the air handling company

robatherm AHUs.

Commissioning.

April 2026

English - Translation of the original instructions

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

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robatherm GmbH + Co. KG
John-F.-Kennedy-Str. 1
89343 Jettingen-Scheppach
Germany

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

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General remarks

The AHU may only be commissioned if it has been installed in accordance with the installation and assembly instructions. All protective devices must be active. A service switch must be located near the door of the fan component.

All structural requirements such as accessibility, completed duct installation, and uninterrupted availability of all supply media must be met. Proper on-site mains connection must be available for commissioning.

Information about 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.

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 comprise several parts and are structured as follows:

Fig. 1: Parts of the instructions

Main operating instructions

- ➔ Transportation and unloading
- ➔ Installation and assembly
- ➔ Commissioning
- ➔ Operation and malfunctions
- ➔ Maintenance and cleaning
- ➔ Shutdown and disabling
- ➔ Disposal

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Security

General risk sources

Electrical hazards due to electric current and voltage

DANGER

Danger from electric current

There is a risk of fatal electric shock if live parts are touched or if the insulation is damaged.

- In case of damage to insulation, switch off the voltage supply immediately and have the defective parts repaired.
- Before carrying out any work on the AHU, disconnect the voltage supply as follows:
  - Turn the main switch to position O.
  - Secure the main switch with a lock.
  - Disconnect the AHU from the voltage supply of the supply line.
  - Verify voltage-free state.
  - Earth and short circuit.
  - Never bypass or disable fuses.
  - Keep moisture away from conductive parts.

DANGER

Danger to life due to stored electric charge!

DC link capacitors of the frequency converter can remain charged even when the mains supply is switched off and disconnected. There is a risk of death if the discharging time is not observed.

- Wait for a discharging time of 15 minutes.

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.

Mechanical hazards due to machine movements

WARNING

Risk of death due to sudden switch-on

When AHU is switched off, or the electrical power supply fails, certain control functions (e.g., timer programs, pump-out, fan overshoot, frost protection) or power restoration can cause components to switch on immediately. This poses danger to life.

- Carry out the steps "Securing the AHU against restarting" (see "Main operating instructions", section "Securing against restarting").

WARNING

Danger from moving parts

After switching off the AHU, there is still a risk of death due to moving parts, as the components do not have immediate stop functions.

- Wait for all moving parts (e.g., fan, rotary heat exchanger, motor, belt drive) to come to a standstill.

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Thermal hazards due to hot and cold surfaces

CAUTION

Risk of burns due to hot surfaces

Hot surfaces of components (e.g., heating coils, direct firing, pressure steam humidifiers, steam heaters) pose a risk of burn injuries during operation and even after the AHU has been switched off.

- Let the fan run to cool down to room temperature.
- Do not touch the hot surface.

CAUTION

Risk of burns due to hot surfaces

There is a risk of burns when touching hot pipes.

- Pipes outside the AHU must be insulated by the customer to make them impermeable.

CAUTION

Risk of injury due to cold surfaces

Cold surfaces of components (e.g., cooling coils, refrigeration technology) pose a risk of injury from ice burns or frostbite during operation and even after the AHU has been switched off.

- Wait until the temperature of components matches room temperature.
- Do not touch cold surfaces.

CAUTION

Risk of injury due to cold surfaces

There is a risk of injury from ice burns or frostbite when touching cold pipes.

- Pipes outside the AHU must be insulated by the customer to make them impermeable.

General hazards

WARNING

Risk of injury due to modifications or use of incorrect spare parts

Serious injuries, death, and material damage can be caused by modifications or installation of incorrect spare parts.

- Use original spare parts only.
- Do not make any modifications.

WARNING

Permanent hearing loss or tinnitus due to high noise levels

When working near fans and compressors, there is a risk of permanent hearing loss or tinnitus due to high noise levels of the components.

- Wear hearing protection for 120 dB(A).

TIP

Combination of earplugs and earmuffs

If no hearing protection achieves adequate sound insulation, earplugs and earmuffs can be combined to achieve adequate protection.

WARNING

Danger to life due to damaged or incomplete structure

If the anchor points are damaged or incomplete, this will cause the structure to fail. When securing a person using personal protective equipment to prevent falls, failure of the anchor points can result in a life-threatening fall.

- Check the anchor points before use. Refer to the 'Installation and assembly' instructions, 'Anchor point' section.

WARNING

Danger to life from falling objects

The anchor points are to be used solely for personal fall protection. There is a risk of fatal injury if the anchor points are used improperly (e.g. for securing objects or transporting materials) and fail.

- Do not attach loads to the anchor points.

WARNING

Danger to life from falling

Using the wrong personal protective equipment to prevent falls, or using it incorrectly, poses a risk to life.

- Only suitable personal protective equipment to prevent falls may be used.
- Personal protective equipment to prevent falls may only be used by trained personnel.

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WARNING

Danger to life from falling!

When stepping on the protection roof, there is a risk to life from falling, as the protection roof is unsuitable for supporting loads.

- Do not enter the protection roof.

WARNING

Danger to life from falling!

If a grate above an air opening is overloaded downwards (>400kg), this will cause the structure to fail. When a person steps on the grate, the structure may fail, causing a risk to life by falling through the air opening.

- Do not exceed the maximum load (≤400kg or 2 persons).

NOTE

Material damage due to localized weight

If more than one person enters the AHU at a time or localized loads are otherwise applied, pans and floors may be deformed.

- Do not let several persons enter the AHU at the same time.
- If this becomes necessary, take suitable measures to distribute the weight (e.g., grates, wooden boards, wood beams).

NOTE

Material damage due to foreign objects and contamination

Foreign objects and contamination (e.g., dust) in the AHU and the duct system can be blown into the rooms when the AHU is switched on and cause damage to property there.

- Before commissioning, check the AHU and duct system for foreign objects and contamination and clean if necessary.

Personnel qualification

The work described in this section may only be performed if the person has the following qualifications:

- ➔ Qualified electrician
- ➔ Refrigeration specialist
- ➔ Mechanic

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Power supply

WARNING

Hazards from insulation faults

During commissioning, certain parts may be live due to insulation faults, resulting in a risk of electric shock.

- Before commissioning, the continuity of the protective conductor system and its impedance must be checked.
- Before commissioning, the insulation resistance test must be performed.
- Subsequently, fault loop impedance under voltage must be performed.
- Do not touch live parts.

WARNING

Danger due to faulty equipotential bonding

If equipotential bonding is faulty, there is a risk of electric shock due to electrostatic charges.

- Bridge electrically non-conductive connection points with equipotential bonding.
- Include all metallic parts of the AHU in the equipotential bonding.
- Ground the AHU.

Establishing the electrical connection

Specifically, perform the following:

- Connect and ground the electrical components (e.g., electric motor, actuator) according to the manufacturer's specifications, local regulations, and general recommendations for avoiding electromagnetic interference (e.g., grounding, cable lengths, cable shielding). Terminal identifications can be found in the terminal boxes.
- Check any grounding tapes (equipotential bonding) for proper attachment and retighten if necessary.
- Check field devices for proper installation.
- Check electrical connections on the control cabinet and the field units. Check all electrical connections (control cabinet, frequency converter, motor, etc.) for tight fit and retighten if necessary (see also DIN 46200).
- Check sensors and actuators included in the scope of delivery for proper function.

Electrical connection of weatherproof devices

WARNING

Fire hazard due to electrical malfunction

Improper electrical connection can cause a short circuit, which can lead to equipment fire.

- The electrical connection of weatherproof devices must be designed such that it and all other materials used can withstand weather conditions (e.g., rain, sunlight).

Fan

WARNING

Danger to life from party flying around

Serious personal injury or even death may be caused by flying parts as a result of impeller breakage.

- Pay attention to unusual vibrations during commissioning, especially when starting the fan for the first time.
- Do not exceed the maximum fan speed specified on the nameplate and in the technical data sheet.
- Do not operate the fan in the event of unusual vibrations.

WARNING

Risk of injury due to impeller rotation despite the fan being switched off

Risk of injury due to impeller rotation as a result of air movement caused by thermal conditions despite of the fan being switched off.

- Avoid backflows from the building (e.g., by closing the dampers).

NOTE

Property damage due to foreign objects

Foreign objects (e.g., tools, small parts) in the AHU or in the duct system can be carried away and cause damage to the fan, the AHU, the duct system, or in the rooms.

- Before switching on the fan, turn the impeller by hand to check if it can run unobstructed.
- Before switching on the fan, check the AHU and the duct system for foreign objects and remove them.

NOTE

Material damage due to improper commissioning

Switching on the fan with the dampers closed may cause damage to the AHU.

- Do not switch on the fan before checking that the relevant dampers are open or before a limit switch indicates they are open.
- Make sure that the fans are switched off immediately when the shut-off dampers are closed.

NOTICE

Material damage if the maximum pressure is exceeded

Material damage if the maximum pressure permitted for the ventilation system is exceeded.

- Install suitable measures for pressure limitation of the ventilation system (e.g. pressure relief damper).

NOTE

Material damages through inadequate motor protection

Melting fuses and circuit breakers are not adequate motor protection. Improper motor protection can cause damage to electrical drives (e.g., fan motor, pump).

- Protect electric drives against overload, if necessary (see chapter "Motor protection", page 13).

Motor protection

- Protect electrical drives (e.g., fan motor, pump) against overload in accordance with DIN EN 60204 (VDE 0113).
- Provide motor protection switch and set to rated motor current (see rating plate). A higher setting is not permitted.
- Protect motors with built-in PTC thermistor sensors via a PTC thermistor tripping device.
- Electric drives with a nominal power of up to 3 kW can generally be switched on directly (observe power limitations of the responsible power supply company). Provide star-delta starting or soft starting for larger motors.
- Permanent-magnet excited synchronous motors must not be operated directly from the mains without special motor electronics (e.g., suitable converters) (also, no mains bypass).

Direction of rotation

Check the direction of fan rotation according to the arrow marker on the fan by briefly switching on the motor. If the direction of rotation is incorrect:

- Check electrical motor connection for clockwise rotation.
- Adjust parameters of the frequency converter.

Current consumption

After the fan has reached operating speed, measure the current consumption of all three phases with the doors closed.

The measured values must not exceed the nominal values of the nameplate (and thus the nominal motor power) and may only deviate slightly from each other. In case of overcurrent, switch off immediately and check external pressures, volume flow, and rotational speed. Check motor connection in case of unequal phase current.

Vibration velocity

Assessment limits of the vibration velocity according to ISO 14694.

Fan with housing

Check bushings and hubs for friction-locked connection (see manufacturer's instructions).

Drive

Before commissioning, check V-belt drive and adjust if necessary:

- Fastening screws of bushings and hubs (see tightening torques).
- Belt tension (see chapter on belt tension).
- Alignment of belt pulleys (tolerance < 0.4°; i.e. < 7 mm/m).

After a run-in period of 1 to 2 hours, check the V-belt drive and adjust if necessary:

- Fastening screws of bushings and hubs (see tightening torques).
- Belt tension (see chapter on belt tension).
- Alignment of belt pulleys (tolerance < 0.4°; i.e. < 7 mm/m).

Belt tension

The belt tension must be checked or adjusted according to the manufacturer's specifications using a suitable measuring device (e.g., belt tension gauge). Observe the operating instructions of the measuring device.

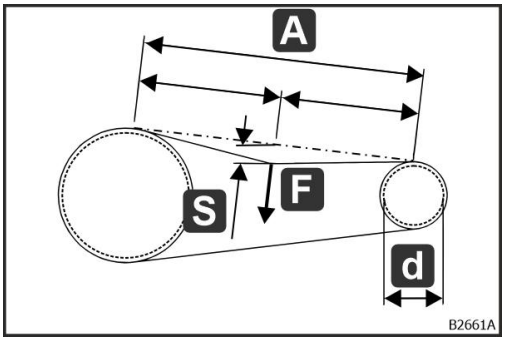

Fig. 2: Belt tension for the fan with housing

1. Measure the center distance (A) of the pulleys [m].
2. Multiply the center distance (A) by 16.

➔ The product is the belt deflection (S) [mm].

3. Apply force (F) to the belt in the middle of the center distance (A) so that the calculated belt deflection (S) is achieved.
4. Measure deflection force (F) [N].
5. Compare the deflection force (F) with the value on the nameplate (test force F_P).

After a run-in period of 1 to 2 hours, check the V-belt drive and adjust if necessary.

The belt drive is largely maintenance-free after the run-in phase. However, depending on the installation site and operating mode, it is recommended to check the belt tension regularly.

Heat recovery systems (HRS)

Rotary heat exchanger

CAUTION

Risk of crushing due to automatic startup

When working on the rotary heat exchanger, there is a risk of injury from crushing due to moving and rotating parts, as the rotary heat exchanger can start up via an automatic cleaning run or restart after a power failure.

- Before carrying out any work on the rotary heat exchanger, switch off the AHU and secure it so that it cannot be switched back on.

Inspection

Before commissioning, ensure that no objects are obstructing the free movement of the rotary heat exchanger. Remove foreign objects and dirt.

Rotor speed

Start up the drive system. For rotary heat exchanger control unit, observe the manufacturer's operating instructions.

Check the specified rotor speed (e.g., 10 rpm at 10 V actuating signal).

Direction of rotation

Check the direction of rotation of the rotary heat exchanger (arrow). If the purge sector is installed, the accumulation mass must rotate from the extract air via the purge sector into the supply air.

If the direction of rotation is incorrect, check the electrical connection of the motor and correct if necessary.

Pressure loss

To avoid contaminating supply air with extract air, pressure potential of the fans should be selected so that the system-related leakage flows from the supply air side into the regeneration air side.

Adiabatic exhaust air humidification

It must be ensured that there is no over-wetting by the humidifier on the rotary heat exchanger and that the accumulation mass is not wetted. The humidifier should be operated with permeate from reverse osmosis preferably.

Desiccant rotor

NOTE

Material damage from improper commissioning

Improper commissioning of the dessicant rotor may result in overheating damage, frost damage or unpleasant odours, for example.

- Only carry out commissioning in the presence of a manufacturer's customer service technician.
- Commissioning must be carried out in accordance with the instructions.
- The air must be free of droplets. Water in aerosol form can damage the dry accumulation mass.
- During commissioning, ensure that the dessicant rotor is ready for operation as soon as the fans are running.
- Continuous rotation of the accumulation mass must be ensured in order to avoid damage caused by overmoistening and to prevent unwanted accumulation of foreign substances.
- For hygienic reasons, there must be the option of raising the regeneration temperature to at least 80 °C for cleaning.
- When installing the regeneration heater, care must be taken to prevent superheating (>150 °C) of the accumulation mass (e.g. due to radiant heat).

Rotor speed

The desiccant rotor requires a significantly lower rotational speed in drying mode than in HRU mode. The specified rotational speed of the rotary heat exchanger must be checked (e.g., drying operation 10 1/h with 2 V control signal (or priority contact closed) and in HRV operation, e.g., 10 1/min with 10 V control signal).
As a desiccant rotor, the SECO HYSG is operated at rotational speeds between 4 and 25 1/h and as a heat recovery rotary heat exchanger at rotational speeds up to 10 1/min.

Pressure loss

To avoid contaminating supply air with humid regeneration air, pressure potential of the fans should be selected so that the system-related leakage flows from the supply air side into the regeneration air side.

Plate heat exchanger

NOTE

Material damage due to pressure gradient

Exceeding the maximum pressure loss in the plate heat exchanger will damage it.

- Do not switch on the fan before checking that the relevant dampers are open or before a limit switch indicates they are open.
- Make sure that the fans are switched off immediately when the shut-off dampers are closed.

Inspection

Check the plate heat exchanger for foreign bodies and contamination and clean if necessary.

Heat pipe

Check the heat pipe for foreign bodies and contamination and clean if necessary.

Heating coil, cooling coil, and electric heater

Heating coil

NOTE

Heat damage to the AHU due to steam heater

Overheating of the steam heater causes heat damage to the AHU.

- Operate the steam heater only when the fan is running.
- Provide airflow monitoring or temperature limiters.

After commissioning

After commissioning, check the bolted connections of the flanges for tightness and retighten if necessary.

Cooling coil

After commissioning

After commissioning, check the bolted connections of the flanges for tightness and retighten if necessary.

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Electric heater

DANGER

Danger to life due to burns

When working on the electric heater, there is a danger to life due to hot surfaces or heat radiation.

- Let the fan run to cool down to room temperature.
- Before carrying out any work on the electric heater, switch off the AHU and secure it so that it cannot be switched back on.
- Wear heat-resistant gloves.

DANGER

Fire hazard due to improper operation of the electric heater

In case of improper operation of the electric heater, there is a danger to life due to fire.

- The electric heater may only be operated if flow monitoring is present. This flow monitoring is performed by a type-tested triple thermostat with safety temperature limiter with manual reset.
- Both in nominal and partial-load operation, the air velocity must not fall below a minimum of 2 m/s. This setting must be specially monitored during commissioning to ensure that insufficient casing air velocity cannot occur.

WARNING

Fire hazard due to incorrect positioning of the triple thermostat

There is a danger to life from fire if the triple thermostat is positioned incorrectly.

- Install the triple thermostat according to the instructions.
- Check the functions of the triple thermostat according to the instructions.

WARNING

Fire hazard due to heat accumulation

With the electric heater, there is a risk of fire due to heat accumulation when installed at the end of the AHU and, e.g., improper switch-off, power failure, or fan failure.

- Let the fan run to cool down to room temperature.
- Install the triple thermostat according to the instructions.
- Check the functions of the triple thermostat according to the instructions.
- The components and parts installed downstream must be heat-resistant up to 145 °C or protected by radiation protection.
- A distance of 300 mm must be maintained between the device outlet and the first component or part installed in the duct.

CAUTION

Hot surfaces due to heat radiation of the electric heater

There is a risk of burns when touching the surfaces (duct, spigots,...) if the electric heater is at the end of the AHU.

- Let the fan run to cool down to room temperature.
- Wear heat-resistant gloves.

NOTE

Damage due to thermal radiation from the electric heater

Damage to the downstream component and parts (duct, nozzles ...) due to thermal radiation from the electric heater if the electric heater is at the end of the AHU.

- The components and parts installed downstream must be heat-resistant up to 145 °C or protected by radiation protection.
- A distance of 300 mm must be maintained between the device outlet and the first component or part installed in the duct.

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Triple thermostat with safety temperature limiter

Each electric heater must be equipped with a type-tested triple thermostat with safety temperature limiter with manual reset.

Recommendation:

Place triple thermostat in the air direction immediately after the electric heater.

The functions must be checked accordingly (e.g., using a hot air blower):

Recommendation:

- "Fan" setting: 40 °C.
- "Temperature sensor" setting: 70 °C.
- "Safety temperature limiter" setting: 90 °C.

Airflow monitoring

The airflow must be monitored by measuring the differential pressure on the fan component using a pressure switch.

Check the airflow control by removing the pressure measuring hoses from the differential pressure switch. A switching operation must take place.

Current consumption

In all stages, check the current consumption by measuring all phases. See rating plate for target data.

If the target data are exceeded, robatherm's Customer Service must be informed.

Dampers

Damper

WARNING

Risk of death due to moving parts

Risk of death when closing fins, moving coupling bars or gears due to crushing between two moving parts.

- Attach separating protective devices (e.g., downstream grid, duct) to the damper.
- Before opening the door, switch off the AHU and secure it against restarting.
- Do not reach between the fins.

NOTE

Material damage due to improper commissioning

Switching on the fan with the dampers closed may cause damage to the AHU.

- Do not switch on the fan before checking that the relevant dampers are open or before a limit switch indicates they are open.
- Make sure that the fans are switched off immediately when the shut-off dampers are closed.

Actuator

- Adjust actuator and bars so that the sectional flap opens fully and reaches its end position when closing.
- Check the damper for ease of movement.

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Pressure relief damper

CAUTION

Risk of injury from triggering the pressure relief damper

Risk of injury from impact or pressure due to sudden triggering of the pressure relief damper.

- Safety devices in accordance with DIN EN ISO 12100 must be attached and effective.

Settings

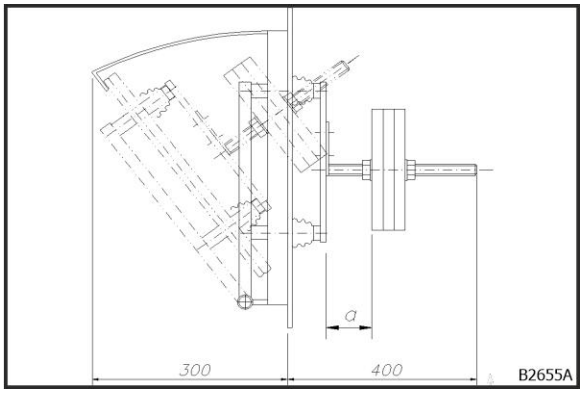

Fig. 3: Pressure relief damper

The release or contact pressure of the pressure relief damper against the unit or duct wall can be adjusted by adjusting the height, number, and distance of the weights (see chapter "Characteristic tripping or contact pressure", page 24).

The presetting is made by means of the specified a dimension.

Simulating the maximum pressure in the network using dampers, which are usually present in every air handling system, means the release pressure must be checked and the weights readjusted if necessary.

Characteristic tripping or contact pressure

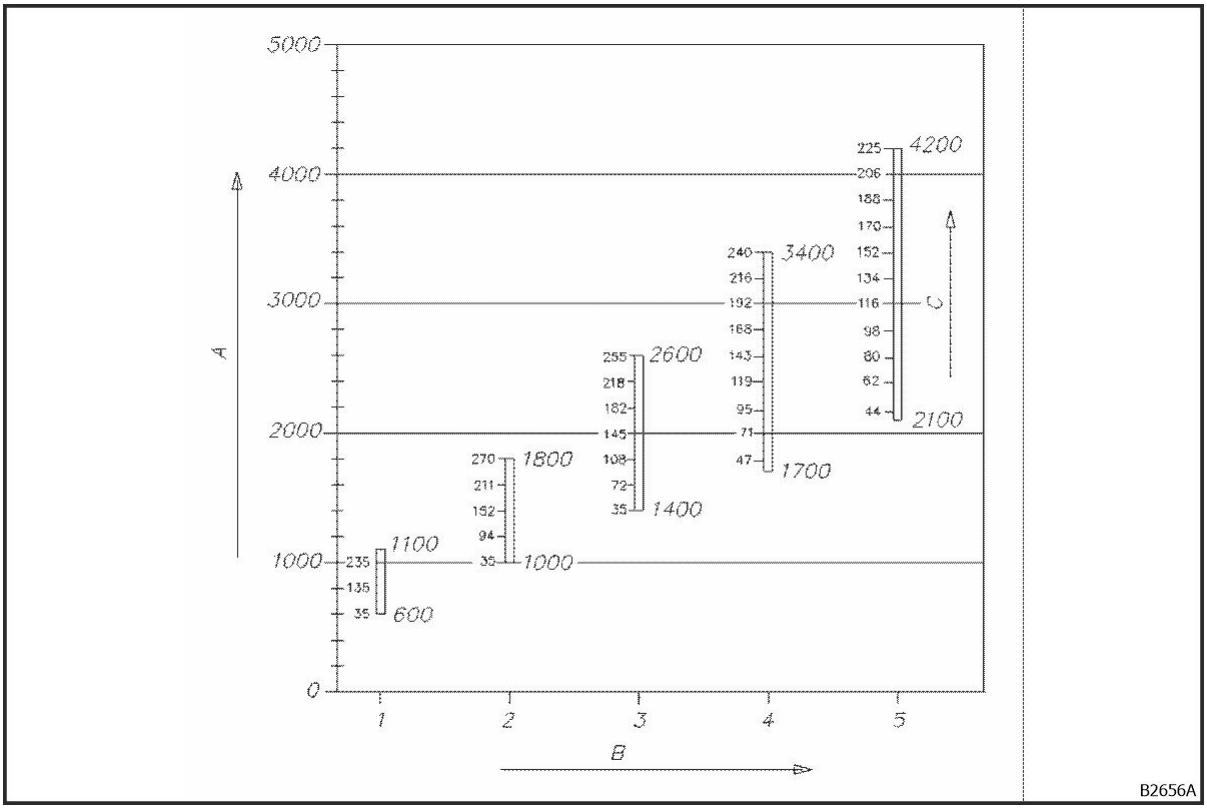

Fig. 4: Pressure relief damper characteristic

A – trigger pressure [Pa]; B – number of weight plates [piece]; C – clearance a [mm]

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Humidifier

CAUTION

Severe health damage due to infection and hypersensitivity reactions

When exposed to water, there is a health risk from viruses, bacteria or fungi due to poor water quality.

- Check water quality at the specified intervals.
- The total colony count of 1000 CFU/ml in the humidifier water must not be exceeded (according to DIN EN ISO 6222).
- The legionella concentration of 100 CFU/100 ml must not be exceeded (according to DIN EN ISO 11731).
- The bacterial count of Pseudomonas aeruginosa King B of 100 CFU/100 ml must not be exceeded.
- There must be no visible mold growth.
- If bacterial counts are too high, clean the AHU immediately.

TIP

Recurrent contamination

In cases of doubt or in the event of rapidly recurring high levels of contamination, it is advisable to seek the advice of a qualified institute.

Circulating water spray humidifier (low pressure)

Adiabatic exhaust air humidification

It must be ensured that there is no over-wetting by the humidifier on the rotary heat exchanger and that the accumulation mass is not wetted. The humidifier should be operated with permeate from reverse osmosis preferably.

Treated water must be removed from galvanized parts immediately. There is a risk of white rust formation.

Commissioning requirements

A casing air velocity of min. 1 m/s (in the clear cross-section of the casing) against the spraying direction of the nozzles must be ensured to avoid a breakdown of the flow rectifier.

Direction of rotation

Start up the pump. Observe the operating instructions of the pump manufacturer.

Check pumps and valves for proper installation (flow direction) and valve actuators for correct direction of rotation.

Dry-run protection

Pump may only be operated when the pan is sufficiently filled. Set dry-run protection. The pump must switch off when the water level drops below 20 mm above the suction line, otherwise pull the cable of the float switch inwards or outwards accordingly.

Float valve

Check float valve. At maximum water level 10 to 20 mm below the overflow nozzle, the fresh water supply must be switched off.

Adjustability

With controllable humidifiers, the pump must switch off at a nozzle pressure below 0.3 bar. Adjustment of control valve or frequency converter according to manufacturer's operating instructions.

Tightness

Check external lines for tightness and re-seal if necessary.

Factory-new droplet eliminator profiles only reach their full separation performance after approx. 3 days of operation (weathering effect).

Shutdown

The humidifier must switch off automatically as soon as the AHU is switched off or fails. During scheduled shutdown, a fan overshoot must ensure that the humidification chamber can be run dry beforehand.

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Standstill

The humidifier trays and lines must be completely emptied outside of operating hours or if the system is shut down for more than 48 hours. The system must be sufficiently drained to allow the residual water, caused by surface tension, to be completely dried out by the fan overshoot.

Preventing stagnation

The specifications of VDI/DVGW 6023 must be observed for the supply line. For proper operation, stagnation of the water in the supply line must be avoided. Water treatment or drinking water post-treatment systems shall continue to be operated as intended or conserved according to manufacturer's specifications during shutdown periods. In particular, disabling of ion exchangers and softening plants without preservation measures is not permitted.

Hygiene monitoring

Hygiene control

Setting the cleaning interval and limit value of the conductivity control.

Desalination system

Requirements

- For requirements, see appendix "Herco – desalination system Cooltrol data", "Testing before commissioning" section).

Work steps

- For commissioning, see attachment "Herco – desalination system Cooltrol data", "Commissioning" section.
- For calibration, see attachment "Herco – Cooltrol data desalination system", attachment "Herco – Cooltrol data open-loop control manual", "Calibration" and Calibration of the LF sensor" sections.
- For parametrization, see attachment "Herco – Cooltrol data desalination system", attachment "Herco – Cooltrol data open-loop control manual", "Parameter overview" section.

Disinfection

UV-C radiation can optionally be used for continuous disinfection (see chapter "UV-C technology for water disinfection", page 28).

Only use chemical disinfectants (biocides) if it has been proven that they are harmless to health in the application concentration.

UV-C technology for water disinfection

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

Risk of serious injuries due to hazardous substances

There is a risk of poisoning if the carton is damaged or if the UV-C illuminants break.

- When handling broken UV-C illuminants, follow the safety instructions for handling mercury.
- Avoid direct contact with eyes, skin, and clothing.
- Ensure excellent ventilation of the AHU and the rooms connected via the ducts.
- Keep broken pieces of UV-C illuminants in airtight packaging and dispose of properly.

TIP

Removal of small amounts of mercury

UV-C illuminants contain small amounts of mercury. Removal of the small amount leaked at breakage can be done with special sorbents for mercury.

CAUTION

Risk of injury from UV-C radiation

During operation of the UV-C lamp, there is a risk of injury from direct exposure to high-energy UV-C radiation.

- Before carrying out any work on UV-C lamps, switch off the AHU and secure it so that it cannot be switched back on.

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CAUTION

Risk of injury due to hot surfaces

When working on the UV-C lamps in the AHU, there is a risk of burns from hot surfaces.

- Let the fan run to cool down to room temperature.
- Before carrying out any work on UV-C lamps, switch off the AHU and secure it so that it cannot be switched back on.
- Wear heat-resistant gloves.

NOTICE

UV-C disinfection performance impaired by finger perspiration

Finger perspiration leaves stains on the UV-C illuminant that burn in and impair the performance of UV-C disinfection.

- Wear cotton gloves when handling the UV-C illuminant.

Personnel qualifications

The tasks described in the section may only be carried out if the person concerned has the following qualification:

➔ Qualified electrician

Requirements

- UVE emitter completely installed in the quartz protection tube of the UVE reactor.
- For further requirements, see appendix "Herco – UV disinfection system UVE 35 – 45 (P) digital", "Testing before commissioning" section.

Work steps

NOTICE

Cancelling the monitoring of the UV-C intensity by subsequently setting the UV-C intensity

The monitoring of the UV-C intensity can be cancelled by subsequently setting the UV-C intensity. This leads to an incorrect display of the disinfection effect.

- Set the UV-C intensity according to the manufacturer's instructions (see appendix "Herco – UV disinfection system UVE 35 – 45 (P) digital", "Setting – UV intensity" section).

For commissioning work steps, see appendix "Herco – UV disinfection system UVE 35 – 45 (P) digital", "Commissioning" section.

Fresh water spray humidifier (high pressure)

WARNING

Danger to life from high pressure!

When working with spray humidifiers in the high-pressure range, there is a danger to life due to a pressure build-up in the pipelines or in the pressure vessel.

- Before carrying out any work on high pressure spray humidifiers, switch off the AHU and secure it so that it cannot be switched back on.

Commissioning requirements

Prior to commissioning, check the following points:

- Proper and complete installation of all parts
- Correct connection of fresh water connection and drain
- Free movement of all valves
- Secure fit of all connections as these can become loose during transport
- Repeat leak tightness test if necessary

Pumping station

- Check the oil level using the inspection window or dipstick and top up with the specified type of oil if necessary (follow the instruction note on the pump station).
- Check the tension of the drive belt and, if necessary, adjust it using the tensioner pulley.
- Check the drain plug for tightness and retighten if necessary. Use a second wrench to hold it in place.
- Start up the system in manual operation and check the basic functions.
- Check that pumps and valves are installed correctly (flow direction) and that valve actuators are rotating in the correct direction.
- Inspect safety devices in accordance with specifications.

Controller unit

- Start up the controller unit as specified.

Shutdown

The humidifier must switch off automatically as soon as the AHU is switched off or fails. During scheduled shutdown, a fan overshoot must ensure that the humidification chamber can be run dry beforehand.

Standstill

The humidifier trays and lines must be completely emptied outside of operating hours or if the system is shut down for more than 48 hours. The system must be sufficiently drained to allow the residual water, caused by surface tension, to be completely dried out by the fan overshoot.

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Preventing stagnation

The specifications of VDI/DVGW 6023 must be observed for the supply line. For proper operation, stagnation of the water in the supply line must be avoided. Water treatment or drinking water post-treatment systems shall continue to be operated as intended or conserved according to manufacturer's specifications during shutdown periods. In particular, disabling of ion exchangers and softening plants without preservation measures is not permitted.

Circulating water contact humidifier

Commissioning requirements

Prior to commissioning, check the following points (see attachment 'fisair – installation and maintenance manual series HEF2 evaporative air humidifier for ventilation systems or duct installation', 'Recommendations for commissioning' section or attachment 'fisair – installation and maintenance manual series HEF2 evaporative air humidifier for ventilation systems or duct installation', 'Recommendations for commissioning' section):

- Proper and complete installation of all parts
- Correct connection of fresh water connection and drain
- Free movement of all valves
- Secure fit of all connections as these can become loose during transport
- Repeat leak tightness test if necessary

Disinfection

UV-C radiation can optionally be used for continuous disinfection (see chapter "UV-C technology for water disinfection", page 28).

Only use chemical disinfectants (biocides) if it has been proven that they are harmless to health in the application concentration.

UV-C technology for water disinfection

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

Risk of serious injuries due to hazardous substances

There is a risk of poisoning if the carton is damaged or if the UV-C illuminants break.

- When handling broken UV-C illuminants, follow the safety instructions for handling mercury.
- Avoid direct contact with eyes, skin, and clothing.
- Ensure excellent ventilation of the AHU and the rooms connected via the ducts.
- Keep broken pieces of UV-C illuminants in airtight packaging and dispose of properly.

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TIP **Removal of small amounts of mercury**

UV-C illuminants contain small amounts of mercury. Removal of the small amount leaked at breakage can be done with special sorbents for mercury.

CAUTION

Risk of injury from UV-C radiation

During operation of the UV-C lamp, there is a risk of injury from direct exposure to high-energy UV-C radiation.

- Equip doors with door contact switches for safe shutdown of the UV-C lamp in case of unauthorized access.
- Before carrying out any work on UV-C lamps, switch off the AHU and secure it so that it cannot be switched back on.

CAUTION

Risk of injury due to hot surfaces

When working on the UV-C lamps in the AHU, there is a risk of burns from hot surfaces.

- Let the fan run to cool down to room temperature.
- Before carrying out any work on UV-C lamps, switch off the AHU and secure it so that it cannot be switched back on.
- Wear heat-resistant gloves.

NOTICE

UV-C disinfection performance impaired by finger perspiration

Finger perspiration leaves stains on the UV-C illuminant that burn in and impair the performance of UV-C disinfection.

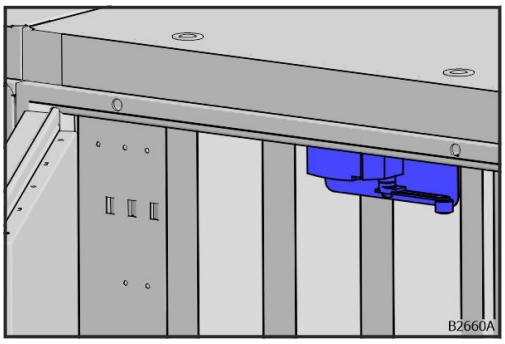
- Wear cotton gloves when handling the UV-C illuminant.

Personnel qualifications
The tasks described in the section may only be carried out if the person concerned has the following qualification:

➔ Qualified electrician

Door contact switch

Set-up and function



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

Fig. 5: Door contact switch

The inspection doors in the effective range of the UV-C radiation are equipped with door contact switches to safely switch off the UV-C illuminants in the event of unauthorised access. The door contact switches are pre-wired in terminal boxes. Where possible, the door contact switches are grouped together in a terminal box. If the structural situation in the AHU does not allow this (e.g. different delivery sections), several terminal boxes are installed accordingly.

Requirements

Door contact switches are connected to the switch cabinet.

- See attachment 'fisair – installation and operating instructions for the basic control panel (CCB4.0) of the fisair evaporation humidifier', 'Configuration of UV illuminant (UV activation)' section or
- See attachment 'fisair – installation and operating instructions for the step control panel (CCE4.0) of the fisair evaporation humidifier', 'Configuration of UV illuminant (UV activation)' section.

Inspection

1. Close all inspection doors with door contact switches.
2. Check that the blue LED (UV) on the switch cabinet lights up.

➔ If the blue LED is lit up, even though all doors are shut, there is a malfunction (see attachment 'fisair – installation and operating instructions for the basic control panel (CCB4.0) of the fisair evaporation humidifier', 'Wiring diagram' section or attachment 'fisair – installation and operating instructions for the step control panel (CCE4.0) of the fisair evaporation humidifier', 'Wiring diagram' section).

UV-C reactor configuration

For UV-C reactor configuration

- Attachment 'fisair – installation and operating instructions for the basic control panel (CCB4.0) of the fisair evaporation humidifier', 'Configuration of UV illuminant (UV activation)' section or
- Attachment 'fisair – installation and operating instructions for the step control panel (CCE4.0) of the fisair evaporation humidifier', 'Configuration of UV illuminant (UV activation)' section.

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Pressure steam humidifier

WARNING

Danger to life from high pressure!

When working with pressure steam humidifiers, there is a risk of death due to pressure build-up in the pipelines or in the pressure vessel.

- Before carrying out any work on pressure steam humidifiers, switch off the AHU and secure it so that it cannot be switched back on.

Commissioning requirements

Prior to commissioning, check the following points:

- Proper and complete installation of all parts
- Correct connection
- Free movement of all valves
- Secure fit of all connections as these can become loose during transport
- Repeat leak tightness test if necessary

Electro steam humidifier

Commissioning requirements

Prior to commissioning, check the following points:

- Proper and complete installation of all parts
- Correct connection of fresh water connection and drain
- Free movement of all valves
- Secure fit of all connections as these can become loose during transport
- Repeat leak tightness test if necessary
- Hygrostat function

Shutdown

The humidifier must switch off automatically as soon as the AHU is switched off or fails. During scheduled shutdown, a fan overshoot must ensure that the humidification chamber can be run dry beforehand.

Standstill

The humidifier trays and lines must be completely emptied outside of operating hours or if the system is shut down for more than 48 hours. The system must be sufficiently drained to allow the residual water, caused by surface tension, to be completely dried out by the fan overshoot.

Electrical connection

For a detailed description of the electrical connection:

- Refer to 'Hygromatik – StandardLine electrode steam humidifier – instructions' attachment, 'Electrical connection' section.
- Refer to 'Hygromatik – StandardLine heater element for steam humidifier – instructions' attachment, 'Electrical connection' section.
- Refer to 'Hygromatik – FlexLine electrode steam humidifier – instructions' attachment, 'Steam distributor' section or
- 'Hygromatik – FlexLine heater element for steam humidifier – instructions' attachment, 'Electrical connection' section.

Commissioning

For a detailed description of commissioning:

- Refer to 'Hygromatik – StandardLine electrode steam humidifier – instructions' attachment, 'Commissioning' section.
- Refer to 'Hygromatik – StandardLine heater element for steam humidifier – instructions' attachment, 'Commissioning' section.
- Refer to 'Hygromatik – FlexLine electrode steam humidifier – instructions' attachment, 'Commissioning' section or
- 'Hygromatik – FlexLine heater element for steam humidifier – instructions' attachment, 'Commissioning' section.

Refrigeration technology (refrigeration plant, heat pump, and split air conditioner)

WARNING

Danger to life from explosion

In the event of leakages or when handling refrigerant R32, there is a risk of explosion, as A2L refrigerants can produce a potentially explosive atmosphere.

- Avoid potential sources of ignition.
- Ventilate the room.
- Check the inside of the AHU with a refrigerant sensor before starting any work.
- Only use a tool designed for A2L refrigerant.

Personnel qualification

Commissioning must only be carried out by a qualified specialist company in instrumentation and control engineering.

At the start of the commissioning work, the commissioning technician must be familiarized with the plant-specific localities by a person to be appointed by the customer.

Commissioning of refrigeration plants may only be carried out by the manufacturer or another qualified person appointed by the manufacturer.

For all activities, the requirements of the service manual for refrigeration plants (available on request), and the applicable standards and guidelines (e.g., DIN EN 378, BGR 500, and F-Gas regulation) must be observed.

Commissioning conditions

All structural requirements, such as accessibility, completion of equipment and ductwork installation, vapour-tight insulation of the pipework outside the AHU, and uninterrupted availability of all supply media, must be met. Depending on the access area, installation site and refrigerant safety class, a refrigerant sensor for monitoring the installation site and suitable ventilation of the installation site must be in place and functional. Furthermore, it must be possible to operate the system at the required operating points.

Fault messages of the refrigeration plant are displayed on the control cabinet.

Split outdoor unit with R32 refrigerant

Split outdoor units with R32 may only be used if the following requirements are met:

- Split air conditioners comprise a closed refrigeration circuit.
- The minimum required volume flow V_{min} of the AHU must be observed see chapter "Determining the minimum required volume flow of the AHU", page 38.

Determining the minimum required volume flow of the AHU

The minimum required volume flow [m³/h] of the AHU is calculated as follows:

$$V_{min} = 60 \cdot \frac{m_{max}}{LFL}$$

V_{min} $\left[\frac{m^3}{h}\right]$	m_{max} [kg]
400	2,0
550	2.8
800	4.0
1250	6.3
1350	6.8

Table 1: Filling quantities depending on volume flow

Type name	m_{max} **[kg]**
PUZ – ZM50	2.0
PUZ – ZM60	2.8
PUZ – ZM71	2.8
PUZ – ZM100	3.6
PUZ – ZM125	3.6
PUZ – ZM140	3.6
PUZ – ZM200	6.3
PUZ – ZM250	6.8

Table 2: Filling quantities for each Mitsubishi electric split outdoor unit for pipework distance of < 30 m

For calculating the maximum permissible filling quantities m_{max}

- see chapter "Determining the maximum permissible filling quantity of refrigerant without a refrigerant sensor", page 39.
- see chapter "Determining the maximum permissible filling quantity of refrigerant with a refrigerant sensor", page 41.

Determining the maximum permissible filling quantity of refrigerant without a refrigerant sensor

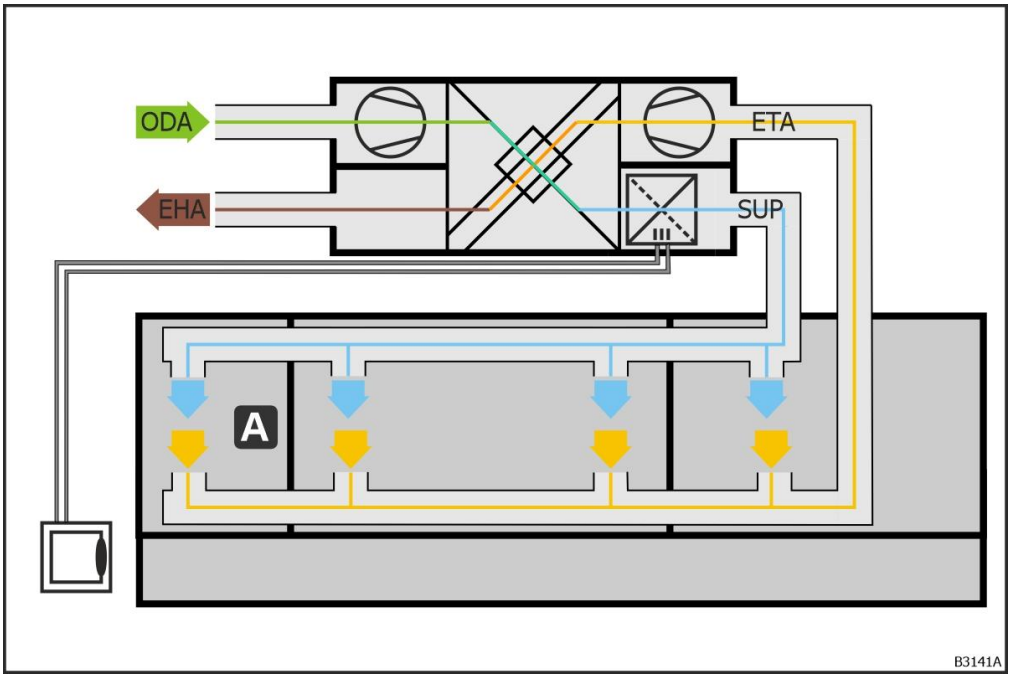

Fig. 6: AHU with split outdoor unit and ventilated spaces without a refrigerant sensor
A – smallest ventilated room

m_{max} = maximum permissible filling quantity [kg] of a cooling circuit

$$m_{max} = 2.5 LFL^{1.25} \cdot h_o \cdot A^{0.5} \leq 15.96 \text{ [kg]}$$

With LFL = lower explosion limit of R32 [kg/m³]

$$LFL = 0.307 \left[\frac{kg}{m^3}\right]$$

With h_o = air outlet height [m] in the smallest ventilated room

h_o [m]	**Air outlet height**
0.6	Floor
1.0	Window
1.8	Wall
2.2	Ceiling

Table 3: Air outlet height h_o

And with A = area of the smallest ventilated room [m²]

When calculating the maximum permissible filling quantity based on the room size, the cooling circuit with the largest filling quantity should always be used if there are several split outdoor units.

Examples:

	Size of the smallest ventilated room A [m²]			
m_{max} [kg]	$h_o = 0.6$ [m]	$h_o = 1.0$ [m]	$h_o = 1.8$ [m]	$h_o = 2.2$ [m]
2.0	34	13	4	3
2.8	67	24	8	5
4.0	137	49	16	11
6.3	338	122	38	26
6.8	394	142	44	30

Table 4: Filling quantities and volume flow in relation to room size and air outlet without a refrigerant sensor

Type name	m_{max} **[kg]**
PUZ – ZM50	2.0
PUZ – ZM60	2.8
PUZ – ZM71	2.8
PUZ – ZM100	3.6
PUZ – ZM125	3.6
PUZ – ZM140	3.6
PUZ – ZM200	6.3
PUZ – ZM250	6.8

Table 5: Filling quantities for each Mitsubishi electric split outdoor unit for pipework distance of < 30 m

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Determining the maximum permissible filling quantity of refrigerant with a refrigerant sensor

If a refrigerant sensor (B) is installed near the coil, the maximum permissible filling quantity increases in relation to the room size. The air outlet height h_o is not taken into account.

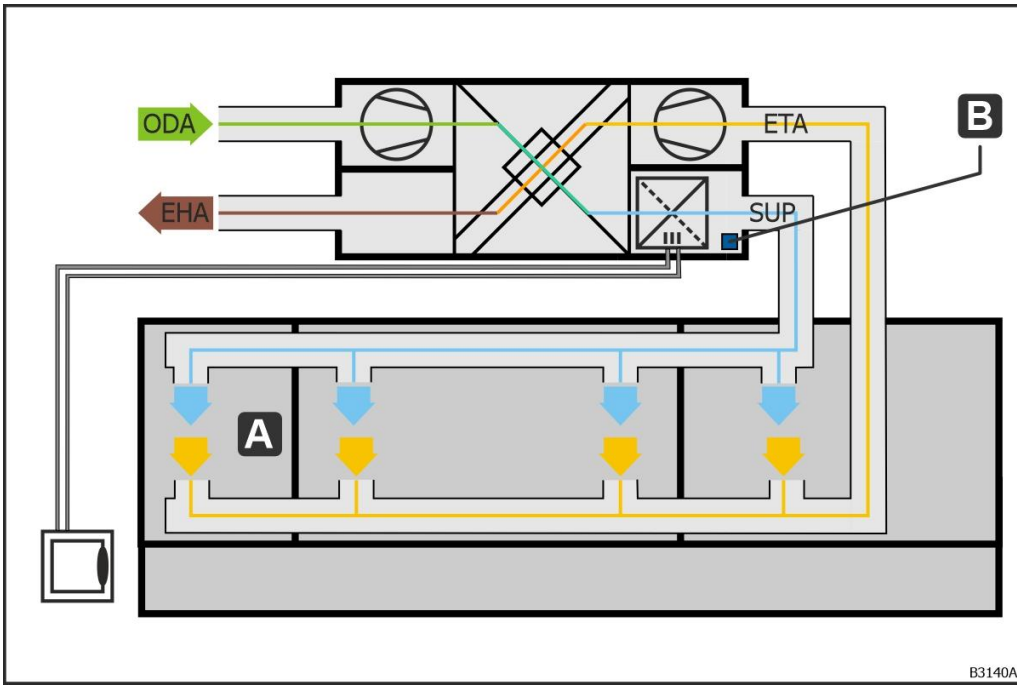

Fig. 7: AHU with split outdoor unit and ventilate rooms with refrigerant sensor
A – smallest ventilated room
B – refrigerant sensor

m_{max} = maximum permissible filling quantity [kg] of a cooling circuit

$$m_{max} = 0.5 \cdot LFL \cdot H \cdot TA \leq 15.96 \text{ [kg]}$$

With LFL = lower explosion limit of R32 [kg/m³]

$$LFL = 0.307 \left[\frac{kg}{m^3}\right]$$

With H = room height [m] ≤ 2.2 [m]

And with TA = total ventilated room area [m²] if:

- no volume flow controllers are present or
- the volume flow controllers are opened when there is a detector alarm.

Or with $TA = A$ = area of the smallest ventilated room [m²] if

- the volume flow controllers are not actuated.

Examples of a room height $H = 2.2\ [\mathrm{m}]$:

m_{max} [kg]	TA [m^2]
2.0	6
2.8	9
4.0	12
6.3	17
6.8	21

Table 6: Filling quantities and volume flow in relation to room size with a refrigerant sensor

Type name	m_{max} [kg]
PUZ – ZM50	2.0
PUZ – ZM60	2.8
PUZ – ZM71	2.8
PUZ – ZM100	3.6
PUZ – ZM125	3.6
PUZ – ZM140	3.6
PUZ – ZM200	6.3
PUZ – ZM250	6.8

Table 7: Filling quantities for each Mitsubishi electric split outdoor unit for pipework distance of < 30 m

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Hydraulic set

Do not exceed approved pressure rating.

Observe technical data sheet.

In the case of a run around coil, the amount of frost protection agent must be selected depending on the lowest outside air temperature (observe the manufacturer's information).

If no condensate pan is provided underneath a (HE-)RAC heating coil, the HRS system may only be operated if no condensate is produced.

Direction of rotation

Check pumps and valves for proper installation (flow direction) and valve actuators for correct direction of rotation.

Hydraulic system

Optionally, perform hydraulic commissioning by adjusting and balancing pressures (e.g., by means of a pressure regulating device).

Direct firing

WARNING

Fire hazard due to loose parts

There is a fire hazard when flammable substances come into contact with the combustion chamber or the direct gas-fired heater.

- Check that there are no parts in front of the combustion chamber and the direct gas-fired heater that could be carried away when the AHU is switched on for the first time.

Combustion chamber

WARNING

Risk of death due to deflagration

There is a risk of deflagration when the burner is switched on again.

- Contact the manufacturer after 5 unsuccessful start-up attempts.

WARNING

Danger to life due to burns

There is a danger to life from burns when working on the flame pot.

- Wear personal protective equipment (safety glasses, respiratory protection, and protective clothing).

CAUTION

Risk of serious damage to health due to exhaust gas emissions

When the burner is switched on for the first time, there may be health hazards due to exhaust gas emissions.

- Always install the combustion chamber or exhaust system in the overpressure area of the AHU.

Personnel qualification

The initial commissioning of a combustion chamber or the associated ventilation system must be carried out by the manufacturer or another expert appointed by the manufacturer (DIN 4794).

Combustion air

The required combustion volume flow (pollutant-free) is approx. 1 m³/h per kW of installed burner capacity. Extract air openings in the building must be designed in accordance with TRGI; in the unit to max. 1 m/s, min. 150 cm².

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Operational readiness

Combustion chamber of the RWE series

Preparing for operation:

1. Vent the oil or gas line
2. Check triple thermostat settings:
   - burner: approx. 70 °C
   - fan: approx. 40 °C
   - Position the sensor approx. 10 cm in air direction downstream of combustion chamber
3. For two-stage burners, check thermostat settings: approx. 60 °C

Condensate combustion chamber

Follow the instructions of the respective combustion chamber supplier. These are part of the supplied documentation.

Gas consumption

The gas consumption depends on the operating point and the output power. Gas consumption can be estimated using the following equation:

Gas consumption (G20, standard-m³/h) = 0.11 x power (kW)

Burner

WARNING

Explosion hazard due to explosive atmosphere

An explosion may occur during burner start-up if an explosive atmosphere is present.

- Purge to ensure that no explosive atmosphere is present before starting the burner.

Put the burner into operation: The commissioning instructions of the burner manufacturer must be strictly observed. Care must be taken to ensure that the fan is in operation at all times. The fuel supply must be set such that the nominal device power Q_N is not exceeded. For gas burners, it is mandatory to use a gas meter for this purpose.

Check flame: The flame must not touch the combustion chamber walls. Use flame head extension or other nozzle angle.

Regulatory and security bodies

The AHU must be in "Off" operating mode. To check the function, heat the capillary, e.g., using a hot air blower.
Check triple thermostat:

- If the "fan" setting is ≥ 40 °C, the fan must switch on.
- If the "burner" setting is ≥ 70 °C, the burner must switch off.
- If the "safety temperature limiter" setting is ≥ 100 °C, the burner must switch off and the safety temperature limiter must lock. If this does not happen automatically:
  - Stop the burner.
  - Replace the triple thermostat.
  - Repeat the entire check.

After successful testing, manually unlock the safety temperature limiter using the reset button.
With two-stage burner: Check temperature sensor:

- If the "burner" setting is ≥ 60 °C, the burner must switch off.

Flap control

For combustion chambers with bypass, check the operating direction of the dampers. If necessary, reverse the direction of rotation of the actuator by adjusting the slide switch.
For combustion chamber temperature control:

- As the heating demand increases, the combustion chamber damper must open and the bypass damper must close. As the heating demand decreases, the dampers behave in the opposite way.
- To ensure adequate cooling of the combustion chamber, the combustion chamber damper must not be closed further than 10 mm of free opening cross-section between the damper blades. Provide a limit switch to shut down burner.

For exhaust gas temperature control:

- When the exhaust gas temperature falls below the set minimum temperature, the combustion chamber damper (if present) must close and the bypass damper must open. If the set maximum flue gas temperature is exceeded, the burner output must be reduced.

Exhaust emissions

Determine emission level according to DIN 4794.

Combustion chamber of the RWE series

- Maximum exhaust gas temperature: approx. 210 °C (BlmSchV, observe the latest version).
- Minimum exhaust gas temperature: approx. 150 °C (to reduce condensate formation). Minimum term burners note.

All settings must be recorded and stored in a setting record.

Condensate combustion chamber

- At maximum power output 175-192 °C (depending on the model).

Condensate

Condensate temperature

- At maximum power output 175-192 °C (depending on the model)

Condensate quantity

The condensate quantity produced depends on the mode of operation and the power output. The condensate quantity can be estimated using the following equation: Condensate quantity [kg/h] = 0.10 x power [kW].

Direct gas-fired heater

WARNING

Risk of death due to deflagration

There is a risk of deflagration when the burner is switched on again.

- Contact the manufacturer after 5 unsuccessful start-up attempts.

WARNING

Explosion hazard due to ignitable atmosphere

After starting the AHU, there is a risk of explosion due to accumulation of flammable substances.

- Monitor if AHU purge has taken place before the burner start (min. 25% concentration below the lower ignition limit).

WARNING

Asphyxiation due to AHU malfunction

Due to a malfunction of the AHU (e.g, direct gas-fired heater in operation even though the fan is at a standstill), there is a risk of suffocation due to excessive CO_2concentration.

- Install CO and O_2 sensor in the room to:
  - detect high CO concentration.
  - Detect low O_2 concentration.

WARNING

Risk of poisoning due to escape of combustion gas

Risk of poisoning due to the accumulation of fuel gas from the safety relief valve in the case of gas control systems with a supply pressure of over 300 bar.

- Lead the line from the safety relief valve to the outside.

Personnel qualification

According to DIN 4794, the initial commissioning of an AHU with a direct gas-fired heater or the associated ventilation system must be carried out by the manufacturer or another expert appointed by the manufacturer. This person must be approved by the DVGW as a gas specialist.

Regulations

When assembling the AHU, in addition to the points listed here, any conditions imposed by the approval authority, all local regulations and the requirement of the DVGW and TRGI must be strictly observed.

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Operational readiness

Preparing for operation:

1. Exhaust ventilate the gas line.
2. Check setting of safety temperature limiter limit value: 60 °C by default. Air openings must be open during operation.

Burner

Commission the burner. In the process, make sure that the supply and extract air fan is constantly in operation without recirculation air.

Unless otherwise agreed by way of exception, this work will only be carried out by the service technician.

1. Open the shut-off valve (1).
2. Check the pressure at the differential pressure gauge (11).

➔ The pressure at the differential pressure gauge (11) must correspond to the design pressure according to the nameplate.

3. Set the min. gas pressure switch (9) to the lowest value.
4. Set the max. gas pressure switch (10) to the highest value.
5. Set the pressure switch on the burner panel to the lowest value.
6. For units with combustion air fan: set the pressure switch of the support fan to the lowest value.
7. Set the setpoint of the duct or room sensor and temperature sensor above the respective ambient temperature.
8. Set the control switch on the switch cabinet to "heating".

➔ The unit now starts a burner.

9. In the event of fault shutdown, repeat the start-up several times (air residue).

If there is no flame formation even though gas is present at the burner:

1. Check correct venting of the gas line.
2. Perform electrical tests on safety devices (6, 9, 10, 15, 16).
3. Check the fine-wire fuse of the control unit.
4. Check the electrical wiring in the control cabinet and the wiring of the field devices, correct if necessary.
5. Check ignition electrode.

If there is only a short flame formation, although gas is present at the burner:

1. Check UV diode for correct connection and discoloration; replace if necessary.
2. For units with ionization monitoring: Check the ionizing bar. Remove contaminations if necessary. The rod must not be in contact with metal parts; check the insulation body.
3. For units with combustion air blower: Check the direction of rotation of the fan and reconnect if necessary.

Regulatory and security bodies

To check the function, heat the capillary, e.g., using a hot air blower.

Check safety temperature limiter:

- With the setting "Safety temperature limiter", the burner must switch off and the safety temperature limiter must lock. If this does not happen automatically:
  - Stop the burner.
  - Replace safety temperature limiter.
  - Repeat the entire check.

After successful testing, manually unlock the safety temperature limiter using the reset button.

Commissioning work

1. Check whether the designed nominal volume flow is set; adjust if necessary.
2. Adjust the gas quantity with the gas meter provided by the customer by turning the adjusting screw on the pressure regulator (control damper with actuator must be fully open).
3. At full load (control damper fully open), the pressure at the differential pressure gauge must correspond to the set pressure according to the nameplate.
4. Set the setpoint of the duct or room sensor to a value lower than the actual value. The control damper must close.
5. Set the minimum gas flow rate using the control damper. To do this, set the control signal to 0 % and use the limit switch in the actuator to set the smallest possible flow rate at which a closed flame pattern is still present. Check via inspection window.
6. Set the AHU to maximum capacity again (open the control damper).
7. Set gas pressure switch to max. lower position until switch-off occurs. Set value: Switch-off threshold + approx. 20 %.
8. Gas pressure switch min. remains at minimum position.
9. Check the direction of rotation of the actuator. If room sensor is set higher than the actual value, the actuator must open the control damper and vice versa.
10. Basically check the function of the control.
11. Set sensors to the setpoint.
12. Carefully check the entire gas line for tightness using leak detection spray. In the event of leaks, initiate suitable re-sealing work.
13. For units with combustion air fan, adjust combustion air pressure by adjusting the intake throttle; follow the burner manufacturer's instructions carefully.
14. Set pressure switch on combustion air blower: Set value: Shutdown value - 20 %.
15. Setting burner orifice: Nominal pressure loss at the burner orifice should be approx. 180 to 250 Pa.
16. Set the pressure switch on the burner orifice: Set value: Nominal pressure loss burner orifice - 40 %.
17. All settings must be recorded and stored in a setting record.

Control system

AHUs with integrated I&C equipment must not be put into operation until commissioning and instruction on the part of robatherm has been completed and the handover has taken place.

Instruction of the operating staff designated by the customer in the course of the commissioning work.

Control

- Configure controllers or DDC substations including loading the project-specific control and PLC programs, if necessary.
- Commission with all data points connected.
- Adjust the parameters to the operating conditions of the operational plant; set and adjust according to the specified setpoints and reference variables.
- Check control programs.

Duct smoke detector

Duct smoke detectors supplied loose by robatherm and installed on site are integrated into the control system by the robatherm service technician for AHUs with integrated I&C equipment.

Specialized customer staff must be available to test the fire or smoke dampers during commissioning.

Pressure measuring devices

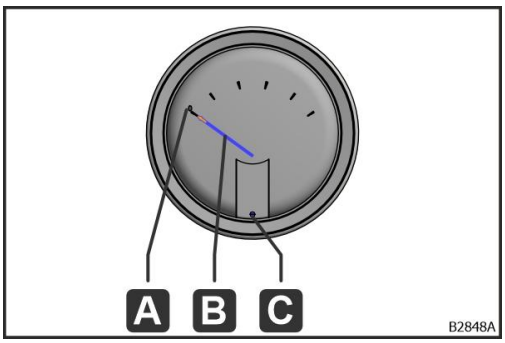
Analog differential pressure indicators

For analog differential pressure gauges, a zero-point correction must be performed.

- For dial gauges see chapter "Zero-point correction for dial gauges", page 52.
- For inclined tube gauges see chapter "Zero-point correction for inclined tube gauges", page 53.

Zero-point correction for dial gauges

Structure of a dial gauge:



A - "0": Zero point on the scale
B - pointer
C - Screw for zero point correction

Fig. 8: Structure of a dial gauge

Tool:

- flat-bladed screwdriver

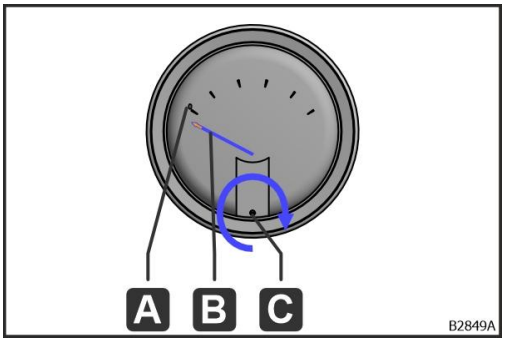
Requirements:

- The fan is not operating.

Possible deviations:

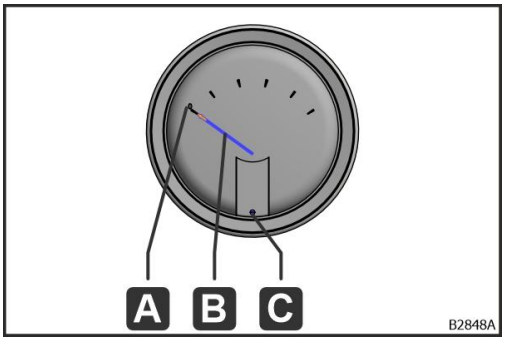
- The pointer (B) is below "0" (A) see chapter "The pointer (B) is below “0” (A)", page 52.
- The pointer (B) is above "0" (A) see chapter "The pointer (B) is above “0” (A)", page 53.

Work steps: **The pointer (B) is below “0” (A)**



1. Turn the screw for zero adjustment (C) clockwise until the pointer (B) is at “0” (A).

Fig. 9: pointer (B) below



➔ Pointer (B) is on “0” (A).

Fig. 10: pointer (B) set correctly

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Work steps: T**he pointer (B) is above "0" (A)**

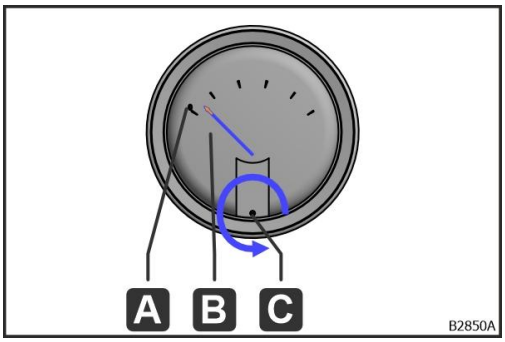

Fig. 11: pointer (B) above

1. Turn the screw for zero adjustment (C) anti-clockwise until the pointer (B) is on "0" (A).

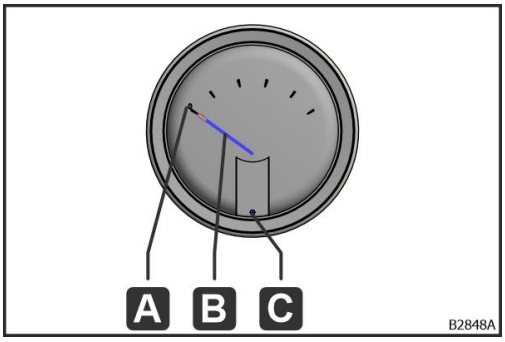

Fig. 12: pointer (B) set correctly

➔ Pointer (B) is on "0" (A).

Zero-point correction for inclined tube gauges

For zero-point correction of inclined tube gauges, see annex "thermokon - pressure difference - inclined tube gauges", chapter "Assembly instructions".

Electrical safety tests

Perform electrical safety tests in accordance with DIN EN 60204-1 (VDE 0113-1), observing the necessary safety precautions. The on-site mains connections must also meet the requirements of DIN EN 60204-1, Table 10.

UV-C technology

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

Risk of serious injuries due to hazardous substances

There is a risk of poisoning if the carton is damaged or if the UV-C illuminants break.

- When handling broken UV-C illuminants, follow the safety instructions for handling mercury.
- Avoid direct contact with eyes, skin, and clothing.
- Ensure excellent ventilation of the AHU and the rooms connected via the ducts.
- Keep broken pieces of UV-C illuminants in airtight packaging and dispose of properly.

TIP

Removal of small amounts of mercury

UV-C illuminants contain small amounts of mercury. Removal of the small amount leaked at breakage can be done with special sorbents for mercury.

CAUTION

Risk of injury from UV-C radiation

During operation of the UV-C lamp, there is a risk of injury from direct exposure to high-energy UV-C radiation.

- Equip doors with door contact switches for safe shutdown of the UV-C lamp in case of unauthorized access.
- Before carrying out any work on UV-C lamps, switch off the AHU and secure it so that it cannot be switched back on.

CAUTION

Risk of injury due to hot surfaces

When working on the UV-C lamps in the AHU, there is a risk of burns from hot surfaces.

- Let the fan run to cool down to room temperature.
- Before carrying out any work on UV-C lamps, switch off the AHU and secure it so that it cannot be switched back on.
- Wear heat-resistant gloves.

NOTICE

UV-C disinfection performance impaired by finger perspiration

Finger perspiration leaves stains on the UV-C illuminant that burn in and impair the performance of UV-C disinfection.

- Wear cotton gloves when handling the UV-C illuminant.

Personnel qualification

The work described in this section may only be performed if the person has the following qualifications:

➔ Qualified electrician

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Door contact switch

Set-up and function

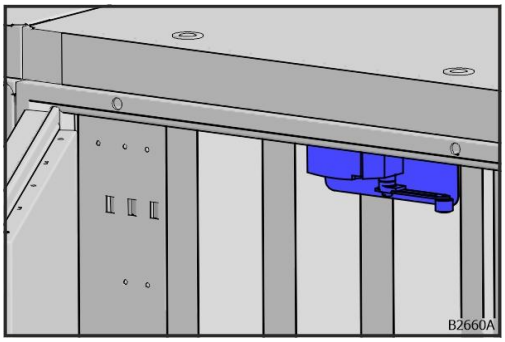

Fig. 13: Door contact switch

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

The inspection doors in the effective range of the UV-C radiation are equipped with door contact switches to safely switch off the UV-C illuminants in the event of unauthorised access. The door contact switches are pre-wired in terminal boxes. Where possible, the door contact switches are grouped together in a terminal box. If the structural situation in the AHU does not allow this (e.g. different delivery sections), several terminal boxes are installed accordingly.

Requirements

UV-C technology for air disinfection

- The door contact switches are connected to the switch cabinet (see appendix "Light progress – Master-SM operating instructions", "Electrical connection" section).

UV-C technology for surface disinfection

- The door contact switches are connected to the switch cabinet (see appendix "Light progress – Master-16-MA operating instructions", "Electrical connections" section).

Inspection

UV-C technology for air disinfection

1. Close all inspection doors with door contact switches.
2. Check that the LED (SAFETY SWITCH) on the switch cabinet lights up.

➔ If the LED is lit up, even though all inspection doors are shut, there is a fault (see appendix "Light progress – Master-SM operating instructions", "Safety switch" section).

UV-C technology for surface disinfection

1. Close all inspection doors with door contact switches.
2. Check that the LED (SAFETY SWITCH) on the switch cabinet lights up.

➔ If the LED is lit up, even though all inspection doors are shut, there is a fault (see appendix "Light progress – Master-16-MA operating instructions", "Safety switch" section).

Commissioning

UV-C technology for air disinfection

For commissioning, see appendix "Light progress – Master-SM operating instructions", "Description and meaning of commands" section.

UV-C technology for surface disinfection

For commissioning, see appendix "Light progress – Master-16-MA operating instructions", "Description and meaning of controls" section.

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robatherm
John-F.-Kennedy-Str. 1
89343 Jettingen-Scheppach

Phone +49 (0)822 999-0
info@robatherm.com
www.robatherm.com

robatherm