

Operating Instructions

Belt driven centrifugal fans

(Translation of the original)

EN

BA-CFB_ADH-RDH-RZR-RER 8.9 – 08/2014

		ADH
		RDH
		RZR
		RER

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1. Revision Index

Table 1-1:
Revision index

Revision
BA-RV 7.1 – 01/2009
BA-RV 8.0 – 11/2009
BA-RV-R-8.1 – 03/2010
BA-RV-R-8.2 – 09/2010
BA-RV 8.3 – 03/2011
BA-RV 8.4 – 09/2011
BA-RV 8.5 – 04/2012
BA-RV 8.6 – 01/2013
BA-CFB_ADH-RDH-RZR-RER 8.7 – 09/2013
BA-CFB_ADH-RDH-RZR-RER 8.8 – 06/2014
BA-CFB_ADH-RDH-RZR-RER 8.9 – 08/2014

2. About This Operating Manual

These operating instructions are an integral part of the centrifugal fan. Nicotra Gebhardt GmbH shall not accept any liability or provide any warranty cover for primary damage or secondary damage arising as a consequence of disregarding these operating instructions.



- ▶ Read operating manual carefully before use.
- ▶ Retain operating manual for entire service life of centrifugal fan.
- ▶ Keep operating manual accessible to personnel at all times.
- ▶ Pass operating manual on to any subsequent owner or user of centrifugal fan.
- ▶ Insert any supplementary instructions received from the manufacturer in the operating manual.

2.1. Validity

This operating manual only applies to the centrifugal fans stated on the front page.

2.2. Target Group

This operating manual is intended for operators and qualified professionals trained in installation, commissioning, operation, maintenance and decommissioning.

2.3. Other Applicable Documents

- ▶ **In addition to the operating instructions, to the type plate, warning and indication signs – fixed to the fan – the following documents have to be observed:**
 - IEC 60364-1/
 - DIN VDE 0100
 - DIN EN 60204-1
 - DIN EN ISO 13857
 - DIN EN ISO 12100
 - DIN EN ISO 13732-1
 - VDMA 24167
 - Technical catalogue
 - Machine directive 2006/42/CE

2.4. Symbols and Markings

2.4.1. Use of Warning Signs






Nature, source and consequences of hazard!

- ▶ Steps required to avert danger

2.4.2. Levels of Danger in Warning Signs

Table 2-1:
Levels of danger in warning signs

Symbol / Danger Level	Likelihood of Occurrence	Consequences of Neglect
 DANGER!	Imminent danger	Death, serious physical injury
 WARNING!	Potential danger	Death, serious physical injury
 CAUTION!	Potential danger	Minor physical injury
CAUTION	Potential danger	Damage to property

2.4.3. Notes

- Note** Note giving pointers for easier or safe work.
- ▶ Steps required for easier or safe work.

2.4.4. Other Symbols and Markings

Table 2-2:
Other symbols and markings

Symbol	Meaning
☑	Requirement for an operation
▶	Operation with one step
1. 2. 3.	Operation with several steps
•	Bullet point (primary list)
-	Bullet point (secondary list)
Accentuation (bold)	For emphasis

3. Designated Use

3.1. Operating Data / Maximum Ratings



Risk of injury!

- ▶ Adhere to technical specifications and permissible limits.

For technical specifications reference should be made to the type plate, technical data sheet and technical catalogue!

To be observed specially!

- specified motor rating
- smallest permitted pulley diameter
- maximum fan rpm
- bearing load limits
- fan weight
- permitted temperatures of conveying medium

CAUTION

The centrifugal fans are suitable for extracting dust-free air and other non-corrosive gases or vapours.

Permissible conveyed medium temperatures:

Table 3-1:
Maximum ratings

Fan	perm. temperature of conveyed medium	max. ambient temperature on drive motor
ADH E0; E2; G2E0; G2E2	-20°C...+80°C	+ 40°C
ADH L; R; G2R;	-20°C...+80°C	
ADH E4;E6; E7; G2E4;G2E7	-20°C...+100°C	
ADH K; K1; K2; G2K; G2K2	-20°C...+100°C	
RDH E0; E2; R;	-20°C...+80°C	
RDH E4; E6; E7; G2E4;G2E7	-20°C...+100°C	
RDH K; K1; K2; G2K; G2K2	-20°C...+100°C	
RDH X1; X2	-20°C...+100°C	
RZR 11; 12; 13; 15; 18; 19	-20°C...+80°C	
RER 11; 12; 15	-20°C...+80°C	
RER 13	-20°C...+120°C	
RER 17	-20°C...+200°C	

RER Measures with transport medium temperatures > +80°C:

- +80°C: provide bearings which can be lubricated as necessary.
- +80°C: provide heat resistant fittings.
- +120°C: an additional cooling disk is necessary to remove heat from around the shaft.

CAUTION

Maximum ambient temperature at the drive motor: +40°C

Examples of incorrect use include the following:

- Extraction of media with impermissibly high or low temperatures
- Extraction of corrosive media
- Extraction of very dusty media
- Extraction of potentially explosive media.

The results are:

- Bearings damage
- Corrosion damage
- Unbalancing
- Vibration
- Deformation
- Abrasion damage

CAUTION **Unauthorised operation**

- No operation above the indicated rpm (see type plate, data sheet)
- No operation at rpm ranges with increased vibration (resonance)
- No operation at rpm ranges out of permitted fan curve area (stability of flow pattern)
- No operation if fan becomes polluted

CAUTION **Avoid dynamic load of the impeller.
No frequent alteration of load!****CAUTION** **Danger points:**

There can be injury to personnel and material damage through impeller breakage, shaft breakage, fatigue failure, fire from spark creation.

4. Safety

4.1. Product Safety

Nicotra Gebhardt fans offer a high degree of operational safety and high quality standards guaranteed by a certified Quality Management System (EN ISO 9001).

Before leaving the factory all the fans are inspected and sealed with a mark of conformity.

Nevertheless, when operating centrifugal fans supplied by Nicotra Gebhardt GmbH there can be a risk of death or injury for the user or third parties, and a risk of damage to the centrifugal fan or other material assets.

1. Only use centrifugal fans in perfect working order and as intended, having due regard for safety, an awareness of hazards and in due compliance with the operating instructions.
2. Arrange immediate repair of any faults which could compromise safety.

4.2. Safety Instructions

The centrifugal fan may only be commissioned, operated and serviced in compliance with the following instructions:

- Operating instructions
- Warning and information signs on centrifugal fan
- Any other operating and installation instructions pertaining to the machine
- Terms and requirements relevant to the machine
- Applicable national and regional regulations, especially regarding health & safety and accident prevention.

4.3. Safety Devices

- ▶ Use appropriate safeguards to prevent contact with rotating parts (shafts, impeller, etc.).
- ▶ After installation (and before electrical connection) immediately refit any guards which have been removed during installation.
- ▶ For surface temperatures $\geq + 70^{\circ}\text{C}$ (DIN EN ISO13732-1) secure accessible fan parts with separating guards!

CAUTION The suitability of protection devices and their fixtures to the fan have to be evaluated within the complete security concept of the installation.

4.4. Professional Staff

1. Installation of centrifugal fan and any work on it to be carried out by skilled professionals only with due regard to these operating instructions and any applicable regulations.
2. Electrical connection to be carried out by qualified electricians only.

4.5. Protective Gear



Ensure that members of staff are wearing protective gear appropriate to their deployment and environment.
The protective clothing is specified below!

4.6. Specific Hazards

4.6.1. Noise Emission



The sound emission expected in normal use of the fan is documented in the technical lists and should be duly taken into account.

- ▶ **Wear ear defenders when working near to or on the running fan!**

4.6.2. Heavy Loads

The heavy weight of the centrifugal fan and its components entail the following risks in transit and during installation:



- Risk of being trapped, crushed or cut by moving or toppling machinery
- Danger of falling components
- ▶ **Do not stand or work under suspended loads.**
- ▶ **Wear a hard hat, safety shoes and gloves.**

4.6.3. Rotating Shafts and Impellers

Objects falling onto rotating shafts and impellers can fly off at an angle and cause serious injury.



Articles of clothing and hair can get caught in rotating shafts and impellers.

- ▶ **Do not remove guards during operation.**
- ▶ **Do not wear loose-fitting clothing when working near rotating shafts and impellers**
- ▶ **Wear goggles**

4.6.4. Hot Surfaces

There is a risk of sustaining burns or scalds on hot surfaces during operation.



- ▶ **Do not touch the motor during operation.**
- ▶ **When the centrifugal fan has stopped wait until the motor has cooled down.**
- ▶ **Wear protective gloves**

4.7. Structural Modifications, Spare Parts

Notes Unauthorised structural modifications may not be made to the centrifugal fan without the consent of Nicotra Gebhardt GmbH. Nicotra Gebhardt GmbH shall not accept liability for any damage arising as a result of said modifications.
Use only genuine spare parts supplied by Nicotra Gebhardt GmbH.

4.8. Installation and Maintenance

The following steps should be taken before working on the centrifugal fan:

1. Switch off the machine and take measures to prevent it from being switched back on accidentally.
2. Display the following message on a sign:
“Do not switch on! Work currently in progress on the machine”

4.9. Signs on the Centrifugal Fan

Depending on the model, the type plate and the arrow indicating the direction of rotation are fitted to the housing or handle for high visibility.

4.9.1. Type Plate

Fig. 4-1:
Example type plate

Nicotra Gebhardt D-74638 Waldenburg					
Tel.: +49 (0) 7942 101 384 Fax.: 385					
email: service@gebhardt.de					
RZR 11-0500 LG/90					
GERÄTE-NR.	126-176088-632658/1			HERSTELLJAHR 2007	
VENTILATOR		SAMPLE		MOTOR	
V	= 12600	m ³ /h	U N	= 400/690	V(D/Y)
dPfa	= 1174	Pa	f N	= 50	Hz
dPt	= 1219	Pa	n N	= 1500	1/min
n	= 1689	1/min	P N	= 7,5	kW
n max	= 2050	1/min	P N max	= 7.5	kW
Pw	= 5.26	kW	Schutzart	IP 55	
Pw max	= 6.5	kW	Wärmeklasse	F	
Dichte	= 1.2	kg/m ³	Stromart	3~	
Tmax	= 80	°C			

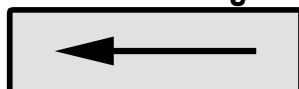
4.9.2 Belt drive plate

Fig. 4-2:
Belt drive - Sample

Nicotra Gebhardt D-74638 Waldenburg	
Tel.: +49 (0) 7942 101 384	
Keilriemenantrieb/ Belt drive	
Ventilator/ Fan	RZR 11-0500 LG/90
Nummer/ No.	126-176088-632658/1
Scheibe/ Pulley	1 SPA 140
Buchse/ Bush	1610/30
SAMPLE	
Motor	
Scheibe/ Pulley	1 SPA 160
Buchse/ Bush	1610/38
Keilriemen/ Belt	XPA 1700 QP
Spannvorschrift/ Tensioning of belt	
Prüfkraft/ Test force in N:	21
Eindrücktiefe/	
Deflection under test force (mm):	6,1
Frequenz/ Frequency in Hz:	48

4.9.3 Arrow Indicating Direction of Rotation

Fig. 4-3:
Arrow indicating direction
of rotation



5. Product Description

5.1. Centrifugal Fans in General

The centrifugal fans can be completed to a fan set by equipping them with base frame and belt drive or acc. to the type & size with pick-a-back and belt drive.

Further options and accessories see proSELECTA II, Technical documentation and price lists.

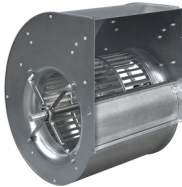
Examples see subsequent drawings.

CAUTION

These centrifugal fans are made for being fitted inside AHU or in AC-installations. They are supplied without guard at intake and discharge as a standard. If there is a risk of direct contact of the rotating parts guards acc. to DIN EN ISO 13857 (available as an option) have to be provided.

5.2. Centrifugal Fans

5.2.1 Fan Ranges ADH double intake



Lap jointed scroll casing of galvanised sheet steel, equipped with various antifriction bearings and various reinforcing side frames.

Built-in centrifugal impeller with forward curved blades, manufactured by notching process, statically and dynamically balanced.

For more detailed specification see catalogue „Belt Driven Centrifugal Fans“

5.2.2 Fan Ranges RDH double intake

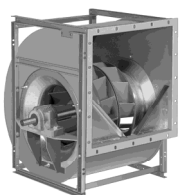


Lap jointed scroll casing of galvanised sheet steel, equipped with various antifriction bearings and various reinforcing side frames.

Built-in centrifugal impeller with backward inclined laminar blades made of sheet steel, welded and coated, statically and dynamically balanced.

For more detailed specification see catalogue „Belt Driven Centrifugal Fans“

5.2.3 Fan Ranges RZR double intake

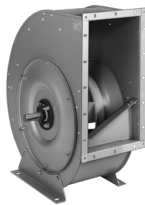


Scroll casing, galvanised or welded and coated, equipped with various antifriction bearings and various reinforcing side frames.

Built-in centrifugal impeller with backward curved, aerodynamically shaped hollow profile blades, made of sheet steel welded and coated, statically and dynamically balanced.

For more detailed specification see catalogue „Belt Driven Centrifugal Fans“

5.2.4 Fan Ranges RER single intake



Scroll casing, galvanised or welded and coated, in different executions, equipped with various antifriction bearings and various reinforcing side frames. According to the execution the bearings are fitted in or out of the conveying medium.

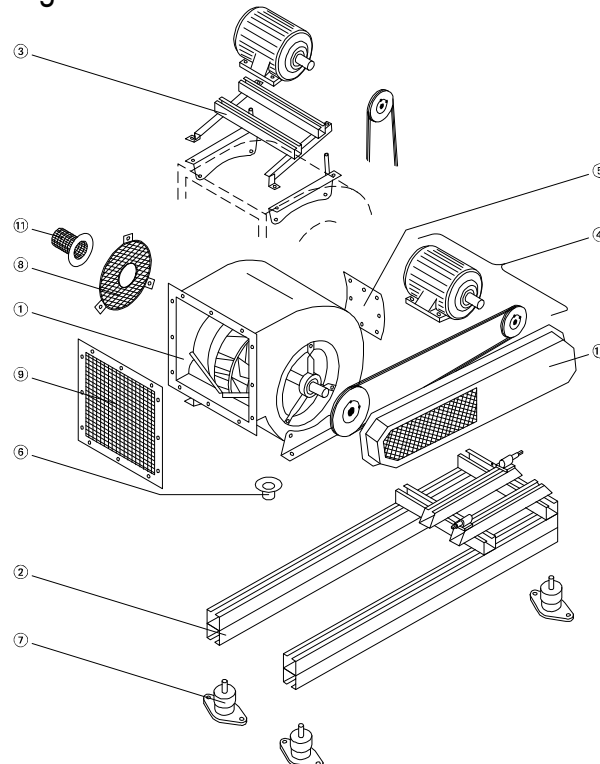
Built-in centrifugal impeller with backward curved, aerodynamically shaped hollow profile blades, made of sheet steel welded and coated, statically and dynamically balanced.

For more detailed specification see catalogue „Centrifugal Fans RER“

5.3. Fan Sets and Fan Fittings

5.3.1 e.g. RZR 11

Fig. 5-1:
Fan Set RZR 11



- 1 Centrifugal fan
- 2 Base frame with motor rails or sledge
- 3 Pick-a-Back
- 4 Drive
- 5 Access door
- 6 Drain plug
- 7 Anti-vibration mounts

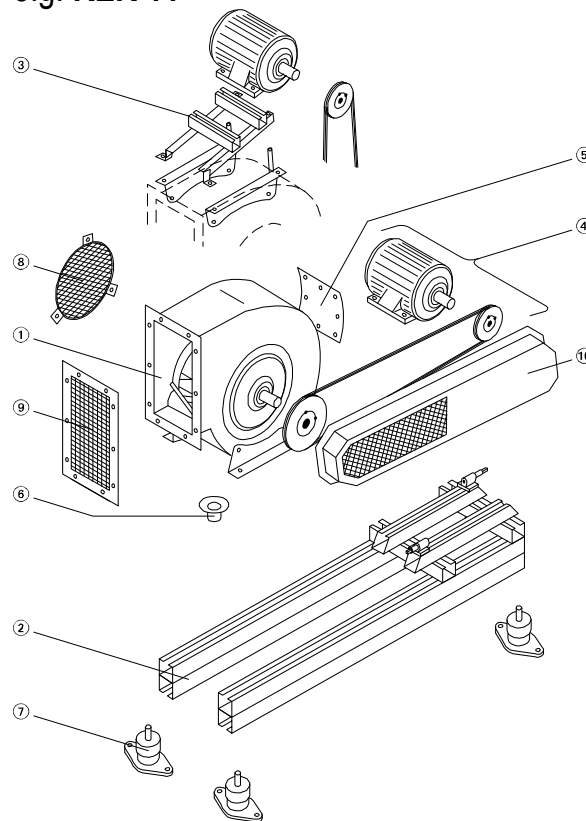
Guards

- 8 Inlet guard
- 9 Discharge guard
- 10 Drive guard
- 11 Shaft guard

Further options and accessories
see technical catalogue.

5.3.2 e.g. RER 11-

Fig. 5-2:
Fan Set RER 11



- 1 Centrifugal fan
- 2 Base frame with motor rails or sledge
- 3 Pick a Back
- 4 Drive
- 5 Access door
- 6 Drain plug
- 7 Anti-vibration mounts

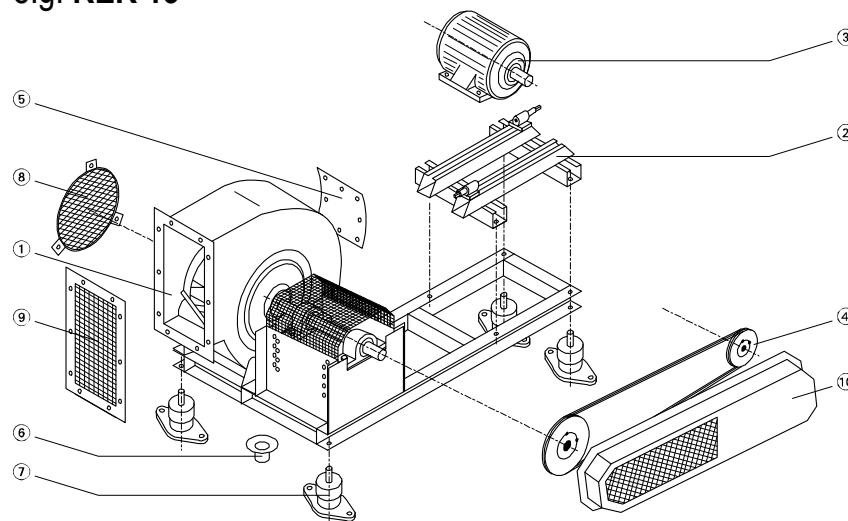
Guards

- 8 Inlet guard
- 9 Discharge guard
- 10 Drive guard

Further options and accessories see technical catalogue.

5.3.3 e.g. RER 13 -

Fig. 5-3:
Fan Set RER 13/17



- 1 Centrifugal fan with base frame
- 2 Motor rails
- 3 Motor
- 4 Belt drive
- 5 Access door
- 6 Drain plug
- 7 Anti-vibration mounts

Guards

- 8 Inlet guard
- 9 Discharge guard
- 10 Drive guard

Further options and accessories see technical catalogue.

6. Handling and Storage







6.1. Packing

Centrifugal fans are packaged in sturdy cardboard boxes or on wooden crates depending on their size and weight. Instructions on removing transportation locks are enclosed.

6.2. Symbols on Packing

The following symbols are printed on the cardboard boxes:

Table 6-1:
Symbols on packaging

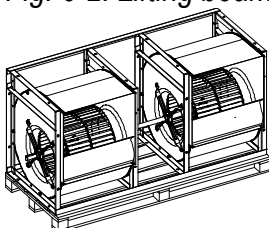
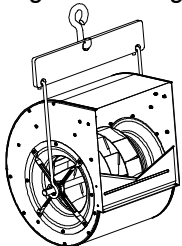
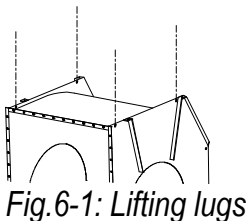
Symbol						
Meaning	Handle with care	Keep dry	Top	Do not use hand hooks	Max. permitted packing load	Do not tilt

6.3. Handling of Centrifugal Fans



Danger of injury from falling components!

- ▶ Do use only certified lifting devices suitable for the fans to handle!
- ▶ Select the transportation mode according to the weight and execution of the fan!
- ▶ Handle the fan as long time as possible with its original packing!
- ▶ Secure load!
- ▶ Do not stand under suspended loads!



1. Select the transportation mode according to the weight, execution, or suspension possibilities of the fan (Weight data see technical catalogue).
2. Centrifugal fans to be attached at the lifting lugs provided or at the base frame, base plate, or supporting plate.
3. If necessary and possible screw in a shackle.
4. Fans without a frame to be handled by using special lifting device taking the fan at both shaft ends and to be transported in a horizontal shaft position only!
5. Double or triple fans to be transported on a common pallet as one stable unit.
No load to be applied on the shaft and frame parts (Risk of deformation)!
6. When using transport belts always provide 4 points of suspension (2 belts).
The belt may not exert a deforming force to the fan or its packing. If necessary use a spacer!
7. Secure load with belts or fix it against sliding!
8. Handle centrifugal fan with care to prevent damages, avoid e.g. shock or rough placement.

CAUTION These are **NO** fixing points at the fan!

- Bearing struts
- Casing flange / Casing frame
- One-sided fixing at fan shaft
- Motor lifting lug

6.4. Storage of Centrifugal Fan**CAUTION** Risk of corrosion!

- ▶ Store the fan in its packaging, adding any other protection dictated by its storage environment.
- ▶ Store centrifugal fan in a well-ventilated room only at normal temperatures and in a non-corrosive atmosphere.
- ▶ Store centrifugal fan in conditions registering less than 70 % atmospheric humidity.
- ▶ Adhere to max. permissible temperature of –20 °C to +40 °C.

6.5. Intermediate storage

- ▶ For an intermediate storage lasting longer than 6 months un tension belt drive.
Prior to start up observe following chapters:
 - Maintenance instructions
 - Tensioning instructions for belt drive

7. Installation**7.1. Safety Instructions for Installation**

- ▶ Observe the safety instructions and preventive measures in Chapter 4 and the relevant legal requirements.

7.2. Installation Preparation

- Place of installation suitable for the centrifugal fan in terms of its category, condition, ambient temperature and environmental media.
- The installation surface is plane and able to support the weight.

1. Unpack centrifugal fan carefully.
2. Unfasten or dismantle transport locks
3. Packing material to be fully removed and disposed.

7.3. Carrying out Installation

1. The fan or base frame must be fixed without stresses to the supporting structure.
 2. AVM to be regularly placed around centre of gravity and definitely fixed. Check whether AVM evenly under load.
- Note**
3. The included vibration absorbers are designed for the maximum weight of the respective fan (any additional loads, e.g. attachment parts, are not considered).
 4. In some cases it may be possible that the optimal load of the vibration absorbers is not achieved by the weight of the fan and thereby not be necessary to assemble all the supplied vibration absorbers!
- No forces or vibrations may be transferred from other plant parts
 - The flexible connections at intake and/or discharge are installed well aligned and freely moving.
 - The AVM are freely moving and under even load!
 - The impeller is turning idly and does not touch at intake cone!
 - The stability against collapse of the fan has been checked.

Conveying humid air outside installation:

- Is a condense water drain fitted to the lowest point of the casing

RER 13/17: If expansion of duct work due to high temperature can be expected:

- Sliding connectors or heat resistant flexible installed.

7.4. Installing Safety Devices

Note Conformity with DIN EN ISO 13857 only relates to the safety guard installed insofar as it is supplied with the fan. The operator of the system is responsible for full compliance with DIN EN ISO 12100.

1. Fit guards to protect exposed inlet openings (DIN EN ISO 13857).
2. Design safety devices in such a way that they prevent objects from being sucked in or from falling in.
3. Ensure that all the mechanical safety devices are fitted.

8. Electrical Connection

8.1. Safety Instructions for Electrical Connection



DANGER!

Caution! Danger of electric shock!

- Observe the safety instructions and preventive measures in Chapter 4 and the relevant legal requirements.
- EN 60204-1, IEC 60364-1 / DIN VDE 0100

CAUTION

In order to protect the fan against unexpected operation a service switch is recommended. (Option).

CAUTION

If control units with electronically components (e.g. frequency inverter) are installed please respect instructions of the control unit supplier about prevention of electro magnetic radio noise (EMV) – earthing, cable lengths, shielding, etc.

CAUTION

In order to avoid damages caused by electric current passing through the bearings when operating with inverter the use of isolated motor bearings is recommended from motor size 225 up.
Please respect information given by the motor manufacturer.



DANGER!

Caution electrical hazard!

Electrical potential at intermediate circuit of Driver and power connections if the permanent magnet motor rotates!

- Do not work at the fan if the impeller/motor is not locked
- Lock fan impeller by proper means

8.2. Connecting the Motor

- Current, voltage and frequency of mains supply checked for conformity with fan type plate and motor rating plate.
- Star-delta or soft start provided for motors with a nominal output >4 kW.
- Inspection switch present if applicable.
- Measures taken to prevent centrifugal fan from starting suddenly.**
- Chapter 4. „Safety“to be respected!**
 1. Fit inspection switch if applicable.
 2. Connect feed line to fan or service switch.
 3. Connect motor as shown on connection diagram supplied.
 4. Ensure that all the electrical safety devices have been fitted and connected.

CAUTION

The motor may become damaged if connected directly to themains supply!

PM motors without integrated electronics must be operated at inverters suitable for that purpose.

Note The evaluation of respect of the radio noise standards and regulations can only be made when considering the complete installation in its existing configuration.

This is to be checked under the responsibility of the customer.

8.3. Motor Protection

- Motors are to be protected against overload in accordance with DIN EN 60204-1.
- Standard motor protection switches are to be provided and set to the nominal motor current. A higher setting is not permitted!
- Motors with built-in thermistors must be protected through a thermistor operated trigger unit.

CAUTION Fuses or circuit breakers do not provide sufficient motor protection. Damage due to insufficient motor protection invalidates the manufacturer's guarantee.

Note In all cases the power limitations provided by the existing power supply company must be taken into account.

In the event that plant conditions necessitate a direct start the suitability of the fan design is to be confirmed with the manufacturer.

Fans with high inertia impellers can take over 6 seconds to reach top running speed. In these cases heavy duty motor protection relays or bimetal relays must be provided.

8.4. Carrying out a Test Run



Risk of injury from rotating impeller!

- ▶ Never reach into the impeller when the fan is open.

1. Take measures to prevent centrifugal fan from being switched on accidentally.
2. Clear the ducting system and fan of all foreign bodies (tools, small parts, construction waste, etc.).
3. Close all the inspection openings.
4. Switch on fan and check direction of rotation of impeller by comparing it with the arrow on the fan indicating the direction of rotation.
5. If the direction of rotation is wrong, reverse the polarity of the motor having due regard to the safety instructions.
6. Once operating speed has been reached measure the current consumption and compare it with the nominal motor current on the fan type plate or motor rating plate.
7. If there is continuous overload switch the centrifugal fan off immediately.
8. Check that the fan runs smoothly and quietly. Ensure that there are no unusual oscillations or vibrations.
9. Check the motor for any abnormal noises.

CAUTION PM motors without integrated electronics must be operated at inverters suitable for that purpose! (e.g. Danfoss VLT HVAC Drive FC-100, see Chapter 9.3)

9. Commissioning / Operation

The motors are designed for continuous operation S1. If operations involve more than three starts per hour Nicotra Gebhardt shall be required to confirm the suitability of the motor.

9.1. Commissioning the Centrifugal Fan



DANGER!

Risk of injury from rotating parts and hot surfaces!

- ▶ Ensure that all the safety devices are fitted.
- ▶ Ensure that the impeller has been secured acc. to DIN EN ISO 13857.

CAUTION

Possible damages of the mains by overload through high starting current!

- Respected the given limitations by the power supply company .

1. Check working order of all control instruments connected.
2. Switch on centrifugal fan.

9.2. Checks after Running-In phase

After a running-in phase of 1 to 2 hours the following checks have to be made:

- Centrifugal fan secured against involuntary switching on!
 1. Check belt tension and retighten if necessary.
(see chapter 10.3.1)
 2. Check bearing temperature (see attachment)

9.3 Commissioning of fans with PM motors

9.3.1 Inverter brand (Danfoss FC-100)

For operating fans with PM motors without integrated electronics, we recommend the inverters of the series FC-100, by Danfoss GmbH. To operate PM motors without position sensors, the rotors are placed in a defined position at the start. Then the motors will start up.

Note Certain parameters are required for commissioning. Incorrect parameters can lead to problems, in particular when starting the devices.

The following table provides an overview of the relevant parameters for the start and operation of PM motors:

Parameter	Title	Remarks
0-02	Hz / rpm switching	"rpm" setting for PM motors
1-06	Direction of rotation	
1-10	Motor type	"PM, non-salient pole" setting for PM motors
1-24	Motor rated current [A]	As per motor type plate
1-25	Rated motor speed [rpm]	As per motor type plate
1-26	Continuous nominal torque [Nm]	As per motor type plate, or calculation: $M = (P_{nom}[kW] * 9550) / n_{nom}[min^{-1}]$
1-30	Stator resistance (Rs) [Ω]	Enter string value; phase-phase values must be halved
1-37	Induct. D-axis (Ld) [mH]	Enter string value; phase-phase values must be halved
1-39	Number of motor poles	$= 2 * (f_{nom}[Hz] * 60) / n_{nom}[min^{-1}]$
1-40	Counter EMF at 1000 rpm [V]	Value of EMF related to 1000 rpm: $(U_{nom}[V] * 1000 min^{-1}) / n_{nom}[min^{-1}]$
1-66	Min. current at low speed [%]	Adjust the current at low speed; increase if problems
1-70	PM start mode	"1" setting for parking
2-06	DC braking current [%]	Current value to "park" the rotor in a defined position
2-07	DC braking time [s]	Time required to "park" the rotor; recommended value: $\approx 5s$
3-41	Ramp time up 1 [s]	Time for start-up: It is recommended to increase the time if there are any starting problems
3-42	Ramp time down 1 [s]	Time for run-out: It is recommended to increase the time if there are any starting problems
4-13	Max. speed (rpm)	Smaller than or equal to the rated motor speed [min^{-1}] => type plate
4-16	Motor torque limit [%]	Increase the value if there are any starting problems
4-18	Current limit [%]	Increase the value if there are any starting problems
4-19	Max. output frequency [Hz]	Maximum frequency that the inverter can deliver

The specified parameters 1-14 to 1-17 are a selection. There is still a range of other parameters that affect the operation of PM motors.

For more detailed information, please see the documentation by Danfoss GmbH.

10. Maintenance

10.1. Safety Instructions for Maintenance

- ▶ Observe the safety instructions and preventive measures in Chapter 4 and the relevant legal requirements.
- ▶ Follow the directions of the motor supplier and the instructions specified by the manufacturers of the switches and control units.



Works on the fan are authorised only when fully cut off power supply!

10.2. Maintenance Preparation

1. Disconnect motor from the mains.
2. Centrifugal fans fitted with an inspection switch should be switched off by means of the inspection switch.
3. Take measures to prevent centrifugal fan from being switched on accidentally.
4. Wait until the impeller has stopped.
5. Wait until all hot surfaces have cooled down.
6. Remove any residues from the fan.

- ▶ According the situation installation components may be unfitted for inspection and maintenance.

Maintenance prepared

10.3. Observing Regular Inspection Intervals

In the interests of upkeep and safety we recommend having the operation and condition of the fans inspected at regular intervals by duly qualified service personnel or a professional maintenance firm and documenting these inspections.

The nature and extent of the maintenance work, the service intervals and any additional work required needs to be specified on a case-by-case basis depending on the use of the fans and the general conditions on site!

Our servicing and inspection recommendations based on VDMA 24186-1 can be found on our website (Downloads).

Maintenance recommendations for Centrifugal fans:

- ▶ Conduct test run if applicable (see Chapter 8.3).
- ▶ Document inspection intervals observed.



Pressure washers can cause damage to property!

- ▶ Do not use pressure washers (steam jet cleaners) to clean the equipment.

10.3.1 Belt drive

The belt drive is from the run-in phase onwards generally maintenance free.

It is however recommended that depending on the installation site and the type of operation the belt tension is regularly checked. The test force F_p is given on

the type plate and the design sheet.

10.3.2 Tensioning rules for V-belt drives

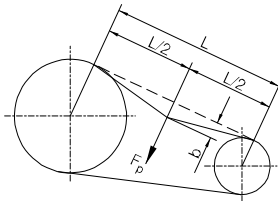


Fig. 10-3: V-belt drive

L = Span between shaft centres

b = Belt deflection under test force F_p

F_p = Test force in N from the

- ▶ The correct tensioning for a belt is achieved if the individual test force F_p produces a belt deflection b of 16 mm per 1000 mm of span.

10.3.3 Tensioning rules for flat belts

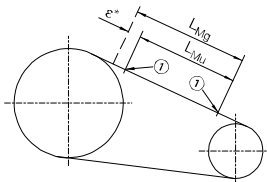


Fig. 10-4: Flat belt drive

L_{Mu} = Measurement mark spacing on un-tensioned flat belt

L_{Mg} = Measurement mark spacing on correctly tensioned belt

ϵ^* = Increase in mm from the manufacturer documentation

- ▶ The correct belt tensioning has been achieved when the measurement mark spacing L_{Mu} has increased by ϵ^* . The adjustment should take place in two stages with a time period of some hours in between to avoid overloading the bearings.

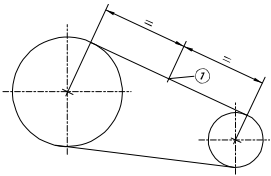


Fig. 10-5: Belt drive

10.3.4 Tensioning rules for V-belt and flat belt drive

The check of the belt tension is made through observation of the static belt frequency. For this purpose the flat or V-belt is hit and vibrating at resonance frequency. An electronically measuring device - the so-called Trummeter – will relate this to the tension force. The oscillation in Hz has to correspond to the value indicated in the documentation/type plate.

The measuring point is places in the centre (1) of the belt, i.e. between both pulleys.

10.3.5 Belt changing

- ▶ The centre distance should be reduced until the new belt/s can be easily fitted by hand.
- ▶ The tensioning of the belt follows in accordance to the respective tensioning rules.
Observe the running-in phase!

10.3.6 Pulley changing

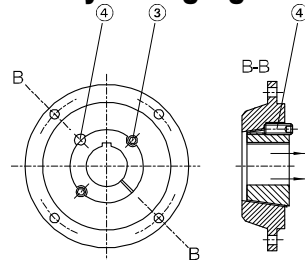


Fig. 10-6 to release

To release the pulley wheel:

1. Unscrew the bolts (3).
2. Tighten the socket head cap screw in the threaded hole (4).
3. Press the clamping bush out of the tapered hole.
4. The pulley wheel can now be easily slid of the shaft.

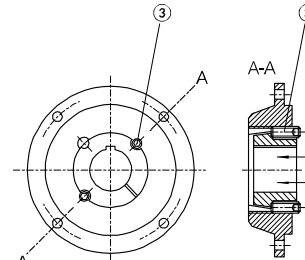


Fig. 10-7: Fixing

To fix the pulley:

1. Pull the pulley wheel and the clamping bush together by means of the socket head cap screw (3).
2. Motor pulley and fan pulley to be exactly in line
3. Belt tension to be set according to instructions

10.3.7 Vibration monitoring

Check fan regularly whether vibrations occur.

The radial vibration speed at fan bearings and motor bearing (drive side) may have not more than the **following max. values:**

- up to size 315 mm $\leq 7,1$ mm/s,
- up to size 1600 mm $\leq 4,5$ mm/s.

10.3.8 Motor bearings

The motor bearings are supplied permanently lubricated by the factory; experience has shown that the grease needs to be changed after several years only under normal operating conditions. In the case of bearing noise please get in touch with Nicotra Gebhardt Service for a check and possible change of defective bearings.

CAUTION

The maintenance instructions of the motor supplier as well as the instructions for the switches and control units have to respected.

CAUTION If the state of the fan does not allow adapted action for repair it has to be put out of order immediately and to be replaced if required.

10.3.9 Periods of stand still

During longer lasting periods of stand still the fan must be from time to time put into operation for a short while. This is to avoid bearing damages by mechanical load and ingress of humidity.

After longer lasting period of storage, fan and motor bearings have to be checked prior to installation.

11. Disturbances

If disturbances occur during operation which cannot be repaired by maintenance personnel please contact the service department of Nicotra Gebhardt GmbH.

CAUTION Centrifugal fan may be damaged by improper operating conditions!

- ▶ Switch the centrifugal fan off immediately if permissible limits are exceeded and in the event of irregularities or disturbances.

12. Service, Spare Parts and Accessories

Nicotra Gebhardt GmbH
Gebhardtstrasse 19–25
74638 Waldenburg, Germany

Phone: +49 (0) 7942 101 384
Fax: +49 (0) 7942 101 385
E-mail: info@nicotra-gebhardt.com
www.nicotra-gebhardt.com

12.1. Ordering Spare Parts

- ▶ Use only genuine spare parts supplied by Nicotra Gebhardt GmbH as featured in the list of spare parts.

The use of spare parts supplied by other manufacturers may compromise the safety of the equipment. Nicotra Gebhardt GmbH shall not accept any liability or provide any warranty cover in respect of primary or secondary damage arising as a consequence of using spare parts supplied by other manufacturers.

Spare parts can be ordered online at - [www.nicotra-gebhardt.com /Partshop](http://www.nicotra-gebhardt.com/Partshop).

12.2. Accessories

Nicotra Gebhardt GmbH has a wide range of accessories for economic and efficient use of the fans.

Accessories are optional and always need to be ordered separately.

Spare parts should be selected on the basis of the technical specifications or via our electronic selection program. Accessories are supplied with separate operating or installation instructions unless their installation or uses are self-explanatory.

13. Annex

13.1. Further Documentation by Nicotra Gebhardt GmbH

Table 13 1:
Further documentation

Type of Documentation	File Location
Maintenance and inspection recommendations	Internet, see link in Chapter 10.3.
Bearing Maintenance	Annex
EC-Declaration of incorporation	Annex

13.2 Annex Bearing Maintenance

Note For service and maintenance observe the following instructions

- **Safety instructions** Chapter 4
- **Service/ Maintenance** Chapter 10
- **Safety Notes** Chapter 10.1

CAUTION

As a standard there are only noise tested precision bearings fitted, designed for a nominal life time (L10h acc. to DIN ISO 281-1) of 40 000 operation hours.

In order to not exceed the permitted bearing loads there are minimum pulley diameters specified for each fan whose values must be fallen below. The minimum pulley diameter indicated are applicable for belt drives which are correctly dimensioned to the actual „state of the art“ and tighten to the tightening specification.

For flat belt drives the minimum pulley diameter value has to be increased of about 40%!

13.2.1 Bearings without Lubricating Device

The bearings are normally supplied greased for life with high performance grease that is resistant to ageing and does not require maintenance under normal operating conditions.

If in the case of normal wear and tear a bearing change is required ask for the Nicotra Gebhardt-Service.

13.2.2 Bearings with Lubricating Device

IWN 01 stand grease (we recommend: Shell Gadus S2 V100 3)

IWN 11 moisture grease (we recommend: Klüber Staburags NBU 12/300KP)

IWN 21 high temperature grease (RER) (we recommend: Shell Aeroshell/Grease 22)

CAUTION

In order to reach the maximum permitted bearing lifetime under heavy duty operating conditions, they have to relubricated within regular intervals.

The intervals depend on the specific operating conditions and are to be determined by the operator. The maintenance instructions of the fans containing relubrication guidelines have to be taken into account.

13.2.3 Relubrication intervals

Under normal operating conditions a relubrication has to be carried out at least once a year!

This is applicable for bearings of a shaft in a horizontal position and when the temperature at outer bearing ring does not exceed +70°C.

- **For temperatures exceeding +70°C the relubrication interval has to reduce to half for every 15°C above this value.**

13.2.4 Lubrication tubes

CAUTION Lubrication tubes are without any grease pre filling!

To fill the bearings with grease, the tubes first must be filled completely with grease.

13.2.4 Relubrication with Lubricating Device

Relubrication during operation (only applicable for RZR fans) is carried out by pressing the required quantity of grease through the (by tubes extended) conical grease nipple into the bearing.

The escaped old grease has to be taken off during a short stop of the fan.

For self aligning bearings fitted in a split Plummer block casing a cleaning of the bearing and a fully new greasing has to be carried out!

**ADH E4/K, ADH E6/K1, ADH E7-0500
RDH E4/K, RDH E6/K1
ADH G2E4/G2K, ADH G2E7-0250/-0630
RDH G2E4/G2K, RDH G2E7-0315/-0630**

Monobloc pedestal cast iron housing with integrated, self aligning radial insert ball bearings with grease nipple directly fitted to the housing.

*Bild 13-1:
Steh-Gussgehäuse mit
Rillenkugellager*

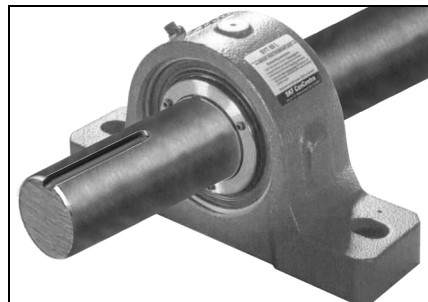


Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

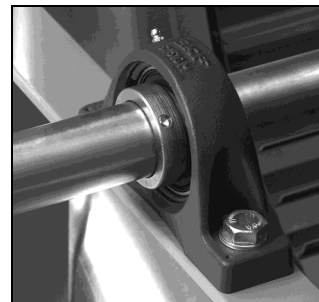
Grease Quantity:
Press grease into bearing until fresh grease is escaping.

**ADH G2K2-0710/-1000
RDH G2K2-0710/-1000**

*Fig. 13-2:
Single piece Plummer
block with bearings*



Outside bearings
Single piece cast iron block housing with integrated self aligning double row roller bearing with grease nipple directly fitted to the housing.



Inside bearings
Single piece cast iron block housing with integrated self aligning single row ball bearing with grease nipple directly fitted to the housing.

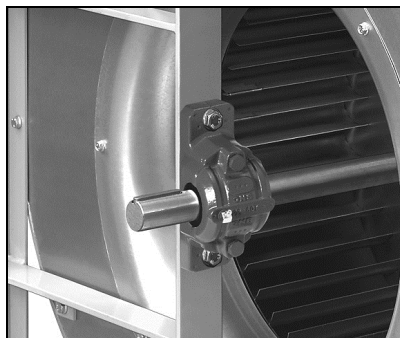
Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

Grease Quantity:
Press grease into bearing until fresh grease is escaping.

**ADH E7-0560, ADH K2-0630/-1000
RDH E7-0560, RDH K2-0630/-1000**

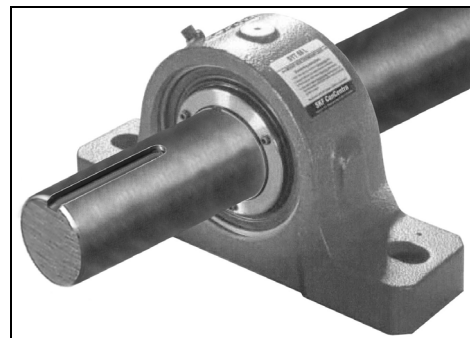
*Fig. 13-3:
Single piece or split type
Plummer block with
bearings*

Sizes 0560/-0800



Single piece or split type plummer block housing with integrated self aligning double row ball bearings with grease nipple directly fitted to the housing.

Sizes 0900/-1000



Single piece or split type plummer block housing with integrated self aligning double row roller bearings with grease nipple directly fitted to the housing.

Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

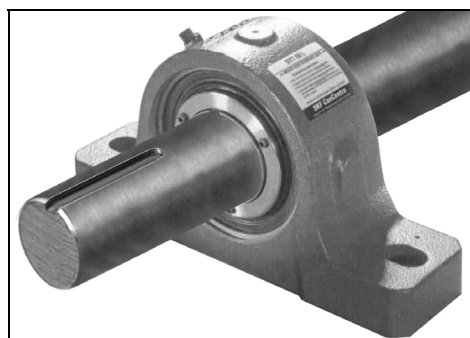
*Table 13-2:
Grease quantity*

ADH/RDH	0560	0630	0710-800	0900-1000
Grease qty.	30g	30g	35g	15g

RDH X1/X2-1120/-1400

Single piece Plummer block housing with integrated self aligning double row roller bearings with grease nipple directly fitted to the housing.

*Fig. 13-4:
Single piece Plummer
block with double row*



Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

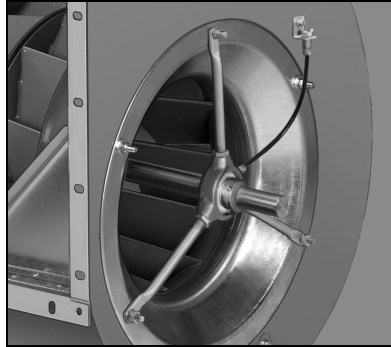
*Table 13-3:
Grease quantity*

Grease quantity	1120	1250	1400
RDH X1	15 g	15 g	15 g
RDH X2	20g	20g	20g

RZR 11-/12-0200/-0710 RZR 19-0200/-0355

Cast iron housing with struts and self aligning radial insert ball bearings with lubrication device IWN.

*Fig. 13-5:
Ball bearings in cast iron
housing with struts*



Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

Grease Quantity:
Press grease into bearing until fresh grease is escaping.

RZR 15-/19-0400/-1000

Split type cast iron housing strut mounted with self-aligning double row bearings with lubrication device IWN.

*Fig. 13-6:
Self aligning double row
bearing in a cast iron
housing.*



Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

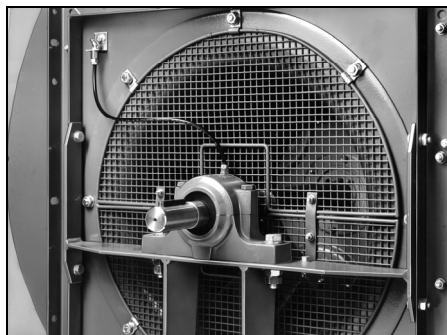
*Table 13-4:
Grease quantity*

Fan size	0400-0500	0560-0630	0710-0800	0900-1000
Grease qty.	15 g	20 g	30 g	35 g

RZR 13-/18-0400/-1000
RZR 13-1120/-1600

Split type Plummer block housing with self-aligning double row bearings with lubrication device IWN.

*Fig. 13-7:
Self aligning double row bearing in a Plummer block housing*



Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

*Table 13-5:
Grease quantity*

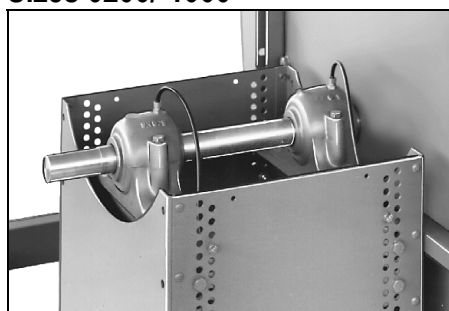
	RZR 13-/18-	0400-0500	0560-0630	0710-0800	0900-1000
Grease qty.		15 g	20 g	30 g	35 g
	RZR 13-	1120	1250	1400	1600
Grease qty.		35 g	40 g	50g	50g

RER 13-/17-0200/-1000
RER 13-1120/-1600

Split type Plummer block housing with self-aligning double row bearings with lubrication device IWN.

*Fig. 13-8:
Self aligning double row bearing in a Plummer block housing*

Sizes 0200/-1000



Sizes 1120/-1600



Relubrication at least once a year.
Interval to be reduced for heavy duty operation.

*Table 13-6:
Grease quantity*

	RER 13-/17-	0200-0250	0280-0355	0400-0500	0560-0710	0800-1000
Grease qty.		15 g	15 g	25 g	30 g	35 g
	RER 13-	1120	1250	1400	1600	
Grease qty.		35 g	40 g	50g	50g	

Translation of the Original

EC-Declaration of incorporation

The manufacturer: **Nicotra Gebhardt GmbH**
Gebhardtstrasse 19-25, 74638 Waldenburg, Germany

herewith declares, that the following product:

Product designation: Centrifugal fan
Type nomination: **ADH / RDH / RZR / RER**
Serial n°: see type plate
Year of construction: see type plate

qualifies as a partly-completed machine, according to Article 2, clause “g” and does comply to the following basic requirements of the Machine Directive (**2006/42/EC**): Annex I, Article **1.1.2; 1.3.7**

The partly-completed machine may be put into operation only if it has been stated, that the machine, into which the uncompleted machine has to be incorporated, does comply with the requirement of the machine directive (2006/42/EC).

The following harmonised standards¹⁾ have been applied:

DIN EN ISO 12100: Safety of machines - General design principles

DIN EN ISO 13857: Safety of machines - Safety distances to hazardous areas

Applied, national standards and technical specifications²⁾ particularly:

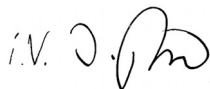
VDMA 24167: Fans - Safety requirements

The manufacturer is committing himself to make the special documents of partly-completed machine available to any state authority if required.

Waldenburg, 04.06.2014

Representative for the documentation: Michael Hampel

Head of Production



i.V. I. Stöbe

Head of Research and Development



i.V. Dr. J. Anschütz

1) The complete listing of applied standards and technical specifications see manufacturer's documentation

2) As far as harmonised standards are not existing

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