AL-KO

QUALITY FOR LIFE

EN

CENTRAL VENTILATION AND AIR HANDLING UNITS

OPERATING AND ASSEMBLY INSTRUCTIONS FOR CENTRAL VENTILATION UNITS

AT4F ATEX SERIES

Legal

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Revision history

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1 About this manual

- The German version is the original operating instructions. All further language versions are translations of the original operating instructions.
- Read these operating and assembly instructions carefully before assembly, commissioning and maintenance. This is the prerequisite for safe work and trouble-free handling.
- Observe the safety instructions and warnings in this documentation and on the product.
- This documentation is a permanent part of the described product, and must be handed over to the buyer if the product is sold.

1.1 Explanation of symbols

1.1.1 Safety instructions

⚠ DANGER

This signal word is used to indicate an imminently dangerous situation which, if not avoided, will result in death or severe injury.

⚠ WARNING

This signal word is used to indicate a potentially dangerous situation which, if not avoided, could result in death or severe injury.

⚠ CAUTION

This signal word is used to indicate a potentially dangerous situation which, if not avoided, could result in minor injury.

ATTENTION

This signal word is used to indicate a potential risk of property damage.

NOTE

Special instructions for ease of understanding and handling.

1.2 Safety signs

Meaning	Symbol
GENERAL DANGER SIGNS If the required safety instructions are not observed, this can lead to death, severe injuries and severe property damage.	
IMPORTANT NOTE If this notice is not observed, problems can arise with the unit.	
OBSERVE THE OPERATING AND ASSEMBLY INSTRUCTIONS If you do not heed the notices in the operating and assembly instructions, this can lead to problems with the unit.	
INFORMATION Heeding this information makes working with the machine easier.	

Warning sign

The warning signs used in these operating and assembly instructions draw attention to specific hazards.

Meaning	Warning sign
Warning of danger of falling If the required safety instructions are not observed, this can lead to death or severe injuries due to falling.	
Warning of danger of slipping If the required safety instructions are not observed, this can lead to death or severe injuries due to slipping.	
Warning of electrical voltage If the required safety instructions are not observed, this can lead to death or severe injuries due to dangerous electrical voltage.	
Warning against suspended loads If the required safety instructions are not observed, this can lead to death or severe injuries due to a suspended load.	
Warning of falling objects If the required safety instructions are not observed, this can lead to death or severe injuries due to falling objects.	
Warning of hot surfaces If the required safety instructions are not observed, this can lead to death or severe injuries due to hot surfaces.	
Warning of danger of crushing If the required safety instructions are not observed, this can lead to death or severe injuries due to crushing.	

Meaning	Warning sign
Warning of sharp objects If the required safety instructions are not observed, this can lead to death or severe injuries due to sharp objects.	
Warning of hand injuries If the required safety instructions are not observed, this can lead to death or severe injuries.	
Warning of poisonous substances If the required safety instructions are not observed, this can lead to death or severe injuries due to poisonous substances.	
Risk of explosion If the required safety instructions are not observed, this can lead to death, severe injuries and property damage due to explosive substances (particularly in potentially explosive atmosphere according to the ATEX Directive).	
Warning of an explosive atmosphere If the required safety instructions are not observed, this can lead to death, severe injuries and property damage due to an explosive atmosphere (particularly in potentially explosive atmosphere according to the ATEX Directive).	

Instruction symbol

The prohibition signs in these operating and assembly instructions draw attention to instructions to be observed.

Meaning	Instruction symbol
Wear eye protection If eye protection is not worn, injuries may be caused to the eyes.	
Wear foot protection If foot protection is not worn, injuries may be caused to the feet.	
Wear hand protection If hand protection is not worn, injuries may be caused to the hands.	
Wear head protection If you do not wear head protection, there is a risk of head injuries.	
Wear a mask If you do not wear respiratory protection, this can lead to poisoning and chemical burns to the lungs.	
Isolate before maintenance or repair Failure to disconnect the unit from all energy sources before starting maintenance or repair work can result in serious injuries.	

1.2.1 Abbreviations

Abbreviation	Meaning
ATEX	derived from the French abbreviation for ATmosphères EXplosibles.
EC technology	Electronically commutated DC drives technology (brushless DC motor)
EHA	Exhaust air
ETA	Extract air
Ex	Explosion-protected version
FU	frequency converter
ODA	Outdoor air
PSA	Personal protective equipment, such as cut-proof gloves, safety goggles, work gloves, ear protection, safety helmet, breathing mask
AC unit	Air handling unit
SUP	Supply air
TA	Droplet eliminator
TRGS	Technical Rules for Hazardous Substances
WRD	Heat recovery, diagonal (plate heat exchanger)
WS	Water column

1.3 Legal notices

All specified data serve solely to describe the product. No statement on a specific characteristic or suitability for a specific purpose can be derived from these data. The data do not exempt the user from his own judgement and checks.

2 Safety instructions

2.1 Intended use

The AT4F ATEX unit is intended only for processing and conveying respirable air, i.e. for ventilation and extraction of rooms and buildings or for maintaining the necessary room climate. The AT4F ATEX unit is suitable for operation in the temperature range from -20 °C to +40 °C.

Depending on the ATEX marking, the AT4F ATEX units are suitable for use in either ATEX gas or ATEX dust. The range of application of the AT4F ATEX unit is documented in the design data sheet, on the type plates, the ATEX type plates and in the EU Declaration of Conformity. Deviating ranges of application must be coordinated with the manufacturer's plant to avoid impacting the installation's function. Explosion-protected AC units bear an ATEX type plate. This is marked according to the ATEX Directive 2014/34/EU. These units may only be used in the declared category or in the ATEX zone defined by the ATEX marking.

The usual atmospheric conditions with regard to the explosion characteristics of the atmosphere apply, these are defined in the ATEX standards as follows:

- Temperature range -20 °C to +60 °C
- Pressure 80 kPa (0.8 bar) to 110 kPa (1.1 bar)
- Air with standard oxygen content, normally 21 % (v/v)

Please note there that the ATEX standard version is for the temperature range from -20 °C to +40 °C. A unit for temperatures up to +60 °C is a special version and is marked accordingly.

Measures must be taken by the operator to ensure that there is a sufficient safety distance between the medium temperature and the minimum ignition temperature of the potentially present explosive mixture in accordance with DIN EN 1127-1.

For the intended use, the AT4F ATEX unit must be professionally installed and operated as intended. To do this, observe the "5 Assembly" on page 34 chapter and other relevant information. Furthermore, the intended use also includes compliance with the operating and maintenance conditions listed in these operating and assembly instructions (see chapters "6 Commissioning" on page 83 and "7 Servicing and maintenance" on page 94). The risk is borne solely by the user.

- The AT4F ATEX unit is an air handling unit for air conditioning.
- Only operate the AT4F ATEX unit when fully assembled.
- Set up the unit horizontally. Otherwise there is a risk that puddles may form, among other things.
- Use only original spare parts.
- Children and persons who are not familiar with the AT4F ATEX unit must not use it.
- Observe the accident prevention regulations, fire protection regulations, explosion protection directive and the relevant standards.
- Personal protective equipment conforming to TRGS 727 is required for work on the AT4F ATEX unit.

2.2 Foreseeable misuse

The AT4F ATEX unit may only be operated within the scope of the technical data specified by AL-KO THERM. Any other use or use beyond that described in section "2.1 Intended use" on page 11 is regarded as being not in accordance with the intended use. The manufacturer cannot be held liable for damage resulting from this.

Possible misuse includes:

- Non-horizontal setup of the AT4F ATEX unit.
- Operation outside the design specifications, observe the data sheets of the unit design.
- Conveying media with impermissibly high or low temperatures.
- Conveying aggressive media or media with a high dust content.
- Installation in an environment with aggressive media (e.g. sea air) or heavily dust-containing media (coast).
- Installation of a non-permissible joint seal.
- Non-compliance with the static limits (customer supplied).
- Installing unsuitable components.
- ATEX components with inadmissible ATEX marking.
- Use of unit in an unapproved ATEX area.
- In case of fire, use the unit as a smoke extraction system.
- Use of the AT4F ATEX unit in conjunction with hybrid mixtures.
- The included cover screws are intended exclusively for retention/statics of the cover. The installation of other materials or mounting clamps, etc. is not permitted.

2.3 General safety instructions

⚠ WARNING

Risk of serious injury or death due to working without personal protective equipment!

Working on the AT4F ATEX unit without personal protective equipment can result in serious injury or death.

- Observe the safety instructions in this operating and assembly instructions.
- Use the personal protective equipment when working on the installation.
- Use further protective equipment according to the work to be carried out.
- Personal protective equipment conforming to TRGS 727 is required for work on the AT4F ATEX unit.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

⚠ WARNING

Risk of serious injuries or death!

Working on/in the AT4FATEX unit can result in serious injury or death.

- The supplied unit version must be used according to the specified ATEX marking. Please refer to the data sheet, the ATEX unit nameplate and the EU Declaration of Conformity for the AT4F ATEX unit.
- Measures must be taken by the operator to ensure that a sufficient safety distance between media temperature (e.g.: medium of the heat exchanger) and the minimum ignition temperature of the potentially present explosive mixture in accordance with DIN EN 1127-1.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Only use approved tools and suitable tools.
- Only allow assembly, installation, commissioning, repair, maintenance and servicing work to be carried out by qualified staff.
- Disconnect the AT4F ATEX unit from the mains power supply on all poles and secure it to prevent restart before starting repair or maintenance work.
- Integrate weatherproof units into the lightning protection concept when installed outdoors.
- Avoid naked flames and flying sparks.
- Observe the working instructions and these operating and assembly instructions.
- Document your work and store the evidence in your documentation.
- Work with care.
- Personal protective equipment conforming to TRGS 727 is required for work on the AT4F ATEX unit.
- Use further protective equipment according to the work to be carried out.

⚠ WARNING

Risk of injury due to falling, and falling modules.

When installing the modules or installing them on platforms or on the roof, persons may fall off and/or modules may fall down.

- Only allow assembly, installation, commissioning, repair, maintenance and servicing work to be carried out by qualified staff.
- Observe the assembly instructions in these operating and assembly instructions.
- Use only tested ladders, scaffolding or suitable platforms.
- Only use suitable lifting equipment.
- Only use approved fasteners when assembling the AT4F ATEX unit.
- Use the personal protective equipment when working on the installation.

⚠ WARNING

Risk of injury and explosion due to unauthorised opening.

- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Keep the inspection doors/inspection covers closed during operation.
- Never open the AT4F ATEX unit during operation.
- Open the inspection doors/inspection covers using the relevant tool if necessary.
- The inspection covers are integrated into the unit potential; after each release of this connection, it must be restored, checked and documented.
- When opening the inspection covers, ensure that they are connected to the unit potential with a potential equalisation cable. If necessary, disconnect the connection for work on/in the air handling unit. The integration into the unit potential must be restored, checked and documented after the work.
- Observe the hazard warnings on the inspection doors/inspection covers.

⚠ WARNING

Risk of poisoning and explosion when working with sealants, adhesives and pre-treatment agents.

- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Do not touch the sealant, adhesive or pre-treatment agent.
- Work with care.
- Do not swallow the sealant, adhesive or pre-treatment agent.
- Ensure that there is adequate ventilation at the workplace.
- Observe the safety data sheets and operating procedures in accordance with the Ordinance on Hazardous Substances.
- Use personal protective equipment during all work on the installation.

⚠ WARNING

Risk of injury from falling from ladders, scaffolding or work platforms.

- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

Observe the safety instructions in these operating and assembly instructions to avoid injuries, fires, explosion and other hazards due to improper use and improper operation of the unit:

- The version and construction of the AT4F ATEX unit complies with the standards listed in the EU Declaration of Conformity or EC Declaration of Incorporation. A potential hazard can only be extensively ruled out if the other applicable standards for the overall system to be completed and installed by the plant manufacturer are adhered to.
- If installation is performed contrary to our regulations, and the defect/damage which has occurred is attributable to improper modification, processing or any other treatment, all damage compensation or warranty claims are ruled out. The orderer must prove that improper installation did not cause the defect which has occurred.
- Safety and monitoring equipment must not be removed, bridged or disabled in any other way.
- All authorised persons must have read and understood the operating and assembly instructions in full before starting work on the AT4F ATEX unit and must observe them at all times.
- To avoid dangers during operation, all of the user's plant, operating and working instructions apply in addition to these operating and assembly instructions.

2.3.1 ATEX warnings

Warning of explosive atmosphere

Fig. 1 Warning of explosive atmosphere

The warning notice is located on the air handling unit.

Warning for cleaning work

Fig. 2 Warning of electrostatic discharge

The warning notice is located on the air handling unit. It indicates that the air handling unit must not be cleaned with dry cloths.

Observe the cleaning instructions in the operating instructions.

2.3.2 Safety instruction for unit installation

- The ATEX units must be used according to the ATEX marking on the ATEX type plate, the EU Declaration of Conformity and the technical data sheet. The unit is labelled in accordance with the applicable ATEX directives and standards and can be used in the defined potentially explosive atmospheres.
- Ensure that the ATEX marking is suitable for your ATEX requirements.
- Observe the usage limitations.
- Observe the applicable standards and directives, in particular the ATEX standards and the ATEX directives 2014/34/EU and 1999/92/EC.

2.3.3 Safety instructions for operation

- AT4F ATEX unit must only be operated with completely closed inspection doors/inspection covers.
- All components must be integrated into the unit potential.
- No unauthorised persons are permitted to have access to AT4F ATEX unit during operation.
- The AT4F ATEX unit may only be operated in the performance range specified in the AL-KO THERM technical documents.
- AT4F ATEX unit must be installed properly and used subject to precise observation of our operating and assembly instructions.
- Only operate the AT4F ATEX unit in an approved ATEX zone.
- Only operate the AT4F ATEX unit when it meets your required ATEX requirements.
- Ensure a sufficient safety distance between media temperature (e.g.: medium of the heat exchanger) and the minimum ignition temperature of the potentially present explosive mixture in accordance with DIN EN 1127-1.
- Observe the applicable standards and directives, in particular the ATEX standards and the ATEX directives 2014/34/EU and 1999/92/EC.
- Only operate AT4F ATEX unit when it is fully assembled and with correctly fitted contact protection (optional).
- The AT4F ATEX unit may only be operated when in a technically flawless condition. Malfunctions and damage that can affect safety must be immediately and professionally rectified. The version and construction of AT4F ATEX unit complies with the standards listed in the Declaration of Conformity or Declaration of Incorporation.
- Wear personal protective equipment (e.g. ear protection) during operation of AT4F ATEX unit.

2.3.4 Safety instructions for maintenance

- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Observe the applicable standards and directives, in particular the ATEX standards and the ATEX directives 2014/34/EU and 1999/92/EC.
- Damaged parts are only permitted to be replaced with original spare parts. The spare parts must correspond to the required ATEX marking.
- During repair and maintenance work, AT4F ATEX unit is to be disconnected from the mains on all poles and secured against restart.
- General maintenance instructions in the operating and assembly instructions from AL-KO THERM must be observed under all circumstances.
- Observe the delay time of the fans. Observe a waiting time of at least 3 minutes, until the fan impellers are stationary, before opening the inspection doors.
- Please note that all inspection covers/inspection doors, other housing parts and components are integrated and components are integrated into the unit potential; after each release of these connections, they must be restored again. Check the integration into the unit potential and document the function in the on-site documentation.

2.3.5 Personal safety instructions

- The AT4F ATEX unit may only be operated by persons who are trained in operating it and expressly authorised to use it.
- Personal protective equipment conforming to TRGS 727 is required for work on the AT4F ATEX unit.
- To avoid dangers during operation, all of the operator's plant, operating and working instructions apply in addition to these operating and assembly instructions.
- The operating and assembly instructions must be kept at a suitable, known place in the workplace.
- The operator of AT4F ATEX unit must draw up operating procedures in an understandable form and in the language of the employees, taking the operating and assembly instructions and the operating conditions into consideration.

2.4 Residual dangers

The AT4F ATEX unit may present a danger if it is not operated by trained personnel and/or is used improperly or not according to its intended use.

Residual hazards are potential dangers that are not immediately obvious, e.g.:

- Injuries due to failure to observe the safety instructions, standards, directives or regulations.
- Injuries caused by uncoordinated work.
- Danger caused by working on the electrical installation, cables and connections.
- Transporting, unpacking and setting up the AT4F ATEX unit; these may result in crushing, cutting, puncture or impact injuries.
- Tipping of the AT4F ATEX unit; uneven and loose surfaces promote the AT4F ATEX unit tipping over.
- There is a risk of stumbling, slipping, falling and falling down when installing the AT4F ATEX unit and the accessory parts.
- There is a danger of electric shock due to damaged and defective electrical components.
- Electrical connection cable: Danger due to stumbling, falling and slipping.
- Noise (hearing damage).
- Human misconduct: Non-observance of safety instructions, standards and regulations.
- Operation or transport without suitable safety measures.

2.5 Training

The operator of AT4F ATEX unit must regularly train their personnel on the following topics:

- Observance of the operating and assembly instructions as well as the legal regulations.
- Intended operation of the AT4F ATEX unit.
- Observance of all company, operating and working instructions at the owner’s/operator's installation site.
- What to do in an emergency.
- Compliance with VDI 6022.
- Compliance with ATEX directives and ATEX standards.

3 Product description

- The exact type designation can be found on the type plates. The type plates are usually affixed to the housing. When ordering spare parts or in case of other queries, please specify the type designation of the AT4F ATEX unit, the year of manufacture, order number, position and the ATEX marking according to the type plate, see chapter "3.3.1 ATEX type plate" on page 21.
- The AT4F ATEX unit is suitable for operation in the temperature range from -20 °C to +40 °C.
- Depending on the requirements, all known air handling units are used in the AT4F ATEX Series for filtration, heating, cooling, silencing, heat recovery, (plate heat exchangers or circulating coil systems), etc.
- The customer-specific unit version can be found in the respective data sheets and drawings.
- AT4F ATEX units are available as a weatherproof version or for indoor installation.
  For AT4F ATEX units of zone 2 inside/without requirements outside, the following point must be observed, among others: If no ATEX zone has been defined in the outdoor area of the AT4F ATEX unit, the operator must ensure that the installation room/installation site is adequately ventilated so that no explosive atmosphere can arise due to leaks during normal operation.
  In general, the installation room/location must be suitable for the air handling unit to be installed. DIN EN 60079-10-1/ DIN EN 60079-10-2 must be taken into account in the planning for the determination of the necessary air exchange.

NOTE

Our products are subject to continuous quality control, and comply with the applicable regulations.

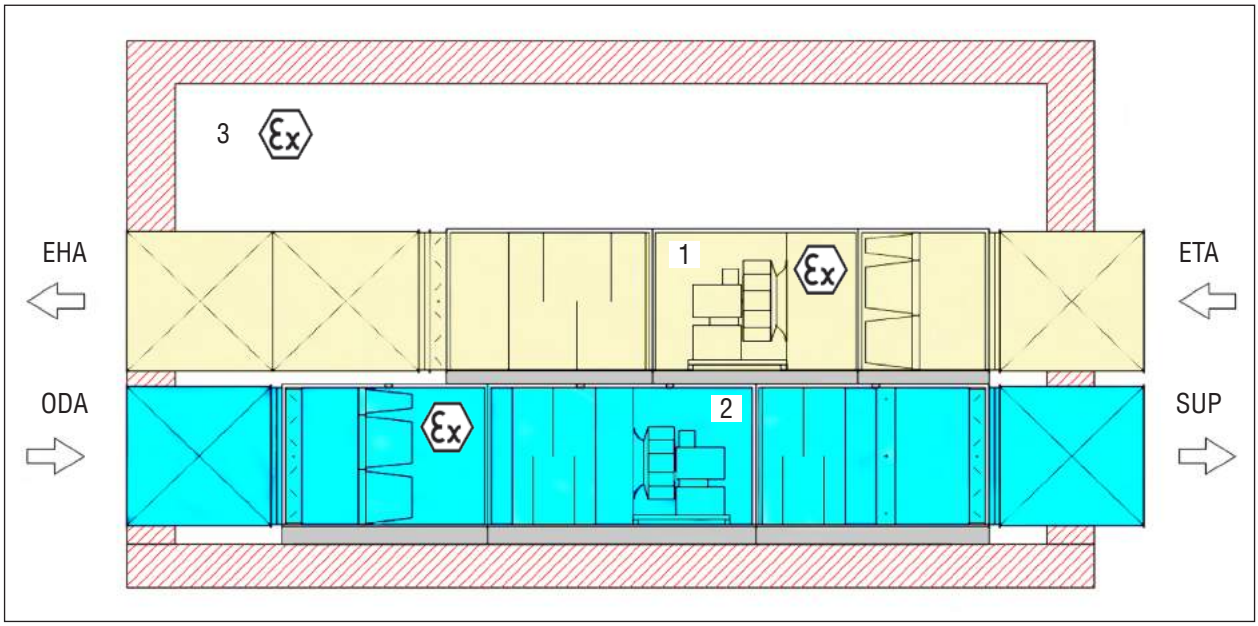


Fig. 3 ATEX zones on/in an air handling unit

1	ATEX zone inside the air handling unit extract air
2	ATEX zone inside the air handling unit supply air
3	ATEX zone outside the air handling unit/at the installation site

Depending on the requirements of the air handling unit, one or more ATEX zones may be present. These can occur both inside and outside the air handling unit.

A backflow during standstill times is always to be avoided. This can be achieved by on-site, air-tight dampers (DIN 1946 T4) in the air lines.

Units with different ATEX zones:

For air handling units, the ATEX zones inside the unit as well as outside the unit must always be considered:

- ATEX zone inside: inside the unit (medium)
- ATEX zones outside: outside the unit (installation in an ATEX zone/zone carryover)

ATTENTION

The ventilation and extraction of the installation room (technical room) must be considered and planned on-site.

3.1 Functional description

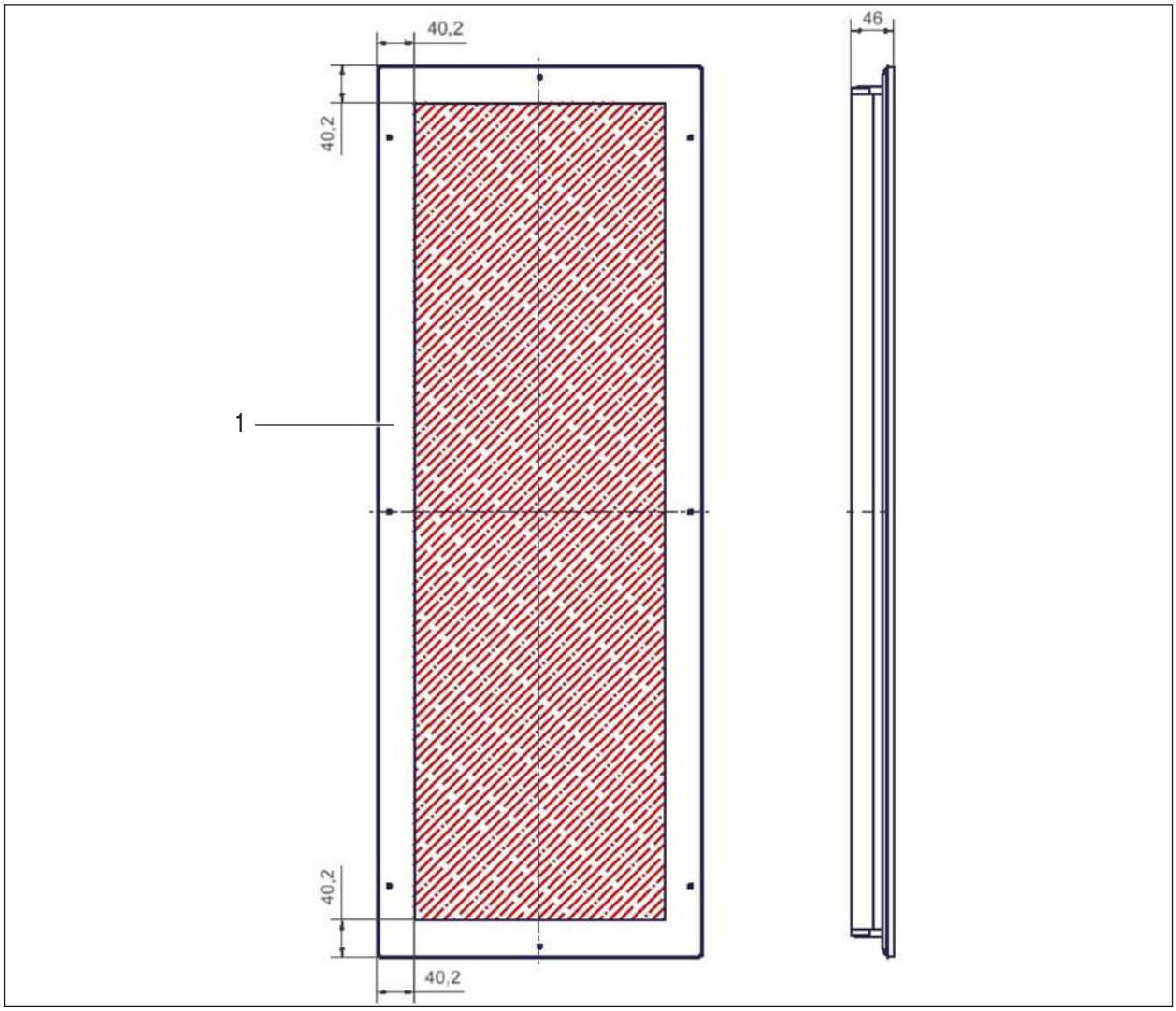
- Central ventilation and air handling units in the AT4F ATEX Series are highly efficient air handling units.
- The AT4F ATEX Series is used in many areas of human air conditioning, industrial applications, chemicals/pharmaceuticals, marine, hygiene, swimming pools, recreational facilities and many other sectors, as well as in the modernisation of old existing installations using highly efficient, state-of-the-art heat recovery and energy saving technologies.
- The sound emissions from the AT4F ATEX Series are minimised by an ingenious housing design and an optimised component layout tailored to the respective, intended use, and through the use of fan and drive units with highly efficient vibration isolation.
- The internally smooth housing design guarantees easy and fast unit cleaning of the units and compliance with the hygiene requirements.
- On request, the air handling units can also be supplied with control and/or cooling technology, incl. wiring and installation of the field devices and sensors.

3.2 Technical data

ATTENTION

Read the documentation provided. There information on the technical and electrical data can be found.

3.2.1 Area for on-site connections/bushings



1	Exterior view

ATTENTION

Holes for connections/bushings may only be inserted in the cross-hatched area. Non-compliance leads to constructional damage to the panel.

Cable glands must be suitable for the required ATEX marking.

3.3 Sample AT4F ATEX type plates

Each functional unit is assigned a separate type plate. The type plates contain the order number, position details, year of manufacture, manufacturer's data as well as the design data. These type plates are externally attached to the unit.

Type plate

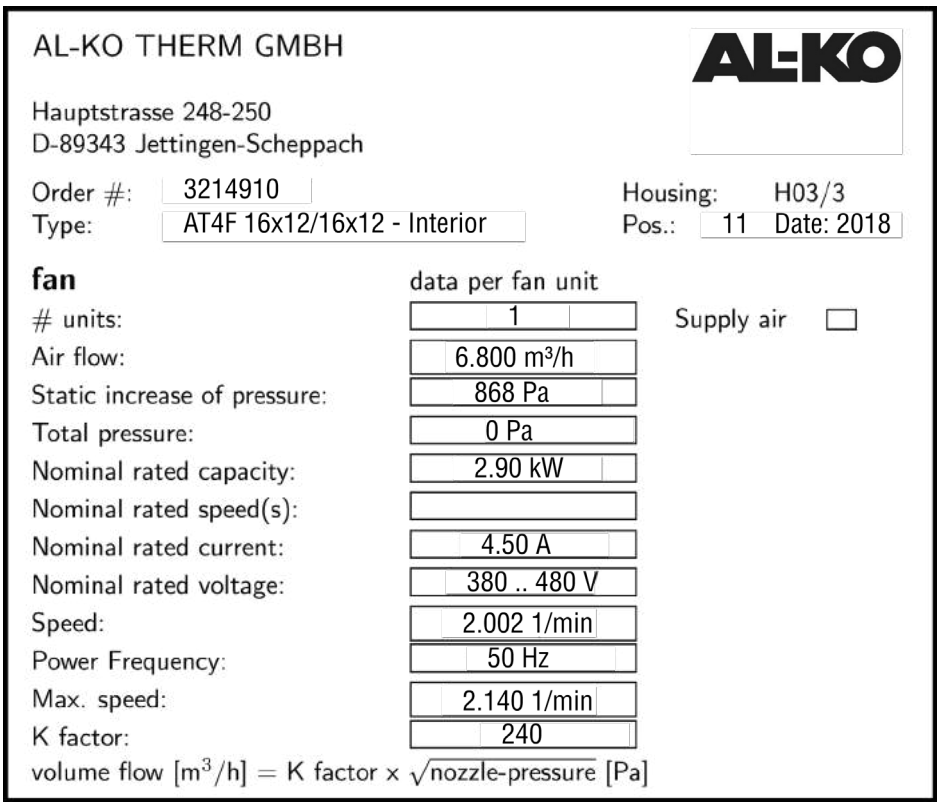


Fig. 4 Example of a type plate

3.3.1 ATEX type plate

The respective valid ATEX marking can be obtained both from the ATEX type plate on the air handling unit and from the EU Declaration of Conformity in accordance with the ATEX Directive 2014/34/EU.

This table explains the relationship between zones, unit category and the equipment protection level (EPL):

EN 60079-10-1; EN 60079-10-2	EU Directive 2014/34/EU		EN 60079-0	
Zones	**Equipment group**	**Unit category**	**Group**	**EPL**
1	II	2G	II	Gb
2		3G		Gc
21		2D	III	Db
22		3D		Dc

Zone 1	Area in which an explosive gas atmosphere can be expected to occur periodically or occasionally during normal operation.
Zone 2	Area in which an explosive gas atmosphere is not expected to occur during normal operation. If it does occur, then it is only of short duration.
Zone 21	Location at which an explosive dust atmosphere in the form of a cloud of dust in the air occasionally occurs during normal operation.
Zone 22	Area in which it is unlikely that an explosive dust atmosphere in the form of a cloud of combustible dust in air will occur when operated as intended. If it does occur, however, it is only for a short period of time.

In the event of deviations from the ATEX standard temperature version, this must be specially marked.

Marking at special temperatures

Unit	Air/ambient temperature during operation	Additional marking
Normal	Maximum: +40 °C Minimum: -20 °C	None
Special	According to the manufacturer and specified in the operating instructions	Ta or Tamb together with the special area, e.g. "0 °C ≤ Ta ≤ 60 °C" or the "X" symbol

3.3.1.1 ATEX type plate gas

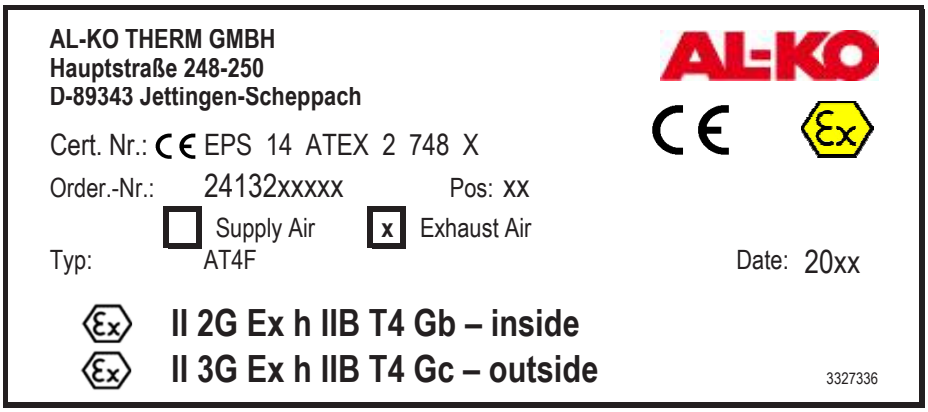


Fig. 5 Example for ATEX type plate zone 1 inside/zone 2 outside

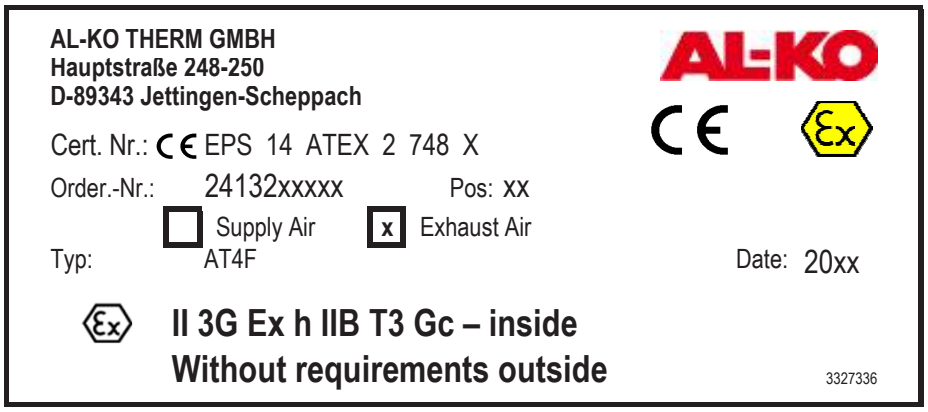


Fig. 6 ATEX type plate zone 2 inside/without requirements outside

Examples for Gas ATEX marking

Guideline part			Standard part				
II	3G	Ex	h	IIB	T4	Gc	
1	2	3|4	5	6	7	8	9

Guideline part			Standard part				
II	2G	Ex	h	IIB+H2	T4	Gb	
1	2	3|4	5	6	7	8	9

Only the ATEX versions are explained, which are also designed as an air handling unit.

1	Ex symbol		Marking of explosion protection
2	Equipment group	II	The unit may be used in potentially explosive atmosphere with the exception of mining. (Mining I)
3 (4)	Unit category	2G; 3G	The unit category indicates how often and for how long an explosive atmosphere is present and this determines the necessary level of safety to be ensured. (G= Gas)
		2G	In the case of unit category 2G, it is to be expected that an explosive gas atmosphere can occur periodically or occasionally in normal operation.
		3G	In the case of unit category 3G, it is not to be expected that an explosive gas atmosphere occurs during normal operation. If it does occur, then it is only of short duration.
5	Ex symbol	Ex	Ex symbol (ATEX version)
6	Type of protection	h	Type of protection for non-electrical units. It is not a type of ignition protection combining multiple individual types of ignition protection, such as "c" constructive safety or "k" liquid encapsulation, etc.
7	Explosion group/ Units in group II	IIA, IIB, IIB+H2	Classification into explosion groups/groups for gases, subdivided into groups IIA, IIB and IIC according to the standard gap width (NSW) and/or the minimum ignition current ratio (MIC ratio). The ignition sensitivity increases from group IIA to IIC. In Germany, this group is also often referred to as an explosion group or gas explosion group.
		IIA	typical gas is propane
		IIB	typical gas is ethylene Units marked with IIB also meet the requirements of IIA.
		IIB+H2	IIB expanded by the gas hydrogen Units marked IIB+H2 meet both IIB and IIA requirements.
8	temperature class	T1; T2; T3; T4	Specifies the maximum permissible surface temperature of all components in relation to the explosive gas atmosphere specified for the intended use. (Attention: Does not refer to the medium temperatures of the air to be transported.) The classification takes place in the temperature classes T1, T2, T3, T4, T5 and T6, the sensitivity of the temperature classes increases from T1 to T6.
		T1	≤ 450 °C
		T2	≤ 300 °C; units of temperature class T2 also meet the requirements of temperature class T1
		T3	≤ 200 °C; units of temperature class T3 also meet the requirements of temperature classes T2 and T1
		T4	≤ 135 °C; units of temperature class T4 also meet the requirements of temperature classes T3, T2 and T1
9	Equipment protection level	Gb; Gc	Equipment Protection Level (EPL)
		Gb	Unit with "high" level of protection ensures a high degree of safety
		Gc	Unit with "extended" level of protection ensures a normal level of safety

3.3.1.2 ATEX type plate dust

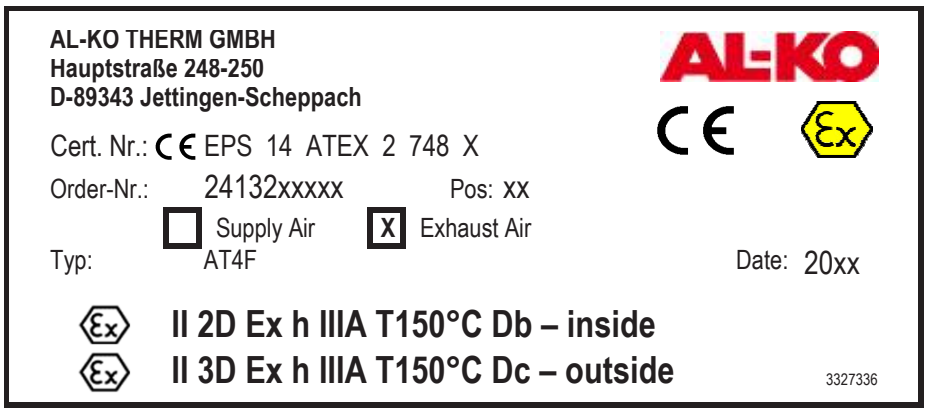


Fig. 7 ATEX type plate zone 21 inside/zone 22 outside

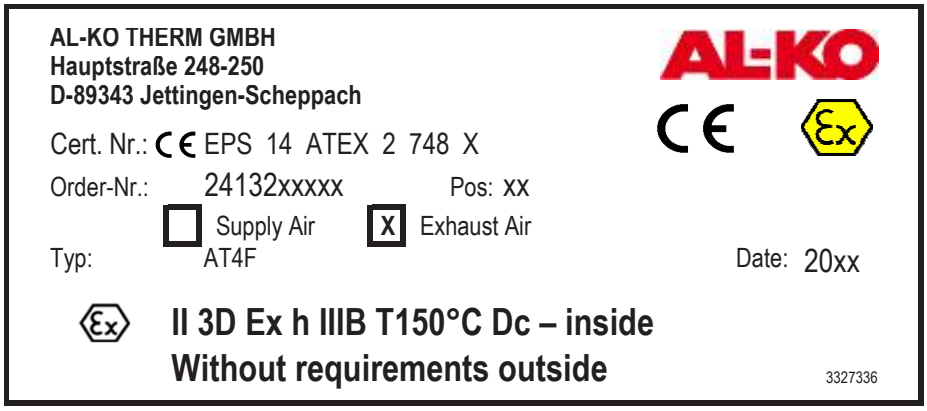


Fig. 8 ATEX type plate zone 22 inside/without requirements outside

Examples for Dust ATEX marking

Guideline part			Standard part				
Ex	II	3D	Ex	h	IIIB	T135°C	Db
1	2	3|4	5	6	7	8	9

Only the ATEX versions are explained, which are also designed as an air handling unit.

1	Ex symbol		Marking of explosion protection
2	Equipment group	II	The unit may be used in potentially explosive atmosphere with the exception of mining. (Mining I)
3 (4)	Unit category	2D; 3D	The unit category indicates how often and for how long an explosive atmosphere is present and this determines the necessary level of safety to be ensured. (D= Dust)
		2D	In the case of unit category 2D, it is to be expected that an explosive dust atmosphere can occur periodically or occasionally in normal operation.
		3D	In the case of unit category 3D, it is not to be expected that an explosive dust atmosphere occurs during normal operation. If it does occur, then it is only of short duration.
5	Ex symbol	Ex	Ex symbol (ATEX version)
6	Type of protection	h	Type of protection for non-electrical units. It is not a type of ignition protection combining multiple individual types of ignition protection, such as "c" constructive safety or "k" liquid encapsulation, etc.
7	Dust group/ units in group III	IIIA, IIIB	Classification into dust groups/groups for dusts, subdivided into groups IIIA, IIB. In Germany, this group is also often referred to as an explosion group or dust explosion group.
		IIIA	Suitable for flammable suspended matter, lint
		IIIB	non-conductive dust Units marked with IIIB also meet the requirements of IIIA.
8	Temperature in °C	T160°C; Txxx°C	Specifies the maximum permissible surface temperature of all components. (Attention: Does not refer to the medium temperatures of the air to be transported.) In the case of dusts, a safety distance between the surface temperature and the ignition point must be observed, which is why the maximum permissible surface temperature is given in °C. This permissible surface temperature must be determined specifically in the respective cases of dust or dust mixtures. The GESTIS-STAUB-EX, for example, also serves as a basis for substance databases.
9	Equipment protection level	Db; Dc	Equipment Protection Level (EPL)
		Db	Unit with "high" level of protection ensures a high degree of safety
		Dc	Unit with "extended" level of protection ensures a normal level of safety

4 Delivery, transport, storage

4.1 Delivery

- The unit dimensions are given in mm. Measurements such as AT4F 12x12 or AT4F 16x12 etc. are grid dimensions. 1 grid = 76.5 mm
- The breakdown of the scope of supply is shown in the unit drawing.
- Depending on their size, the AT4F ATEX Series central ventilation and air handling units are delivered either partially disassembled, fully disassembled or fully assembled or as components bolted to square transport timbers according to the breakdown of the scope of supply.
- With the disassembled, partially disassembled or disassemblable AT4F ATEX unit version, an AL-KO straightener is required.

⚠ WARNING

Risk of explosion due to electrostatic discharge.

Unpacking (foil) can produce electrostatic charges, causing ignitable sparks. This can lead to an explosion.

- Unpack the unit during ATEX zone clearance.

4.2 Transport

⚠ WARNING

Danger of death - Suspended loads.

For crane transport, all valid safety conditions according to DGUV regulation 52 Cranes and DGUV Control unit 100-500 chapter 2.8 must be observed.

- Do not walk under suspended loads.
- Use the specified attachment and mounting points.
- Observe the weight specifications.
- Only use suitable lifting equipment.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

⚠ CAUTION

Risk of injury due to the module tilting or tipping over.

Failure to observe the safety instructions, standards, directives and regulations leads to a risk of injury due to the AT4F ATEX unit tipping over.

- Observe the applicable standards, directives and regulations.
- Observe the instructions in these operating and assembly instructions.
- Use the specified attachment and mounting points.
- Observe the weight specifications.
- Only work on on-site surfaces that are suitable for installation preparations and lifting.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

NOTE

Any paint damage that occurs during transport can be rectified with a touch-up pen.

A touch-up pen can be ordered from AL-KO THERM if necessary.

ATTENTION

- Uniform lifting of the unit components must be ensured.
- Transport is only permitted using the attachment points given below.
- Only approved lifting equipment with a sufficient load capacity may be used.
- The lifting equipment must be in perfect condition.
- The lifting gear must be inspected for load-bearing capacity and damage before use.
- The protruding drip edges on AT4F ATEX units in the weatherproof version must be protected by additional measures (e.g. spreader beams or spacers) during crane transport.
- Secure the load during transport.
- Use only suitable transport locks.
- If the maximum weights to be lifted are exceeded (per person), plan for a second person to help.
- The individual components of the installation may only be moved with the transport equipment provided for this purpose.
- Use only suitable transport devices and suitable industrial trucks.
- Maintenance doors must be kept closed at all times during transport.

- Ensure sufficient visibility during transport (accompanying persons, if necessary).
- No persons must be allowed to remain in the transport area.
- The unit must only be transported by trained and qualified personnel and in observance of the safety aspects.
- If transport devices are used that require a driving licence, the personnel operating these devices must have an applicable, valid driving licence for this.
- During transport, observe the instructions in these operating and assembly instructions and the relevant regulations on occupational safety and environmental protection.
- Transport the unit only when upright and secure the unit to prevent tipping and slipping.
- Avoid distorting the housing or other damage.
- Damage that results from improper packaging and transport are at the expense of the initiator.
- As described in chapter "4.2 Transport" on page 26, the unit can be transported using a forklift or a crane.
- The AT4F ATEX unit is only to be transported, lifted and set up within the temperature usage limits (-20 °C to +40 °C).

4.2.1 Transport under challenging conditions

When transporting under aggravated conditions (e.g. on open vehicles, under unusual vibration stresses, transport by sea or in subtropical countries), additional packaging must be used that will protect the unit from these particular influences.

4.2.2 Fork-lift truck/pallet truck

The AT4F ATEX unit is supplied on squared timbers.

ATTENTION

- Always place the lifting forks of the forklift on the squared timbers.
- Pay attention to any protrusions (e.g. floor drains).

- Before lifting the units, close the inspection doors/inspection covers.
- Suitable fork lengths must be used to prevent damaging the unit.
- Use suitable wood intermediate layers.

4.2.3 Crane transport

All AT4F ATEX units have a crane transport option as standard. A distinction is drawn here between transport tube, shackle, base frame bracket or crane eyelet. The transport openings are sealed with covering caps when the units are delivered.

⚠ WARNING

Danger of death - Suspended loads and crane transport!

Observe the local and legal regulations and the rules of the professional associations.

- Do not walk under suspended loads.
- Do not work under suspended loads.
- Use the specified attachment and mounting points.
- Observe the weight specifications.
- Use suitable lifting equipment.
- Only use suitable industrial trucks and lifting equipment (crane).
- Only use suitable positioning tools.
- Attach suitable load securing equipment before lifting the load.
- Wear personal protective equipment.

4.2.3.1 Crane transport using transport tube

Transporting the unit using the transport tube is permissible up to a width of 49 grids and max. 2000 kg.

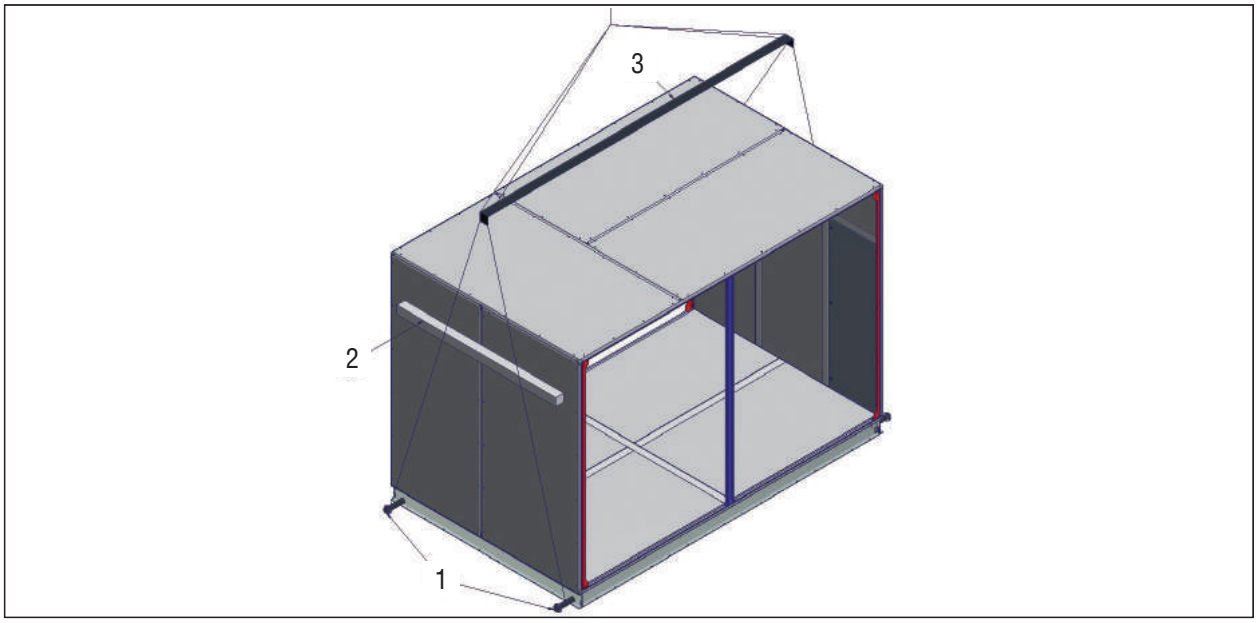


Fig. 9 Crane transport using transport tube

1	Transport tube with tube lock	3	Spreader beam (on-site)
2	Spacer (on-site)		

- Remove the covering caps.
- Slide the transport tubes (special accessories: 11/2" tubes conforming to DIN EN 10255) through the transport openings in the base frame and secure with the tube lock (lock pin with washer).
- Use lifting equipment the complies with the regulations.
- Fasten the slings (ropes, chains, lifting straps) to the transport tubes projecting out at the sides (protrusion on both sides at least 200 mm).
- With narrow and high unit components, ensure that tipping over of the component during transport is prevented.
- After transport, the transport openings are to be sealed with the covering caps.

Unit width (overall) in grid	Unit width (external)	Length (transport tube)	Projection of transport tube on each side
08	688.5 mm	1100 mm	200 mm
12	994.5 mm	1400 mm	
16	1300.5 mm	1700 mm	
20	1606.5 mm	2000 mm	
24	1912.5 mm	2300 mm	
28	2218.5 mm	2600 mm	
32	2524.5 mm	2900 mm	
41	3213 mm	3600 mm	
49	3825 mm	4200 mm	

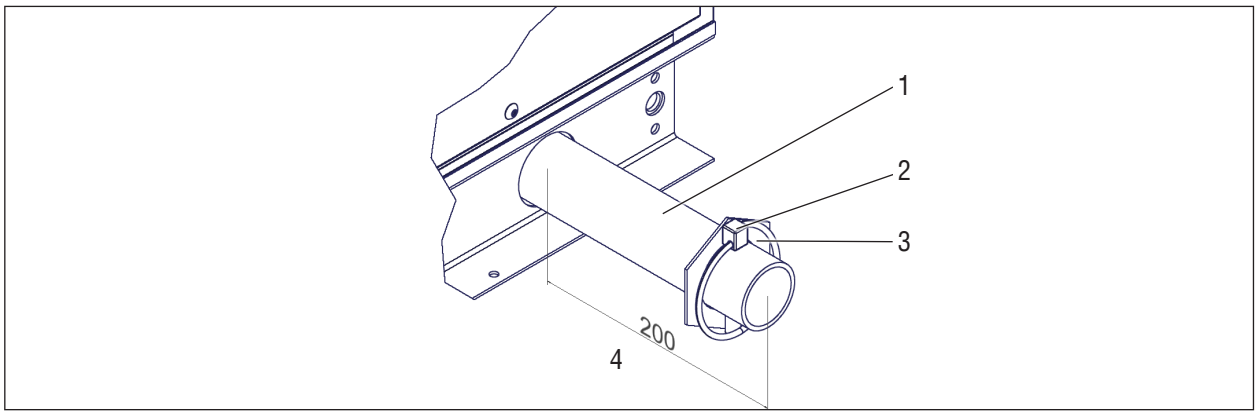


Fig. 10 Transport tube

1	Transport tube	3	Lock washer
2	Lock bolt	4	Projection of transport tube (200 mm)

4.2.3.2 Crane transport using shackle

Max. width for unit transport with shackle	Max. permissible weight of the individual components
49 grid	2500 kg

- With AT4F ATEX units, the shackle is screwed into the borehole in the base frame.
- Transport is only permitted using a spreader beam to protect the unit.
- With AT4F ATEX units in the weatherproof version, a tension plate is fitted on the fronts of the units to protect the drip edges. The shackle is then screwed into the hole in this plate. The projecting drip edges must be protected during crane transport with additional measures (e.g. on-site spreader beams or spacers).

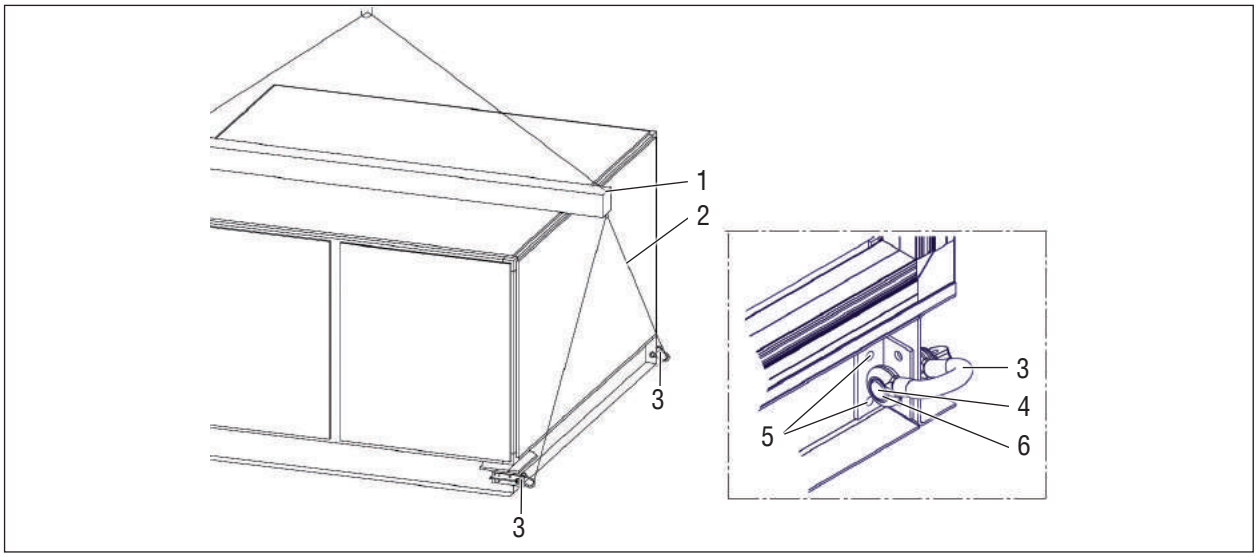


Fig. 11 Transport using shackle

1	Spreader beam (on-site)	4	Screw M12 x 30
2	Traction ropes (on-site)	5	Drilling screw 6.3 x 25
3	Shackle	6	Borehole for shackle

4.2.3.3 Crane transport using a base frame bracket

The AT4F ATEX unit is supplied with a base frame that is suitable for crane transport. Transporting the unit using the base frame bracket is permissible up to an overall weight of max. 1500 kg!

AT4F ATEX units are equipped as standard with a base frame with prefabricated mounting holes for the base frame bracket. Crane transport is also possible in the case of subsequent assembly of these base frame brackets.

⚠ WARNING

Danger of death - Suspended loads and crane transport!

Observe the local and legal regulations and the rules of the professional associations.

- Do not walk under suspended loads.
- Do not work under suspended loads.
- Use the specified attachment and mounting points.
- Observe the weight specifications.
- Only use suitable lifting equipment.
- Only use suitable industrial trucks and lifting equipment (crane).
- Only use suitable positioning tools.
- Attach suitable load securing equipment before lifting the load.
- Wear personal protective equipment.

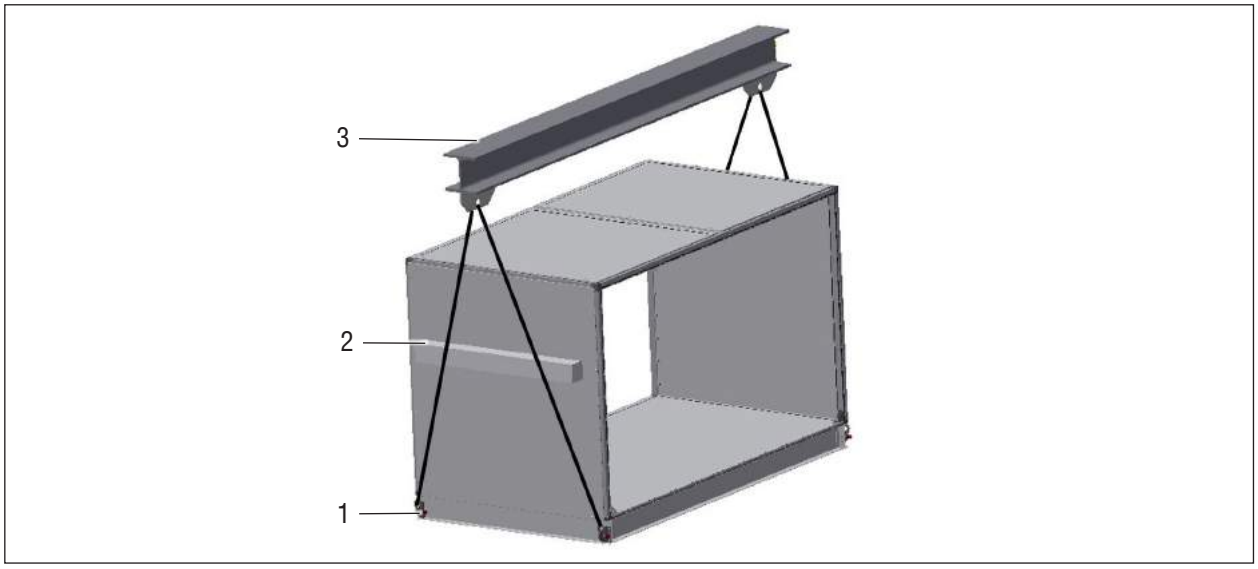


Fig. 12 Transport using a base frame bracket

1	Base frame bracket	3	Spreader beam, chains or slings (on-site)
2	Spacer (on-site)		

- Use lifting equipment that complies with the regulations.
- Secure attachment equipment (ropes, chains, lifting slings) to the base frame brackets protruding from the sides.
- In the case of narrow and high unit components, it is important to ensure that the component is not tilted during transport (additional protection).
- The angle between the two traction ropes, chains or lifting slings may not exceed 60° and the angle between the vertical frame profile and the traction rope, chain or lifting sling may not exceed 30°.

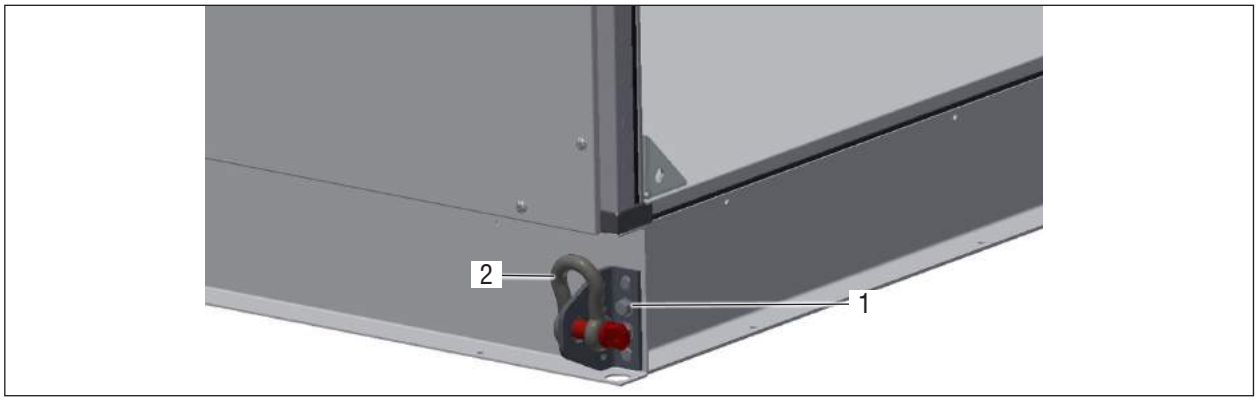


Fig. 13 Base frame bracket with shackle

1	Base frame bracket	2	Shackle (on-site)

Step	Action
1	Before lifting the units, seal the inspection doors/inspection covers.
2	Use only approved and tested transport harnesses to attach them to the intended mounting points.
3	For subsequent crane transport, you must attach the base frame brackets (1) to the base frame. Only use the fastening material supplied by us.

4.2.3.4 Crane transport using crane eyelets

Transporting the unit using crane eyelets is permissible up to a width of 49 grids!

Suspension on crane eyelets	Max. permissible weight of the individual components
Suspension via 4 crane eyelets	1500 kg
Suspension via 4 crane eyelets and additional 2 centre eyelets	2500 kg

Transport with crane eyelets:

- The attached crane and centre eyelets must be used for the transport of all components.
- All crane and centre eyelets on the AT4F ATEX unit must be used and **evenly** loaded! A crane harness (spreader beam and chain hoist) is to be used for 6 suspension options and above!
- An **angle of more than 45° and less than 80°** must be maintained between rope and unit roof.
- On the crane and centre eyelets, a shackle (not supplied) must be attached on-site. To do this, a hole diameter of 22 mm is provided for.
- The crane and centre eyelets must be removed before beginning the unit connection assembly work.
- After removing the crane eyelets, the openings are to be sealed airtight with sealing plugs d = 12 mm (included as accessories).
- Horizontal pulling on the crane eyelets is not permitted.

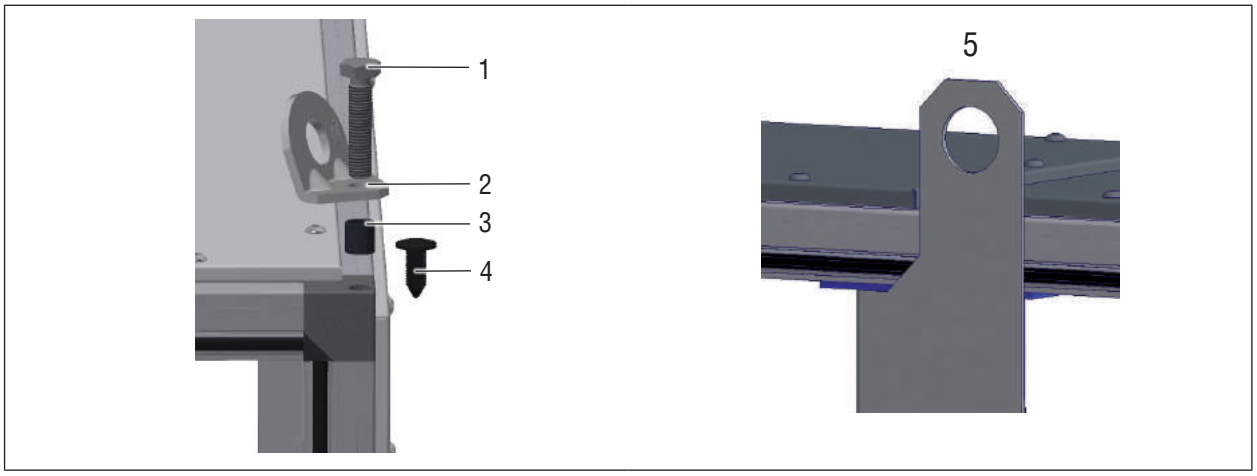


Fig. 14 Crane eyelets

1	Hexagon head bolt M12x80 (min. Strength class 10.9)	4	Sealing plug (insert after removing the crane eyelets)
2	Crane eyelet	5	Centre eyelet (present depending on the roof construction)
3	Bushing		

4.3 Storage prior to assembly

- Store the individual functional parts in a dry and weatherproof location in their original packaging.
- Store the functional parts in the temperature range of -20 °C to +40 °C.
- Cover open pallets with tarpaulins, and protect the functional parts from dirt (e.g. chips, stones, wire, etc.).
- Frequent and, above all, abrupt temperature changes must be avoided during storage. This is especially harmful if moisture is able to form condensation.
- To avoid bearing damage, the fan must be rotated monthly if at a standstill for more than one month.
- For storage periods of more than 1 year, check the ease of movement of the fans' bearings (by turning by hand) before assembly.
- Avoid distorting the housing or other damage during storage.
- Damage resulting from improper packaging and storage are at the expense of the initiator.

4.4 Disposal of packaging

When disposing of the packaging, comply with the relevant local environmental and recycling regulations in your country and community that are applicable at the time when the activity is undertaken.

5 Assembly

5.1 Safety instructions for assembly

⚠ WARNING

Risk of explosion due to electrostatic discharge.

Unpacking (foil) can produce electrostatic charges, causing ignitable sparks. This can lead to an explosion.

- Unpack the unit during ATEX zone clearance.
- During the on-site installation, it must be ensured that the unit connection ensures that all components are and remain connected to the equipotential bonding system. All metallic parts of the unit must be included in the local equipotential bonding measure (potential connection on the unit frame and base frame).
- Only use components that correspond to the required ATEX zone.
- Integrate all components in the equipotential bonding of the unit.
- All on-site duct and pipe insulations in the ATEX zone are electrostatically conductive or electrostatically non-rechargeable.
- Mounting and installation parts that have not been supplied by AL-KO THERM are not part of the EU Declaration of Conformity issued by AL-KO THERM.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

⚠ WARNING

Risk of injury due to impact, cutting or stabbing during assembly/installation of the modules.

- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.
- Electrical connections must only be undertaken by a certified electrician under consideration of the valid DIN and VDE regulations as well as the directives of the local energy supply company.
- Observe the working instructions and these operating and assembly instructions.
- Work with care.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out (cut-proof gloves).
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

⚠ WARNING

Risk of injury and explosion when installing the unit modules on platforms or on the roof.

When assembling the unit modules, the tool/housing material can fall off in the event of careless operation.

Due to the working height, there is a risk of falling.

- Use only suitable industrial trucks and lifting equipment (crane) and suitable positioning aids.
- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.
- Wear personal protective equipment.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

⚠ CAUTION

Risk of crushing the limbs and cutting injuries on sharp edges during assembly/installation of the modules.

- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.
- Use assembly aids when installing the modules and components.
- Work with care.
- Wear personal protective equipment (cut-proof gloves).

ATTENTION

Before installation and commissioning, it is essential to read and observe the operating and assembly instructions.

- The AT4F ATEX unit is supplied with its components pre-assembled. Depending on the size and design of AT4F ATEX unit, this can be supplied in different disassembly conditions.

5.2 Preparations

If no ATEX zone has been defined in the outdoor area, the operator must ensure that the installation room/installation site is adequately ventilated so that no explosive atmosphere can arise due to leaks during normal operation.

DIN EN 60079-10-1/DIN EN 60079-10-2 must be taken into account in the planning for the determination of the necessary air exchange.

During the on-site installation, it must be ensured that the equipotential bonding of all components is and remains guaranteed due to the unit connection. All metallic parts of the unit must be included in the local equipotential bonding measure (potential connection on the base frame).

Fig. 15 Potential connection on the base frame

- Observe the condition of the substrate at the installation site.
- Check the individual components for transport damage.
- Select the installation site with regard to good accessibility for servicing and maintenance work.
- Ensure that the components and the connection cables at the installation site cannot be either damaged or contaminated by oil or other materials.
- Check that fuses, contactors and circuit boards are securely in place in the switch cabinet (optional).
- Secure any loosened assemblies.
- The fresh air intake must be designed in accordance with the applicable standards and should be located away from exhaust air outlets or exhaust openings (kitchen, laundry, etc.).
- If possible, the exhaust air must be discharged via a roof hood away from fresh air inlets, windows, balconies, etc.
- Connect the AC unit and the unit-attached equipotential bonding to the duct system.
- The integration into the equipotential bonding system of individual components in the overall system must be checked and documented using a suitable measuring instrument.

Fig. 16 Potential equalisation mounted on the unit

ATTENTION

Components that come loose during transport can lead to malfunctions or damage.

Maintenance panel

Fig. 17 Connection of the maintenance panel for integration into the equipotential bonding of the unit

When the unit is delivered, the maintenance panels are integrated into the housing potential.

ATTENTION

This equipotential bonding must be restored every time this connection is disconnected, otherwise the installation must not be operated.

Housing cover

Fig. 18 Connection of the housing cover for integration into the equipotential bonding of the unit

When the unit is delivered, the housing covers are integrated into the housing potential.

ATTENTION

Should these connections tear off or have to be loosened due to the disassembled housing cover, these connections must be restored immediately to the equipotential bonding, otherwise the installation must not be operated.

Hand lever

Fig. 19 Attach covering caps to hand lever axes

The hand lever axes are fitted with corresponding covering caps.

ATTENTION

Ensure that these remain on the axes at all times. If the covering caps are lost, they must be replaced immediately, otherwise the installation must not be operated.

5.2.1 Space requirements

- Sufficient space must be available to operate and maintain the AT4F ATEX unit (see VDI 2050 "Requirements on central technical systems").
- In general, it must be ensured during assembly that the AT4F ATEX unit remains freely accessible for maintenance purposes.
- During and installation, in particular of the connecting pipework, it must be ensured that the inspection doors can always be opened and that the swivel range is kept clear.
- According to VDI 6022, the extensibility of system components such as heat exchangers, droplet eliminators, etc., must be guaranteed.
- The installation height of the siphon for condensate drain lines (optional) must be taken into account when setting up the AT4F ATEX unit, see chapter "5.9.3 Condensate drain connection via siphon" on page 71.

5.2.2 Foundation

ATTENTION

The installation site must be designed for the loads of the entire AC unit.

A check by a structural engineer may be necessary.

- The units must be set up on flexurally rigid, horizontal foundations (DIN 18202) or substructures. The foundation can be designed as a full foundation or a strip foundation.
- Unevenness of the substrate must be compensated using appropriate measures (e.g. documents, etc.).
- Particularly in the case of the rotary heat exchanger and the dampers, attention must be paid to a horizontal and distortion-free setup.
- In the case of strip foundations, cross beams must additionally be installed for support at the beginning and end of the unit and at the component separating points that are over 2 m wide.
- The implementation of the foundations must meet the on-site requirements for the acoustics (structure-borne sound insulation underlay) and the professional water drainage of the condensate.
- The unit must be professionally connected to the foundation in accordance with the on-site conditions. Points to be considered here include the wind loads, in particular for weatherproof units.

5.3 Assembly of separated housing

ATTENTION

Before installation and commissioning, it is essential to read and observe the operating and assembly instructions.

- The potential equalisation between the unit components is realised via the unit connections.
- All on-site duct and pipe insulations in the ATEX zone are electrostatically conductive or electrostatically non-rechargeable.
- Integrate the AT4F ATEX unit into the on-site building potential.
- The assembly instructions of the modules can be found in the supplied unit drawing.
- Installation of the AT4F ATEX units starts with the unit component containing the air outlet (duct connection).
- The duct connection must be distortion-free and free of load on the AC unit.

ATTENTION

The installation sequence of the individual unit components can be seen from the order-related drawing and must be adhered to under all circumstances.

ATTENTION

On delivery, the accessories are in the correspondingly marked unit component.

- For vibration absorption, AL-KO THERM recommends that the AT4F ATEX units are underlaid with suitable insulation strips (not included). Observe the specifications from the insulation strip manufacturer.
- Make sure that the natural frequency of the sub-construction is sufficiently far away from the excitation frequency of certain components such as e.g. fans, motors, etc.
- AL-KO THERM recommends placing insulation strips underneath the unit face ends, component separating points and in the longitudinal direction above a component length of approx. 1200 mm.
- To avoid structure-borne noise transmission, AL-KO THERM recommends using elastic nozzles as a connection between the unit and the air duct.

NOTE

To meet the requirements of VDI 6022, all unit separation points must be sealed with microbially inert sealing material in the base area.

ATTENTION

AT4F ATEX units must be levelled to ensure proper function.

The unit frames must be parallel and horizontal to each other under all circumstances.

Do not walk on the upper side of the unit without protection against damage (scaffolding or covers).

Before and after assembly, carefully cover units up to commissioning to avoid damage and soiling.

ATTENTION

When installing downwards (roof opening), all details must be clarified with the factory in advance.

With a weatherproof version, the lightning protection is to be ensured on-site.

According to VDI 3803-1, units for weatherproof installation must not take on any static loading or replace the function of the building roof.

5.3.1 Housing separation point seal for indoor installation

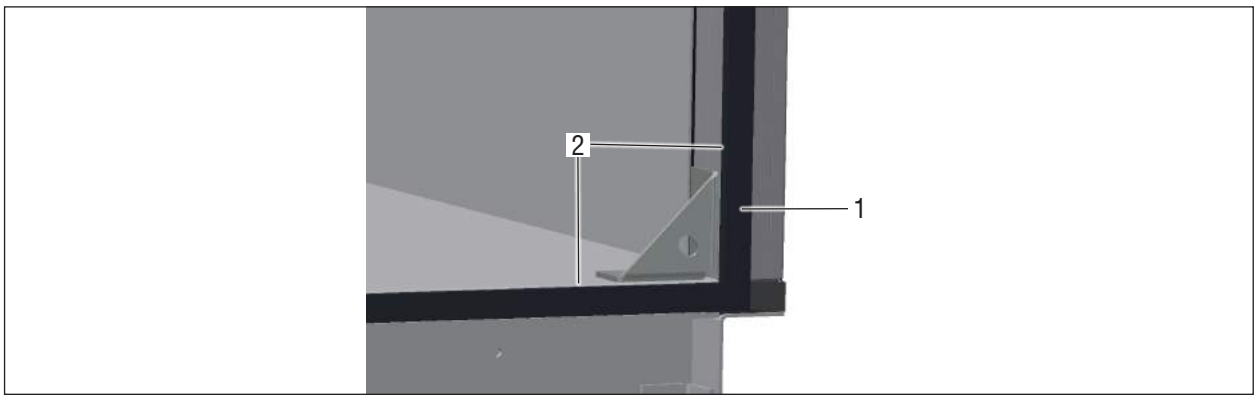


Fig. 20 Sealing of separation points

1	Sealing tape 8 x 15 mm	2	Unit inside edge

Step	Action
1	Stick the supplied sealing tapes (1) to the face ends of the unit components flush with the inner edge of the unit (2).

5.3.2 Housing separation point sealing for outdoor installation (weather-proof)

Also observe the instructions in chapter "5.5 Outdoor installation" on page 47.

- With outdoor installation, an additional sealing strip (3 x 15) must be applied to the housing frame.

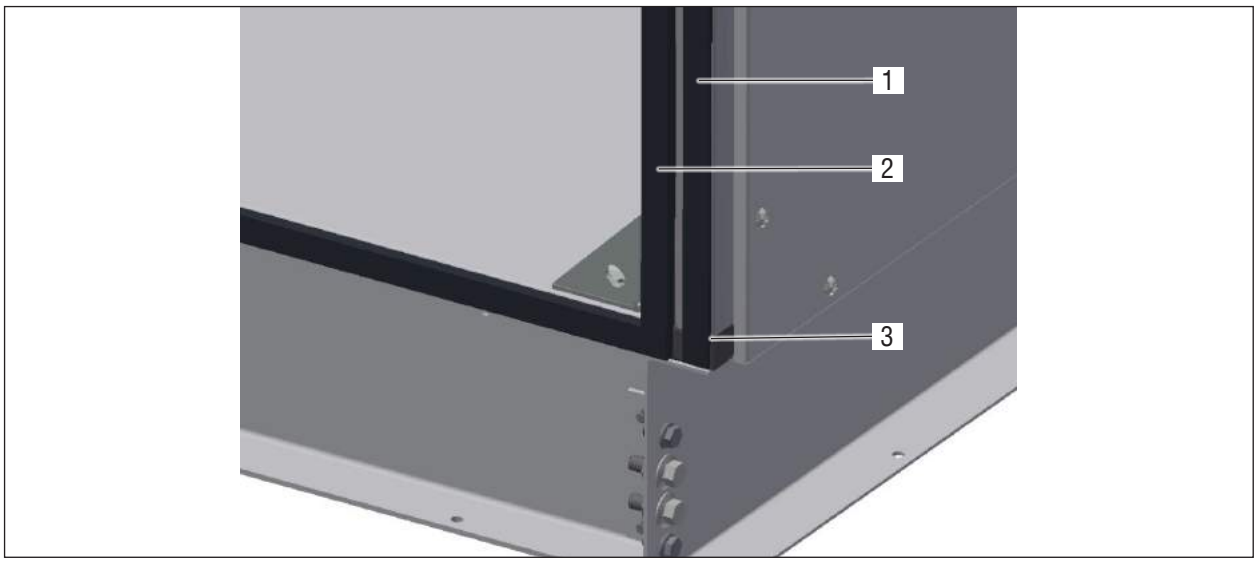


Fig. 21 Separation point sealing with outdoor installation

1	Additional sealing tape 3 x 15	3	Unit outer edge
2	Sealing tape 8 x 15		

Step	Action
1	Attach the additional sealing strip (1) to the left and right of the housing frame, flush with the outer edge of the housing (3).

5.3.3 Inside unit connections with split housing

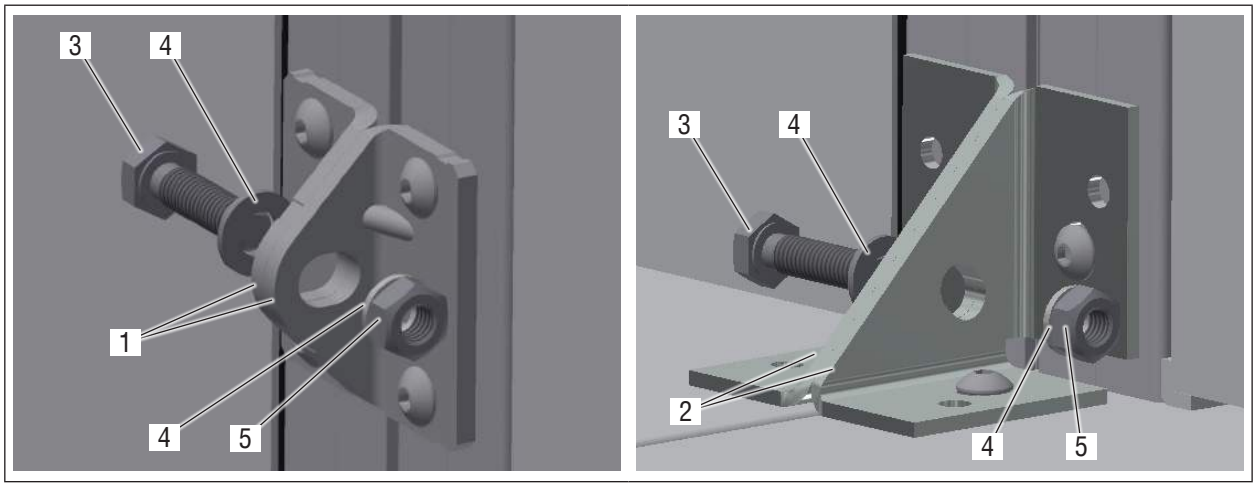


Fig. 22 Unit connections with split housing

1	Unit connections, horizontal/vertical centre	4	Washer
2	Gusset plates	5	Hexagon nut
3	Hexagon head bolt		

ATTENTION

The unit connections are used exclusively to fix the unit in its final position. They must not be used to draw the individual components together.

In the case of units with several housings, the individual housings must be assembled on-site. To do this, proceed as follows:

Step	Action
1	Position the unit modules as close to each other as possible.
2	Align the unit modules in the final housing position.
3	Draw the aligned unit modules together using suitable equipment (e.g. belts). NOTE: The unit connections are used exclusively to fix the final housing position!
4	After pulling the units together, connect them via the unit connections: Insert the hexagon head bolt (3) with washer (4) into unit connections (1) or gusset plates (2) and fix using a washer (4) and hexagon nut (5). During assembly, ensure that the potential equalisation of all components is and remains ensured by the unit connection (gusset plates (2) on the operating side of the housing).
5	With unit versions conforming to VDI 6022, unit separation points are additionally equipped on the inside with microbially inert sealing material.
6	After installing the components, check that they are integrated into the unit potential and document this. All metallic/conductive/discharging parts of the unit must be included in the local equipotential bonding measure.

5.4 Unit connection with unit arrangement one above the other and next to one another

5.4.1 Unit arrangement one above the other

ATTENTION

The unit base frame must be additionally sealed all round with a microbially inert sealing material in the area of the mixing chambers (air-side connection) between upper and lower unit.

ATTENTION

With a length offset between the upper and lower unit components, the base frame cross profile must be screwed onto the housing cover.

For AT4F ATEX units in a weatherproof version, the base frame cross profile must also be properly sealed with a microbially inert sealing material.

Unit arrangement one above the other without length offset

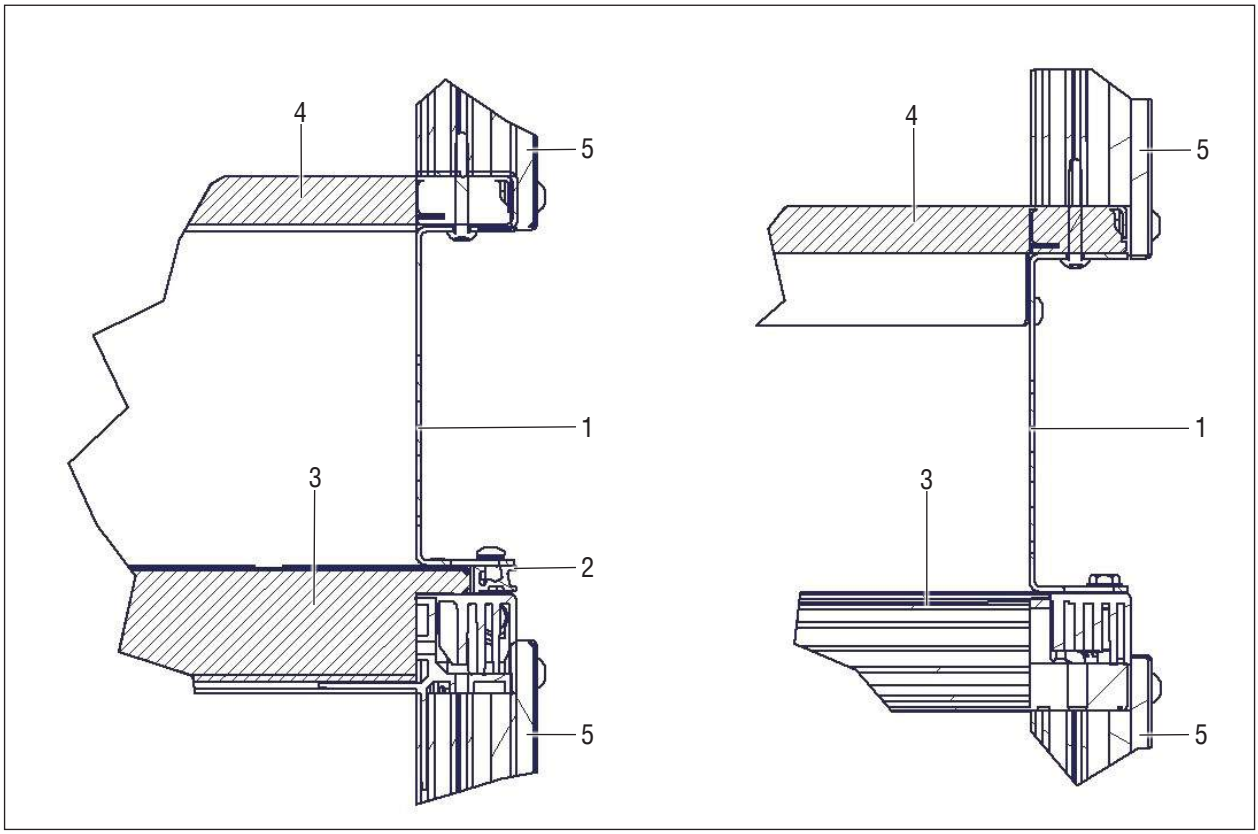


Fig. 23 Unit arrangement roof assembly with unit frame profile (left) and without unit frame profile (right)

1	Base frame	4	Floor (top unit)
2	Base frame compensation profile	5	Panel
3	Roof (lower unit)		

Unit arrangement one above the other with length offset

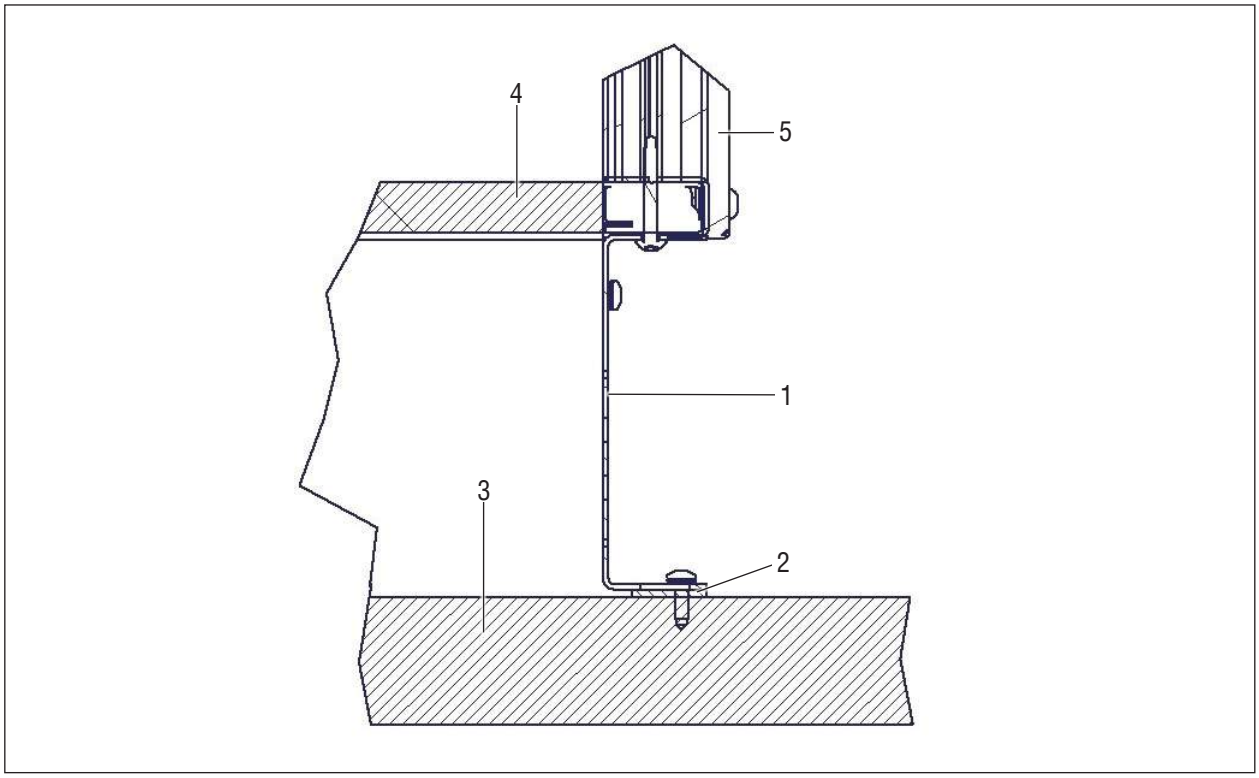


Fig. 24 Unit arrangement one above the other with length offset

1	Base frame	4	Floor (top unit)
2	Microbially inert sealing material (with weatherproof units)	5	Panel
3	Roof (lower unit)		

Step	Action
1	With weatherproof units, install the microbially inert sealing material (2) around the circumference before installing the top unit (4).
2	Place the top unit (4) on the roof of the lower unit (3) using crane transport.
3	Screw the base frame (1) to the roof of the lower unit (3) using drilling screws.

5.4.2 Unit arrangement next to one another

5.4.2.1 Version of floor/roof assembly with unit frame profile

Unit arrangement next to one another without mixing chamber

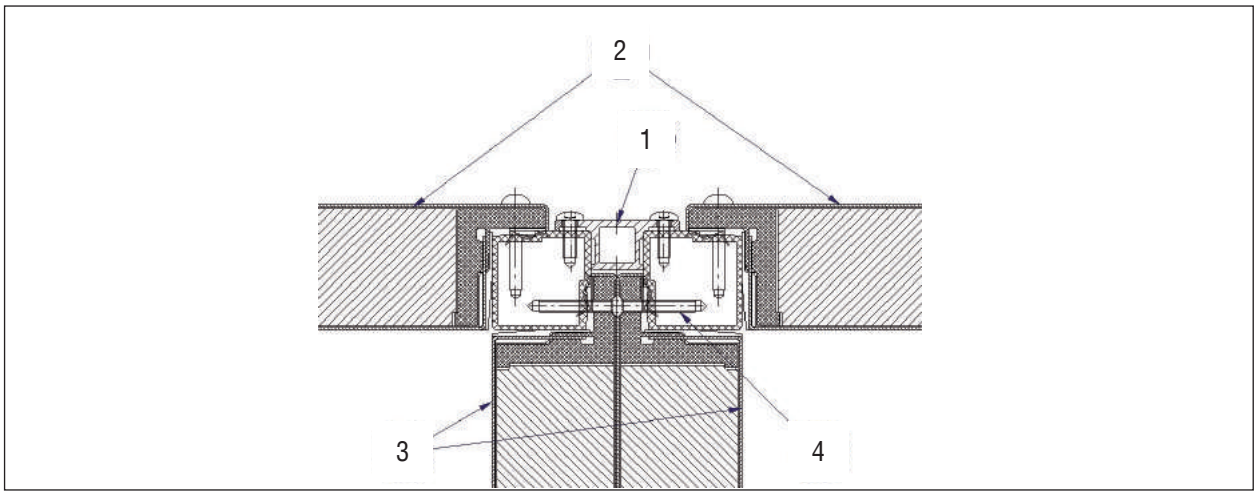


Fig. 25 Unit arrangement next to one another without mixing chamber

1	Spacer rail	3	Panel (side)
2	Panel (roof)	4	Countersunk drilling screw

Unit arrangement next to one another with mixing chamber

ATTENTION

A sealing strip (3) must be adhered around the circumference in addition to the spacer rail in the area of the mixing chambers (air-side connection). This must be tested for leakage following installation.

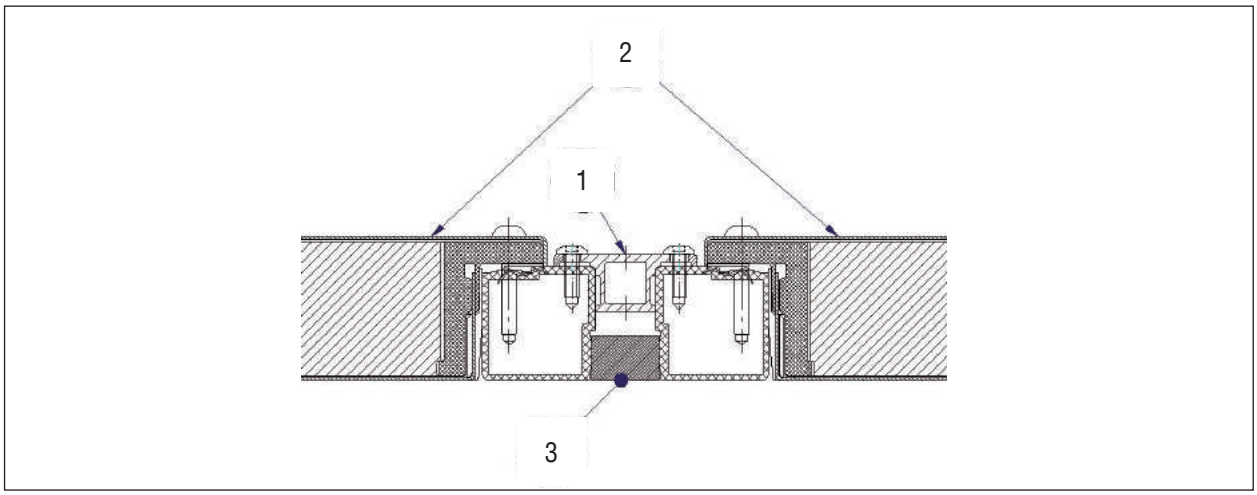


Fig. 26 Unit arrangement next to one another with mixing chamber

1	Spacer rail	3	Sealing strips
2	Panel (roof)		

Step	Action
1	Loosen the bolts on the factory-fitted/loose spacer rail (1).
2	Fit sealing strips (3) to the upper and lower inner frame edges.
3	Set down the unit components next to it using a forklift or crane.
4	Pre-drill the spacer rail and lower it.
5	Fix the spacer rail (1) using the countersunk drilling screws. This allows you to integrate these into the unit potential.
6	After installing the components, check that they are integrated into the unit potential and document this. All metallic/conductive/discharging parts of the unit must be included in the local equipotential bonding measure.

5.4.2.2 Version of floor/roof assembly without unit frame profile

Unit arrangement next to one another without mixing chamber

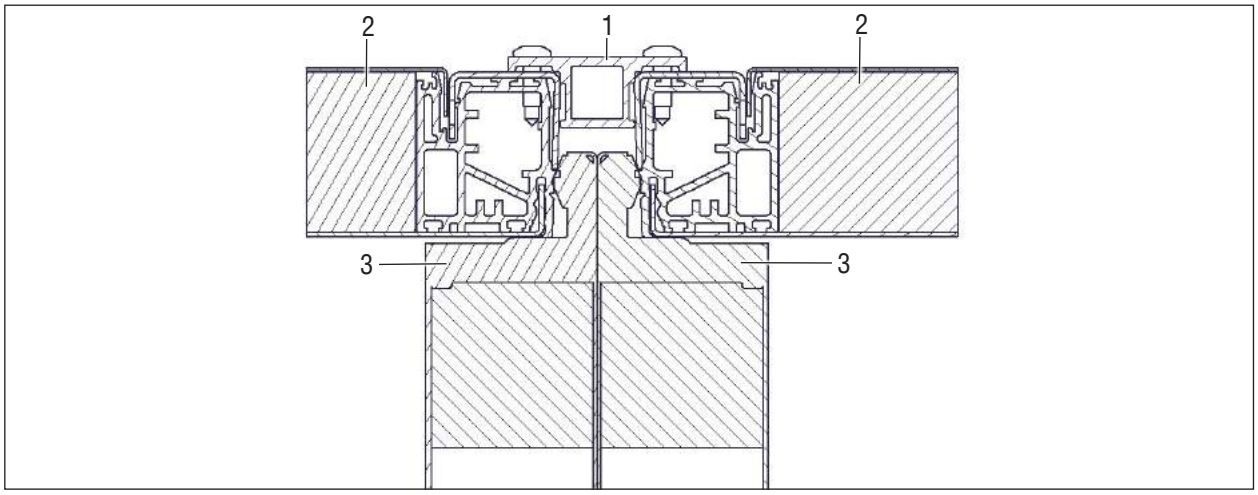


Fig. 27 Unit arrangement next to one another without mixing chamber

1	Spacer rail	3	Panel (side)
2	Panel (roof)		

Unit arrangement next to one another with mixing chamber

ATTENTION

A sealing strip (3) must be adhered around the circumference in addition to the spacer rail in the area of the mixing chambers (air-side connection). This must be tested for leakage following installation.

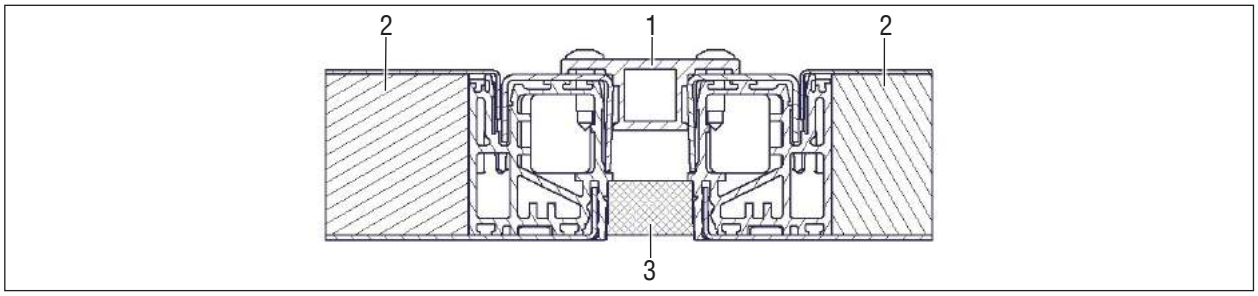


Fig. 28 Unit arrangement next to one another with mixing chamber

1	Spacer rail	3	Sealing strips
2	Panel (roof)		

Step	Action
1	Loosen the bolts on the factory-fitted/loose spacer rail (1).
2	Fit sealing strips (3) to the upper and lower inner frame edges.
3	Set down the unit components next to it using a forklift or crane.
4	Pre-drill the spacer rail and lower it.
5	Fix the spacer rail (1) using countersunk drilling screws. This allows you to integrate these into the unit potential.
6	After installing the components, check that they are integrated into the unit potential and document this. All metallic/conductive/discharging parts of the unit must be included in the local equipotential bonding measure.

Length offset of unit components

ATTENTION

With a length offset between the left and right unit components, the facing bracket must be screwed onto the housing cover.

For AT4F ATEX units in a weatherproof version, the facing bracket must also be sealed with a microbially inert sealing material.

For AT4F ATEX units in a weatherproof version, the supplied screws are additionally equipped with an EPDM sealing washer.

Establish the equipotential bonding via a screw with contact washer.

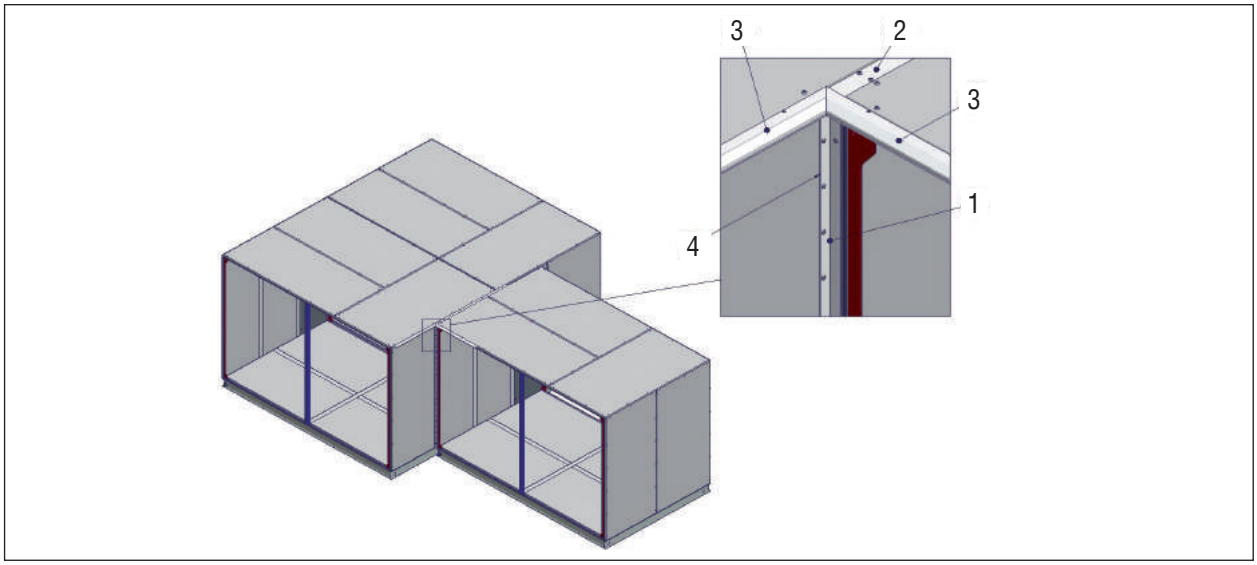


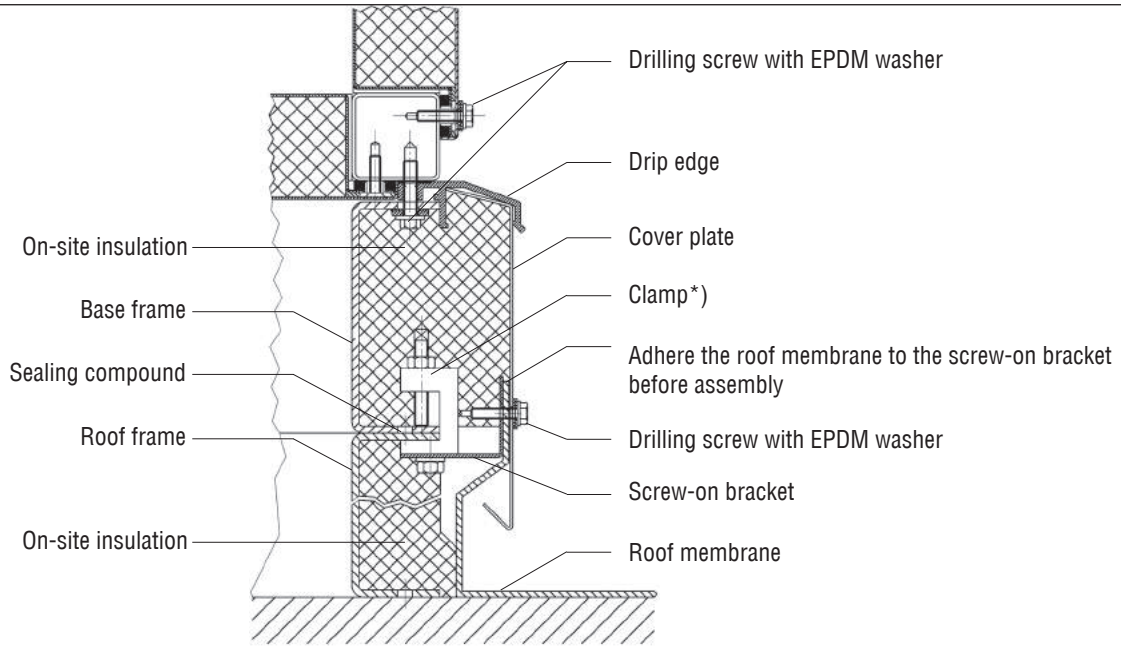
Fig. 29 Unit arrangement next to one another

1	Facing bracket	3	Drip edge (with weatherproof units)
2	Spacer rail	4	Microbially inert sealing material (with weatherproof units)

5.5 Outdoor installation

5.5.1 Roof frame - floor assembly version with unit frame profile

5.5.1.1 Roof frame preassembled on-site



*) Number of clamps per component at least 2 pieces, but max. distance between the clamps 700 mm.

Fig. 30 Roof frame preassembled on-site

Step	Action
1	Place the roof frame onto the foundation.
2	Screw the roof frame to the foundation and tie it into the building potential.
3	Seal the transport openings in the roof frame with the covering caps (if present).
4	Apply the sealing compound to the roof frame.
5	Place the units onto the roof frame via crane transport.
6	Screw the units to the roof frame and integrate the AT4F ATEX unit into the building potential.
7	Seal the transport openings in the base frame with the covering caps (if present).
8	Screw the clamp to the screw-on bracket and then screw onto the roof frame – base frame connection.
9	Attach the on-site insulation in the area of the roof frame and base frame.
10	Pull up the on-site roofing membrane for sealing on the roof frame and glue the raised roofing membrane onto the screw-on bracket. NOTE: If no covering plate is used, the roofing membrane must be pulled up to below the drip edge and glued to it.
11	Hang the covering plate on the drip edge and screw the suspended covering plate to the screw-on bracket (optional accessory). Integrate the cover plate into the unit/building potential.

5.5.1.2 Factory-mounted base frame

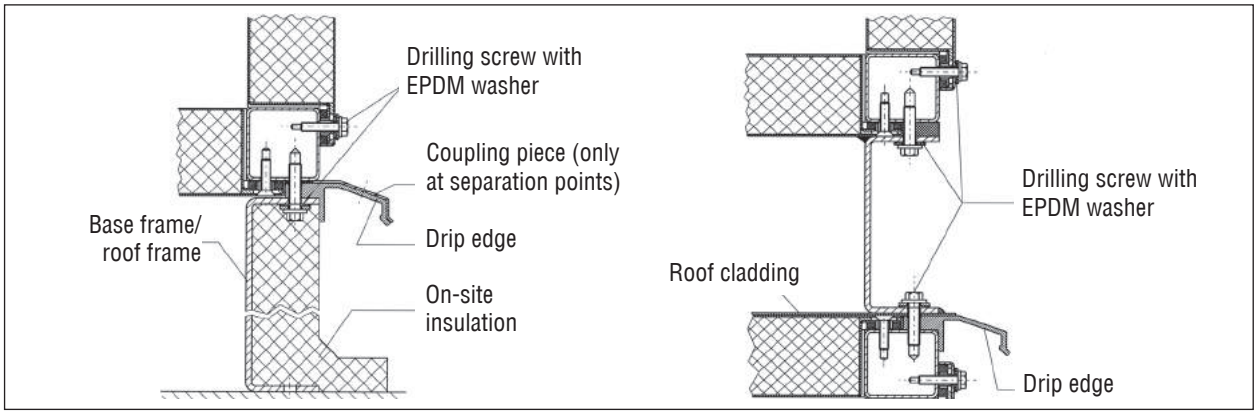


Fig. 31 Factory-mounted base frame

Step	Action
1	Seal the transport openings in the base frame/roof frame with the covering caps.
2	Pull up the on-site roofing membrane for sealing on the base frame/roof frame and glue the raised roofing membrane under the drip edge.
3	With separated modules, position the unit modules as close to each other as possible.
4	Align the unit modules in the final housing position.
5	Draw the aligned unit modules together using suitable equipment (e.g. belts). NOTE: The unit connections are used exclusively to fix the final housing position!
6	Screw the units to one another after pulling together.
7	Seal the unit separation points with microbially inert sealing material.

5.5.2 Roof frame - floor assembly version without unit frame profile

5.5.2.1 Roof frame preassembled on-site

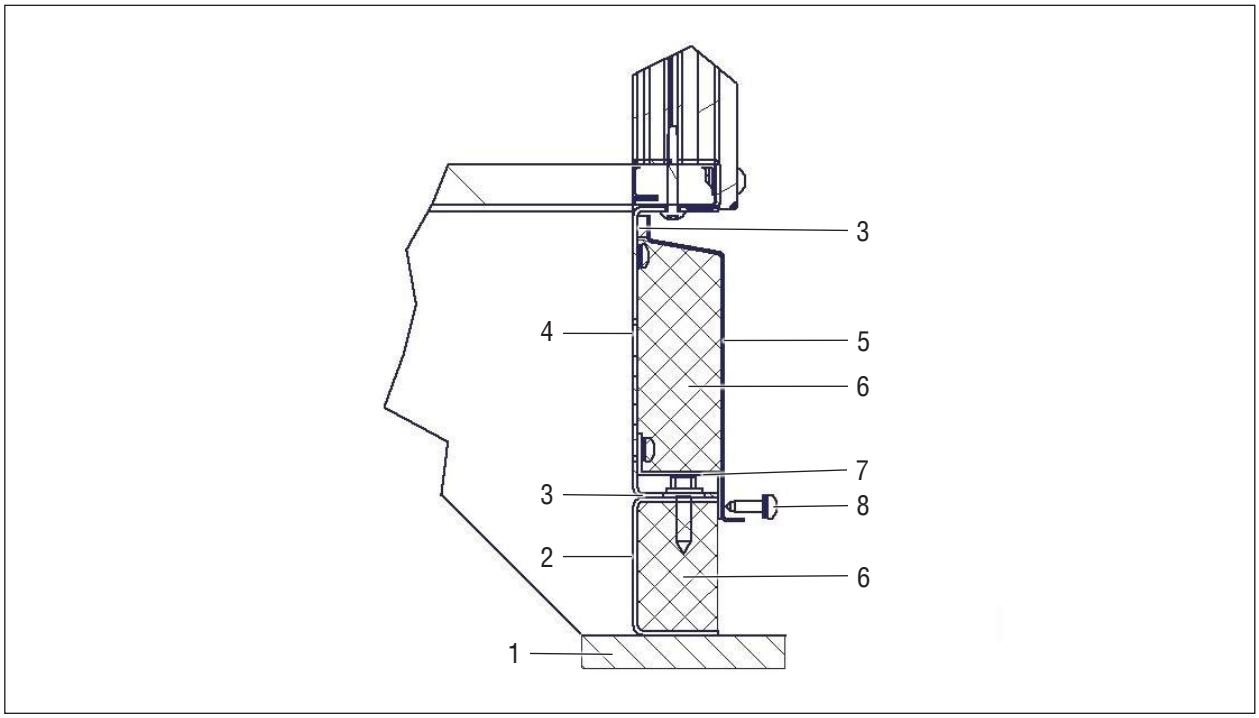


Fig. 32 Roof frame preassembled on-site

1	Foundation	5	Sheet metal apron (on-site installation)
2	Roof frame	6	On-site insulation
3	Sealing compound	7	Z-bracket (on-site installation)
4	Base frame	8	Drilling screw with EPDM washer

Step	Action
1	Place the roof frame (2) onto the foundation (1).
2	Screw the roof frame (2) to the foundation (1) and tie it into the building potential.
3	Apply the sealing compound (3) to the roof frame (2).
4	Place the units onto the roof frame (2) via crane transport.
5	Screw the unit base frame (4) to the roof frame and integrate the AT4F ATEX unit into the building potential.
6	Screw the supplied Z bracket (7) to the base frame (4).
7	Attach the on-site insulation (6) in the area of the roof frame (2) and base frame (4).
8	Pull up the on-site roof membrane for sealing on the roof frame (2) and glue the raised roofing membrane onto the Z bracket (7). NOTE: If no sheet metal apron (5) is used, the roof membrane must be pulled up to below the upper base frame member (4) and glued to it.
9	For the installation of the sheet metal apron (5, optional accessories), apply the sealing compound (3) in advance to the corners of the upper base frame member (4). Then press the upper flange of the sheet metal apron (5) into the sealing compound (3).
10	Screw the sheet metal apron (5) onto the Z bracket (7). To do this, use the drilling screws with the EPDM washer (8). The openings for this are pre-punched. Also integrate the cover plate into the unit/building potential.

5.5.2.2 Factory-mounted base frame

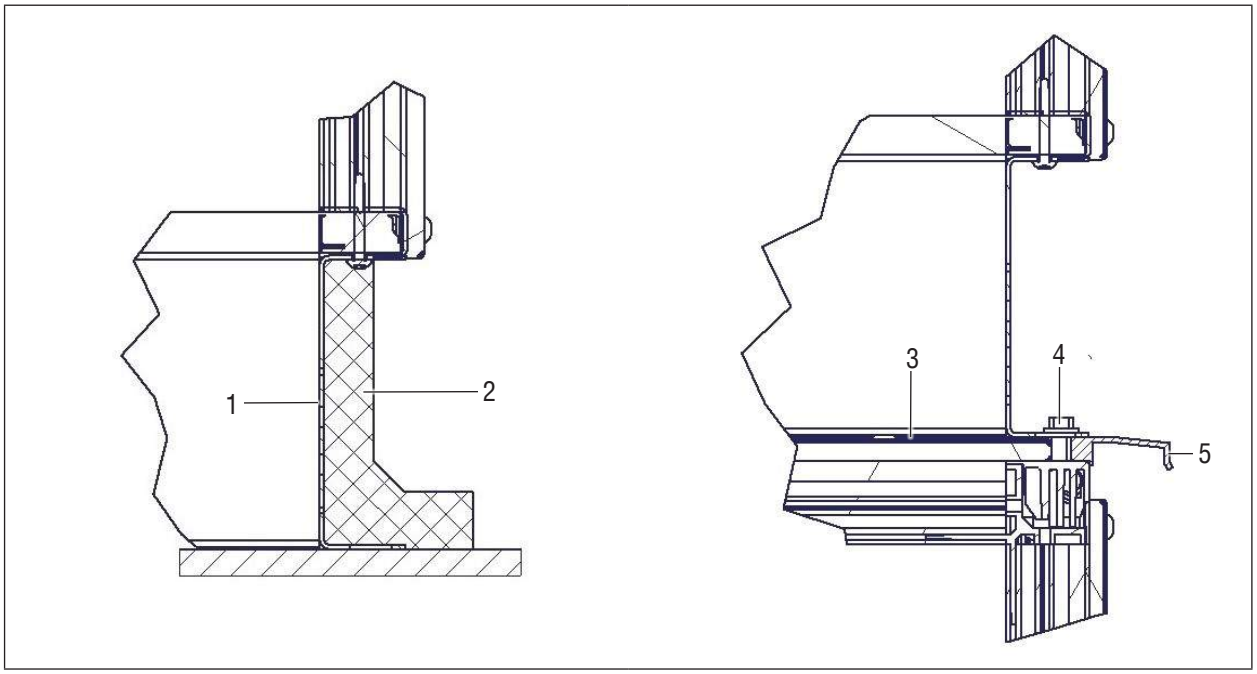


Fig. 33 Factory-mounted base frame, right with units arrangement on top of one another

1	Base frame	4	Drilling screw with EPDM washer
2	On-site insulation	5	Drip edge
3	Roof cladding		

Step	Action
1	With separated modules, position the unit modules as close to each other as possible.
2	Align the unit modules in the final housing position.
3	Draw the aligned unit modules together using suitable equipment (e.g. belts). NOTE: The unit connections are used exclusively to fix the final housing position!
4	Screw the units to one another after pulling together.
5	Seal the unit separation points with microbially inert sealing material.
6	Pull up the on-site roof membrane for sealing into the base frame (1) and glue the raised roofing membrane onto the upper member of the base frame (1).

5.5.2.3 Sealing of the unit separation points with solvent welding agent for weatherproof units

⚠ WARNING

Ignition hazard and risk of explosion due to highly flammable solvent welding agent.

Liquid and vapour of the solvent welding agent are highly flammable.

- Keep ignition sources and naked flame away from the solvent welding agent.
- Observe the safety instructions on the containers. For further information, you can request the current EC safety data sheets from AL-KO THERM.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Ensure that this sealing procedure may be implemented on-site.

⚠ WARNING

Danger to health from inhalation of toxic fumes of the solvent welding agent.

Fumes and liquid of the solvent welding agent cause severe eye irritation.

Inhalation of the fumes may cause drowsiness and light-headedness.

- Use suitable respiratory protection and safety goggles when working with the solvent welding agent.
- Observe the safety instructions on the containers. For further information, you can request the current EC safety data sheets from AL-KO THERM.

⚠ WARNING

Risk of serious injury or death if working without personal protective equipment.

Working on the AT4F ATEX unit without personal protective equipment can result in serious injury or death.

- Observe the safety instructions in this operating and assembly instructions.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

ATTENTION

Welding of the roof membrane must be started immediately after the unit installation to avoid damage.

NOTE

For outside temperatures > 10 °C, the solvent welding agent or hot air dryer can be used. At lower outside temperatures, welding with the hot air dryer is to be used to seal the unit separation points.

Check the housing seal carefully.

Sealing of the roof membrane at the unit separation points

⚠ WARNING

Danger to health from inhalation of toxic fumes of the solvent welding agent.

Fumes and liquid of the solvent welding agent cause severe eye irritation.

Inhalation of the fumes may cause drowsiness and light-headedness.

- Use suitable respiratory protection and safety goggles when working with the solvent welding agent.
- Observe the safety instructions on the containers. For further information, you can request the current EC safety data sheets from AL-KO THERM.

ATTENTION

Welding of the roof membrane must be started immediately after the unit installation to avoid damage.

Unit separation point, straight

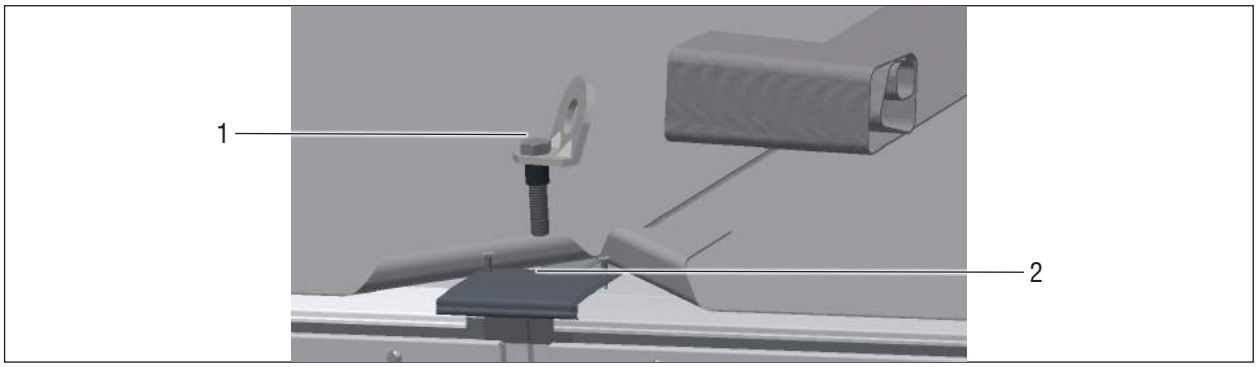


Fig. 34 Unit separation point, straight

1	Crane eyelet	2	Coupling piece fastened with 4.2 screws x 22

Step	Action
1	Check the correct attachment of the seal, see chapter "5.5 Outdoor installation" on page 47.
2	Remove the crane eyelet, if present (1).
3	Clean the unit roof in the unit separation area. The unit separation area must be dust-free and dry.
4	Screw on the coupling piece (2) above the drip edge.

Unit separation point, lateral offset

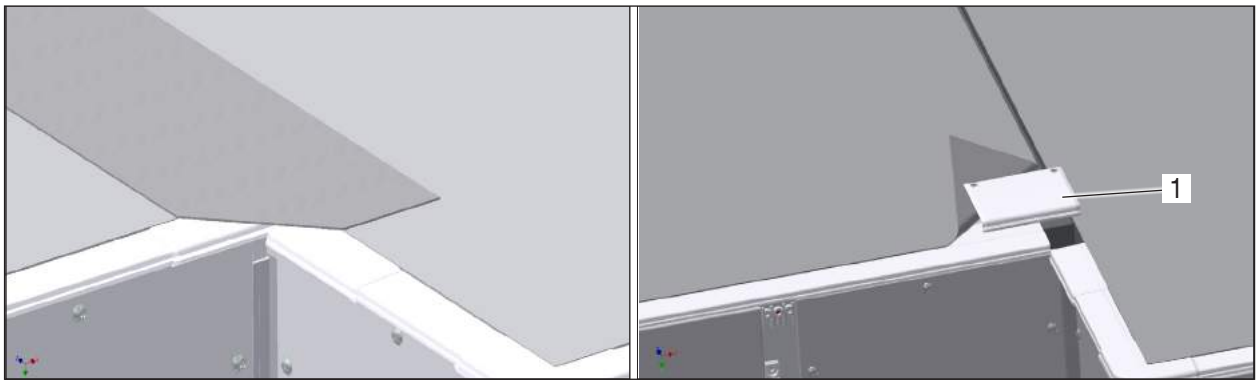


Fig. 35 Unit separation point, lateral offset

1	Coupling piece fastened with 4.2 screws x 22		

Step	Action
1	Screw on the coupling piece (1) above the drip edge.

Sealing of the unit separation points with foil strips

⚠ WARNING

Danger to health from inhalation of toxic fumes of the solvent welding agent

Fumes and liquid of the solvent welding agent cause severe eye irritation.

Inhalation of the fumes may cause drowsiness and light-headedness.

- Use suitable respiratory protection and safety goggles when working with the solvent welding agent.
- Observe the safety instructions on the containers. For further information, you can request the current EC safety data sheets from AL-KO THERM.

ATTENTION

Welding of the foil strips must be started immediately after the unit installation to avoid damage.

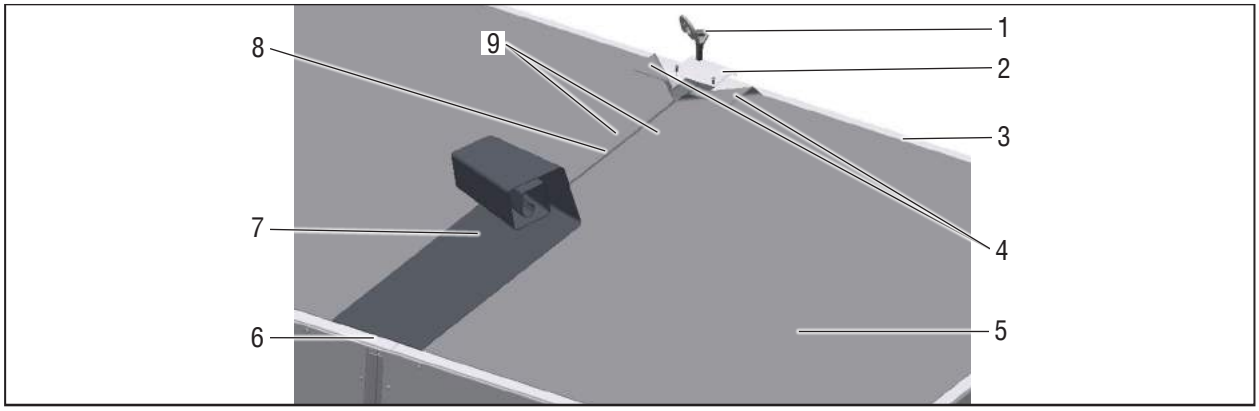


Fig. 36 Sealing of the unit separation points with foil strips

1	Crane eyelet	6	Drip edge coupling piece fitted
2	Drip edge coupling piece (screws 4.2 x 22)	7	Foil strips
3	Drip edge	8	Unit separation line
4	Free roof membrane flaps	9	Solvent welding agent application area
5	Roof membrane		

Step	Action
1	Check that the seal is correctly attached. See chapter "5.5 Outdoor installation" on page 47.
2	Clean the unit roof in the unit separation area using a cloth. The unit separation area must be dust-free and dry.
3	Remove the crane eyelet, if present (1).
4	For units with panel and integrated frame: Screw the drip edge coupling piece (6) to the unit separation point.
5	Clip the coupling piece at the unit separation point under the drip edge.
6	Fold away the free roof membrane flaps (4).
7	Apply the solvent welding agent using the brush in the coupling piece area (2) and in the drip edge area (3) up to the affixed roof membrane (5) to seal on the free roof membrane flaps (4).
8	Press the free roof membrane flaps (4) on securely.
9	Then apply the solvent welding agent again only in the area of the foil strips (7) (depending on the strip width).
10	Then position the foil strips (7) flush with the roof membrane attachment and roll them out.
11	Press down the joints well to avoid wrinkles.

NOTE

For outside temperatures > 10 °C, the solvent welding agent or hot air dryer can be used.
At lower outside temperatures, welding with the hot air dryer is to be used to seal the unit separation points.
Check the housing seal carefully.

Weatherproof units with height offset

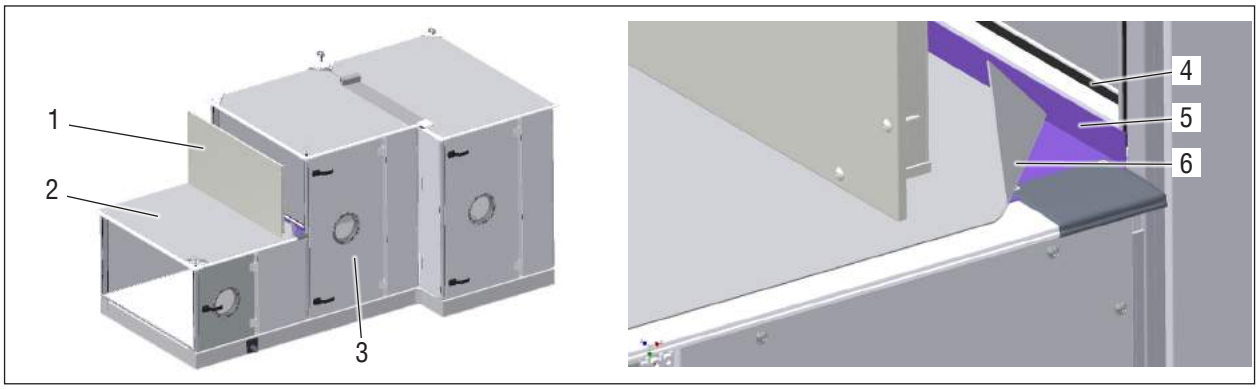


Fig. 37 Weatherproof units with height offset

1	Panel	4	Microbially inert sealing material
2	Lower component	5	Foil bracket
3	Higher component	6	Roof membrane

Fig. 38 Example representation of a contact disc with screw

Step	Action
1	Before placing the components together, unscrew the panel (1) of the higher component (3). To do this, you must first disassemble the equipotential bonding cable in the unit from this panel. The panel is fastened to the outside with bolts and contact washers.
2	Position the lower component (2).
3	Align the components.
4	Screw the components together (see chapter "5.3 Assembly of separated housing" on page 39).
5	Insert the foil bracket (5) under the roof membrane (6) and then onto the component (3).
6	Weld the foil bracket (5) to the roof membrane (6) (see chapter "5.5.2.3 Sealing of the unit separation points with solvent welding agent for weatherproof units" on page 51).
7	Seal the vertical sides and the upper horizontal edge of the foil bracket (5) with microbially inert sealing material (4).
8	Screw the unscrewed panel (1) back on. Ensure that pressure is also applied to the foil bracket (5). Ensure that the cover (1) is screwed back on with the screws and the contact washers. The correct position of the contact washer is critical here.
9	Restore the equipotential bonding of the unit and the cover (1). To do this, use the equipotential bonding cable in the unit and reattach it to the cover (1).
10	Perform a check of the functionality of the potential integration. Confirm the test and store it in the unit documentation.

Weatherproof unit with dual-function unit stacked on top

This arrangement can also occur in units with heat recovery diagonally with plate heat exchanger (WRD).

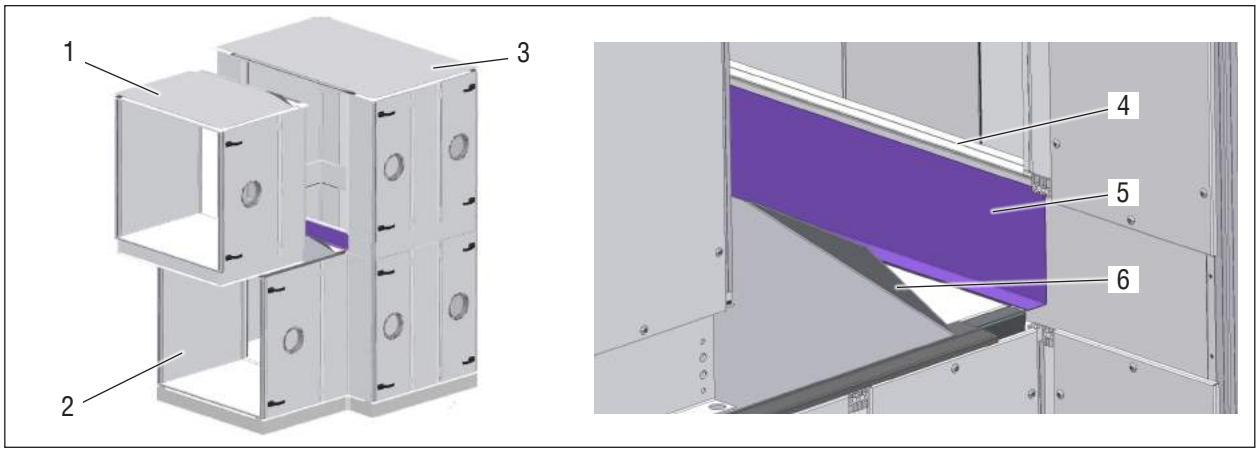


Fig. 39 Weatherproof units with dual-function units, stacked one above the other

1	Component, upper unit	4	Microbially inert sealing material
2	Component, lower unit	5	Foil bracket
3	Component with dual-function unit	6	Roof membrane

Step	Action
1	Position the component lower unit (2) and the component with dual-function unit (3) next to one another.
2	Align the components.
3	Screw the components together (see chapter "5.3 Assembly of separated housing" on page 39).
4	Insert the foil bracket (5) under the roof membrane (6) and then onto the component (3).
5	Weld the foil bracket (5) to the roof membrane (6) (see chapter "5.5.2.3 Sealing of the unit separation points with solvent welding agent for weatherproof units" on page 51).
6	Seal the vertical sides and the upper horizontal edge of the foil bracket (5) with microbially inert sealing material (4).
7	Position the component upper unit (1) onto the component with dual-function unit (3).
8	Align the components.
9	Screw the components together (see chapter "5.3 Assembly of separated housing" on page 39).
10	Check the potential equalisation integration of the individual housings in the unit potential. Perform a check of the functionality of the potential integration. Confirm the test and store it in the unit documentation.

Sealing the drip edge corner

- In the case of weatherproof units, the roof membrane is factory-sealed only up to the countersunk holes at the drip edge corner.
- With the drip edge corner, the roof membrane is welded on-site (see chapter "5.5.2.3 Sealing of the unit separation points with solvent welding agent for weatherproof units" on page 51).
- If a crane eyelet is fitted, remove it beforehand.

Transport device corner

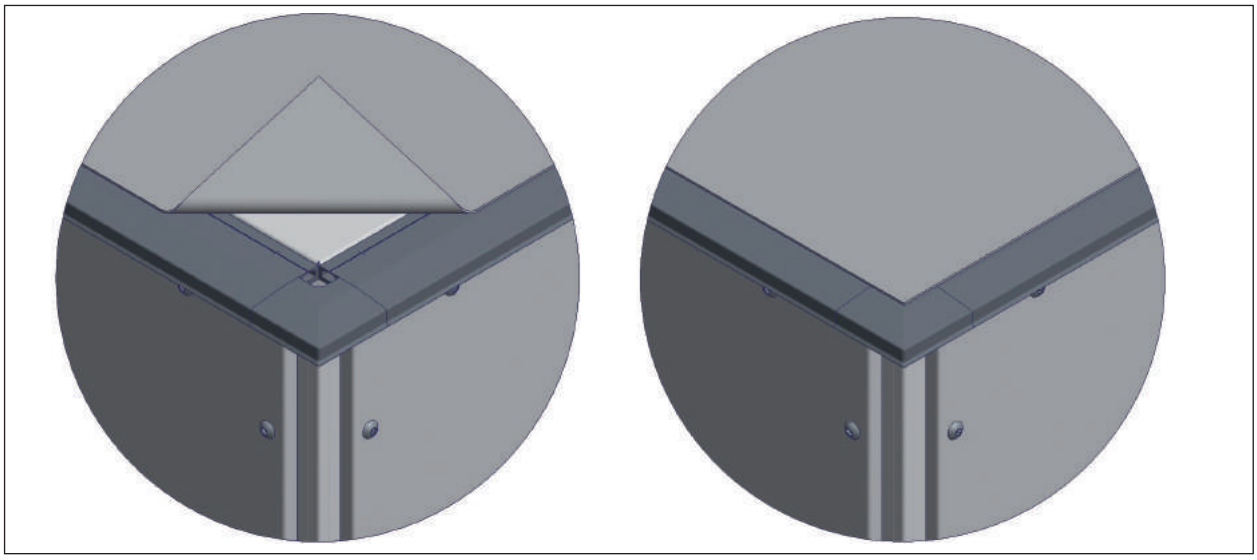


Fig. 40 Weatherproof units with transport device corners on roof assembly with unit frame profile

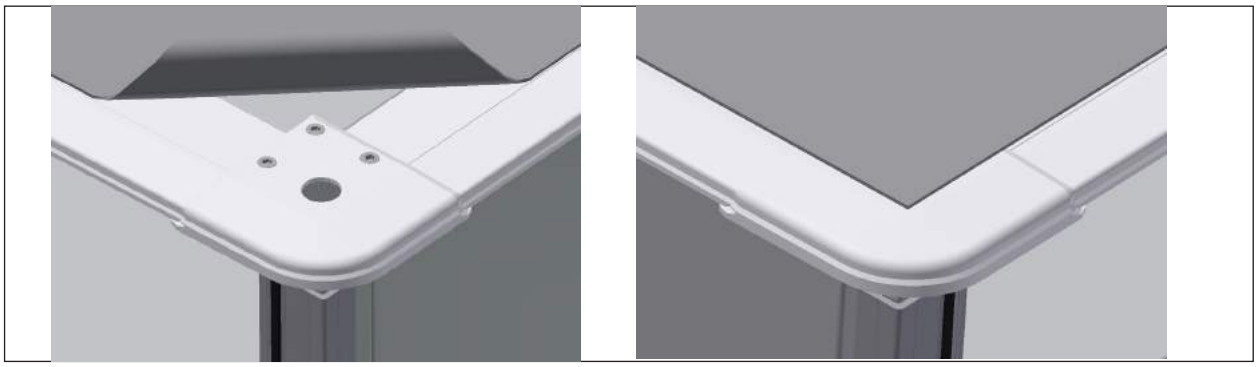


Fig. 41 Weatherproof units with transport device corners on roof assembly without unit frame profile

5.5.2.4 Sealing of the unit separation points with hot air welding for weatherproof units

⚠ WARNING

Risk of burns and explosion from hot air and hot foil

Due to the high air temperature, contact with hot air and hot, molten foil may result in an explosionr or cause burns to the limbs, especially the hands.

- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- When hot air welding, use your personal protective equipment and suitable protective gloves to protect your hands against burns.

Seal welding

Required temperature of the hot air	Required hot air nozzle	Pressure roller material
450 °C	angled and approx. 40 mm wide	Silicone or metal

Hot air welding of sheets

- The sheets are continuously seal-welded backwards in one operation.

Hot air welding of blanks up to approx. 33 cm wide

- Blanks are first tacked and then seal-welded.

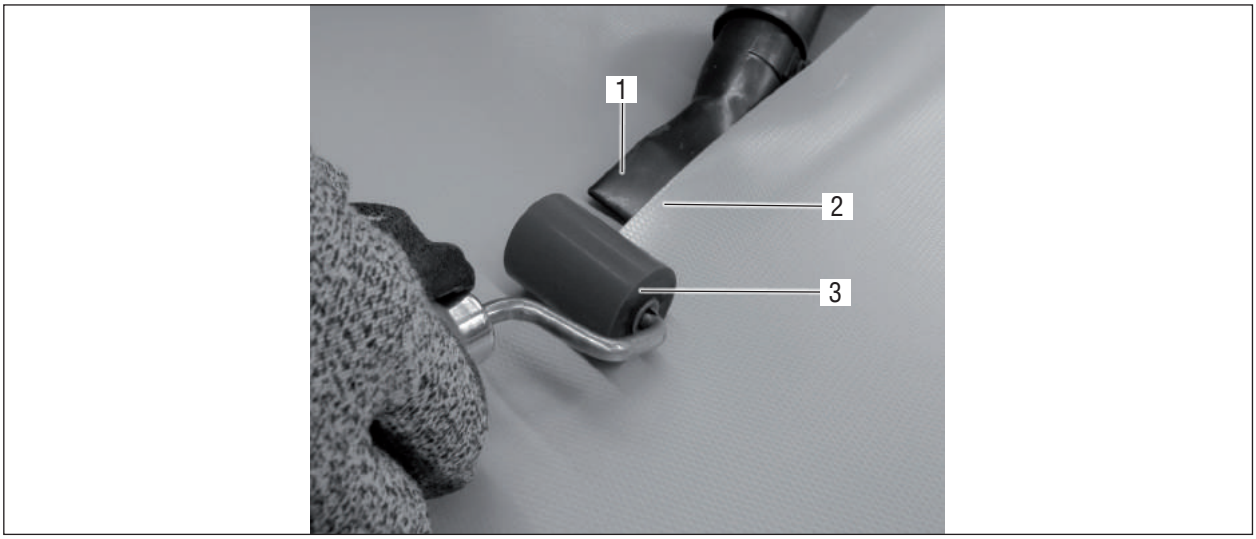


Fig. 42 Sealing of the roof membrane via hot air welding

1	Hot air nozzle	3	Pressure roller
2	Seam overlap		

Step	Action
1	Guide the nozzle of the hand welding unit (1) between the two foil sheets in the seam overlap (2). Align the angle of the nozzle approx. 45° to the edge of the membrane and approx. 30° to the roof surface.
2	Weld the foils together backwards.
3	Ensure that the lower and upper web edges are blown and plastified simultaneously. NOTE: Only insert the nozzle deeply enough that only the seam overlap is plastified.
4	Press the plastified overlap regions together with the pressure roller (3).
5	Feed the pressure roller (3) continuously.

5.6 Units with split plate heat exchanger (option)

ATTENTION

- Plate heat exchangers must be assembled exactly according to the assembly instructions. The assembly instructions can be requested from customer services if necessary.
- Assembly may only be performed by trained qualified staff.
- With the explosion-protected unit version, an AL-KO supervisor is required for the construction of the divided, dismountable and dismounted plate heat exchanger. The latter checks the work and documents it. These documents are stored with us at the factory in the order documentation.

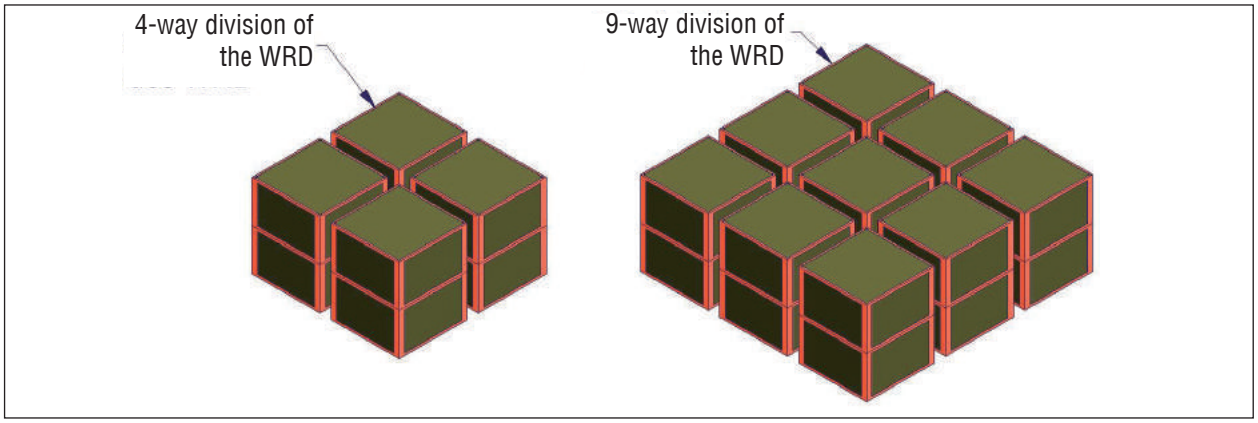


Fig. 43 Units with split plate heat exchanger

- Larger housings with plate heat exchangers are supplied in a split or disassembled version for ease of handling and transport. In this case, the plate exchangers can be supplied in one piece, split into slies or split into cubes. However, this depends on the conditions on the construction site and must be clarified in advance with the manufacturer's factory.
- These components are then assembled on-site. For this purpose, separate assembly instructions are included with the documentation.

5.7 Additional installation instructions for hygiene units

ATTENTION

After installing and connecting the individual unit components together, the unit separating points incl. unit connecting angles inside the unit must be sealed with microbially inert sealing material.

- During the installation of pipes and supply lines on site, take care that the function and operation of the unit components that can be pulled out to the side are not impaired.
- Directly connecting the water drains of the "hygiene unit" to the drain system is not permissible.

5.8 Heat exchanger connection

NOTE

Vent and drain valves must be provided on-site in the pipeline.

ATTENTION

Ensure in general that the AT4F ATEX unit remains accessible for maintenance purposes. During installation, particularly of the connecting pipework, ensure that the inspection doors can always be opened.

According to VDI 6022, the retractability of the heat exchangers (and any droplet eliminators) must be ensured up to a clear unit height of 1.6 m.

5.8.1 Connection of hot water heater (option)

For heating the supply air, a pump hot water air heater (PWW) can be used. Extraction and emptying of the heat exchanger must be carried out on-site.

- The feed and return lines are to be professionally connected on-site.

NOTE

Do not mix up the feed and return lines when connecting the pipelines.

The medium inlet is located on the air outlet side (Fig. 45 Counterflow principle for heat exchanger connection).

⚠ WARNING

Risk of explosion due to impermissible components and due to electrostatic charging.

If inadmissible components are used for the ATEX version, the unit can be electrostatically charged. This can lead to an explosion.

- The heat exchanger used must be suitable for the required ATEX marking.
- The valves and actuators optionally supplied by AL-KO THERM may only be installed outside the ATEX zone. Otherwise, valves and actuators approved for the ATEX zone must be used.
- Measures must be taken by the operator to ensure that a sufficient safety distance between media temperature (e.g.: medium of the heat exchanger) and the minimum ignition temperature of the potentially present explosive mixture in accordance with DIN EN 1127-1.
- Integrate the heat exchanger into the equipotential bonding of the unit.

ATTENTION

Counter-hold using a suitable tool (e.g. pipe wrench) during connection of the heat exchangers in order to avoid damage.

The limitation of the permissible heating medium temperature of the heat exchanger is to be implemented on-site by the owner/operator.

Install pipes and connections in such a way that the heat exchangers remain freely accessible for maintenance.

- Maximum working pressure: 16 bar
- Maximum hot water flow temperature: 120 °C

- Valves and actuators must be installed professionally. Please note here whether a version with a 2-way or 3-way valve is to be set up.
- For electrical connection of the actuator, see the circuit diagram.

Requirements for water	Maximum working pressure	Maximum hot water flow temperature
free of corroding properties free of oxygen free of carbon dioxide	16 bar	120 °C

2-way valve and 3-way valve versions

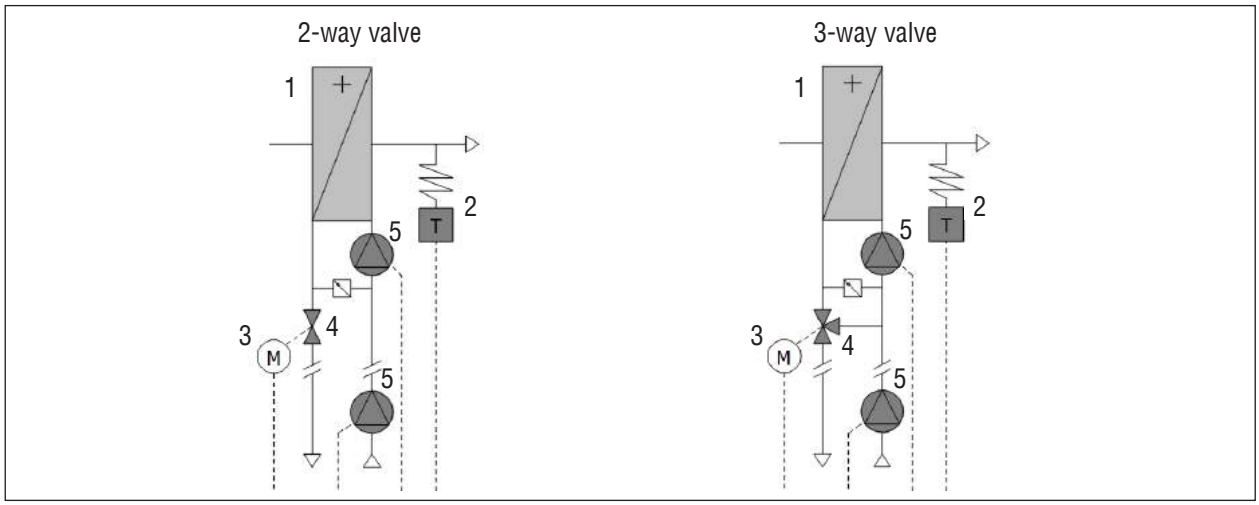


Fig. 44 2-way valve and 3-way valve connection versions

1	PWW heater	4	Valve
2	Frost monitor	5	Recirculation pump (on-site)
3	Valve actuator		

Counterflow principle for heat exchanger connection

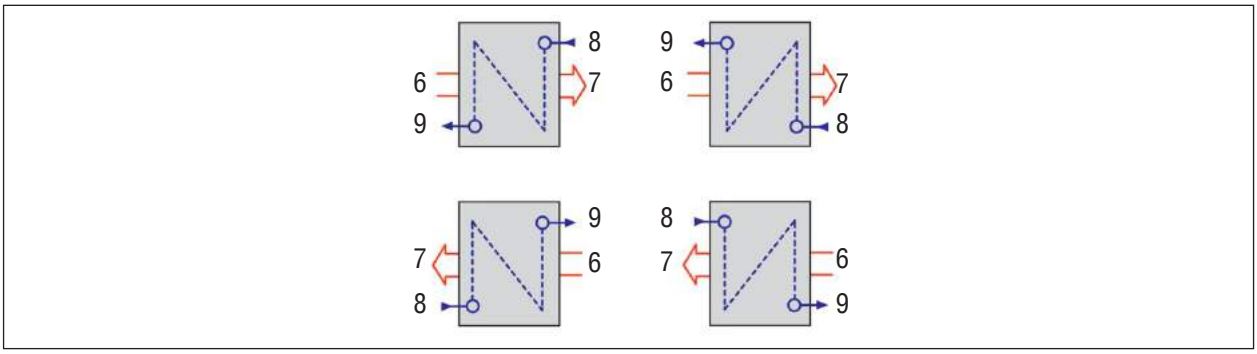


Fig. 45 Counterflow principle for heat exchanger connection

6	Air inlet	8	Media inlet
7	Air outlet	9	Media outlet

Step	Action
1	Connect the heat exchanger using the counterflow principle (water flow direction opposite the air flow direction in the unit).
2	Connect the pre flow up or down depending on the air direction.
3	Carefully vent the heat exchanger.
4	Check all of the piping for leaks.
5	Ensure that the piping and the heat exchanger are integrated into the unit potential.

ATTENTION

If the unit version control has been selected, neither the valve nor the valve actuator are supplied. In this case, these are on-site services.

NOTE

The figure shows schematics only of the hydraulic connection of the heater. The exact hydraulic connection must be carried out at the discretion of the heating specialist.

If the heat exchanger is the last component in front of the on-site duct, a duct-side inspection opening must be provided directly on the register. This is used for inspection and cleaning.

Function

The heater is included in the control system for the room or supply air temperature. The heat output is metered by regulating the corresponding actuating valve.

ATTENTION

Measures for decommissioning:

At temperatures below freezing, the heat exchanger must be either drained and blown out with compressed air, or filled with a commercially available antifreeze with corrosion inhibiting additive due to the risk of freezing and corrosion.

5.8.2 Connection of heater/pumps-cold water air cooler (option)

A pump hot water heater (PWW) and pump cold water air cooler (PCW) can be provided for the additional heating and cooling of the supply air.

To avoid condensate transfer into the duct, a droplet eliminator (TA) is installed behind the cooler. If the air speed is sufficiently low, this DE can optionally be deselected.

- The supply and return lines of both heat exchangers must be professionally connected.

NOTE

Do not mix up the feed and return lines when connecting the pipelines.

The medium inlet is located on the air outlet side (Fig. 47 Counterflow principle for heat exchanger connection).

⚠ WARNING

Risk of explosion due to impermissible components and due to electrostatic charging.

If inadmissible components are used for the ATEX version, the unit can be electrostatically charged. This can lead to an explosion.

- The heat exchanger used must be suitable for the required ATEX marking.
- The valves and actuators optionally supplied by AL-KO THERM may only be installed outside the ATEX zone. Otherwise, valves and actuators approved for the ATEX zone must be used.
- Measures must be taken by the operator to ensure that a sufficient safety distance between media temperature (e.g.: medium of the heat exchanger) and the minimum ignition temperature of the potentially present explosive mixture in accordance with DIN EN 1127-1.
- Integrate the heat exchanger into the equipotential bonding of the unit.

ATTENTION

Counter-hold using a suitable tool (e.g. pipe wrench) during connection of the heat exchangers in order to avoid damage.

Install pipes and connections in such a way that the heat exchangers remain freely accessible for maintenance.

- Maximum working pressure: 16 bar
- Maximum hot water flow temperature: 120 °C

- Valves and actuators must be installed professionally. It should be noted here whether a version with 2-way valves, 3-way valves or with a combination of 2-way and 3-way valves is used.
- For the electrical connection of the actuators, see the circuit diagram.

2-way valve, 3-way valve versions and combined 2-way and 3-way valve versions

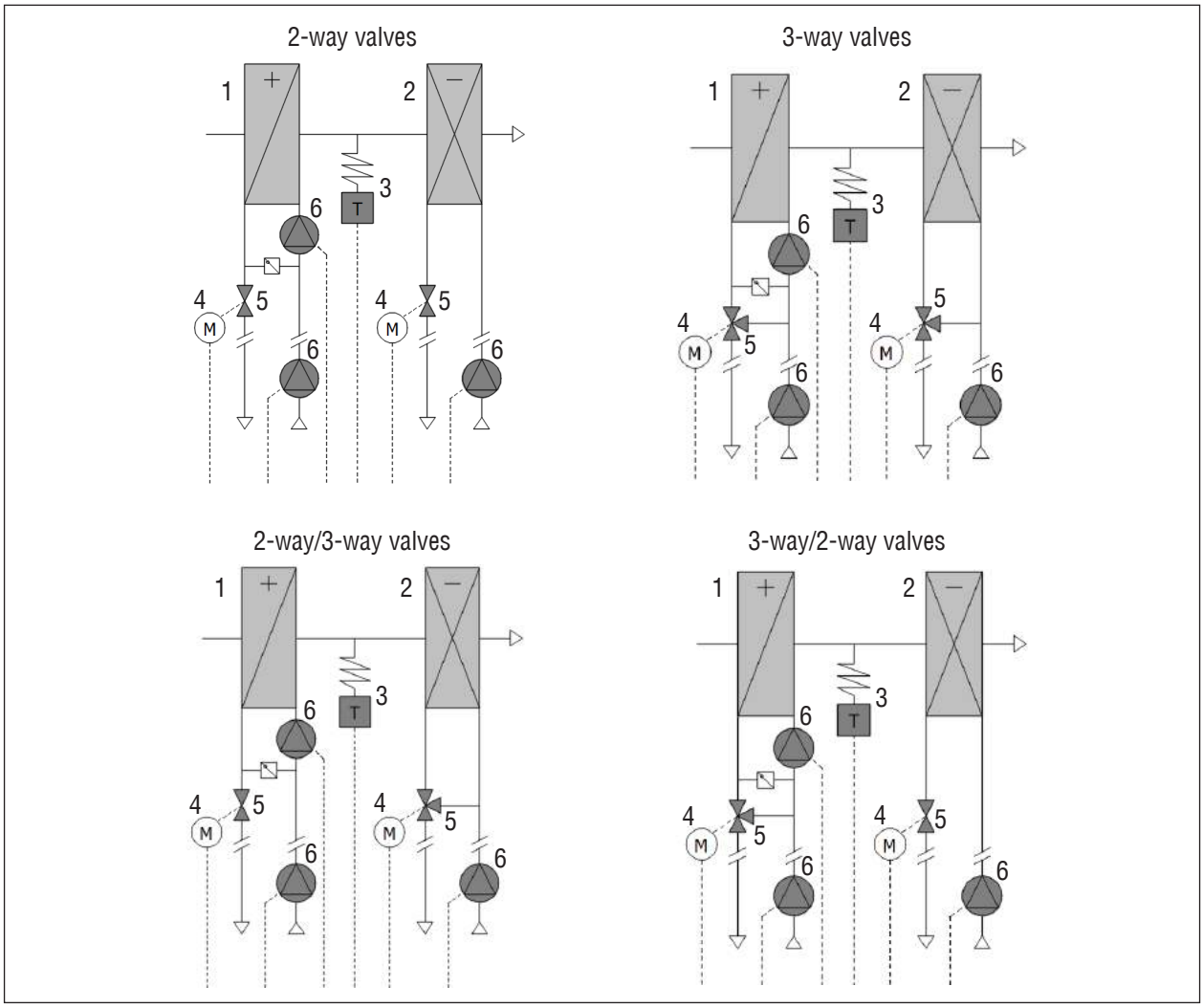


Fig. 46 2-way valve and 3-way valve connection versions

1	PWW heater	4	Valve actuator
2	PCW cooler	5	Valve
3	Frost monitor	6	Recirculation pump (on-site)

Counterflow principle for heat exchanger connection

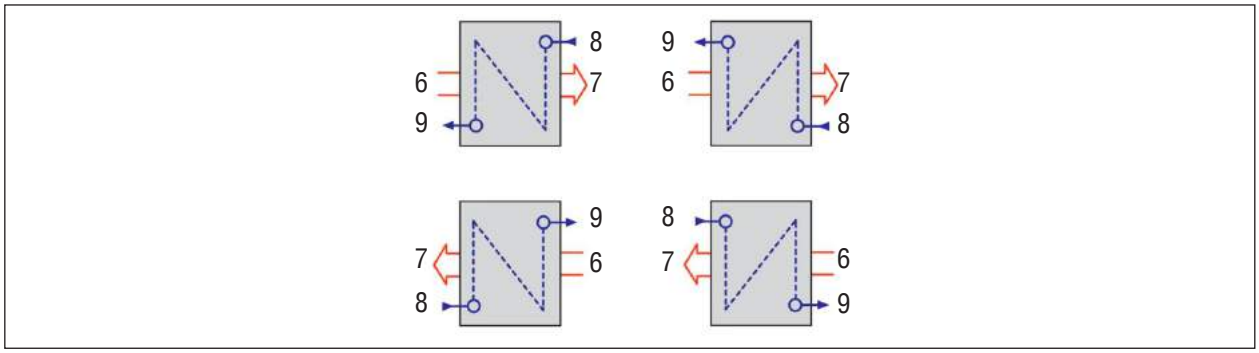


Fig. 47 Counterflow principle for heat exchanger connection

6	Air inlet	8	Media inlet
7	Air outlet	9	Media outlet

Step	Action
1	Connect the heat exchanger using the counterflow principle (water flow direction opposite the air flow direction in the unit).
2	Connect the pre flow up or down depending on the air direction.
3	Carefully vent the heat exchanger.
4	Check all of the piping for leaks.
5	Ensure that the piping and the heat exchanger are integrated into the unit potential.

ATTENTION

If the unit version control has been selected, neither the valve nor the valve actuator are supplied. In this case, these are on-site services.

NOTE

The figure shows schematics only of the hydraulic connection of the heater.and the cooler. The exact hydraulic connection must be carried out at the discretion of the heating specialist.

If the heater/cooler module is the last component before the on-site duct, a duct-side inspection opening must be provided directly on the register/droplet eliminator. This is used for inspection and cleaning.

Function

Heater and cooler are integrated into the temperature control. The temperature is set by controlling the cold water and hot water control valves.

ATTENTION

At temperatures below freezing point, the heat exchanger must be either drained and blown out with compressed air, or filled with a commercially available antifreeze with corrosion inhibiting additive due to the risk of freezing and corrosion.

On-site siphon

ATTENTION

The drain pipe and the siphon are to be kept frost-proof on-site.

- A siphon is also required on-site for the cooler and for the direct evaporator.
- Each pan drain must be fitted with a separate siphon.

5.8.3 Connection of pumps/cold water/air cooler (option)

For additional cooling of the supply air, a pump cold water air cooler (PKW) can be used.

To avoid condensate transfer into the duct, a droplet eliminator (TA) is installed behind the cooler.

- The supply and return lines of both heat exchangers must be professionally connected.

NOTE

Do not mix up the feed and return lines when connecting the pipelines.

The medium inlet is located on the air outlet side (Fig. 49 Counterflow principle for heat exchanger connection).

⚠ WARNING

Risk of explosion due to impermissible components and due to electrostatic charging.

If inadmissible components are used for the ATEX version, the unit can be electrostatically charged. This can lead to an explosion.

- The heat exchanger used must be suitable for the required ATEX marking.
- The valves and actuators optionally supplied by AL-KO THERM may only be installed outside the ATEX zone. Otherwise, valves and actuators approved for the ATEX zone must be used.
- Measures must be taken by the operator to ensure that a sufficient safety distance between media temperature (e.g.: medium of the heat exchanger) and the minimum ignition temperature of the potentially present explosive mixture in accordance with DIN EN 1127-1.
- Integrate the heat exchanger into the equipotential bonding of the unit.

ATTENTION

Counter-hold using a suitable tool (e.g. pipe wrench) during connection of the heat exchangers in order to avoid damage.

Install pipes and connections in such a way that the heat exchangers remain freely accessible for maintenance.

- Maximum working pressure: 16 bar
- Maximum hot water flow temperature: 120 °C

- Valves and actuators must be installed professionally. Please note here whether a version with a 2-way or 3-way valve is to be implemented.
- For the electrical connection of the actuators, see the circuit diagram.

2-way valve and 3-way valve versions

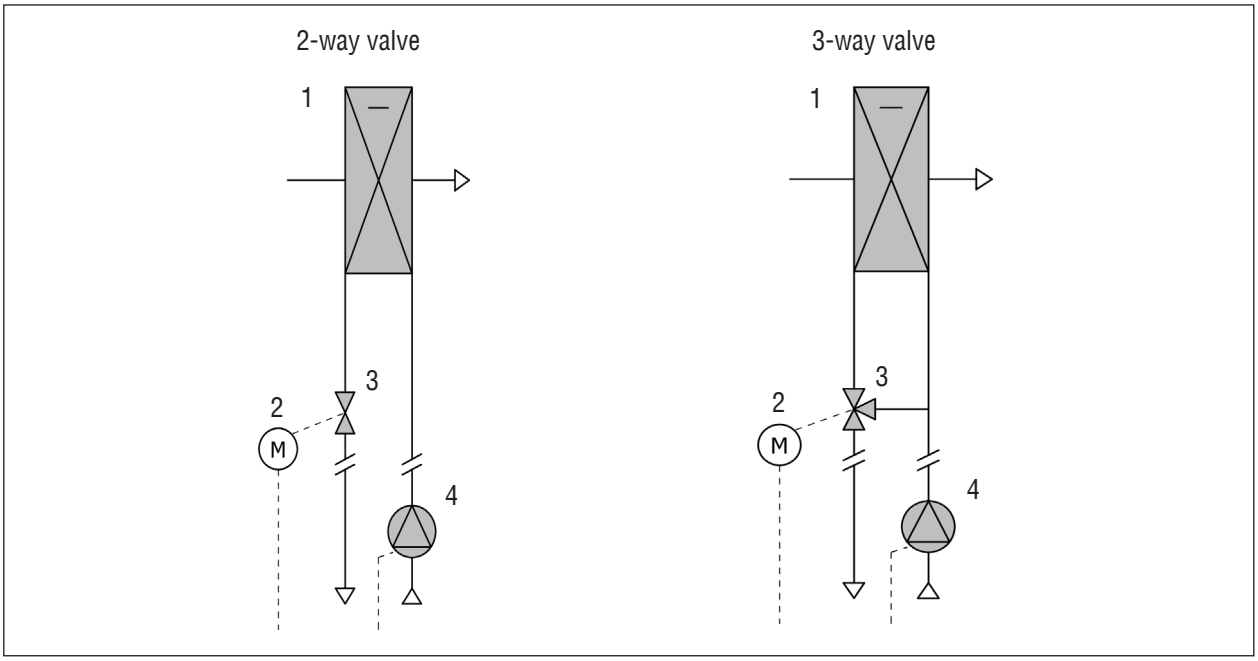


Fig. 48 2-way valve and 3-way valve connection versions

1	PCW cooler	3	Valve
2	Valve actuator	4	Recirculation pump (on-site)

Counterflow principle for heat exchanger connection

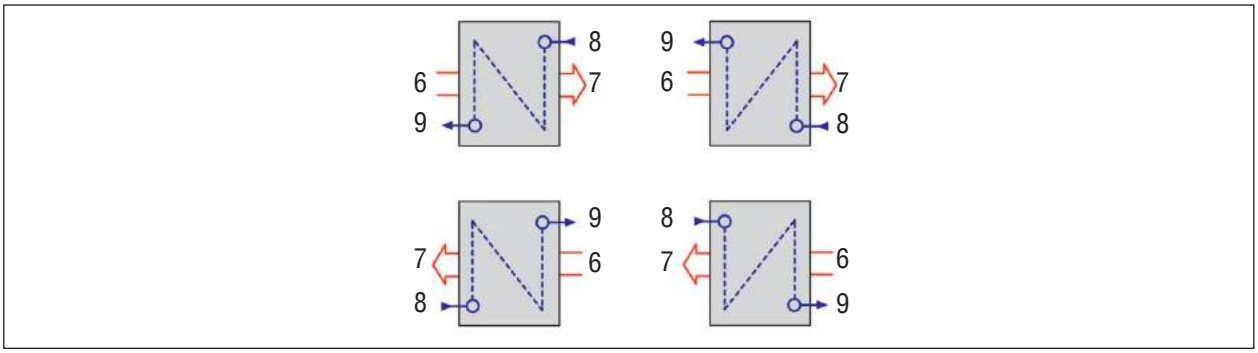


Fig. 49 Counterflow principle for heat exchanger connection

6	Air inlet	8	Media inlet
7	Air outlet	9	Media outlet

Step	Action
1	Connect the heat exchanger using the counterflow principle (water flow direction opposite the air flow direction in the unit).
2	Connect the pre flow up or down depending on the air direction.
3	Carefully vent the heat exchanger.
4	Check all of the piping for leaks.
5	Ensure that the piping and the heat exchanger are integrated into the unit potential.

ATTENTION

If the device version control has been selected, neither the valve nor the valve actuator are supplied. In this case, these are on-site services.

NOTE

The figure shows schematics only of the hydraulic connection of the cooler. The exact hydraulic connection must be carried out at the discretion of the heating specialist.

If the cooler module is the last component before the on-site duct, a duct-side inspection opening must be provided directly on the register/droplet eliminator. This is used for inspection and cleaning.

Function

Coolers are integrated into the temperature control. The temperature is set by controlling the cold water actuating valves.

ATTENTION

At temperatures below freezing point, the heat exchanger must be either drained and blown out with compressed air, or filled with a commercially available antifreeze with corrosion inhibiting additive due to the risk of freezing and corrosion.

On-site siphon

ATTENTION

The drain pipe and the siphon are to be kept frost-proof on-site.

- A siphon is also required on-site for the cooler and for the direct evaporator.
- Each pan drain must be fitted with a separate siphon.

5.8.4 Steam register

⚠ WARNING

Risk of explosion due to impermissibly high temperatures and due to electrostatic charging.

If inadmissible components are used for the ATEX version, the unit can be electrostatically charged. This can lead to an explosion.

If the steam register is operated at higher media temperatures than defined by the ATEX marking and the associated correction factors, this can lead to an explosion.

- The heat exchanger used must be suitable for the required ATEX marking (note temperature class, correction factor).
- The valves and actuators optionally supplied by AL-KO THERM may only be installed outside the ATEX zone. Otherwise, valves and actuators approved for the ATEX zone must be used.
- The limitation of the permissible heating medium temperature of the heat exchanger is to be implemented on-site by the owner/operator.
- Measures must be taken by the operator to ensure that a sufficient safety distance between media temperature (e.g.: medium of the heat exchanger) and the minimum ignition temperature of the potentially present explosive mixture in accordance with DIN EN 1127-1.
- Integrate the heat exchanger into the equipotential bonding of the unit.

⚠ WARNING

Danger of burns/scalds during filling of the heat exchanger with steam.

Danger due to contact with leaking media lines and hot surfaces.

- Perform a visual inspection of the pipelines and connections before filling.
- Wear personal protective equipment.
- Only use steam registers with pre-welding flanges for the corresponding pressure level.
- Comply with the Pressure Equipment Directive and the corresponding standards.
- The steam register is pressurised.

⚠ WARNING

Danger of bursts/explosions during filling of the heat exchanger with steam

The steam register is pressurised. Damage to the heat exchanger can cause a risk of bursting and an explosion. This is associated with a loud bang.

- Wear your personal protective equipment during filling of the heat exchanger.
- Observe the operating and assembly instructions as well as the working instructions.
- Work with care.
- Secure the hazardous areas. Only trained persons are permitted in this area.
- Operate the heat exchanger and the steam register only at the permissible operating points.
- Integrate the heat exchanger into the unit potential.
- Check the steam register for visible damage.
- Comply with the Pressure Equipment Directive and the corresponding standards.

⚠ WARNING

Danger of slipping due to puddle formation.when filling or leaking of the heat exchanger.

- Clean away puddles and even small spills immediately.
- Use suitable absorbent materials such as cloths or binders.
- Dispose of the used cloths or binders in accordance with the applicable regulations.
- Wear personal protective equipment.
- Dispose of the ingested spills in a professional manner, in accordance with local regulations.

Step	Action
1	Connect the heat exchanger using the counterflow principle (water flow direction opposite the air flow direction in the unit).
2	Connect the pre flow up or down depending on the air direction.
3	Carefully vent the heat exchanger.
4	Check all of the piping for leaks.
5	Ensure that the piping and the heat exchanger are integrated into the unit potential.

5.8.5 Circulating coil system CCS (recuperative energy recovery)

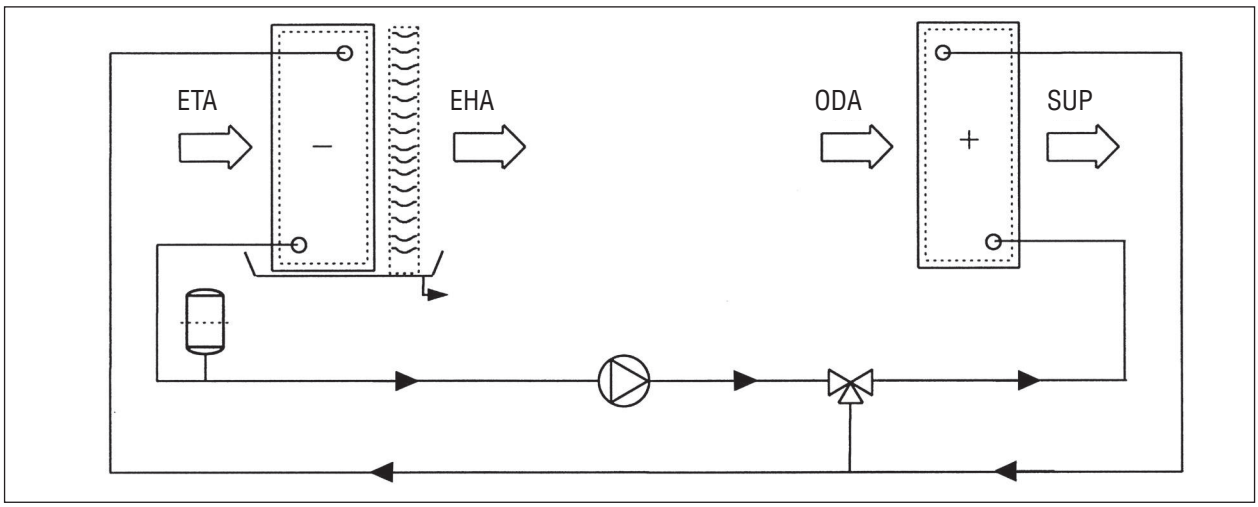


Fig. 50 Schematic diagram of a circulating coil system

With heat exchangers in a circulating coil system, the pipe circuits themselves cannot be emptied.

For this reason, the circulating coil system is only to be operated with a frost-proof water/glycol mixture and tested for leak-tightness after assembly.

If the system does have to be drained, the pipe circuits can be blown out with compressed air, although water still remains in the heat exchanger even in this case.

ATTENTION

When using high-performance circulating coil systems, observe the manufacturer's operating instructions.

ATTENTION

During commissioning, observe chapter "5.9.4 Filling and venting" on page 73.

Step	Action
1	Connect the heat exchanger using the counterflow principle (water flow direction opposite the air flow direction in the unit).
2	Connect the pre flow up or down depending on the air direction.
3	Carefully vent the heat exchanger.
4	Check all of the piping for leaks.
5	Ensure that the piping and the heat exchanger are integrated into the unit potential.

- Piping must be provided on-site.
- Circulating pump must be dimensioned according to the technical data sheet.
- Heat exchangers must be connected in the counterflow principle.
- Antifreeze concentration must correspond to the specifications on the technical data sheet.
- The pre flow is at the top or bottom, depending on the air direction.
- We recommend the use of the antifrogen N with a mixture of 25 – 35 %.

5.8.6 Direct evaporator/condenser

Additional information for the use of direct evaporators:

ATTENTION

The direct evaporator must be installed by an authorised refrigeration company.
Only permitted with thermostatic expansion valve in the ATEX zone.
Only safety refrigerants according to DIN 8960 are permitted to be used as refrigerants.
Observe the operating instructions for cooling systems and heat pumps.

⚠ WARNING

Risk of explosion due to electrostatic discharge.

- The direct evaporator must be suitable for the required ATEX marking.
- Integrate the direct evaporator into the equipotential bonding of the unit.

ATTENTION

For the refrigerant supply line, the cutout may have to be provided on-site.

On-site siphon

ATTENTION

The drain pipe and the siphon are to be kept frost-proof on-site.

- A siphon is also required on-site for the cooler and for the direct evaporator.
- Each pan drain must be fitted with a separate siphon.

Air direction when installing a direct evaporator

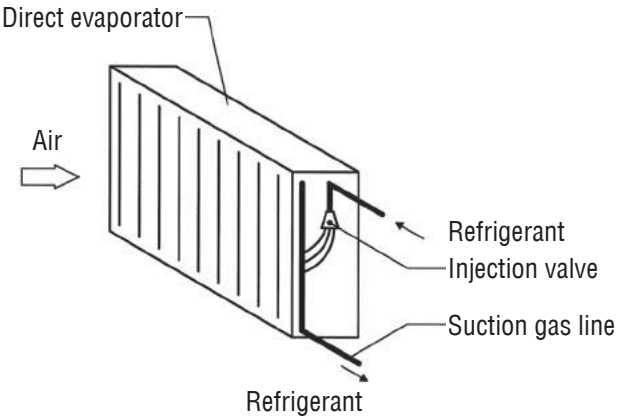


Fig. 51 Air direction when installing a direct evaporator

5.9 Mechanical connection

⚠ WARNING

Risk of crushing

When installing the duct connections as well as fittings and other intake and exhaust options, the damper must be closed. When closing the multi-leaf damper, there is a risk of crushing injuries to the hands.

- Do not reach into the damper when closing the multi-leaf damper.
- Wear the personal protective equipment.

⚠ WARNING

Risk of injury due to impact, cutting or stabbing during assembly of the duct connections.

- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.
- Observe the working instructions and these operating and assembly instructions.
- Work with care.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out (cut-proof gloves).

5.9.1 Duct connection

The duct system of the ventilation directs the outdoor air to the air handling unit and as supply air into the building. The exhaust air is passed through the unit and to the outside as exhaust air for heat recovery.

The duct connection of the air handling unit is to be integrated into the building potential.

Duct connectors (option)

For the ATEX air handling units, the duct connection is determined according to the order.

Optionally, both sound-decoupled sockets (connection frames) and canvas nozzles (anti-static) can be included.

- The connection of the ventilation ducts to the unit must be carried out professionally.
- The duct connection must be distortion-free and free of load on the AT4F ATEX air handling unit.
- Establish pre-assembled equipotential bonding on the duct.

Requirements for the duct system

In favour of efficiency, energy consumption and air performance of the unit, the pipe system must be designed for slow flow speeds and low pressure drop.

- All connections between the ventilation ducts and air handling unit must be designed and secured to fit exactly.
- Inspection openings must be provided.

Condensation protection/thermal insulation

Outdoor air and exhaust air ducts must always be well insulated to protect against condensation.

- Careful insulation of all ventilation ducts leading directly to the unit and in cold rooms/zones is particularly important.

5.9.2 Intake and exhaust hood (option)

- For a weatherproof version, an optional intake and exhaust hood can be ordered.
- Here, it must be ensured on-site that no ATEX zone or no higher ATEX zone can arise than the ATEX zone defined on the AT4F ATEX unit for outside use.
- For units without a factory-delivered intake hood, a drain tray must be provided on site at the unit inlet and in the duct.
- The on-site ducting must ensure that the installation site is suitable for the ATEX unit version.
- To avoid short-circuit currents, these position and orientation of the intake and outlet ends must be adjusted, depending on the local conditions, using the on-site duct sections. The applicable rules/standards regarding the fresh air intake and the exhaust air outlet must be complied with in this regard.

5.9.3 Condensate drain connection via siphon

- In accordance with VDI 6022, a water drain and siphon is provided on a condensate pan (recommended with backflow protection).
- Condensate drain lines must be connected to the drain system with a siphon. Direct connection of water drains to the drain system is not permitted.

ATTENTION

The drain pipe and the siphon are to be kept frost-proof on-site.

NOTE

The standing height of the respective siphon must be designed for the underpressure or overpressure of the air handling unit to prevent suction or blowing out of air from the closed drain pipe. For a weatherproof version, the pipe trace heating is to be provided. The corresponding standards must be complied with. The pipeline must be protected against environmental influences.

Snake siphon (overpressure or vacuum)

The snake siphon is a siphon to be filled for draining AC units in the area of the cooler, humidifiers or other wet areas with overpressure relative to the environment.

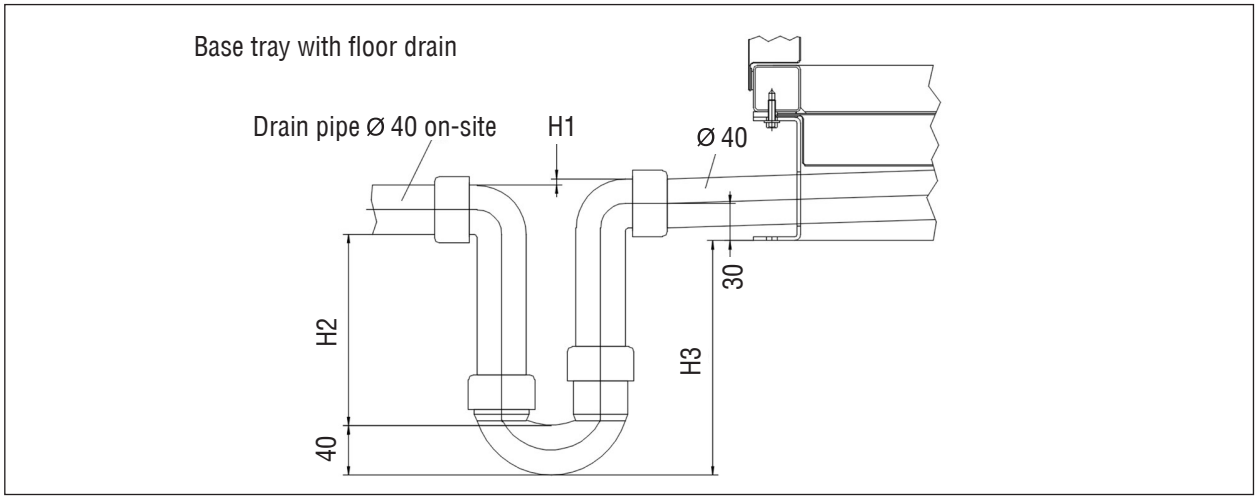


Fig. 52 Connection of the condensate drain with snake siphon

Ball siphon (overpressure)

The ball siphon is a self-filling siphon for draining coolers and other wet areas with vacuum relative to the environment. An inserted float ball prevents the suction of air in the dry operating condition, so that the first condensate produced can fill the siphon. The ball continues to act as a check valve in the event of pressure shocks in the system and prevents empty suction.

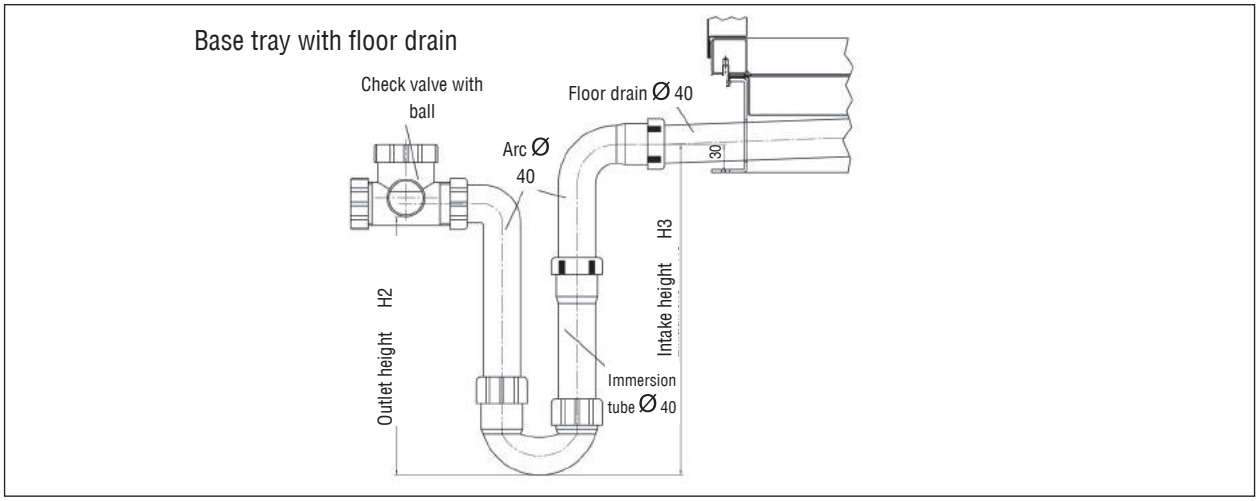


Fig. 53 Connection of the condensate drain with ball siphon with overpressure

Dimensioning of snake siphon (overpressure or vacuum) and ball siphon (overpressure)

Below 600 Pa observe min. dimensions H1 - H3.

10 Pa = 1 mmWS (water column)

Height	minimal	maximal	Overpressure up to 1900 Pa	Vacuum up to 1300 Pa
H1	0 mm	190 mm	50 mm	mmWS + 50 mm
H2	55 mm	245 mm	1.5 * mmWS + 25 mm	mmWS / 2 + 50 mm
H3	100 mm	270 mm	H2 + 40 mm	H1 + H2 - 10 mm

Ball siphon (vacuum)

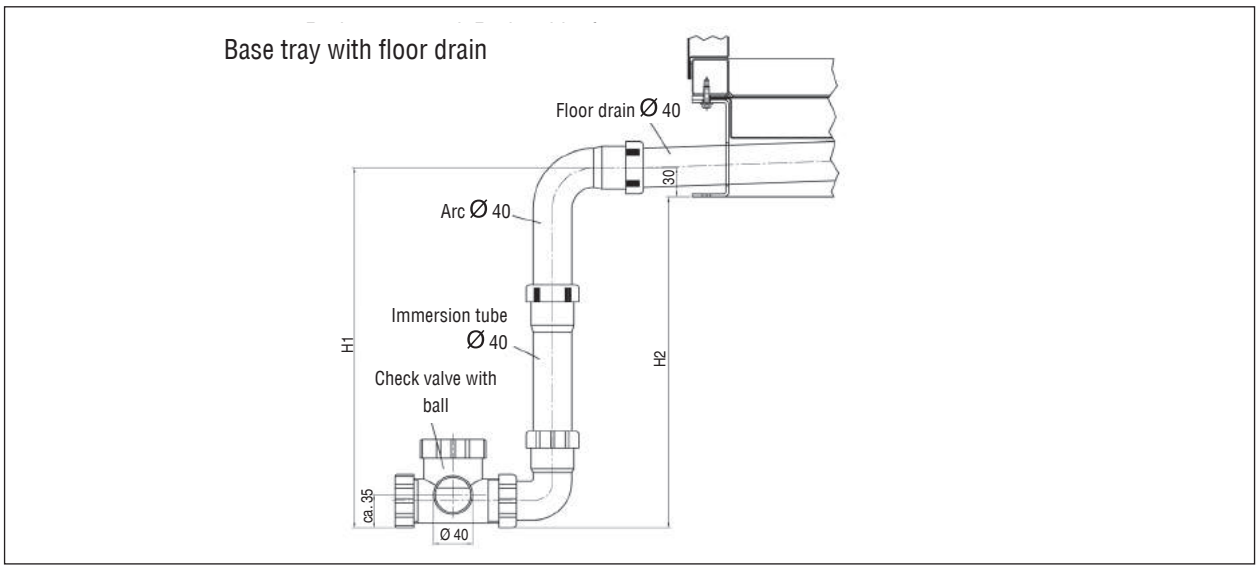


Fig. 54 Connection of the condensate drain with ball siphon with vacuum

Dimensioning of ball siphon (vacuum)

Height	minimal	maximal	Vacuum up to 3200 Pa
H1	30 mm	350 mm	mmWS + 30 mm
H2	0 mm	320 mm	mmWS

NOTE

The installation height of the siphon must be taken into account when installing the AT4F ATEX unit.

Observe minimum dimensions H1-H3.

5.9.4 Filling and venting

⚠ WARNING

Danger of burns/scalds during filling.

Danger due to contact with leaking media lines and hot surfaces.

- Perform a visual inspection of the pipelines and connections before filling.
- Wear personal protective equipment.

⚠ WARNING

Risk of poisoning when filling with glycol.

- Work with care.
- Avoid skin and eye contact with glycol, do not swallow glycol and observe the safety data sheet.
- Use only approved containers.
- Perform a visual inspection of the pipelines and connections before filling.
- Wear personal protective equipment.

⚠ WARNING

Danger of slipping due to puddle formation.

- Clean away puddles and even small spills immediately.
- Use suitable absorbent materials such as cloths or binders.
- Dispose of the used cloths or binders in accordance with the applicable regulations.
- Wear personal protective equipment.
- Dispose of the ingested spills in a professional manner, in accordance with local regulations.

ATTENTION

- At temperatures below freezing point, the heat exchanger must be filled with a commercially available antifreeze with corrosion inhibiting additive due to the risk of freezing and corrosion.
- The glycol content must be prepared according to the manufacturer's informations.
- The glycol mixture is to be renewed after a certain operating time in accordance with the manufacturer's data.

- The glycol/water mixture must already be mixed before filling. Otherwise, subsequent mixing is not guaranteed.
- The pipe system must be resistant to the glycol/water mixture used.
- The pipeline system must be carefully and completely vented via the ventilation unit provided on-site.

5.10 Electrical connection

⚠ DANGER

Hazard due to electric current and explosion hazard due to electric current.

Electric shocks or an explosion can occur in the event of incorrect connection to the power supply or incorrect installation of electrical components.

- For the on-site wiring work, you will need to take into account the requirements for the installation of electrical equipment in potentially explosive atmospheres in accordance with DIN EN 60079-14 and EEx- i circuits, among others.
- Only have the electrical connection carried out by an approved electrician and in line with ATEX requirements.
- Perform the connection exactly according to the circuit diagram and the assignment plan.
- Only use ATEX-compliant components that conform to the required ATEX zone.
- Observe the valid DIN and VDE regulations and ATEX standards and directives.
- Observe the directives of the local energy supply company.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out.
- Do not operate the AT4F ATEX unit with defective or damaged cables or plugs.
- Regularly check the connection cables for damaged areas.
- Use only the permissible tool.
- Shut off the power supply for maintenance work and secure it to prevent restart.
- Observe the electrical safety regulations.

⚠ WARNING

Risk of injuries due to incorrect or faulty connection.

- Electrical connections must only be undertaken by a certified electrician under consideration of the valid DIN and VDE regulations as well as the directives of the local energy supply company. In addition, the ATEX standards and ATEX directives must be observed.
- Only have assembly, servicing and maintenance carried out by qualified staff.
- Wear personal protective equipment.

ATTENTION

Main switch or repair switch

It must be possible to shut down the supply line on all poles via a main switch and/or a repair switch.

The operating and assembly instructions for the individual field devices must be observed.

- For the electrical connection, see also the points under "2.3 General safety instructions" on page 12.
- Check that the data on the type plate matches the connection data.
- After completion of the electrical connection work, a safety inspection of the installation must be carried out in accordance with VDE 0701 Part 1 and VDE 0702.
- Only use components with the required ATEX marking.

5.10.1 Electric motor

⚠ WARNING

Risk of explosion due to electric ignition sparks or electrostatic charging.

If inadmissible components are used for the ATEX marking and ATEX zone, the unit may carry an electrostatic charge. Electrical ignition sparks can lead to an explosion.

- The motor used must be suitable for the required ATEX marking.
- Integrate the motor into the unit potential.

ATTENTION

Electric motors with a nominal output of 3 kW or more must be operated with star-delta starting. Increased switching frequencies ("cycling") of the motors lead to premature malfunctions.

- Wire the motor according to the supplied circuit diagrams.
- Measure the power consumption on all three phases and compare the measured values with the values on the motor type plate.

ATTENTION

- Wiring must be carried out according to DIN VDE 0100-100, DIN EN 60204-1 (DIN VDE 0113) and DIN EN 50156-1 (DIN VDE 0116).
- Motor wiring must be designed so that the motor can be moved to the V-belt tension.
- The power consumption may only be measured with the maintenance doors and maintenance panels closed due to the risk of overloading the motor. The power consumption must not exceed the specified nominal current.
- With multistep motors, operation via a frequency converter is not permitted.
- Depending on the motor, frequency converter or fan manufacturer, a sine filter must be taken into account.
- If the motor is speed-controlled, the frequency converter - in combination with the additional MCB112 plug-in board - can also be used to evaluate the PTC thermistor.
- Alternative evaluation via a separate PTC thermistor evaluation unit with corresponding ATEX approval.
- All other motors must be protected with an overload circuit breaker.
- For adjustable motors, the maximum power consumption of the transformer and the motor must not be exceeded. For adjustable motors, the motor protection must be dimensioned accordingly.
- All electrical clamping points must be retightened.
- If the motor is operated via a FC or EC technology, the combination can be secured using a residual current circuit breaker. For this purpose, an all-current sensitive residual current circuit must be selected.

NOTE

The operating and assembly instructions of the motor manufacturer must be observed.

5.10.1.1 Connection of three-phase motors

ATTENTION

Do not switch the upper speed directly. Observe the wiring diagram in the motor terminal box for motors with PTC thermistor or thermal contact.

Circuit for one speed

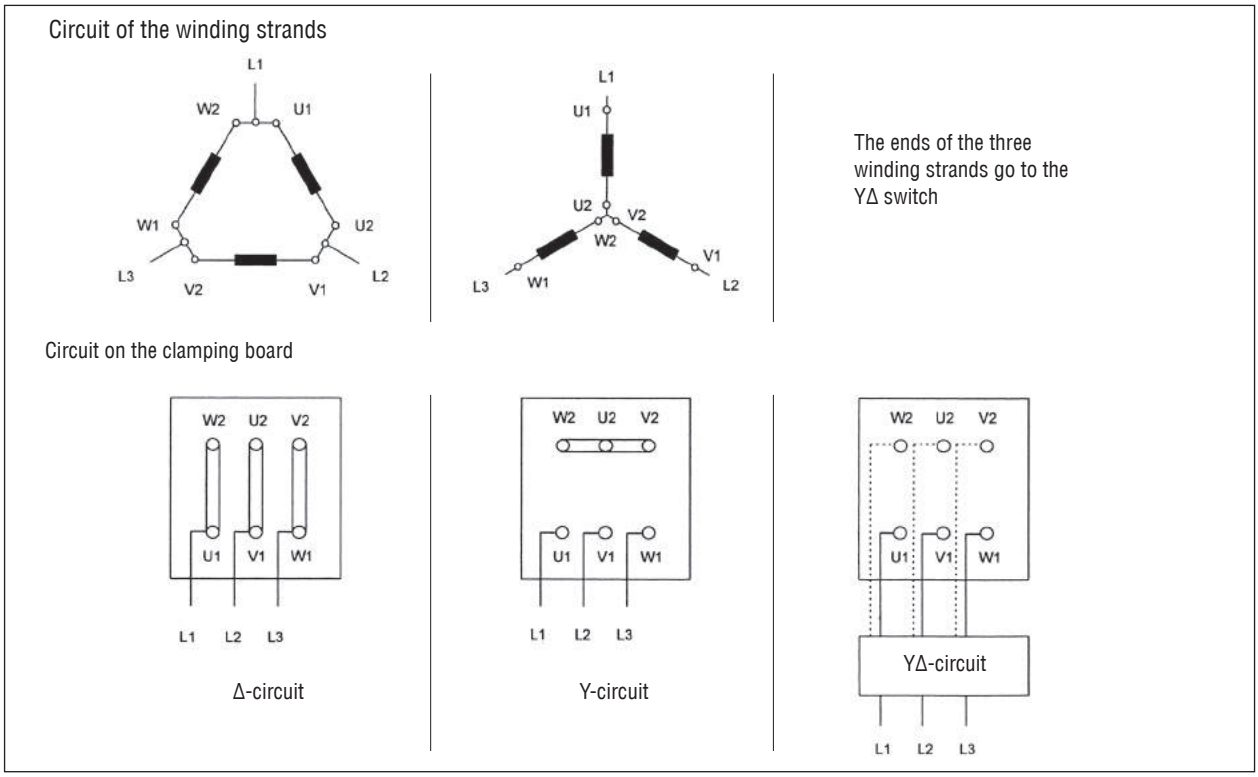


Fig. 55 Circuit of three-phase motors for one speed

Circuits for two speeds in the ratio 1 : 2 (winding in the Dahlander pole changing)

Version e.g. for 1500/3000 rpm or 4-/2-pole or 750/1500 rpm or 8-/4-pole

In motors with Dahlander pole changing, the six winding ends 1U, 1V, 1W and 2U, 2V, 2W are connected to the six terminals of the clamping board of a normal motor terminal box.

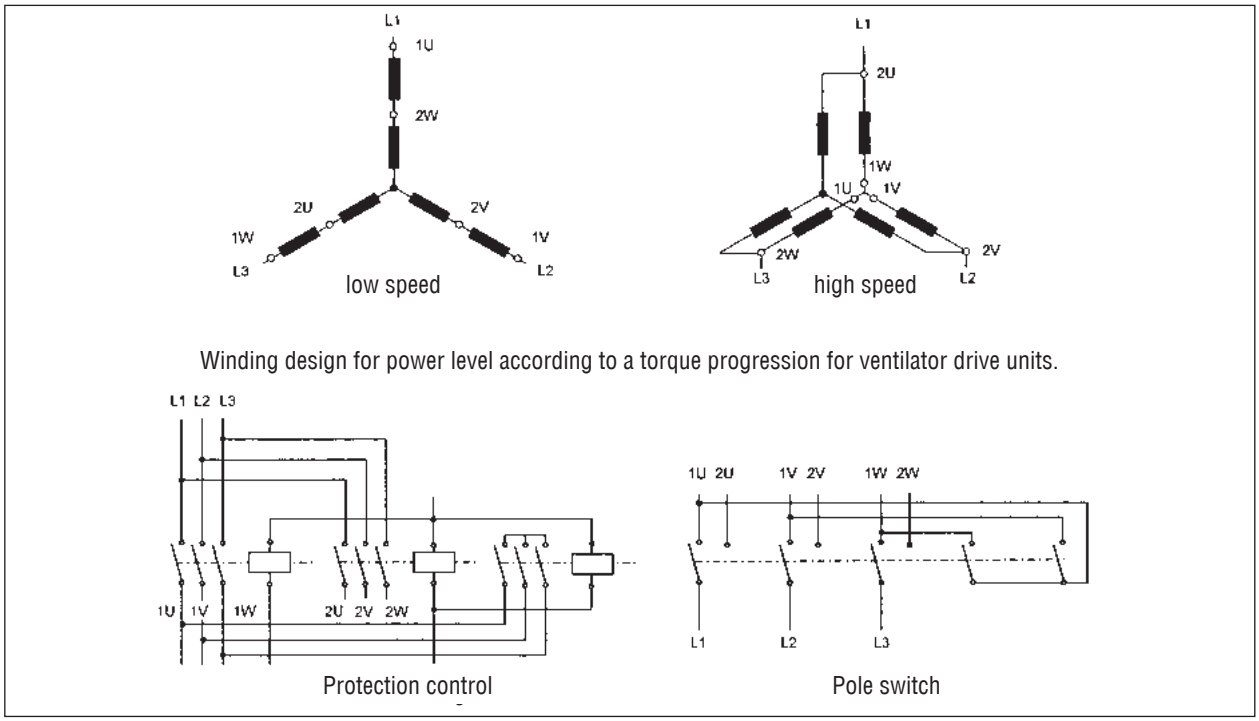


Fig. 56 Circuit of three-phase motors for two speeds in the ratio 1 : 2

Circuit for two speeds (two separate windings)

Version e.g. for 1000/1500 rpm or 6-/4-pole or 750/1000 rpm or 8-/6-pole

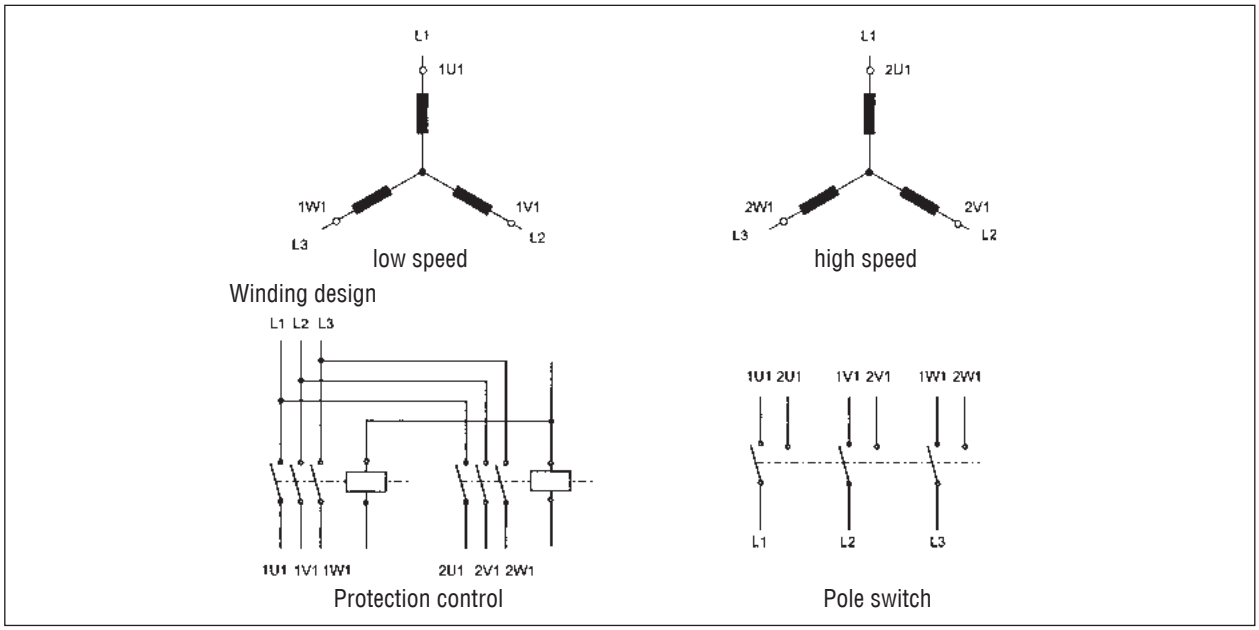


Fig. 57 Circuit of three-phase motors for two speeds

Circuits for three speeds

(two separate windings, one in Dahlander pole changing, nine terminals are required here). Version for ventilator drive units 750/1000/1500 rpm or 8-/6-/4-pole; 750/1500 rpm in Dahlander pole changing.

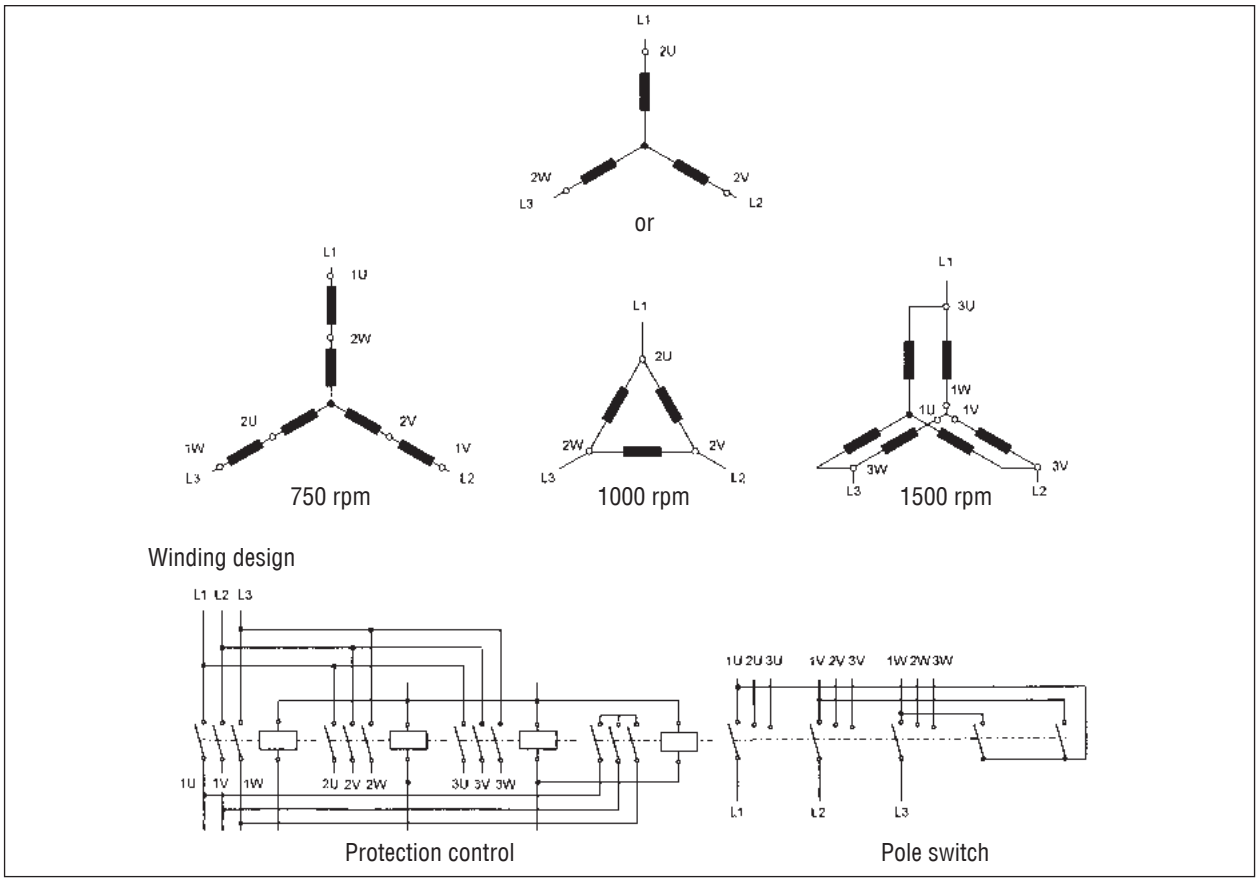


Fig. 58 Circuit of three-phase motors for three speeds

5.10.1.2 Circuit with frequency converter - wiring examples

Wiring example: FC wiring (FC 102) with external repair switch

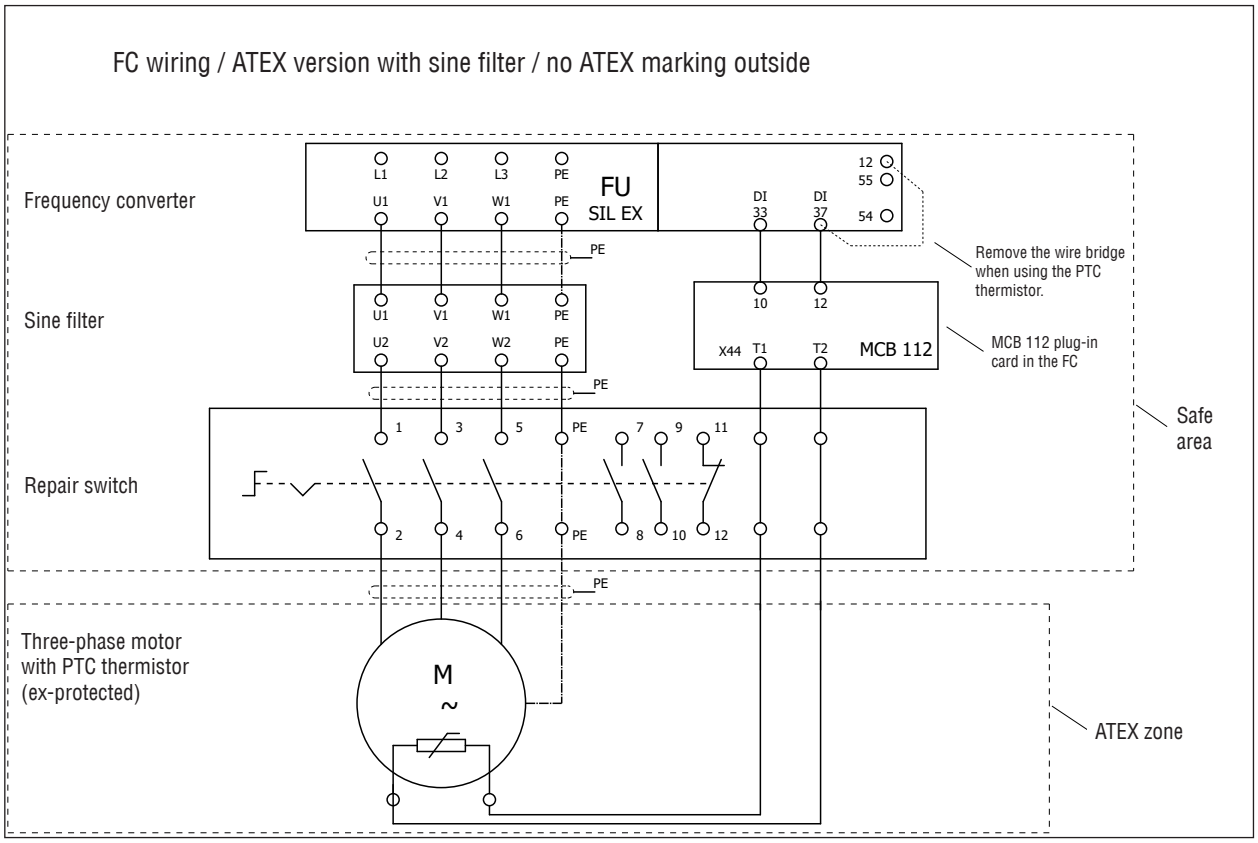


Fig. 59 Circuit of three-phase motors with frequency converter (FC 102) and external repair switch (without ATEX requirements outside)

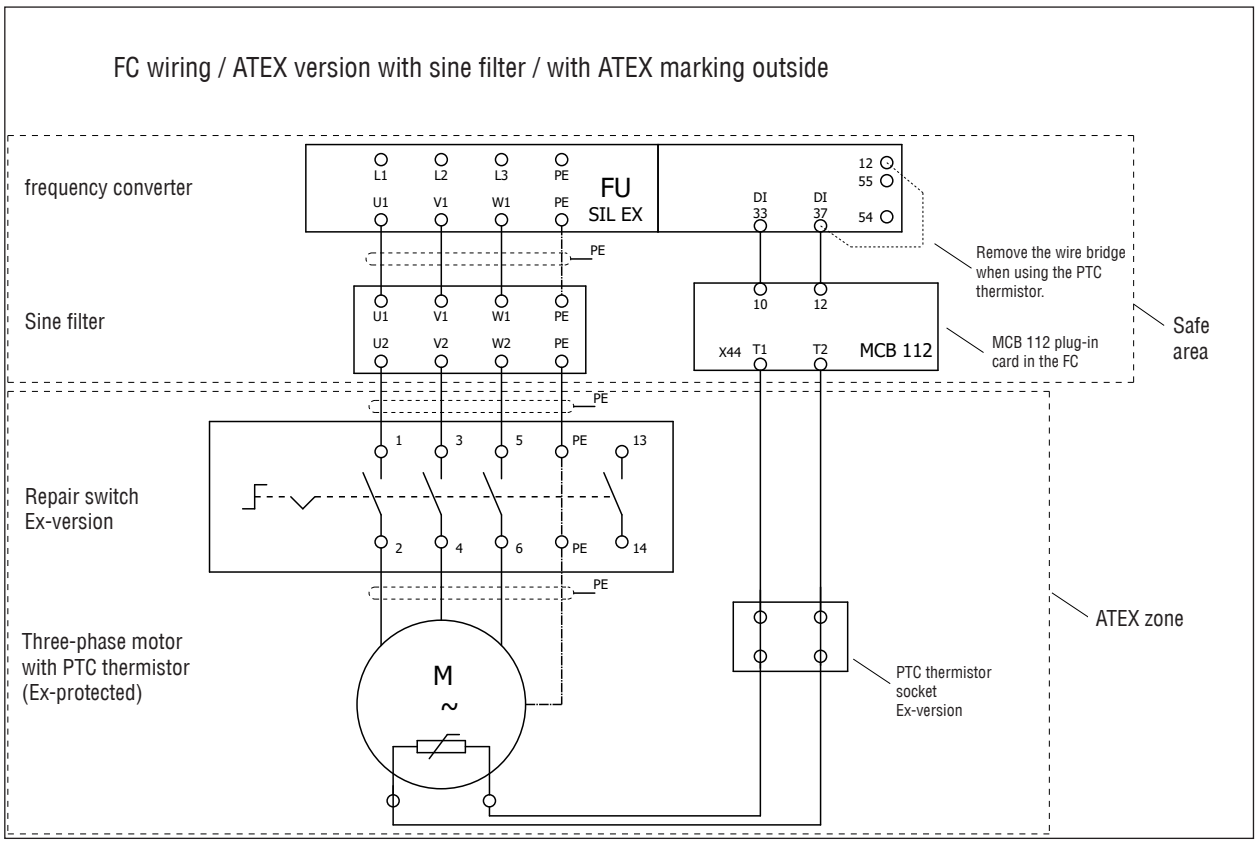


Fig. 60 Circuit of three-phase motors with frequency converter (FC 102) and external repair switch (with ATEX requirements outside)

The following must be noted when operating with frequency converter:

1. The fan motor combination must be suitable for operation via frequency converters. Depending on the motor, frequency converter or fan manufacturer, a sine filter must be taken into account.
2. The frequency converter and the sine filter must be mounted outside the ATEX zone. These components must not be mounted on the ATEX air handling unit.
3. The motor must be protected against overload, e.g. PTC thermistor and approved PTC thermistor evaluation unit. This PTC thermistor evaluation can also be carried out via the board MCB112 (especially for use with explosion-protected motors) of the Danfoss frequency converter. A motor protection switch with bimetallic release is not suitable.
4. Under no circumstances may the permitted maximum speed of the fan and the motor be exceeded.
5. Observe the operating instructions of the frequency converter manufacturer.
6. Installation in accordance with the EMC Directive, ATEX Directive and the ATEX standards must be guaranteed.
7. If the motor is operated via a FC or EC technology, the combination can be secured using a residual current circuit breaker. For this purpose, an all-current sensitive residual current circuit must be selected.

ATTENTION

The connection diagrams are intended for illustration only. The actual connection diagram for the specific installation is to be found in the installation documentation and applied.

5.10.1.3 Connection of EC fans

- The circuit diagrams for EC fans are to be clarified according to the order.
- The motors are generally equipped with internally connected temperature monitors.
- If the motor is operated via a FC or EC technology, the combination can be secured using a residual current circuit breaker. For this purpose, an all-current sensitive residual current circuit must be selected.

The following must be observed when operating EC fans:

1. The EC fan used must be suitable for the required ATEX marking
2. The EC motor has integrated protection functions that automatically switch off the motor in case of a fault. No upstream motor protection device is required.
3. Enter the release for the EC motor via the control signal or via the control input 0-10 V (system-related).
4. Do not switch on and off the motor (e.g. in cyclic operation, operational switching) via the mains. In the event of an accident (e.g. fire), the motor can be switched off on the mains side.
5. To avoid electromagnetic interference, care must be taken to ensure a sufficient distance between the mains and control lines.
6. Observe the operating and assembly instructions from the EC fan manufacturer.
7. Installation in accordance with the EMC Directive, DIN-VDE and ATEX Directive must be guaranteed.

5.10.2 Connection of electric air heater

⚠ WARNING

Risk of injuries and explosion due to incorrect or faulty connection.

- Only have the electrical connection carried out by an approved electrician.
- Only have assembly, servicing and maintenance carried out by qualified staff.
- Wear personal protective equipment.
- The electric air heater used must be suitable for the required ATEX marking.
- Integrate the electric air heater into the unit potential.
- Observe the electrical safety rules.

⚠ CAUTION

Risk of burns due to contact with the hot electric air heater.

- Wait until the hot electric air heater has cooled down.
- Wear personal protective equipment.

⚠ CAUTION

Risk of fire and explosion due to foreign objects on the electric heating coil

- Before commissioning, check the electric heating coil for foreign objects.

Special instructions for electric air heaters:

- For the use of an electric air heater, DIN VDE 0100-420 must be observed.
- A separate mains supply is required for the electric air heater.
- Always carry out the electrical connection of the air heater according to the circuit diagram.
- Observe the operating instructions of the electric air heater manufacturer.
- The electric air heater used must be suitable for the required ATEX marking.
- The electric air heater must be integrated into the unit potential.
- The electric air heater may only be operated in combination with a flow monitor (positioning and adjustment is carried out on-site).
- The temperature monitor and the safety temperature limiter are to be integrated into the control circuit of the electric air heater.
- In the case of speed-controlled fans, the power of the electric air heater must be reduced accordingly.
- After any power failure or fault messages, the installation is to be checked for damage and replacement measures must be taken where necessary.

ATTENTION

It is critical to avoid accumulated heat in the area of the electric air heater.

Damage caused by excessively high temperatures due to accumulated heat is excluded from the warranty.

5.10.3 Control (switch cabinet)

- The electrical control (switch cabinet) of the air handling units is available as an option for operation outside the ATEX zones. In this version, the switch cabinet must be installed outside the ATEX zone.
- For assembly in an ATEX zone, the switch cabinet must be suitable for the applicable ATEX zone.

6 Commissioning

ATTENTION

Commissioning protocol

During commissioning, all functions are checked, logged and signed by the operator. Transfer of the operating and assembly instructions is also confirmed on signing. These documents must be attached to the unit documentation.

6.1 Principles

⚠ WARNING

Accident and injury risk due to human misconduct

Failure to observe the safety instructions, standards, directives and regulations leads to a risk of injury and a risk of explosion.

- Disconnect the AT4F ATEX unit from the mains power supply on all poles and secure it to prevent restart before starting any repair or maintenance work.
- Wear personal protective equipment. Personal protective equipment conforming to TRGS 727 is required for work on the AT4F ATEX unit.
- The maintenance instructions in the operating and assembly instructions for central AC units in the AT4F ATEX Series from AL-KO THERM must be observed under all circumstances.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.
- Observe the standards and directives and the ATEX regulations.

ATTENTION

AL-KO THERM generally recommends the replacement of all installed filters after a short period of operation of the AC unit in order to remove any dirt that may have entered the filters during the installation phase and after commissioning.

NOTE

Observe the operating and assembly instructions for the individual field devices/components.

Before commissioning, always ensure the following:

- that the AT4F ATEX unit has been installed as described in these operating and assembly instructions (see chapter "5 Assembly" on page 34).
- that all the filter elements are correctly installed. Check the tight fit of all installed filters, in particular the fine dust filters.
- that the duct system and the water and drain pipe are properly connected to the unit.
- that the fresh air inlet is at a sufficient distance from contamination sources (kitchen hood extraction, central dust extraction, etc.).
- that the electrical installations have been implemented completely and professionally.
- that all media connections have been professionally connected and are leak-tight.
- that all components are installed professionally and integrated into the unit potential, see chapter "5.2 Preparations" on page 35. Document this test.
- that only components/components suitable for the required ATEX marking have been used.
- that no impermissible changes have been made to components.
- that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.

6.2 Before system start

⚠ WARNING

To be carried out by the person responsible:

- After carrying out the work, ensure that there are no longer any persons in the installation.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Before commissioning the installation, ensure that all factory-installed protective measures are functioning correctly.
- After carrying out the work, ensure that all maintenance doors, inspection covers and housing covers are integrated into the unit potential. After each release of these equipotential bonding connections, they must be restored, checked and documented.

⚠ WARNING

Risk of injuries due to run-on of fans.

- Only open the inspection doors only when the fans are switched off and stationary.
- Observe the delay time of the fans. Observe a waiting time of 3 minutes, until the fan impellers are stationary, before opening the inspection doors.
- Never brake the impellers of the fans by hand or using an object.

⚠ WARNING

Risk of injury from fan during fan test run.

- Never disassemble or bypass safety installations.
- Work with care.
- Remove any loose parts in the air handling unit.
- Eliminate tripping hazards.
- Maintain the safety distance.
- Do not remain in the rubble cloud when the fan starts up.
- Wait until the fan impeller has come to a standstill.
- Perform a vibration measurement of the fan impeller. If the permissible vibrations are exceeded, no commissioning may take place. Observe the table with the respective vibration values (see chapter "3.2 Technical data" on page 19). Contact our customer service if necessary.

  Phone: +49 8225 39 - 2574
  E-mail: service.center@al-ko.com
  Web: www.al-ko.com

- Carry out a visual inspection for cracks in the impeller.
- Wear personal protective equipment (ear protection).
- Never brake the impellers of the fans by hand or using an object.

⚠ WARNING

Risk of explosion due to electrostatic discharge, electrical ignition sparks or friction and grinding sparks or overheating during fan test run.

Electrostatic charging, ignition, friction or grinding sparks or overheating can lead to an explosion.

- Check the that screw connections are securely fitted.
- Check that the fan is integrated in the unit potential.
- Check the gap dimension depending on the fan design.
- Document and confirm the test results.
- Depending on the version, use ignition source monitoring, e.g. vibration monitoring.
- Have work performed only by trained, qualified staff.
- Work carefully at all times and observe the safety rules.
- Observe the operating instructions of the manufacturer.

⚠ WARNING

Risk of explosion due to electrostatic discharge or misalignment of the damper fins.

Due to misalignment of the fins, the zone reduction is not achieved when the fins are open. The electrostatic charging of the dampers can result in an explosion.

- Check that the dampers are integrated into the unit potential.
- Check the correct position of the fins and the correct function of the dampers.

⚠ CAUTION

Risk of fire and explosion due to foreign objects on the electric heating coil

- Before commissioning, check the electric heating coil for foreign objects.

ATTENTION

Hygienic and toxological concerns may arise during 100% recirculation air operation due to the contamination of the waste air with pollutant gases. A minimum outdoor air volume flow must therefore be ensured during recirculation air operation.

ATTENTION

Check seals before commissioning and apply seals when fans are running.

Before starting up the system, check:

- Mechanical function of the multi-leaf dampers.
- Tight fit of all installed filters.

NOTE

AL-KO THERM generally recommends the replacement of all installed filters after a short period of operation of the AC unit to remove any dirt that may have entered the filters during the installation phase and after commissioning (see chapter "7.4 Replacing components" on page 126).

Use only original spare parts.

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- Bypass damper for mechanical function (plate heat exchanger).
- Fan for foreign objects and easy running.
- Heat exchangers for contamination, damage and leakage of the media connections.
- Each condensate drain must be connected to the drain system by a separate siphon. Direct connection of water drains to the drain system is not permitted.
- Fully assemble the unit and commission it according to the commissioning protocol.
- Inspection doors/inspection covers must be closed.
- The inspection covers must be integrated into the unit potential. After each release of these connections, they must be restored, checked and documented.

6.2.1 Commissioning of the electric heating coil

ATTENTION

Electric heating coil

Check safety chain: Test the function of the flow monitor and temperature monitor and adjust these if necessary. This is the only way to ensure safe operation of the air handling unit.

- Observe the operating instructions of the manufacturer.

Frequent causes of error for accumulated heat with electric air heaters

Cause	Remedy
No air volume flow	Check that the dampers are open. Check the function of the fan unit. Check if a foreign object has been drawn in.
Insufficient air volume flow through controlled fans	Adjust the air volume in speed-controlled fans to the heating capacity. Check that the dampers are open. Check if a foreign object has been drawn in.
Temperature monitor is not connected	The temperature monitor is mandatory and must be checked.
Safety temperature limiter is not connected	The safety temperature limiter is mandatory and must be checked.
No fan delay	The fan delay is absolutely necessary. If this is not the case, the electrical circuit must be checked.
Incorrect commissioning – Checking the electric heater without sufficient air flow due to closed flaps or false air, for example	Ensure that there is always a sufficient air volume flow at the heating coil during testing
Air temperatures above 40 °C	Ensure that the air temperatures do not exceed 40 °C at any time. The air temperature in normal operation (continuous operation) must not exceed 40 °C

6.2.2 Commissioning of fans

⚠ WARNING

Risk of injury caused by impeller breakage

Operation with impermissibly high vibration values, in particular with fans without spiral housing, can result in impeller breakage, which can lead to serious property damage and personal injuries.

- Perform a vibration measurement of the fan impeller regularly and document the checks. If the permissible vibrations are exceeded, no operation may take place. Observe the table with the respective vibration values.
- For speed control, the frequency converter must generally be operated without overmodulation.
- Evaluation via a separate PTC thermistor evaluation unit with corresponding ATEX approval or the supplied frequency converter, in combination with the additional MCB112 plug-in card.
- During commissioning, determine the resonance speeds and eliminate them, e.g. by hiding the frequencies on the frequency converter.
- Do not operate fans in the range of the resonance speed (and its multiples) of the fan motor system.
- Operation with impermissibly high vibration values can result in impeller breakage, which can lead to serious property damage and personal injuries. AL-KO THERM recommends continuous monitoring using a vibration sensor (available as an option).
- Only operate the fan when the fan is integrated into the unit potential.

ATTENTION

- Danger of motor overloading with an incorrect direction of rotation.
- Power consumption must not exceed the specified nominal current.
- Maximum motor speed must not be exceeded.
- Maximum fan speed must not be exceeded.
- Above a rated motor output of 3 kW: Star-delta starting.

- Observe the operating instructions of the manufacturer.

6.2.2.1 Commissioning of fans with belt drive

- Remove transport locks from the fan base frame.
- Inspect the duct system and fan for foreign objects.
- Check the impeller moves freely by turning it by hand.
- Check the fan rotation direction (see arrow on fan housing) by briefly switching on the motor (caution with open door).
- If necessary, reverse the motor polarity and correct the rotation direction.
- Measure the power consumption with closed maintenance doors and compare to the nominal current specified on the motor type plate.
- Perform a protective earthing conductor test.
- Check for loose components (correctly tightened taper-lock clamping bushes, screws on the motor substructure/ pressure bulkhead, see chapter "7.3.8.4 Fan with belt drive" on page 120
- Check that the fan is integrated in the unit potential.

Belt drive commissioning

- Check V-belts for ATEX marking (antistatic/dissipative).
- Check the belt tension and re-tighten if necessary.
- Check alignment (flush) of the V-belt pulleys.
- Check the belt drive and set the required belt tension.
- Check the frictional seating of the pulleys and their exact alignment (parallelism).
- After approx. 1 hour, check the V-belt pulley, motor and fan screws and, if necessary, retighten, check the belt tension and, if necessary, tighten, see the clamping specification for the belt drives.

ATTENTION

Incorrectly tensioned belt drives can cause bearing damage to the fan and the electric motor. From a standstill time of 3 months, the belt drives must be relaxed or removed to avoid bearing damage, otherwise the warranty will be voided.

The belt-driven ATEX fans are complete units with an ATEX certificate. Modifications to ATEX components are not permitted; this will void the ATEX certificate.

6.2.2.2 Commissioning of fan free-wheel with direct drive

- Remove transport locks from the fan base frame.
- The unit must be inspected for transport damage before commissioning.
- The impeller must not touch the fan inlet nozzle. Check the impeller moves freely by turning it by hand.
- Check the fan rotation direction (see arrow on fan housing) by briefly switching on the motor (caution with open door).
- If necessary, reverse the motor polarity and correct the rotation direction.
- Measure the power consumption with closed maintenance doors and compare to the nominal current specified on the motor type plate.
- Perform a protective earthing conductor test.
- Check for loose components (correctly tightened taper-lock clamping bushes, screws on the motor substructure/pressure bulkhead), see chapter "7.3.8.10 Maintenance or inspection of the taper-lock clamping bushes" on page 125
- Check that the fan is integrated in the unit potential.

Check gap dimension

For free-wheels, the gap dimension between the inlet nozzle and impeller must be checked all the way around.

Depending on the fan manufacturer and fan design, there are fixed values that must be observed. These must be checked before commissioning and documented accordingly.

The diagrams of the gap dimensions to be measured differ depending on the fan manufacturer.

The image below on the gap measurement is an example only. Depending on the fan manufacturer, the measured values are to be sent to the fan manufacturer for operational approval.

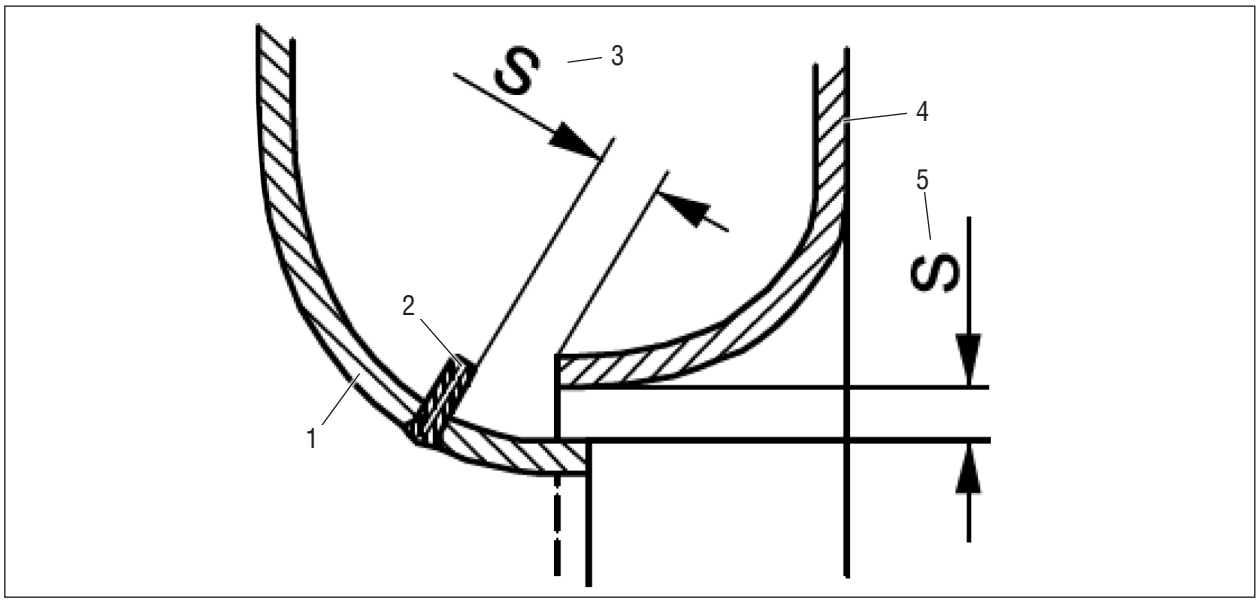


Fig. 61 Example for gap dimensions (depending on the manufacturer)

1	Inlet nozzle	2	Measuring nipple of the volumetric flow measuring device
3	Gap dimension between impeller edge and measuring nipple of the volume flow measuring device	4	Impeller
5	Gap dimension between inlet nozzle and impeller		

Step	Action
1	Before commissioning, check the gap dimension between the impeller edge and the measuring nipple of the volumetric flow measuring device and between the impeller and inlet nozzle in accordance with the fan manufacturer's documentation. For the valid measured values, see the documentation of the respective fan manufacturer.
2	The fan may only be operated if the test has been passed. Document the test results.

ATTENTION

Risk of ignition due to impermissible gap dimensions between stationary and rotating components.

- Ensure that the gap does not fall below the valid gap dimension at any point.

ATTENTION

Observe the manufacturer's documentation.

6.2.2.3 Commissioning of the built-in fan (motor outside the air flow)

- Remove transport locks from the fan base frame.
- The unit must be inspected for transport damage before commissioning.
- The built-in fan must be suitable for the required ATEX marking.
- The impeller must not touch the fan inlet nozzle. Check the impeller moves freely by turning it by hand.
- Check the fan rotation direction (see arrow on fan housing) by briefly switching on the motor (caution with open door).
- If necessary, reverse the motor polarity and correct the rotation direction.
- Measure the power consumption with closed maintenance doors and compare to the nominal current specified on the motor type plate.
- Perform a protective earthing conductor test.
- Check for loose components (correctly tightened taper-lock clamping bushes, screws on the motor substructure/pressure bulkhead), see chapter "7.3.8.10 Maintenance or inspection of the taper-lock clamping bushes" on page 125
- Check that the fan is integrated in the unit potential.

Check gap dimension

For built-in fans, the gap dimension between the inlet nozzle and impeller must be checked all the way around.

Depending on the fan manufacturer and fan design, there are fixed values that must be observed. These must be checked before commissioning and documented accordingly.

The diagrams of the gap dimensions to be measured differ depending on the fan manufacturer.

The image below on the gap measurement is an example only. Depending on the fan manufacturer, the measured values are to be sent to the fan manufacturer for operational approval.

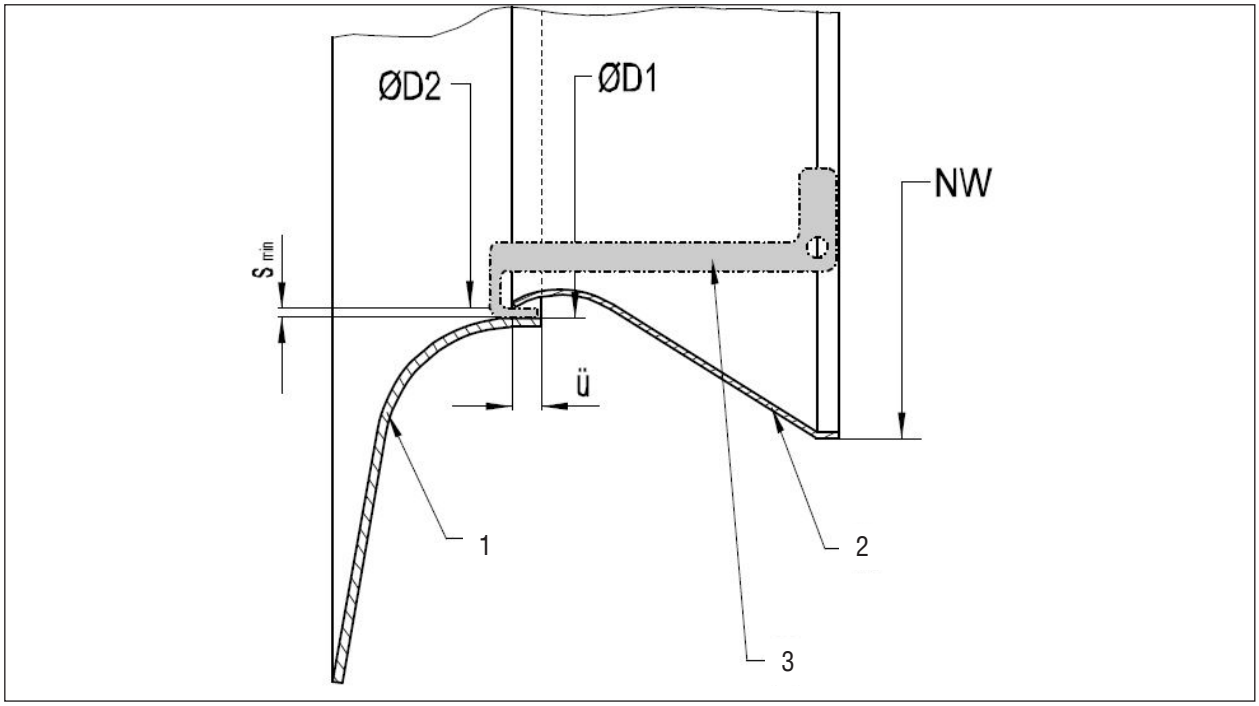


Fig. 62 Example for gap dimension (depending on the manufacturer)

1	Impeller	2	Inlet nozzle
3	Gap dimension gauge	NW	Nominal width (nozzle)
D1	Inner diameter (cover disc nozzle of the impeller)	D2	Outer diameter (inlet nozzle)
s_{min}	With test gauge for gap width to be ensured	ü	Coverage

Step	Action
1	Check the gap dimension between the impeller and inlet nozzle according to the fan manufacturer documentation. Ensure that the gap dimension is not underrun during any phase of the rotary movement (turning by hand). For the valid measured values, see the documentation of the fan manufacturer.
2	Measure the gap dimension at four points m circumference offset by 90°. Place the supplied gauge to the outer diameter of the inlet nozzle. The minimum gap must not be underrun. The gauge must not jam, slight rubbing of the impeller during rotation is permissible.
3	The fan may only be operated if the test has been passed. Document the test results.

ATTENTION

Risk of ignition due to impermissible gap dimensions between stationary and rotating components.

- Ensure that the gap does not fall below the valid gap dimension at any point.

ATTENTION

Observe the manufacturer's documentation.

6.2.3 Heat exchanger commissioning

⚠ WARNING

Risk of explosion due to impermissible components and electrostatic charging.

If inadmissible components are used for the ATEX version, the unit can be electrostatically charged and result in an explosion.

- Check that the heat exchangers are integrated into the unit potential.
- Check that only components approved for the ATEX area have been used.

ATTENTION

During commissioning, observe chapter "5.9.4 Filling and venting" on page 73.

- Piping must be provided on-site.
- Check that the heat exchangers are integrated into the unit potential.
- Circulating pump must be dimensioned according to the technical data sheet. Depending on the version, the circulation pump must be installed outside the ATEX area.
- Heat exchangers must be connected in the counterflow principle.
- In the case of two-part heat exchangers, their pipe or screw connections are to be retightened in the air handling unit and tested for leak-tightness.
- Antifreeze concentration must correspond to the specifications on the technical data sheet.
- The pre flow is at the top or bottom, depending on the air direction.
- We recommend the use of the antifrogen N with a mixture of 25 – 35 %.
- During the pressure test, the entire installation must be checked for leakage.
- It is to be rinsed until no more residual particles and scale are flushed out.

6.2.3.1 Commissioning of circulating coil system CCS (recuperative energy recovery)

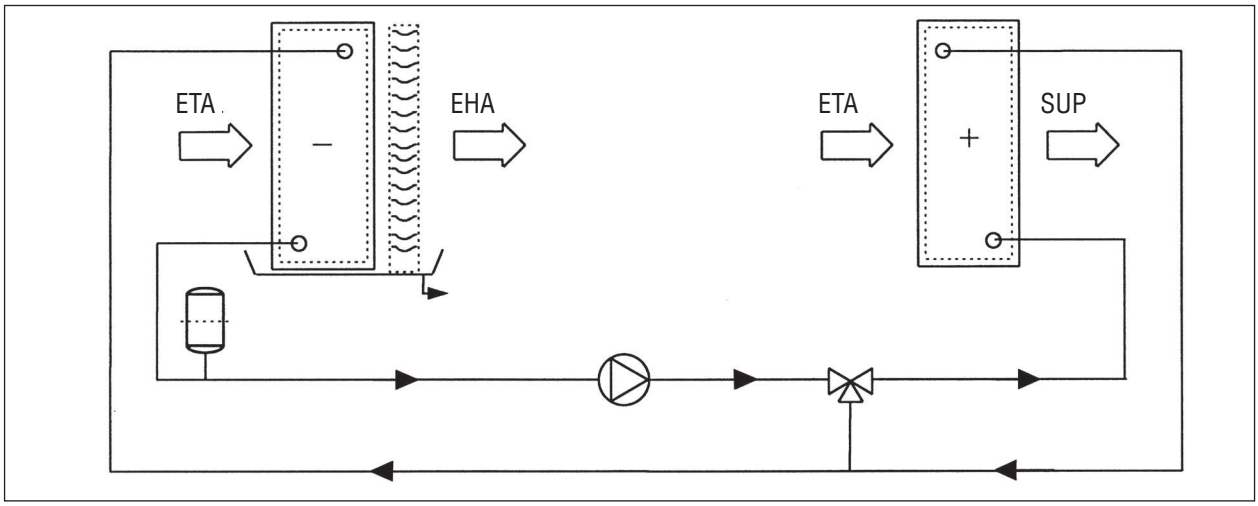


Fig. 63 Schematic diagram of a circulating coil system

ATTENTION

When using high-performance circuit heat recovery systems, observe the manufacturer's operating instructions.

6.3 Switching the installation on/off

⚠ WARNING

Risk of serious injuries or death.

Working on the AT4F ATEX unit can result in serious injury or death.

- After switching off via the main switch, no safety functions of the unit are then guaranteed (e.g. frost protection).
- Never use the main switch to switch it on and off during operation.
- Use the main switch only for repair purposes.

- The main switch connects the installation to the mains power supply. This means that all control and regulating modules are ready for operation.

6.4 After system start

NOTE

Further information on the control of AT4F ATEX unit can be found in the AL-KO THERM operating manual for "Control ART TECH LEVEL II".

⚠ WARNING

Risk of injuries due to run-on of fans.

- Only open the inspection doors only when the fans are switched off and stationary.
- Observe the delay time of the fans. Observe a waiting time of at least 3 minutes, until the fan impellers are stationary, before opening the inspection doors.
- Never brake the impellers of the fans by hand or using an object.

- Check the valves of the heat exchangers to see if they are in the correct position. If this is not the case, the direction of rotation of the valve actuators must be changed if necessary. The valve actuators must be placed outside the ATEX area.
- Set the time, date, average and low air performance, and program the weekly schedule.

7 Servicing and maintenance

7.1 Safety instructions for servicing and maintenance

⚠ WARNING

Risk of injury.

- Disconnect the AT4F ATEX unit from the mains power supply on all poles and secure it to prevent restart before starting any repair or maintenance work.
- Close the media supply (water, gas, etc.) before all repair and maintenance work.
- Follow the applicable safety rules.
- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.

To be carried out by the person responsible:

- Ensure that only suitable components according to the required ATEX marking are used.
- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Personal protective equipment conforming to TRGS 727 is required for work on the AT4F ATEX unit!
- Only suitable tools that meet the requirements of DIN EN 1127-1 may be used.
- After carrying out the work, ensure that there are no longer any persons in the installation.
- After carrying out the work, ensure that all maintenance doors, inspection covers and housing covers are integrated into the unit potential. After each release of these equipotential bonding connections, they must be restored, checked and documented (see chapter "5.2 Preparations" on page 35).
- After carrying out the work, ensure that all components are integrated back into the unit potential.
- Before restarting the installation, ensure that all factory-installed protective measures are functioning correctly.

⚠ WARNING

Risk of cuts

There is a risk of cutting injuries during cleaning and maintenance of the AT4F ATEX unit.

- Wear personal protective equipment (cut-proof gloves).

⚠ WARNING

Risk of slipping! Leaked medium/condensate

- Immediately take up the spill quantity and dispose of it properly.

⚠ WARNING

Risk of injury from falling from ladders, scaffolding or work platforms.

- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

⚠ WARNING

Risk of injuries due to fan delay

- Only open the inspection doors only when the fans are switched off and stationary.
- Observe the delay time of the fans. Observe a waiting time of at least 3 minutes, until the fan impellers are stationary, before opening the inspection doors.
- Never brake the impellers of the fans by hand or using an object.

⚠ WARNING

Risk of explosion due to electrostatic discharge.

When cleaning the unit type plates, the type plates, roof film and the cable duct cover, the unit can become electrostatically charged and cause an explosion.

- Only clean the AT4F ATEX unit with a damp cloth.

⚠ CAUTION

Risk of burns as a result of contact with hot surfaces and media (plate heat exchanger, heat exchanger and electric heating coil)

- Wait until the hot surfaces have cooled down.
- Wear personal protective equipment.

NOTE

The owner of an RLT installation is obliged to have the system maintained regularly by trained qualified staff.

AL-KO THERM recommends that maintenance is carried out in accordance with German VDI 6022 and VDMA 24186.

In addition, a hygiene inspection in compliance with VDI 6022 is required every 3 years.

Upon conclusion of a maintenance contract, AL-KO THERM undertakes these tasks.

Customer Service
Phone: +49 8225 39 - 2574
E-mail: service.center@al-ko.com
Web: www.al-ko.com

ATTENTION

Only use original consumables and spare parts. This is the only way to ensure safe operation.

Use of other parts will void the EU Declaration of Conformity and the warranty.

A spare parts list can be found as part of the unit documentation.

Customer Service
Phone: +49 8225 39 - 2574
E-mail: service.center@al-ko.com
Web: www.al-ko.com

7.1.1 Qualifications of personnel

Constant adherence to the hygiene requirements and execution of the operation and maintenance measures required for this in AC installations necessitate corresponding personnel qualifications. Demanding operating activities as part of maintenance as well as inspections and repairs must only be performed by trained qualified staff.

- Due to the ATEX versions of the units, special expertise is required. Appropriate training is required for this purpose.
- Special training courses for "simple hygiene activities" (also called category B) and "demanding hygiene activities" (also called category A) are offered for these activities.
- Only qualified staff who have successfully completed this training is authorised to perform hygiene activities.

The tasks involved in maintenance measures are described in greater detail in the following table:

Grouping of the measures (according to VDMA)		
Inspection Objectives of the measures (acc. to DIN 31 051)	**Maintenance Objectives of the measures (acc. to DIN 31 051)**	**Repair Objectives of the measures (acc. to DIN 31 051)**
Determining and assessing the actual condition	Maintaining the nominal condition	Restoring the nominal condition
Individual measures	**Individual measures**	**Individual measures**
Checking, measuring, assessing	Checking, adjusting, replacing, adding, lubricating, preserving, cleaning	Repairing, replacing
Execution by	**Execution by**	**Execution by**
Technicians, engineers, skilled trades-persons	Trained personnel (limited use), specialists, qualified persons	Specialists, qualified persons
Required hygiene training according to VDI 6022 Sheet 4	**Required hygiene training according to VDI 6022 Sheet 4**	**Required hygiene training according to VDI 6022 Sheet 4**
Category A	Category B	Category B

7.2 Maintenance instructions in accordance with VDI 6022 and VDMA 24186

- The owner/operator is obliged to have the installation maintained regularly by qualified staff.
- The operating and assembly instructions for the installed parts must be observed under all circumstances (request them if necessary).

7.2.1 Initial and repeat inspections must only be performed by category A trained qualified staff according to VDI 6022 Sheet 1

Inspections necessitate particular specialist training or technician qualification in the field of supply technology as well as category A training. Hygiene inspections have to be performed regularly to meet these requirements.

Hygiene inspection intervals

- for AC installations at an interval of every 3 years.

We recommend that hygiene specialists are commissioned to complete these inspections.

The hygiene inspections include at least the following activities:

- Inspection of the central AC unit, including all components and the rooms supplied via the unit.
- If hygiene deficiencies are discovered: Measurement of physical climate parameters (temperature, humidity, air velocity) at representative points of the AC installation.
- In the case of visually noticeable hygiene deficiencies, the causes must be identified and eliminated. If required for determination, perform additional microbiological investigations, e.g. determination of the supply air colony count, semi-quantitative surface investigations or differentiation according to microbe types.

As the result of the hygiene inspection, documentation of the hygiene status of the inspected AC installation and written notification of the inspection result to the owner, including a list of necessary measures, must be drawn up. The date of any necessary follow-up inspection must be defined depending on the urgency of the measures to be performed.

Critical findings exist in the following cases:

- On occurrence of higher microbial counts downline of air conditioning installations than upline
- On visible mould infestation or other microbial coatings

In the event of a critical finding, a hygienist or further qualified staff must be consulted, and the company physician must be involved.

7.2.2 Performing of hygiene checks during maintenance by Category B trained maintenance personnel in accordance with VDI 6022 Sheet 1

The aim of the hygiene checks to be performed regularly by the maintenance personnel is to determine and eliminate hygiene deficiencies on the air conditioning installations at an early stage through frequent visual inspections or random microbiological self-checks.

The regular hygiene checks include the following measures:

- Visual inspection of the relevant AC area for hygiene deficiencies such as e.g. microbial growth or soiling, rust formation, calcium deposits and damage.
- Check of the total colony count in the circulated water of air humidifiers.

Table 6 in Section 5.5 of VDI 6022 Sheet 1 specifies the type and scope of the checks to be performed, any measures required to eliminate ascertained hygiene deficiencies and the time intervals within which the respective hygiene checks are to be performed.

7.2.3 Maintenance schedule

Hygiene requirements and maintenance, servicing of air handling units in accordance with VDI 6022 and VDMA 24186

	Activity/unit components	Measure / remark	Inspections to be performed at monthly intervals				
			1	3	6	12	24
1	**Hygiene inspection**		**1**	**3**	**6**	**12**	**24**
		To be performed by trained qualified staff in accordance with VDI 6022 Sheet 4	AC installations: every 3 years				
2	**Outdoor air intakes and exhaust air outlets**		**1**	**3**	**6**	**12**	**24**
2.1	Check for soiling, damage and corrosion	Clean completely and repair				X	
3	**Unit housing**		**1**	**3**	**6**	**12**	**24**
3.1	Inspect for soiling, damage and corrosion on the air side	Clean and repair				X	
3.2	Check for water formation (condensate, leaks)	Clean and identify the cause			X		
3.3	Check function of drains	Clean, if necessary				X	
3.4	Check flexible connections for leaks					X	
3.5	Check doors and closures for ease of movement and leak-tightness	Repair				X	
3.6	Check the integration of the housing parts into the unit potential	Repair					
3.7	Check the condition of the type plates for legibility.	If necessary, replace it				X	

	Activity/unit components	Measure / remark	Inspections to be performed at monthly intervals				
			1	3	6	12	24
4	**Air filter**		**1**	**3**	**6**	**12**	**24**
4.1	Check for impermissible soiling, damage (leaks) and odours	Air filters must have a filtration efficiency appropriate to the filter class over their entire period of use. If there is noticeable soiling or leakage, the filter must be replaced. Replace the air filter concerned if the last change of the filter stage is less than six months ago, otherwise replace the whole filter stage. Check new filters for damage, check for suitability with regard to the ATEX marking, insert filter, check filter for integration into the equipotential bonding, and document.		X			
4.2	Check differential pressure	If the maximum differential pressure is exceeded, replace the filter stage. Check new filters for damage, check for suitability with regard to the ATEX marking, insert filter, check filter for integration into the equipotential bonding, and document.	X				
4.3	Latest filter change with non-regenerative air filters, otherwise thorough cleaning	Check new filters for damage, check for suitability with regard to the ATEX marking, insert filter, check filter for integration into the equipotential bonding, and document.				X	
	1. filter stage					X	
	2. filter stage						X
4.4	Check the hygiene condition					X	
4.5	Check integrations of the air filter into the unit potential	Repair					
5	**Droplet eliminator**		**1**	**3**	**6**	**12**	**24**
5.1.1	Inspect on the air side for soiling and damage	Function-preserving cleaning of all surfaces, including trays; dismantle the droplet eliminator, if necessary. After installation, integrate into the unit potential, check the equipotential bonding and document it.	X				
5.1.2	Inspect the droplet eliminator for coating formation	Function-preserving cleaning in the event of visible encrustation. After installation, integrate into the unit potential, check the equipotential bonding and document it.	X				
5.1.3	Check function of water drain and odour trap	Clean and repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.				X	
5.1.4	Check integrations of the droplet eliminator into the unit potential	Repair					
6	**Heat exchangers, general**		**1**	**3**	**6**	**12**	**24**
		If cleaning in installed state is not sufficient, the heat exchanger must be pulled out and cleaned accordingly. After installation, integrate into the unit potential, check the equipotential bonding and document it.					
6.1.1	Check for soiling, damage and corrosion	Clean and repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.		X			

	Activity/unit components	Measure / remark	Inspections to be performed at monthly intervals				
			1	3	6	12	24
6.1.2	Check wet cooler, condensate drip tray and droplet eliminator for soiling, corrosion and function	Repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.		X			
6.1.3	Check function of siphon	Repair		X			
6.1.4	Check the hygiene condition					X	
6.1.5	Check integrations of the heat exchangers into the unit potential	Repair					
6.2	**Air heater**		**1**	**3**	**6**	**12**	**24**
6.2.1	Inspect on the air side for soiling, damage and corrosion	Repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.		X			
6.2.2	Clean to preserve function (air-side)	After installation, integrate into the unit potential, check the equipotential bonding and document it.				X	
6.2.3	Check function of flow and return flow					X	
6.2.4	Venting					X	
6.2.5	Check integrations of the fan heater into the unit potential	Repair					
6.3	**Electric air heater**		**1**	**3**	**6**	**12**	**24**
6.3.1	Check for scale deposits and corrosion	Clean and repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.			X		
6.3.2	Clean to preserve function (air-side)					X	
6.3.3	Check functionality	Repair				X	
6.3.4	Check control and safety equipment for correct function	Repair				X	
6.3.5	Check integrations of the electric air heater into the unit potential	Repair					
6.4	**Air cooler (air/liquid) dehumidifier evaporator (air/refrigerant)**	**The siphon with backflow protection must be dimensioned according to the pressure conditions and located in such a way that the condensate can drain off without delay**	**1**	**3**	**6**	**12**	**24**
6.4.1	Inspect for soiling, damage and corrosion	Clean and repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.			X		
6.4.2	Inspect wet cooler, condensate pan and droplet eliminator for soiling, corrosion and function. Check function of siphon	Repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.		X			
6.4.3	Clean wet cooler, droplet eliminator and trays	After installation, integrate into the unit potential, check the equipotential bonding and document it.				X	
6.4.4	Check function of flow and return flow	After installation, integrate into the unit potential, check the equipotential bonding and document it.				X	
6.4.5	Venting	(with liquid only)				X	
6.4.6	Check for icing	(at the evaporator only) only possible during operation				X	
6.4.7	Check the hygiene condition					X	
6.4.8	Check integrations of the air cooler into the unit potential	Repair					

	Activity/unit components	Measure / remark	Inspections to be performed at monthly intervals				
			1	3	6	12	24
	Droplet eliminator		**1**	**3**	**6**	**12**	**24**
6.4.9	Inspect for soiling damage and coating formation	Function-preserving cleaning of all surfaces, including trays; dismantle the droplet eliminator, if necessary. After installation, integrate into the unit potential, check the equipotential bonding and document it.	X				
6.4.10	Inspect the droplet eliminator for coating formation	Function-preserving cleaning in the event of visible encrustation. After installation, integrate into the unit potential, check the equipotential bonding and document it.	X				
6.4.11	Check function of water drain and odour trap	Clean and repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.				X	
6.4.12	Check integrations of the droplet eliminator into the unit potential	Repair					
7	**Heat recovery, general**		**1**	**3**	**6**	**12**	**24**
		Heat exchangers and their accessories must be checked periodically for airborne contamination, corrosion and damage.					
7.1.1	Check for soiling, damage and corrosion	Clean and repair.			X		
7.1.2	Check leak-tightness between exhaust and outdoor air supply	Repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.		X			
7.1.3	Inspect condensate pan and droplet eliminator for soiling, corrosion and function	Repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.		X			
7.1.4	Check function of siphon	Repair		X			
7.1.5	Clean wet cooler, droplet eliminator and condensate pan	After installation, integrate into the unit potential, check the equipotential bonding and document it.			X		
7.1.6	Check the hygiene condition					X	
7.1.7	Check integrations of the heat recovery into the unit potential	Repair					
7.2	**Cross-flow heat exchanger**		**1**	**3**	**6**	**12**	**24**
7.2.1	Inspect on the air side for soiling, damage and corrosion	Clean and repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.			X		
7.2.2	Clean to preserve function (air-side)					X	
7.2.3	Check function of cleaning equipment	If available, repair				X	
7.2.4	Check for hygienic condition					X	
7.2.5	Check integrations of the cross-flow heat exchanger into the unit potential	Repair					
	Droplet eliminator		**1**	**3**	**6**	**12**	**24**
7.2.6	Inspect on the air side for soiling and damage	Function-preserving cleaning of all surfaces, including trays; dismantle the droplet eliminator, if necessary. After installation, integrate into the unit potential, check the equipotential bonding and document it.	X				

	Activity/unit components	Measure / remark	Inspections to be performed at monthly intervals				
			1	3	6	12	24
7.2.7	Inspect the droplet eliminator for coating formation	Function-preserving cleaning in the event of visible encrustation, dismantle droplet eliminator if necessary. After installation, integrate into the unit potential, check the equipotential bonding and document it.	X				
7.2.8	Check function of water drain and odour trap	Clean and repair. After installation, integrate into the unit potential, check the equipotential bonding and document it.				X	
7.2.9	Check integrations of the droplet eliminator into the unit potential	Repair					
8	**Sound absorber**		**1**	**3**	**6**	**12**	**24**
	Sound attenuator splitters with perforated plate	Sound absorbers are to be inspected externally at periodic intervals for soiling, damage and corrosion. If it is not possible to see inside the sound absorbers, they must be removed. After installation, integrate back into the unit potential, check the equipotential bonding and document it.					
8.1	Inspect sound absorbers for soiling, damage and corrosion	Repair. After installation, integrate back into the unit potential, check the equipotential bonding and document it.				X	
8.2	Inspect the inner air line surface for soiling and corrosion at two to three representative points	Determine the cause and clean the corresponding air guidance sections.				X	
8.3	Check integrations of the sound absorber into the unit potential	Repair					
9	**Dampers**		**1**	**3**	**6**	**12**	**24**
9.1	Check for soiling, damage and corrosion	Clean and repair				X	
9.2	Check the mechanical function	Repair				X	
9.3	Actuators	Function check				X	
9.4	Check integrations of the dampers into the unit potential	Repair					
10	**Fire prevention dampers if installed in the unit**		**1**	**3**	**6**	**12**	**24**
	Only with appropriate ATEX approval	The test certificate must also be observed See also VDMA 24186 Part 7					
10.1	Check flaps for ease of movement	Repair				X	
10.2	Check engagement device for soiling and function	Clean, if necessary				X	
10.3	Check trigger element for soiling and function	Replace trigger element if necessary				X	
10.4	Check seals for soiling and damage	Clean and repair				X	
10.5	Actuators, position indicator	Function check				X	
10.6	Check integrations of the fire prevention damper into the unit potential	Repair					
11	**Fans**		**1**	**3**	**6**	**12**	**24**
		The fan and drive units must be checked periodically for soiling, damage and corrosion					
11.1	Check for soiling, damage and corrosion. Check the impeller, particularly welding seams, for possible cracking.	Clean and repair			X		

	Activity/unit components	Measure / remark	Inspections to be performed at monthly intervals				
			1	3	6	12	24
11.2	Function-preserving cleaning of the water drain and parts of the fan that come into contact with air					X	
11.3	Vibration check!				X		
11.4	Check bearings for noise					X	
11.5	Grease bearings using a relubrication device					X	
11.6	Check flexible connection for leaks	Repair				X	
11.7	Check function of vibration absorbers	Repair				X	
11.8	Drive elements	See item 12					
11.9	Instrument and control facilities	Check the function of pressure/volume flow controllers				X	
11:10	Check integrations of the fan into the unit potential	Repair					
12.	**Drive elements**		**1**	**3**	**6**	**12**	**24**
12.1	**Electric motors**		**1**	**3**	**6**	**12**	**24**
12.1.1	Check the exterior for dirt, secure fitting, damage, and corrosion	Clean and repair				X	
12.1.2	Check the direction of rotation (initial commissioning)						
12.1.3	Re-tighten connection terminals					X	
12.1.4	Measure tension	Measured data must be documented in the measurement log				X	
12.1.5	Measure power consumption	Measured data must be documented in the measurement log				X	
12.1.6	Measure phase symmetry	Measured data must be documented in the measurement log				X	
12.1.7	Check bearings for noise					X	
12.1.8	Grease bearings using a relubrication device					X	
12.1.9	Check the function of the protection device	Repair				X	
12.1.10	Check integrations of the motor into the unit potential	Repair					
12.2	**Belt drive**		**1**	**3**	**6**	**12**	**24**
12.2.1	Inspect for soiling, damage and wear	Replace if necessary; use only dissipative/conductive V-belts.			X		
12.2.2	Function-preserving cleaning	Scope of services must be defined and agreed upon.				X	
12.2.3	Check for tension and alignment	Readjust			X		
12.2.4	Replace belt	Use only dissipative/conductive V-belts				X	
12.2.5	Check the function of the protection device	Repair				X	

7.3 Maintaining and cleaning components

All installed components are either freely accessible for cleaning or can be pulled out of the AT4F ATEX unit or removed after opening the inspection doors/removing the inspection cover.

- Coarse dirt in the housing can be removed using an industrial vacuum cleaner.
- Remove other dirt with a damp cloth.

Cleaning

⚠ WARNING

Risk of explosion due to electrostatic discharge.

When cleaning the unit type plates, the type plates, roof film and the cable duct cover, the unit can become electrostatically charged and cause an explosion.

- Only clean the AT4F ATEX unit with a damp cloth.

- Only lukewarm water, possibly with a mild detergent without perfume, should be used for cleaning. Do not use mechanical aids, e.g. sharp tools, grinding stones, wire brushes, files, steel wool made of unalloyed or low-alloy carbon steel, etc.

Disinfection

- If disinfection is necessary with air handling units, a check must be performed at a suitable and non-critical point before using disinfectants to ensure that the disinfectant does not cause damage to the seals, surfaces, etc.

ATTENTION

Only lukewarm water, possibly with a mild detergent without perfume, should be used for cleaning of the inspection glass.

No cleaning agents and disinfectants that attack the materials used in the HV unit are permitted to be used.

The following points are to be observed for the use of disinfectants and for carrying out the disinfection:

- Specifications from the safety data sheet of the disinfectant must be complied with.
- The disinfectant must be used according to the manufacturer's instructions (e.g. concentration, exposure time, etc.).
- Remove the disinfectant completely.
- Dispose of the disinfectant and the necessary aids correctly.
- Disinfectants containing chloride in combination with a strong continuous action of moisture (e.g. areas around spray humidifiers) can cause corrosion damage to (even coated) materials and may not be used in this application.

Also observe the following:

- Do not use a high-pressure cleaner for cleaning or disinfection.
- Detergents or disinfectants must not penetrate into electrical or mechanical system parts.
- If necessary, completely reinstall the protective and safety installations or coverings removed for cleaning or disinfection and check their functionality.

(Subsequent) damage resulting from a nonetheless carried out or incorrect application of corresponding disinfection or cleaning are at the expense of the initiator.

Hygiene checks

The aim of the hygiene checks to be performed regularly is to determine and eliminate hygiene deficiencies on the air conditioning systems at an early stage through frequent visual inspections or random microbiological self-checks.

The regular hygiene checks include the following measures:

- Visual inspection of the relevant unit area for hygiene deficiencies such as e.g. microbial growth or soiling, rust formation, calcium deposits and damage.
- If soiled components are detected during the hygiene checks, these must be cleaned immediately.
- If necessary for cleaning, the inspection glasses of the AT4F ATEX unit series can be easily removed and have two lenses.
- If housing covers sealed with sealing material are removed for maintenance purposes, the inside of the housing must be sealed again following maintenance using microbially inert sealing material.

7.3.1 Finned heat exchanger

These include the pump hot water and pump cold water heat exchangers, as well as the evaporators, condensers and steam registers.

⚠ WARNING

Risk of cuts

During maintenance and cleaning of the heat exchanger there is a risk of cuts.

- Wear personal protective equipment (cut-proof gloves).

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the heat exchanger, there is a risk of explosion.

- Integrate the heat exchanger back into the unit potential after each unfastening of the equipotential bonding.

⚠ CAUTION

Risk of burns as a result of contact with hot surfaces and media (plate heat exchanger, heat exchanger and electric heating coil)

- Wait until the hot surfaces have cooled down.
- Wear personal protective equipment.

⚠ CAUTION

Risk of slipping! Leaked medium/condensate

- Immediately take up the spill quantity and dispose of it properly.

ATTENTION

At temperatures below freezing, the heat exchanger must be either **drained** and blown out with compressed air, or filled with a commercially available antifreeze with corrosion inhibiting additive due to the risk of freezing and corrosion.

ATTENTION

The use of high-pressure water cleaners with conventional single-jet nozzles is not permitted due to the risk of damage.

Observe the manufacturer's documentation.

The heat exchanger is essentially maintenance-free. Regular cleaning of the heat exchangers is necessary in order to ensure their proper function.

Fins of the finned heat exchanger

Dents in the fins of the heat exchanger have no influence on the function of the system as a whole – as long as the pipes of the fin unit are not damaged – and do not constitute grounds for complaints. The fins can be "combed out" on-site. If necessary, the corresponding tool can be obtained from the manufacturer.

NOTE

For the following heat exchanger designs, additional points are to be observed:

Chapter "7.3.1.3 Circulating coil system (heat exchanger with pipe circuits)" on page 107.

Chapter "5.8.5 Circulating coil system CCS (recuperative energy recovery)" on page 68.

7.3.1.1 Maintenance

- Inspect the heat exchangers on the air side for soiling, damage and corrosion.
- Check connections and screw fittings.
- Check function of flow and return lines.
- Check the venting valve and filling of the heat exchangers.
- Check the function of the frost protection thermostat.
- Check antifreeze concentration and top up if necessary.
- Inspect the siphon and top up, if necessary.
- Check function of water drain and odour trap.
- Inspect the droplet eliminator and clean, if necessary.
- The integration of the heat exchanger and the droplet eliminator into the equipotential bonding must be checked.

NOTE

During prolonged standstills, corrosion can be caused in the heat exchangers by sulphate-reducing bacteria. These sulphides primarily attack the solder seams as well as the copper base material.

We recommend the following measures to reduce this type of copper corrosion:

- Use of sulphate-free water in the whole circuit
- Ensure that the circuit has no leaks
- Avoid prolonged standstills of the filled circuit
- Avoid frequent topping up of fresh water
- Use of material-compatible inhibitors or use of biocides

7.3.1.2 Cleaning

Only methods that do not damage the fins may be used for cleaning of the heat exchanger registers.

	Cleaning methods	Can be used for all types of finned heat exchanger
1	Compressed air	All heat exchanger registers
2	Steam cleaners	Steel galvanised heat exchanger registers only
3	High-pressure water cleaner **only** with THD multi-jet method	All heat exchanger registers

ATTENTION

When using compressed air and steam cleaners ensure a sufficient distance and that the jet is aligned parallel to the fins.

The heat exchanger must be integrated back into the unit potential each time the equipotential bonding is released.

NOTE

Complete removal of the deposits in heat exchangers is not possible using compressed air. Thorough cleaning cannot be guaranteed, particularly in deep registers, by using only compressed air and steam cleaners.

As a result, the dirt deposits are compacted in the depths of the heat exchangers instead of being removed. The consequences are increased pressure losses, a lack of hygiene, odours, material attack, etc.

- The use of high-pressure water cleaners using conventional spray nozzles is not permitted as these can damage the delicate fins and thorough cleaning, particularly in the deeper heat exchanger registers, cannot always be achieved.
- Heat exchanger registers should therefore only by cleaned with high-pressure water cleaners using the THD multi-jet method. This ensures damage-free deep cleaning of the heat exchanger registers. This applies to all heat exchanger register types.
- The cleanability of the AL-KO THERM heat exchanger registers using the THD multi-jet method was demonstrated by the Institute for Air Hygiene Berlin during the hygiene conformity evaluation for the AL-KO air handling units (see figure THD multi-jet method).
- The use of the THD multi-jet method includes the correction of any bent fins to restore the optimum flow and performance of the heat exchangers ("fluidic renovation").

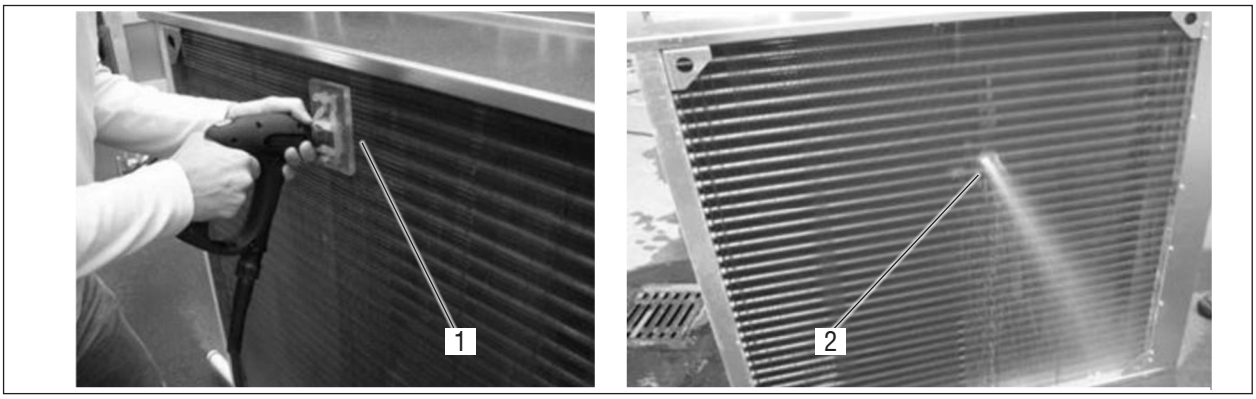


Fig. 64 THD multi-jet method

1	THD multi-jet method/front	2	THD multi-jet method/back

For further information on the THD multi-jet method:
THD
Technischer Hygiene Dienst GmbH
Am Kleingewerbegebiet 3
D-15745 Wildau
Phone: +49 / (0)30 / 66 76 57 75-0
Fax.: +49 / (0)30 / 66 76 57 75-5
E-mail: info@thd-berlin.de
Web: www.thd-berlin.de

7.3.1.3 Circulating coil system (heat exchanger with pipe circuits)

With heat exchangers in a circulating coil system, the pipe circuits themselves cannot be emptied.

For this reason, the circulating coil system is only to be operated with a frost-proof water/glycol mixture and tested for leak-tightness after assembly.

If the system does have to be drained, the pipe circuits can be blown out with compressed air, although water still remains in the heat exchanger even in this case.

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the heat exchanger, there is a risk of explosion.

- Integrate the heat exchanger back into the unit potential after each unfastening of the equipotential bonding.

ATTENTION

When using high-performance circulating coil systems, observe the manufacturer's operating instructions.

ATTENTION

The maintenance work for the heat exchangers must be carried out at regular intervals.

- Antifreeze concentration must correspond to the specifications on the technical data sheet.
- We recommend the use of the antifrogen N with a mixture of 25 – 35 %.

7.3.1.4 Steam register

⚠ WARNING

Danger of bursting due to pressure

The steam register is pressurised. Damage to the heat exchanger can cause a risk of bursting and an explosion. This is associated with a loud bang.

- Observe the operating and assembly instructions as well as the working instructions.
- Work with care.
- Secure the hazardous areas. Only trained persons are permitted in this area.
- Operate the heat exchanger only at the permissible operating points.
- Check the steam register for visible damage.
- Comply with the Pressure Equipment Directive and the corresponding standards.

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the heat exchanger, there is a risk of explosion.

- Integrate the heat exchanger back into the unit potential after each unfastening of the equipotential bonding.
- The steam temperature must be permissible for the required temperature class. Consider the safety factors or use monitoring.

⚠ WARNING

Risk of slipping! Leaked condensate

- Immediately take up the spill quantity and dispose of it properly.

⚠ CAUTION

Risk of burns as a result of contact with hot surfaces and media (plate heat exchanger, heat exchanger and electric heating coil)

- Wait until the hot surfaces have cooled down.
- Wear personal protective equipment.

ATTENTION

Observe the manufacturer's documentation.

- Carry out maintenance and cleaning work according to the manufacturer's data.

7.3.1.5 Evaporator/condenser

⚠ WARNING

Danger of bursting due to pressure

The evaporator/condenser is pressurised. Damage to the heat exchanger can cause a risk of bursting and an explosion. This is associated with a loud bang.

- Observe the operating and assembly instructions as well as the working instructions.
- Work with care.
- Secure the hazardous areas. Only trained persons are permitted in this area.
- Only operate the evaporator/condenser in the permissible operating points.
- Check the evaporator/condenser for visible damage.
- Comply with the Pressure Equipment Directive and the corresponding standards.

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the heat exchanger, there is a risk of explosion.

- Integrate the heat exchanger back into the unit potential after each unfastening of the equipotential bonding.

⚠ WARNING

Risk of slipping! Leaked condensate

- Immediately take up the spill quantity and dispose of it properly.

⚠ CAUTION

Risk of burns as a result of contact with hot surfaces and media (plate heat exchanger, heat exchanger and electric heating coil)

- Wait until the hot surfaces have cooled down.
- Wear personal protective equipment.

ATTENTION

Observe the manufacturer's documentation.

- Carry out maintenance and cleaning work according to the manufacturer's data.

7.3.2 Plate heat exchanger

⚠ WARNING

Risk of cuts

During maintenance and cleaning of the plate heat exchanger there is a risk of cuts.

- Wear personal protective equipment (cut-proof gloves).

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the heat exchanger, there is a risk of explosion.

- Integrate the heat exchanger back into the unit potential after each unfastening of the equipotential bonding.

⚠ WARNING

Risk of slipping! Leaked condensate

- Immediately take up the spill quantity and dispose of it properly.

⚠ WARNING

Risk of injury from falling from ladders, scaffolding or work platforms.

- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

⚠ CAUTION

Risk of burns as a result of contact with hot surfaces and media (plate heat exchanger, heat exchanger and electric heating coil)

- Wait until the hot surfaces have cooled down.
- Wear personal protective equipment.

ATTENTION

Observe the manufacturer's documentation.

7.3.2.1 Maintenance

- Check plates for soiling.
- Remove dust and fibrous materials or similar, clean condensate drain.
- Check water drain and siphon of the drain tray and top up if necessary.
- Check the damper connection, drive and control functions.
- The integration of the plate heat exchanger and the droplet eliminator into the equipotential bonding must be checked, see also chapter "7.3.6 Droplet eliminator" on page 114.

7.3.2.2 Cleaning

- Dry dusts or fibrous materials can be removed using compressed air.
- Remove oil and grease deposits using hot water, steam or grease-dissolving cleaning agents.
- Remove damp, greasy and greasy deposits with a high-pressure cleaner and steam or hot water.

The heat exchanger can be cleaned using a hot water high pressure cleaner.
The following parameters are to be observed here:

Nozzle	Flat jet nozzle
Pressure	max. 20 bar
Water volume	max. 450 l/h
Water temperature	max. 70 °C
Distance to heat exchanger*	min. 30 cm
Nozzle direction	90° offset to foil embossing or fins

* The minimum distance to the heat exchanger is a recommendation. The minimum distance must be selected in such a way that complete and thorough cleaning without damage is ensured.

Cleaning direction: from the exhaust air side to the outgoing exhaust air side

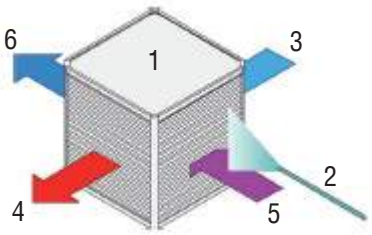


Fig. 65 Cleaning direction for plate heat exchanger

1	Plate heat exchanger	4	Supply air
2	High pressure flat jet nozzle	5	Extract air
3	Outdoor air	6	Exhaust air

ATTENTION

The specified values must be adhered to, otherwise the plate heat exchanger may be damaged.

The plate heat exchanger must be integrated back into the unit potential each time the equipotential bonding is released.

NOTE

To remove stubborn dirt, cleaning agents can also be used (e.g. all-purpose cleaner, biodegradable).

It must then be rinsed using plenty of fresh water.

Do not use aluminium cleaners! These are acidic and attack the surface of the plate heat exchanger.

7.3.3 Grease trap filter

The grease trap filter must be cleaned with hot water (> 80 °C) or steam if soiled by grease or dust or after reaching the recommended end pressure difference (type plate). Servicing and assembly are generally carried out on the dusty air side.

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the grease trap filter, there is a risk of explosion.

- Integrate the grease trap filter back into the unit potential after each unfastening of the equipotential bonding.

ATTENTION

Observe the manufacturer's documentation.

Cleaning the filter elements up to unit size 16 x 16

Step	Action
1	Pull the filter element with the mounting frame including the collecting troughs out of the AT4F ATEX unit.
2	Unfasten the clamping bracket on the filter frame and clean the filter element including the collecting tray.

Cleaning the filter elements from unit size 20 x 16

Step	Action
1	Detach the clamping bracket from the filter frame.
2	Remove the filter element and clean it.
3	Clean collecting tank

7.3.4 Dampers

⚠ WARNING

Risk of crushing

When closing the multi-leaf damper, there is a risk of crushing injuries to the hands.

- Do not reach into the damper when closing the multi-leaf damper.
- Wear the personal protective equipment.

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the dampers/fins, there is a risk of explosion.

- Check the integration of the equipotential bonding into the unit potential.
- Document the test.

ATTENTION

Observe the manufacturer's documentation.

7.3.4.1 Maintenance

- Check the damper for integration into the equipotential bonding. If necessary, the integration is to be renewed; alternatively the damper is to be replaced.
- Inspect the multi-leaf dampers for soiling, damage and corrosion.
- Check the mechanical function of the multi-leaf dampers.
- Lubricate the damper bearing and joints if necessary using appropriate lubricants.
- Check the end position of the damper adjusting actuators and adjust, if necessary.

7.3.4.2 Cleaning

- Clean the multi-leaf dampers at regular intervals.

7.3.5 Sound absorber

⚠ WARNING

Risk of cuts

During maintenance and cleaning of the sound attenuator splitters there is a risk of cuts.

- Wear personal protective equipment (cut-proof gloves).

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the sound absorber, there is a risk of explosion.

- Integrate the sound attenuator splitter (with perforated plate) back into the unit potential after each unfastening of the equipotential bonding.

ATTENTION

Observe the manufacturer's documentation.

Fig. 66 Multiple silencer baffles with equipotential bonding

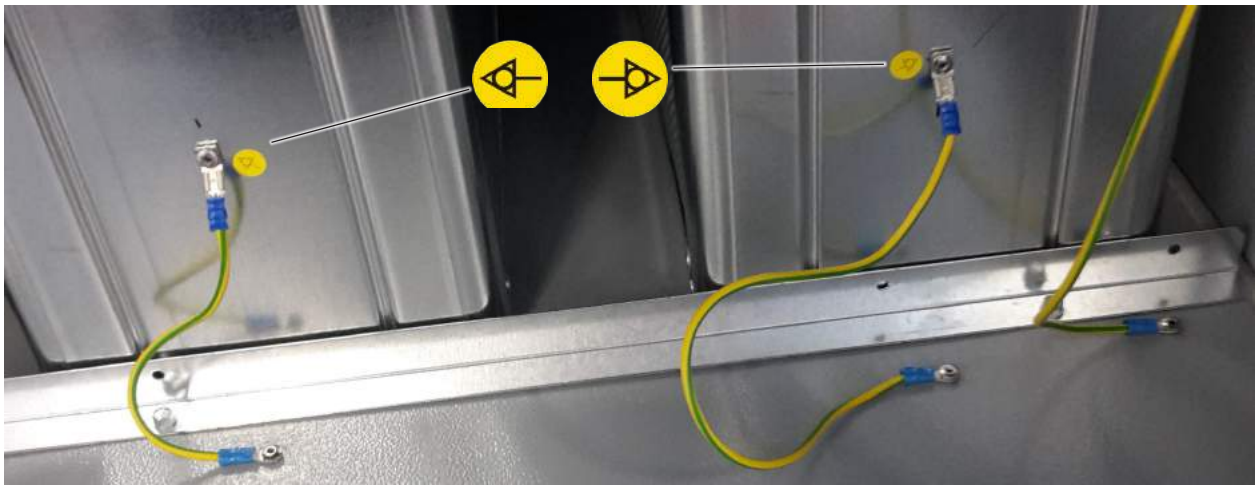


Fig. 67 Equipotential bonding on the sound attenuator splitters

7.3.5.1 Maintenance

- Check the sound absorbers for soiling and damage at regular intervals.

7.3.5.2 Cleaning

- Sound attenuator splitters (optional) can be taken out/removed from the unit for cleaning.

NOTE

Following extended operating intervals, clean the sound attenuator splitters (optional) using an industrial vacuum cleaner.

7.3.6 Droplet eliminator

⚠ WARNING

Risk of cuts

There is a risk of cutting injuries during cleaning and maintenance of the droplet eliminator.

- Wear personal protective equipment (cut-proof gloves).

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the droplet eliminator, there is a risk of explosion.

- Integrate the droplet eliminator back into the unit potential after each unfastening of the equipotential bonding.

ATTENTION

Observe the manufacturer's documentation.

- The droplet eliminator can be pulled out of the housing to the side for cleaning and maintenance purposes.

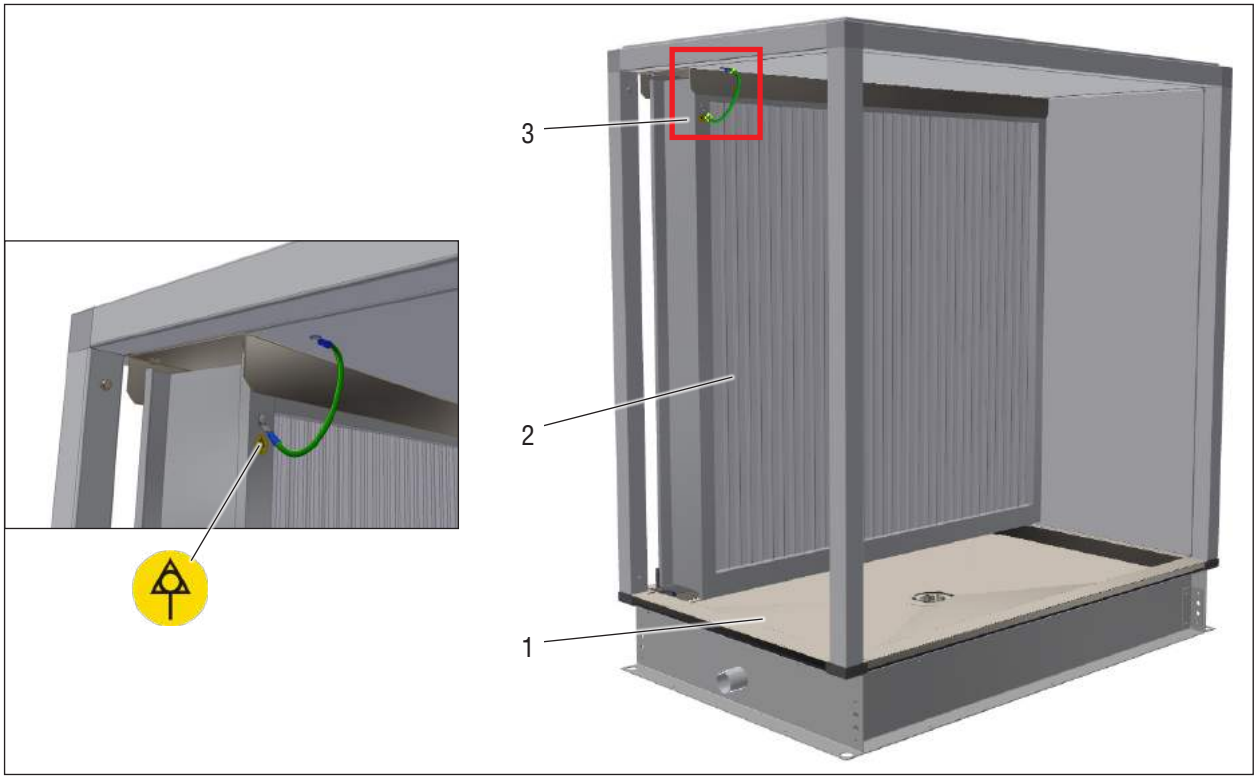


Fig. 68 Droplet eliminator installation situation

1	Condensate collecting pan	2	Droplet eliminator
3	Equipotential bonding		

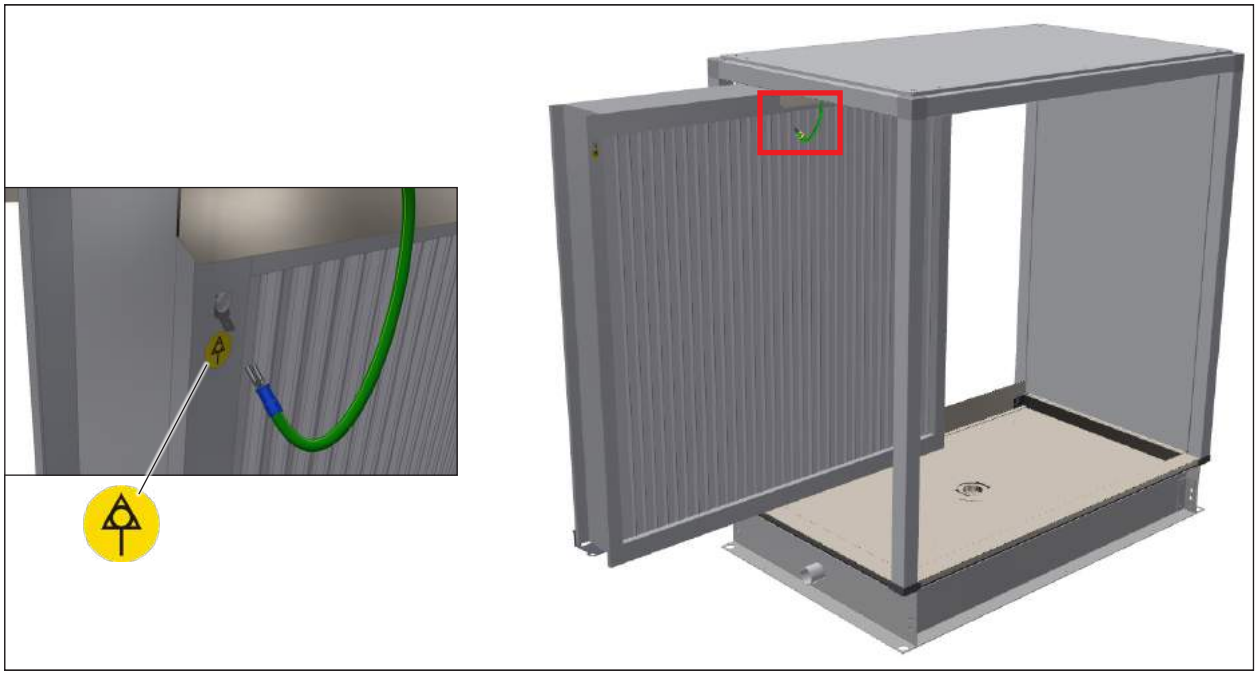


Fig. 69 Loosen and reconnect the equipotential bonding connection on the droplet eliminator

7.3.6.1 Maintenance

- Inspect the droplet eliminator for soiling, damage and corrosion.
- Inspect the water drain and odour trap.
- Check water drain and siphon of the drain tray and top up if necessary.
- Check integration of the droplet eliminator into the unit equipotential bonding.

ATTENTION

During installation of the pipelines on site, ensure that the droplet eliminator can still be pulled out to the side.

7.3.6.2 Cleaning

- Clean the droplet eliminator and condensate collecting pan using compressed air, water, steam or grease-dissolving cleaning agents.

7.3.7 Electric motor

⚠ DANGER

Hazard due to electric current and explosion hazard due to electric current.

Electric shocks can occur in the event of incorrect connection to the power supply or incorrect installation of electrical components. Risk of explosion from electric ignition sparks and electric charge.

- Ensure that work on/in the AT4F ATEX unit takes place during ATEX zone freedom.
- Only have the electrical connection carried out by an approved electrician.
- Perform the connection exactly according to the circuit diagram and the assignment plan.
- Integrate the electric motor back into the unit potential after each unfastening of the equipotential bonding.
- Observe the valid DIN and VDE regulations.
- Observe the directives of the local energy supply company.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out.
- Do not operate the AT4F ATEX unit with defective or damaged cables or plugs.
- Regularly check the connection cables for damaged areas.
- Use only the permissible tool.
- Shut off the power supply for maintenance work and secure it to prevent restart.
- Observe the electrical safety regulations.

⚠ WARNING

Risk of injury.

- Disconnect the AT4F ATEX unit from the mains power supply on all poles and secure it to prevent restart before starting any repair or maintenance work.
- Observe the applicable safety rules.
- Have installation, commissioning, servicing and maintenance work carried out only by qualified staff.

To be carried out by the person responsible:

- After carrying out the work, ensure that there are no longer any persons in the installation.
- Before restarting the installation, ensure that all factory-installed protective measures are functioning correctly.

⚠ WARNING

Risk of injuries due to incorrect or faulty connection.

- Electrical connections must only be undertaken by a certified electrician under consideration of the valid DIN and VDE regulations as well as the directives of the local energy supply company.
- Only have assembly, servicing and maintenance carried out by qualified staff.
- Wear personal protective equipment.

ATTENTION

Observe the motor manufacturer's documentation.

Only use lubricants according to the manufacturer's data.

7.3.7.1 Maintenance

The electric motors are usually equipped with permanently lubricated motor bearings.

In the case of electric motors with relubricatable motor bearings, these must be regularly checked and, if necessary, relubricated. Use only lubricants specified by the motor manufacturer.

- Check motor for dirt, damage and corrosion.
- Check motor mounting and retighten all fastening screws.
- Check the bearing and re-lubricate if necessary.
- Check the function of the protective devices.
- All fastening screws/electrical connections must be retightened.
- Check integration of the motor into the unit equipotential bonding.

7.3.7.2 Cleaning

- Clean the motor and motor substructure regularly.

7.3.8 Fans

⚠ WARNING

Risk of injury from fan during fan test run

- Never disassemble or bypass safety installations.
- Work with care.
- Remove any loose parts in the air handling unit.
- Eliminate tripping hazards.
- Maintain the safety distance.
- Remain in the debris shadow when the fan starts up.
- Wait until the fan impeller has come to a standstill.
- Carry out a visual inspection for cracks in the impeller.
- Wear personal protective equipment (ear protection).

⚠ WARNING

Risk of explosion due to electrostatic discharge, electrical ignition sparks or friction and grinding sparks or overheating during fan test run.

Electrostatic charging, ignition, friction or grinding sparks or overheating can lead to an explosion.

- Check the that screw connections are securely fitted.
- Check that the fan is integrated in the unit potential.
- Check the gap dimension depending on the fan design.
- Document and confirm the test results.
- Depending on the version, use ignition source monitoring, e.g. vibration monitoring.
- Have work performed only by trained, qualified staff.
- Work carefully at all times and observe the safety rules.
- Observe the operating instructions of the manufacturer.

⚠ WARNING

Risk of injury caused by impeller breakage

Operation with impermissibly high vibration values, in particular with fans without spiral housing, can result in impeller breakage, which can lead to serious property damage and personal injuries.

- Perform a vibration measurement of the fan impeller regularly and document the checks. If the permissible vibrations are exceeded, no operation may take place. Observe the table with the respective vibration values.
- When operating with a frequency converter, the frequency converter should generally be operated without overmodulation.
- Do not operate fans in the range of the resonance speed (and its multiples) of the fan motor system.

⚠ WARNING

Risk of injuries due to fan delay

- Switch off the unit on all poles and secure it against restart.
- Only open the inspection doors only when the fans are switched off and stationary.
- Observe the delay time of the fans. Observe a waiting time of at least 3 minutes, until the fan impellers are stationary, before opening the inspection doors.
- Never brake the impellers of the fans by hand or using an object.

ATTENTION

Observe the manufacturer's documentation.

7.3.8.1 Maintenance

- Check fan impeller for soiling and unbalance.
- Check fan gap and overlap, see chapter "7.3.8.8 Check gap dimension and overlap for fans" on page 124.
- Check the bearing and re-lubricate if necessary.
- Retighten all fastening screws, see chapters "7.3.8.9 Tightening torques of the screw connections on the fan part" on page 125 and "7.3.8.10 Maintenance or inspection of the taper-lock clamping bushes" on page 125.
- Check the function of the vibration absorbers.
- Check the drainage function if necessary.
- Inspect the fan for soiling, damage and corrosion.
- Check integration of the fan into the unit equipotential bonding.

7.3.8.2 Cleaning

- Clean the fan unit at regular intervals.

7.3.8.3 Removing the fan for maintenance purposes

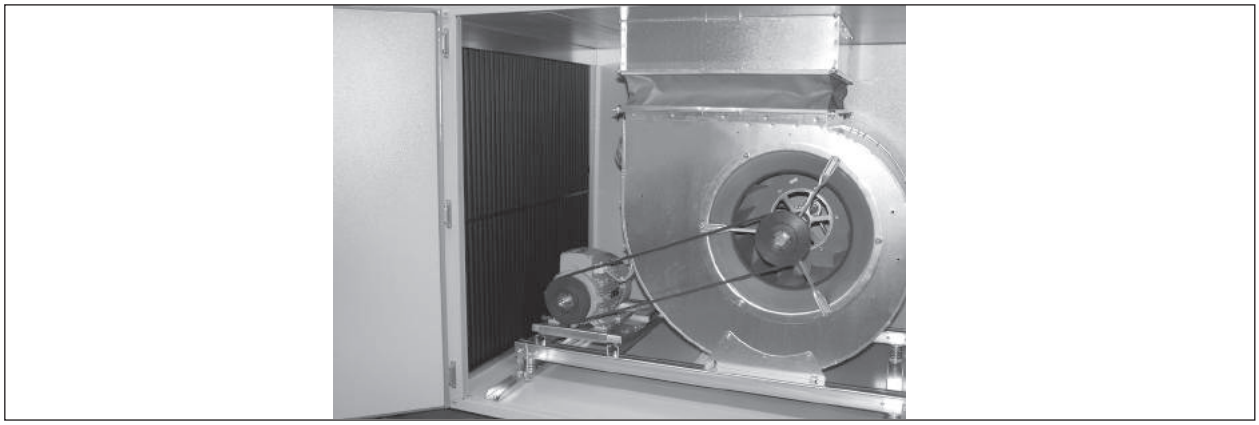


Fig. 70 Removal opening for fan, in this case, fan with belt drive

The fan unit can be removed laterally for maintenance purposes:

- Unfasten the fastening screws of the fan unit.
- Unfasten the equipotential bonding connections.
- Unfasten the antistatic canvas nozzle.
- Take out the fan unit out of the housing to the side.
- After re-installation, the fan must be integrated back into the device potential.

ATTENTION

Avoid damage to the housing coating by carefully pulling out the fan unit.

NOTE

For easier removal and installation of fans, motor removal rails are available as options.

7.3.8.4 Fan with belt drive

- Inspect V-belt drive for soiling, damage and wear.
- Check V-belt tension and retighten if necessary.
- Check alignment of the V-belt pulleys.
- Clean the V-belt drive at regular intervals.
- The V-belts must be electrostatically conductive.

ATTENTION

When replacing V-belts in multi-groove drives, the entire V-belt set must always be replaced.

ATTENTION

Observe the manufacturer's documentation.

Clamping specification for V-belt drive

The correct belt tension is achieved when with the individual test force F_p a belt deflection b according to the technical data sheet has been reached. Alternatively, it can also be adjusted using frequency measurement.

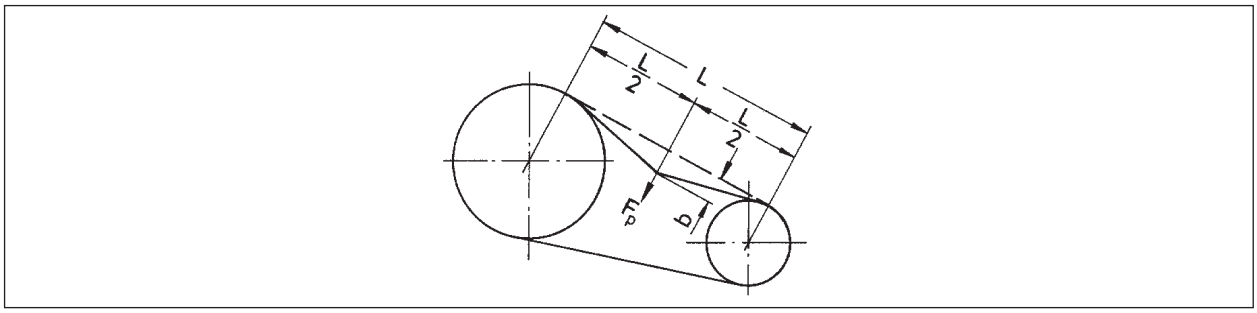


Fig. 71 Checking the belt tension on the V-belt drive

L	Span length	F_p	Test load in N from AL-KO document or type plate
b	Belt deflection under the test force F_p		

7.3.8.5 EC fan

⚠ CAUTION

Risk of burns due to contact with hot surfaces.

- Wait until the hot surfaces have cooled down.
- Wear personal protective equipment.
- Observe the manufacturer's documentation.

ATTENTION

Observe the manufacturer's documentation.

- Check fan for hygienic condition, dirt, damage, corrosion, and a secure fastening.
- Check the function of the protection devices.

7.3.8.6 Built-in fan (motor outside the air flow)

Check gap dimension

For built-in fans, the gap dimension between the inlet nozzle and impeller must be checked all the way around.

Depending on the fan manufacturer and fan design, there are fixed values that must be observed. These must be checked before commissioning and documented accordingly.

The diagrams of the gap dimensions to be measured differ depending on the fan manufacturer.

The image below on the gap measurement is an example only. Depending on the fan manufacturer, the measured values are to be sent to the fan manufacturer for operational approval.

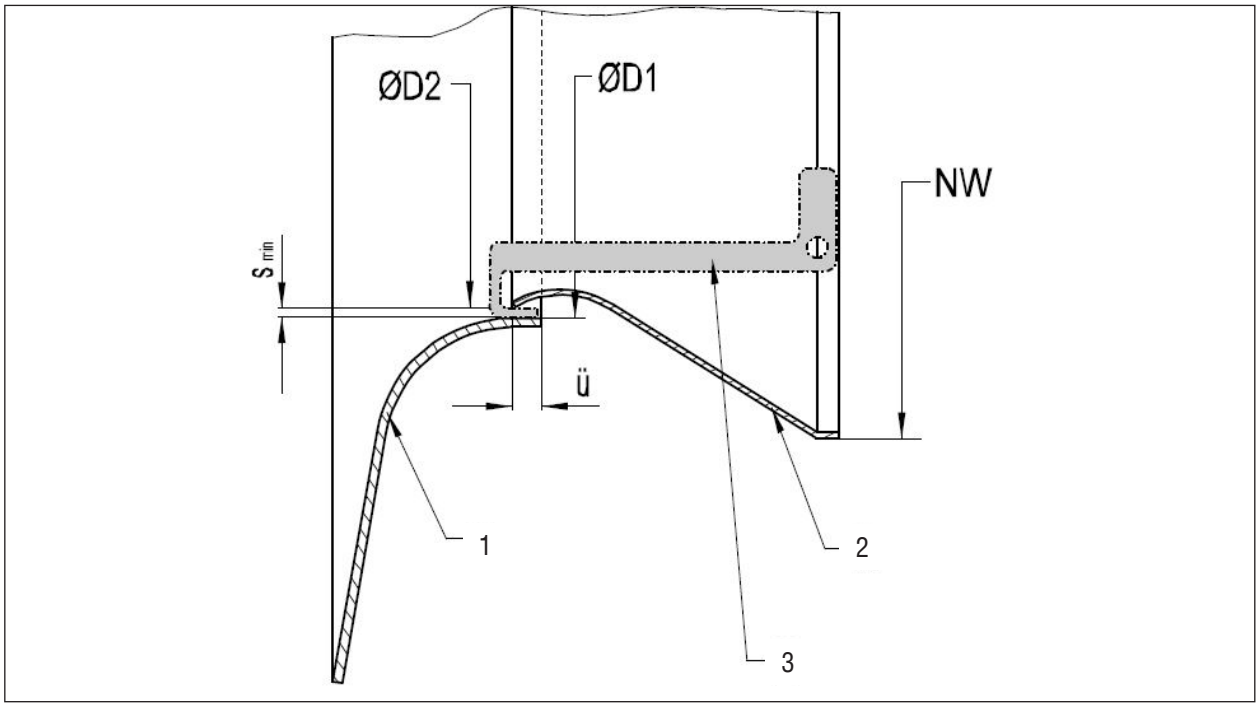


Fig. 72 Example for gap dimension (depending on the manufacturer)

1	Impeller	2	Inlet nozzle
3	Gap dimension gauge	NW	Nominal width (nozzle)
D1	Inner diameter (cover disc nozzle of the impeller)	D2	Outer diameter (inlet nozzle)
s_{min}	With test gauge for gap width to be ensured	ü	Coverage

Step	Action
1	Check the gap dimension between the impeller and inlet nozzle according to the fan manufacturer documentation. Ensure that the gap dimension is not underrun during any phase of the rotary movement (turning by hand). For the valid measured values, see the documentation of the fan manufacturer.
2	Measure the gap dimension at four points m circumference offset by 90°. Place the supplied gauge to the outer diameter of the inlet nozzle. The minimum gap must not be underrun. The gauge must not jam, slight rubbing of the impeller during rotation is permissible.
3	The fan may only be operated if the test has been passed. Document the test results.

ATTENTION

Risk of ignition due to impermissible gap dimensions between stationary and rotating components.

- Ensure that the gap does not fall below the valid gap dimension at any point.

ATTENTION

Observe the manufacturer's documentation.

7.3.8.7 Fan free-wheel with direct drive

⚠ WARNING

Risk of injury caused by impeller breakage

Operation with impermissibly high vibration values, in particular with fans without spiral housing, can result in impeller breakage, which can lead to serious property damage and personal injuries.

- Perform a vibration measurement of the fan impeller regularly and document the checks. If the permissible vibrations are exceeded, no operation may take place. Observe the table with the respective vibration values.
- When operating with a frequency converter, the frequency converter should generally be operated without overmodulation.
- Do not operate fans in the range of the resonance speed (and its multiples) of the fan motor system.

ATTENTION

Observe the manufacturer's documentation.

NOTE

AL-KO recommends continuous monitoring using a vibration sensor (available as an option).

Table of vibration values

Installation	Machine group	Good	Usable	Still permissible
Rigid up to 15 kW	K	0.7 mm/s	1.8 mm/s	4.5 mm/s
Rigid from 15 kW	M	1.1 mm/s	2.8 mm/s	7.1 mm/s
Vibration-isolated	T	2.8 mm/s	7.1 mm/s	18 mm/s

Maintenance

- Perform maintenance at least once per year.
- Check fan gap and overlap, see chapter "7.3.8.8 Check gap dimension and overlap for fans" on page 124.
- Check fan for soiling, vibration, damage, loose screws and corrosion.
- Check the impeller, particularly welding seams, for possible cracking every 6 months.
- Check the function of the safety installations (door catch, protective grille).
- Check integration of the fan into the unit equipotential bonding.

Operating point setting

- The operating point can be approached accurately with an adjustable fan speed.
- When controlling the speed, make sure that the maximum fan speed and the permissible motor currents are not exceeded.
- The nozzle gap must not be adjusted.

Air volume determination

Optionally, the fans are equipped with a volume flow measuring device. The pressure difference between the static pressure in the suction-side chamber and the pressure at the inlet nozzle is measured via a pressure measuring point on the inlet nozzle. This differential pressure (effective pressure) has a fixed relationship to the volume flow. Detailed description on request.

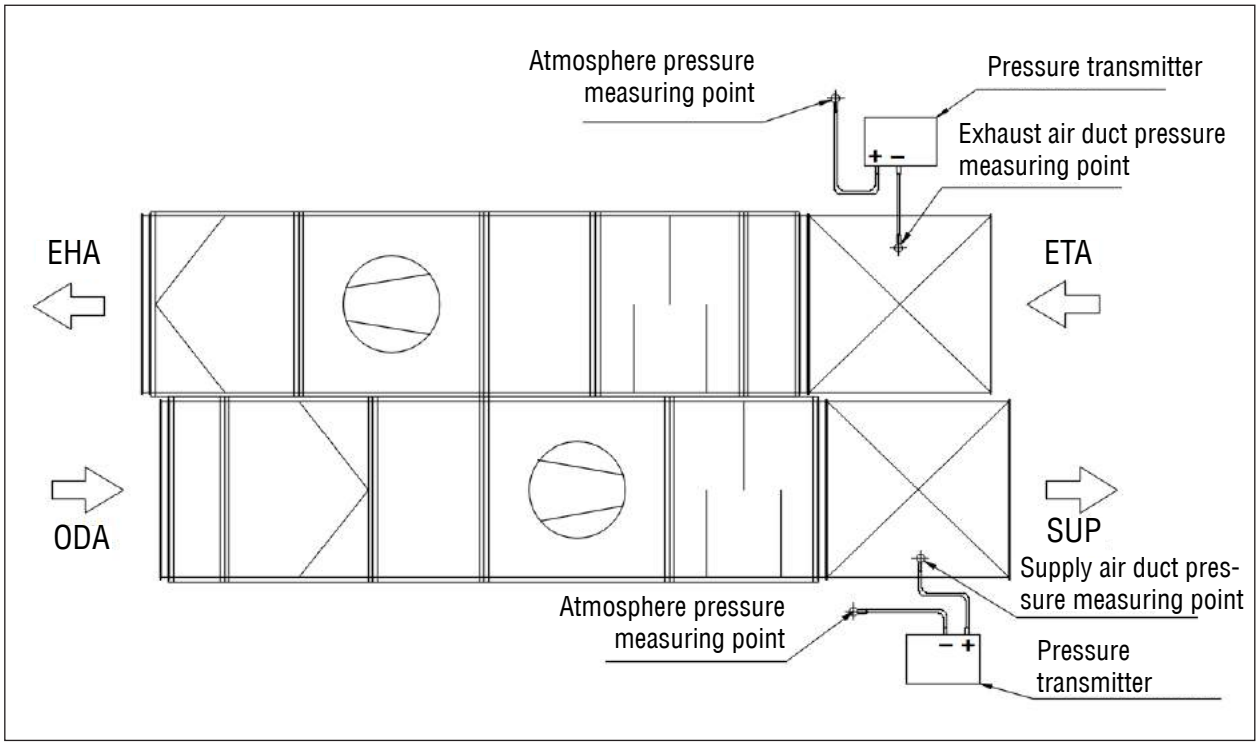


Fig. 73 Wiring diagram for volume flow measurement

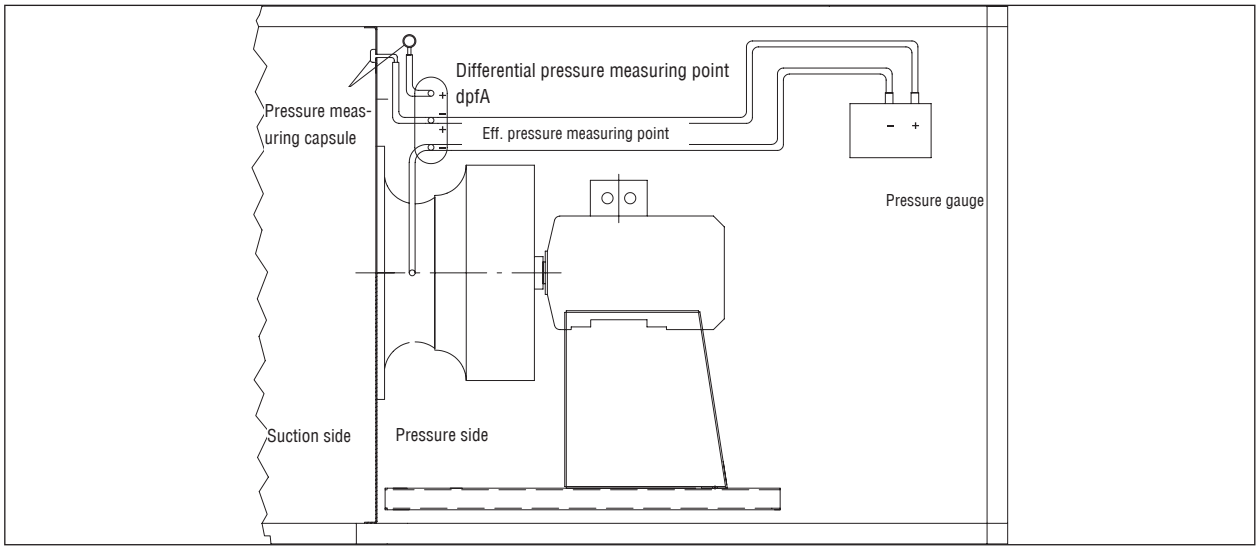


Fig. 74 Air volume determination via measuring differential pressure

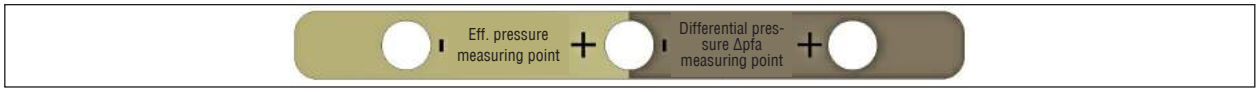


Fig. 75 Pressure measuring point stickers

7.3.8.8 Check gap dimension and overlap for fans

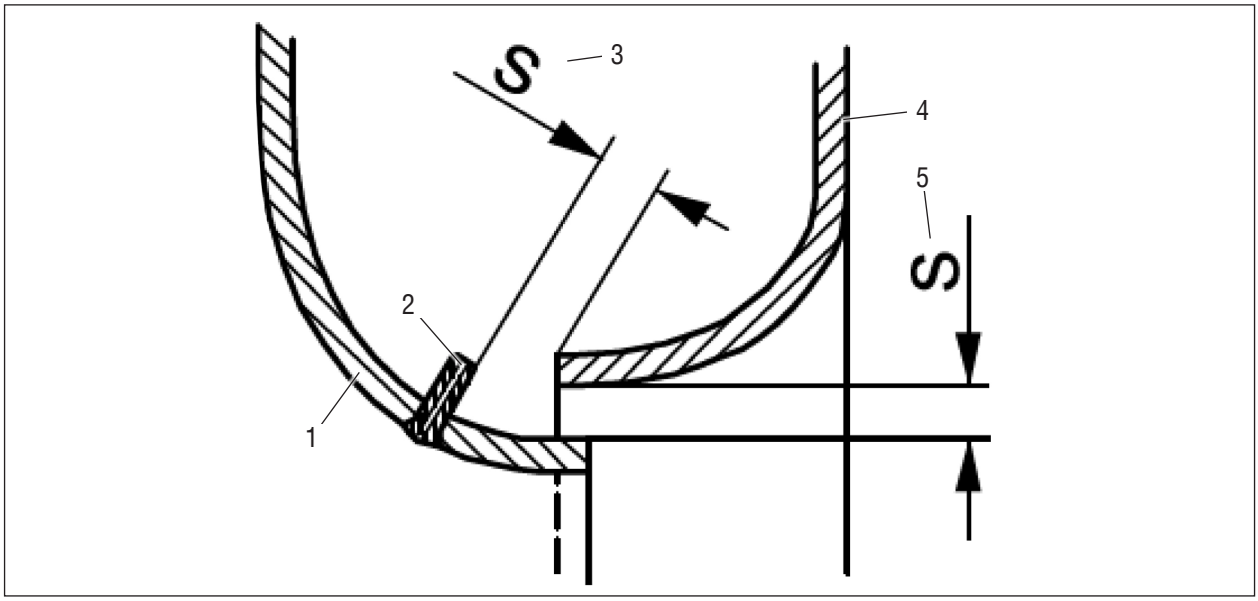


Fig. 76 Example of gap dimensions and overlap (depending on manufacturer)

1	Inlet nozzle	2	Measuring nipple of the volumetric flow measuring device
3	Gap dimension between impeller edge and measuring nipple of the volume flow measuring device	4	Impeller
5	Gap dimension between inlet nozzle and impeller		

Step	Action
1	Before commissioning, check the gap dimension between the impeller edge and the measuring nipple of the volumetric flow measuring device and between the impeller and inlet nozzle in accordance with the fan manufacturer's documentation. For the valid measured values, see the documentation of the respective fan manufacturer.
2	The fan may only be operated if the test has been passed. Document the test results.

ATTENTION

Observe the manufacturer's documentation.

ATTENTION

The exact gap dimensions can be requested from the respective fan manufacturer.

7.3.8.9 Tightening torques of the screw connections on the fan part

ATTENTION

After approx. 1 hour, check the screw connections on the fan base frame and, if necessary, tighten evenly with the screw tightening torques specified in the table below using a torque wrench.

Thread dimension	Screw thread tightening torque (Nm)
M6	10
M8	25
M10	49
M12	85

7.3.8.10 Maintenance or inspection of the taper-lock clamping bushes

- Clean and degrease all bare surfaces such as the hole and the conical surface of the taper-lock clamping bush as well as the conical hole of the disc. Insert the taper-lock clamping bush into the hub and bring all the connection holes to coincide (half threaded holes must face half smooth holes).
- Threaded pin (size 1008 – 3030) or cylinder screws (size 3535 – 5050) are lightly covered with threadlocker and screwed in – do not tighten the screws yet!
- Clean and degrease shaft. Slide the disc onto the shaft using a taper-lock clamping bush.
- If a feather key is used, it must first be inserted into the groove of the shaft. There must be back clearance between the feather key and the bore groove.
- Using the torque wrench, threaded pins or hexagon socket head cap screws, tighten evenly with the tightening torques specified in the table.

Bushing	Screw tightening torques (Nm)	Screws	
		Quantity	Size
1008/1108	6	2	1/4" BSW
1310/1315	20	2	3/8" BSW
1210/1215	20	2	3/8" BSW
1610/1615	20	2	3/8" BSW
2012	31	2	7/16" BSW
2517	48	2	1/2" BSW
3020/3030	90	2	5/8" BSW
3535	112	3	1/2" BSW
4040	170	3	5/8" BSW
4545	192	3	3/4" BSW
5050	271	3	7/8" BSW

7.3.9 Cooling system and heat pump

ATTENTION

Observe the requirements in the separately supplied operating instructions for cooling systems and heat pumps.

The installations must be suitable for use in conjunction with explosion-protected units.

7.3.10 Electric air heater

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the electric air heater, there is a risk of explosion.

- Integrate the electric air heater back into the unit potential after each unfastening of the equipotential bonding.

Frequent causes of error for accumulated heat with electric air heaters

Cause	Remedy
No air volume flow	Check that the dampers are open. Check the function of the fan unit. Check if a foreign object has been drawn in.
Insufficient air volume flow through controlled fans	Adjust the air volume in speed-controlled fans to the heating capacity. Check that the dampers are open. Check if a foreign object has been drawn in.
Temperature monitor is not connected	The temperature monitor is mandatory and must be checked.
Safety temperature limiter is not connected	The safety temperature limiter is mandatory and must be checked.
No fan delay	The fan delay is absolutely necessary. If this is not the case, the electrical circuit must be checked.
Incorrect commissioning – Checking the electric heater without sufficient air flow due to closed flaps or false air, for example	Ensure that there is always a sufficient air volume flow at the heating coil during testing
Air temperatures above 40 °C	Ensure that the air temperatures do not exceed 40 °C at any time. The air temperature in normal operation (continuous operation) must not exceed 40 °C

- After any power failure or fault messages, the installation is to be checked for damage and replacement measures must be taken where necessary.
- Observe the manufacturer's documentation.
- Check that the electric air heater is integrated into the unit equipotential bonding.

7.4 Replacing components

7.4.1 Changing the filter

⚠ WARNING

Risk to health when changing the filters due to dust load and microbial contamination.

- Switch off the unit on all poles and secure it against restart.
- Adhere to the maintenance plan.
- Wear the personal protective equipment (dust mask) during a filter change.
- Use other protective equipment according to the work carried out.

⚠ WARNING

Risk of explosion

Due to electrostatic charging of the filter, there is a risk of explosion.

- Only use ATEX filters that match the required ATEX marking of the unit!
- Integrate the ATEX filters into the unit potential.

Special instructions for operating the units

ATTENTION

The built-in filter elements fulfil a safety function and may only be operated up to the final pressure losses stated on the data sheet.

Only ATEX filters that match the required ATEX marking of the unit are permitted.

ATTENTION

Observe the manufacturer's documentation.

NOTE

Do not wash and reuse used air filters; always replace them. Otherwise, the hygienic requirements will not be met.

ATTENTION

Only use original consumables and spare parts. This is the only way to ensure safe operation.

All spare parts must correspond to the required ATEX marking.

Use of other parts will void the EU Declaration of Conformity and the warranty.

A spare parts list can be found as part of the unit documentation.

Customer Service
Phone: +49 8225 39 - 2574
E-mail: service.center@al-ko.com
Web: www.al-ko.com

- The filter elements must be approved according to ISO 16890.
- The filter elements must be monitored for the final pressures and checked for damage on a regular basis.
- Use only original spare parts.
- Technical data, e.g. final pressures, can be found in the data sheets of the filter manufacturer.

7.4.1.1 Replacing bag filters

ATTENTION

The filter bags should generally be replaced when the permissible end pressure difference indicated on the type plate is reached.

The filter bags must be disposed of in accordance with the currently valid and applicable local regulations.

Only ATEX filters that match the required ATEX marking of the unit are permitted.

- Inspect all filter classes at regular intervals for soiling and damage and replace, if necessary.
- Replace the 1st filter stage every 12 months at the latest.
- Replace the 2nd filter stage every 24 months at the latest.

Bag filters can be replaced either on the dust-air side or on the clean-air.

The filters are delivered packed in a cardboard box.

A filter quick change device is optionally available for all filter classes up to a clear unit height of 1836 mm.

Replacing the filter bags when fastening the clamps:

NOTE

When inserting the filter bags, make sure that they are installed centrally and firmly clamped to the seal by all four filter clamps.

Step	Action
1	Disconnect the clamps in the filter frame by unhooking.
2	Pull the filter bags out individually.
3	Check the filter gaskets, inspect and replace any damaged gaskets.
4	Check the new filter bags for damage, compare the ATEX marking of the filter with the ATEX marking on the unit. Insert the filter into the filter frame.
5	Close the clamps in the filter frame by hooking and check that they are secure.
6	Check that the installed filter is integrated in the unit potential.

Fig. 77 Filter mounting frame, left filter clamp

Fig. 78 Filter mounting frame, right filter clamp

Fig. 79 Filter mounting frame with filter clamps

Replace the filter bags with quick change device:

Step	Action
1	Release the clamping device by simply pulling it out using pull-out lever that is supplied loose.
2	Pull the filter bags out of the AT4F ATEX unit individually.
3	Check the filter gaskets, inspect and replace any damaged gaskets.
4	Check the new filter bags for damage, compare the ATEX marking of the filter with the ATEX marking on the unit. Insert the filter.
5	Close the clamping device by pushing it in.
6	Check that the installed filter is integrated in the unit potential.

7.4.1.2 Replace the particulate air filter

ATTENTION

The particulate air filters should generally be replaced when the permissible end pressure difference indicated on the type plate is reached.

Only ATEX filters that match the required ATEX marking of the unit are permitted.

Servicing and assembly are generally carried out on the dusty air side.

Replacing the filter elements:

Step	Action
1	Unfasten the screws on the filter frame and remove the filter element.
2	Clean the sealing surfaces of the filter wall/filter frame.
3	Check the new element for damage, compare the ATEX marking of the filter with the ATEX marking on the unit. Insert filter element and secure.
4	Check that the installed filter is integrated in the unit potential.

ATTENTION

AL-KO THERM does not assume any warranty for damage due to improper handling of the particulate air filter during assembly and disassembly.

8 Emergencies and malfunctions

8.1 Emergency

ATTENTION

In case of fire, used building materials can develop toxicologically hazardous substances.
To protect against any released pollutants, rooms must only be entered with breathing masks.
Safety of persons has priority over safety of property.

8.2 Help in the event of malfunctions

⚠ WARNING

Risk of injury due to incorrectly implemented measures.

Incorrect or incorrectly executed measures can put the installation in a potentially dangerous state. There is then a risk of injuries and even electric shock.

- Only allow work on electrical equipment inside the switch cabinet (e.g. test work, replacement of fuses) to be carried out by qualified staff.
- Only allow diagnosis, troubleshooting and recommissioning to be carried out by authorised persons.
- Use the personal protective equipment when working on the installation.
- Use other protective equipment according to the work carried out.

NOTE

Further information on "General malfunctions" of AT4F ATEX unit can be found in the AL-KO THERM operating manual for "Control ART TECH LEVEL II".

8.3 Contact for malfunctions

For all questions that you have in connection with our products, please contact the manufacturer of your ventilation installation, one of our branches or directly to:

AL-KO THERM GMBH	Phone:	(+49) 82 25 / 39 - 0
Hauptstraße 248-250	Fax:	(+49) 82 25 / 39 - 2113
D-89343 Jettingen-Scheppach	E-mail:	klima.technik@al-ko.com
Germany	Web:	www.al-ko.com
Customer Service	Phone:	(+49) 82 25 / 39 - 2574
	E-mail:	service.center@al-ko.com

9 Shut-down

ATEX zone freedom must be guaranteed on-site for safe decommissioning or disassembly.

9.1 Decommissioning

De-energise the installation before beginning work (all-pole shutdown) and secure it against unauthorised restart.

⚠ WARNING

Risk of injury due to pressurised parts.

- When decommissioning, note that certain installation parts are pressurised.
- Comply with the safety rules!

ATTENTION

In winter, there is a general freezing hazard for all components. If necessary, take suitable measures such as fully draining the liquid media. At temperatures below freezing, the heat exchanger must be either drained and blown out with compressed air, or filled with a commercially available antifreeze with corrosion inhibiting additive due to the risk of freezing and corrosion.

- If the installation is decommissioned for a long period of time, the instructions for the individual components must be observed.
- The information from the component manufacturers must also be followed (request this information if necessary).
- Before recommissioning, observe chapters "6 Commissioning" on page 83 and "7 Servicing and maintenance" on page 94.

9.2 Dismantling

- Dismantling must be carried out according to the currently valid and applicable occupational safety and accident prevention regulations.

⚠ WARNING

Risk of injury from falling from ladders, scaffolding or work platforms.

- Only use suitable and tested ladders, steps, scaffolding and work platforms.
- Work with care.

⚠ WARNING

Risk of poisoning when draining the media.

The AT4F ATEX unit may contain media that are hazardous to health, such as coolants.

- The drained media may only be filled and stored in approved containers.
- Work with care.
- Avoid skin and eye contact with the media, do not swallow media and observe the safety data sheets.
- Wear personal protective equipment.
- Absorb spills immediately.

⚠ WARNING

Risk of injury and risk of explosion when dismantling electrical and thermal components.

- Only have disassembly work carried out by trained qualified staff.
- Before starting work, disconnect the installation from the central supply line.
- Perform all work only with ATEX zone freedom.
- Use suitable tools.
- When dismantling, note that certain parts of the installation are pressurised.
- Fix the impellers of the fans.
- Work with care.
- Use only suitable means of transport when transporting installation parts.
- Use the personal protective equipment when working on the installation.
- Absorb spills immediately.

⚠ WARNING

Health hazards when removing the filter elements.

- When removing filters, wear the personal protective equipment (dust mask).
- Use other protective equipment according to the work carried out.
- Avoid contact with the dust.

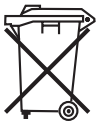
9.3 Disposal

⚠ WARNING

Risk of poisoning when disposing of the media.

The unit may contain media that are hazardous to health, such as coolants.

- Work with care.
- Avoid skin and eye contact with the media, do not swallow media and observe the safety data sheets.
- Wear personal protective equipment.
- When disposing of the media, comply with the relevant local environmental and recycling regulations in your country and community that are applicable at the time when the activity is undertaken.
- The drained media may only be filled and stored in approved containers.



Do not dispose of worn-out units, spent batteries or rechargeable batteries in domestic waste.
When disposing of the unit, operating equipment and accessories, proceed according to the relevant local environmental and recycling regulations in your country and community that are applicable at the time when the activity is undertaken.

10 Spare parts

If third-party spare parts are installed/attached or changes are made without consultation with the manufacturer, a new conformity assessment must be carried out.

The ATEX Declaration of Conformity was issued exclusively in accordance with the scope of delivery of AL-KO THERM. In this context, the ATEX Declaration of Conformity issued by AL-KO THERM loses its validity due to modifications.

Depending on the scope/ATEX version, a new conformity assessment must be carried out by a qualified person and/or with a notified body or a new ATEX certificate (notified body) must be issued.

After carrying out the evaluation, it must be documented in accordance with the ATEX and Machinery Directives.

A new ATEX Declaration of Conformity must be issued on-site.

The Declaration of Conformity and Incorporation are invalidated in the event of a modification to the AC unit that is not coordinated with AL-KO THERM.

The warranty may also be invalidated.

ATTENTION

Only use original consumables and spare parts. This is the only way to ensure safe operation.

All spare parts must correspond to the required ATEX marking.

Otherwise the warranty and the ATEX Declaration of Conformity will be voided.

A spare parts list can be found as part of the ATEX unit documentation.

ATTENTION

Please note: the ATEX Declaration of Conformity was issued in accordance with the scope of delivery of AL-KO THERM. The ATEX Declaration of Conformity is invalidated in the event of modifications to the AC unit. A new ATEX Declaration of Conformity must therefore be issued on-site.

NOTE

The valid spare parts list can be found as part of the ATEX unit documentation. This is created on the basis of the order.

AL-KO THERM GMBH	Phone:	(+49) 82 25 / 39 - 0
Hauptstraße 248-250	Fax:	(+49) 82 25 / 39 - 2113
D-89343 Jettingen-Scheppach	E-mail:	klima.technik@al-ko.com
Germany	Web:	www.al-ko.com
Customer Service	Phone:	(+49) 82 25 / 39 - 2574
	E-mail:	service.center@al-ko.com

11 Certifications

The following EC Declaration of Incorporation and EU Declaration of Conformity will be issued per order, according to their validity.

The ATEX markings specified here are only by way of example. The documents always receive the valid ATEX marking for each order. If both the order number and the position of the unit are specified, the issued document must be assigned to the respective unit.

11.1 EC Declaration of Incorporation conforming to 2006/42/EC

EG- EINBAUERKLÄRUNG

EC DECLARATION OF INCORPORATION
DÉCLARATION DE MONTAGE CE

AL-KO QUALITY FOR LIFE

Hersteller / *Manufacturer / Fabricant:* **AL-KO THERM GMBH I Hauptstraße 248-250 I 89343 Jettingen-Scheppach I Germany**

Im Sinne der EG- Maschinenrichtlinie 2006/42/EG, Anhang II, Teil 1, Abschnitt B
As defined in EC Machinery Directive 2006/42/EC, Annex II, Part 1, Section B
Au sens de la directive Machines CE 2006/42/CE, annexe II, partie 1, section B

Unvollständige Maschine / *Partly completed machinery / Machine incomplète:* RLT/Space air technical devices / Air d'espace les appareils echniques
Serie / *Series / Série:* AT4F Ex
Auftrags-Nr. / *Order no. / N° de commande:* xxxxxxx **Position**/ *position/ la position:* xx

Hiermit erklären wir, dass die oben genannte unvollständige Maschine den folgenden EG/EU- Richtlinien entspricht:
We hereby declare that the above-mentioned partly completed machinery conforms to all relevant provisions of the following EC/EU directives:
Nous déclarons par la présente que le Machine incomplète susnommé répond à toutes les dispositions pertinentes de la directive CE/UE suivante:

Maschinenrichtlinie 2006/42/EG / *Machinery Directive 2006/42/EC / Directive Machines CE 2006/42/CE.*
Elektromagnetische Verträglichkeit 2014/30/EU / *Electromagnetic Compatibility 2014/30/EU / Compatibilité électromagnétique 2014/30/UE:*
Druckgeräterichtlinie 2014/68/EU / *Pressure Equipment Directive 2014/68/EU / Directive sur les appareils sous pression 2014/68/UE:*

Angewandte harmonisierte Normen / *Applied harmonized standards / Normes harmonisées appliquées:*

- DIN ENISO 12100-1/-2,	Sicherheit von Maschinen – Allgemeine Gestaltungsleitsätze – Risikobeurteilung und Risikominderung *Safety of machinery - General principles for design - Risk assessment and risk reduction* *Sécurité des machines – Principes généraux de conception – Appréciation et réduction du risque*
- DIN EN 60204-1,	Sicherheit von Maschinen – Elektrische Ausrüstung von Maschinen – Teil 1: Allgemeine Anforderungen *Safety of machinery - Electrical equipment of machines - Part 1: General requirements* *Sécurité des machines – Equipement électrique des machines – Partie 1 : exigences générales*
- DIN EN 349,	Sicherheit von Maschinen - Mindestabstände zur Vermeidung des Quetschens von Körperteilen *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body* *Sécurité des machines – Distances minimales pour prévention des contusions de parties du corps humain*
- DIN EN ISO 13857,	Sicherheit von Maschinen – Sicherheitsabstände gegen das Erreichen von Gefährdungsbereichen mit den oberen und unteren Gliedmaßen *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs* *Sécurité des machines – Distances de sécurité empêchant l'entrée dans les zones dangereuses des membres supérieurs et inférieurs*
- DIN EN 61000-6-1,	Störfestigkeit für Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe *Immunity standard for residential, commercial and light-industrial environments* *Résistance au brouillage pour le domaine d'habitation, les locaux commerciaux et professionnels ainsi que les petites exploitations*
- DIN EN 61000-6-2,	Störfestigkeit für Industriebereiche *Immunity standard for industrial environments* *Résistance au brouillage pour les zones industrielles*
- DIN EN 61000-6-3,	Störaussendung für Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe *Emission standard for residential, commercial and light-industrial environments* *Émission au brouillage pour le domaine d'habitation, les locaux commerciaux et professionnels ainsi que les petites exploitations*
- DIN EN 61000-6-4,	Störaussendung für Industriebereiche *Emission standard for industrial environments* *Émission d'interférences pour les zones industrielles*
- DIN EN 378-2,	Kälteanlagen und Wärmepumpen – Sicherheitstechnische und umweltrelevante Anforderungen – Teil 2: Konstruktion, Herstellung, Prüfung, Kennzeichnung und Dokumentation *Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation* *Installations frigorifiques et pompes à chaleur – Exigences techniques de sécurité et pertinentes écologiquement – Partie 2 : construction, fabrication, contrôle, marquage et documentation*

Zusätzlich angewendete Normen / *Additional applied standards / Normes appliquées supplémentaires :*

- DIN EN 1886,	Lüftung von Gebäuden – Zentrale raumlufttechnische Geräte – Mechanische Eigenschaften und Messverfahren *Ventilation for buildings - Air handling units - Mechanical performance* *Ventilation des bâtiments – Appareils centraux techniques à air conditionné – Propriétés mécaniques et procédés de mesure*
- DIN EN13053,	Lüftung von Gebäuden; Zentrale raumlufttechnische Geräte – Leistungskenndaten für Geräte, Komponenten und Baueinheiten *Ventilation for buildings - Air handling units - Rating and performance for units, components and sections* *Ventilation des bâtiments ; appareils centraux techniques à air conditionné – Données caractéristiques de puissance pour les appareils, les composants et les unités de montage*
- VDMA 24167,	Ventilatoren – Sicherheitsanforderungen *Fans - Safety requirements* *Ventilateurs – Exigences de sécurité*
- VDI 6022,	Hygieneanforderungen an Raumlufttechnische Anlagen und -Geräte *Hygiene requirements for ventilation and air-conditioning systems and units* *Exigences hygiéniques applicables aux installations et appareils techniques à air conditionné*

Die Inbetriebnahme unseres Produktes bleibt so lange untersagt, bis festgestellt wurde, dass die Ausführung der Anlage/ Maschine, in welcher der Einbau erfolgen soll oder von dem es ein Teil sein wird, mit den entsprechenden Rechtsvorschriften übereinstimmt.
Our product is not cleared for commissioning and use until it has been determined that the product is going to be integrated into a facility/machine and/or is used as part of an assembly, which agree with all applicable laws and regulations.
La mise en service de ce produit est interdite tant qu'il n'a pas été constaté, que le modèle de l'installation/ la machine, dans lequel il doit être incorporé, ou dont il deviendra une partie, est conforme aux dispositions légales correspondantes.

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen:
Authorized representative in charge of the technical document compilation:
Personne autorisée à constituer le dossier technique
Anschrift siehe Hersteller / *see manufacturer's address above / Adresse, voir fabricant*

Jettingen-Scheppach, 22.11.2021

Leiter der Abteilung Entwicklung
Head of Development Department
Chef du département de développement

Dr. Christian Stehle
Geschäftsführer / *Managing Director / Directeur général*

11.2 EU Declaration of Conformity in accordance with 2014/34/EC with gas ATEX marking

EU-KONFORMITÄTSERKLÄRUNG

EU DECLARATION OF CONFORMITY
DÉCLARATION DE CONFORMITÉ UE

QUALITY FOR LIFE

Hersteller / *Manufacturer* / *Fabricant:* **AL-KO THERM GMBH I Hauptstraße 248-250 I 89343 Jettingen-Scheppach I Germany**

Im Sinne der EU- Richtlinie 2014/34/EU, Anhang X, Abschnitt B vom 26. Februar 2014
As defined in EU Directive 2014/34/EU, Annex X, Section B of February 26, 2014
Au sens de la directive UE 2014/34/UE, annexe X, section B du 26 Février 2014

Hiermit erklären wir, dass die Bauart und die Ausführung der
We hereby declare that the design and construction of the
Nous déclarons par la présente que la conception et la construction de l'installation

Gerät / *Device* / *Appareil :* **RLT** / Space air technical devices / Air d'espace les appareils echniques

Auftrags-Nr. / *Order no. / N° de commande :* **XXXXXXXX** **Position** */ position / la position:* **XX**

Serie / *Series* / *Série :* **AT4F Ex**

Fertigungsdatum / Production date / date de fabrication **: XXXX**

EX-Kennzeichnung / *EX marking* / *marquage EX :*

☐ **Zuluft** / *Supply air / air d'alimentation :* ☒ **Abluft** / *Exhaust air / Air d'échappement :*

CE Ex II 2G Ex h IIB T4 Gb – innen/inside/à l'intérieur
CE Ex II 3G Ex h IIB T4 Gb – außen/outside/à l'extérieur

X = besondere Bedingungen siehe Anlage / *special conditions as annexed* / conditions particulières voir annexe

folgenden geltenden Normen und Richtlinien entspricht.
complies with the following applicable standards and directives.
est conforme aux normes et directives applicables suivantes.

ATEX - Richtlinie 2014/34/EU / *ATEX Directive 2014/34/EU / Directive ATEX 2014/34/UE*

Angewandte harmonisierte Normen / *Applied harmonized standards / Normes harmonisées appliquées:*

- DIN EN 1127-1: 2011,	Explosionsfähige Atmosphären – Explosionsschutz Teil 1: Grundlagen und Methodik *Explosive atmospheres – Explosion prevention and protection - Part 1: Basic concepts and methodology* *Atmosphères explosives – Prévention de l'explosion et protection contre l'explosion – Partie 1 : Notions fondamentales et méthodologie*
- DIN EN ISO 80079-36: 2016,	Explosionsfähige Atmosphären – Teil 36: Nicht-elektrische Geräte für den Einsatz in explosionsfähigen Atmosphären – Grundlagen und Anforderungen *Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements* *Atmosphères explosives – Paties 36: Appareils non électriques destinés á être utilisés en atmosphéres explosives – Méthodologie et exigences*
- DIN EN ISO 80079-37: 2016,	Explosionsfähige Atmosphären – Teil 37: Nicht-elektrische Geräte für den Einsatz in explosionsfähigen Atmosphären – Schutz durch konstruktive Sicherheit „c", Zündquellenüberwachung „b", Flüssigkeitskapselung „k" *Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"* *Atmosphères explosives – Paties 37: Appareils non électriques destines à être utilisés en atmosphéres explosives – Mode de protection non électrique par sécurité de construction «c», par contrôle de la source d´inflammation «b», par immersion dans un liquide «k»*
- DIN EN 60079-0: 2014,	Explosionsgefährdete Bereiche – Teil 0: Betriebsmittel – Allgemeine Anforderungen *Explosive atmospheres – Part 0: Equipment – General requirements* *Atmosphères explosives – Paties 0: Matériel – Exigences générales*

Zusätzlich angewendete nationale Normen und techn. Spezifikationen / *Additional applied national standards and technical specifications / Les normes nationales et spécifications techniques utilisées supplémentaires*

- TRGS 727: 2016/CENELEC, Report R 044-001	Vermeidung von Zündgefahren infolge elektrostatischer Aufladung *Avoidance of ignition hazards as a result of electrostatic charges* *Évitement des risques d'inflammation dus aux charges électrostatiques*

Das Konformitätsbewertungsverfahren gemäß EU-Richtlinie 2014/34/EU wurde unter Beteiligung der folgenden benannten Stelle durchgeführt:
The conformity assessment procedure according to EU Directive 2014/34/EU has been implemented with the participation of the following Notified Body:
La procédure d'évaluation de la conformité selon la directive UE 2014/34/UE a été réalisée avec la participation de l'organisme notifié suivant :

Bureau Veritas Consumer Product Services Germany GmbH
Businesspark A96, 86842 Türkheim, Germany
Identifikations-Nr.: 2004

Bei einer mit uns nicht abgestimmten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit.
Any modification of this device without confirmation shall automatically annul this declaration.
En cas de modification de la appareil non convenue avec nous, la présente déclaration perd sa validité.

Jettingen-Scheppach, 22.11.2021

Dr. Christian Stehle

Seite **1** von **2**

11.3 EU Declaration of Conformity in accordance with 2014/34/EC with dust ATEX marking

EU-KONFORMITÄTSERKLÄRUNG

EU DECLARATION OF CONFORMITY
DÉCLARATION DE CONFORMITÉ UE

QUALITY FOR LIFE

Hersteller / *Manufacturer* / *Fabricant:* **AL-KO THERM GMBH I Hauptstraße 248-250 I 89343 Jettingen-Scheppach I Germany**

Im Sinne der EU- Richtlinie 2014/34/EU, Anhang X, Abschnitt B vom 26. Februar 2014
As defined in EU Directive 2014/34/EU, Annex X, Section B of February 26, 2014
Au sens de la directive UE 2014/34/UE, annexe X, section B du 26 Février 2014

Hiermit erklären wir, dass die Bauart und die Ausführung der
We hereby declare that the design and construction of the
Nous déclarons par la présente que la conception et la construction de l'installation

Gerät / *Device* / *Appareil :* RLT / Space air technical devices / Air d'espace les appareils echniques

Auftrags-Nr. / *Order no. / N° de commande :* XXXXXXXX **Position** / *position / la position:* XX

Serie / *Series / Série :* AT4F Ex

Fertigungsdatum / Production date / date de fabrication : **XXXX**

EX-Kennzeichnung / *EX marking / marquage EX :*

☐ **Zuluft** / *Supply air / air d'alimentation :* ☒ **Abluft** / *Exhaust air / Air d'échappement :*

CE Ex II 3D Ex h IIIB T150°C Dc – innen/inside/à l'intérieur

Ohne Anforderungen – außen/outside/à l'extérieur

X = besondere Bedingungen siehe Anlage / *special conditions as annexed* / conditions particulières voir annexe

folgenden geltenden Normen und Richtlinien entspricht.
complies with the following applicable standards and directives.
est conforme aux normes et directives applicables suivantes.

ATEX - Richtlinie 2014/34/EU / *ATEX Directive 2014/34/EU / Directive ATEX 2014/34/UE*

Angewandte harmonisierte Normen / *Applied harmonized standards / Normes harmonisées appliquées:*

- DIN EN 1127-1: 2011,	Explosionsfähige Atmosphären – Explosionsschutz Teil 1: Grundlagen und Methodik *Explosive atmospheres – Explosion prevention and protection - Part 1: Basic concepts and methodology* *Atmosphères explosives – Prévention de l'explosion et protection contre l'explosion – Partie 1 : Notions fondamentales et méthodologie*
- DIN EN ISO 80079-36: 2016,	Explosionsfähige Atmosphären – Teil 36: Nicht-elektrische Geräte für den Einsatz in explosionsfähigen Atmosphären – Grundlagen und Anforderungen *Explosive atmospheres – Part 36: Non-electrical equipment for explosive atmospheres – Basic method and requirements* *Atmosphères explosives – Parties 36: Appareils non électriques destinés à être utilisés en atmosphères explosives – Méthodologie et exigences*
- DIN EN ISO 80079-37: 2016,	Explosionsfähige Atmosphären – Teil 37: Nicht-elektrische Geräte für den Einsatz in explosionsfähigen Atmosphären – Schutz durch konstruktive Sicherheit „c", Zündquellenüberwachung „b", Flüssigkeitskapselung „k" *Explosive atmospheres – Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"* *Atmosphères explosives – Parties 37: Appareils non électriques destines à être utilisés en atmosphères explosives – Mode de protection non électrique par sécurité de construction «c», par contrôle de la source d'inflammation «b», par immersion dans un liquide «k»*
- DIN EN 60079-0: 2014,	Explosionsgefährdete Bereiche – Teil 0: Betriebsmittel – Allgemeine Anforderungen *Explosive atmospheres – Part 0: Equipment – General requirements* *Atmosphères explosives – Parties 0: Matériel – Exigences générales*

Zusätzlich angewendete nationale Normen und techn. Spezifikationen / *Additional applied national standards and technical specifications / Les normes nationales et spécifications techniques utilisées supplémentaires*

- TRGS 727: 2016/CENELEC, Report R 044-001	Vermeidung von Zündgefahren infolge elektrostatischer Aufladung *Avoidance of ignition hazards as a result of electrostatic charges* *Évitement des risques d'inflammation dus aux charges électrostatiques*

Das Konformitätsbewertungsverfahren gemäß EU-Richtlinie 2014/34/EU wurde unter Beteiligung der folgenden benannten Stelle durchgeführt:
The conformity assessment procedure according to EU Directive 2014/34/EU has been implemented with the participation of the following Notified Body:
La procédure d'évaluation de la conformité selon la directive UE 2014/34/UE a été réalisée avec la participation de l'organisme notifié suivant :

Bureau Veritas Consumer Product Services Germany GmbH
Businesspark A96, 86842 Türkheim, Germany
Identifikations-Nr.: 2004

Bei einer mit uns nicht abgestimmten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit.
Any modification of this device without confirmation shall automatically annul this declaration.
En cas de modification de la appareil non convenue avec nous, la présente déclaration perd sa validité.

Jettingen-Scheppach, 22.11.2021

Dr. Christian Stehle

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Notes

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