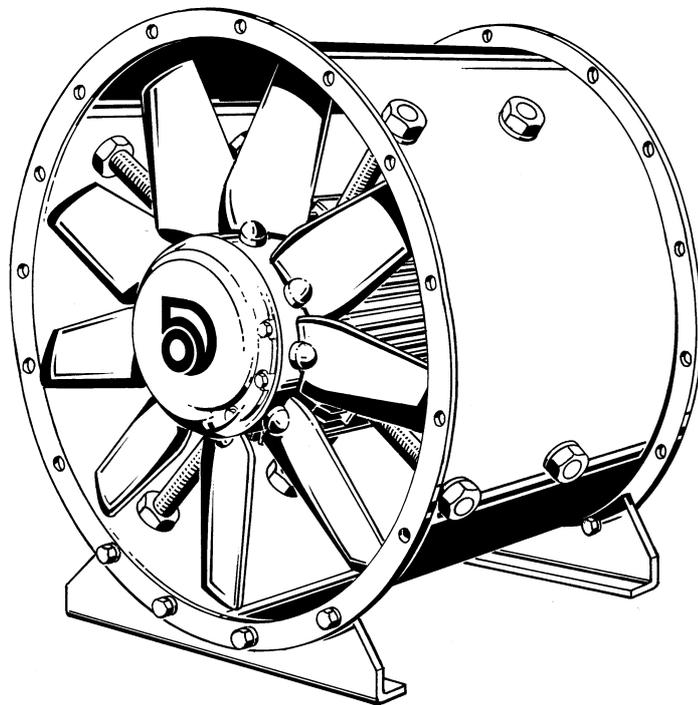


Operating Instructions for

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AXV / BXV Axial Fans



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1 General safety notes

1.1 The operator's duty of care

The fans of the AXV and BXV series have been constructed and built whilst taking into account an analysis of the hazards involved, and after careful selection of the harmonised standards to be observed, as well as other further technical specifications. They thus correspond to the current level of technology and guarantee a high degree of safety.

In operational practice, however, this level of safety can only then be attained if all required measures are taken. It is incumbent upon the operator's duty of care to plan these measures and to monitor their execution.

In particular, the operator must ensure that

- the fan is only used as stipulated (cf. chapter, „Product Description“)
- the fan is only operated in a faultless and functional condition and that safety fittings, especially, are regularly examined with respect to their functionality
- the operating instructions are always maintained in a readable condition and are available at the fan's location of deployment in their entirety
- only sufficiently qualified and authorised personnel operate, maintain and repair the machine
- these members of personnel are familiar with the operating instructions and especially the safety notes contained therein
- no safety and warning signs fitted to the fan are removed, and that they are kept in a readable condition.

1.2 Explanation of the safety symbols used

The following symbols are used in these operating instructions. These symbols are, above all, intended to draw the reader's attention to the text contained in the adjacent safety note.



Warning

This symbol indicates that dangers exist which are hazardous to life and health



Mortal danger

Electrical hazard. Serious – and also fatal – injury can result if these notes are disregarded.



Note

Indicates user tips and other useful advice.

1.3 Basic safety measures

Wolter axial fans are, at the moment of delivery, manufactured to the current level of technology.

Extensive materials, function and quality checks assure them of a high level of usefulness and long service life! Nevertheless, these machines can be dangerous if they are improperly used by untrained personnel or are used in a non-stipulated manner.



- Read these operating instructions carefully before putting the axial fans into operation!
- Only operate the fan in its enclosed state or with properly assembled protective anti-intrusion fittings, or with protective screens. (We can supply suitable, tested protective screens on request!)



- Assembly, electrical connection and maintenance may only be carried out by trained craftsmen!
- Only operate the fan in the manner stipulated and within the specified output limits (see rating plate) and with approved conveyed media!

1.4 Particular kinds of hazards

The fans of the AXV and BXV series are axial fans. In this respect, particular hazards are caused by the rotor and through the flow of air, which can, at times, be considerable. For this reason the following points are to be observed:

- Never reach into the rotor when it is rotating. Do not try to use your hand as a brake for the rotor during maintenance work.
- Loose clothing or light parts can be sucked in by the draught of air. That is why you should always wear tight-fitting clothing during maintenance work and during free-suction operation.
- Larger items (tools etc.) can obstruct or totally ruin the rotor. For this reason you should always fit a protective screen during free-suction or free-blowing operation.

2 Product description

2.1 Stipulated usage

Our axial fans have been specially developed for use in modern ventilation and air conditioning systems. The rotors are statically and dynamically balanced at the factory, and manufacture is subject to the strictest intermediate and end checks and is certified in accordance with DIN/EN/ISO 9001.

Conditions of use

The air should correspond to tender specifications, as the corresponding components are determined for this. If these are not listed in more detail, then the following applies:

The axial fans of the AXV and BXV series are suitable for the conveyance of

- clean air
- air which has little dust and grease content
- gases and vapours which are only slightly aggressive in nature
- media up to a maximum air density of 1.3 kg/m³
- flow volumes at temperatures ranging from - 30 °C to + 60 °C
- media up to a max. humidity of 95%

Conditions of fitting

- The fan must either be built into a ducting channel or have suction and outflow protection elements fitted to it.

The fans are not designated for any types of usage other than those cited here, and any such use shall be considered as improper usage!



In particular, we especially draw your attention to the following points. Non-compliance can either result in considerable material damage or personal injury, or that the demanded fan output values are not attained.

- The fan may not be operated without the necessary safety fittings. Should there be no ducting channel connected at one end, e.g. the suction end, then a protective screen must be fitted at that end in order to prevent access to rotating parts.
- In order to avoid any damage to the fan and specially to the rotor vanes, you must prevent the possibility of loose parts being sucked in by the fan or of other items being able to find their way into the fan.

- The fitting notes regarding intake and outlet flow conditions are to be observed.

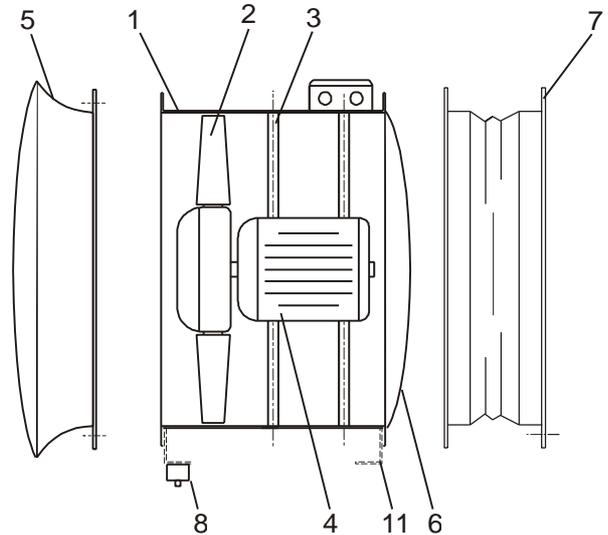
2.2 Construction

The axial fan consists of the following main parts:

- (1) Ducting piece as fan housing
- (2) Rotor mounted onto the motor shaft
- (3) Motor stay in the form of struts or bracket
- (4) Electric motor

According to the particular use the fan is put to, the following parts may also be included:

- (5) An intake nozzle complete with suction protective screen for free-suction operation
- (6) An outflow protective screen for free-blow operation
- (7) Flexi-connectors are obtainable to prevent decoupling through vibration
- (8) Vibration dampers (spring or rubber vibration dampers according to the weight of the unit)
- (9) Counter flange
- (10) Fan switch-off facility
- (11) Assembly base supports



In normal circumstances the fan is built into a ducting system. It can, however, be integrated into a box in order to suppress noise, which is then built into the ducting system.

The rotors, made from plastic or aluminium, have fins which can be adjusted when the fan is not running. The fan's characteristic curve can be adapted the required operational point by this means (take note of the motor's loading specification!)

2.3 Functional description

The fan sucks air from the ducting on the suction side through the rotating rotor and conveys this air in the axial direction to the outflow side via the motor. The motor is positioned in the air flow and is cooled by the flow.

Control and regulation of the system is carried out by an external control unit. This does not form part of the fan itself. The corresponding operating instructions are to be consulted with regard to the control unit's operation. The fan itself requires no operation when it is running.

3 EC Declaration of Conformity

in accordance with Appendix II A of the EC Machinery Directive (89/392/EWG)

The manufacturer:

**Wolter GmbH
Maschinen- und Apparatebau KG
Am Wasen 11
D-76316 Malsch**

hereby declares that the machine described in the following:

Fans of the AXV or BXV series

meets the health and safety requirements of the following EC Directives:

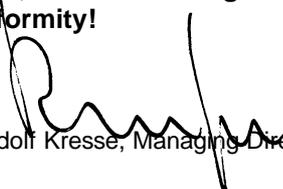
**In accordance with Machinery Directive (98/37/EG), Appendix II A
in accordance with the Low Voltage Directive (73/23/EWG)**

Harmonised standards applied:

DIN EN 60335-2-2	Safety of electrical equipment for household use and similar purposes; Part 2: Special requirements for dust and water suction machinery
DIN EN 60335-2-80	Safety of electrical equipment for household use and similar purposes; Part 2: Special requirements for fans
DIN VDE 0700-220	Safety of electrical equipment for household use and similar purposes; Fans and associated control units for use on ships
DIN EN 1037	Machine safety; Avoiding the unexpected start up of the machinery.
DIN EN 1088	Machine safety; Locking systems in combination with detachable protective fittings; Guiding principles for lay-out and selection
DIN EN 25136	Acoustics; Determining the irradiated noise output of fans in ducting. Ducting behaviour (ISO 5136:1990 and Technical Corrigendum 1:1993)
DIN EN 292-1	Machine safety; Basic terms, general guiding principles of lay-out; Part 1: Basic terminology, methodology
DIN EN 294	Machine safety; Safety distances for the prevention of upper limbs coming into the vicinity of danger areas
DIN EN 811	Machine safety; Safety distances for the prevention of lower limbs coming into the vicinity of danger areas
DIN EN ISO 11200	Acoustics; Noise irradiation of machines and appliances; Guidelines on the application of basic standards for establishing noise emission levels at the workplace and at other fixed locations (ISO 11200:1995)

Any changes in construction which have an effect on the technical data specified in the operating instructions and on the machinery's stipulated usage, i.e. those changes which essentially change the machine, shall invalidate this declaration of conformity!

Malsch, 04.10.2000



Hans Rudolf Kresse, Managing Director

4 Transportation and Storage

4.1 Transportation

Wolter fans are packed at the factory to suit the respectively agreed mode of transportation.

Transport the fan in its original packaging.

- Only use suitable means of transport, such as pallet trucks or fork-lift trucks.
- If the fan is to be transported by hand, ensure that supporting and carrying loads are kept within reasonable limits for the personnel involved.



The following special hazards must be taken into account when transporting the equipment:

- The transportation packaging does not prevent damage to the equipment through improper transportation. The fans must not be dropped or thrown.
- Sharp, protruding edges can lead to injury through cuts.
-  Suspended loads can fall, which then constitutes a fatal hazard – stand well clear of suspended loads!
- Parts which have been stacked too high can collapse.
- If load-carrying devices other than those specified here are used, then this can lead to serious damage to the machine.
- A risk of fire exists due to the easily flammable nature of the packaging materials – do not use naked flames and do not smoke!
- Read the chapter, „General Safety Notes“.

4.2 Storage

- Store the fan in a dry, weather-protected location in its original packaging or protect it from the effects of dirt and the weather until final assembly. Cover open pallets with tarpaulin sheets and protect the fans from the effects of dirt and contaminants (e.g. swarf, stones, wire etc.)
- Avoid extremes of cold and heat.
- Avoid lengthy storage periods (a maximum of one year is recommended) and check that the motor bearing assembly is in good functional order prior to fitting.

4.3 Dimensions

See chapter, „Technical Data“

5 Assembly



Assembly and electrical work is only to be carried out by trained and instructed craftsmen and in accordance with the respectively applicable regulations!



The following points are to be observed when assembling the fan:

- Secure the fan to the assembly base plates.
- The fans must not be deformed or twisted during fitting! Use spacing plates if the need arises

- The fitting position agreed in the lay-out is to be observed
- Only self-locking screws may be used for securing the outflow flange!



Attention: Make the electrical connection in accordance with the technical connection conditions and the relevant regulations!

- Make the electrical connection as per the enclosed terminal plan in the motor connection cabinet or terminal cabinet housing
- Feed in and seal the cable into the connection cabinet properly
- If present, connect the posistor / thermo-contact for motor protection, as otherwise the warranty lapses!



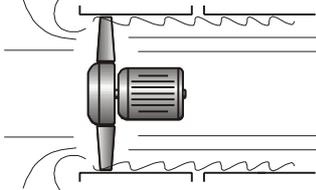
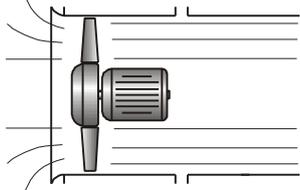
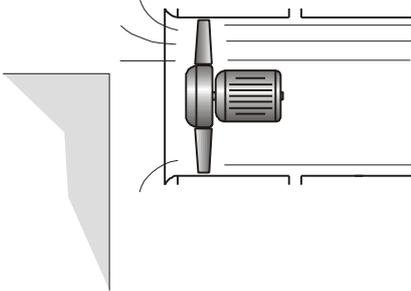
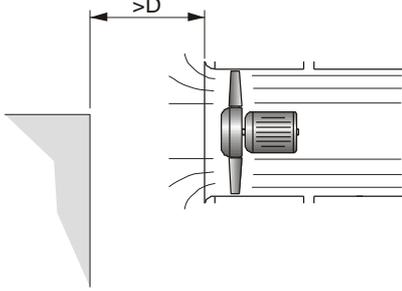
Before checking the direction of travel:

- Remove foreign bodies from the fan area
- Assemble contact protector, protective screen (see accessories), or box in fan
- Turn the rotor through a few revolutions by hand in order to test its ease of movement
- Check the direction of travel in accordance with the arrow on the housing by switching on and off very quickly
- If necessary, alter the direction of travel for AC motors by swapping 2 phases
- In the case of single-phase motors, reverse the direction of travel by swapping Z1 with Z2 (attention: the direction of current flow in the auxiliary winding also changes)

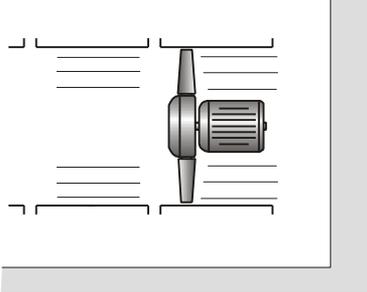
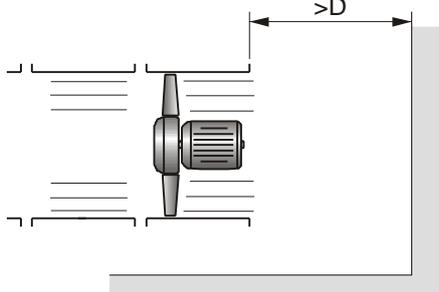
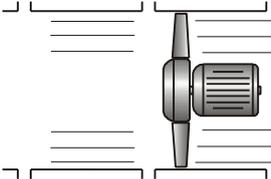
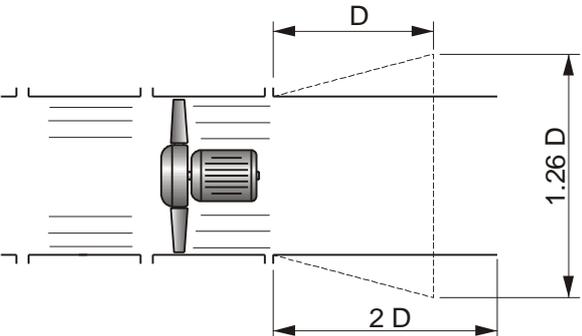
5.1 Common errors which occur during assembly

The following points must always be observed in order to achieve the desired operational level and to guarantee the fan's safe operation.

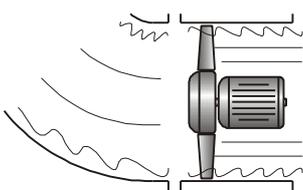
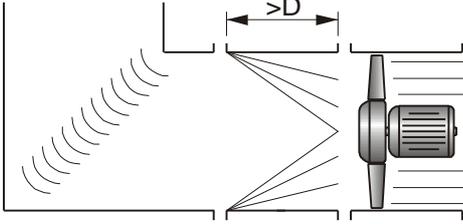
5.1.1 Inflow

Incorrect	Correct
 <p>INCORRECT: No intake nozzle – Result: The vane edges are not in the air flow, the air output is reduced, noise output becomes greater. This can cause permanent damage to the rotor blades.</p>	 <p>RECOMMENDED: The intake nozzle enables an even flow to be achieved over the whole cross-sectional area.</p>
 <p>INCORRECT: The fan output is reduced if an obstacle is situated too close to the intake</p>	 <p>RECOMMENDED: The distance must be at least as great as the fan diameter</p>

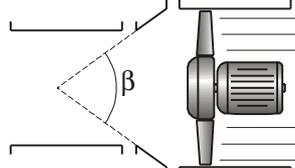
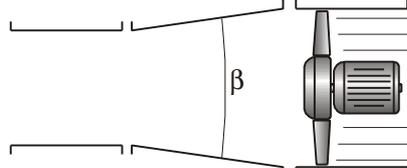
5.1.2 Outflow

Incorrect	Correct
 <p>INCORRECT: Any blockage of the outflow must be prevented</p>	 <p>RECOMMENDED: The distance must at least be as great as the fan diameter</p>
 <p>INCORRECT: The outflow should not end at the same point as the fan.</p>	 <p>RECOMMENDED: An outflow passage having a length of $2xD$, or an outflow diffuser, as shown, both reduce outflow losses</p>

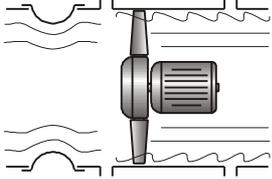
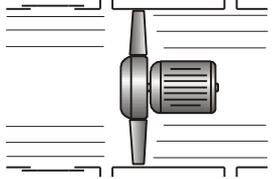
5.1.3 Bends

Incorrect	Correct
 <p>INCORRECT: Bends with a small radius of curvature reduce fan output and increase noise levels if fitted too close in front of the vane.</p>	 <p>RECOMMENDED: A quadratic channel corner with short guide vanes is preferred.</p>

5.1.4 Changes in cross-sectional area

Incorrect	Correct
 <p>INCORRECT: Diffusers or nozzles having an angle greater than 30° should not be used.</p>	 <p>RECOMMENDED: If possible the angle should be less than 15°.</p>

5.1.5 Flexible connections

Incorrect	Correct
	
<p>INCORRECT: Loose, flexible connections in front of the fan obstruct the available cross-sectional area, fan output is reduced and noise levels increase.</p>	<p>RECOMMENDED: Flexible connections should be tensioned to such a point that they only permit the movement required for insulation.</p>

6 Initial Start-up

The following points are to be observed in order to avoid damage to the machinery or life-threatening injury during initial start-up:

- Only qualified personnel may carry out the machine's initial start-up and this must take place in compliance with the safety notes.
- Prior to initial start-up, check that all tools and foreign bodies have been removed from the machine.
- Activate all safety devices and Emergency Stop switches prior to initial start-up.
- Check the motor's direction of travel prior to initial start-up.
- Read the chapter, "General Safety Notes".

6.1 Checks prior to initial start-up

Proceed with the fan's initial start-up in the following sequence:

- Check that the mechanical assembly has been carried out properly
- Remove foreign bodies located in the suction and outflow areas and in the fan space
 - Check that the electrical installation has been completed in accordance with regulations
 - Does the mains voltage match the motor voltage specified on the rating plate?
 - Is the switchgear used suitable for the motor both with respect to the switching functions to be carried out and also to the switching conditions and switched output of the motor?
 - Is the motor protection system set correctly with regard to the motor's nominal current? The setting must be carried out in accordance with the corresponding details contained on the motor output plate.
 - Has the motor been connected correctly in accordance with the wiring diagram? The connection schematic supplied by the motor suppliers applies for the connection of the motor. The special connection regulations are to be observed for explosion-protected models.



Accident prevention

- Protective anti-intrusion fittings, protective screens (see accessories) mounted, fan boxed in or assembled out of reach.
- If the fan is assembled for free-suction, the suction aperture must be covered by a protective screen. This is the only way that the accident prevention regulation governing protection from contact can be deemed to have been met.

6.2 Starting up the fan for the first time

Only put the fan into operation after it has been assembled in accordance with the regulations!

- Put the fan into operation.
- Monitor its correct function (quiet running, vibration, imbalance, power consumption, controllability)

i Should the required output (volume flow or pressure increase) not be achieved by the fan, e.g. through unforeseen changes in the installation system, the rotor fins can be adjusted up to the maximum fin settings specified both on the rating plate and in the technical documentation. The power consumption must be re-measured in order to avoid any possible motor overload.

The thermo-protection system may be activated if the motor power consumption is too high!

- Check the bearing temperature after a lengthy period of operation

i Always keep suction openings clear! Check protective screens or protective anti-intrusion fittings for dirt, and clean if necessary!

6.3 Checks after initial start-up

Check the mechanical connections after initial start-up, especially the joints at the fan.

7 Help with Malfunctions

The following points must be observed in order to avoid damage to the machinery or life-threatening injury when eliminating machine malfunctions:

- Only eliminate any malfunction if you have the specified qualifications necessary for the task.
- First of all ensure that the machine cannot be switched on inadvertently, by locking the equipment's off switch or control cabinet by means of a padlock.
- Secure the hazardous area with respect to moving machine parts.
- Read the chapter, "General Safety Notes".

7.1 Tabular overview of possible malfunctions and aids in eliminating those malfunctions

Symptom	Cause	Elimination
Motor or motor control system switches off	Motor too hot, thermo-contact activates.	<p>Allow the motor to cool off. Depending upon the control equipment in use, the fan will either start itself up or will have to be re-started again.</p> <p>Check whether:</p> <ul style="list-style-type: none"> - The conveyed medium is too hot - All phases are evenly loaded and connected - Operating point does not match the lay-out - Rotor blocked

Air output incorrect	Incorrect direction of travel of the fan	Change the direction of travel (see electrical assembly)
	Fan assembled incorrectly	Either the rotor is incorrectly mounted on the motor shaft or the whole fan has been incorrectly fitted into the installation. Switch off the fan. Correct the incorrect assembly (rotor or complete fan).
	Rotor blocked	Switch off the fan. Remove the blockage. Ensure that the accident prevention regulations are observed in the process.
	Rotor defective	Switch off the fan. Dismantle the rotor and fit a new one.
	Lay-out does not match installation resistance	Clean or replace filters if dirty; In the event of an erroneous lay-out, the fan's output can be altered by changing the vane angle within limits. In this case the shaft output must be checked for the required vane, so that the motor is not overloaded. The rotor should be re-balanced after any alteration to the vane angle.
Fan is labouring under load, air flow is periodically interrupted	Fan is operating within an unfavourable characteristic curve range	If possible, reduce the installation resistance. If this laboured operation of the fan continues over a prolonged period, the rotor will be ruined!

8 Maintenance

The following safety notes must be observed when maintaining the machine – life-threatening injuries to personnel, damage to the machine and other material damage, as well as environmental damage, will be avoided in this way.

- Cleaning, lubrication and maintenance work may only be carried out by authorised operating personnel – operating instructions are to be observed.
- Repair work may only be carried out by authorised craftsmen – accident prevention regulations are to be observed.
- Secure the operational area over a large area prior to the commencement of maintenance work.
- The specified sequence of the working stages is to be observed exactly.
- All work on the machine's electrical equipment may only basically be carried out by trained electricians.
- Self-locking screws and nuts are always to be renewed.
- All specified screw torque settings are to be observed precisely.
- Read the chapter, "General Safety Notes ".

8.1 Servicing

The rotor and housing are subject to natural wear and tear through the action of dust, acidic and corrosive vapours, as well as the gases which are mixed into the conveyed flow. The type and concentration of the dust, as well as the gases and vapours, can lead to deposits, abrasion and corrosion at the rotor and housing.

The materials can be attacked so much by this natural wear and tear that they can no longer stand up to the demands made of them. Deposits on the rotor, which have never been evenly distributed, lead to an imbalanced state and thus to noisy running, which in turn can result in damage to the motor bearing. Deposits in the housing lead to a narrowing of the available cross-sectional area or to a roughening of the housing panels and can thus have an unfavourable effect on the fan's output data. Should the checks, the regularity of which depend on the conveyed media and other operating conditions which differ in each individual case, only reveal slight wear and tear, then the individual parts can be cleaned in good time, or replaced if necessary.

Prior to all servicing work:

- Bring the fan to a halt in the prescribed manner and completely isolate the fan from the mains supply!
- Wait until the rotor has come to a halt!
- Ensure that the machine cannot be switched on again!
- Clean the fan
- Clean the suction apertures
- Clean the rotor (if necessary dismantle the protective anti-intrusion fitting)



Only use cleaning agents generally available through the trade and in compliance with the prescribed safety measures. Do not use scratching or scraping tools (protective surface coating will be ruined)

- Do not overload the motor!
- Do not bend the rotor or vanes!
- Assemble the protective anti-intrusion fitting

General checks

- Too much bearing play?
- Lubricant leaking from the bearings?
- Surface protective coating damaged?
- (Attention: Conveyed medium too aggressive!?)
- Unusual noises during operation
- Fan output still sufficient for possibly extended or shortened ducting system?

8.2 Overhaul

Prior to all overhaul work:

- Bring the fan to a halt in the prescribed manner and completely isolate the fan from the mains supply!
- Wait for the rotor to come to a halt!
- Ensure that the machine cannot be switched on again!

Only use spare parts which have been tested and approved by us!

Bushes		Torque	
Type	Drilling	Tightness	
	[mm]	[Nm]	
1008	12, 19, 24	6	2 threaded studs
1108	19, 24, 28	1/4" sw 3	
1210	16, 19	20 3/8" sw 5	
1215	24, 32		
1310	14, 25, 35		
1610	19, 24		
1615	38, 42		
2012	24, 38, 50	32 7/16" sw 6	
2517	38, 48, 60	49 1/2" sw 6	

Torque settings for taper hubs

8.2.1 Dismantling the rotor

- Remove hub cover.
- Slacken off securing screw (Allen key), completely undo one grub screw and slacken off the tension cone using the forcing drilling.
- Pull off the rotor from the motor shaft (possibly using a puller tool)

8.2.2 Assembling the rotor

- Push the rotor onto the motor shaft
- Tighten both grub screws evenly, whilst observing the torque settings given in the adjacent table.
- Fit the hub cover

Screw	M 4	M 5	M 6	M 8	M 10	M 12	M 16	M 20
Torque setting	3.7	7.5	12	31	60	108	265	510
+0% / -10%	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm

Torque settings for screws

8.2.3 Motor bearing service intervals

The roller bearings of the standard AC motors are basically equipped with a permanently sealed lubrication system consisting of a high-quality, temperature-resistant, lithium-based roller bearing grease (melting point approximately 160°C). The amount of lubricant supplied to the bearing by the motor manufacturer is sufficient for 10,000 to 20,000 operating hours.

Unfavourable operating conditions, such as permanently lengthy operating periods, changes in bearing loads etc., require that the motor bearings are monitored carefully. The service intervals or lubrication deadlines and amounts depend on the motor's operating conditions, the rotary speed and size of bearing.

As only the construction size and rotary speed of the motors are usually known, the service intervals specified in the adjacent table should be applied. They refer to a coolant temperature of 40°C in the case of horizontal fitting (construction form B3). The service intervals are to be put back by 1/3 in the case of vertical fitting.

Motor size	Service intervals in operating hours for		
	3000 min ⁻¹	1500 min ⁻¹	1000 and 750 min ⁻¹
56	20000	20000	20000
63	20000	20000	20000
71	20000	20000	20000
80	18000	20000	20000
90	16000	20000	20000
100	14000	20000	20000
112	14000	20000	20000
132	11000	20000	20000
160		20000	20000
180		20000	20000
200		18000	20000
225		18000	20000

Service intervals for motor bearings

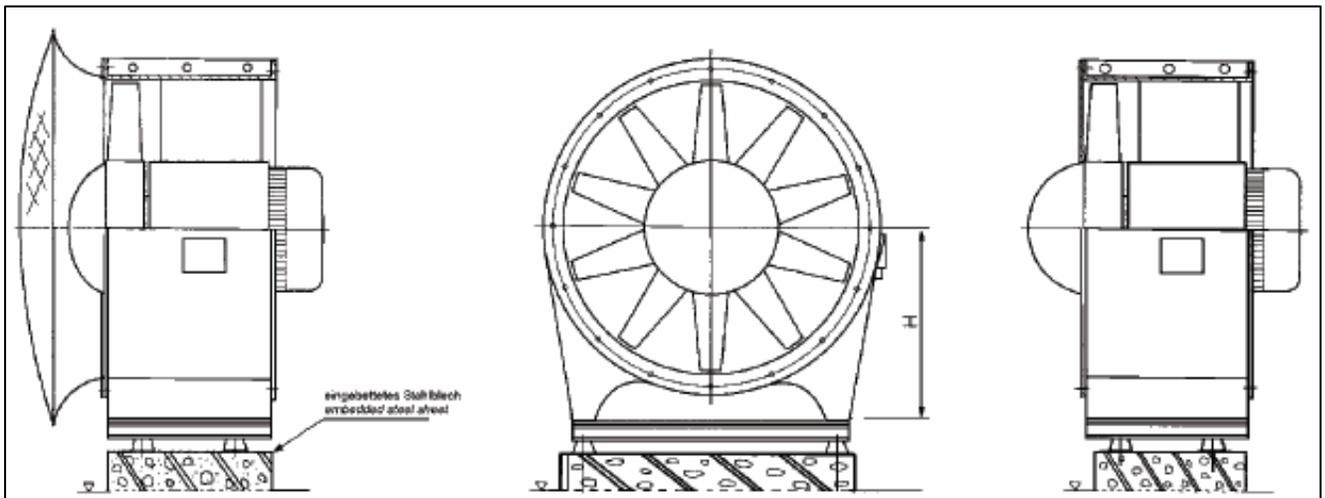
You should consult the manufacturer without fail in the event that motor repairs are required within the warranty period.

8.2.4 Instructions on correct bearing replacement

Only allow work on the electric motor to be carried out by a craftsman or by a suitable motor winding workshop.

8.2.5 Possible axial fan floor mounting position

A) Horizontal Mounting



B) Vertical Mounting

