor carefully back into its seat.

h) Tighten the swivel nuts manually.

4. Set the exhaust air cleaning system to **On** (see chapter 5.7 ”Switching on the system”, page 53).

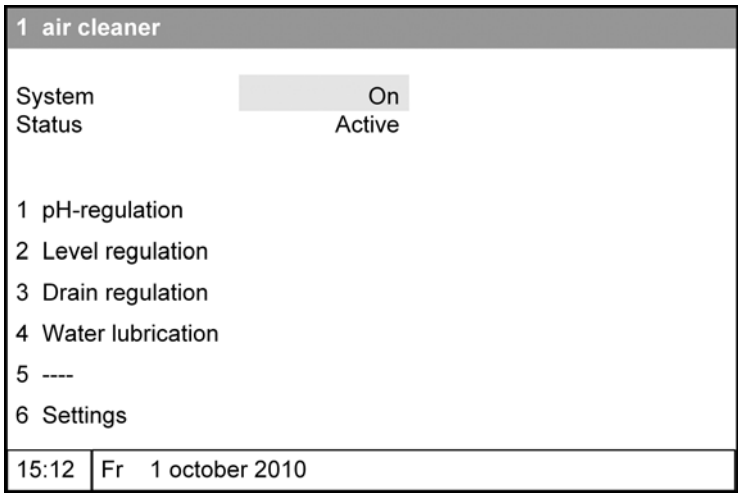


Figure 7-21: Air cleaner menu – operating mode

7.4.3 Cleaning the filter before the circulation pumps

⚠ CAUTION!

Wear the personal protective equipment (see chapter 3.6).

- ► Face shield in combination with respiratory protection
- ► Suitable gloves
- ► Corrosion-resistant protective clothing

1. In the menu **Air cleaner** (1), set the system to **Maintenance**.

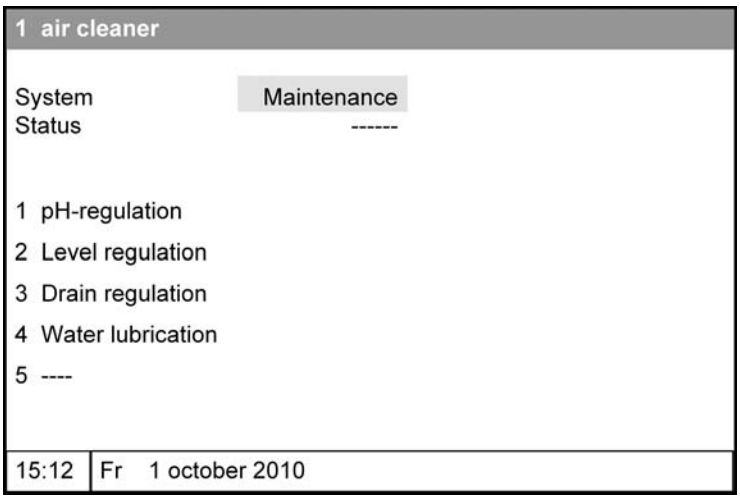


Figure 7-22: Air cleaner menu – maintenance mode

The electric valve in the pressure line behind the pump closes.

If no electric valve is installed, close the shut-off valve manually.

2. Open the lower drain valve. The water from the filter casing can only flow back into the reservoir now.

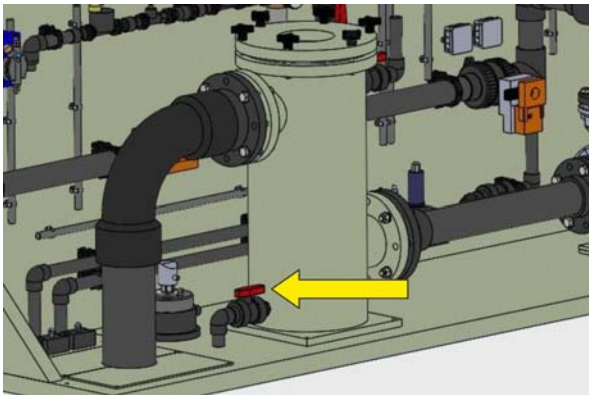


Figure 7-23: Drain valve

3. Slowly open the upper venting valve.

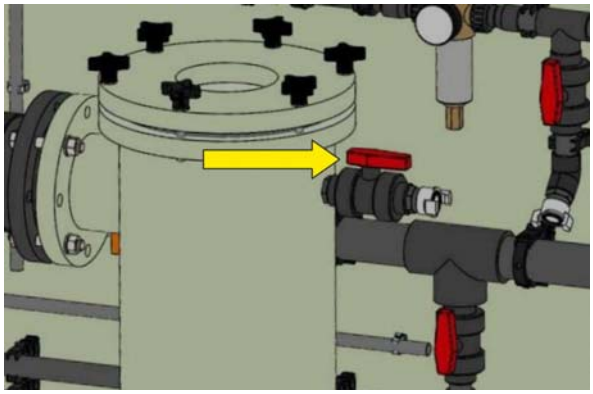


Figure 7-24: Venting valve

4. Close both valves as soon as the water level has dropped to the top of the filter basket.
5. Loosen the knurled screws.

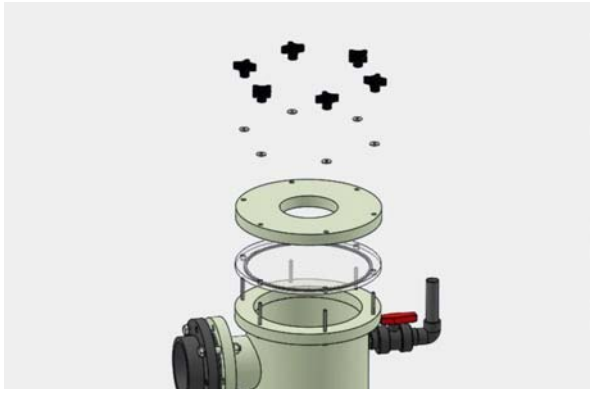


Figure 7-25: Flange at the filter casing

6. Remove the flange and the lid.
7. Pull the filter basket from the filter casing.

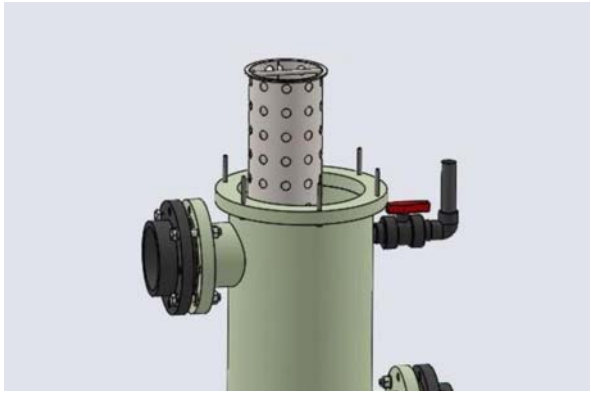


Figure 7-26: Removing the filter basket

8. Clean the filter basket thoroughly.
9. Place the filter basket back into the filter casing.

10. Clean the top of the filter casing.

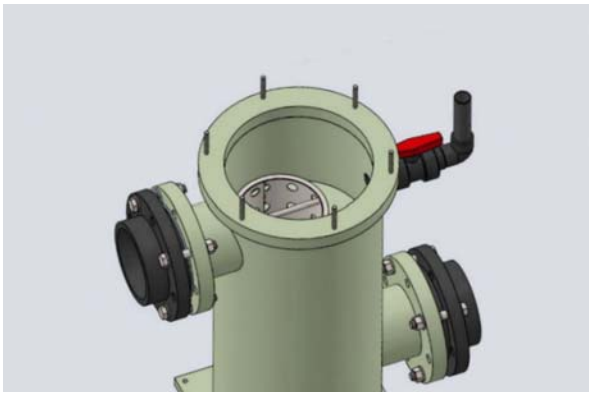


Figure 7-27: Cleaning the filter casing

11. If the filter casing drained, fill it with water.
12. Check whether the O-ring fits tightly into the slot of the lid.

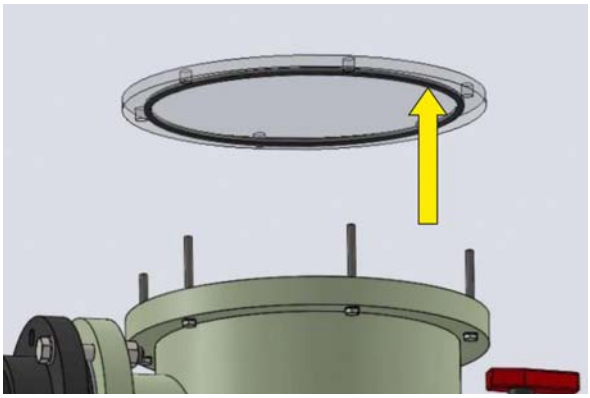


Figure 7-28: O-ring at the filter casing

13. Place the lid back on the filter casing with the O-ring facing the floor.

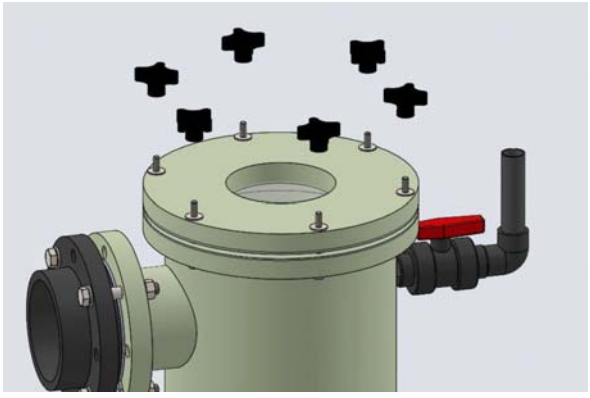


Figure 7-29: Attaching the flange to the filter casing

14. Place the flange on the lid.
15. Put the washers on the threaded rods.
16. Tighten the knurled screws.

17. After the filter casing has drained, refill it with water.
18. Set the exhaust air cleaning system to **On** (see chapter 5.7 ”Switching on the system”, page 53).

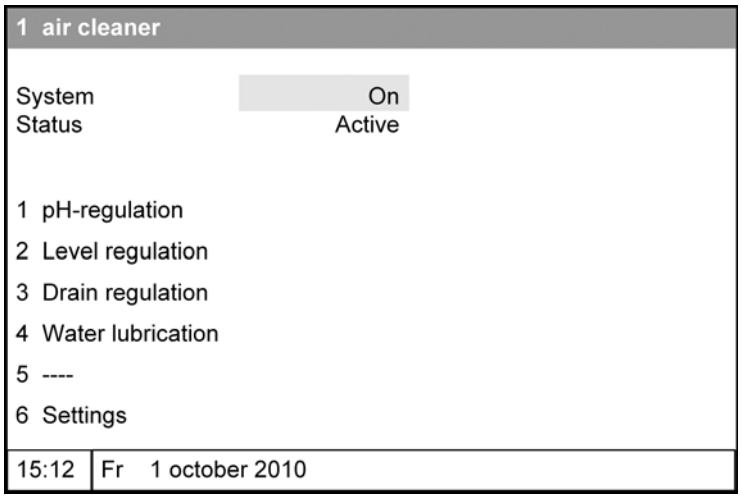


Figure 7-30: Air cleaner menu – operating mode

It might take some time before the system switches back on.

7.4.4 Other checks

1. Check all pipes for leaks:
   – wash water lines;
   – drain lines;
   – sulfuric acid lines;
   – anti-foaming agent lines.
2. Check whether all safety symbols are still present on the system (see chapter 3.10 and chapter 3.11). Replace them, if necessary.

7.5 Annual maintenance

7.5.1 Cleaning the entire system

In the following situations, the entire exhaust air cleaning system must be cleaned:

- When the alarm message **Ventilation pressure too high** appears.
- When the lamp **[Filter package contaminated]** is lit.
- At least once a year.

The system must be switched off.

⚠ WARNING!

► Wear the personal protective equipment as described in chapter 3.6!

► Do not use a high-pressure cleaner or a steam cleaner! This can damage the filter packages. Always use a maximum water pressure of approx. 10 bar.

► Do not step on the pipes!

NOTICE!

The exhaust air cleaning system must be well cleaned before the manufacturer can service it.

The necessary actions depend on the conditions on site. The following general points are important:

1. Enter the company code or the personal access code, if applicable, in the **main menu**.
2. Open the menu **Manual control** (4).

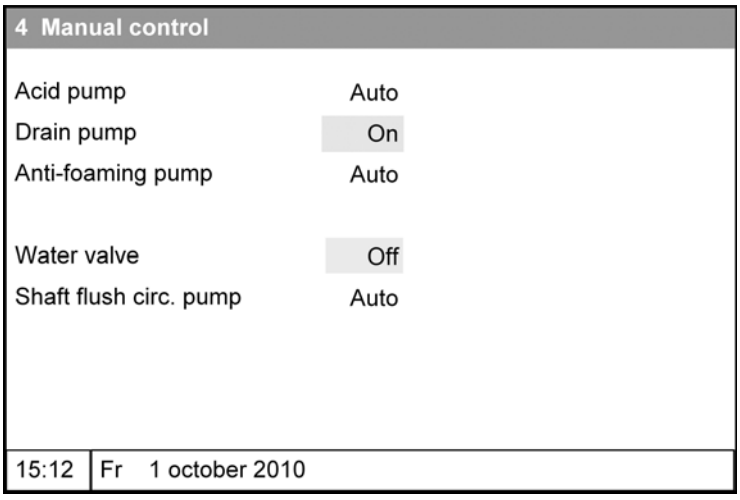


Figure 7-31: Manual control menu

3. Switch the water valve to **Off** so that the reservoir is no longer refilled automatically.
4. Switch the drain pump to **On** to drain the reservoir.
5. Switch the drain pump off as soon as the reservoir is empty.
6. Switch the cleaning system to **Off** (see chapter 5.8 ”Switching off the system”, page 53).
7. Also switch the main switch off and secure it against unintentional restart.

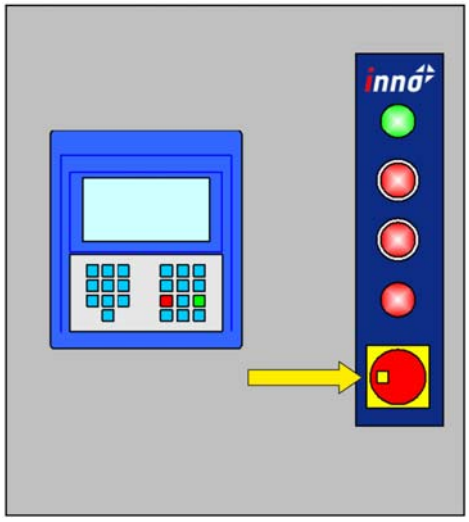


Figure 7-32: Main switch

8. Wait until all water has drained from the filter packages.

⚠ WARNING!

Never step below the filter packages as long as the exhaust air cleaning system is still in operation or as long as water is still dripping from it!

General tasks:

⚠ WARNING!

A second person must be present and able to to come to the rescue if the first person should become unwell. The second person must not get under the packages during maintenance and must be able to call for external help quickly.

9. Clean the filter packages thoroughly. If possible, remove them from the exhaust air cleaning system.
10. Thoroughly clean the floor of the exhaust air cleaning system or the central collector.
11. Clean all pipes and sprinklers.
12. Switch on the main switch.

13. Set the exhaust air cleaning system to **On** (see chapter 5.7 ”Switching on the system”, page 53).

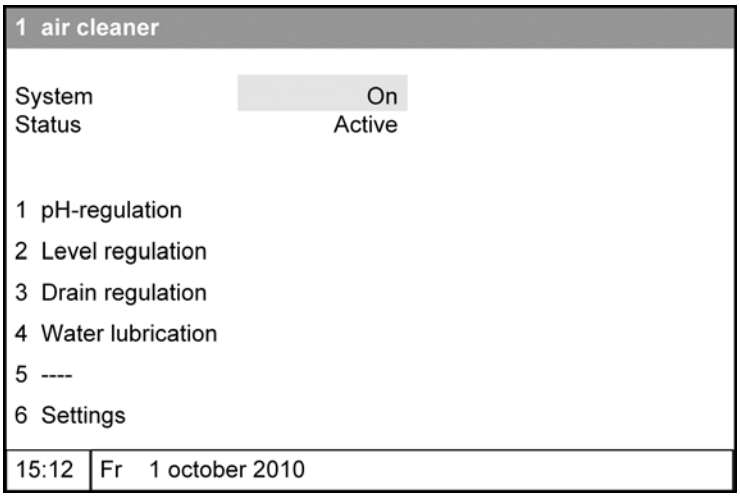


Figure 7-33: Air cleaner menu – operating mode

14. If the red lamp **[Filter package contaminated]** is lit, press **[Reset]**.

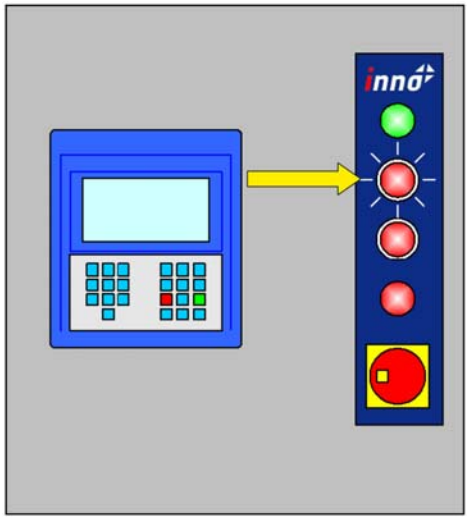


Figure 7-34: Alarm due to contaminated filter packages

8 Troubleshooting

8.1 Recognizing an alarm situation

The control system of the exhaust air cleaning system constantly monitors the entire system to ensure proper operation. If one of the components or controls deviates, an alarm message is generated.

Depending on the severity of the error, the exhaust air cleaning system will either switch off or remain operational.

An active alarm is indicated as follows:

- The red LED of the alarm button constantly lit at the computer. The display indicates the meaning of the alarm (see chapter 8.2 ”Activating and deactivating alarms”, page 93).
- The red lamp [Alarm] is lit.
- Any connected additional alarm device (flashing light, buzzer) is also activated.

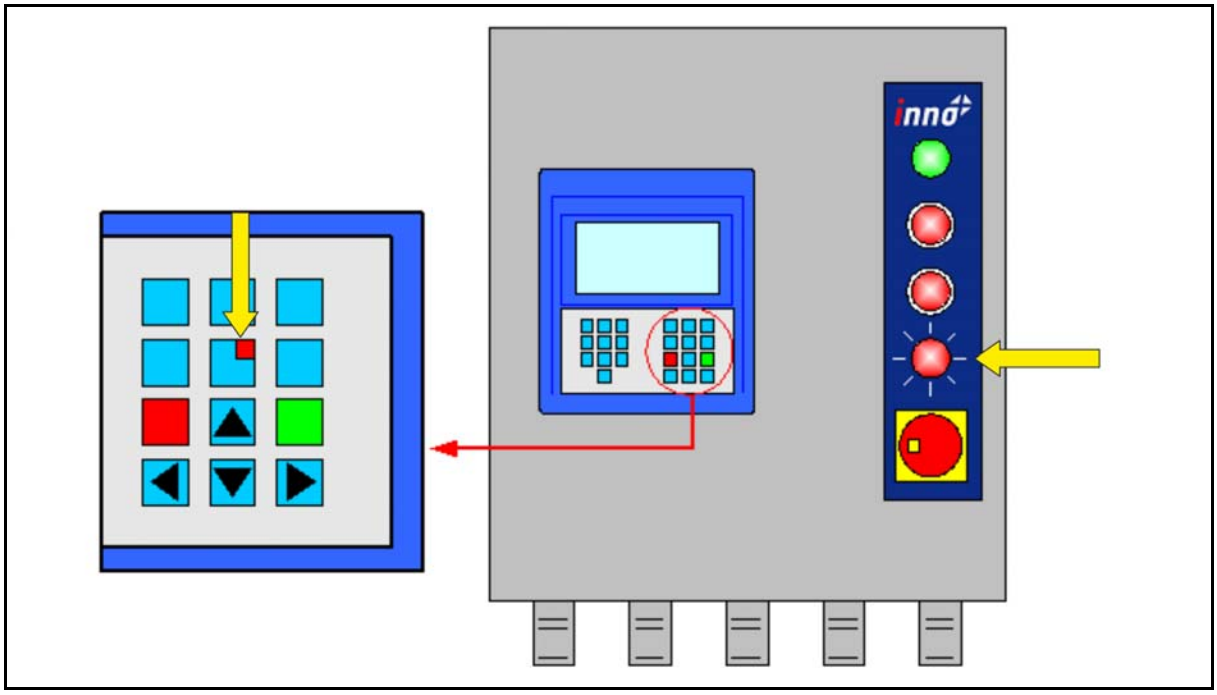


Figure 8-1: Alarm indication

NOTICE!

If the LED in the alarm button flashes, this indicates an alarm situation, but the respective alarm group or the main alarm are inactive. The alarm is therefore indicated by this flashing button only.

chapter 8.4 describes the different alarms and the required user actions depending on the alarm type.

All alarms are saved in the control computer's memory. When this memory is full, the oldest alarms are deleted first.

chapter 8.6 describes how to view the alarm history.

8.2 Activating and deactivating alarms

The system control has several alarm groups that are all active by default. This means:

- **Alarm group on:** Any occurring errors in this alarm group are registered and the red lamps are lit. In some cases, a pump is switched off or a supply valve is closed.
- **Alarm group off:** Any occurring errors in this alarm group are ignored. The system remains operational and the user is not notified about the error situation (except for the flashing LED at the control computer).

All alarm groups are part of the **Main alarm**. The main alarm can also be activated and deactivated. Therefore:

- **Main alarm on:** The system searches for individual alarm groups. If all alarm groups are activated, any occurring alarm is reported.
- **Main alarm off:** No alarm is reported.

NOTICE!

If the main alarm is deactivated, it automatically reactivates after 3 days.

NOTICE!

A flashing LED in the alarm button indicates an alarm situation, but the main alarm or the respective alarm group is deactivated.

Press the alarm button to view the menu **Alarm status**. The menu shows which alarm groups are active and inactive (see figure 8-2).

If the **main alarm** is deactivated, the system indicates when it will be reactivated automatically. The alarm can also be activated manually at any time.

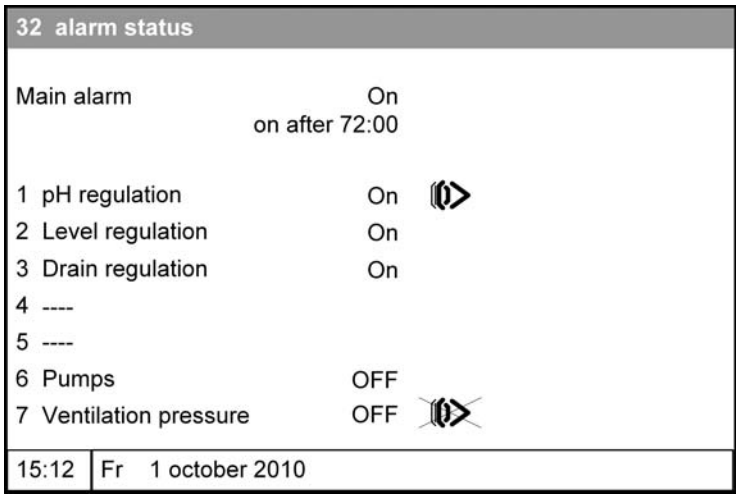


Figure 8-2: General alarm status

The example in figure 8-2 shows the following:

- Alarm group 1 is active and an error has occurred (horn icon). A general alarm message is generated.
- Alarm groups 2 and 3 are active, but there are no errors.
- Alarm group 6 is inactive and there is no error.
- Alarm group 7 is inactive but an error has occurred. This is only indicated by the flashing button at the computer.

NOTICE!

The horn icon shows that there is an active alarm in this alarm group. A crossed-out horn icon ( ) indicates that this alarm group is inactive, but an alarm has occurred in this group.

The main alarm and the individual alarm groups can be activated and deactivated as follows:

1. Enter the company code or the personal access code, if applicable, in the **main menu**.
2. Press the alarm button.
3. Use the arrow keys to navigate to the correct row (the cursor remains in the row **[On / Off]**).
4. To change a setting, press the Enter button in the correct row. The cursors turns transparent.
5. Press the arrow keys to change the setting.

6. Press the Enter button again.
7. Leave the menu by pressing the Return button.

8.3 Viewing an alarm

If an alarm occurs, check the computer for details on the situation:

1. Press the alarm button to view the menu **Alarm status**. The activated alarm group now has an additional horn icon.

NOTICE!

Remember to enter the company code first!

2. Press the correct numeric key to show this group's status.

   The bottom row of the display now shows an alarm description. Above it, you can see the current status of the individual components. figure 8-3 shows how it works.

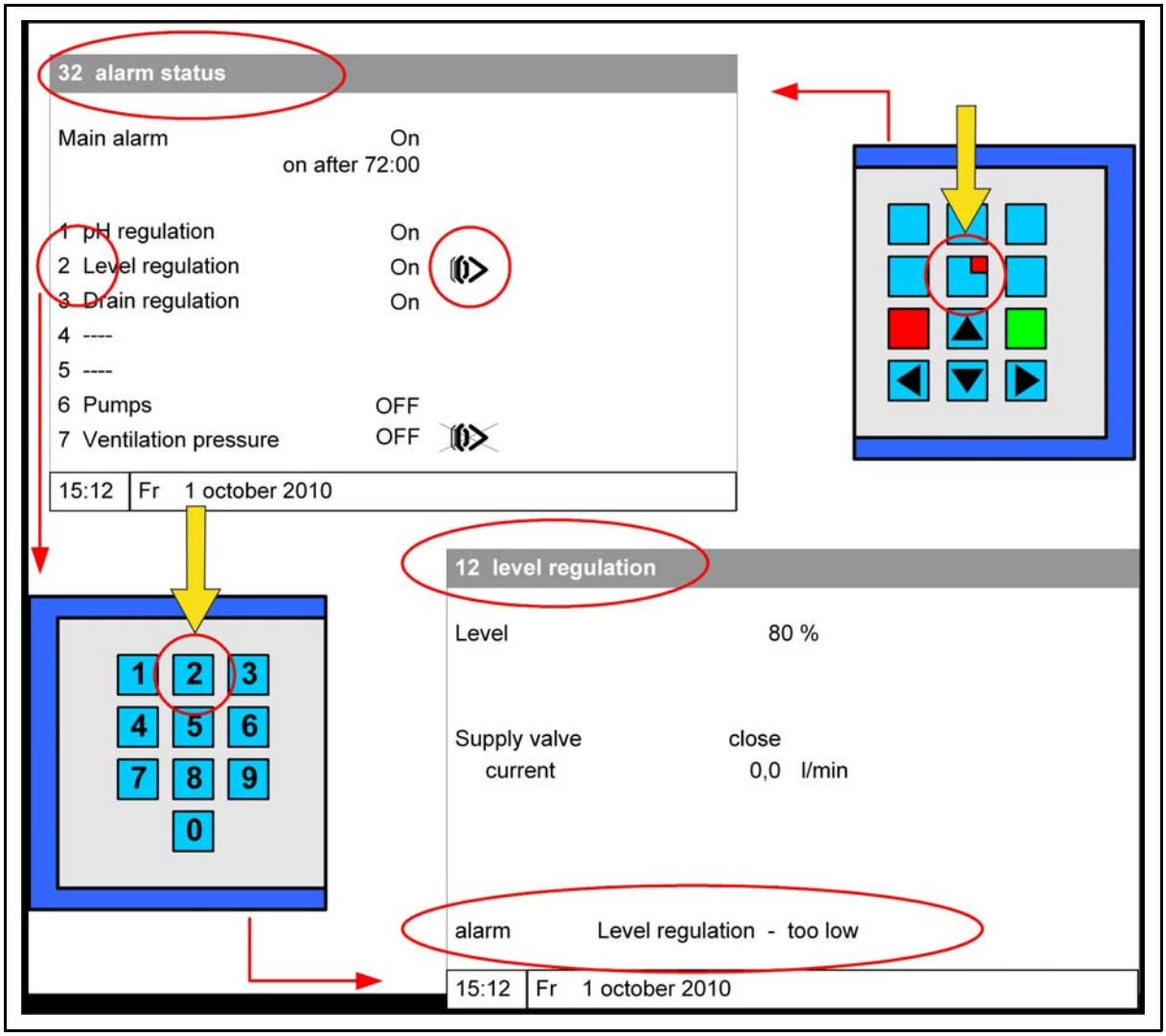


Figure 8-3: Viewing an alarm

3. Reset the alarm as described in chapter 8.5.

8.4 List of potential alarms

The computer may report any of the alarms below.

Column "H": Alarms marked with ■ require manual resetting (as described in chapter 8.2). All other alarms are deleted automatically once their cause has been eliminated.

Table 8-1: Alarms

Message code and meaning	Possible cause	H	Consequences and required action
Ventilation pressure – sensor The measured pressure difference above the filter packages is out of the sensors' working range.	One of the two pressure sensors is defective or not connected correctly.		Contact the manufacturer.
Ventilation pressure – too high The measured pressure difference above the filter packages exceeds the alarm limit (80 Pa).	The filter package is heavily contaminated and air can no longer flow through it.		Clean the filter package as soon as possible (see chapter 7.5.1 ”Cleaning the entire system”, page 89).

Message code and meaning	Possible cause	H	Consequences and required action
pH regulation – runtime The acid pump was operated for too long without the wash water reaching the correct pH value.	• The sulfuric acid container is empty. • There is air in the acid line. • The valve of the bypass line is closed so that the wash water cannot reach the pH sensor. • The acid pump is defective. • There is a problem with the pH sensors.	■	1. Check the acid container. Replace it, if necessary. 2. Vent the line (see chapter 7.3.3 ”Checking and replacing the sulfuric acid”, page 76). 3. If a valve is installed in the bypass line, check whether it is 10 % open. 4. If you cannot solve the problem, contact the manufacturer.
pH regulation – deviation The values of the two pH sensors are too far apart.	One of the sensors is probably defective.		Contact the manufacturer for a recalibration or for a replacement of the pH sensor.
pH regulation – leakage Liquid has been found in the drip tray below the acid pump.	• The hose is not connected correctly. • The pump is defective.		1. Clean the drip tray (see chapter 3.12.2 ”Cleaning of spilled sulfuric acid”, page 26). 2. Have the manufacturer repair the hose connection. 3. If the pump leaks, contact the manufacturer.
pH regulation level too low The pH level stays below the set value for too long.	• The valve of the bypass line is closed so that the wash water cannot reach the pH sensor. • The regulation does not work correctly.		1. If a valve is installed in the bypass line, check whether it is 10 % open. 2. If you cannot solve the problem, contact the manufacturer.

Message code and meaning	Possible cause	H	Consequences and required action
pH regulation level too high The pH level stays above the set value for too long.	• The valve of the bypass line is closed so that the wash water cannot reach the pH sensor. • The regulation does not work correctly.		1. If a valve is installed in the bypass line, check whether it is 10 % open. 2. If you cannot solve the problem, contact the manufacturer.
Level regulation – valve During the status **Test safety valve**, the system control detected active water flow.	• The safety valve leaks.	■	Contact the manufacturer.
Level regulation – floater The water level in the reservoir (master or slave) is so high that the emergency floater was activated and the safety valve closed.	• Large supply of external water (rain water, melt water, cleaning water). • The water supply valve is defective and thus permanently open. • The water level sensor is defective. • The emergency floater is dirty.	■	The system no longer takes in any more water and stops acid supply. The circulation pumps continue working normally. 1. If external water has entered the reservoir, drain the reservoir partially. 2. If you cannot solve the problem or if the problems keeps recurring, contact the manufacturer.
Level regulation – sensor The electric signal of the water level sensor is out of range.	• The sensor is defective or a cable has broken.		Contact the manufacturer.

Message code and meaning	Possible cause	H	Consequences and required action
Level regulation – too high The water level in the reservoir (master or slave) has exceeded the maximum control limit.	• Large supply of external water (rain water, melt water, cleaning water). • The water supply valve is defective and thus permanently open. • The water level sensor is defective.		The system no longer takes in any more water and stops acid supply. The circulation pumps continue working normally. 1. If external water has entered the reservoir, drain the reservoir partially. 2. If you cannot solve the problem or if the problems keeps recurring, contact the manufacturer.
Level regulation – too low There is too little water in the reservoir.	• Too much water evaporates or is lost via the filter packages, while no or only very little water is refilled. • There is a large leak in the system.		1. Check whether the main valve is open. 2. If you cannot solve the problem, contact the manufacturer.
Level regulation – leak Despite a closed water valve, a certain amount of water has passed through within a specific time.	• (Small) leaks in the water valve.	■	If this alarm occurs only sporadically, this does not necessarily constitute a problem. If the problem occurs frequently, however, contact the manufacturer.

Message code and meaning	Possible cause	H	Consequences and required action
Level regulation – minimum flow The water flow in the supply line is insufficient during filling.	• The water supply filter is clogged. • The main valve is closed. • The distribution network's capacity is not sufficient. • The water meter is defective. • The water supply valve is defective.	■	1. Check the main valve and the water line. Check and clean the water filter (see chapter 7.4.1 ”Cleaning the technical room”, page 79). 2. If you cannot solve the problem or if the problems keeps recurring, contact the manufacturer.
Drain regulation – runtime Draining the reservoir with the drain pump takes too long (4 hours).	• The drain pump is defective or was switched off due to increased current consumption. • The drain pump or the drain line is clogged.The water level sensor is defective.	■	The drain pump switches off and the reservoir is not filled. The circulation pump continues operating, but the wash water is already maximally contaminated. The wash water also has a neutral pH value so ammonia absorption is insufficient. Contact the manufacturer.
Drain regulation – sensor The electric signal of the conductivity sensor is out of range.	• The sensor is defective or a cable has broken.		Contact the manufacturer.

Message code and meaning	Possible cause	H	Consequences and required action
Drain regulation – minimum flow The drain pump is active but the measured flow rate is too low.	• The drain pump is defective or was switched off due to increased current consumption. • The drain pump or the drain line is clogged. • The water level sensor is defective. • The drain water meter is defective.	■	Contact the manufacturer.

Message code and meaning	Possible cause	H	Consequences and required action
Pumps – thermal One of the pumps is overloaded and was switched off due to increased current consumption. The motor protection switch in the technical room failed.	• The pump is defective or stalled. • The motor protection switch (PKZ) is defective or configured incorrectly.		Contact the manufacturer.
Dry running protection The flow rate delivered by the circulation pump is too little and the pump has therefore been deactivated.	• The valve in the pressure line is closed. • The reservoir is empty. • The filter of the circulation pump is dirty. • The sprinklers are clogged.	■	1. Open the valve (see chapter 7.4.3 ”Cleaning the filter before the circulation pumps”, page 85). Check the water level and the supply valve (manual valve). Clean the filter (see chapter 7.4.3 ”Cleaning the filter before the circulation pumps”, page 85).Clean the sprinklers (see chapter 7.3.2 ”Checking the overall cleaner situation and quick cleaning”, page 72).

8.5 Resetting an alarm manually

Some problems that generate alarms are solved automatically and then disappear from the menu. Other alarms must be reset manually. This manual resetting requirement is indicated in the overview table in chapter 8.4.

Proceed as follows to reset an alarm:

1. Enter the company code or the personal access code, if applicable, in the **main menu**.
2. Press the alarm button.
3. Go to the column **[On / Off]** in the correct alarm row.
4. Press the Enter button. The cursors turns transparent.
5. Use the arrow keys to set the alarm group to **Off**.
6. Press the Enter button.
7. Press the Enter button again. The cursor turns transparent again.
8. Use the arrow keys to set the alarm group to **On**.
9. Confirm by pressing the Enter button.
10. Wait 2 second until the alarm message is no longer displayed (provided the cause for the alarm has been eliminated).

NOTICE!

Several alarms may have been active at the same time. In this case, the next alarm message will now appear.

8.6 Viewing the alarm history

You can view the 25 most recent alarms at the control computer. Proceed as follows to do this:

1. Go to the **main menu**.
2. Go to row **[3 Alarms]**.
3. Go to row **[1 Alarm history]**.

   The menu **[31 Latest alarms]** appears. All saved alarms are displayed in blocks, showing two alarms per page.
4. Use the arrow keys to view other alarms.

   Alarm 1 is the most recent alarm.

8.7 Alarm due to a too high water level

If the emergency floater is activated because the water level is too high, the system switches off (only the circulation pump remains active). Additionally, the lamp **[High water]** at the control cabinet will light up (see figure 8-4).

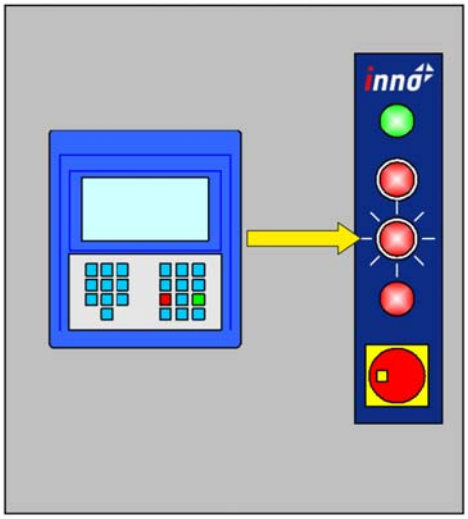


Figure 8-4: Too high water level alarm

Proceed as follows in this situation:

1. Search for the cause of the error and eliminate it.
2. Press **[Reset]** at the control cabinet.
3. Switch the system **On** (in the menu **Air cleaner** (1)).

8.8 Alarm due to contaminated filter packages

When the filter packages are contaminated to a certain degree, the system switches off (only the circulation pump remains active). Additionally, the lamp **[Filter package contaminated]** at the control cabinet will light up (see figure 8-5).

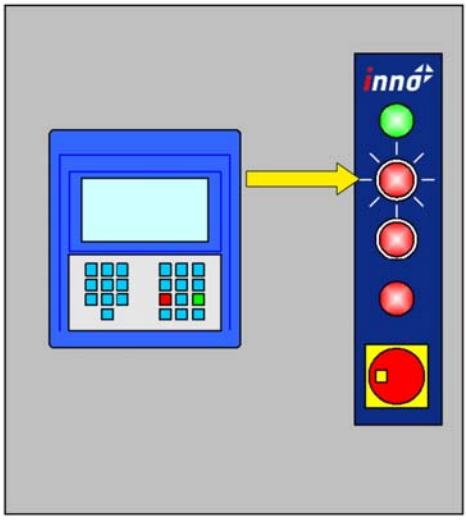


Figure 8-5: Alarm due to contaminated filter packages

Proceed as follows in this situation:

1. Clean the filter packages (see chapter 7.5.1 ”Cleaning the entire system”, page 89).
2. Press **[Reset]** at the control cabinet.
3. Switch the system **On** (in the menu **Air cleaner** (1)).

9 Dismantling and disposal

⚠ WARNING!

Designate a person who is responsible for the required actions and for safety. This person must ensure that measures are taken to prevent the risk of falling. The person must also make sure that personnel limits their presence under the filter packages.

NOTICE!

When disposing of the system, commission experts only.

The operator is responsible for disposing of the system at the end of its service life. Observe the applicable statutory provisions when disposing of the system.

NOTICE!

Incorrect disposal can lead to environmental damage.

► The system and individual parts must be disposed of properly!

► If necessary, commission a specialised company with the disposal.

NOTICE!

Observe system-specific safety instructions during dismantling.

If the exhaust air cleaning system is not going to be used any longer and must be disassembled, take into account the following points:

- Clean the exhaust air cleaning system as described in chapter 7.5.1.
- Dispose of the chemical tanks in accordance with local regulations.
- Disconnect the mains supply and make sure it cannot be activated accidentally.
- Disassemble the pumps, measuring devices and all other equipment.
- Disassemble the acid lines and hoses.

  Empty and clean them thoroughly so that no acid can leave them later on. Read chapter 3.12 first for more information.
- Work from top to bottom to disassemble the exhaust air cleaning system. Use proper aids and tools to do this and ensure safety!
- All components must be disposed of in accordance with local regulations and preferably be taken to a recycling company.

10 Notes

11 Annex

01. Identification of the substance/preparation and of the company/undertaking

Trade name

Sulfuric acid ca. 96%

Use of the substance/preparation

Base chemical with not specially defined use

Company/undertaking identification

Address

BÜFA Chemikalien GmbH & Co.KG
An der Autobahn 14
27798 Hude / Altmoorhausen

Telephone no.	+49 4484 9456 852
Fax no.	+49 4484 9456 863
Information provided by / telephone	Department product safety
Emergency telephone	Giftzentrale Göttingen: +49 551 19 240
E-mail address of person responsible for this SDS	produktsicherheit-c@buefa.de

02. Hazards identification

Classification

Classification	C, R35

Hazard symbols

C	Corrosive

R phrases

35	Causes severe burns.

03. Composition / information on ingredients ***

Hazardous ingredients ***

Sulphuric acid ...%

CAS no.	7664-93-9			
EINECS no.	231-639-5			
Concentration		>=	50	%
Classification	C, R35			

Complete text of R-phrases in Chapter 16

04. First aid measures

General information

Remove affected person from danger area, lay him down. Remove contaminated, soaked clothing immediately and dispose of safely. Irregular breathing/no breathing: artificial respiration. If the patient is likely to become unconscious, place and transport in stable sideways position.

After inhalation

Remove the casualty into fresh air and keep him calm. Keep warm, calm and covered up. If the patient is likely to become unconscious, place and transport in stable sideways position. Summon a doctor immediately.

After skin contact

Wash immediately with plenty of water for several minutes. Summon a doctor immediately.

After eye contact

Separate eyelids, wash the eyes thoroughly with water (15 min.). Summon a doctor immediately.

After ingestion

Rinse out mouth and give plenty of water to drink. Do not induce vomiting. Summon a doctor immediately.

05. Fire-fighting measures

Suitable extinguishing media

Carbon dioxide, Dry powder, Water spray jet, Alcohol- resistant foam

Non Suitable extinguishing media

Full water jet

Special exposure hazards arising from the substance or preparation itself, its combustion products or from resulting gases

In case of combustion evolution of dangerous gases possible.

Special protective equipment for fire-fighting

Use self-contained breathing apparatus. Acid-resistant protective clothing

Other information

Collect contaminated fire-fighting water separately, must not be discharged into the drains.

06. Accidental release measures

Personal precautions

Use personal protective clothing. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing. Use breathing apparatus if exposed to vapours/dust/aerosol.

Environmental precautions

Do not allow to enter drains or waterways. Do not discharge into the subsoil/soil. In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.

Methods for cleaning up

Pick up with absorbent material (e.g. sand, sawdust, general-purpose binder, kieselguhr). When picked up, treat material as prescribed under heading "Disposal".

07. Handling and storage

Handling

Advice on safe handling

Keep container tightly closed. Open and handle container with care. Avoid formation of aerosols. When diluting, always stir product into water.

Advice on protection against fire and explosion

No special measures necessary. The product is not combustible.

Storage

Requirements for storage rooms and vessels

Provide acid-resistant floor. Keep only in the original container.

Hints on storage assembly

Do not store together with: Alkalies, Metals, Reducing agents

Further information on storage conditions

Keep container tightly closed and dry in a cool, well-ventilated place.

VCI storage category

VCI storage category 8B Non-combustible corrosive substances

08. Expose controls/personal protection ***

Exposure limit values ***

Sulphuric acid ...%

Type	MAK	
Value	0,1	mg/m³
Ceiling limit value	1	
Pregnancy group	Y	
Remarks	35, TRGS 901-104, DFG	

General protective and hygiene measures

Remove soiled or soaked clothing immediately. Avoid contact with eyes and skin. Keep seperated from food-stuffs and feed-stocks. At work do not eat, drink, smoke or take drugs. Wash hands before breaks and after work. Do not inhale gases/vapours/aerosols.

Respiratory protection

Short term: filter apparatus, combination filter B-P3; Self-contained breathing apparatus.

Hand protection

impermeable gloves

Appropriate Material	viton		
Material thickness	>=	0,7	mm
Penetrating time	>=	480	min

Eye protection

Tightly fitting safety glasses

Skin protection

Acid-resistant protective clothing

09. Physical and chemical properties

General information

Form	liquid
Colour	colourless
Odour	odourless

Boiling point

Value	appr.	310	°C

Melting point

Value	appr.	-10	°C

Vapour pressure

Value	<	0,0001	hPa
temperature		20 °C	

Density

Value	1,835	g/cm³
temperature	20 °C	

Viscosity

dynamic

Value	21,6	mPa.s
temperature	20 °C	

Solubility in water

Remarks	Completely miscible

pH

Value	<	1	
temperature		20 °C	

10. Stability and reactivity

Conditions to avoid

No decomposition if used as prescribed.

Materials to avoid

Reactions with metals, with evolution of hydrogen. Reacts strongly with water. Addition of water leads to increase in temperature. Reactions with alkalies.

Hazardous decomposition products

sulphurous oxides (SOx)

Other information

When diluting, add acids to water, never the other way around.

11. Toxicological information

Acute toxicity / further data

Acute oral toxicity

Species	rat		
LD50		2140	mg/kg

Irritant/corrosive effects

Irritant effect on skin

valuation	strongly corrosive
Remarks	Irritating effects on the skin and mucous membrane.

Irritant effect on eyes

valuation	strongly corrosive

Sensitization

valuation	non-sensitizing

Effects after repeated or prolonged exposition (subacute, subchronic, cronic)

Other information

Phrase nicht verfügbar.

12. Ecological information

General information / ecology

Do not discharge into the drains/surface waters/groundwater. Do not allow to enter soil, waterways or waste water canal. Toxic to aquatic organisms. Phrase nicht verfügbar. Do not release into waterways untreated.

13. Disposal considerations

Disposal recommendations for the product

Allocation of a waste code number, according to the European Waste Catalogue (EWC), should be carried out in agreement with the regional waste disposal company.

Disposal recommendations for packaging

Packaging that cannot be cleaned should be disposed off in agreement with the regional waste disposal company.

14. Transport information

Land transport ADR/RID

UN number	1830
Class	8
Packing group	II

Label	8
Technical name	SULPHURIC ACID
Tunnel limitation code	E

Marine transport IMDG/GGVSee

UN number	1830
Class	8
Packing group	II
Technical name	SULPHURIC ACID
EmS	F-A, S-B

15. Regulatory information ***

Labelling in accordance with EC directives *

The product is classified and labelled in accordance with EC directives/the relevant national laws.

Registration no.

EC No.: 231-639-5

Hazard symbols

C Corrosive

Hazardous component(s) to be indicated on label

contains *** Sulphuric acid ...%

R phrases

35 Causes severe burns.

S phrases *

26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
36/37/39	Wear suitable protective clothing, gloves and eye/face protection.
45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
60	This material and its container must be disposed of as hazardous waste.

National regulations

Water Hazard Class (Ger.)

Water Hazard Class (Ger.) WGK 1

Classification according to VwVwS

16. Other information

R-phrases of the ingredients listed in chapter 3

35 Causes severe burns.

Department issuing safety data sheet

Department product safety

This information is based on our present state of knowledge. However, it should not constitute a guarantee for any specific product properties and shall not establish a legally valid relationship.

Safety data sheet
according to 1907/2006/EC

Printing date 24.07.2012 Version number 8 Revision: 24.07.2012

1 Identification of the substance/mixture and of the company/ undertaking

· **1.1 Product identifier**

· **Trade name: Struktol SB 2032**

· **Article number:** 02054
· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.
· **Application of the substance / the preparation** Anti-foaming agent

· **1.3 Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**

Schill+Seilacher "Struktol" GmbH
Moorfleeter Str. 28
D-22113 Hamburg
Phone: +49 / (0)40 / 73362-0
Fax: +49 / (0)40 / 73362-194
· **Further information obtainable from:**
QW Gefahrgut / -stoffe
E-Mail: msds@struktol.de
· **1.4 Emergency telephone number:**
GIZ-Nord
Phone: +49 / (0)551 / 19240

2 Hazards identification

· **2.1 Classification of the substance or mixture**
· **Classification according to Regulation (EC) No 1272/2008**
The product is not classified according to the CLP regulation.

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**
Not applicable.
· **Information concerning particular hazards for human and environment:**
The product does not have to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

· **2.2 Label elements**

· **Labelling according to EU guidelines:**
Observe the general safety regulations when handling chemicals.
The product is not subject to identification regulations under EU Directives and the Ordinance on Hazardous Materials (German GefStoffV).
· **2.3 Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **3.2 Chemical characterization: Mixtures**
· **Description:** Modified fatty alcohols.

· **Dangerous components:** Void

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(Contd. of page 1)

· **Additional information:**
This information refers to the product in concentrated form only.

For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· **4.1 Description of first aid measures**
· **After inhalation:**
Supply fresh air and to be sure call for a doctor.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:**
Wash off with water and soap.
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.
· **After eye contact:**
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **4.2 Most important symptoms and effects, both acute and delayed** Allergic reactions
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
CO_2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **5.2 Special hazards arising from the substance or mixture**
In case of fire, the following can be released:
Carbon monoxide and carbon dioxide
· **5.3 Advice for firefighters**
· **Protective equipment:** Do not inhale explosion gases or combustion gases.

6 Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Wear protective clothing.
· **6.2 Environmental precautions:**
The product should not be released into the aquatic environment without preliminary treatments (purification plant).
Do not allow to enter sewers/ surface or ground water.
Do not allow to penetrate the ground/soil.
· **6.3 Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of the material collected according to regulations.
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.

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See Section 13 for disposal information.

*
7 Handling and storage

· **7.1 Precautions for safe handling**
The usual precautionary measures are to be adhered to when handling chemicals.
· **Information about fire - and explosion protection:** No special measures required.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** Store in a cool location.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Store in dry conditions.
Store in a cool place.
· **7.3 Specific end use(s)** No further relevant information available.

*
8 Exposure controls/personal protection

· **Additional information about design of technical facilities:**
No further data; see item 7.

· **8.1 Control parameters**
· **Ingredients with limit values that require monitoring at the workplace:**
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
Avoid contact with the skin.
Avoid contact with the eyes and skin.
· **Protection of hands:**
chemical resistant protective gloves (EN 374)
Oil resistant gloves
Neoprene gloves
If only a short-term loading of the glove material by splashes is expected, tricoted gloves with higher wearability for the better acceptance of the users are recommended.
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Penetration time of glove material**
The exact break trough time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:** Goggles recommended during refilling
· **Body protection:** Protective work clothing

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(Contd. on page 4)

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9 Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Fluid
Colour:	Yellowish
· **Odour:**	Weak aromatic
· **Change in condition**	
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not determined.
· **Flash point:**	> 120°C (DIN EN ISO 2592)
· **Ignition temperature:**	ca. 200°C
· **Self-igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Density at 20°C:**	0.88 g/cm³ (DIN 53479)
· **Solubility in / Miscibility with water:**	Not miscible or difficult to mix.
· **Viscosity:**	
Dynamic at 20°C:	23 mPas (DIN 51550)
· **Solvent content:**	
Organic solvents:	0.0 %
· **9.2 Other information**	No further relevant information available.

10 Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
· **10.3 Possibility of hazardous reactions** No dangerous reactions known.
· **10.4 Conditions to avoid** No further relevant information available.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:**
No dangerous decomposition products known.

11 Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**
· **Primary irritant effect:**
· **on the skin:** No irritating effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.

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· **Additional toxicological information:**
The product is not subject to classification according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version.
When used and handled according to specifications, the product does not have any harmful effects to our experience and the information provided to us.

12 Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability** No further relevant information available.
· **12.3 Bioaccumulative potential** No further relevant information available.
· **12.4 Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
The product should not be released in concentrated form into the aquatic environment without preliminary treatments (purification plant).
Negative ecological effects are, according to the current state of knowledge, not expected.
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **12.6 Other adverse effects** No further relevant information available.

13 Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Disposal must be made according to official regulations.
Must not be disposed together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **14.6 Special precautions for user**	Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **Transport/Additional information:**	Not dangerous according to the above specifications.

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Trade name: Struktol SB 2032

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15 Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

· **National regulations:**

· **Breakdown regulations:**

· **Breakdown regulations, Annex II, No.:**
None of the ingredients is listed.

· **15.2 Chemical safety assessment:**
A Chemical Safety Assessment has not been carried out.

16 Other information

This information refers to the product in concentrated form only.
This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing MSDS:** QW Gefahrgut / -stoffe
· **Abbreviations and acronyms:**
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
· * **Data compared to the previous version altered.**

Big Dutchman
PIG EQUIPMENT

OPERATING INSTRUCTIONS

in accordance with §14 GefStoffV[1]

RECEIVING COMPANY:

WORK AREA:
EXHAUST AIR CLEANING SYSTEM
WORKPLACE: ACID SUPPLY

TASK:
Replacing the acid store

AUTHORISED PERSON:

Name of hazardous substance

Concentrated sulfuric acid (96 %) – H_2SO_4

Dangers for persons and environment

- Causes severe burns and injuries which only heal very slowly
- Released vapours and aerosols can damage mucosa and eyes
- Mixing with water causes strong heat development
- Concentrated sulfuric acid can destroy organic substances (charring)

Protective measures and directives



- Ensure sufficient ventilation before starting to work
- Do not inhale acid fogs (aerosol)
- Avoid contact with the skin and eye mucosa by:
  - wearing acid-resistant protective clothing
  - wearing protective gloves with cuffs
  - wearing tight-fitting goggles
- Keep acids away from food and drinks
- When using, do not eat, drink or smoke
- Wash hands thoroughly before breaks and after completing work with the acid
- Carefully open and tightly close acid containers
- Only authorised persons are permitted to handle acids.


In case of danger

- Neutralize spilled acid with lime or soda and rinse with plenty of water
- Immediately leave the danger zone in case of larger quantities of vapour or fog
- Wear respiratory protection masks with filter P2 (white)

Emergency number 112

First aid

- Immediately take off wetted clothing
- Rinse wetted skin immediately with plenty of water (for at least 15 minutes)
- After contact with eyes: Rinse eyes using an eyeshower or under running water while holding the lid open (for at least 15 minutes)
- Inform the first aider and seek medical advice immediately

Emergency number 112

Correct disposal

Do not empty into drains. Immediately clean the floor and contaminated objects. Return empty and no longer usable packaging at the appropriate disposal point.

Date: _____ Responsible: _____

[1] German for *Gefahrstoffverordnung*, English: Hazardous Substances Ordinance