Operation & Maintenance

Translation of the original operating instruction

WOLF GEISENFELD

AIR HANDLING UNITS (AHU)

WK-com series

MADE IN GERMANY

Quality Assurance

QZV
Verein zur Qualitätssicherung und Zertifizierung für den Mittelstand e.V.

QZV DIN EN ISO 9001:2015

CERTIFICATE

The Verein zur Qualitätssicherung und Zertifizierung für den Mittelstand e.V. certifies that the company

WOLF Anlagen-Technik GmbH & Co. KG
Münchener Straße 54
85290 Geisenfeld

has established and maintains a Quality Management System according to DIN EN ISO 9001:2015. Proved in an audit.

Audit number: **12291191**

Conducted by: Prof. Dr.-Ing. Gerhard Kraaer

This certificate was issued the: 14.10.2021 and is valid until: 13.10.2024
Certificate registration number: **12191191**

For the QZV: Axel Wolkert

QZV e.V. Schlierseestr. 46, 81539 München
Registration number 33150102 (AICB e.V.)

ACB

Installer declaration

WOLF Anlagen-Technik GmbH & Co. KG
Münchener Str. 54
85290 Geisenfeld, GERMANY

WOLF

Einbauerklärung

Im Sinne der Maschinenrichtlinie 2006/42/EG, Anhang II, Teil 1, Abschnitt B vom 17.05.2006
Declaration of Incorporation in the sense of Machine Guideline 2006/42/EG, Annex II, Part 1, Par. B dd. 17.05.2006

Hiermit erklären wir, dass die nachfolgend bezeichnete unvollständige Maschine zum Zusammenbau mit anderen Maschinen/Maschinenteilen zur bestimmungsgemäßen Verwendung geeignet ist und dass seine Inbetriebnahme solange untersagt ist, bis festgestellt wurde, dass die, unter Beachtung unserer aktueller Montage-, Betriebs- und Wartungsanleitung (gem. Anhang VI), durch Zusammenbau erstellte Maschine, bzw. Anlage oder die Maschine eingebaut werden soll, den Bestimmungen der Richtlinie 2006/42/EG entspricht und die EG-Konformitätserklärung gemäß Anhang IIA vorliegt. Bei einer nicht mit uns abgestimmter Änderung der unvollständigen Maschine verliert diese Erklärung ihre Gültigkeit. Diese Einbauerklärung gilt nur im Zusammenhang mit den gültigen Datenblättern und der aktuellen Montage-, Betriebs- und Wartungsanleitung.
We hereby declare that the incomplete machine described below is suitable for assembly with other machines/machine parts for the intended use and that its commissioning is prohibited until it has been determined that the machine or system created by assembly according to our current assembly, operating and maintenance instructions (according to Appendix VI) the machine or plant created by assembly or the machine is to be installed, complies with the provisions of Directive 2006/42/EC and the EC Declaration of Conformity according to Annex IIA is available. This declaration becomes invalid if the incomplete machine is modified without our agreement. This declaration of incorporation is only valid in conjunction with the valid data sheets and the current assembly, operating and maintenance instructions.

Diese Einbauerklärung gilt nur im Zusammenhang mit den gültigen Datenblättern und der aktuellen Montage-, Betriebs- und Wartungsanleitung und bezieht sich nur auf den auftragsbezogenen Leistungs- und Lieferumfang.
This declaration of incorporation is only valid in conjunction with the valid data sheets and the current assembly, operating and maintenance instructions and only refers to the order-related scope of supply and services.

Produktbezeichnung *Product Name*	**Raumlufttechnisches zentrales Luftbehandlungsgerät** *Central Air Handling Unit*
Serien- / Typenbezeichnung *Serial / Type Name*	**WK-com...**
Fabrikatnummer *Production Number*	**siehe Typenschild am Gerät** *See nameplate on the machine*
Baujahr *Year of Construction*	**2023**
Einschlägige EG-Richtlinien und Verordnungen: *Relevant EC-Directives and Regulations:*	**Maschinenrichtlinie 2006/42/EG** *Machine Directive 2006/42/EG*
	EMV-Richtlinie 2014/30/EU *EMV-Directive 2014/30/EU*
	Druckgeräterichtlinie 2014/68/EU *Pressure Equipment Directive 2014/68/EU*

Bevollmächtigter der WOLF Anlagen-Technik GmbH & Co. KG für die Zusammenstellung aller technischen Unterlagen ist Herr Viktor Richtsfeld, Leitung Technik.
Authorized Representative of WOLF Anlagen-Technik GmbH & Co. KG for compiling all technical documents is Mr. Viktor Richtsfeld, Technical Management.

Geisenfeld, 01.10.2023

ppa.
Viktor Richtsfeld, Mitglied der Geschäftsführung
Viktor Richtsfeld, Member of Management

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Declaration of Conformity

WOLF Anlagen-Technik GmbH & Co. KG
Münchener Str. 54
85290 Geisenfeld, GERMANY

CE WOLF

EG-Konformitätserklärung

Im Sinne der Lüftungsgeräte-Ökodesignverordnung (EU) 1253/2014/EU, Artikel 5 vom 07.07.2014 zur Durchführung der Ökodesignrichtlinie 2009/125/EG vom 21.10.2009.
EC-Declaration of Conformity in the sense of Ecodesign Regulation for Ventilation Equipment (EU) 1253/2014/EU, Art. 5 dd. 07.07.2014 for implementation of Ecodesign Directive 2009/125/EG dd. 21.10.2009

Hiermit erklären wir, dass die nachfolgend bezeichnete unvollständige Maschine zum Zusammenbau mit anderen Maschinen/Maschinenteilen zur bestimmungsgemäßen Verwendung geeignet ist und dass seine Inbetriebnahme solange untersagt ist, bis festgestellt wurde, dass die, unter Beachtung unserer aktueller Montage-, Betriebs- und Wartungsanleitung (gem. Anhang VI), durch Zusammenbau erstellte Maschine, bzw. Anlage oder die Maschine eingebaut werden soll, den Bestimmungen der Richtlinie 2006/42/EG entspricht und die EG-Konformitätserklärung gemäß Anhang IIA vorliegt. Wir erklären außerdem, dass die nachfolgend bezeichnete unvollständige Maschine den Ökodesignanforderungen der Lüftungsgeräte-Ökodesignverordnung entspricht. Bei einer nicht mit uns abgestimmten Änderung der Maschine verliert diese Erklärung ihre Gültigkeit. Diese Einbauerklärung gilt nur im Zusammenhang mit den gültigen Datenblättern und der aktuellen Montage-, Betriebs- und Wartungsanleitung.
We hereby declare that the incomplete machine described below is suitable for assembly with other machines/machine parts for the intended use and that its commissioning is prohibited until it has been determined that the machine or system created by assembly according to our current assembly, operating and maintenance instructions (according to Appendix VI) the machine or plant created by assembly or the machine is to be installed, complies with the provisions of Directive 2006/42/EC and the EC Declaration of Conformity according to Annex IIA is available. We also declare that the incomplete machine designated below complies with the ecodesign requirements of the Ventilation Unit Ecodesign Ordinance. This declaration becomes invalid if the incomplete machine is modified without our agreement. This declaration of incorporation is only valid in conjunction with the valid data sheets and the current assembly, operating and maintenance instructions.

Diese Konformitätserklärung gilt nur im Zusammenhang mit den gültigen Datenblättern und der aktuellen Montage-, Betriebs- und Wartungsanleitung und bezieht sich nur auf den auftragsbezogenen Leistungs- und Lieferumfang.
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Bevollmächtigter der WOLF Anlagen-Technik GmbH & Co. KG für die Zusammenstellung aller technischen Unterlagen ist Herr Viktor Richtsfeld, Leitung Technik.
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Viktor Richtsfeld, Member of Management

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Content

1. Operator instructions and regulations

Importance of the operating instructions

Read these operating and maintenance instructions carefully prior to installation and commissioning in order to ensure correct use. Please note that these operating and maintenance instructions apply to the unit only, and in no event to the entire system. All unit-specific data, such as for example order number, energy data, weight, dimensions, and so on, are either specified on the type plates of the respective components, or the technical order confirmation. These operating and maintenance instructions ensure safe working on and with the specified unit. It includes safety information to be observed, and details required for fault-free unit operation. Store the operating and maintenance instructions on the unit. Ensure that all individuals carrying out activities on the unit can refer to the operating and maintenance instructions at any time. Store the operating and maintenance instructions for later use. They must be handed over to each user or end customer.

Operator duty of care

- The employer or operator must ensure that the system and operating equipment are operated and maintained in accordance with applicable rules and statutory regulations.
- The operator must operate the unit in perfect condition only.
- The unit may be used only as intended ("application range").
- Safety equipment must be tested regularly to ensure that it is functional.
- The operating and maintenance instructions are to be kept always in a legible state and shall be complete and available at the location where the unit is used.
- Personnel must be instructed regularly in all relevant occupational safety and environmental protection issues, and must be familiar with the operating and maintenance instructions; in particular the safety guidelines contained within them.
- All safety and warning information attached to the unit must not be removed and must remain legible.

2. Intended use

Central AHU for ventilation and air conditioning of

- offices
- conference rooms
- canteens
- commercial and industrial premises
- hospitals
- clean rooms

The central AHUs are suitable for

▶ Delivering air, which is

- dust-free
- free of pollutants
- non-aggressive
- non-corrosive
- non-combustible

▶ Air treatment for

- filtration
- heating
- cooling
- humidifying
- dehumidifying

▶ Subject to the operating parameters specified in the quotation, order and on the type plates, such as

- media temperatures (air, water, refrigerant, steam, etc.)
- air humidity
- explosive atmosphere
- max. capacities of drive units

Any other use is expressly excluded by WOLF.

Any other use requires the prior agreement of the manufacturer.

ATEX units for the handling of combustible gases, vapours, mists, or dusts must be specifically designed for such purposes. Refrigeration units must not be installed or operated in an ATEX area. All electrical products are designed and tested in accordance with the harmonized standards for an ambient temperature range between -20 ° C and + 40 ° C, this temperature range must not be exceeded or deceeded during operation.

Unless otherwise stated in our technical specifications and on the unit, standard AHU cannot be used in this hazardous area, e.g. in potentially explosive atmospheres.

ATEX units cannot be used in the vicinity of:

- powerful light sources (e.g., laser radiation)
- ultrasonic sources (e.g., ultrasonic echo test equipment)
- sources of high frequency emissions (e.g., transmitters)
- sources of ionising radiation (e.g., x-ray tubes)

3. Safety

The qualified personnel assigned with carrying out must be instructed to follow these operating instructions prior to commencing work. Anyone carrying out an activity on this unit must have read the operating and maintenance instructions.

Failure to observe the operating instructions can result in risks to the individuals charged with expediting the work as well as faults on the unit

- Installation
- Commissioning
- Maintenance
- Troubleshooting
- Decommissioning

The AHU is only a part of the overall AHU system. Only when installed and after connecting the on-site air ducts,water and condensate lines as well as the power supply, will the unit meet its safety standard.
Safety risks presented by the unit must be re-assessed and tested following installation in the final unit/overall system.

Caution!
Work on the AHU must only be started or performed if the following functions are ensured:

- Service switches fitted to the unit are connected to the control circuit of the AHU system
- Power supply is omnipolar at zero volt
- Powered rotating parts are secured against reconnection (lockable service switch).
- All rotating parts are at standstill.
- Unit components are cooled down to normal ambient temperature (room temperature)

After completing work, start system according to *„6. Commissioning" on Page 34*!

Caution!
Only qualified electricians are permitted to work on electric components. The local PSU (power supply utility) and IEE (Institute of Electrical Engineers) regulations must be observed.

Making structural modifications or enhancements to the AHU is not permitted. Doing so will void the manufacturer's Declaration of Conformity and the installer installation.

Filter dust can cause allergic reactions to skin, eyes, or respiratory organs on contact. Wear personal protective clothing when servicing or changing the air filter; for example face mask, safety goggles, protective clothing.

Caution! Refrigeration equipment:

- All applicable national and international standard regulations must be observed. All work on the system must be carried out by qualified trained personnel.
- High refrigerant concentrations can cause suffocation. Refrigerant is odourless and tasteless.
- Observe safety datasheets.
- Use general safety information and personal protective equipment against refrigerant and heating agents according to BGV D4 (safety goggles, gloves, observe industrial hygiene, S1 safety boots, etc.).
- Avoid all bodily contact with refrigerant and compressor oil, as they can are harmful to skin and eyes.
- Never exceed the maximum workplace concentration of the substances used – see safety datasheets (EN 378).
- Risk of burns from hot surfaces on compressor, pipes, and heat exchangers.
- Before entering the system, ensure that it fully isolated from its power supply and that all moving parts have come to a complete standstill.
- If refrigerant has been released, the area (room) may be entered only with a suitable self-contained breathing apparatus, as far the safety of the atmosphere has not been proven.
- Keep ignition sources away – no smoking.
- Store containers with hazardous substances in a well ventilated location.
- Implement measures to prevent electrostatic charging.
- Never inhale gas, smoke, vapour or aerosols.
- The effects of fire can result in system rupture.
- Protect from heat radiation.
- Caution, system under pressure.
- Incorrect use or misuse of the refrigeration unit can cause material losses or personal injury.
- Refrigeration units must not be installed or operated in an ATEX area.

Symbols:

You find this symbol anywhere in these operating instructions where failure to observe

- will result in a potential risk to life and limb
- may cause damage to the unit.

You find this symbol anywhere in these operating instructions where there is
a potential hazard from electrical components.

You find this symbol anywhere in these operating instructions wherever there is a risk or need for increased protective measures due to areas at risk from explosions.

You will find this symbol anywhere in these operating instructions where there is a crushing hazard.

The symbol adjacent can be found in the operating instructions wherever,

- there is a danger of tipping over.
- there is a danger to life and limb of persons.
- damage to the unit can occur.

Danger: biological hazard symbol, hospital hygiene DIN1946-4, gas mask, area, art, biological hazard

You will find this symbol anywhere in these operating instructions where there is a suspended load hazard.

Warning against harmful and irritant substances

This symbol indicates guidelines or cross references in these operating instructions, which are important for the operation of the AHU system.

This symbol in these operating instructions indicates information or application tips.

You will see the adjacent symbol anywhere, where for example a risk of ignition can arise as a result of electrostatic charge. The operator must earth (equipotential bonding) the entire unit according to state of the art in order to prevent electrostatic charging.

Mandatory sign; use mask

Mandatory sign; use hand protection

4. General informations

04.01 Application range

The application range of the supplied AHU is specified in the order confirmation, in particular in the unit specification.

- An AHU only cannot ensure the complete and necessary explosion protection.
- The protection concept must always take into account the entire plant and other circumstances.
- The overall responsibility for correct installation, intended use and maintenance is always the responsibility of the plant constructor or operator of the entire plant
- Explosion-protected AHUs must be labelled according to Directive 2014/34/EU.
- The use may only be carried out in accordance with the specified Ex-labelling inside and outside the building in compliance with the instructions in the operating and maintenance manual.

Units with the "Ex" marking (ATEX units) are suitable for the hazardous areas identified on the unit type plate and its datasheet compliant to the ATEX Directive 94/9/EU.
Note application limits!

ATEX units must not be used in the proximity of the following:

- high-frequency sources (such as transmitters)
- strong light sources (for example, laser radiation)
- ionizing radiation sources (e.g. X-ray tubes)
- ultrasound sources (e.g. ultrasound echo testing equipment)

04.02 Accessories

The manufacturer offers and supplies AHUs in line with the specifications drawn up by external design engineers covering the entire AHU system. Generally, this covers only a section of the overall AHU system. Given that only specialised contractors will supply these units, certain accessories such as

- actuators
- differential pressure switches for filters, flow rate
- service switches
- complete control system, power switchgear

can be provided by the client. The specification will identify the accessories to be provided by the client.
The specialist contractor must install safety-relevant accessories before the first trial run.

04.03 Adopted safety measures

Our AHUs are generally equipped with the necessary safety equipment

- Access to service doors or covers to be opened using a tool.

In the delivered condition, access to the fan discharge area is possible. This is no longer possible once ducts have been connected on-site.

04.04 Sound emissions

Our AHUs are designed and manufactured compliant with the specification determined by a design engineer.
The technical values indicated in the specification and on the type plates are achieved under the following conditions:

- the system is fully installed
- the design criteria, e.g. external discharge pressure, are met on-site
- adequate sound attenuation measures for fitted parts are in place

04.05 Lightning protection

According to VDE 0185 T1 a professional lightning protection system must be installed with roof centres.

5. Storage, transport and assembly

05.01 Receipt of goods, transport damage

Unpack the goods in the driver's presence and check that they are complete and undamaged against our delivery note.
Damage in transit must be acknowledged by the haulier! (date and signature)
Any subsequent complaint will be rejected by the haulier's insurance.

05.02 Information on one-way packaging

The packaging is merely transport packaging. Its amount has been reduced to the indispensable minimum, in order to be able to ship and unload the high grade parts free of damage.
The material is fully recyclable and can therefore be reused.
Disposal costs are borne by the recipient.
As an alternative, it is possible to return the packaging to us. Return shipping costs are met by the consignee of the goods. Please note that the packaging must not be soiled and must be returned separated according to groups.

05.03 Storage on site and function maintenance

If parts are packed in foil, this foil must be removed immediately after receipt. Foils encourage condensation and thus oxidation, especially on hot-dip galvanized material.

Corrosion of cut edges can occur in sendzimir-processed components. Reddish or whitish discolouration of cut edges alone is not an indication of problematic corrosion manifestation. Corrosion protection is still ensured and does not constitute a reduction in its quality, or is no reason for complaint.

All components must be stored so as to rule out the possibility of spoilage, damage due to soiling, condensation, weather conditions, or external influence. Relax the belts on any belt-driven components during storage, idle periods, or delayed commissioning (stoppages longer than 3 months). Move and rotate any parts that turn or rotate, such as fans, motors, pumps, heat recovery rotors, actuators, and dampers, once a month.
In addition, observe the following:

- Remove al plastic film
- When storing equipment temporarily, place it in a dry and dust-free location protected from weather conditions
- Close unit apertures to prevent ingress of dirt (dust, insects).
- Prevent condensation
- Check the functional integrity of components and incorporated parts
- Observe any additional service and operating instructions provided by component manufacturers

Also ensure that the units are protected against ingress of dirt during installation.

Maximum permissible storage period or idle time for: inverters, EC controllers, motors with integral controllers.

Refreshing intermediate circuit capacitors

The maximum permissible storage period or idle time without mains voltage is particularly dependent on the electrolytic capacitors, since the dielectric in the capacitor decomposes and the electrolyte vaporises.

Depending on the duration the system is de-energised, it may be necessary to refresh the internal capacitors before applying full mains voltage.

Time without mains voltage	Actions to take prior to start-up
Less than 1 year	None
1-2 years	Connect unit to mains for 1 hour without enabling it
Longer than 2 years	Refresh (without enabling it) using adjustable supply voltage 1. 30 % of mains voltage for 1 hour 2. 60 % of mains voltage for 1 hour 3. 85 % of mains voltage for 2 hours 4. 100 % of mains voltage for 3 hours

Mains voltage: See the specification of the respective unit, for wide voltage ranges = use upper value indicated for mains voltage.

05.04 AHU transport to construction site and assemblies

Caution

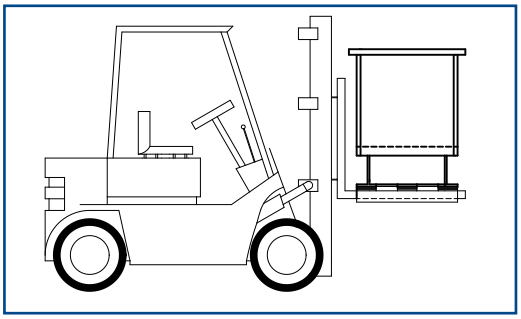
Falling loads can result in very serious personal injury or material losses if safety regulations are not observed.

Use and observe safety regulations appertaining means of handling, hoists and approved lifting tackle (to BGV D6).

Never stand below suspended loads.

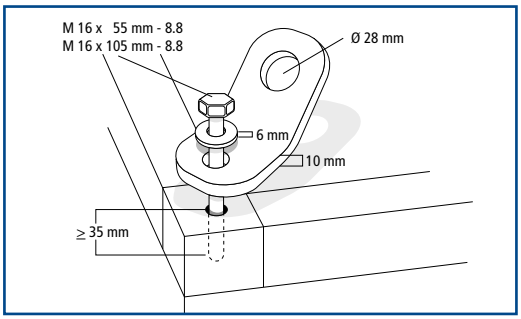
Units without handling facility: When transporting using a pallet truck or rollers, leave the shipping pallet underneath the air handling unit. When transporting using a forklift truck, ensure that the forks reach across the entire width of the casing. Both sides of the frame must be supported by the forks.

The unit components must only be transported in the installation position. They must be kept upright and must not be turned in their longitudinal axis because integral parts may otherwise be damaged (e.g. the fan anti-vibration dampers can shear off).



05.04.01 Fitting the lifting brackets

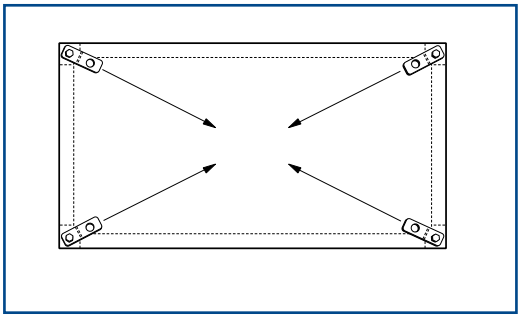
Only the lifting brackets specified or supplied by the factory may be used to attach lifting ropes to the unit.



Caution! The lifting brackets may only be used to install one unit!

The lifting brackets must not be used for multiple units because possible hairline cracks could compromise safety.

The lifting brackets must be fitted using M16 x 55 mm – 8.8 hexagon bolts to DIN 933 for standard construction or M16 x 105 mm – 8.8 hexagon bolts to DIN 933 for weatherproof construction and 6.0 mm thick washers with a minimum thread-in depth of 35 mm, to ensure the load bearing capacity of the lifting brackets.



The thread in the corner connection must be free of dirt and undamaged.

The spacer sleeves specified and supplied by the factory must be used on all weatherproof units.

To secure, align the plates towards the centre (see Fig.) and tighten by hand.

- Lifting brackets with missing ID markings must not be used.
- Modifications and repairs, in particular welding is not permitted.
- Any use with or of products by third parties is not permitted.

05.04.02 Attachment to lifting gear

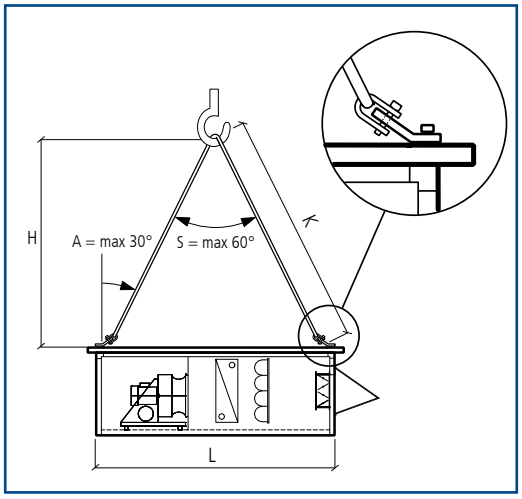
Attachment to lifting gear must be carried out in accordance with the specifications in these operating instructions.

For fixing the track ropes resp. chains to the load angle, fixing elements adequate to the load, for example shackles, have to be used! For the crane transport, all relevant safety regulations acc. to DGUV (German Legal Accident Insurance) Rule 52 Crane and DGUV 500 Chapter 2.8 must be observed.

Attention! The max. load capacity per delivery unit incl. own weight of auxiliaries for lifting must not be exceeded! This could damage the delivery object and cause danger to life.

WK-com Typ	Max. load capacity / delivery unit	Max. load capacity / corner connector
N, N-W, H, H-W	2.500 kg	625 kg
S, S-W	3.000 kg	750 kg

Multiple units must not be lifted together during unloading, lifting or installation. Units with more than 4 lifting plates must only be lifted using a gantry hoist.



The rope angle (S) must not exceed 60°.

The angle of inclination (A) must not exceed 30°.

The arrangement and sizing of the lifting plates are based on a rope angle of 60° (corresponding to a 30° angle of inclination).

Greater rope angles or angles of inclination cause an the lifting plates to be overloaded and result in damage to the unit.

The length of the lifting chains or ropes must at least correspond to the distance between the lifting plates.

Please refer to table *„05.04.03 Guide values for attachment to lifting gear" on Page 12* for the specified values.

The values in this table are based on a rope angle of 60° (= 30° angle of inclination).

05.04.03 Guide values for attachment to lifting gear

L = Module length	Module width	H = Hook height	K = Chain length
6.00 m	3.00 m	5.81 m	6.71 m
6.00 m	1.65 m	5.40 m	6.22 m
6.00 m	1.00 m	5.30 m	6.08 m
5.00 m	3.00 m	5.06 m	5.84 m
5.00 m	1.65 m	4.56 m	5.27 m
5.00 m	1.00 m	4.41 m	5.09 m
4.00 m	3.00 m	4.33 m	5.00 m
4.00 m	1.65 m	3.75 m	4.33 m
4.00 m	1.00 m	3.57 m	4.12 m
3.00 m	3.00 m	3.67 m	4.24 m
3.00 m	1.65 m	2.97 m	3.42 m
3.00 m	1.00 m	2.73 m	3.15 m
2.00 m	1.65 m	2.24 m	2.59 m
2.00 m	1.00 m	1.93 m	2.23 m
1.00 m	1.00 m	1.21 m	1.40 m

05.05 Foundations

A smooth, level **floor which is as vibration-isolated as possible,** is required for the correct installation of these units. Strip foundations, in particular foundations made of steel supports, must be sufficiently rigid to prevent the unit from bending.

All strip foundations require cross supports at the front and end of units as well as at the joints between unit sections.

Failure to meet these requirements may result in problems on the unit, such as jamming doors.

Assembly instructions: Place steel plates between the unit and the anti-vibration strips during assembly (assembly of unit modules). This simplifies drawing the modules together.

When installing a washer unit, all other unit sections must be supported by an on-site substructure. Observe the foundation height for units with traps.

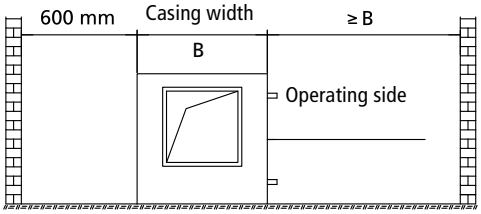
The stability of the unit at the installation site must be ensured according to the state of the art and the existing conditions, e.g. tipping over, wind loads. In particular, units that are outdoors or have a motor extension rail must be secured to the foundation.

The unit must be earthed at the base frame according to the state of the art (foundation earth). Additionally, with ATEX units an attachment, e.g. blind rivet nut is provided at the bottom of the unit. The position is identified with an earth label. All connections must be secured against self-undoing.

05.06 Structure-borne sound insulation

It is recommended to use suitable anti-vibration mounts for insulate against vibrations.
Install structure-borne sound insulation strips (supplied by us) all around or according to our instructions.

05.07 Required space for operation and maintenance



Required space: Generally, one unit width should be available on the operating side.

Minimum width in front of integrated parts:	≥ B
Fan component:	1000 mm
Heater, cooler:	unit width + 200 mm
Bag filter:	700 mm
Bag filter, mounting frame extendible:	unit width

The back of the unit must also be accessible. A clearance of 600 mm is sufficient for installation.

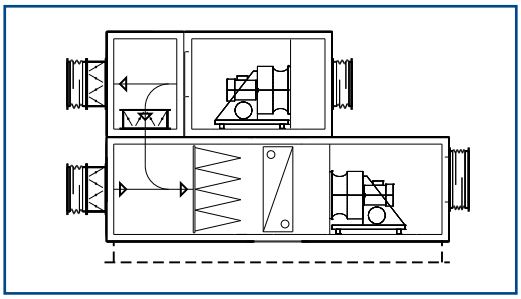
In the case of hygienic units, access to the back of the units must also be possible for easier cleaning as well as disinfection. (see Fig.)

When routing connection cables/lines (electricity, air, water, etc.), please ensure that operating doors and service covers are not obstructed.

According to VDI 6022, integral components installed inside the AHU must be accessible from both sides.

05.08 Unit arrangement

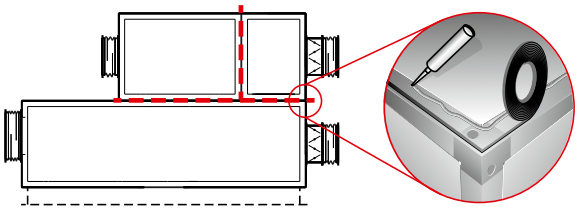
Stacked units (piggyback layout) are available up to and including WK-com 1270. From WK-com 255 to WK-com 1270, the upper modules of the unit can only be supplied as individual components!.



Units must only be installed according to their designated use. If modifications are required, e.g. units intended to be installed in-line now want to be stacked (piggyback), consult the factory first.

WK-com 255 to 446 are delivered with base frames on the bottom unit.

05.09 Assembly of unit modules for indoor and outdoor units



Before the attached / upper unit modules can be installed, the horizontal and vertical joints must be prepared. A sealing tape must be laid all around and an additional seam must be drawn all around. Only after that, the put on unit modules can be installed. The sealant is included in our scope of supply

When assembling and installing unit modules, ensure that they are assembled in the order specified under *„05.09.01 Assembly of units with 30 mm wall thickness“ on Page 15*.

Unit Modules, which belong together, have the same mark at the respective connection points on their flanges. For example connect "flange 1" to "flange 1".

Our centring pins are used to ensure the accurate fit of individual modules in the longitudinal direction (see Fig.). These are already prefitted or included with the assembly accessories.

Attention
As long as the unit is not connected to the structure in accordance with the regulations, there is a risk of it tipping over (e.g. units with castors) and components falling down. Tipping over or falling down can cause serious personal injury or even fatal injury."

Doors were adjusted during manufacture under ideal conditions.

After installation on site, it may be necessary to readjust the doors: – undo the hinge screws on the door leaf –
adjust door leaf to the same gap – firmly tighten the hinge screws

When installing units indoors and outdoors, always make sure that all horizontal and vertical joints / separating points are sealed permanently all around with sealing tape and suitable sealant.

When fitting individual units, connect the equipotential bonding to the frame profile. The connections are additionally labelled with stickers (connect equipotential bonding here). All connections must be secured against self-undoing.

05.09.01 Assembly of units with 30 mm wall thickness

(WK 21/31, WK-com N 42 to WK-com N 510)

Parts included:

Hexagon screws	M 8 x 90
Allen screws	M 8 x 80
Nuts	M 8
Washers	9 / 35 mm

Required tools:

Open-ended spanner	13 mm
Allen key	size 6

Assembly sequence:

1. Affix the sealing tape (12 x 6 mm) supplied to the connection flanges of each unit to be joined to another, flush with the inner and outer surfaces.
2. Join the units at their upper corners using the M 8 x 90 screws, M 8 nuts, and 9 / 35 mm washers, tightening the nuts in alternating fashion (top - bottom). Not applicable to units with smooth wipe clean covers. Important! The screw connection merely serves to join the units and not for pulling together of units intended to be linked with a gap.
3. Insert M 8 x 80 screws and secure in place with M 8 nuts using the drilled holes frame profile (unit centre).
4. After having completed installation, the joint of the separating point has to be sealed inside all around with the supplied sealing material.

Joining units arranged side by side:
Secure unit sections in place at the drilled holes using M 8 x 80 screws and M 8 nuts.

05.09.02 Assembly of units with 60 mm wall thickness

(WK 21/31, WK-com S 42 to WK-com S 1270)

Parts supplied:

Gusset plates	
Threaded bars	M 12 x 163 / M 8 x 163
Nuts	M 12 / M 8
Washers	- / 8.5 / 15 mm

Required tools:

Open-ended spanners	2 x 13 mm /2 x 19 mm

Assembly sequence:

1. Affix the sealing tape (12 x 6 mm) supplied to the connection flanges of each unit to be joined to another, flush with the **inner and outer surfaces.**
2. At the upper corners, place the gusset plates supplied so drilled holes are flush, insert one M 12 x 163 threaded rod through 2 gusset plates and secure the unit sections together by tightening the nuts in alternating fashion (top - bottom).
   Important! The fasteners only serve to secure the sections together and not to pull units together that are intended to be linked with a gap. Not applicable to units with smooth wipe-clean covers.
3. Insert M 8 x 163 threaded rods through the drilled holes in the frame profile (unit centre) and secure with 8.5 / 15 mm washers and M 8 screws.
4. After having completed installation, the joint of the separating point has to be sealed inside all around with the supplied sealing material.

Joining units arranged in-line:
Secure the unit sections using the drilled holes provided with M 8 x 163 threaded rods, 8.5 / 15 mm washers and M 8 nuts.

05.09.03 Assembly of hygienic units

(WK-com H 42 to WK-com H 510)


Figure 1


Figure 2

Parts supplied:

Hexagon nuts	M 8
Hexagon screw	M 8 x 100
Tensioning elements	(depending on size)
Allen screws	M 8 x 40

Required tools:

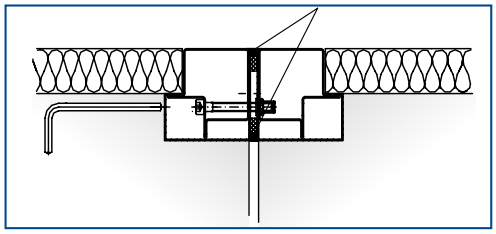
Open-ended spanner	2 x 13 mm
Allen key	size 6

Assembly sequence:

1. Affix the 6 x 12 mm sealing tape supplied to the flange of one of the units to be joined.
   Apply this tape to the outer edge of the unit flange.
   Affix the sealing tape all around with a central joint.
2. At the corners, insert the M 8 x 100 screws and M 8 nuts supplied and secure the unit sections firmly in an alternate manner (top - bottom) by tightening the nuts (Figure 1).
   Important! The fasteners only serve to secure the sections together and not to pull units together that are intended to be linked with a gap.
3. Secure the unit also on its outside using the tensioning elements as well as the M 8 x 40 Allen screws and M 8 nuts supplied. Place the tensioning elements with hexagonal fitting facing outwards. (*„05.09.05 Assembly of units - piggyback style, tensioning elements" on Page 18*)
4. After having completed installation, the joint of the separating point has to be sealed inside all around with the supplied sealing material. The cover caps (included in scope of supply) have to be fixed (Figure 2) and also sealed airtight.
   Use only the sealing material supplied (approval for AHUs) on the inner surface of the unit!

05.09.04 Assembly of hygienic units

(WK-com S 595 to WK-com S 1270, WK-com N 42 to WK-com N 510)



Parts supplied:

Cylinder head screws (WK-com S)	M 8 x 90
Cylinder head screws (WK-com N)	M 8 x 50

Required tools:

Allen key	size 6

Assembly sequence:

1. Affix the 6 x 12 mm sealing tape supplied to the flange (with blind rivets) of one of the units to be joined. This is applied **5 mm from the inner and outer edge of the unit flange.** Affix the sealing tape all around with a central joint.
2. Open the inspection covers or operating doors.
3. Secure the parts on the vertical inner bar cover using M 8 x 50 cylinder head screw. Attach plastic cover (part of accessories) tight onto the drilled hole.
4. Finally, seal the unit joint / transition internally and externally using the sealing material supplied. **Use only the sealing material supplied (approval for hygienic units) on the inner surface of the unit!**

05.09.05 Assembly of units - piggyback style, tensioning elements

(WK-com H 212 to WK-com H 510)

Parts supplied:

Allen screws	M 8 x 40
Nuts	M 8
Tensioning elements	

Required tools:

Open-ended spanner	13 mm
Allen key	size 6

Assembly sequence:

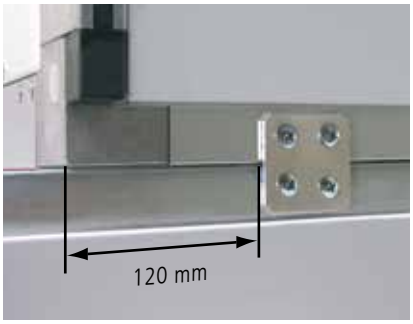
Join the unit sections on the outside with the tensioning elements as well as M 8 x 40 screws and M 8 nuts supplied. Place the tensioning elements with hexagonal fitting facing outwards.

Before the attached / upper unit parts can be installed, the horizontal and vertical joints must be prepared. A sealing tape 12 x 6 mm must be laid all around and an additional seam must be drawn all around. Only after that, the attached parts can be installed. The sealant is included in our scope of supply.

Important! The fasteners only serve to join the sections and not to pull units together that are intended to be linked with a gap. Parts joined in this manner must not be lifted with a hoist (load lifting point on top).

05.09.06 Assembly of units - piggyback style, connection brackets

(WK-com H 42 to 170, WK-com N and WK- S 42 to 1270)



Parts supplied:

Self-tapping screws	6,3
Connection brackets	4 x holes

Required tools:

Phillips or Torx bit	size 3

Assembly sequence:

Secure stacked units at the front and rear to the respective lower unit using 2 connection brackets each. Observe minimum distance of 120 mm to the unit corner.

Before the attached / upper unit parts can be installed, the horizontal and vertical joints must be prepared. A sealing tape 12 x 6 mm must be laid all around and an additional seam must be drawn all around. Only after that, the put on unit modules can be installed. The sealant is included in our scope of supply.

Important! The fasteners only serve to join the parts. Sections joined in this manner must not be lifted using a hoist (load lifting point on top)!

05.09.07 Assembly of units - covering the C-rail

(WK-com H)

The C-rails of the frame profile have to be covered exactly with a rubber profile (included in the accessories) after completing the entire unit installation.

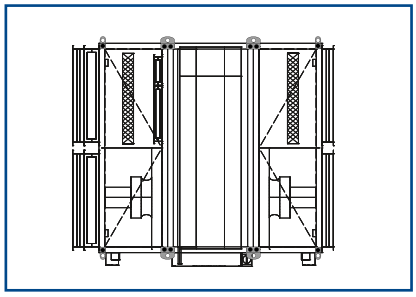
The rubber profile can be cut off with a knife and is pressed into the C-rail.

Make sure that all attachments such as hinges, clamping brackets, device connections etc. are left out.

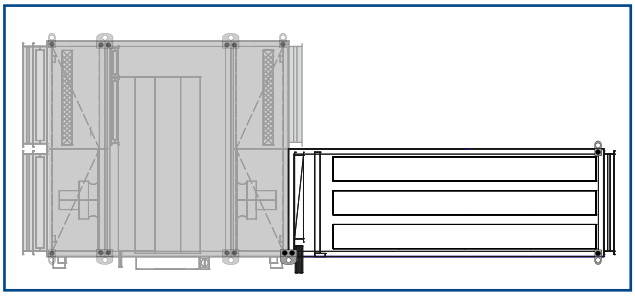
05.09.08 Installation instructions for the ceiling mounting set for the flat-panel unit

(WK-com F 16, F26, F34)

The fixing clips are always screwed to the corner connector in the base area of the unit with an M16 x 55 mm screw with M16 spring ring lock (see picture). The plant constructor is responsible for the correct installation of the ceiling fixing set (accessories) or of the device earthing.



floor view e.g. WK-com



floor view e.g. WK-com F with extension module

Fixing clip M0020618

Fixing clip M0020619

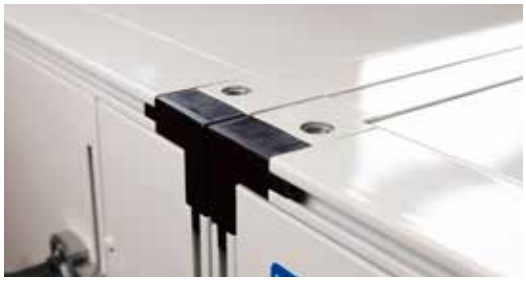
Attention

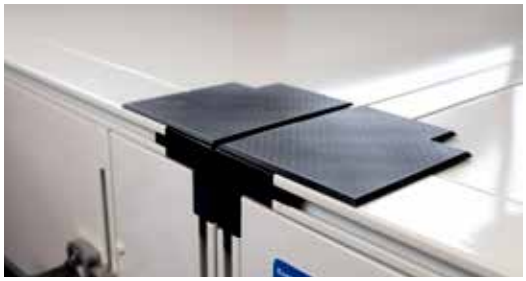
- Die The structure-borne sound decoupling devices (e.g. „rubber buffers“) must be provided by others. (see picture)
- The threaded rods of at least M12 8.8 must be provided by others. These must be fastened with suitable screw locks that can withstand the dynamic and static loads. The screw lock as well as all screw connections must be checked as required, but at least once a year and retightened if necessary (see picture). The inspection should be carried out by qualified personnel.

05.09.09 Corner connectors covers

(WK-com H inside)

After unit assembly, fit the covers supplied.





05.10 Transit bolts

Only remove the transit bolts attached to the unit after installation of the AHU on site. There are usually transit bolts inside the fan section, specifically on the anti-vibration mounts.

Remove the transit bolts if the heaters are split (allows expansion).

Transit bolts are marked in red and must be removed before commissioning the unit!

05.11 Equipotential bonding

Caution!

Fitted equipotential bonding must not be removed. The equipotential bonding installed on the intake and pressure side must be connected to the on-site connection duct.

The operator must have the equipotential bonding of the unit connected to the on-site equipotential bonding system by a qualified electrician in accordance with the legal requirements, standards and guidelines and ensure proper functioning.

For units to be used in an explosive atmosphere, flexible connectors with higher conductivity ratings are used.
These are additionally fitted with equipotential bonding.

To prevent risk of ignition from electrostatic charging, all electrically non-conductive connections must be bypassed with equipotential bonding; for example, flexible connectors, separated framework, vibration dampers, etc. All metal parts of the unit must be integrated into the local equipotential bonding measures. The unit base frame must be earthed using the best available techniques (foundation earth terminal).

See identification with **additional** earthing sticker.

05.12 Air connectors, air dampers

Install flexible or anti-vibration connectors between the unit and on-site air duct, to avoid the transfer of structure-borne noise.

Flexible (canvas) connectors must be installed so that full mobility of the flexible material is ensured. Never twist flanges because this puts tension on the flexible connectors.

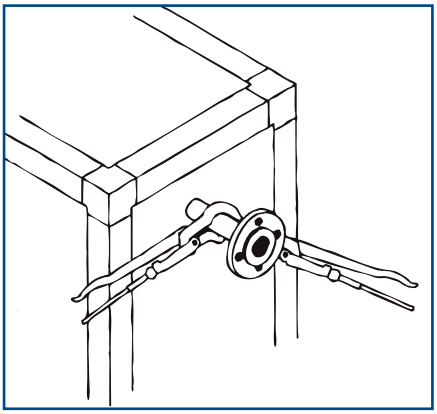
Flexible connectors **must be insulated on site**, to prevent condensation and the transfer of vibrations.If the actuator is installed on site ensure that near the air dampers side walls are not drilled or fasteners inserted. This would result in jammed damper flaps.

Drive torques:
Air dampers for outdoor, recirculating and exhaust air may be loaded with torque of up to 40 Nm.
The maximum torque for heat recovery bypass dampers is 20 Nm.

05.13 Connections on the medium side (pumped hot water, pumped cold water, refrigerant, steam)

All parts in contact with water must be made of corrosion-resistant materials (humidifier category A to E acc. to EN 13053). Integral components such as droplet eliminators, nozzles and pipes can be removed (humidifier category A to E acc. to EN 13053).

Heat exchangers are connected using detachable connections. Please ensure that the connection lines do not restrict access to other unit sections (fan, filter, washer, etc.). When connecting heat exchangers, counter-hold fitting with a pipe wrench. (see Fig.)



Heat exchanger connections must not be stressed through expansion forces of on-site supply lines.

Absorb arising forces by means of expansion loops or joints.

The heating or cooling system flow is connected to the exchanger on the air discharge side (counter-current principle).

Ensure on-site ventilation and draining options.

In the case of steam heat exchangers, ensure that no condensate backs up inside the heat exchanger. Also ensure efficient ventilation so that condensate can drain off. Observe the steam trap manufacturer's installation instructions.

For threaded fittings, use only approved thread sealant.

When filling the heat exchangers, pay attention to the following on the heating medium side (pumped hot water, pumped cold water, steam):

- Open air vent valves
- Open supply valve slowly, to avoid water hammer or thermal stress
- Close air vent and drain valves
- Check all connections for tightness

Caution! To avoid the built-in parts overheating when the fan is switched off, the heating medium supply must be forced off for air heaters with an inlet temperature in excess of 90 °C and for heaters operated with saturated steam. In these cases, the fan must be switched with a 3-5 minute run-on time.

Caution! Note the following when using refrigerant:

- Keep away from ignition sources – no smoking
- Protect containers from heat radiation and store in a well ventilated location
- Implement measures to prevent electrostatic charging
- Never inhale gas, smoke, vapour, aerosols.

Direct expansion coil and condenser
If the manufacturer does not assemble the unit, then this must be carried out by an authorised refrigeration specialist.

Caution:
Always wear personal protective equipment to BGV D4 (gloves, S1 minimum safety goggles, industrial hygiene, etc.) when opening the supply line. There is a risk of suffocation if adequate ventilation of the work area/environment is not ensured. Keep refrigerant away from ignition sources – no smoking, ventilate adequately, and implement measures against electrostatic charging. Avoid all bodily contact with refrigerant. There is an increased risk of frostbite to body parts. Never inhale gas, smoke, and aerosols. Heat exchangers of this type are charged with protective nitrogen oxide on completion.

Please observe the following when connecting refrigerant lines:

- Check the heat exchanger for tightness. If the nitrogen charge escapes with a hissing sound when opening the connecting lines of the heat exchanger, tightness is ensured.
- If no nitrogen escapes, there is a leak caused during shipping or other influences. Please return the heat exchanger to us.
- Install an appropriate number of shut-off valves to ensure that the system can be controlled easily and faulty parts can be replaced quickly.
- For larger systems, a shut-off valve, a sight glass and a dehumidifier should be installed upstream of each evaporator and a shut-off valve downstream of each evaporator.

05.14 Connections on the waste water side (condensate, drain, overflow pipes, trap)

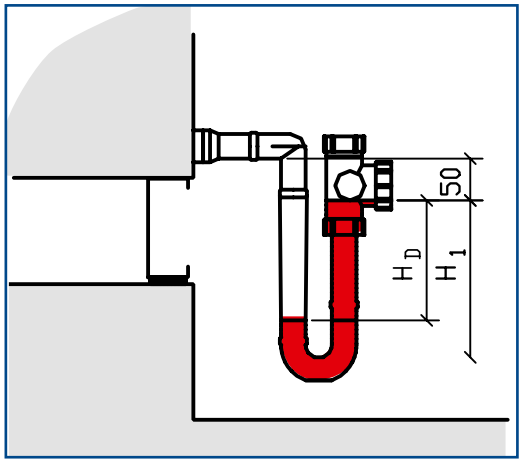
All unit drains (condensate connector on the cooler, steam humidifier, surface humidifier, heat recovery - as well as overflow on the washer) must be connected to a trap with non-return valve and automatic filling.
The trap must be sized so that it permits water (condensate) to freely flow from the collection pan.

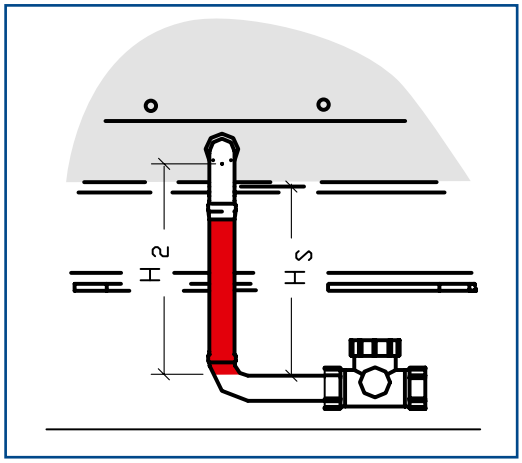
Important! The trap must safeguard separation between the waste water system and airflow in the unit!

Before commissioning and after longer downtime, fill trap with water. Seen from the trap, the unit must not slope towards the back. **Install the unit absolutely level!**

All parts in contact with water must be made of corrosion-resistant materials (humidifier category A to E acc. to EN 13053). Integral components such as droplet eliminators, nozzles and pipes can be removed (humidifier category A to E acc. to EN 13053).

Trap calculation





Positive pressure in the unit

$H_D = \frac{Pa}{10}$ [mm]
Pa = positive pressure in the unit (pascal)
$H_1 = H_D + 50$

Negative pressure in the unit

$H_S = \frac{Pa}{10}$ [mm]
Pa = negative pressure in the unit (pascal)
$H_2 = H_S + 50$

05.15 Frost protection

Frost protection for heat exchangers

- Frost protection thermostat on the air discharge side of the pre-heater.
- Operation with antifreeze.
- Thermostatically controlled electric heater.

When the heating system is switched off: Drain all parts filled with water (carefully blow out heat exchanger with compressed air). Also protect trap from frost.

The electrical fuse protection and protective measures must be provided by the customer. The use of a 30 mA Fi circuit breaker is mandatory.

05.16 Air filters

Subject to customer-specific AHU layout, air filters may be fixed or removable. To check the degree of saturation of the air filter (with the exception of activated carbon filters), we recommend that you install a monitoring device that indicates saturation pressure.

The saturation pressure/terminal resistor can vary subject to the fitted filter system and manufacturer. The unit-specific terminal pressure drop is specified on the filter type plate (or complies with recommendations to EN 13053).

Observe the supplied filter manufacturer operating and maintenance instructions for roller tape filters.

Caution:

- Always ensure that filter pockets are vertical when installing the filter.
- Filter dust can cause allergic reactions to skin, eyes, or respiratory organs on contact. Wear personal protective clothing when servicing or changing air filters; for example face mask, safety goggles, protective clothing. Observe the general safety instructions on page 7.

With ATEX units only approved equipment / components may be used.
All electrical equipment / components must be earthed.

05.17 Fans

To ensure safety and smooth operation, we recommend installing a vibration measuring device for all fan types. A vibration measuring unit is strongly recommended for centrifugal ventilation fans!

To monitor the rated airflow, we recommend the installation of a flow meter for all fan types.

For fans with motorised forced ventilation (e.g. kitchen extractor fans), affected components must be replaced in the event of severe soiling according to VDI 2052 (Association of German Engineers).

With ATEX units only approved equipment / components may be used.

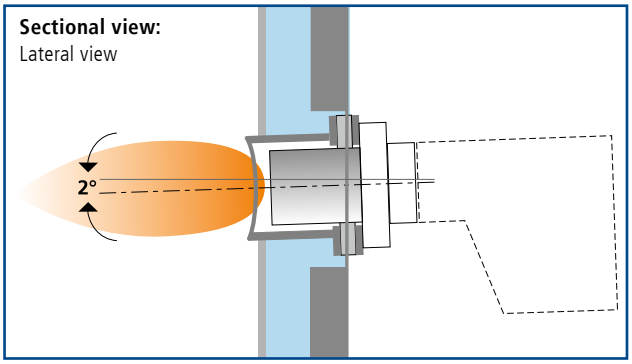
05.18 Connections on the fuel side for WK-com-WLE-K (oil, gas)

For air heaters type WLE; WLE-K as a horizontal design

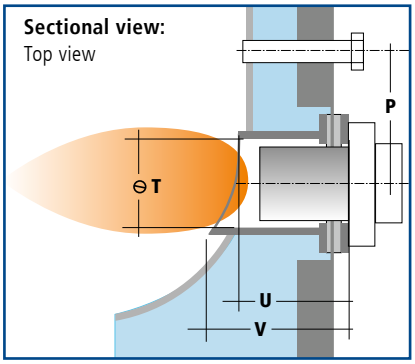
For assembly and connection of the air heater type WLE; WLE-K, observe the following sections in the operating instructions supplied **Stationary air heaters WLE / WLE-K**.

- Safety-related installation requirements
- Horizontal units
- Flue
- Burner settings – efficiency
- Burner installation
- Operation with oil burner EN 267
- Operation with gas burner EN 676
- Burner flame
- Combustion air
- Safety thermostat
- Additional information on air heater WLE-K
  - condensing mode
  - condensate drain conditions
  - condensate disposal
  - connection, trap

Sectional view:
Lateral view



Sectional view:
Top view



Burner tube length for WK-com units

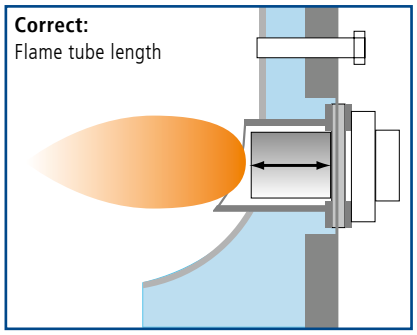
WK-com N - wall thickness 30 mm							
Type WLE / WLE-K	30	45	80	140	260		
Ød	140	140	140	197	197		
U	144	125	167	170	213		
V	144	175	217	247	303		
P	172	186	190	278	350		

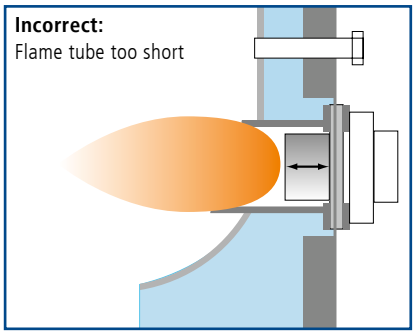
WK-com S - wall thickness 60 mm							
Type WLE / WLE-K	30	45	80	140	260	500	1000
Ød	140	140	140	197	197	240	290
U	174	155	197	200	230	300	322
V	174	205	247	277	320	405	492
P	172	186	190	278	350	500	550

The length of the flame tube on the oil/gas burner must be matched to the flame tube in the air heater.
The flame tube must be arranged so that the burner flame cannot light up the flame tube of the air heater.

The heat exchanger WLE-K is installed within the casing with an incline of 2° towards the rear, to encourage the draining of the condensate. For this reason, a lop-sided seal is affixed to the burner flange.

Caution!
The burner axis must tilt 2° backwards (see Figure, sectional view: lateral view) so that the flame burns symmetrically inside the combustion chamber which slopes towards the back!





05.19 Electrical connection

05.19.01 General information

Caution! During commissioning and maintenance, all terminals in the electrical installation must also be retightened.

With ATEX units only approved equipment / components may be used.
All electrical equipment / components must be earthed.

05.19.02 Standard motors

Safety information
Electric motors are equipment with – in use – dangerous, voltage leading and rotating parts. These could result in a risk to health or material losses in the event of incorrect operation, inappropriate use or inadequate servicing.

- Consequently, only qualified electricians are permitted to work on motors.
- All work on electric motors must only be conducted when they are switched off.
- Secure motors against reconnection.

Observe all safety information
Before connection and commissioning of the motor, drain off any water that has penetrated the motor (condensate) via the condensation drain (at the lowest point of the bearing shield) and close the drain hole again. Protect the motor terminal box against ingress of water. – Only open terminal box cover for wiring.

On-site requirements:

a) Power cable in line with applicable regulations [such as IEE regulations] and the regulations of the relevant power supply utility.

- The power supply must be made by a qualified electrician.
- The power cable cross-sections must be matched to the rated mains current.
- Provide power cables with strain relief.
- Terminate earth conductors at the identified earth studs [in line with IEE regulations].
- Use the original gaskets when closing the terminal box.
- Cover all unused apertures with dust and waterproof seals.

b) The control panel must provide the voltage indicated on the fan motor [type plate]. Voltage deviations greater than ± 6 % will lead to faults. According to EC 38, three-phase motors can be used in a range of 400 V +6 % -10 %, single phase AC motors in the range of 230 V +6 % -10 %.

Starting via star-delta contactor with automatic switching from Y to Δ is required for motors 3 kW and higher (check with the relevant power supply utility).

Before commissioning, carry out inspections according to VDE 0100 part 610, VDO 0105, VBG 4 and VDE 0113 or VDE 0701 [or local regulations].

In particular, ensure continuity of earth and the main equipotential bonding to insulated structural parts such as doors, anti/vibration frames, etc.

Commissioning the fan motor:

1. Provide fuse/MCB protection in line with IEE regulations.
2. Check the current drawn by the motor (ampere).
   a) Point of measurement between fuse and Y Δ switch, current drawn must be lower than the rated current specified on the type plate (see electrical wiring).
   b) Point of measurement between Y Δ switch and motor terminals, current drawn must be lower than the rated current specified on the type plate x 0.58 (see electrical wiring).
3. **Motor protection**
   according to VDE 0165, each motor must be protected against excessive overheating due to overloads by means of a monitoring unit. According to VDE 0660, omnipolar protection is required if the motor is to be monitored by an overcurrent device with current-dependent delayed response (e.g. Circuit breaker).

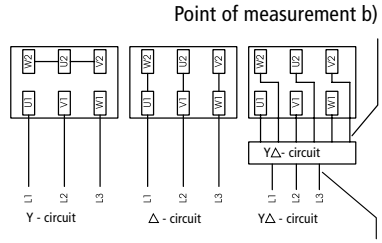
Adjustment of thermal overcurrent relay:
The thermal overcurrent relay must be set to the actual value. For Y△circuits, adjustment according to measuring point b. If the motor draws excessive amperes even if it is connected correctly, the actual duct pressure will be lower than indicated when ordering. This can be resolved by artificially increasing the duct pressure (additional installation of a deflector plate or a butterfly damper), modifying the V-belt pulley or partly by adjusting the variable V-belt pulleys) (see correction of the drive unit speed).

Overloaded motors must not be put into operation. Any warranty issued by the motor manufacturer will be void.

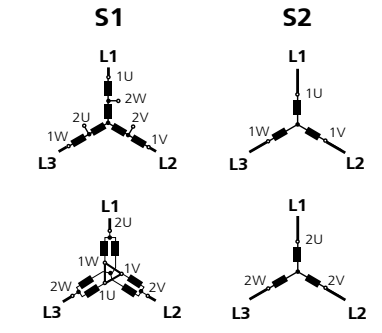
Motors must only be used in continuous operation and for standard, non-cyclical starts during which there are no substantial increases in starting temperature.

When the supply or extract air fans are switched off or fail, all control valves must be automatically closed and the washer pump switched off.

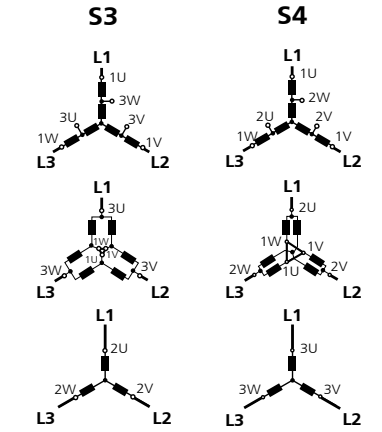
Electrical wiring



Single speed motor:			
Voltage as specified on the motor	Mains voltage L1-L2 / L1-N		
	230 / 133 V	400 / 230 V	690 / 400 V
133 / 230 V	Y	/	/
230 / 400 V	Y △	Y	/
400 / 690 V, 400 △	/	Y△	Y
Y △ = star-delta starting			



2-speed motor:					
Synchronous speed 750 / 1500 rpm					
Three-phase motor pole-changeable, quadratically decreasing torque					
Circuits	Number of poles	Synchronous speed	Number of windings	Circuit	Number of terminals
S1	4 / 2	1500 / 3000	1	: II	6
	8 / 4	750 / 1500	1	: II	6
Synchronous speed 1000 / 1500 rpm					
Three-phase motor pole-changeable, for decreasing torque fourfold					
Circuits	Number of poles	Synchronous speed	Number of windings	Circuit	Number of terminals
S2	6 / 4	1000 / 1500	2		6



3-speed motor:					
Synchronous speed 750 / 1000 / 1500 rpm	500 / 1000/ 1500 rpm				
Three-phase motor pole-changeable, quadratically decreasing torque					
Circuits	Number of poles	Synchronous speed	Number of windings	Circuit	Number of terminals
S 3	8 / 6 / 4	750 / 1000 / 1500	2	: II	9
S 4	12 / 6 / 4	500 / 1000 / 1500	2	: II	9

Caution!
The fan motor is fitted with a PTC thermistor to protect it against overheating as a result of an overload.
This PTC thermistor must be wired to a thermistor motor protection relay in the control panel. Failure to observe this requirement will void the motor manufacturer's warranty.

05.19.03 EC fan

Never route the unit's control cables adjacent to the power cables. Keep them as far apart as possible. Recommended clearance > 10 cm (separate cable routing/trunking).

Never connect mains voltage to digital inputs.

Residual current devices

To ensure the highest degree of operational safety, we recommend the use of residual current devices with a tripping current of 30 mA.

- **For single phase fans:** Residual current device (type A)
  Electric shock hazard
  Exception: Power supply connection across two external conductors with three-phase 230 V mains

When using residual current devices, ensure that only devices that are sensitive to all types of current are used. According to EN 50 178, Art. 5.2., no other residual current device types may be used.

- **For three-phase fans:** Residual current devices (type B)
  Electric shock hazard
  When using residual current devices, ensure that only devices that are sensitive to all types of current are used. According to EN 50 178, Art. 5.2., no other residual current device types may be used.

For Ziehl-Abegg models

- **Power supply for external devices "D", "G" (+24 V, GND) motor sizes only:** Never join outputs of several units.
- **Electric shock hazard**
  If digital inputs for several units are controlled in common, only use the 10 V output from one of the units. Joining the supply voltage from several units is not permissible.

05.19.04 Electric heat exchanger

To avoid overheating, units must be operated with the minimum air flow rate. These are shown in the technical documentation or in the order confirmation.

Caution: If the fan is switched off or fails, the electric heat exchanger must be switched off automatically. For the connection of the power stages as well as the overheating monitor - see separate operating instructions**.**

Switch off unit before opening! The isolating device must be designed so that the system cannot be re-connected without the person authorised to carry out the work being aware of it.

To avoid any overheating of integral components when the unit is switched off, fans must only be switched off after expiry of a 3-5 minute run-on time.

Furthermore, observe the manufacturer's operating and maintenance instructions.

With ATEX units only approved equipment / components may be used.
All electrical equipment / components must be earthed.

05.19.05 Inverter

Externally provided inverters must be set to the maximum frequency "f max" before the trial run. The maximum fan speed indicated on the type plate must not be exceeded!

EMC guidelines and the level of radio interference suppression must be taken into account. For mains bypass circuits, observe the relevant IEE regulations and those issued by the power supply utility for star-delta or DOL starting.

When sizing the motor connection, also take the inverter efficiency into account!

According to directive EEC 82/499 and the EMC specifications, all cables on the output side of the inverter, including control cables, must be **screened**.

Observe the manufacturer's connection guidelines.

The cross-section of the earth wire must be at least 10 mm²; alternatively use two separately routed earth cabled, which are connected to EN 50178 or IEC 61800-5-1. Always comply with national and local regulations regarding wire cross-sections.

For centrifugal impellers, check whether or not DOL operation on the mains is permitted regarding the minimum air flow rate.

Commissioning: Observe the inverter operating instructions during commissioning.
Record the inverter settings.

Caution: Contact with electric components can be life threatening even after they have been disconnected from the power supply. Wait at least 15 minutes after disconnection.

With ATEX units only approved equipment / components may be used.
All electrical equipment / components must be earthed. This applies particularly to inverters supplied separately. These have no equipment approval according to ATEX 94/9/EC and must therefore not be used in areas/atmospheres where there is a risk of explosion.

05.20 Refrigeration technology

If the manufacturer does not assemble the unit, then this must be carried out by an authorised refrigeration specialist.

The refrigeration components installed in the unit (compressor, collector, etc.) may be moved upright only. Always avoid bumps and shocks. When positioning the refrigeration unit, comply with the provisions of the German Water Resources Act (WHG).

Never install refrigeration units in areas where flammable gases can escape.

Refrigeration units must never be sited in ATEX areas.

See

„05.13 Connections on the medium side (pumped hot water, pumped cold water, refrigerant, steam)" on Page 21

„05.15 Frost protection" on Page 22

„06.06 Refrigeration technology" on Page 40

„8. Malfunctions and repair" on Page 50

for more information on refrigeration.

Attention: Attention: All work on electrical connections and wiring must be carried out by a qualified electrician. The applicable standards must be complied with.
Any work is prohibited until the installation has been disconnected from the electrical power supply. Before working, make sure that no voltage is present.

05.21 Measurement and control technology

1. Control panel installation (if the control panel is not integrated into the ventilation unit).
2. Install all field equipment (sensors, valves, servomotors, etc.).
3. Carry out full wiring as well as the supply to the control panel.
4. Terminate the field equipment and in the control panel.

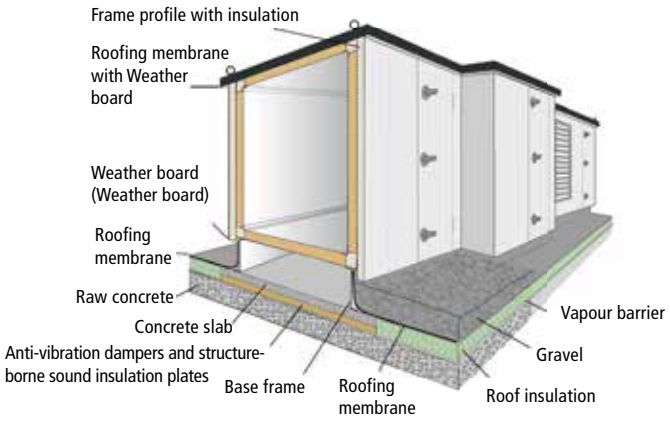
Attention: Attention: All work on electrical connections and wiring must be carried out by a qualified electrician. The applicable standards must be complied with.
Any work is prohibited until the installation has been disconnected from the electrical power supply. Before working, make sure that no voltage is present.

05.22 Weatherproof AHUs WK-com-W

05.22.01 Unit arrangement

Our weatherproof AHUs are included in the VOB part C / DIN 18379 as "central roof units" and are regarded as part of technical building services. The units are manufactured according to the rules of mechanical engineering and are therefore not regarded as part of the building. (See explanation in VDMA (German Engineering Federation) 13053-6.2)

Our AHUs have been inspected by the TÜV-Süddeutschland (Technical Inspection Agency) according to RAL GZ 652 as well as for mechanical stability of the casing according to EN 1886.



Unit arrangement: If possible, units should be arranged so that the outdoor air intake is positioned on the side turned away from the wind direction. Where this is not feasible, rain cowls should be used for the outdoor air intake instead of a weather grille.

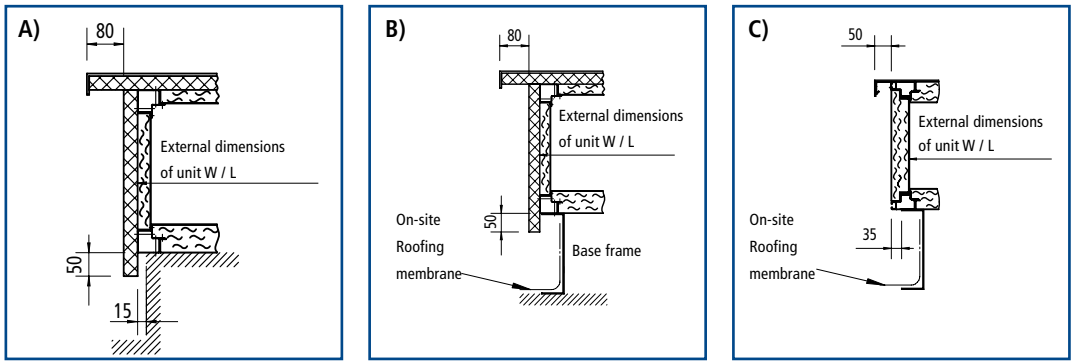
Foundations: Units can be installed on foundations on site or on base frames. The standard unit base must not also be used as roofing.

Stability: Unit stability (connection to the on-site substructure) must be checked for each respective site taking into account local wind loads. Use securing elements, approved by local building authorities, for the connection to the on-site substructure.

Never walk on the roof of the unit. Use planks underfoot for walking on the roof.

Additional loads: Never place or install any additional loads on the roof of the unit.

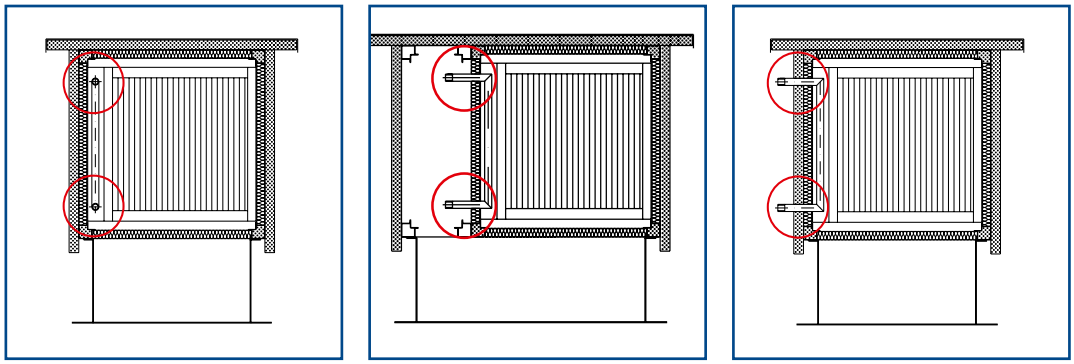
05.22.02 Foundations



A) On-site foundations: Height of concrete base subject to local conditions, e.g. level of snow cover. Insulation boards can be placed between the air handling unit and the concrete base as anti-vibration measure and for noise control.

B) and C) Base frame: Provide a level surface on site. The base frame also serves as connection for roof insulation on-site. If necessary, insulation strips as anti-vibration and sound insulation measures can be placed between the base frame and the surface on site. The standard unit base must not be used as the building roof.

05.22.03 Connections on the media side



Heater and cooler connections within the air handling unit:
→ angled connections.

Heater and cooler connections within weatherproof projection:
→ on-site pipework

Heater and cooler connections through side wall:
→ on-site insulation.

05.22.04 Installation of the delivery units

Join the assemblies and bolt them together.

Caution! Sealing

Fix and seal roof foil strips (in accessories) with clamping strip or insulating connector/flexible connection.
Weld overlapping roof foil sections with a hot air device; see *„05.22.05 Dachfolie verlegen" auf Seite 30*

05.22.05 Laying roof foil

1. Installation tools required

1. Silicone pressure roller
2. Brass pressure roller
3. Seam tester
4. Roofing membrane scissors
5. Roofing membrane cutter
6. folding ruler
7. Installation instructions
8. Protective gloves
9. Hot-air tools hand-held with an angled nozzle e.g. Leister, model Triac.

2. Step 1: Cleaning

The overlapping of the roofing membranes with each other serves to ensure that the material is joined / welded without foreign material.

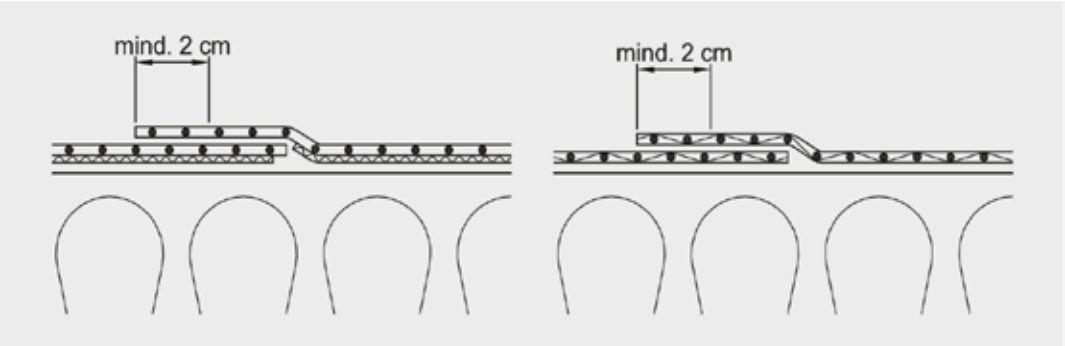
Due to soiling caused by the construction site or other influences (e.g. due to work interruptions), it is necessary to clean the overlap beforehand.

It is necessary to clean the overlapping surfaces of the roofing membranes with roofing membrane cleaner beforehand.

The overlapping surfaces must be dry and free of dirt. The contact surfaces are heated with hot air until plastic state. Seam edges that are to be welded over with a subsequent membrane, a cut or a shaped part must first be bevelled in the width of the weld seam (e.g. T-joint) to avoid the so-called capillary effect.

3. Step 2: Joining with hot air welding

The seams must be tightly welded at least 2 cm wide from the upper edge of the sheet.



Manual hot-air welding
Hot-air welding can be carried out without additional measures at ambient temperatures of at least + 5 °C can be carried out. Depending on the type of equipment (hot-air welding machine) the hot-air temperature should be approx and depending on the weather conditions, the hot air temperature should be approx. 470 - 570 °C. By preheating the seam areas, it may also be possible to weld at lower ambient temperatures if necessary. Test welds must be carried out to determine the correct welding temperature!

All hot-air hand tools (9) with an angled, approx. 40 mm wide nozzle that generate hot air at the required temperature of approx. 470 - 570 °C are suitable.

The hand-held hot-air tool is placed at an angle of approx.

- approx. 45° to the edge of the sheet and
- approx. 30° to the roof surface

in the seam overlap.

The sheets are seal-welded backwards in one operation, while narrow blanks (up to 33 cm) are first tack-welded and then seal-welded.

When seal welding, the nozzle should only be guided deep enough between the webs so that the upper edge of the web is also blown on and thus plasticised.

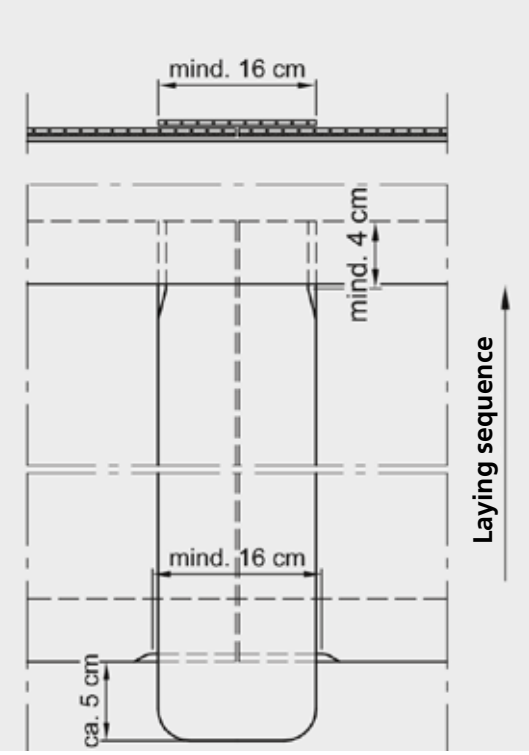
With a silicone pressure roller (1) guided parallel to the nozzle opening, the plasticised overlap areas are sealed by moderate pressure.

Overlap areas are joined by applying moderate pressure. Due to welding in reverse, the nozzle always blows against already seal-welded seam areas.

Head joints of sheets laminated on the underside
Roofing membranes laminated on the underside are overlapped by approx. 2 - 3 cm[1] at the end of the membrane, stapled or glued with hot air and covered with an unlaminated blank[2] at least 16 cm wide. The length of the blank is: sheet width + approx. 5 cm. Round off the two corners at one end of the blank.

The blank is positioned centrally on the sheet joint so that the rounded end rests approx. 5 cm on the previously laid sheet that is continuous at the joint. The other end of the blank is flush with the butted sheets. In this position, the blank is stapled in the centre with hot air and seal-welded all around.

The longitudinal seam edges of the butted sheets below the rounded end of the blank must be bevelled to a width of approx. 5 cm each. The same applies to the longitudinal seam edges at the other end of the blank itself in overlap width.

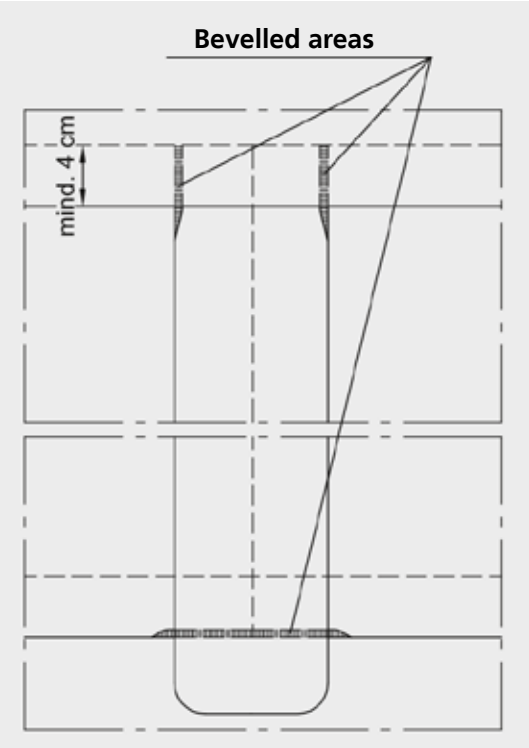


After bevelling, the blank is tightly welded at its longitudinal edges and at the rounded end. The bevelling areas should be welded particularly carefully with hot air (hot air hand tool (9)).

Especially the bevelled areas can be joined additionally with a brass pressure roller (2) by applying moderate pressure.

The welded edge of the following web in turn overlaps a longitudinal edge of the butted webs

and the cut in the area of the bevel by at least 4 cm. Here, too, the bevelling areas must be carefully welded with hot air (hot air hand tool (9)).



4. Step 3: Checking the seam
After the weld has cooled down to ambient temperature, the sealing layer should be free of foreign matter over the entire weld width (at least 2 - 3 cm) from the front edge of the seam. This makes the seam permanently watertight and highly stressable. The serviceability of the waterproofing is decisively determined by the seam quality.

In order to locate any defects, the weld seams must be inspected along their entire length, especially carefully at the T-joints.

The hot-air welded seams can be inspected immediately after cooling down to ambient temperature.

The inspection along the seam edges can be carried out non-destructively and in a craftsman's manner with the inspection needle.

The tip of the test needle penetrates the seam overlap at defective points.

overlap. Defects are to be welded tight with hot air (hot air hand tool (9)).

Seam sealing
Seam edges of the roofing membranes do not have to be sealed. Sealing can additionally secure the seam edge.

05.23 ATEX explosion protection

Take the following steps to ensure ATEX explosion protection:

- Securely connect all units to the equipotential bonding intended for that purpose (see Figure)
- Connect the assembled unit to the equipotential bonding of the building.
- All filters must comply with ATEX requirements (see type plate on the unit) to avoid dust loads and soiling as possible sources of danger.

ATEX protection is not possible for inverters.
Inverters are supplied separately and cannot be used inside EX zones.

If you remove the equipotential bonding from the unit to work on it, this must be reinstated on completion of work according to the manufacturer specifications. The protective function of the equipotential bonding must then be tested and restored.

Never operate the unit whilst working on it. (See *„3. Safety" on Page 7* and *„6. Commissioning" on Page 34*)

6. Commissioning

06.01 First trial run

Retighten all terminals on the electric system.

During commissioning, please ensure that no AHUs are operated beyond the limits specified in the design data.
Pay particular attention to the following:

- Maximum fan speed
- Maximum power consumption of drive motors
- Maximum internal temperature of the unit = 24 °C

The result of incorrect operation is damage to the unit which is excluded from our warranty.
During commissioning as well as in subsequent operation of the AHU, please observe all relevant labels on the AHU!

Checks prior to the first trial run

- Has the interior of the AHU been thoroughly cleaned, and all loose objects and foreign bodies removed?
- Has the AHU been cleaned inside?
- Have the transit bolts (parts marked red) been removed?
  Can the anti-vibration dampers move freely in all directions?
- Are V-belt pulleys aligned?
  Are the hub mounting screws and clamping screws on the clamping bushes fully tightened?
- Are the V-belts tensioned correctly?
- Are the humidifier water trays filled?
- Are all traps filled with water?
- Are all air ducts connected to the AHU?
  Are all components installed in the ductwork, so that the required external pressure drop is achieved?
- Are all motors connected correctly with their appropriate supply voltage?
- Check rotational direction of the actuators!

Caution! The actuators of the multi leaf dampers are driving against an end-stop when closed.
Never switch the fan on until either the sectional dampers have been checked to ensure they are open, or a limit switch indicates that they are. Check to ensure that closing shut-off dampers results in the immediate shutdown of the associated fans. WOLF assumes no liability for damage arising from inappropriate operation. Use overpressure valves to prevent damage from pressure hammer when the system is equipped with fire dampers.

- In addition to the above points, test all components, such as the thermal wheel heat exchanger, in line with the technical requirements in these and any previous supplier operating instructions provided, and readjusted where necessary.
- Are all unit access apertures with inspection covers and doors closed?
- Check lubrication of fan bearings and lubricate, if necessary.
- In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

Only start ATEX units if the following conditions are met:

- Conditions of use in accordance with the intended purpose
- Materials to EN 1127-1 (prone to spontaneous ignition) must not be used in the close proximity of the unit.
- Permanent and adequate ventilation of the installation room (technical centre) for ATEX units without a defined external explosion area. This is to prevent potentially explosive atmospheres from being caused by zone spread due to operational equipment leakage to the outside.

Never enter or work on unit until the following conditions have been met:

- Absence of potentially explosive atmospheres (flush and ventilate the unit beforehand, if necessary)

Hydraulics – connection of heating and cooling media

There is a risk of injury when charging and venting the system due to the following:

- Escaping pressure jet
- Scalding by hot heating medium
- Chemical burns through skin contact with antifreeze in cooling media

The maximum permissible pressures of the following components must be observed:

- Heater, cooler – 16 bar at 20 °C
- Heat recovery KVS (Heat recovery by a cycle run around coil system system) pipework, 1.7 bar quiet mode pressure, safety valve response pressure 2.5 bar
- Heat recovery H-KVS (Heat recovery by a high performance run around coil system) pipework, 5 bar bar quiet mode pressure, safety valve response pressure 8 bar

Checking the frost protection temperature of the heat recovery KVS system. Frost protection must be set to the locally lowest outside air temperature. Observe the manufacturer's information and safety datasheet.

With ATEX units only approved equipment / components may be used.
All electrical equipment / components must be earthed. Ensure that the ignition temperature of the flammable mixture is not reached by the highest surface temperature of the heat exchanger.

Check before charging the system
Check the following parameters prior to charging the hydraulic circuit:

- Correct installation of all components
- Air-vent valve installed at the highest point of the pipework
- Flow direction on valves, pumps, etc.
- Installed orientation of valves, etc.
- Connection of heater, cooler according to the counter flow principle – otherwise there will be considerable loss of performance
- Tightness of all connections (threaded fittings, flanges, etc.)
- Smooth operation of valves, dampers, actuators
- Hydraulic lines must be flushed and cleaned

Charging and venting

Charge hydraulic circuit slowly – vent thoroughly. The air-vent valve must be open during the charging cycle. Check all joints for leakage during the charging cycle and remedy, if necessary. After reaching the system pressure on the medium side, close air-vent valve.

Attention
When opening the ventilation device of, for example, heat recovery KVS, the plant must be switched off (secure main switch). The liquids, for example water-glycol mixture (-20°C to 40°C) are under pressure 5,0 bar and can suddenly escape. Use personal safety equipment, for example wear suitable goggles and gloves and pay attention to manufacturer's indications.

Check after charging cycle
Switch on circulation pump, check rotational direction, if necessary reverse rotational direction by re-wiring. Let circulation pump run, to remove residual air from the circuit. Check system pressure; if necessary, top-up charge and vent again.

Check in cases of heating with steam
Condensate backup or steam bubbles must not occur in the steam heat exchanger. Provide for condensate discharge in the steam feed if condensate hammer occurs, otherwise the heat exchanger can be destroyed by steam hammer. Ensure correct condensate discharge from the heat exchanger; observe the installation instructions by the steam trap manufacturer.

First trial run

Caution! During commissioning, unexpected and dangerous conditions can occur anywhere in the system due to incorrect settings, defective components or incorrect electrical connection. There must not be any people or objects in the danger area. Any installation residues and foreign bodies must be removed from connecting parts and fan parts. Commissioning must not take place until all safety instructions have been checked and any danger has been ruled out.

- Are all multi air dampers opened? If multi air dampers are closed, unit casing damage can result.
- Switch on mains isolator
- Is the inverter set to the maximum frequency "f max"? The maximum speed indicated on the type plate must not be exceeded. Run unit through the frequency range, hide resonance ranges.

- Briefly start the motor, to check the fan's rotational direction (according to rotation arrow on the fan).
- After being installed in the system, the fan must be checked for mechanical vibrations; it should run quietly, with low vibrations. If the limit values according to ISO 10816-1 are exceeded, it is possible to skip certain speed ranges (see Motor Setup).
  Caution! Strong vibrations due to unsteady running (imbalance), e.g., due to transport damage or improper handling, can lead to failure.
- Conduct this check through the inspection port with the doors closed or after stopping the motor by subsequently opening the inspection door. If necessary, change the rotational direction.
  Caution! Never touch the rotating fan or drive mechanism.
- Check the current drawn by the drive motor. It must not exceed the specification on the type plate.
- Check motor starting time. The current drawn must return to the rated current within the changeover from Y to Δ. If necessary, use heavy duty starter relay.
- Check the air flow rate and external pressure drop. An excessively low external pressure drop increases the air flow rate, which leads to olverload of various components.
- For example - motors are overloaded
  - droplet eliminators break through, which results in water damage in the downstream sections as well as in the building.

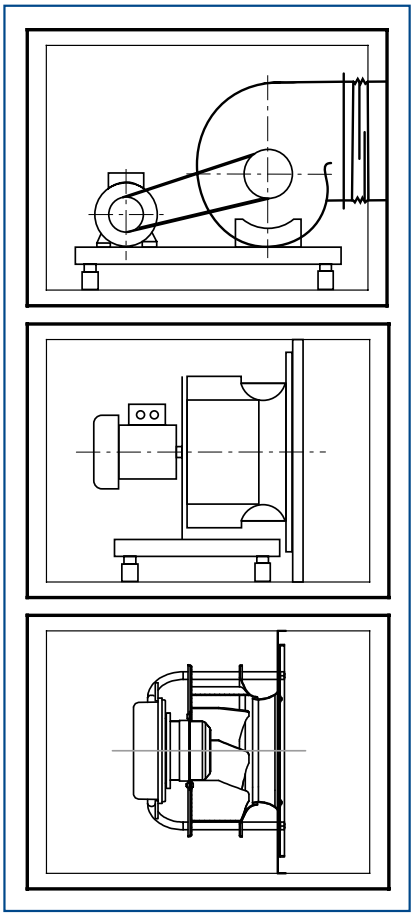
Important for hygienic units

- AHU systems must ensure that in interconnected rooms, the air flows from rooms with higher demands to rooms with lower demands.
- In the case of infinitely variable speed control, a minimum flow rate of 15 % of nominal flow rate must be assured.
- In addition to the different magnitudes of supply and extract air flow rates, it is essential to keep the supply air flow rate constant.
- A vibration check is required prior to the ultimate commissioning of the fan.
  An air flow meter must be available on site to check the nominal air flow rate.

06.02 Fan section

Prior to commissioning, remove fitted transit bolts (parts marked in red). The fan shaft must be horizontal in all installation positions. Only specifically designed fan components must be used for routing the air flow vertically. Anti-vibration dampers must always be designed to be subjected to pressure.

There is a risk of bearing damage in the event of longer shutdown periods under humid conditions. Prevent corrosion by means of suitable protective measures.



After the AHU plant has been fully assembled and installed
(with on-site air ducts) and closed inspection doors

1. Check rotational direction of the fan impeller
2. Check current drawn by the fan motor (*„05.19 Electrical connection" on Page 25*)
3. Conduct capacity check
   - air flow rate
   - total pressure drop
   and correct by changing the speed, if necessary.
4. Check motor starting time.
5. Check lubrication of fan bearing and motor bearings; re-lubricate if required. Observe fan and motor manufacturer instructions.
6. In the event of longer shutdown periods, operate the fan briefly on a regular basis to prevent bearing damage from mechanical stress or moisture ingress. Check the bearing prior to installation after a prolonged storage.

The motor current drawn must return to the rated current within the changeover from Y to Δ. If necessary, use heavy duty starter relay.

06.02.01 Drive: Belt tension – belt alignment

In order to avoid unnecessary loads on V-belt pulleys, bearings and overheating and wear of V-belts, ensure the perfect alignment and tension of V-belts.
Adjustments are made by changing the position of the drive motor. It can be moved along its longitudinal and transverse axes after undoing the screws on the motor tensioning unit.
For WK-com 42, 63, 85, 127, V-belts are tensioned via the adjustable motor carriage:
Undo the lock nuts - tension the V-belts - and retighten the lock nuts.

Observe the following:
Check and re-tension V-belts after the initial 30 minute run.

V-belt tension:
Tension V-belts only to the extent that no slipping occurs during start-up. It must still be possible to deflect the V-belt.

Calculation for checking with applied deflection force:
Deflection depth x = E * L; E = deflection depth per 100 mm (see table), L = space between axes in m

Values for narrow V-belts to DIN 7753

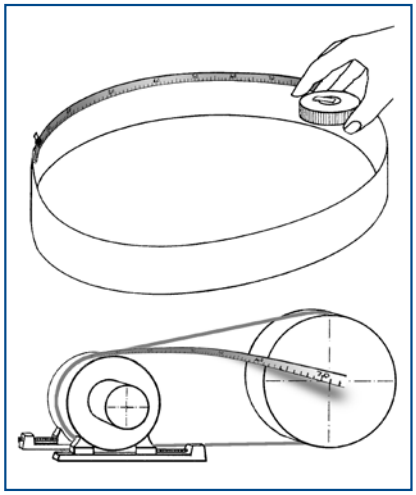
V-belt profile	Deflection force per belt in N	Smallest pulley diameter	Deflection depth per 100 mm space between axes
SPZ	25	> 71 < 90 > 90 < 125 > 125	2.20 2.05 1.90
SPA	50	> 100 < 140 > 140 <200 > 200	2.75 2.55 2.45
SPB	75	> 112 < 160 > 160 < 224 > 224 < 355	3.00 2.55 2.22

Test with pre-tension meter

V-belt profile	Smallest pulley diameter	Belt resilience in N initial installation	Belt resilience in N re-tensioning
SPZ	> 71 < 90 > 90 < 125	250 350	200 250
SPA	> 100 < 140 > 140 <200	400 500	300 400
SPB	> 112 < 160 > 160 < 224 > 224 < 355	650 700 900	500 550 700

Length and replacement of V-belts
For drives with several V-belts, only use bundled V-belts from one manufacturer. Never mount old and new V-belts together. If necessary, replace the complete set.

Caution! Prior to commissioning, ensure that all screws are fully tightened.



Flat belts are maintenance-free belts. Never lubricate them.

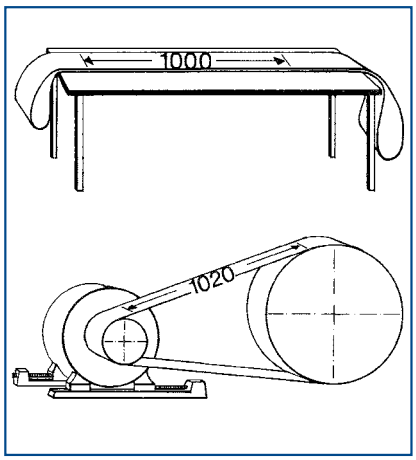
Checking flat belts
The specified length of endless belts is measured inside, i.e. on the friction layer.

- Place the belt upright, clamp the end of the steel measuring tape inside
- or measure directly on the belt pulleys

Mounting flat belts
- Check whether or not the shafts are parallel and belt pulleys are aligned; if necessary, adjust according to manufacturer's specifications.
- Remove any anti-corrosion agents, dirt or grease from the mounting surface of the belt pulleys
- Mount belt according to manufacturer's instructions

Important: Never mount Extremultus transmission belts by the edges of pulleys or using tools that could damage the edges and lead to kinks or tears in the belt. Particularly belts of the A series are prone to this kind of damage (due to the aramid tension support).

The belt drive must meet ATEX Directive requirements.



Stretching of flat belts
If no stretch measuring unit/stretch gauge available, proceed as follows:

- make two thin gauge marks on the top surface of the evenly laid out belt
- stretch belt until the gauge mark distance has reached its nominal value
- spin the drive mechanism several times and check again.

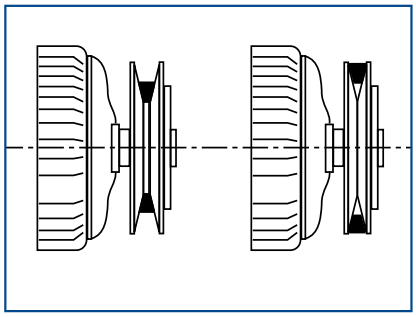
Example:
Gauge mark distances for a required belt stretch of 2 %.
(For specification, see belt labelling or instruction leaflet in accessories)

Not stretched	Stretched
1000 mm	1020 mm
500 mm	510 mm
250 mm	255 mm

Before commissioning, check for correct tension and alignment. See belt imprint for required tension.
Check after approx. 100 hours.

The belt drive must meet ATEX Directive requirements.

06.02.02 Changing the V-belt speed



This can be partially conducted using adjustable V-belt pulleys.

After removing the V-belt, the half of the pulley opposite the motor (fan) on the threaded hub can be turned and therefore, adjusted by undoing the Allen screws.
In the case of more current being drawn, the speed must be reduced.

By turning half of the pulley anti-clockwise, this half moves away from the other half of the pulley, which results in a smaller contact radius of the V-belt (lower speed).

Ensure that the Allen screws are again positioned on a flat area of the threaded hub, to avoid damaging the thread. After adjustment, retighten the Allen screws firmly and mount the V-belt.

06.02.03 Checking vibrations and flow rate

Conduct a vibration check prior to the ultimate commissioning of the fan. To monitor the nominal air flow rate, we recommend installing a flow meter for all fan types.

06.02.04 Service switch

Caution: Install a service switch for each fan section, to be able to isolate the drive motor omnipolar for maintenance work.

Work on electric installations must only be carried out by qualified electricians.

06.02.05 Motor casing

To guarantee the cooling of the motor, the required air flow rate must be adjusted.
This is subject to the negative pressure inside the fan section and can therefore only be adjusted on-site once installed. Mount a short measuring duct on the outer air intake and determine the air velocity using an air velocity meter. The airflow calculated in this way must match the motor manufacturer's technical specification.

Corrections can be made by moving the slider on the intake aperture on the motor shaft.

06.03 Thermal wheel heat exchangers

Caution: Observe the general safety instructions on page 7.

Caution: If, during maintenance, the power supply is not isolated across all poles, the drive motor can start suddenly; for example due to automatic cleaning. There is then a risk of limbs being crushed.

Before commissioning the thermal wheel, remove all foreign bodies and dirt deposits, and ensure that nothing prevents the free running of the thermal wheel.

The sealing strips must be pushed as close as possible to the thermal mass.
Avoid direct interference, especially under operating conditions.

The thermal wheel is factory preset. It may however require adjustment due to local conditions. Please refer to the operating instructions issued by the manufacturer of the thermal wheel heat exchanger. The sealing strip and the

sealings on the rotor mus be re-adjusted, if necessary.

To test the drive unit, open the inspection cover indicated on the corner of the thermal wheel. The V-belt must be adequately tensioned. Check the V-belt tension every 400 hours. The thermal wheel speed must not exceed the manufacturer's specification of the thermal wheel heat exchanger. Check the rotational direction (see arrows on thermal wheel housing). Where an auxiliary cleaning unit is installed, the thermal mass of the thermal wheel must rotate from the extract air into the supply air.

Thermal mass adjustment must be tailored to the unit-specific pressure ratio operating conditions, and must be retested again following successful commissioning.

The storage mass has to be adjusted to the specific operating states of the pressure conditions and has to be checked before commissioning by a test run without and with air capacity and once again after commissioning.

To prevent contamination of the supply air by extract air, adjust the pressure ratios so that the operational leaks flow from the supply side to the extract side.

Adiabatic extract air humidification
Ensure that air is not excessively humidified on account of the humidifier on the thermal wheel, or that the thermal mass becomes damp with moisture.

Only approved components can be used in ATEX units. Earth all electrical components. Ensure that no zone entrainment occurs.

06.04 Air washer

Please observe prior to commissioning

- Clean water tray, to avoid subsequent damage to the pump.
- Fill the tray with water up to 10 mm below the installed trap or overflow connector.
- Adjust float valve to this water level.

Caution: The trap must be filled with water during initial commissioning, otherwise the humidifier draws excess air. This can lead to the overflow becoming inoperable, resulting in the tray overflowing.

- Commission the system on the air side; adjust the air flow rate to the prevailing operating conditions.
- Commission the water circulation pump after checking its rotational direction.
  Caution: Water is supplied even in the event of an incorrect rotational direction.

The rotational direction of the pump must only be checked with the water tray filled.
Check current drawn by the pump.

- Check if there are any leaks at the threaded or flanged connections in the pump pressure line.
- Check the capacity of the blow-down unit and adjust it so that the blow-down volume is twice that of the evaporation volume. In the case of fully desalinated water, the blow-down volume is reduced by 50 %.
- Run the humidifier for several hours. During the first few days, water drops can penetrate the demister, given that the filtration efficiency depends on the wetness level.
- Switch on the circulation pump every 2 days for at least 1 minute (provide for timer control).
- If the threshold values for the water according to VDI 3803, annex A4, table 9 or according to special details provided by the manufacturer of the humidifier are reached, service the unit immediately. (*„7. Maintenance" on Page 41*)!

Empty water tray, pump and pipework if there is a risk of frost.
Recommended threshold values for the condition of the water circulating through the air washer to VDI guideline 3803, annex A4, table A1.

Run air washer for several hours. During the first few days, water drops can penetrate the droplet eliminator, given that the filtration efficiency depends on the wetness level. Regularly remove deposits from the droplet eliminator profiles.

Switch on the circulation pump every 2 days for at least 1 minute (provide for timer control).

Troubleshooting:

Water penetration:
- Is droplet eliminator installed correctly?
- Is the nominal air flow rate satisfied?
- The nozzles must spray against the air stream.
- Pump pressure < 3 bar?

Humidification capacity:
- Is there pump pressure?
- Check rotational direction of pump.
- Are all nozzles working?

Moreover, observe all operating and maintenance instructions by the air humidifier/air washer manufacturer.
The water fed into the humidifier must meet the microbiological requirements of the Drinking Water Ordinance [or local regulations]. Feedback into the drinking water network must be prevented.
The humidifier must be automatically switched off, as soon as the AHU system is shut down or fails. Feedback into the drinking water network must be prevented.
The fan (or the AHU system) must continue to run until all surfaces of the air humidifier are dry.

06.05 Steam humidifier

If the AHU is fully equipped with a steam humidifier, the unit is sized according to the supplier's guidelines as well as hygiene requirements such as:

- No condensation after installing the humidifier
- No droplets form after installing the humidifier
- Adequate humidification up to downstream components
- Use water of potable quality for generating steam

If the steam humidifier is provided by the client, the aforementioned points are the client's responsibility.

The water fed into the humidifier must meet the microbiological requirements of the Drinking Water Ordinance [or local regulations]. Feedback into the drinking water network must be prevented.
The humidifier must be automatically switched off, as soon as the AHU system is shut down or fails. Feedback into the drinking water network must be prevented.
The fan (or the AHU system) must continue to run until all surfaces of the air humidifier are dry.

06.06 Refrigeration technology

Observe the requirements of applicable national and international regulations and standards during all activities.

Completion and commissioning of refrigeration units must only be carried out by the manufacturer or other qualified and competent individuals. This also applies to maintenance. Comply with the mandatory logbook requirements in accordance with (EU) no. 517/2014 and (EC) no. 1516/2014 for refrigeration plants (request where required) as well as those of applicable standards and guidelines (e.g. EN 378, BGR 500 and F-gas regulation) in the course of all activities.

Implement all structural requirements to ensure accessibility. Unit and duct assembly must be complete, and the supply media connection and constant availability ensured. Ensure that the system/unit can be operated at the operating point. All works required on the refrigeration unit must be complete.

All necessary cables must be connected to the refrigeration control panel.

- Supply
- Enable contact
- Output control (where available)

Caution: All work on electrical connections and wiring must be carried out by a qualified electrician. Comply with all applicable standards.
All work is prohibited while the system is still connected to the power supply.
Ensure that the system is voltage free before commencing work.

System operation
The warranty becomes void if damage occurs due to incorrect handling, operation, and failure to observe regulations. The declaration of conformity and warranty become void if unauthorised or in-house modifications are carried out on the refrigeration unit.

The refrigeration unit must only be operated in connection with an AHU. Refrigeration unit fault messages are transmitted to the control panel where they are displayed.

Regular inspections
In accordance with para. 15 of the German Industrial Safety Regulation (BetrSichV), the system and its components are subject to partial and periodic inspection requirements. These inspections must be carried out by a competent person or approved inspection body. Observe other statutory requirements applicable to the respective installation site.

Regular maintenance is essential to ensure that the unit remains fully functional. The F-gas regulation stipulates that the number of leakage checks depends on the refrigerant charge (per refrigerant circuit) of each unit.

Caution: The system contains fluorinated greenhouse gas in accordance with the Kyoto Protocol. For reasons of environmental protection, never release refrigerant to atmosphere. Use only those oil types approved by the compressor manufacturer (see compressor specification), otherwise the system suffer damage.

Use general safety information and personal protective equipment against refrigerant and heating agents according to BGV D4 (safety goggles, gloves, observe industrial hygiene, S1 safety boots, etc.).

Avoid all bodily contact with refrigerant. Refrigerant contact can lead to frostbite to body parts. There is a risk of suffocation if refrigerant (odourless and tasteless) escapes. If refrigerant has been released, the area (room) may be entered only with a suitable self-contained breathing apparatus, where the safety of the atmosphere has not been proven.

Caution refrigerant:

- Keep away from ignition sources – no smoking.
- Store containers in a well ventilated location.
- Implement measures to prevent electrostatic charging.
- Never inhale gas, smoke, vapour or aerosols.

Caution: All work on electric connections as well as wiring must be carried out by a qualified electrician.
Observe all applicable standards.

06.07 Measurement and control technology

Commissioning must only be carried out by qualified personnel (process measuring and control technology). Observe all applicable standards.

Attention: Attention: All work on electrical connections and wiring must be carried out by a qualified electrician. The applicable standards must be complied with.
Any work is prohibited until the installation has been disconnected from the electrical power supply. Before working, make sure that no voltage is present.

06.08 ATEX explosion protection

Prior to commissioning, ensure that all equipotential bonding of unit and building is connected and functions correctly.

Open cables and cable entries must be connected or sealed on site in accordance with the relevant ATEX Directive (ignition types) and legislation. This may only be carried out by specialist personnel trained in the field of explosion protection.

7. Maintenance

07.01 Warranty

Our warranty will be void in the case of damage resulting from incorrect handling, operation and maintenance. Moreover, experience has shown that with the increasing age of products, there is more significant damage if adequate maintenance is neglected. Consumables and wearing parts are generally excluded from our warranty.

Statutes clearly indicate annual maintenance intervals for safety equipment:

For example: **Workplace regulation - paragraph 4, 3 [Germany]**

Inspections of safety equipment must only be carried out by competent trained personnel.

- VDI 6022 Hygiene requirements for ventilation and air handling systems
- VDI 3801 Operation of ventilation and air handling systems
- EN 13053 Services for the maintenance of ventilation and other technical equipment in buildings; ventilation equipment and plants
- AMEV Recommendation - maintenance 85
- DIN 1946/4 Ventilation and air handling systems in hospitals
- EN 13053 Central air handling units - performance data for units, components and structural units

We refer to the checklists included in the above regulations, where recommendations for maintenance intervals are specified.

For maintenance and servicing work on AHUs, training according to VDI 6022, category B (hygiene training) is required.

Refrigeration unit warranty is accepted only where the required maintenance intervals have been complied with in full by a qualified refrigeration specialist. Evidence of professional maintenance must be documented in full in a service booklet or logbook in accordance with (EU) no. 517/2014 and (EC) no.1516/2014.

The special conditions of the certified equipment must be complied with and, in addition, the maintenance and operating instructions of the component manufacturers must be followed.

For maintenance and cleaning work in potentially explosive areas, only suitable, non-incendive tools may be used (to EN 1127-1). In order to prevent personnel from accumulating static charge, dissipative shoes (BGR 132) must be worn during maintenance and work on the unit. In order to avoid a risk of ignition (due to electrostatic discharge), all surfaces of ATEX units should only be cleaned with a damp, anti-static cloth.

In case of modifications by qualified personnel where components or spare parts have been renewed and / or repaired, a new EC conformity or safety evaluation of the ATEX directive (category, temperature class, etc.) must be carried out. Only then may the unit be put back into operation. In the event of improper modifications to the unit by third parties or if no renewed safety evaluation (ATEX Directive) has been carried out, the EC Declaration of Conformity or Declaration of Incorporation by WOLF will expire.

07.02 Cleaning

Caution!

- All cleaning work may only be carried out when the unit is switched off.
  The unit must be secured against restarting.
- You must take note of the general safety instructions at *„3. Sicherheit" auf Seite 7*.
- Cleaning may only be performed by specialist, qualified personnel. Avoid direct contact with disinfectant. Personal protective equipment, e.g., goggles, respiratory protection, gloves, protective clothing, etc. must be worn. In addition, the instruction manuals and safety datasheets of the respective cleaning agents used must be observed.
- When the unit has finished being cleaned, it should be clean and dry with no residues.
- After completing cleaning work, check that all foreign bodies, e.g., cleaning cloths, have been removed from the unit.
- The unit must be cleaned thoroughly, especially before initial commissioning. In particular, ensure it is free of drilling chips that may have been created by subsequent structural installation of accessories. Current guidelines and standards, e.g., VDI 6022, must be observed.

- When using disinfectants containing alcohol, do not exceed 50 ml of stock solution per m² of surface to be treated and max. 2 m².
  This quantity must not be exceeded due to the risk of fire and explosion in large-scale applications.
- To prevent the risk of ignition from electrostatic charge, all surfaces of ATEX units may only be cleaned with a damp, antistatic cloth.

- Coarse dirt should first be cleaned by dry or damp means, or additionally vacuumed.
- For other soiling: remove with a dry cloth, wash off if necessary with a little water containing basic cleaning agents, and dry the surfaces.
- Before surface disinfection, the surfaces must be dry. Only disinfectants suitable for AHUs (air handling units) may be used.
- For surface disinfection, disinfectants from the DGHM list, or with DVG or VAH certification must be used, and the specified concentrations and exposure times must be observed. Suitable cleaners include BODE Microbac, Bode Bacillol AF or DESOMED Desotop, for example. Corresponding concentrations, applications and safety instructions can be found in the manufacturer's datasheets. If necessary, the surface compatibility should be tested in advance on a non-visible area. Soaps and surfactants must not be added to disinfectant solutions or disinfectants. The use of hydrogen peroxide H2O2 or other oxidizing agents for disinfection is prohibited.
- Do not use sponges or tools with a scratching and/or scraping effect for cleaning (surface protection will be destroyed).
- Clean the seals on the inspection doors; check for germs, fungi and leaks. We recommend treating the seals with a moisture-repellent preservative.
- Where disinfectant is applied on a large scale, ensure sufficient ventilation in the affected areas.

Observe current guidelines and standards! We recommend at least the cleaning intervals according to VDI 6022, provided there are no other specifications.

07.03 Maintenance intervals of system components

The application period for the following items cannot be specified. Regular maintenance and cleaning of the system solely depends on the degree of soiling. This is subject to the dust content of the outdoor or recirculating air.

Checklist for hygienic operation and servicing of ventilation and air handling systems								
	Activity	**If applicable, action**	**Months**					
			1	**3**	**6**	**12**	**24**	
1 Central chambers/Unit casing								
1.1	Check for soiling, damage and corrosion on the air side	Clean and repair				x		
1.2	Check for water pooling	Clean, establish cause			x			
2 Air filters								
2.1	Check for unacceptable soiling and damage (leaks), check for odours	Replace relevant air filters if the last replacement of the filter stage was less than six months ago; otherwise replace the complete filter stage		x				
2.2	Check differential pressure	Replace filter stage	x					
2.3	Latest filter replacement 1st stage					x		
2.4	Latest filter replacement 2nd stage						x	
	Activity	**If applicable, action**	**Months**					
			1	**3**	**6**	**12**	**24**	
3 Air humidifier								
3.1 Evaporation and run-around spray humidifier								
3.1.1	Check for soiling, damage and corrosion	Clean and repair	x					
3.1.2	Check function of circuit breakers/off switches	readjust if necessary			x			
3.1.3	Check number of colonies in the humidifier water (dip slides)	For a colony value > 1000 CFU/ml: wash with cleaning agent, rinse and dry the tray, if necessary disinfect	fortnightly					
3.1.4	Check for deposits on spray nozzles	Clean nozzles, replace if required	x					
3.1.5	Check the condition and function of strainers	Clean and repair			x			
3.1.6	Check for flocculation at the bottom of the humidifier tray.	Clean tray	x					
3.1.7	Check for dirt and film deposits in the suction line of the circulating pump	Clean pump circuit		x				
3.1.8	Check function of blow-down unit	Readjust blow-down unit			x			
3.1.9	Check function of conductivity cell	Repair	x					
3.1.10	Check function of sterilisation system	Repair			x			
3.1.11	Complete draining and drying of humidification system		During downtime					
3.2 Droplet eliminator								
3.2.1	Check for soiling, damage, film formation and corrosion	Cleaning to safeguard function	x					
3.3 Steam humidifier								
3.3.1	Check for soiling, damage and corrosion	Clean and service, disinfect if required		x				
3.3.2	Check for condensate in the humidifier chamber	Ascertain and eliminate the cause(s), clean steam humidifier	x					
3.3.3	Check for deposits on steam lance	Clean			x			
3.3.4	Check condensate drain	Clean and repair		x				
3.3.5	Check control valve function	Repair			x			
3.3.6	Check humidity limiter	Repair			x			

4 Heat exchanger

4.1	Heater: Check for soiling, damage, corrosion and impermeability (directly fired), if required	Clean and repair, replace if required			x		
4.2	Cooler: Check for soiling, corrosion, damage and impermeability of heat exchanger (coil), condensate tray and droplet eliminator unit	Repair		x			
4.3	Check trap function	Repair		x			

5 Fan

5.1	Check for soiling, damage and corrosion	Clean and repair			x		
5.2	To safeguard function clean fan components, which come in contact with air, as well as the water drain					x	
5.3	In the case of storage of the fan with self-aligning ball bearing in pillow block housing with grease nipple	Clean and lubricate			x		
	Activity	**If applicable, action**	**Months**				
			1	**3**	**6**	**12**	**24**

6 Heat recovery

6.1	Check for soiling, damage and corrosion	Clean and repair		x			
6.2.	Check for impermeability between exhaust and outdoor air	Repair		x			
6.3	Check for soiling, corrosion and function of condensate tray and droplet eliminator	Repair		x			
6.4	Check trap function	Repair		x			
6.5	Clean wet cooler, droplet eliminator and condensate tray			x			

7 Air ducts and silencers

7.1	Check for damage to accessible air duct sections	Repair				x	
7.2	Check for soiling, corrosion and condensate in the inner air duct at 2 – 3 representative points	Ascertain the cause, check the dust density according to annex A, clean respective air duct sections according to annex A, if necessary				x	
7.3	Check for soiling, damage and corrosion of silencers	Ascertain the cause, repair or replace, swab tests if required				x	

8 Refrigeration units: Leak test without leak detection system - caution, system under pressure

8.1	Leak test	CO_2 equivalents of 5 to 50 tonnes				x	
	Leak test	CO_2 equivalents of 50 to 500 tonnes			x		
	Leak test	CO_2 equivalents of more than 500 tonnes		x			

07.04 Electric connections

Retighten all terminals.

07.05 Motor

The fan motor is maintenance-free. It should be cleaned (dry) regularly to remove dust.

At regular intervals (depending on condensation), drain off accumulated condensate via the condensate drain (at the lowest point of the end plate), then close the drain again.

Caution EC motors (EC=electronically commutated)
Minimum 3 minute delay. Use of capacitors creates a risk to life from direct contact with live parts or those that have been energised as a result of fault conditions, even after system shutdown. Removal or opening of the inspection housing is permitted only with the power supply switched off and after a three minute delay.

Caution!
Maintenance and inspection personnel must be instructed regarding the work to be carried out. After completing maintenance, the inspection ports and doors must be closed and locked again. Keys for the lock must be removed and kept in a safe place.

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

07.06 Fan

Fan impeller
Remove dust and other deposits regularly from the impeller, to avoid imbalance.
Conduct a vibration check after cleaning.

Fan bearings
The grooved ball bearings, mounted in the bearing spiders as well as the pillow block bearing housings without grease nipples are maintenance-free.

The self-aligning ball bearings installed in the bearing spiders and the pillow block bearings without grease nipples are maintenance-free. Lubricate the self-aligning ball bearings installed in the pillow block bearing housing fitted with a grease nipple after 30 hours of operation and then every 6 months thereafter using lithium soap grease until a new bead of grease forms. Remove old grease – ensure old grease can escape freely.

Check to ensure the initial lubrication is free of air when using centralised piped lubrication systems.

Drive
Check drive belts for correct tension and alignment.

Functional check
After maintenance, check the nominal air flow rate using an on-site flow meter.

Caution!
Maintenance and inspection personnel must be instructed regarding the work to be carried out. After completing maintenance, the inspection ports and doors must be closed and locked again. Keys for the lock must be removed and kept in a safe place.

Check the balancing weights/balancing. Missing balance weights cause the fan to flutter.
This can lead to an explosion due to impact sparks.

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

07.07 Heat exchanger

Check the fin package for soiling on the air side and if necessary, clean with compressed air. If the heat exchanger can be removed, it can also be cleaned with a high pressure cleaner. Observe low pressure and a nozzle clearance of at least 300 mm. Never permit the fins to deform.

Check header pipes and all joints to the connected pipework for tightness.

Check the function of antifreeze as well as that of the frost stats.

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

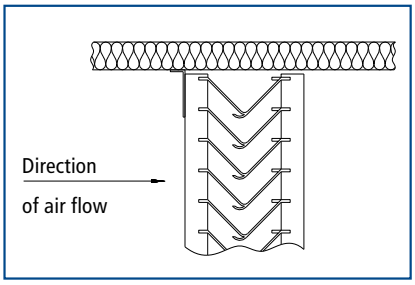
07.08 Droplet eliminator

The droplet eliminator in hygienic units can be removed from the unit and be completely dismantled for optimum cleaning.

After cleaning, ensure that the unit is reinstalled correctly.

Adjust the droplet eliminator fins in line with the direction of air flow through the unit.

In larger units, always hold the droplet eliminator by several fins because individual fins might otherwise slip due to the weight.



In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

07.09 Silencers

Silencers can be removed from the unit for better cleaning.

Clean silencers in the area of the attenuation material using a vacuum cleaner. Frame parts and resonance surfaces can be wiped clean.

Never soak the attenuation material.

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

07.10 Heat recovery – aluminium plate heat exchanger

Many years of experience have shown that soiling of the plate heat exchanger in standard ventilation and air handling units is unlikely. The reason for this is the higher air velocity through the plate heat exchanger. Nevertheless, if the exchanger inlet shows signs of soiling in special applications, e.g. welding extraction, paint shops, extract air from kitchens, etc., the heat exchanger set can be cleaned as follows:

a) Dust and fibres can be easily removed with a soft hand brush. Be careful when using compressed air, to avoid damage to the heat exchanger set.

b) Oil, solvents, etc. can be removed by washing/immersing with/in hot water, washing-up liquid, etc.

Caution: Cleaning agents must not have a detrimental effect on the heat exchanger itself. When using a high pressure cleaner, ensure that the heat exchanger set is not damaged (maintain a distance of at least 300 mm).

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

07.11 Heat recovery – thermal wheel heat exchanger

Caution: Cleaning agent must not come into contact with the exchanger itself. Where high pressure cleaners (maintain a minimum distance of 300 mm) or compressed air are used, ensure that the exchanger package does not become damaged. The compressed air or water jet must make contact with the heat exchanger surfaces at right angles only.

- Check thermal wheel heat recovery for hygienic condition, foreign bodies, dirt, damage, and corrosion
- Check sealing strips for dirt, foreign bodies, and compression. Replace if worn
- Check drive belt for wear and tension; replace if necessary
- Check thermal wheel for imbalance and running out of true
- Check bearing for impermissible heating, vibration, or running noise; replace if necessary (no later than at the end of the theoretical service life)
- Check function of water drain and trap; clean if necessary
- Check trap water level; top up if necessary
- Check that the thermal wheel run check functions correctly; align sensor if necessary
- Clean the thermal mass with compressed air or a high pressure cleaner (water only without additives)
- Carefully remove dirty water

Maintenance interval
The maintenance interval is 3 months, or one month for ATEX units (more frequently if necessary).

Decommissioning
In the event of longer shutdown periods (for example during summer) put the thermal wheel into operation intermittently to safeguard self-cleaning.

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

07.12 Air humidifier / air washer

Upon reaching the threshold limits of the water to VDI 3803, annex A4, table A1 and according to the degree of water contamination, the water tray as well as fitted parts must be cleaned.

When draining and filling the tray, the system must not be in use.

- Drain and clean water tray. Generally, avoid using foaming cleaning agents.
- Limescale can be removed with descaler or heavily diluted acid.
- Clean humidifier nozzles, to ensure optimum spraying and therefore, ideal humidification performance at all times.

Remove deposits from droplet eliminator profiles given that these influence the separation capacity.

Steam humidifier

Observe the operating and maintenance instructions issued by the humidifier manufacturer.
The water fed into the humidifier must meet the microbiological requirements of the Drinking Water Ordinance [or local regulations]. Feedback into the drinking water network must be prevented.
The humidifier must be automatically switched off, as soon as the AHU system is shut down or fails. Feedback into the drinking water network must be prevented.
The fan (or the AHU system) must continue to run until all surfaces of the air humidifier are dry.

07.13 Filter

Only use air filters checked to EN 779 (ISO 16890 replaces EN 779 until mid 2018) or EN 1822.

Subject to customer-specific AHU layout, air filters may be fixed or removable.
To check the degree of saturation of the air filter (with the exception of activated carbon filters), we recommend that you install a monitoring unit that indicates saturation pressure.

The saturation pressure/terminal resistor can vary subject to the fitted filter system and manufacturer. The unit-specific terminal pressure drop is specified on the filter type plate (or complies with recommendations to EN 13053).

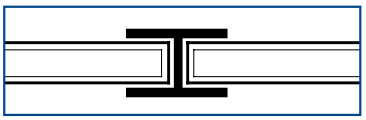
Observe the supplied filter manufacturer operating and maintenance instructions for roller tape filters.

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

Caution:

- Always ensure that filter pockets are vertical when installing the filter.
- Filter dust can cause allergic reactions to skin, eyes, or respiratory organs on contact.
  Wear personal protective clothing or face mask with P3 filter, safety goggles, and protective clothing when servicing or changing air filters. Contaminated filters pose an increased health risk.
  Observe the general safety instructions on page 7.

In the case of panel filters, insert H profiles between the individual filters (see Fig.), to prevent air leakage.



Dust deposits represent an ignition hazard and must always be removed or prevented.

07.14 Multi air dampers

Multi air dampers can be installed both horizontally and vertically. Clean shafts and rods of leaves annually; never lubricate with oil.

In addition, the individual operating and maintenance instructions for the installed parts or supplied parts must be observed!

07.15 Hygienic units

The complete operating side of hygienic AHUs is accessible through removable inspection covers (operating doors).

Fitted parts can be pulled out of the unit by following the steps below:

- Removable pocket filters → Slacken off the compacting pressure exerted by the filter guide rail by undoing the toggle screws and pull out the filter frame.
- Fan section – centrifugal impeller – standard: stationary, optionally removable via floor and ceiling rails → Undo Allen screws under the plastic caps on the bottom and top guide rail.
- Fan section with radial fan or centrifugal impeller installed on bottom rails → remove front star screws and extract the complete fan with anti-vibration frame up to the end-stop.
- Heat exchanger (heater, cooler) → either removable through appropriate pipework (flange connection) or accessible from both sides of the unit.
- Droplet eliminator → open casing door/cover, extract demister.

Consequently, the complete inside of the unit is also optimally accessible for cleaning or wipe-down disinfection.
All seals are snapped on and can be easily replaced, if necessary.

After cleaning, reinstall the parts securely, to ensure the effectiveness of all seals.

In the case of a centrifugal impeller with bottom and top rails, tighten the Allen screws fully and replace the caps into the relevant drilled holes.

07.16 Refrigeration technology

Maintenance can be carried out by the manufacturer or by a certified and authorised refrigeration specialist.

Comply with the mandatory logbook requirements in accordance with (EU) no. 517/2014 and (EC) no. 1516/2014 for refrigeration plants (request where required) as well as those of applicable standards and guidelines (e.g. EN 378, BGR 500 and F-gas regulation) in the course of all activities.

The F-gas regulation legally obliges operators of refrigeration units to ensure that regular maintenance and leak tests are carried out by certified specialist personnel. Document these in the system logbook.

Keep the system log up to date. Carry out maintenance in accordance with EN 378-4.

Refrigeration unit warranty is accepted only where the required maintenance intervals have been complied with by a qualified refrigeration specialist. Evidence of professional maintenance must be documented in full in a service booklet or logbook in accordance with (EU) no. 517/2014 and (EC) no.1516/2014.

The operator is obliged to retain the system log.

Caution
Refrigeration unit fault messages are displayed on the control panel. In accordance with the German Industrial Safety Regulation (BetrSichV), this plant is subject to inspection. For this, specific requirements are incumbent on its operator and must be met in accordance with para. 14 BetrSichV prior to system operation. Observe other statutory requirements applicable to the respective installation site.

In accordance with para. 15 of the German Industrial Safety Regulation (BetrSichV), the system and its components are subject to partial and periodic inspection requirements. These inspections must be carried out by a competent person or approved inspection body. Observe other statutory requirements applicable to the respective installation site.

Use only those oil types approved by the compressor manufacturer (see compressor specification), otherwise the system can suffer damage.

See *„3. Safety" on Page 7* for general safety instructions.

07.17 Process measuring and control technology (PMC technology)

The system must be routinely serviced by an authorised company specialised in PMC technology.

Safety equipment must be subjected to an annual function test. All faulty parts must be replaced/repaired.

07.18 Additional operating and maintenance instructions

Additional operating and maintenance instructions are available for various built-in parts or supplied parts.
For this order, the respective operating and maintenance instructions were enclosed in addition to our operating and maintenance instructions: These can also be requested as required.

- Electric heater
- Heat recovery (rotary heat exchanger)
- Air washer
- Surface humidifier
- Steam generator
- Free-running plug fan wheel
- Drive motor / electrical components
- Warm air heater type WLE / WLE-K - Cleaning the heat exchanger
- Compressor - Condenser unit
- Radial fan
- Volumetric flow meter
- C-max control
- Therm-Connect hydraulic units
- Refrigeration

8. Malfunctions and repair

08.01 Eliminating faults

Only qualified personnel must work on or repair faults on the AHU.

Caution!
Work on the AHU must not be started or carried out until the following conditions are met:

- Service switches fitted to the unit are connected to the control circuit of the AHU system
- Power supply is omnipolar at zero volt
- Powered rotating parts are secured against reconnection (lockable service switch).
- All rotating parts are at standstill.
- Unit components are cooled down to normal ambient temperature (room temperature)

After completing the work, restart the system. (For this see: *„06.01 First trial run" on Page 34*)

Caution!
Only qualified electricians are permitted to work on electric components. The regulations of the local power supply utility and the VDE (Association of German Engineers) [or local regulations] must be observed.

No structural modifications or additions must be carried out on the AHU, otherwise the manufacturer's declaration of conformity will be void.

Commissioning after eliminating faults (for this see: *„06.01 First trial run" on Page 34*)

08.02 Fan section

08.02.01 Torn drive belt

- Remove damaged drive belt
- Check drive pulleys for damage
- Install new drive belts (for this see: *„06.02.01 Drive: Belt tension – belt alignment" on Page 37*)

08.02.02 Faulty drive motor – motor replacement

Fan section with radial fan and motor on anti-vibration frame:

- Release tension from the motor so that V-belt are lying slack in the belt pulleys.
- Remove V-belts
- Undo and remove motor mounting screws
- Loosely secure new motor symmetrically (axially) to the fan on the anti-vibration frame (sliding rails), fit motor pulley with bush onto the motor shaft and ensure it is centrally located on the hub
- Align motor and tension V-belts (for this see: *„06.02.01 Drive: Belt tension – belt alignment" on Page 37*)

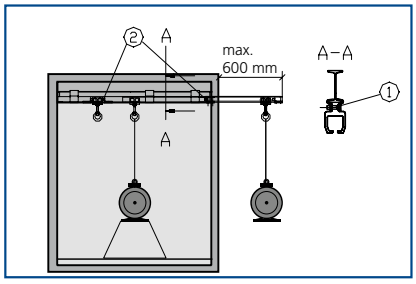
Fan section with centrifugal impeller:

Caution: Motor replacement and fitting the impeller must be carried by an authorised specialist, given that once the assembly has been completed, a function test must be performed and rebalancing may be required.

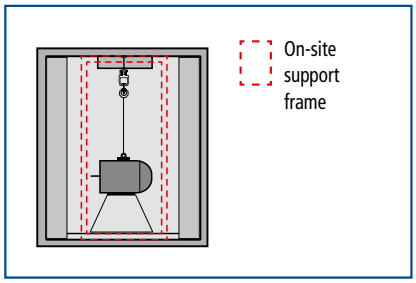
Refer to the manufacturer's operating instructions for disassembly and assembly steps. These are attached to these operating instructions.

08.02.03 Motor extraction rail

In various units there is a motor extraction rail for removing and re-fitting heavy drive motors. Power connection (see *„05.19 Electrical connection" on Page 25)*



Side view



Front view

Follow the steps below before pulling out the motor extraction rail:

- Switch off the unit (service switch OFF and locked in the off position).
- Remove any casing panels and braces.
- Mount the on-site support frame below the casing frame.
- Undo the screws on the motor extraction rail retainers (1).
  Do not change the position of the retainers.
- Pull the motor extraction rail no more than 600 mm out of the casing.
- Retighten the screws on the motor extraction rail retainers (1).
- Remove the end-stops (2), then fit and tighten one each at either end of the motor extraction rail.
- Once the motor replacement is complete, restore the unit to its original operating state.
- Before starting, balance the motor together with the impeller.

Caution:
Use caution when lifting with an inclined pulley block, as the motor may swing out. Use additional lifting gear to prevent the motor from oscillating, if necessary. Observe the maximum load bearing capacity. See the information provided on the unit.

Beware of crushing hazard when extracting the motor. The unit must be secured to the foundation to ensure stability.

Beware of suspended load hazard when extracting the motor.

08.02.04 Fan bearings

Before replacing, contact us on identifying correct spare parts and supply of bearings.
When replacing bearings, observe the fan manufacturer's installation instructions.

Before replacing bearings, remove the drive belts (for this see: *„06.02.01 Drive: Belt tension – belt alignment" on Page 37* or *„08.02.01 Torn drive belt" on Page 51*)

08.02.05 Imbalance of the fan unit

In the case of imbalance or strong vibrations in the fan unit, a vibration measurement and vibration analysis must be carried out. In addition, check the fastenings, oscillating spring dampers (if fitted) and impeller bearing. Measures: if necessary, clean and rebalance (as per ISO 10816-1) or replace the bearings.

08.02.06 Incorrect air flow rate

Ascertain the nominal air flow rate using a flow meter. If no damage is detected on the fan, check the entire system.

08.03 Heating/cooling section

Replacing the heat exchanger

- Close all shut-off valves
- Drain flow and return lines and reduce pressure to zero.
- Remove flow and return lines and provide good access to the service cover on the AHU.
- Remove service cover
- Extract the heat exchanger from the AHU
- Insert new heat exchanger into the fitted guide rail
  Push carefully to avoid damage to copper piping or aluminium fins
- Install service cover of AHU
- Connect flow and return lines (*„05.13 Connections on the medium side (pumped hot water, pumped cold water, refrigerant, steam)" on Page 21*)

9. Decommissioning, dismantling and disposal

09.01 Decommissioning

Seasonal shutdown
Operate thermal wheel heat exchanger periodically during the summer months (cleaning the surface)

Short-term shutdown
Reduce the system to minimum capacity using the control system

- Run multi air dampers in recirculating air mode – close outdoor air damper, to avoid cooling down and risk of frost
- Close all control valves
- Switch off circulating pumps
- Close fresh water valves; close manual valves
- Drain installed parts exposed to a risk of frost. Blow through heat exchanger and connecting pipes using compressed air until they are fully drained.
  Allow the fan to run on until all surfaces are dry.
- Empty trap
- Switch off mains isolator and lock system

Long-term shutdown for several months
Same measures as for "Short-term shutdown" however, also
undo or remove fan section V-belt, to avoid damage during storage.

Recommissioning – also see *„6. Commissioning" on Page 34*
Conduct visual inspection, to check if there is any obvious damage. Then conduct commissioning of the unit as described in *„6. Commissioning" on Page 34*.

- Mount and tension fan section V-belt
  – in the case of bearings with grease nipples, remove old grease and re-lubricate with lithium soap grease
- Slowly recharge drained components – vent carefully
- Open all valves
- Activate mains isolator
- Switch on control system

09.02 Dismantling and Disposal

Removal - dismantling
Before starting any removal, disconnect the AHU and integrated consumers from the power supply.
All live power cables must be disconnected by a qualified electrician.

Furthermore, all components in contact with media must be fully drained. This must be conducted by a specialist contractor, who will also take care of the professional disposal of

- water with antifreeze constituents
- refrigerants in evaporator and condenser pipework
- compressor oils

Caution!
System parts under pressure.

The system contains fluorinated gases with greenhouse effect as covered by the Kyoto Protocol. Maintenance and disposal work must be carried out by certified and authorised specialist personnel in compliance with applicable standards.

The AHU can then be dismantled on-site into individual units or their components. This must also be carried out by a specialist contractor familiar with environmentally correct disposal of these components.

When handling dusty components (filters) as well as mineral wool products, suitable breathing masks must be worn.

Carry out disposal according to the applicable, relevant and local environmental and recycling regulations of your country and community.

The following materials are used in our AHUs

Casing – frame profiles, casing panels and installed parts:

- Hot-dip galvanised sheet steel
- Stainless steel 1.4301
- Aluminium AlMg
- Copper
- Brass
- PVC

Seal/gasket profiles:

- Natural mixed rubber profile EPDM
- PVC

Sealants:

- Polyurethane – waste code 55908, 080404,
- All sealing materials can be treated as special waste or given to controlled combustion

Insulating material:

- Mineral wool – waste code 31416
- Sound insulating mats
- All insulating materials can be disposed of at normal building rubble dumps

10. Emergencies

10.01 Fire fighting

AHUs do not represent a direct fire hazard. Through external influences, only the seals which are installed in small numbers can burn out.
In case of fire, respiratory protection equipment (RPE) must be worn, which operates independently of recirculating air.

The unit must be disconnected from the mains. Suitable fire extinguishing media are

- Water jet
- Fire extinguishing foam
- Fire extinguishing powder

10.02 Escape of harmful substances

Given that only small amounts of combustible seals are fitted, only small amounts of hazardous substances can be released by a fire. Based on the materials used, these are – nitric oxides, carbon dioxide, carbon monoxide, hydrogen chloride.

11. Filter inspection list

Visual inspection monthly - to DIN 1946-4

Date of inspection	Date of last filter change	Date of next filter change	Filter type	Initial pressure drop	Differential pressure	"0" check position Pressure gauge	Inspector/ operator

This filter inspection list can also be printed or copied from our operating and maintenance instructions.

HEATING
VENTILATION
AIR CONDITIONING DIVISION

Subject to modifications in design and function.

0M10ND2-K3

The latest version of the operating and maintenance instructions can be found at:
www.wolf-geisenfeld.de/downloads

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