



robatherm AHUs.

Main operating instructions.

November 2024

English - Translation of the original instructions

Air handling units | type RM/RL/TI-50

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You can find the currently valid version of these instructions, and further instructions, on our website at www.robatherm.com/manuals.

This leaflet is based on the generally accepted engineering standards at the time of drafting. Since the printed version is not subject to change control, the current version must be requested from robatherm or downloaded from the Internet at www.robatherm.com before application.

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Content subject to change.

To improve readability, this document does not use male, female, and non-binary pronouns (m/f/d). All pronouns apply equally to all genders.

Last modified: November 2024

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General remarks

Information about these instructions

How to use these instructions

These instructions will facilitate safe and efficient use of the AHU.



All persons working on the AHU must thoroughly read and understand these instructions before starting any kind of work.

Safe working is dependent on adhering to all safety information and instructions.

Safekeeping of the instructions

These instructions are part of the AHU and must be kept accessible for all persons working on the AHU in the immediate vicinity of the AHU at all times.

Accident prevention regulations

In addition to the information in these instructions, the local accident prevention and national occupational health and safety regulations apply.

Further information

The instructions describe all the available options. Whether and which options are available in the AHU depends on the options selected and the country for which the AHU is intended. The illustrations serve as an example and may differ.

The instructions consist of several parts and have the following structure:



Fig. 1: Parts of the instructions

Main operating instructions

- ➔ Transport and unloading
- ➔ Installation and assembly
- ➔ Commissioning
- ➔ Operation and faults
- ➔ Maintenance and cleaning
- ➔ Disabling and disposal

Explanation of symbols

Safety information

DANGER



This combination of symbol and signal word refers to an immediately dangerous situation, which, if not avoided, will lead to serious injuries, including death.

WARNING



This combination of symbol and signal word refers to a potentially dangerous situation, which, if not avoided, may lead to serious injuries, including death.

CAUTION



This combination of symbol and signal word refers to a potentially dangerous situation, which, if not avoided, may lead to negligible or slight injuries.

NOTE



This combination of symbol and signal word refers to a potentially dangerous situation, which, if not avoided, may lead to material damage.

Tips and additional information

TIP



This combination of symbol and signal word denotes useful tips and additional information.

Safety symbols

Warning signs

The following warning signs indicate specific hazards. Failure to observe safety information marked in this way may result in death or serious injury due to the particular hazard.



General warning sign



Warning of explosive materials



Warning of obstacles on the floor



Warning of falling hazard



Warning of biological hazard



Warning of low temperatures



Warning of electrical voltage



Warning of suspended load



Warning of toxic materials



Warning of hot surface



Warning of automatic start



Warning of flammable substances



Warning of sharp objects



Warning of hand injuries



Warning of oxidizing substances



Warning of objects falling down



Warning of objects falling over



Warning of loud noise



Warning of suffocation hazard

Table 1: Warning signs

Mandatory action signs



Follow instructions



Wear hearing protection



Wear safety glasses



Wear protective footwear



Wear protective gloves



Wear protective clothing



Wear respiratory protection



Disconnect before carrying out scheduled maintenance or repairs.

Table 2: Mandatory action signs

Prohibition signs

No smoking



Do not touch



Do not extinguish with water



No heavy load



No climbing



Do not walk or stand here



Do not alter the state of the switch

Table 3: Prohibition signs

Other symbols and markings

Designation of components in the image

(A), (B),
(C), ...

Referencing of components in the text



Listing without a defined sequence

1., 2.,
3., ...

Action steps with a defined sequence



Result of the action

Table 4: Other symbols and markings

Security

Intended use

Definition of the scope of application

robatherm AHUs must be used exclusively for transporting air and/or for air treatment, with any other use expressly ruled out. This includes the following functions:

- Air treatment: A process in which the condition of air is changed with respect to one or more of the following: Temperature, humidity, dust content, bacteria content, gas content, and water content.
- Filtering: Removal of particles from the airflow.
- Heating: Transfer of heat from one body or medium to another.
- Cooling: Removal of sensible and/or latent heat.
- Humidifying: Controlled increase of water vapor content of flowing or stagnant air.
- Dehumidifying: Controlled reduction of water vapor content of the air.

Transporting the air is specified using a characteristic value:

- Airflow: Conveyed air within set balance limits (e.g., air ducts).

Foreseeable misuse

WARNING



Danger from misuse

Serious personal injury or even death and damage to property can be caused by misuse of the AHUs.

AHUs are not smoke extraction units and must not be used for smoke extraction.

AHUs must not be used in environments with a potentially explosive atmosphere (e.g. explosive dusts and/or gases) and must not convey a potentially explosive atmosphere.

The roof of AHUs is not designed to support additional roof loads. AHUs are not intended as a support structure for other trades (ventilation ducts, maintenance platforms, cable trays, etc.). AHUs must not be installed directly on top of each other without a suitable support structure or additional equipment provided on site (see operating instructions "Installation and assembly", "Roof rack frame" section).

AHUs must not be used for fall protection (e.g. fastening guardrails to the casing, fastening the fall protection to transport lugs or lifting lugs).

AHUs must not be used for building functions.

Combination units (two airflows combined in one unit) must not be used to treat and convey airflows that are hazardous to health.

AHUs are not suitable for applications with aggressive media.

AHUs are only suitable for stationary use.

AHUs are not intended for use in general engineering processes.

AHUs may only be installed in certain locations (see operating instructions "Installation and assembly", section "Installation site requirements").

General risk sources

Electrical hazards due to electric current and voltage

CAUTION

**Risk of injury due to unexpected rotation of PM motors**

When the AHU is switched off and secured against restarting, there is a risk of death when PM motors are rotated due to the resulting voltages.

- Block the impeller so that it cannot be turned.
- Protect PM motors by short-circuiting the cores of the supply line (eddy-current brake).

General hazards

WARNING

**Risk of death by being trapped in the AHU**

When working in the AHU, there is a risk of death due to being trapped in the AHU.

- Work in teams of two at a minimum.
- For doors with lever locks with key cylinders, remove the key and carry it with you.
- Before closing the door, make sure that there are no people inside the AHU.

WARNING

**Danger to life from falling!**

A falling height of more than 1 m constitutes a fall hazard.

- For falling heights of 1 m or more, a railing is recommended.
- From falling heights of 3 m, fall protection can be implemented using anchor points.

WARNING

**Risk of death due to excessive snow load**

Excessive snow load on the casing may cause damage to the AHU and roof failure. As a result, there is a risk of death if the device is stepped on.

- Determine clearing height by calculating the snow load.
- Clear the casing roof of snow or ice before reaching the determined clearing height.

CAUTION**Risk of cutting due to sharp edges**

There is a risk of being cut by the sharp edges when touching the metal edges.

- Wear personal protective equipment (cut-resistant gloves and long-sleeved clothing).

CAUTION**Physical injury due to forced posture**

If there is no leg/foot room, the working height is too low or too high and the freedom of movement is restricted, there is a risk of forced posture.

- Modify tasks to allow for posture change.
- Move at least once an hour for about 5 minutes.

Chemical hazard due to operating fluids

WARNING



Harm to health from frost protection agent

Frost protection agent contains propylene or ethylene glycol. Frost protection agent may contain toxic and environmentally hazardous substances.

- Prevent contact with skin and eyes. If it comes into contact with skin and eyes, rinse with plenty of water.
- Do not swallow.
- Make sure the danger zone is well ventilated.
- Wear personal protective equipment (for temporary exposure (<30 minutes) gloves made of nitrile rubber and safety goggles).
- Observe the manufacturer's safety data sheet.

WARNING



Harm to health from refrigerant

Refrigerant may contain or develop toxic and environmentally hazardous substances if released.

- A refrigerant sensor for monitoring the installation site and suitable ventilation of the installation site must be in place and functional.
- Prevent contact with skin and eyes. If it comes into contact with skin and eyes, rinse with water.
- Do not inhale.
- Make sure the danger zone is well ventilated.
- Prevent ingress in places where accumulation could be hazardous (e.g. cellar, waste water system).
- Wear personal protective equipment (cold-insulating gloves and chemical-resistant goggles and full face visor).
- Observe the manufacturer's safety data sheet.

WARNING



Harm to health from lubricants

Lubricants such as greases and oils contain toxic substances.

- Prevent contact with skin and eyes. If it comes into contact with skin and eyes, rinse with water.
- Wear personal protective equipment (gloves and safety goggles).
- Observe the manufacturer's safety data sheet.

WARNING



Damage to health from mercury

UV-C illuminants contain mercury. Mercury is toxic and dangerous to the environment.

- Avoid contact with skin and eyes. In case of contact, flush skin and eyes with plenty of water. Take off contaminated clothing.
- Do not swallow. If swallowed, induce vomiting.
- Ensure good air exchange in the danger zone.
- Comply with the safety data sheet of the manufacturer.

CAUTION**Damage to health from compressor oil**

Compressor oil contains toxic and environmentally hazardous substances.

- Avoid contact with skin and eyes.
- Ensure good air exchange in the danger zone.
- Do not swallow.
- Wear protective equipment (chemical-resistant gloves and safety glasses with side protection).
- Comply with the safety data sheet of the manufacturer.

The operator's responsibility

Operator

The operator is the person who operates the AHU for commercial or economic purposes themselves or cedes it to a third party for use/application and who bears the legal product liability for the protection of the user, the staff, or third parties during operation.

HVAC installer

The installer of a ventilation system is both the person who installs, extends, modifies or maintains a ventilation system and the person who although has not installed, extended, modified or maintained it, has checked the work carried out as an expert and assumes responsibility for its proper execution.

Operator's obligations

The operator must:

- Know and implement the occupational health and safety regulations applicable at the installation site.
- identify, by carrying out a hazard assessment, any hazards which are due to the working conditions at the installation site.
- Safety instructions for the operation of the AHU. The operator must regularly check whether the safety instructions comply with the current status of the regulations.
- Clearly regulate and define the responsibilities for installation and assembly, commissioning, operation, troubleshooting, maintenance, cleaning, and disabling.
- Ensure that the staff responsible have read and understood the instructions.
- Instruct and inform personnel about hazards at regular intervals. For better tracking, the performance of training must be recorded. The record must contain the following minimum details:
 - Date of training
 - Type of training
 - Name of instructor
 - Name of trainee
 - Signature of trainee
- Provide personnel with the necessary personal protective equipment.
- Ensure that the maintenance intervals specified in these operating instructions are adhered to. The specified maintenance intervals refer to normal use (by normally polluted air inspired by VDI 6022). If the air is more polluted, the maintenance intervals must be shortened accordingly.
- Keep the AHU in perfect condition.
- Check the AHU daily for proper function or damage.
- Check all safety devices regularly for proper functioning and completeness.
- Comply with the fire safety regulations in force at the installation site. The operator must integrate the AHU into the fire protection concept of the building and define individual rules of conduct in case of fire.
- In the case of AHUs with refrigeration technology, fulfill the specific requirements in accordance with Section 14 of the German Operational Safety Ordinance (BetrSichV) prior to operation, as the refrigeration technology within the meaning of the BetrSichV requires monitoring.

- Document changes to the plant (e.g., retrofits, conversion measures, scheduled maintenance work, ...)

Hygienic requirement

The operator must:

- Observe the standards and regulations applicable at the installation site with regard to hygienic requirements .
- Conduct hygiene training for the staff at regular intervals based on the standards and regulations applicable at the installation site. Recommendations of VDI 6022 must be observed.

Personnel qualification

AHUs may only be installed, connected, maintained, repaired, and accessed by persons with appropriate qualifications.

→ Operator

The operator has technical training with technical understanding to carry out checks and adjustments on the AHU, as well as to commission specialist companies to carry out maintenance and to monitor this. The operator has been instructed by a competent person in the use of the AHU and performs work independently in accordance with documents and instructions, observing the relevant regulations and safety provisions. The operator can avoid possible hazards due to improper behavior on the basis of the instruction.

→ Qualified person in accordance with pressure equipment regulation

The qualified person in accordance with the pressure equipment regulation has had technical vocational training and is qualified in accordance with the Pressure Equipment Directive 2014/68/EU. The qualified person in accordance with the pressure equipment regulation is trained for the specific task area in which they work and know the relevant standards and regulations. The qualified person in accordance with the pressure equipment regulation has in-depth knowledge and skills for safely handling pressure vessels and pipework. Based on their professional training, knowledge and experience, the qualified person in accordance with the pressure equipment regulation can carry out work on pressure vessels and pipework and identify and avert potential hazards unaided.

→ Professional driver

The professional driver has a valid driver's license for the motor vehicle according to Directive 2003/59/EC with entry of code number 95 in the driver's license. Professional drivers are trained for the specific task area in which they work and know the relevant standards and regulations. The professional driver has in-depth knowledge of transport and load securing. The professional driver is able to carry out transport work on the basis of professional training, knowledge and experience and to recognize and avoid possible dangers independently.

→ Qualified electrician

The qualified electrician is trained for the specific task area in which he/she works and knows the relevant standards and regulations. Based on their professional training, knowledge and experience, qualified electricians can perform work on electrical systems and independently recognize and avoid potential hazards.

→ Waste disposal and recycling company and waste and recycling specialist

The management and supervisory staff of the waste disposal and recycling company in accordance with Waste Directive 2006/12/EC have in-depth knowledge and skills in the safe handling of waste collection, transport and disposal. The specialist for recycling and waste management is trained for the specific area of responsibility in which he or she works and knows the relevant standards and regulations. Based on their professional training, knowledge and experience, the specialist for recycling and waste management can carry out work in the field of waste collection, transport and disposal and independently recognize and avoid possible hazards.

→ Registered gas installer

The registered gas installer is certified according to the Gas Appliances Regulation 2016/426/EU. Registered gas installers are trained for the specific task area in which they work and know the relevant standards and regulations. The registered gas installer has in-depth knowledge and skills in the safe handling of the connection and installation of gas appliances. Due to their professional training, knowledge and experience, registered gas installers can carry out work on gas installations and independently recognize and avoid potential hazards.

→ Hygiene specialist

The hygiene specialist has completed a hygiene training in accordance with VDI 6022 for category A AHUs. Hygiene specialists are trained for the specific task area in which they work and know the relevant standards and regulations. The hygiene specialist has in-depth knowledge and skills in the safe handling of AHUs during hygiene inspections. Based on their professional training, knowledge, and experience, the hygiene specialist can perform demanding activities on AHUs, such as planning, installation, scheduled maintenance, monitoring, and hygiene inspection on AHUs, and independently identify and avoid potential hazards.

→ Refrigeration specialist

The specialist for refrigeration has a certification of category 1 according to F-Gas Regulation 517/2014/EU. Refrigeration specialists are trained for the specific task area in which they work and know the relevant standards and regulations. The refrigeration specialist has in-depth knowledge and skills in the safe handling of refrigeration equipment, in the area of emission prevention and the recovery of fluorinated greenhouse gases. Based on their professional training, knowledge and experience, refrigeration specialists can carry out work on refrigeration systems and independently identify and avoid potential hazards.

→ Crane operator

Crane operators are trained for the specific task area in which they work and know the relevant standards and regulations. Based on a theoretical and practical examination, the crane operator has in-depth knowledge of load suspension devices and lifting equipment as well as of estimating, slinging, setting down and storing loads. The crane operator is able to carry out transport work on the basis of professional training, knowledge and experience and to recognize and avoid possible dangers independently.

→ Mechanic

The mechanic is trained for the specific task area in which he is working and knows the relevant standards and regulations. The mechanic has in-depth knowledge and skills in the area of installation, commissioning, and maintenance of AHUs. Based on their professional training, knowledge and experience, the mechanic can carry out assembly, commissioning and maintenance work and independently recognize and avoid possible hazards.

➔ Cleaning specialist

The cleaning specialist has been instructed by a hygiene specialist for the specific task area in which he works. Based on their instruction, the cleaning specialist is able to perform the tasks assigned to them and avoid possible hazards due to improper behavior. Cleaning specialists have been trained to carry out simple operational activities on AHUs, such as changing filters, scheduled maintenance, cleaning, servicing, assembly, and hygiene checks.

➔ Forklift driver

Forklift drivers are trained for the specific task area in which they work and know the relevant standards and regulations. Based on a theoretical and practical examination, the forklift driver has in-depth knowledge of industrial trucks as well as of estimating, lifting, transporting, setting down and storing loads. The forklift driver is able to perform transport work based on professional training, knowledge and experience, and to recognize and avoid possible hazards independently.

Safety labels

There are safety signs on the AHU. The safety signs are affixed in the immediate vicinity of the danger zone concerned.

Danger

Electric voltage. Danger to life when touching live parts.

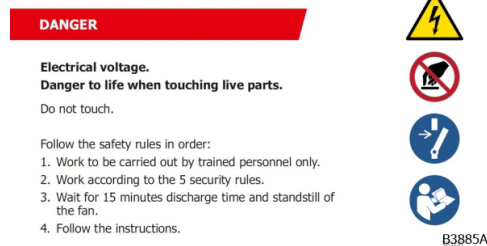


Fig. 2: Danger "Electrical voltage. Danger to life when touching live parts."

An area marked with this indicates a danger to life from electric voltage when touching live parts. Touching is prohibited.

- Work to be carried out by trained personnel only.
- Work according to the 5 safety rules.
- Wait for 15 minutes discharge time and standstill of the fan.
- Follow the instructions.

Hot surfaces. Risk of burns.

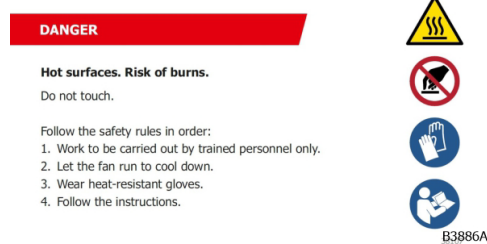


Fig. 3: Danger "Hot surfaces. Risk of burns."

A part marked with this indicates a danger of burning on hot surfaces. Touching is prohibited.

- Work to be carried out by trained personnel only.
- Let the fan run to cool down.
- Wear heat-resistant gloves.
- Follow the instructions.

Warning

Danger of falling. Danger of life.

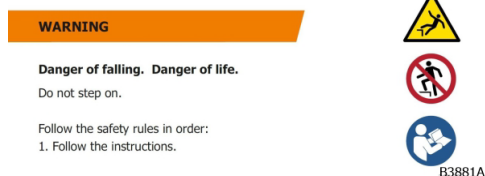


Fig. 4: Warning "Danger of falling. Danger of life."

An area marked with this indicates a danger to life from falling. Do not step on.

- Follow the instructions.

Explosion hazard. Danger to life.

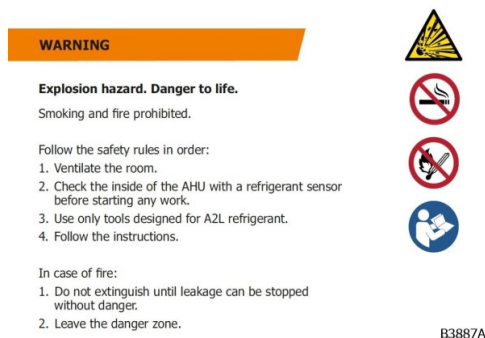


Fig. 5: Warning "Explosion hazard. Danger to life".

An area marked with this indicates a danger to life from a risk of explosion. Smoking and open flames are prohibited.

- Ventilate the room.
- Check the inside of the AHU with a refrigerant sensor before starting any work.
- Use only tools designated for A2L refrigerant.
- Follow the instructions.

In case of fire:

- Do not extinguish until leakage can be stopped without danger.
- Leave the danger zone.

Opening downwards. Danger of falling. Falling objects. Danger to life.

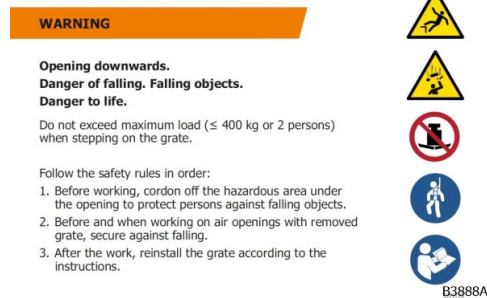


Fig. 6: Warning "Opening downwards. Danger of falling. Falling objects. Danger to life".

An area marked with this indicates a danger to life from falling or objects falling down through an air opening. Do not exceed the maximum load (≤ 400 kg or 2 persons) when stepping on the grate.

- Before working, cordon off the hazardous area under the opening to protect persons against falling objects.
- Before and when working on air openings with removed grate, secure against falling.
- After the work, reinstall the grate according to the instructions.

Suspended loads. Falling objects. Danger to life.

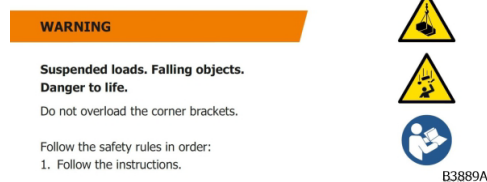


Fig. 7: Warning "Suspended loads. Falling objects. Danger to life".

An area marked with this indicates a danger to life caused by suspended loads or falling objects. Do not overload the corner brackets.

- Follow the instructions.

Risk of deflagration. Danger to life.

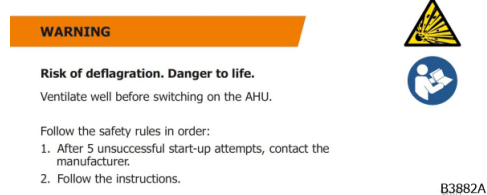


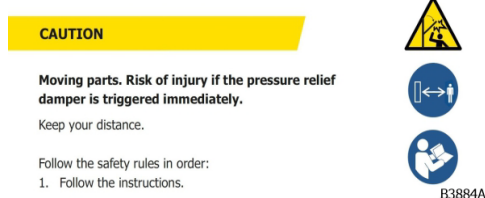
Fig. 8: Warning "Risk of deflagration. Danger to life."

An area marked with this indicates a danger to life from deflagration. Ventilate well before switching on the AHU.

- After 5 unsuccessful start-up attempts, contact the manufacturer.
- Follow the instructions.

Caution

Moving parts. Risk of injury if the pressure relief damper is triggered immediately.



An area marked with this indicates a risk of injury caused by sudden actuation of the pressure relief damper. Keep a safe distance.

- Follow the instructions.

Fig. 9: Caution "Moving parts. Risk of injury if the pressure relief damper is triggered immediately."

Toxic and environmental hazardous substances. Risk of injury.



An area marked with this indicates toxic and environmental hazardous substances. There is a risk of injury. Use self-contained respiratory protection. Wear chemical protective clothing and gloves.

There is a danger to life from deflagration in this area. Ventilate the AHU well before switching on.

- Keep away from sources of ignition.
- Do not smoke.
- Keep container tightly closed and store in a cool, well ventilated place. Keep out of direct sunlight.
- Do not allow the hazardous substance to reach water bodies or sewage systems.
- Observe the safety instructions on the containers and the instructions.

In case of fire:

- Cool down endangered containers with water spray from a protected position.
- Use a carbon dioxide (CO₂), extinguishing powder or water spray to extinguish.
- Fight larger fires with water spray or alcohol-resistant foam.
- Do not allow contaminated extinguishing water to reach water bodies or the sewage system.

Fig. 10: Caution "Toxic and environmental hazardous substances. Risk of injury."

UV-C radiation. Risk of injury.

CAUTION

UV-C radiation. Risk of injury.

Do not open the door during operation.

Follow the safety rules in order:

1. Switch off the unit and secure it against being switched on again.
2. Follow the instructions.



B3890A

There is a risk of injury from UV-C radiation behind a door marked with this symbol. Opening the door during normal operation is prohibited.

- Switch off the unit and secure it against a being switched on again.
- Follow the instructions.

Fig. 11: Caution "UV-C radiation. Risk of injury."

Personal protective equipment

During the various operations, the personal protective equipment required by each section must be worn. Personal protective equipment is used to protect health. Working without personal protective equipment can lead to injuries.

Description of personal protective equipment



Depending on the execution, protective clothing protects against:

- Dusts,
- Weathering (a water vapor permeability as high as possible with simultaneous wind tightness) or
- Mechanical hazards (prevents snagging on plant parts due to tight-fitting arm and leg cuffs, no outside pockets or concealed buttons).



Depending on the execution, respiratory protection protects the respiratory tract from:

- Gases,
- Dusts,
- Viruses, bacteria, or fungi.



Hearing protection protects hearing from noise and prevents hearing damage.



Protective goggles protect the eyes from

- parts flying around and
- Liquid splashes.



Depending on the execution, protective gloves protect the hands from

- sharp edges,
- Liquids,
- hot or cold surfaces.



Safety shoes are used to protect the feet from crushing and falling parts. Safety shoes provide a good grip on different surfaces.

Safety devices

Main switch of the AHU

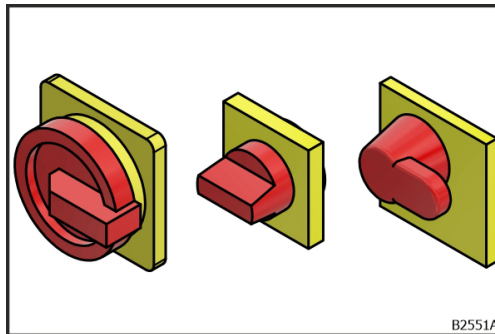


Fig. 12: Main switch position O

The main switch interrupts power and voltage supply to the AHU in position O. Electrical conductors, terminals, and equipment (e.g., switch cabinet lamp, surge arresters) upstream of the main switch remain live.

The main switch can be secured with a lock to prevent it from being switched on again (see chapter "Securing against restart", page 34).

To perform work on the AHU, wait for all moving parts (e.g., fan, rotary heat exchanger, motor, belt drive) to come to a standstill.

Service switch

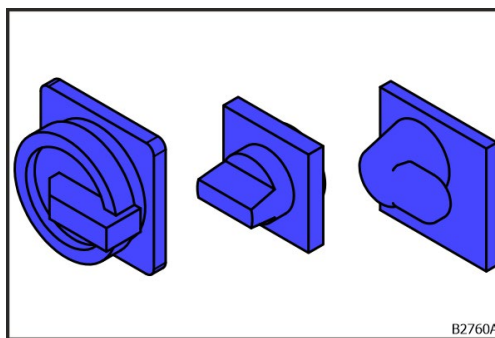
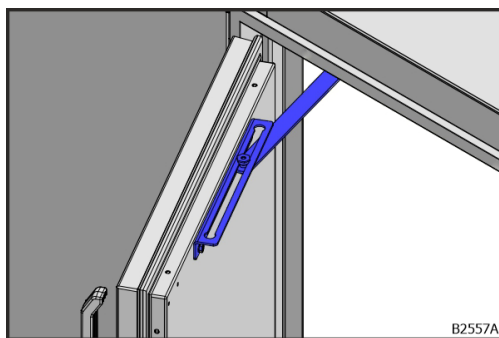


Fig. 13: Service switch

The service switch interrupts power and voltage supply to a component in position O. Electrical conductors and terminals upstream of the service switch remain live.

The service switch can be secured with a lock to prevent it from being switched on again. To perform work on the component, wait for all moving parts (e.g., fan, rotary heat exchanger, motor, belt drive) to come to a standstill.

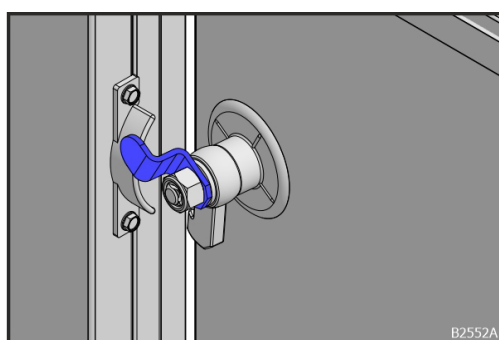
Locking pin



The locking pin is attached to doors of weatherproof units. The door leaf is locked in the open position by the locking pin. This prevents the door from opening or slamming shut due to wind or pressure differences in the AHU. If the locking pin cannot be fitted due to lack of space, the door must be secured against opening and slamming shut by suitable means.

Fig. 14: Locking pin

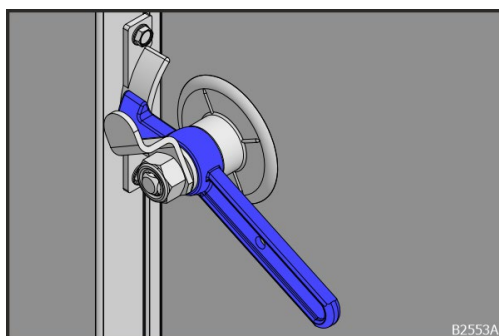
Retaining mechanism on doors in the overpressure area



A retaining mechanism is fitted on the inside of all doors on the discharge side. The retaining mechanism prevents the door from swinging open in an uncontrolled manner when it is opened.

Fig. 15: Retaining mechanism

Emergency lever lock



For walk-in AHUs (enclosures with clearance > 1.6 m), the doors are equipped with an emergency lever lock. The emergency lever lock can be used to open the door from the inside.

Fig. 16: Locking cam catch with emergency lever lock

Lever lock with key cylinder, lever lock with key size 10 / double-bit 3 or external lock with key size 10 / double-bit 3

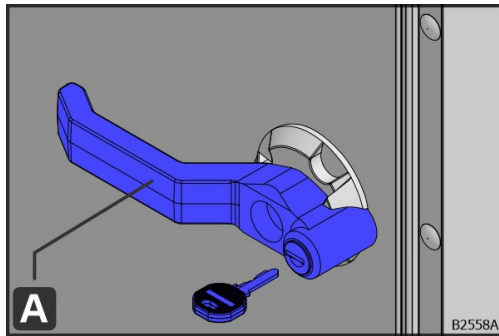


Fig. 17: Lever lock with key cylinder

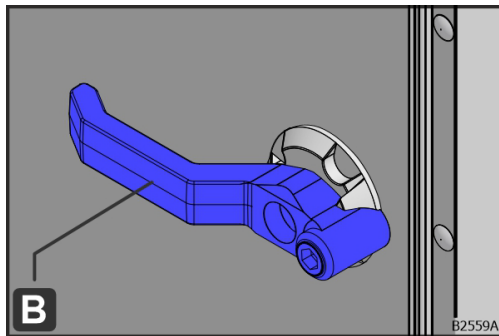


Fig. 18: Lever lock with key size 10 / double-bit 3

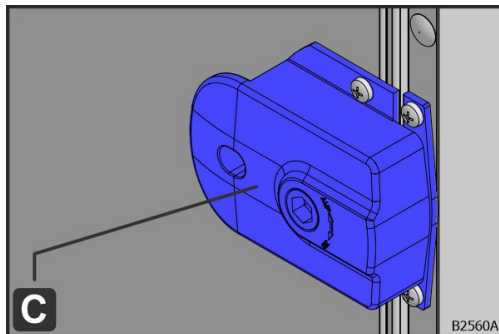


Fig. 19: External lock with key size 10 / double-bit 3

A lever lock with key cylinder (A), a lever lock with key size 10 / double-bit 3 (B), or an external lock with key size 10 / double-bit 3 (C) is fitted to doors with access to hazardous areas (e.g., fan).

The door lever with shooting cylinder (A) can only be operated with a suitable key. The lever lock with key size 10 / double-bit 3 (B) and the external lock with key size 10 / double-bit 3 (C) can be operated with a hexagon socket (nominal width SW10) or a double-bit key (DB3, also called control cabinet key). The external lock with key size 10 / double-bit 3 (C) can only be operated from the outside.

Protective grate by the fan

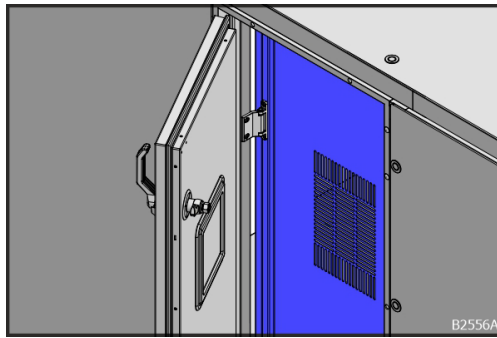


Fig. 20: Protective grate

The protective grate is installed on the fan in the overpressure and underpressure areas if the door can be opened without tools or the fan does not have any other mechanical protection against contact.

Inlet protection grate at the fan

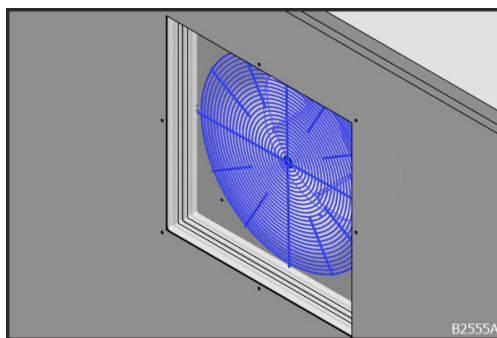


Fig. 21: Inlet protection grate

An inlet protection grate is fitted in the underpressure area between the fan and refrigeration technology if they are not separated by any other component. The inlet protection grate facilitates work on the refrigeration technology where the fan must be in operation. The inlet protection grate prevents injuries caused by unintentional contact with the components of the fan when working on the refrigeration technology.

The inlet protection grate protects the fan from flying parts.

Downstream grid

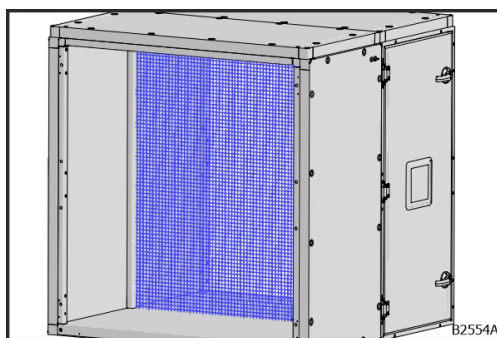
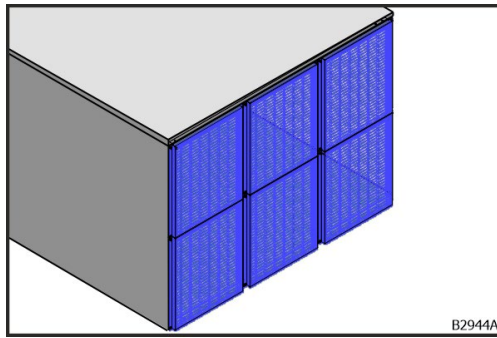


Fig. 22: Downstream grid

A downstream grid is fitted in the overpressure area between the fan and refrigeration technology if they are not separated by any other component. The downstream grid facilitates work on the refrigeration technology where the fan must be in operation. The downstream grid prevents injuries caused by unintentional contact with the components of the fan when working on the refrigeration technology.

The downstream grid protects the downstream component or duct from flying parts.

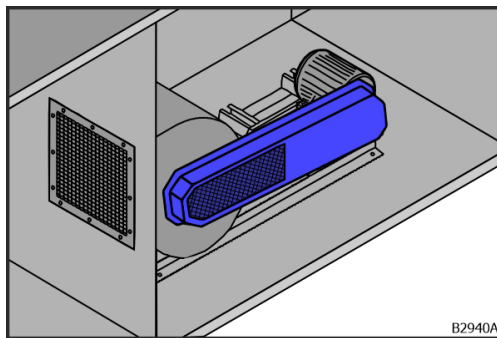
Touch protection grid



A contact protection grate is fitted to the air openings at the start or end of the unit if these are not fitted with unit connections, weatherproof devices, or similar. The touch guard prevents injuries caused by accidental contact with components at the start or end of the device.

Fig. 23: Touch protection grid

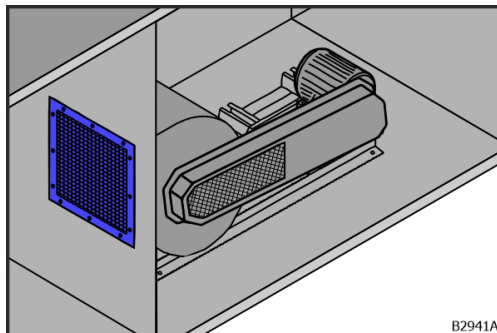
Belt protection on the fan with housing



A belt protection is attached to the belt drive of the fan with housing. The closed belt protection prevents injuries caused by unintentional contact with the belt drive.

Fig. 24: Belt protection

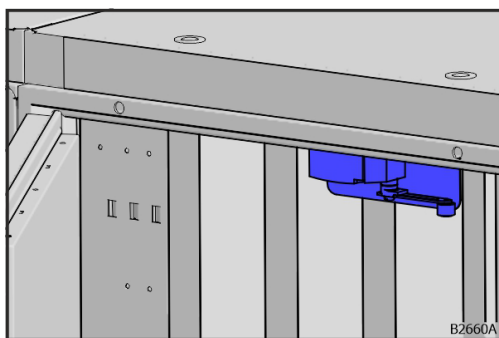
Discharge protection grate on the fan with housing



A discharge protection grate is attached to the fan partition wall in the overpressure area. The discharge protection grate prevents injury from accidental contact with the fan components.

Fig. 25: Discharge protection grate

Door contact switch



The door contact switch interrupts the current and voltage supply of the UV-C lamp when the door is opened.

Fig. 26: Door contact switch

Securing against restart

Secure the AHU against being switched on again

WARNING



Danger to life due to uncontrolled or unauthorized restarting

Uncontrolled or unauthorized restarting can result in serious injury or death.

- Before switching on again, make sure that there are no people in the AHU.
- Before switching on again, make sure that there are no loose objects (e.g., tools) in the AHU.
- Before switching on again, make sure that all doors are closed.

WARNING



Risk of electric shock

When the main switch is switched off, the following parts are still live and can cause injury from electric current: electrical conductors and terminals upstream of the main switch, switch cabinet lamps, surge arresters including their connected wires, cables and terminals.

- Do not touch live parts.
- Work on the switch cabinet may only be carried out by a qualified electrician.

Requirements:

- The AHU must be shut down in a controlled manner.
- The AHU must be in a safe condition (e.g., fans stopped, cold pump-out is complete, components have cooled to a non-critical temperature).

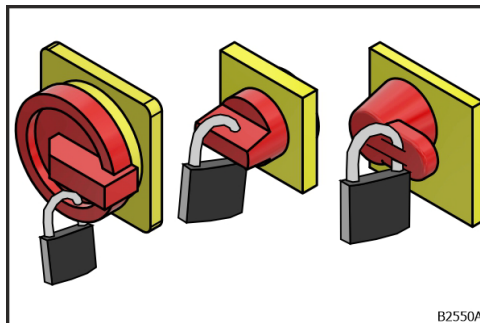


Fig. 27: Secure main switch

1. Turn the main switch to position "0".
→ The power and voltage supply is interrupted.
2. Secure the main switch with a lock.
3. Remove the key.
4. Attach the sign indicating work on the AHU to the main switch.
→ The AHU is secured against unauthorized or uncontrolled restart.

What to do in case of danger

What to do in case of fire

WARNING

**Danger to life from explosion**

In the event of fire, there is a risk of explosion with R32 refrigerant, as A2L refrigerants can produce a potentially explosive atmosphere.

- Leave the danger zone.
- Do not extinguish until the leakage can be stopped without risk.
- Remove ignition sources if this is possible without risk.

CAUTION

**Damage to health due to toxic substances in the event of a fire**

Toxic substances may form in the event of a fire.

- Use self-contained respiratory protection.

CAUTION

**Risk of injury from pressure tanks or piping in the event of a fire**

In the event of a fire, pressure tanks or pipes may burst due to the effects of fire or thermal radiation.

- Leave the danger zone.

robatherm AHUs are not smoke extraction units and must not be used for smoke extraction.

The AHU must be shut down in a controlled manner in the event of a fire by opening the "release central fire alarm system" contact.

Fire protection

Refrigerant (R407C, R410A, R134a)

- In the event of a fire, pressure tanks or pipes may burst due to the effects of fire or thermal radiation.
- Cool endangered pressure tanks from a safe distance using water spray.
- Use self-contained respiratory protection.
- If possible, stop gas leakage.
- Do not use a water jet for extinguishing, as this may spread the fire.
- Use water spray or water mist to combat smoke.
- Do not allow contaminated extinguishing water to enter drains and the waste water system.
- Comply with the safety data sheet of the manufacturer.

Refrigerant R32

- Take into account the risk of a potentially explosive atmosphere.
- In the event of a fire, pressure tanks or pipes may burst due to the effects of fire or thermal radiation.
- Cool endangered pressure tanks from a safe distance using water spray.
- Use self-contained respiratory protection.
- Only extinguish leaking burning gas if absolutely necessary. Spontaneous explosive re-ignition is possible.
- Do not extinguish until the leakage can be stopped without risk.
- Extinguish all other fires.
- Do not use a water jet for extinguishing.
- Use water spray or water mist to combat smoke.
- Comply with the safety data sheet of the manufacturer.

Compressor oil (polyolester oil 160SZ)

- Use self-contained respiratory protection.
- If possible, stop gas leakage.
- Do not use a water jet for extinguishing, as this may spread the fire.
- Compressor oil poses a particular hazard because it floats on water.
- Comply with the safety data sheet of the manufacturer.

Compressor oil (polyolester oil RL 32-3MAF)

- In the event of a fire, pressure tanks or pipes may burst due to the effects of fire or thermal radiation.
- Cool endangered pressure tanks from a safe distance using water spray.
- Use self-contained respiratory protection.
- If possible, stop gas leakage.
- Do not use a water jet for extinguishing, as this may spread the fire.
- Comply with the safety data sheet of the manufacturer.

Components**Humidifier**

Desalination system

Circulating water spray humidifier (low pressure)

For behaviour in the event of danger, see the attachment "Herco – Cooltrol data desalination system" and the "Shutting down the plant in an emergency" section.

Fire protection

WARNING



Fire hazard due to transfer of fire

Fire can spread through the building by transfer between the extract air and the supply air (e.g., via the HRS or the recirculation air).

- Install appropriate precautions to prevent the transmission of fire (e.g., fire dampers) on site.

WARNING



Fire hazard due to combustible parts

There is a fire risk due to transporting burning parts into the supply air duct.

- A downstream grid (in accordance with DIN EN 1886, AHU directive 01 or LüAR) or a suitable component must prevent combustible parts (e.g., from filters, droplet eliminators, contact humidifiers) from being transported into the supply air duct.
- Such a grid (e.g., downstream grid) must be explicitly ordered from robatherm in advance or provided by the customer.

Lightning protection for weatherproof devices

The installation site must have a suitable lightning protection system in accordance with country-specific regulations. Creating and implementing a lightning protection concept is the responsibility of an authorized specialist company.

The external lightning protection must not be installed on the AHU. When routing cables of the air handling unit, the separation distances required on-site between the cables and the external lightning protection and other hazardous lines must be maintained.

When retrofitting AHUs or upgrading existing AHUs, lightning and surge protection measures on or in the building and the existing facilities may need to be retrofitted.

In Germany, AHUs and control cabinets must be installed at least in lightning protection zone LPZ 0B (see DIN VDE 0100-443:2016-10 and DIN VDE 0100-534:2016-10). Control cabinets with complete I&C destined for Germany are equipped with a type 2 surge arrester for TN networks. For AHUs with partial I&C, overvoltage protection is included in the customer's scope of services.

No surge arrester is installed for all AHUs with destinations outside Germany.

What to do in case of leaks

Frost protection agent (Antifrogen L)

Frost protection agent contains propylene or ethylene glycol. Frost protection agent may contain toxic and environmentally hazardous substances.

Personal protection

- Avoid contact with skin and eyes.
- Leave the danger zone.
- Ensure good air exchange in the danger zone.
- Wear personal protective equipment (long-term exposure: gloves made of impermeable butyl rubber; for short-term exposure (splash protection): gloves made of nitrile rubber and safety goggles; respiratory protection in the case of insufficient extraction or longer exposure: wear a full-face mask in accordance with DIN EN 136 with filter A (organic gases and vapours) in accordance with DIN EN 141).
- Comply with the safety data sheet of the manufacturer.

Environmental protection

- Do not allow it to enter waterways or waste water system.
- Absorb with inert liquid-binding material (e.g., sand, silica gel, acid binder, universal binder, sawdust). May be landfilled or incinerated in accordance with local regulations.
- Must be disposed of by a waste disposal and recycling company.
- In case of contamination of waterways inform the relevant authorities.
- Comply with the safety data sheet of the manufacturer.

Frost protection agent (Antifrogen N)

Frost protection agent contains propylene or ethylene glycol. Frost protection agent may contain toxic and environmentally hazardous substances.

Personal protection

- Avoid contact with skin and eyes.
- Leave the danger zone.
- Ensure good air exchange in the danger zone.
- Wear personal protective equipment (long-term exposure: gloves made of impermeable butyl rubber; short-term exposure (splash protection): gloves made of nitrile rubber; respiratory protection in the case of insufficient extraction or longer exposure: full-face mask in accordance with DIN EN 136 filter A (organic gases and vapours) in accordance with DIN EN 141; protective clothing, eye protection depending on the hazard: frame goggles with side protection or cage goggles and, if necessary, visor, full face visor).
- Comply with the safety data sheet of the manufacturer.

Environmental protection

- Do not allow it to enter waterways or waste water system.
- Absorb with inert liquid-binding material (e.g., sand, silica gel, acid binder, universal binder, sawdust). May be landfilled or incinerated in accordance with local regulations.
- Must be disposed of by a waste disposal and recycling company.
- In case of contamination of waterways inform the relevant authorities.
- Comply with the safety data sheet of the manufacturer.

Refrigerant (R134a, R407C, R410A, R513A)

Refrigerant may contain or develop toxic and environmentally hazardous substances.

Personal protection

- Avoid contact with skin and eyes.
- Leave the danger zone.
- Ensure good air exchange in the danger zone.
- Use self-contained respiratory protection.
- Prevent ingress in the waste water system, cellar, work pits or other places where accumulation could be hazardous.
- Wear personal protective equipment (cold-insulating gloves or protective gloves for mechanical risks, chemical-resistant safety goggles with side protection or full safety goggles and full face visor).
- Comply with the safety data sheet of the manufacturer.

Refrigerant (R407C, R410A, R134a)

Environmental protection

- Ventilate the surroundings.
- If possible, stop gas leakage.
- Prevent entry into sewage systems, basements, operator pits, or other places where accumulation could be hazardous.
- Must be disposed of by a waste disposal and recycling company.
- Comply with the safety data sheet of the manufacturer.

Refrigerant (R513A)

Environmental protection

- If possible, stop gas leakage.
- Do not let it enter the environment.
- Must be disposed of by a waste disposal and recycling company.
- Comply with the safety data sheet of the manufacturer.

Refrigerant R32

Personal protection

- Take into account the risk of a potentially explosive atmosphere.
- Avoid contact with skin and eyes.
- Leave the danger zone.
- Ensure good air exchange in the danger zone.
- Use self-contained respiratory protection.
- If possible, stop gas leakage.
- Prevent ingress in the waste water system, cellar, work pits or other places where accumulation could be hazardous.
- Wear personal protective equipment (cold-insulating gloves or protective gloves for mechanical risks, chemical-resistant safety goggles with side protection or full safety goggles and full face visor).
- Comply with the safety data sheet of the manufacturer.

Environmental protection

- If possible, stop gas leakage.
- Prevent entry into sewage systems, basements, operator pits, or other places where accumulation could be hazardous.
- Must be disposed of by a waste disposal and recycling company.
- Comply with the safety data sheet of the manufacturer.

Lubricants

Lubricants such as greases and oils contain toxic substances.

Personal protection

- Wear personal protective equipment (gloves and safety goggles).
- Avoid contact with lubricants.
- Comply with the safety data sheet of the manufacturer.

Environmental protection

- Do not let it enter the environment.
- Absorb with inert liquid-binding material (e.g., sand, silica gel, acid binder, universal binder, sawdust). May be landfilled or incinerated in accordance with local regulations.
- Must be disposed of by a waste disposal and recycling company.
- Comply with the safety data sheet of the manufacturer.

Compressor oil

Compressor oil contains toxic and environmentally hazardous substances.

Personal protection

- Avoid contact with skin and eyes.
- Leave the danger zone.
- Ensure good air exchange in the danger zone.
- Do not swallow.
- Wear personal protective equipment (chemical-resistant gloves and safety goggles with side protection).
- Comply with the safety data sheet of the manufacturer.

Compressor oil (polyolester oil 160SZ, RL 32-3MAF)**Environmental protection**

- If possible, stop gas leakage.
- Do not let it enter the environment.
- Absorb with inert liquid-binding material (e.g., sand, silica gel, acid binder, universal binder, sawdust). May be landfilled or incinerated in accordance with local regulations.
- Must be disposed of by a waste disposal and recycling company.
- Comply with the safety data sheet of the manufacturer.

Compressor oil (polyolester oil 175PZ)

Environmental protection

- If possible, stop gas leakage.
- Do not allow it to enter waterways or waste water system.
- Absorb with inert liquid-binding material (e.g., sand, silica gel, acid binder, universal binder, sawdust). May be landfilled or incinerated in accordance with local regulations.
- Must be disposed of by a waste disposal and recycling company.
- In case of contamination of waterways inform the relevant authorities.
- Comply with the safety data sheet of the manufacturer.

Environmental protection

NOTE



Risk to the environment due to incorrect handling of environmentally hazardous substances.

Improper handling of environmentally hazardous substances can cause damage to the environment. Incorrect disposal of environmentally hazardous substances can endanger the environment.

- Observe the instructions in the operating manual.
- Environmentally hazardous substances must be disposed of by a waste disposal and recycling company.
- In case of leakage of environmentally hazardous substances, take appropriate measures (see chapter "What to do in case of leaks", page 40) and inform competent authorities.

Frost protection agent (Antifrogen L)

Frost protection agent contains propylene or ethylene glycol. Frost protection agent may contain toxic and environmentally hazardous substances.

Behavior in case of leaks for environmental protection see chapter "What to do in case of leaks", page 40.

Frost protection agent (Antifrogen N)

Frost protection agent contains propylene or ethylene glycol. Frost protection agent may contain toxic and environmentally hazardous substances.

Behavior in case of leaks for environmental protection see chapter "What to do in case of leaks", page 40.

Refrigerant (R134a, R407C, R410A, R513A)

Refrigerant may contain or develop toxic and environmentally hazardous substances.

Behavior in case of leaks for environmental protection see chapter "What to do in case of leaks", page 40.

Refrigerant (R32)

Refrigerant may contain or develop toxic and environmentally hazardous substances if released.

Behavior in case of leaks for environmental protection see chapter "What to do in case of leaks", page 40.

Lubricants

Lubricants such as greases and oils contain toxic substances.

Behavior in case of leaks for environmental protection see chapter "What to do in case of leaks", page 40.

Compressor oil

Compressor oil contains toxic and environmentally hazardous substances.

Behavior in case of leaks for environmental protection see chapter "What to do in case of leaks", page 40.

Technical data

Technical data sheet and technical drawing

The technical data sheet and the technical drawing are provided before delivery. It is recommended to add these documents to the operating instructions.

Nameplate

The rating plate of the component is attached to the component door. If the component does not have a door, the rating plate is attached to the panel. The nameplate contains the following data:

RLT-GERÄT	robatherm the air handling company
<hr/>	
Auftrags-Nr. 111242.19	Baujahr 34/2022
Typ TI50-06/06	
 CE robatherm • John-F.-Kennedy-Str. 1 • 89343 Jettingen-Scheppach, Germany • www.robatherm.com	
B2659A	

Fig. 28: sample nameplate for the AHU

VENTILATOR ZULUFT		robatherm the air handling company	
Auftrags-Nr. 111242.19		Baujahr 34/2022	
Typ TI50-06/06		Luftvolumenstrom 1640 m ³ /h	
Externer Druck 600 Pa		Gesamtdruck 1139 Pa	
Betriebsdrehzahl 3265 1/min		Max. Drehzahl 3850 1/min	
Motorleistung 1,4 kW		Motordrehzahl 3400 1/min	
Spannung 400 V		Netzfrequenz 50 Hz	
Stromaufnahme 3,5 A			
		B2657A	

Fig. 29: sample nameplate for a fan

Set-up and function

The arrangement of the individual components of the customised AHU is documented in the technical drawing.

Functional principle of the AHU and components

General functional principle

The AHU comprises a casing in which the individual components are located. AHUs are used to convey air and for air treatment. Air treatment can include the following functions:

- Filtering
- Heating
- Cooling
- Humidifying
- Dehumidifying

Operation modes

The following operation modes can be selected:

Operating mode	Description
Off	The AHU is off. Safety functions (e.g. frost protection) are maintained.
Manual mode	The AHU is permanently activated. Time schedules are suppressed.
Automatic	The AHU is operated according to the saved time schedule.

Table 5: AHU operation modes

Functional principle of components

Housing



The casing is used to accommodate the components of an AHU. The casing protects the components and airflow from external influences.

Filter unit



The filter component is used to clean the air. In addition to removing dust particles, this also refers to the elimination of aerosols (e.g. viruses, bacteria, fungi) and reducing certain harmful gases (e.g. gas filtration). Outdoor air is filtered to provide an appropriate supply air quality. Filtering the extract air often serves to protect the AHU.

Silencers



Silencers reduce noise generated by the components (e.g. fan, refrigeration technology) and minimise sound transmission into the ducts.

Fan



The fan conveys the air through the AHU and the duct and provides the required pressure boost.

HRS

HRS systems reduce the energy consumption of the AHU by transferring energy in the form of heat from one airflow to another airflow. The same principle can also be used for cold recovery in cooling applications.

Rotary heat exchanger



Extract air flows through the slowly rotating accumulation mass of the rotary heat exchanger in one direction and outdoor air flows through it in the other. This allows both heat and humidity to be transferred, depending on the accumulation mass.

Plate heat exchanger



The airflows are separated from each other by thin, parallel plates. This allows heat to be transferred.

Run around coils heat recovery system



The heat is transferred from one airflow to another airflow by means of a coil on an intermediate heat transfer medium.

Heating coil



Heating coils are made up of finned tubes. The tubes contain a heat transfer medium whose heat is transferred to the airflow via the fins.

Cooling coil



Cooling coils are made up of finned tubes. The tubes contain a heat transfer medium which extracts heat from the airflow via the fins.

Electric heater



The airflow is heated up with electrical heating elements.

Damper



The casing cross-section or parts of it can be closed or the cross-section reduced with a damper.

Humidifier

Humidifiers increase the humidity of the airflow.

Spray humidifier



Spray humidifiers spray water by means of nozzles. This increases the airflow humidity. A distinction is made in this case between fresh water spray humidifiers and circulating water spray humidifiers.

Steam humidifier



Water is heated up in the steam humidifier. This produces vapour, which is fed into the airflow through steam lances, thereby increasing its humidity.

Contact humidifier



In contact humidifiers, water is evaporated via a contact panel with a porous surface, thereby increasing the humidity of the airflow.

Refrigeration technology

Refrigeration technology has the task of lowering the temperature in an airflow below the ambient temperature and absorbing heat. The extracted heat is transferred to another area above the ambient temperature.

Refrigeration plant/heat pump



The refrigeration plant extracts heat from the supply airflow. The heat pump supplies heat to the supply airflow. It comprises a closed refrigeration circuit in which a refrigerant circulates and continuously changes its aggregate state. The refrigeration plant comprises three main components (compressor, direct expansion coil, condenser). These are connected by pipework.

Change overs



Change overs can be used as both heating coil and cooling coil. They can be operated in reversible refrigeration technology with refrigerant or in a hydraulic control loop with a water or water/glycol mixture.

Split air conditioner



A split air conditioner extracts heat from the supply airflow. It comprises a direct expansion coil positioned in the airflow and a split outdoor unit mounted next to or on top of the AHU. Split air conditioners can also be used for heating.

Direct expansion coil



The direct expansion coil extracts heat from the airflow by evaporating refrigerants.

Condenser



The condenser transfers heat to the airflow. This is the total amount of heat absorbed by the direct expansion coil and the electrical drive energy of the compressor. In the process, refrigerant is condensed.

Axial condenser



The axial condenser transfers heat to the environment. This is the total amount of heat absorbed by the direct expansion coil and the electrical drive energy of the compressor. In addition to the coil, the axial condenser also includes axial fans that generate the required airflow.

Direct firing

With direct firing, the required heat is generated from the energy sources directly in the AHU.

Combustion chamber



In the combustion chamber, a mixture of air and fuel is continuously burnt in a combustion chamber casing, which in turn heats the airflow.

Direct gas-fired heater



The airflow is heated by a flame positioned in the airflow.

Droplet eliminator



The droplet eliminator is used to collect and drain condensed air. The droplet eliminator protects the following components from entrained water droplets.

Weatherproof hood



The weatherproof hood prevents direct ingress of rain, snow and entrained parts (e.g. leaves).

Weatherproof louvre



The weatherproof louvre prevents direct ingress of rain, snow and entrained parts (e.g. leaves). The weatherproof louvre has a compact design.

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