



**robatherm ATEX unit.**

**Commissioning.**

the air handling company

**March 2024**

**English translation of the original German operating instructions**

Air handling units for potentially explosive atmospheres | Type TI50

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For reasons of better readability, we will use gender-neutral language forms. All references to persons 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 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

# Security

## General risk sources

### Electrical hazards due to electric current and voltage

#### DANGER



##### Risk of electric shock

Risk of death from electric current when touching parts with live voltage. If the insulation is damaged, there is risk of death from electric current.

- When the insulation is damaged, turn the voltage supply off immediately, and arrange for repair.
- Before carrying out any work on the AHU, disconnect power and voltage supply as follows:
  - Turn the main switch to position "0".
  - Secure the main switch with a lock.
  - Disconnect AHU from power and voltage supply of the supply line.
  - Ensure that the unit is disconnected.
  - Ground and short-circuit.
  - Do not bridge or switch off fuses.
  - Keep moisture away from live 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.

## Hazards from explosive atmosphere

### WARNING



#### Risk of explosion from explosive atmosphere

There is a risk of explosion, as the AHU may convey a potentially explosive atmosphere.

- Purge the AHU with fresh air before opening to remove any potentially explosive atmosphere.
- Only open the AHU if it is certain that there is no potentially explosive atmosphere.
- Follow the instructions in the operating instructions.

### WARNING



#### Risk of explosion from explosive atmosphere

There is a risk of explosion, as the AHU may convey a potentially explosive atmosphere. In conjunction with a source of ignition, this may result in an explosion.



- Before carrying out any work on the AHU, disconnect the power and voltage supply as follows:
  - Turn the main switch to position O.
  - Secure the main switch with a lock.
  - Disconnect the AHU from the power and 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.
- Use electrostatically dissipative safety footwear.
- Use electrostatically dissipative protective clothing.
- Use tools complying with DIN EN 1127-1 Annex A.
- Do not take sources of ignition into the danger zone (e.g. hot surfaces, spark discharge, naked flame).
- Alternatively: gauge the danger zone to eliminate a potentially explosive atmosphere.

### WARNING



#### Risk of explosion from electrostatic discharge

Cleaning the AHU with a dry cloth may cause a static charge. The discharge and the resulting sparks may cause an explosion.

- Only wipe the AHU with a damp cloth.
- Follow the instructions in the operating instructions.



## 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.

## 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.

## 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 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 ( $\leq 400\text{kg}$  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 person in explosion protection
- Qualified electrician
- Qualified electrician in explosion protection
- Mechanic
- Person trained in explosion protection

# Power supply

## WARNING



### **Risk of explosion from lack of equipotential bonding**

Non-existent or incorrectly connected equipotential bonding may cause components to become statically charged. The discharge may cause an explosion.

- Connect all factory installed equipotential bonding conductors and secure them to prevent them from loosening.
- Observe the work steps set out in the operating instructions.

## 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.

## Personnel qualification

→ Qualified electrician in explosion protection

Wiring and connection work in potentially explosive atmospheres must be carried out by a qualified explosion protection electrician. The requirements of DIN EN 60079-14 must be taken into account in particular, but not exclusively.

## 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.
- A disconnection device must be provided on site to isolate all poles of the voltage supply to the ATEX unit in the safe area. The current technical regulations for explosion protection must be observed (in particular DIN EN 60079-14).

## 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



### Risk of explosion from lack of equipotential bonding

Non-existent or incorrectly connected equipotential bonding may cause components to become statically charged. The discharge may cause an explosion.

- Connect all factory installed equipotential bonding conductors and secure them to prevent them from loosening.
- Observe the work steps set out in the operating instructions.

## WARNING



### Risk of explosion due to the use of fans with inadequate ignition protection

Using fans without adequate ignition protection may cause static charging of the AHU. The discharge and the resulting sparks may cause an explosion.

- Use fans (fully assembled fan unit comprising motor, impeller, nozzle, flexible connection and support structure) that as a minimum fulfil the ATEX requirements of the AHU.

## WARNING



### Danger to life from parts 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 17).

## 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).
- Equip motors that are operated in potentially explosive atmospheres and with a frequency inverter with an ATEX-tested resistor monitoring element. In the case of on-site closed-loop control, the HVAC installer/operator must ensure the motor is connected correctly and that an ATEX-approved monitoring element is used.
- The voltage peaks at the motor terminal board must not exceed the maximum values specified by the manufacturer. For speed-controlled motors, a sine filter must be used between the frequency inverter and the motor.

## 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.

## Inlet protection grate

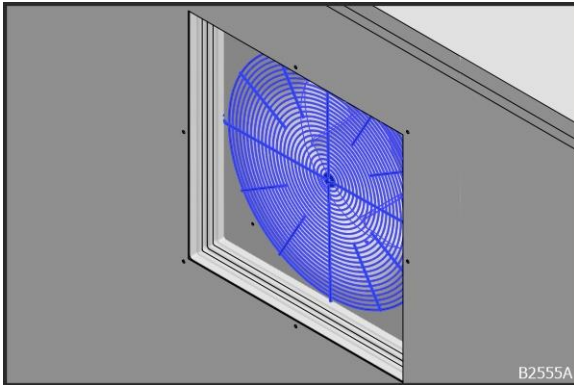


Fig. 2: inlet protection grate

Fans may only be operated in potentially explosive atmospheres with an inlet protection grate.

Before commissioning, it must be ensured that the fan is fitted with an inlet protection grate.

## Vibration velocity

Assessment limits of the vibration velocity according to ISO 14694.

# Heat recovery systems (HRS)

## 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 connection with the AHU equipotential bonding see chapter "Electrical safety tests ", page 26.

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

# Heating and cooling coils

## 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.

Hydraulic sets have a variety of potential sources of ignition and may only be used in safe areas.

### Inspection

Check the connection with the AHU equipotential bonding see chapter "Electrical safety tests ", page 26.

### After commissioning

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

## Cooling coil

Hydraulic sets have a variety of potential sources of ignition and may only be used in safe areas.

### Inspection

Check the connection with the AHU equipotential bonding see chapter "Electrical safety tests ", page 26.

### After commissioning

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

# Dampers

## Damper

### WARNING



#### Risk of explosion from lack of equipotential bonding

Non-existent or incorrectly connected equipotential bonding may cause components to become statically charged. The discharge may cause an explosion.



- Connect all factory installed equipotential bonding conductors and secure them to prevent them from loosening.
- Observe the work steps set out in the operating instructions.

### WARNING



#### Risk of explosion due to the use of dampers with inadequate ignition protection

Using dampers without adequate ignition protection may cause static charging of the AHU. The discharge and the resulting sparks may cause an explosion.

- Use dampers that are at least compliant with the ATEX requirements of the AHU.

### 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.

## Hydraulic set

Do not exceed approved pressure rating.

Observe technical data sheet.

Hydraulic sets have a variety of potential sources of ignition and may only be used in safe areas.

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).

# Control system

## WARNING



### **Risk of explosion due to the use of components with inadequate ignition protection**

Using parts without adequate ignition protection may cause static charging of the AHU, for example. The discharge and the resulting sparks may cause an explosion.

- Use parts in the AHU that are at least compliant with the ATEX requirements for the inside of the AHU.
- Use parts on the outside of the AHU or next to the AHU that at least fulfil the ATEX requirements next to the AHU.
- When assembling parts, only use cable glands, reducers and dummy plugs with the appropriate ATEX approval.

## Personnel qualification

- Qualified electrician in explosion protection

Wiring and connection work in potentially explosive atmospheres must be carried out by a qualified explosion protection electrician. The requirements of DIN EN 60079-14 must be taken into account in particular, but not exclusively.

## 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

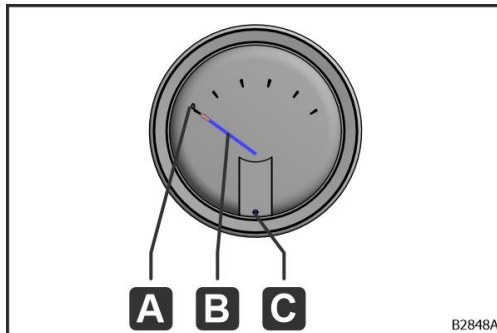
### Analog differential pressure indicators

A zero adjustment must be carried out for analogue differential pressure indicators.



### 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. 3: Structure of a dial gauge

Tool:

- flat-bladed screwdriver

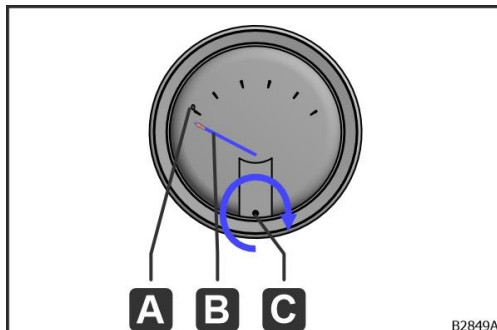
Requirements:

- The fan is not operating.

Possible deviations:

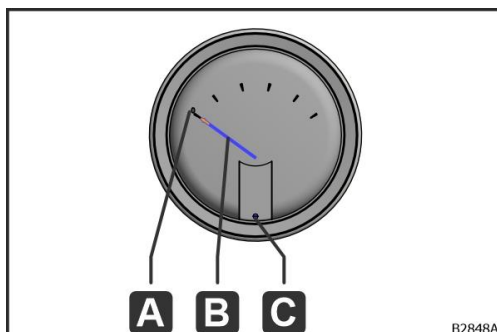
- The pointer (B) is below "0" (A) see chapter " ", page 24.
- The pointer (B) is above "0" (A) see chapter " ", page 25.

Work steps: <Dg\_ref\_target>**The pointer (B) is below "0" (A)**



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

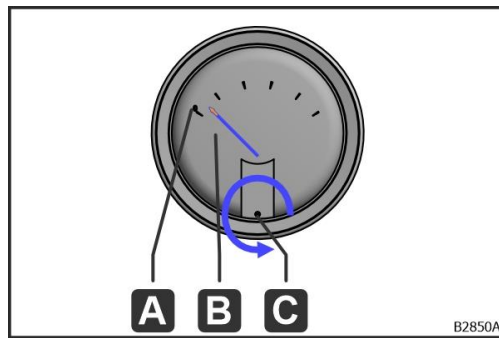
Fig. 4: pointer (B) below



→ Pointer (B) is on "0" (A).

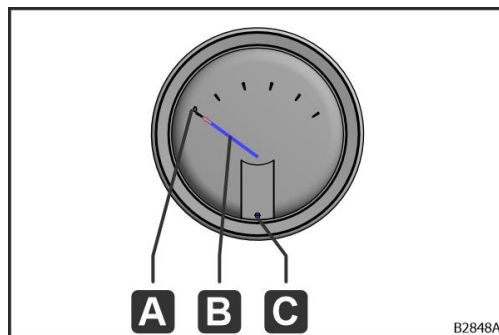
Fig. 5: pointer (B) set correctly

Work steps: <Dg\_ref\_target>**The pointer (B) is above "0" (A)**



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

Fig. 6: pointer (B) above



→ Pointer (B) is on "0" (A).

Fig. 7: pointer (B) set correctly

# Electrical safety tests

## Personnel qualification

- Qualified electrician in explosion protection
- Qualified person in explosion protection

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.

In addition, the following tests must be carried out for ATEX units:

sufficient connection to the equipotential bonding of the AHU (base frame) must be checked for all metallic and coated parts. For example, these test parts include:

- Panels (external and internal sheets)
- Inspection doors (external and internal sheets)
- Unit floor (external and internal sheets)
- Drain pan (insulating sheet and pan sheet)
- Parts of mounting sets (e.g. tube and plates)
- Components (e.g. filters, silencers, fans, coils)
- Mounting parts (e.g. damper, sound-insulated connection)

Apply the test methods for uncoated, metallic parts in accordance with DIN EN 60079-32-2:

1. A screw or crocodile clip can be used at the earthing point of the AHU (borehole in the base frame labelled with a PE sticker).
2. Use a standard measuring electrode (test probe) on the test part.
3. Apply a test voltage of 100 V (15±5 s) between the earthing point of the AHU and the test part.
4. Read off the bleeder resistance.
5. A bleeder resistance of >10 Ω is measured (in accordance with IEC 60079-32-1):
  - Check the equipotential bonding conductor and mounting set.
  - If necessary, clean the component support points.
  - If necessary, replace the equipotential bonding conductor.
  - Repeat the test.

A bleeder resistance of ≤10 Ω is measured (in accordance with IEC 60079-32-1):

- The correct function of all earthing measures is ensured.
- The build-up of a static potential difference, which could result in a static discharge posing the risk of an ignition source, is excluded.

Apply the test methods for coated, metallic parts in accordance with DIN EN 60079-32-2:

1. A screw or crocodile clip can be used at the earthing point of the AHU (borehole in the base frame labelled with a PE sticker).
2. Use a standard measuring electrode (metal plate with circular area = 20 cm<sup>2</sup>) on the test piece.
3. Apply a test voltage of 100 V (15±5 s) between the earthing point of the AHU and the test part.
4. Read off the bleeder resistance.
5. A bleeder resistance of >1 M Ω is measured (in accordance with IEC 60079-32-1):

- Repeat the measurement with a test voltage of 500 V (65±5 s).

A bleeder resistance ≤1 M Ω is measured (in accordance with IEC 60079-32-1):

- The correct function of all earthing measures is ensured.
- The build-up of a static potential difference, which could result in a static discharge posing the risk of an ignition source, is excluded.

A bleeder resistance of >1 M Ω is measured (in accordance with IEC 60079-32-1):

- Check the equipotential bonding conductor and mounting set.
- If necessary, clean the component support points.
- If necessary, replace the equipotential bonding conductor.
- Repeat the test.

A bleeder resistance ≤1 M Ω is measured (in accordance with IEC 60079-32-1):

- The correct function of all earthing measures is ensured.
- The build-up of a static potential difference, which could result in a static discharge posing the risk of an ignition source, is excluded.

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