

Transport, Assembly,  
Commissioning and Maintenance  
of Central Air Handling Units

**Series AT 58**

## **General Instructions**

The units should be assembled properly and used precisely in accordance with our instructions. If assembly is carried out contrary to our attached instructions and if the resulting defect/damage is due to improper modification, treatment or handling, then any claims for compensation or against the guarantee are excluded.

The customer would then have to provide evidence that the improper assembly did not cause the defect in question.

It is essential to comply with the general installation, assembly, commissioning and maintenance instructions as supplied with each unit series AT 5 as manufactured by AL-KO THERM GMBH.

Assembly, commissioning and maintenance work should only be carried out by qualified skilled personnel.

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The regulations below must be observed when installing, commissioning and maintaining units:  
Local/national regulations should also be complied with.

DIN EN 292 Parts 1 and 2	Safety of machines
DIN EN 294	Safety of machines: units and systems
DIN EN 349	Safety of machines: minimum clearances
DIN EN 60204-1	Safety of machines: Electrical design of machines, general requirements
DIN VDE 0100	Installation of electrical power systems up to 1000 V
DIN VDE 0113	Electrical equipment for machines: general requirements
VDMA 24167	Fans, safety requirements
VDMA 24168	Ventilation systems: programme of maintenance work
VDI 2079	Ventilation systems: acceptance test
VDI 3801	Operating ventilation systems
VDI 3803	Ventilation systems: structural and technical requirements
VDI 6022	Hygiene requirements for ventilation systems, offices and meeting rooms
UVV VBG 1	Accident prevention regulations: general instructions
UVV VBG 7	Accident prevention regulations: fans
UVV VBG 9	Accident prevention regulations: cranes
UVV VBG 9a	Accident prevention regulations: operating lifting gear
89/392/EEC	Machinery directive

## **1. Transport**

Irrespective of their size, AT 5 series air handling units are either supplied assembled complete or as components bolted on to square transport timbers, according to delivery section arrangements. The unit drawing shows how the delivery is sectioned (° Î: = delivery division)

All AT 5 units are equipped as standard with a base frame  
AT 5 units may be transported to the place of installation by crane or forklift truck.

## 1.1 Transporting the units by forklift truck

### Warning:

Use forks of correct length in order to avoid damage to the base of the unit.  
Basically, look out for projections (e.g. base drainage).  
Service doors must always be locked during transport.

## 1.2 Transporting the units by crane

### Note:

All current VBG 9 and VBG 9a and any local or national safety regulations must be observed for transport by crane.

For weatherproof AT 5 units, the projecting weather skirts must be given additional protection (e.g. cross-members or spacing timber) when transporting by crane.  
Service doors must always be locked during transport.

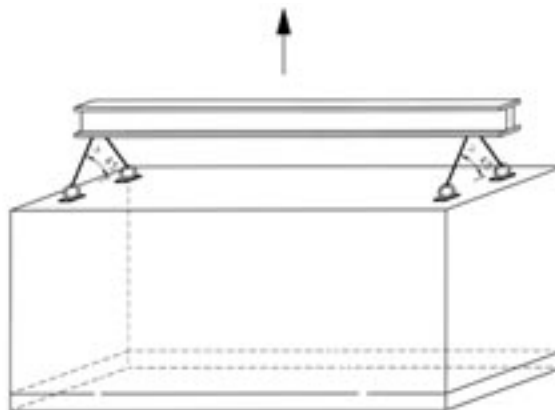


Fig. 1

### Lifting Principle

Caution: This is a schematic diagram only and is not to scale.

## 2. Assembly

### General:

A level foundation is needed to assemble the equipment. The foundation may be either a solid foundation or a continuous footing. For continuous footings, and where the units are more than 2 m wide, additional cross-members must be provided to give support at the front of the unit, the back of the unit and at the points where component sections join.

### Note:

**At the time of delivery, the accessories can be found packed in the fan chamber.**

### Recommendation:

- In order to cushion vibrations, suitable anti-vibration strips (not supplied) may be placed underneath the AT 5 units. Take note of the insulation strip manufacturer's instructions.
- Generally, AL-KO THERM recommends that anti-vibration strips be placed underneath the front ends of the units, the points where the components join and in a longitudinal direction where components are approx. 1200 mm long or more.
- In order to prevent structure-borne noise from being transmitted, AL-KO THERM recommends the use of flexible connections between the unit and air ducts.

### Warning:

The order in which the individual components are assembled can be determined from the contract drawing and must be complied with.

- Assembly of the AT 5 units begins with the component which incorporates the air outlet (duct connection).
- Stick the sealing strips supplied to the front faces of the unit components flush with the outer edge of the unit.
- Position subsequent unit components as closely as possible and connect using the self-centring unit bracket or, for larger and heavier unit components, pull together with appropriate aids (belts) and connect.

### Warning:

Units must be level in order to guarantee correct operation.  
Do not walk on top of unit unless it is protected against damage (scaffolding or supports).  
Carefully cover units between assembly and commissioning in order to prevent damage and soiling.

### 2.1. Assembly of flameproof units

For some components, the cover plates have to be removed in order to assemble the unit. There are holes provided in these covers. Once the components have been connected, the holes must be sealed using the blind rivets supplied.

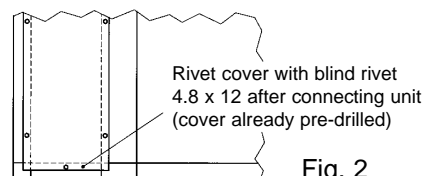


Fig. 2

## 2.2 Internal unit connection for split casing

- Stick on enclosed sealing tape flush with the outer edge of the unit.
- Insert hexagonal bolts into corner plates and assembly brackets as necessary then fix with a shim and hexagonal nut.

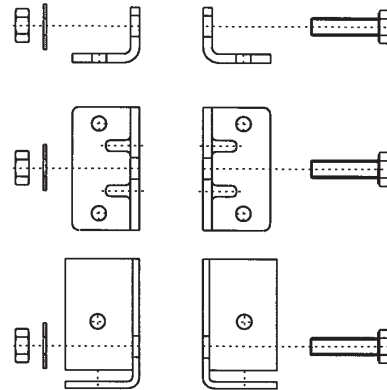


Fig. 3: Unit connection

## 2.3 AT 5 unit connection

**Achtung:**

Wird ein Befeuchter eingebaut, so sind bauseits abgesetzte Fundamente zum Ausgleich des Höhenunterschiedes zwischen Befeuchterwanne und Grundrahmen der anschließenden Gerätekomponenten erforderlich.

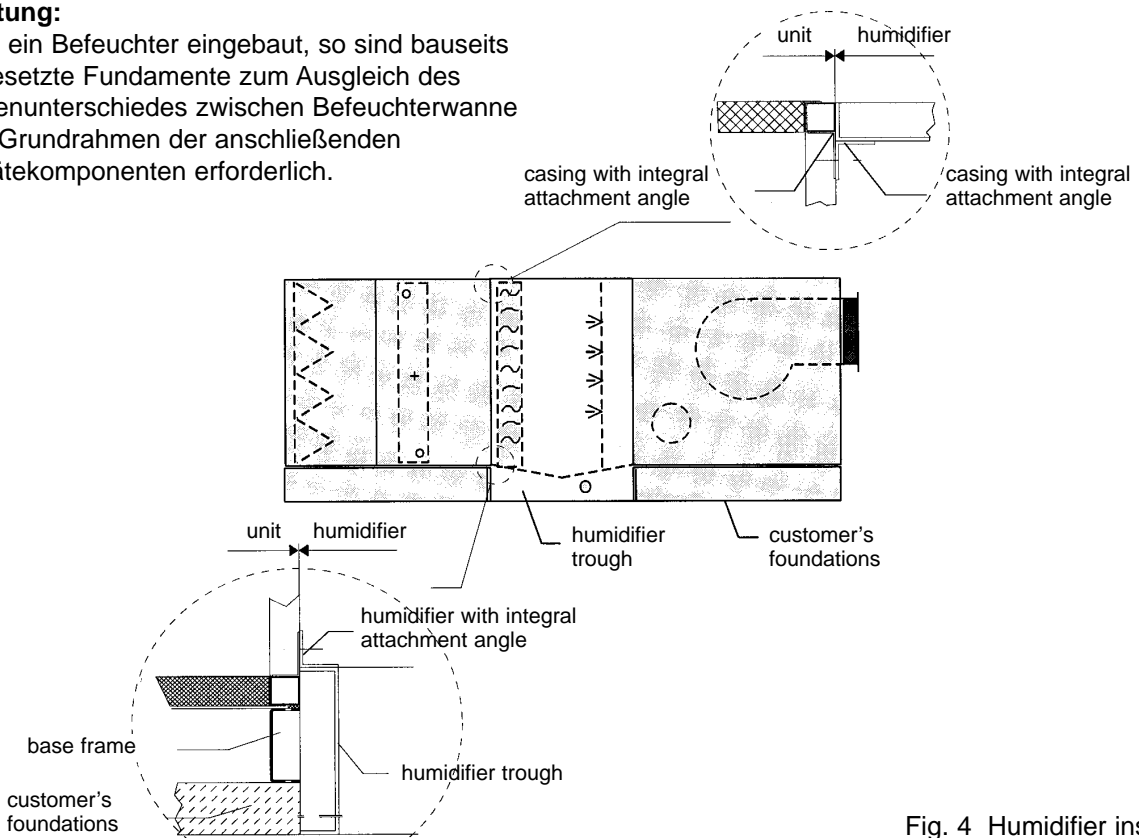


Fig. 4 Humidifier installation

### 3. Additional assembly and maintenance instructions for hygiene units

#### 3.1 Assembly

**Warning:**

Following assembly and connection of the individual components, the unit joins are sealed internally with liquid, disinfectant-resistant sealing material.

#### 3.2 Commissioning and maintenance

Before commissioning the ventilation system, all installed filters, in particular the fine-dust filters, must be checked to see that they are sealed tightly.

**Warning:**

AL-KO THERM generally recommends that all filters be replaced after the ventilation system has been operating for a short time, in order to remove contamination which has entered the filter during the building phase and commissioning.

**Reinigung:**

Frostschutzrahmen und Tropfenabscheider sind zu Reinigungszwecken seitlich ausziehbar und müssen außerhalb des Gerätes mittels Hochdruckreiniger gesäubert werden. Der Tropfenabscheider ist zusätzlich für die Reinigung zerlegbar.

Die Schaugläser der AT 5-Hygienegerätebaureihe sind, sofern für Reinigungszwecke notwendig, leicht demontierbar und zweiseitig ausgebildet.

All fitted components must be either freely accessible for cleaning or be removed or dismantled from the unit once the facing cover has been removed.

If the facing cover is dismantled for maintenance purposes, then the inside of the casing in this area must be resealed with liquid, disinfectant-resistant sealing material on completion of maintenance.

AL-KO THERM recommends that maintenance of the ventilation systems be carried out on the basis of VDMA 24186 Part 1 and VDI 6022.

**Warning:**

It is essential that the general maintenance information contained in the assembly, commissioning and maintenance instructions for central ventilation units, series AT 5, manufactured by the AL-KO THERM company, is complied with.

During installation of pipework and supply lines on site, care must be taken that the function and operation of the extending side components of the unit is not restricted.

## **4. Commissioning and maintenance**

### **4.1 Fan**

#### **Commissioning:**

1. Remove transport protection devices from the fan base.
2. Check the fan direction of rotation (see arrow on fan casing) by briefly switching the motor on.
3. If necessary, reverse the motor poles and correct the direction of rotation.
4. Measure current consumption with the service doors closed and compare with the rated current indicated on the rating plate.
5. Measure the differential pressure  $Dp_{fa}$  and if necessary adapt the operating point by adjusting the AIR-vent.
6. Check alignment (balance) of the V-belt pulleys.
7. Check V-belt tension and if necessary adjust. (see also 4.9.2)

#### **Warning:**

If the direction of rotation is incorrect, there is a risk of motor overload.

Current consumption must not exceed the rated current indicated.

The maximum motor speed must not be exceeded.

Maximum fan speed must not be exceeded.

For a rated motor output of 5 kW upwards: Star delta starting

#### **Maintenance and commissioning:**

- Check fan wheel for imbalance
- Check bearings and if necessary re-grease
- Retighten all fixing bolts
- Check operation of vibration dampers
- If necessary check that the draining device is working properly
- Check fan for contamination, damage and corrosion
- Regularly clean fan unit.

#### **Warning:**

First disconnect unit from mains and switch off master and/or repair switch (disconnect all poles) and secure against unauthorised re-setting (e.g. padlock).

Only open inspection doors when fans have been switched off and are at a standstill.

After the unit has been switched off, the impeller will continue running for 1-3 minutes.

The impeller must never be slowed down by hand or with objects.

**Assembly, commissioning and maintenance work must only be carried out by qualified, skilled personnel.**

#### 4.1.2 Tightening torques for screw connections on fan section

After the fan has run for approx. 1 hour, check the screw connections on the fan base and, if necessary, evenly tighten with a torque spanner with the screw torques indicated in Table 2 alongside.

thread size	screw tightening torque (Nm)
M 6	10
M 8	25
M 10	49
M 12	85

Table 1

#### Maintaining or checking the Taper-Lock clamping bushes:

1. Clean and degrease all unpainted surfaces, such as the hole and taper surface of the taper lock clamping bush and the tapered hole in the washer.  
Insert taper clamping bush into the hub and align all fixing bolts (semi-threaded holes must be opposite half smooth holes in each case).
2. Coat threaded pin (size 1008-3030) or cheese-head bolts (size 3535-5050) lightly with screw locking varnish and screw in – do not tighten bolts yet!
3. Clean and degrease shaft. Push washer with taper clamping bush onto the shaft
4. If a fitting key is used, this must first be placed in the shaft groove.  
There must be backplay between the fitting key and hole groove.
5. Using a torque spanner, DIN 911, tighten threaded pins or cheese-head bolts evenly with the tightening torques indicated in Table 3.

bushing	bolt tightening torque (Nm)	number	bolts size
1008/1108	6	2	1/4" BSW
1310/1315	20	2	3/8" BSW
1210/1215	20	2	3/8" BSW
1610/1615	20	2	3/8" BSW
2012	31	2	7/16" BSW
2517	48	2	1/2" BSW
3020/3030	90	2	5/8" BSW
3535	112	3	1/2" BSW
4040	170	3	5/8" BSW
4545	192	3	3/4" BSW
5050	271	3	7/8" BSW

Table 2

**Removing the taper-lock clamping bushes:**

1. Slacken all bolts and, depending on bushing size, completely unscrew one or two bolts, grease and screw into the counterpart holes.
2. Evenly tighten the bolt or bolts until the bushing becomes detached from the hub and the washer can be freely moved on the shaft.
3. Remove washer and bushing from the shaft.

**4.2 Heat exchangers**

The heat exchangers are largely maintenance free. In order to guarantee long life, the heat exchangers require regular cleaning.

**Note:**

The customer is to supply vent and drain valves in the piping.

**Warning:**

Generally ensure that the unit remains accessible for maintenance purposes. When installing, particularly the connecting pipes, care must be taken that the inspection doors can always be opened.

**Assembly:**

1. Connect heat exchanger on the counter-flow principle (direction of water flow in the unit opposite to the direction of air).
2. Install water feed at bottom and water return at the top.

**Warning:**

When connecting the heat exchangers, support with suitable means (e.g. pipe brackets) so as to avoid damage. Fit lines and connections in such a way that the heat exchangers are freely accessible for maintenance.

Max. operating pressure: 16 bar

Max. hot water supply temperature: 120°C.

**Maintenance:**

- Check heat exchangers for airside contamination, damage and corrosion.
- Clean heat exchangers with compressed air. Galvanised steel heat exchangers can also be cleaned with steam jet units
- Check connections and screw connections
- Check operation of flow and return
- Check vent valve and heat exchanger filling
- Check operation of antifrost thermostat
- If necessary, check concentration of anti-freeze
- Check siphon and top up as necessary
- Check function of water drain and odour trap
- Check moisture eliminator and clean if necessary.

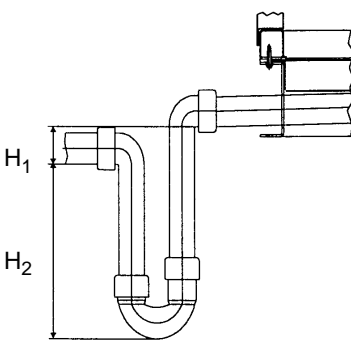
**Warning:**

Where the ambient temperature is below freezing point, the heat exchanger must either be drained and blown out with compressed air, or filled with correct solution of commercial anti-freeze containing anti-corrosive, because of the risk of frost and corrosion.

**Additional instructions for using direct expansion evaporators:**

Installation must be carried out by an approved specialist refrigeration company. Only safety refrigerant to DIN 8962 may be used as the refrigerant.

**For the cooler and the direct expansion evaporator, a siphon (as described below) is also required on site:**

**Double siphon:**

The double siphon with screw-on cover for filling and inspection is a fillable siphon for draining ventilation units in the vicinity of coolers, humidifiers or other wet areas at higher than ambient pressure.

Excess pressure in the unit:  $H_1 = 50 \text{ mm}$

$$H_2 = Dp + 50 \text{ mm}$$

Negative pressure in unit:  $H_1 = Dp + 50 \text{ mm}$

$$H_2 = Dp/2 + 50 \text{ mm}$$

$Dp$  = unit pressure in mm, water column  
(100 Pa = 100 mm water column).

Fig. 5:  
Siphon dimensioning

**Ball siphon:**

The ball siphon is a self-filling siphon for draining the cooler, steam humidifier and other wet areas at pressure lower than that of ambient pressure. A float ball prevents the air from being sucked in during dry operating conditions so that the initial condensate can fill the siphon. The ball also acts as a return valve where there are pressure surges in the system, thus preventing emptying.

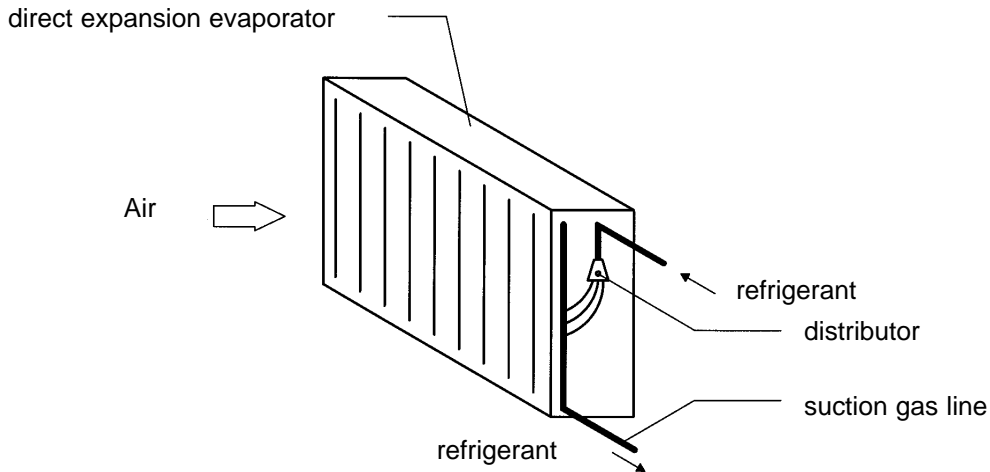


Fig. 6 Air direction when installing a direct evaporator

**Note:**

The customer must provide sufficient access for the refrigerant gas connections.

## 4.3 Heat recovery

### 4.3.1 Plate exchanger

**Maintenance:**

- Regularly clean plates:
  - a) remove dust, fibres etc. with a brush
  - b) remove oil and grease deposits with hot water, steam or grease-dissolving detergents
- Clean condensate drain
- Check siphon and if necessary, top up.
- Check damper connection, drive and control functions.

### 4.3.2 Rotary heat exchanger

**Maintenance:**

- Check drive and control elements
- Regularly clean rotor with compressed air, water, steam or grease-dissolving detergents.

### 4.3.3 Recuperative energy recovery: Integrated circuit system KVS

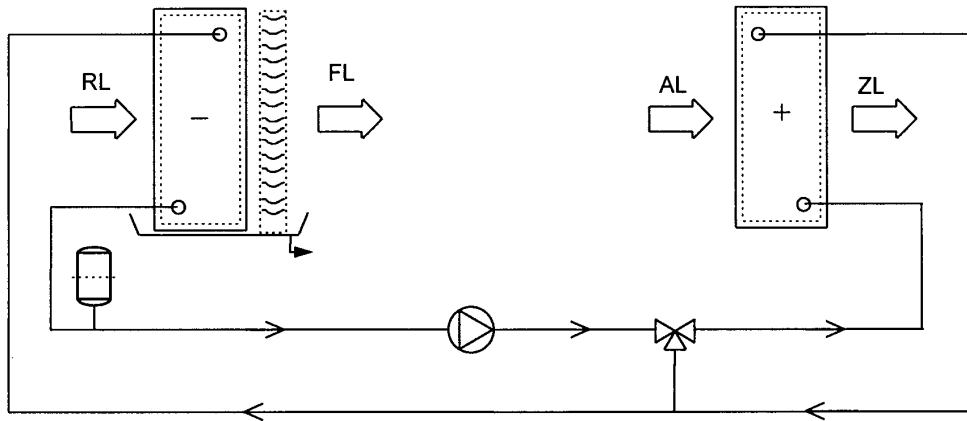


Fig. 7 Integrated circuit system

**The heat exchangers must be maintained regularly.**

**Warning:**

Piping shall be provided by the client.

Circulating pump must be of the size indicated in the technical data sheets.

Heat exchangers must be connected according to the counter-current principle.

Concentration of anti-freeze must comply with the specifications indicated in the technical data sheets.

We recommend the use of Antifrogen N in a mixing ratio of 25 to 35%.

Following the pressure test, the entire system must be thoroughly checked.

It must be purged until no more scale or residual particles are flushed out.

## 4.4 Filters

### 4.4.1 Bag filters

#### Maintenance:

- All classes of filter must be examined every six months for dirt and damage and if necessary replaced.
- The 1st filter level must be renewed at least every 12 months.
- The 2nd filter level must be renewed at least every 24 months.



Bag filters can be replaced either at the dirty air or clean air end.  
The filters are packed for delivery in a box inside the marked components.

Fig. 8

#### Warning:

In general, when the maximum ultimate pressure difference indicated on the rating plate is reached, the filter bags must be replaced.

#### **4.4.2 Activated carbon filters**

Once saturated, the activated carbon must be replaced.

Maintenance and assembly are generally carried out on the clean airside.

As a rule, activated carbon cartridges are supplied for delivery, packed in a box in the marked components.

##### **Changing the filter cartridge**

1. Release bayonet fixing on base plate (key optional extra)
2. Remove activated carbon from between the two perforated plate cylinders
3. Re-attach filter cartridges to the base plate with the bayonet fixing.
4. Check that filter insert is tightly in position.

#### **4.4.3. Schwebstofffilter**

When clogged with grease or dust or once the recommended maximum pressure difference (rating plate) has been reached, the grease trap filter must be changed.

Maintenance and assembly are generally carried out on the dirty airside.

Generally the filters are packed for delivery in a box inside the marked components.

##### **Replacing the filter elements:**

1. Slacken bolts on filter frame
2. Remove filter element
3. Insert new filter element and tighten bolts.

## **4.5 Louvre flaps**

### **Maintenance:**

- Check dampers for contamination, damage and corrosion.
- Check mechanical function of dampers
- Lubricate bearings
- Clean dampers regularly
- Check final position of damper drive motors and adjust as necessary.

## **4.6 Noise attenuators**

The noise attenuators are generally maintenance free.

### **Recommendation:**

Following long breaks in operation, clean noise attenuator silencer faces with a vacuum cleaner.

## **4.7 Drip collector**

For maintenance purposes, the moisture eliminator can be pulled out of the casing from the side and can be dismantled for cleaning.

### **Maintenance:**

- Check moisture eliminator for contamination, damage and corrosion.
- Clean moisture eliminator and condensate collector trough with compressed air, water, steam or grease-dissolving detergents.
- Check water drain and odour seal.

## 4.8 Air humidifier

### 4.8.1 Spray humidifier (air washer)

**Warning:**

- A siphon must be provided by the client if a spray humidifier (air washer) is to be installed (see Fig. 14: Siphon dimensioning, page 14).

**Recommendation:**

AL-KO THERM recommends that an electrical dry-run protection should be fitted for the water-circulating pump. Only use de-mineralised water to operate spray humidifiers, so as to prevent corrosion damage. Arrange spray humidifier as the final component in the ventilation unit, directly at the inlet of the ducting system.

**Assembly and commissioning:**

- Check spray humidifier to see that it is complete and for any transport damage.
- Remove heavy soiling from the humidifier trough and check that the pump suction basket is correctly positioned.
- Check direction of spray and correct seat of spray diffusers.
- Fill humidifier trough up to approx. 10 mm below the top edge of the internal siphon or overflow connection and then adjust the float of the float valve to this water level.
- Check operation of drain and overflow and clean the dirt trap and siphon.
- Check direction of rotation of water circulation pump
- Check tightness of the screw and flange connections of the pump pressure line
- Adjust sludge drainage unit (if fitted), in such a way that the sludge draining rate is twice that of the volume of water evaporated.
- Check installation of water filter.
- Run system on airside and if necessary adjust the operating point of the spray humidifier by regulating the volume of water.
- Check moisture eliminator to see that there are no holes or damage.
- The specified water quality must be maintained and regularly adjusted.
- If there is a reduction in the rate of volumetric flow (e.g. where a frequency converter is used), the pump output must also be reduced.

**Warning:**

The direction of rotation of the water circulation pump must only be checked when the washer trough is full. The water level in the humidifier trough must be sufficient to prevent the water circulation pump from running dry.

The rate of sludge discharge is reduced by 50% where fully demineralised water is used.

With drip collectors made from plastic sections, slight amounts of water may seep through for a short period in exceptional circumstances, because the surface has not become weathered, due to the production method used. Weathering sets in after approx. 24 operating hours.

**Maintenance:**

- Check spray humidifier for contamination, damage and corrosion.
- Clean spray humidifier unit, including jets and stems at least once a year
- Check siphon and if necessary top up
- Check float valve
- Check sludge drainage unit and clean, if necessary.
- Check and clean drip collector / rectifier.

**Warning:**

Observe maintenance, commissioning and assembly instructions of humidifier manufacturer.  
Do not clean spray humidifiers with foaming cleaning agents.

**4.8.2 Steam humidifier****Maintenance:**

- Check steam humidifier for contamination, damage and corrosion
- Regularly clean steam humidifier and dirt trap
- Check tightness of steam and condensate pipe
- Check operation of steam distributor
- Check operation of solenoid valves
- Check measurement and control devices.

**Additional maintenance work for steam humidifier with own steam generator**

- Check operation of water supply system and water level
- Measure current consumption
- Check steam cylinder for deposits and replace, if necessary.

**Additional maintenance work for steam humidifier without own steam generator**

- Check operation of control valve
- Adjust control valve stuffing box

**Note:**

AL-KO THERM will accept no guarantee for the customer's own steam humidifier installations or casing ducts provided by the customer, or for any incorrect handling of the bottom trough and drainage connections not properly connected.

This also applies to humidifiers not properly operated and to the humidifier performance.

## 4.9 Drive elements

### 4.9.1 Electric motor

Electric motors with a power rating of 5 kW and upwards must be operated with star delta starting. Increased frequency of motor operating cycles ("cycling") will soon result in motor failure. Generally, the standard electric motors are fitted with permanently lubricated motor bearings.

In the case of electric motors with motor bearings that require re-greasing, these bearings will require regular inspection and greasing. The motor rating plate indicates the maintenance intervals and the greasing requirements.

**Commissioning:**

1. Wire motor according to the wiring diagrams enclosed.
2. Measure current consumption for all three phases and compare with the values indicated in the technical data sheet.

**Warning:**

Wiring to be in accordance with DIN VDE 0100, DIN VDE 0113 and DIN VDE 0116 and any local or national regulations.

Motor wiring to be such that the motor can be adjusted for V-belt tensioning.

Current consumption can only be measured with the service doors and covers locked, because of the risk of motor overload.

Current consumption must not exceed the rated current indicated.

**Warning:**

Motors with thermo contacts and PTC thermistor must be protected by way of a motor protection device with manual re-set.

All other motors must be protected by an overload switch.

**Warning:**

In the case of variable speed motors, the max. current consumption of the transformer and motor must not be exceeded. For variable speed motors, the protection must be rated accordingly.

**Maintenance:**

- Check motor for contamination, damage and corrosion
- Check motor attachment and tighten all attachment bolts
- Check bearings and re-grease if necessary
- Regularly clean motor and motor sub-structure
- Check function of protection devices.

**4.9.2 Belt drive****Commissioning:**

1. Check V-belt drive and adjust belt tension as necessary.
2. Check non-positive seat of V-belt pulleys and that they are precisely aligned (parallel)
3. After approx. 1 hour's running, check pulley, motor and fan bolts and re-tighten if necessary.  
Check belt tension and adjust, if necessary.

**Warning:**

Incorrectly tensioned V-belts can cause damage to fan bearings and to the electric motor. In order to avoid bearing damage, after a downtime of 3 months or more the V-belts must be slackened or removed, otherwise the guarantee will lapse.

**Maintenance:**

- Check V-belt drive for contamination, damage and wear.
- Check V-belt tension and adjust, if necessary (see also point 4.1)
- Check alignment of V-belt pulleys
- Regularly clean V-belt drive.

**Warning:**

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

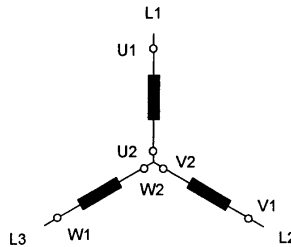
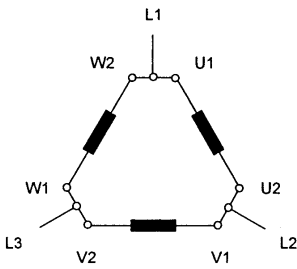
4.9.3 Rotary three phase a.c. motor connections

**Warning:**

With multi-speed motors, do not switch directly on to high speed, always start on low speed. For motors with PTC thermistor or thermo-contact, it is essential that note be taken of the connection diagram in the terminal box.

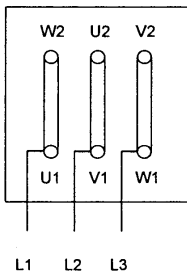
**Circuits for one speed:**

Arrangement of the phase windings

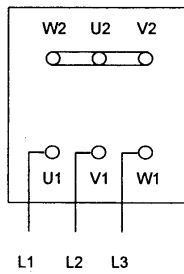


Arrangement of the phase windings

Arrangement on the terminal board



D-arrangement



Y arrangement

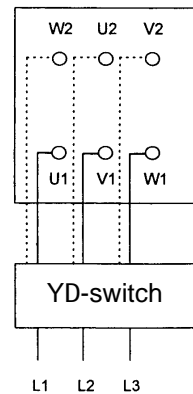
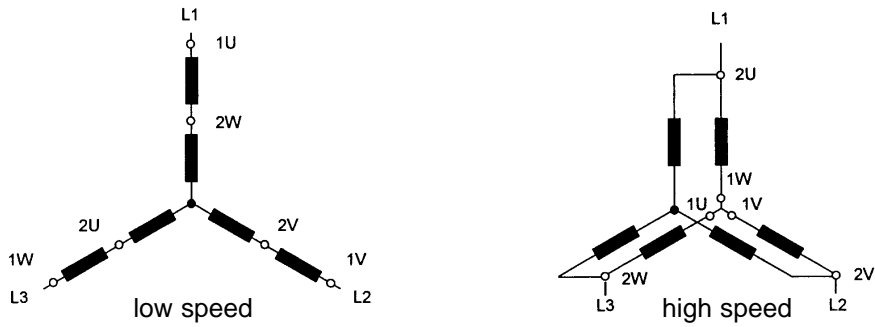


Fig. 9

**Arrangements for two speeds in the ratio of 1 : 2**

(Dahlander pole-change winding)

Designed, for example, for 1500/3000 rpm or 4/2-pole or 750/1500 rpm or 8/4-pole



Winding designed for a rating class that corresponds to a torque curve for ventilator drives.

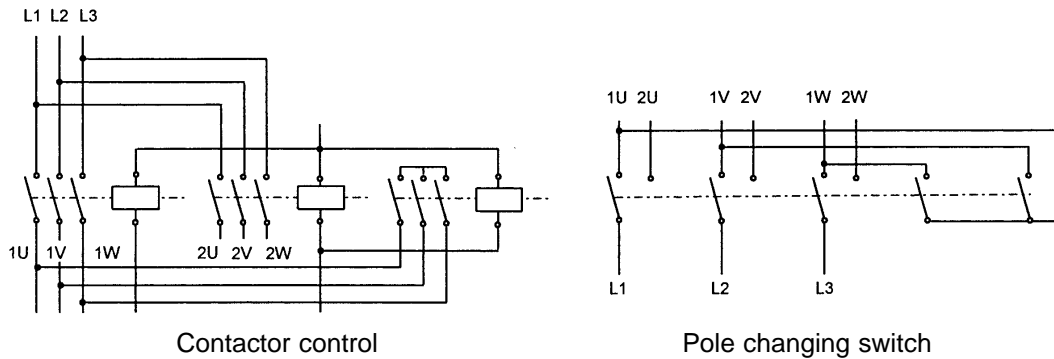


Fig. 10

For motors with Dahlander speed change switching, the six winding ends 1U, 1V, 1W and 2U, 2V and 2W are connected to the six terminals of the terminal board of a normal terminal box.

**Schaltung für zwei Drehzahlen (zwei getrennte Wicklungen)**

Ausführung z.B. für 1000/1500 U/min bzw. 6-/4-polig oder 750/1000 U/min bzw. 8-/6-polig

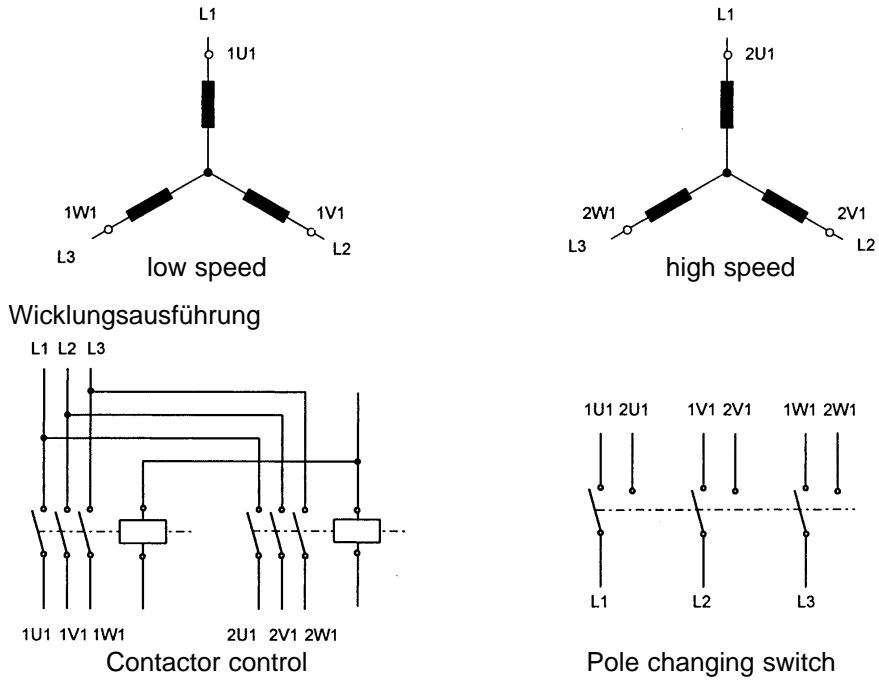


Fig. 11

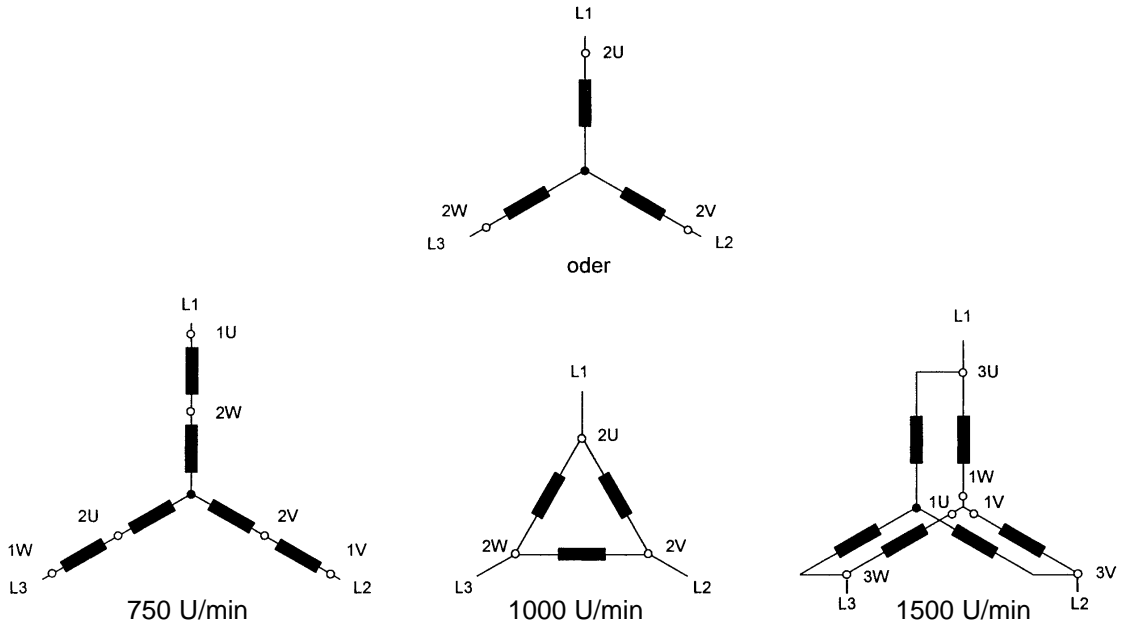
**Arrangements for three speeds**

(two separate windings, one in Dahlander (speed change multi-circuit arrangement).

Nine terminals are needed in this case.

Design for ventilator drives 750/1000/1500 rpm or 8/6/4-pole;

750/1500 rpm in Dahlander (speed change multi-circuit arrangement).



**Arrangements for three speed**

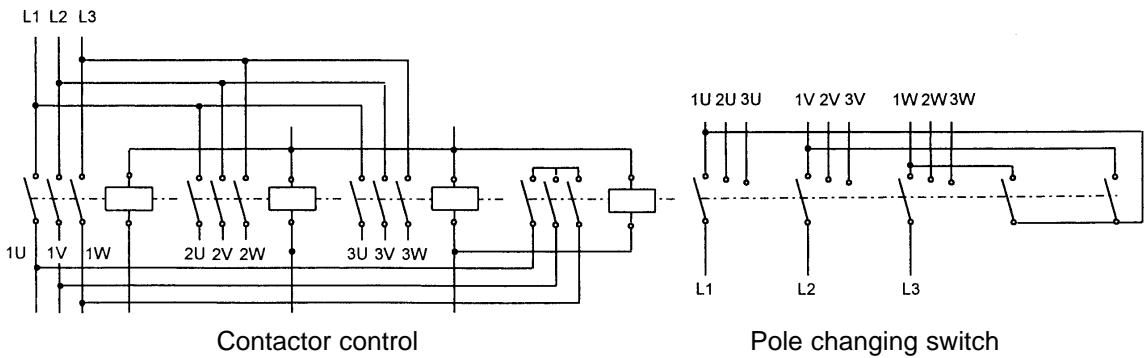


Fig. 12

4.9.4 Arrangement with frequency converter

Wiring example:

Frequency converter with pressure sensor, isolating switch and PTC thermistor

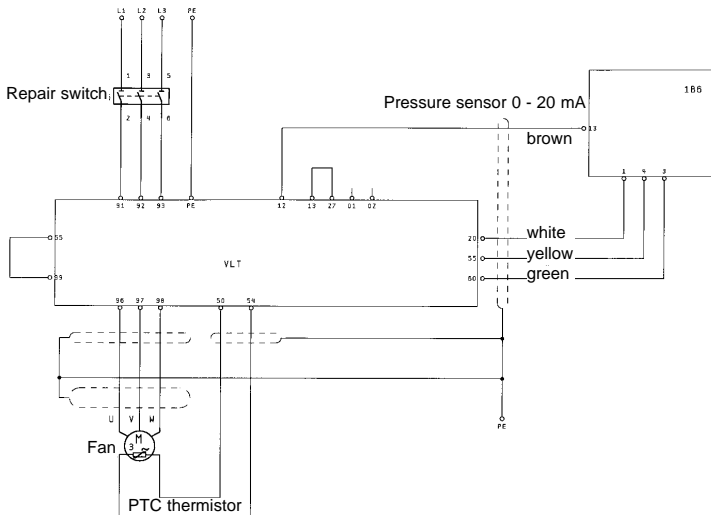


Fig. 13

When working with a frequency converter the following must be observed:

1. The fan motor must be suitable for operation with a frequency converter.
2. The motor must be protected against overload and overheating, e.g. PTC thermistor. A motor protection switch with bimetallic release is not suitable.
3. Shielded leads must be used to wire the motor PTC thermistor to the frequency converter.
4. The permitted maximum speed of the fan and motor must not be exceeded under any circumstances.
5. Refer also to the assembly and operating instructions of the appropriate frequency converter manufacturer.

Example: EMC installation

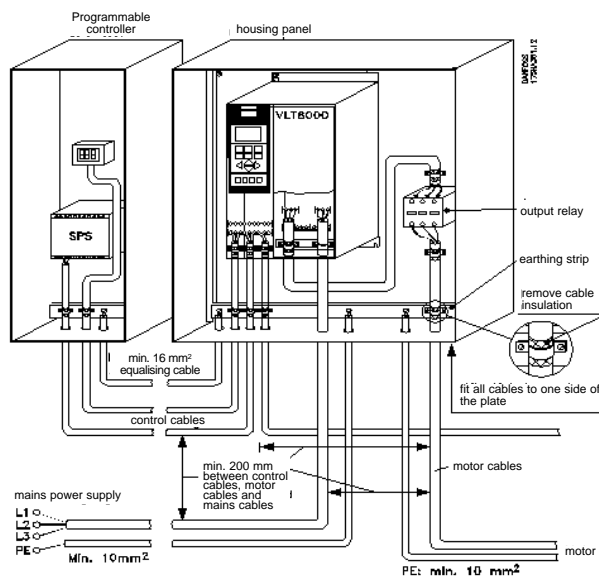


Fig. 14



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