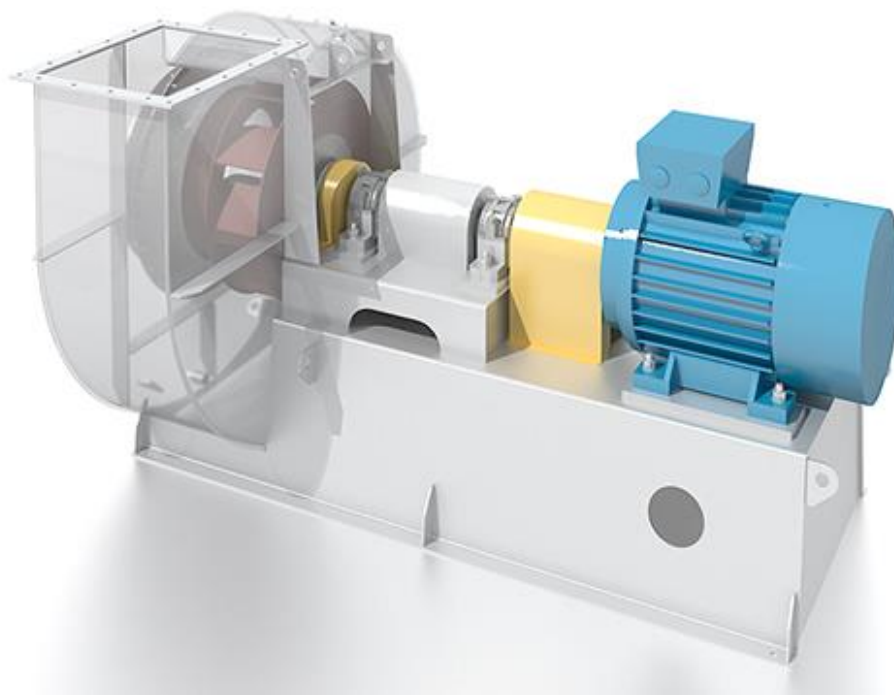


Translation of the Original Instructions

Single Stage Radial Fan

Design KXE



See chapter 20 of this operating manual
for detailed addresses of all companies of the REITZ Group.



Please read this operating manual carefully.

In case of doubt, or if certain points are unclear, please clarify them with REITZ first.

The operating manual, as well as the spare parts lists and documentation of sub-suppliers, is a separate part of the overall documentation. The overall documentation must be made available to the personnel appointed for operating and maintenance work.

OPERATING MANUAL: RADIAL FAN KXE

© 2020 REITZ HOLDING GMBH & CO. KG

Copyright on the operating manual

REITZ Holding GmbH & Co. KG holds the copyright in this operating manual.

This operating manual is intended for technical personnel performing the following work on the fan: transport, installation, commissioning, operation, service, troubleshooting, maintenance, repair, decommissioning, dismantling, disposal. Instructions and drawings of a technical nature may not be copied, in whole or in part, distributed, imparted to third parties or used for the purpose of competition without prior authorisation.

This operating manual was drawn up with the utmost care. Liability for direct and/or indirect damage caused as a result of delivery or utilisation of this operating manual is excluded, wherever legally permissible.

Table of contents

1. Preface	6
2. Introduction	7
2.1 Legal notices	8
2.2 EC Declarations.....	9
2.3 Utilisation of the operating manual.....	9
2.4 Regulations and standards	10
3. Fundamental safety instructions	11
3.1 Symbols and warning information.....	11
3.2 Authorised personnel.....	13
3.2.1 Qualified persons	14
3.2.2 Electrical specialists	14
3.3 Personal protective equipment	15
3.4 Overview of hazards	17
3.5 Obligations of the operating company and plant manufacturer	19
3.5.1 Intermediate storage	19
3.5.2 Measures in the event of a power failure.....	19
3.6 Risk of slipping, tripping or tumbling	20
4. Product description	21
4.1 Intended use.....	22
4.2 Product identification and labelling.....	26
4.3 Technical data	27
4.4 Drive	30
4.4.1 Motor	30
4.4.2 Variable speed control (optional).....	30
4.5 Additional components	30
5. Accessories	31
5.1 Anti-vibration mounts.....	31
5.2 Flexible connections	31
5.3 Monitoring devices.....	31
5.4 Additional accessories	31
6. Transport	32
6.1 Transport with a crane	33
6.2 Transport with a truck	33
6.3 Packaging.....	34
6.4 Transport damage	34
6.5 Intermediate storage.....	35
7. Installation	36
7.1 Preparing for installation	37
7.2 Mounting and alignment	38
7.3 Assembling the fan	39
7.3.1 Procedure	40

7.3.2	Screw connections	41
7.4	Securing the fan	42
7.4.1	Anti-vibration mount	43
7.4.2	Spring phonolators (spring type anti-vibration mounts)	44
7.4.3	Stone bolts.....	45
7.5	Insulation of the fan	46
8.	Measures prior to commissioning	47
8.1	Aligning the coupling	48
8.2	Checking the impeller gap	51
8.3	Connecting the duct work	53
8.4	Fitting the flexible connections.....	55
8.5	Activating the re-lubrication devices.....	57
8.5.1	Bearings	59
8.5.2	Shaft seal.....	61
8.6	Connecting the shaft seal	62
8.7	Electrical connection.....	64
8.8	Connecting the monitoring devices.....	67
8.9	Monitoring devices limit values	69
8.9.1	Vibrations.....	70
8.9.2	Temperatures	71
8.10	Connecting the cooler fan.....	72
8.11	Checking the lubricant	73
8.12	Connecting the external oil supply system	76
8.13	Checking the final installation condition	77
9.	Start-up	79
9.1	Switching on the fan	80
9.2	Checking the sense of rotation	80
9.3	Powering up the fan.....	81
9.3.1	Direct connection	83
9.3.2	Star-delta starting.....	83
9.3.3	Variable speed control	83
9.4	Switching off the fan	86
10.	Operation	87
10.1	Regulation via variable speed control	89
10.2	Emergency shutdown	89
10.3	Exceeding limit values	89
10.4	Minimum duration of operation	90
10.5	Minimum speeds	91
10.6	Maximum speeds	92
11.	Fault and rectification.....	93
12.	Inspecting the fan	97
12.1	Weekly inspections.....	98
12.2	Monthly inspections.....	99

12.3 Annual inspections	100
13. Maintenance	101
13.1 Lubricants.....	103
13.2 Bearings	105
13.2.1 Grease-lubricated single bearing	107
13.2.2 Grease-lubricated multiple bearing block	108
13.2.3 Oil-lubricated single bearing.....	112
13.2.4 Oil-lubricated multiple bearing block.....	113
13.2.5 Oil change intervals	113
13.2.6 Sealing oil-lubricated bearings	114
13.3 Shaft seal	115
13.3.1 Seal locking plate.....	116
13.3.2 Chamber seal	116
13.3.3 Labyrinth seal	117
13.4 Inspection opening	119
13.5 Shaft earthing	120
14. Repair.....	122
14.1 Requesting a REITZ service technician	124
14.2 Requesting spare parts.....	124
15. Decommissioning	125
16. Recommissioning	127
17. Dismantling	129
18. Waste disposal	131
19. Annex	132
19.1 Inspections in accordance with the checklist.....	132
20. Addresses of the REITZ group.....	134
21. List of figures	137
22. Tables index	138

1. Preface

Read the entire operating manual meticulously.

Should you have any questions or ambiguities, please contact us immediately. We would be more than happy to provide support and to clarify any queries.

This operating manual constitutes one part of the overall documentation. The overall documentation must be made available to the personnel appointed to operating and maintenance works at all times.

Additional documents of the overall documentation include:

- Fan data sheet
- Equipment card
- Spare parts list
- Performance curve, technical data (optional)
- General drawing of fan
- Additional drawings (optional)
- EC Declaration of Conformity or EC Declaration of Incorporation
- Instructions for storage and corrosion protection for fans
- Documentation of the respective manufacturers.

This operating manual is intended exclusively for personnel performing the following work on the fan:

Transport, mounting, commissioning and start-up, operation, operating, troubleshooting, maintenance, repair, shutting-down, dismantling, disposal.

All work on the fan must be carried out exclusively by verifiable competent persons.

See chapter 3.2 Authorised personnel for a list thereof.

This operating manual must be diligently retained for subsequent referral.



NOTICE!

This operating manual, as well as all documents included in delivery must be accessible to all persons involved with work on or with the fan at all times.

2. Introduction

This operating manual provides a description of the fan and information regarding handling of the product, from delivery to disposal.

This operating manual has been compiled to prevent personal injury, material damage to property, functional failure and harm to the environment. Adherence to the instructions is prerequisite for a safe, flawless operation and prolonged service life.

This operating manual exclusively refers to the fan, but not to the electrical equipment. Installation of an electric drive does not constitute the fan becoming electrical equipment.

This operating manual describes and represents optional components that may not be included within the scope of delivery. Many illustrations are simplified representations.

In the event that instructions for components or accessory parts are not available in the overall documentation, please notify us immediately in this regard. We would be more than happy to forward these missing documents to you.

We reserve the right to perform technical modifications to the fan within the context of improving performance characteristics and continued development.

This generally-applicable operating manual applies for all fans of this particular structural design. All fans are designed and produced in accordance with EC Machinery Directive 2006/42/EC.

Fan configuration in accordance with ATEX (optional):

This operating manual also applies for fans which are intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX).

2.1 Legal notices

This operating manual, as well as all text, drawings, pictures and other representations therein are protected by copyright. Copies of any type – including extracts thereof – as well as utilisation and/or disclosure of the content is not permitted without prior declaration of release in writing from the manufacturer and/or Reitz Holding GmbH & Co. KG. Infringements in this regard shall result in an obligation to provide compensation for damages. The assertion of additional claims remains reserved. This operating manual may only be forwarded without special approval of the manufacturer if forwarded as a complete document, and only together with the product with which it was supplied.

This operating manual is intended exclusively for personnel performing the following work on the fan:

Transport, mounting, commissioning and start-up, operation, operating, troubleshooting, maintenance, repair, shutting-down, dismantling, disposal.

Liabilities for direct and / or indirect damages that are related to the delivery and / or the usage of this operating manual are excluded, as far as legally permitted.

The manufacturer is not liable in particular for damage, whether direct or indirect, caused as a result of:

- Negligence of this operating manual
- Negligence of information pertaining to the fan
- Employment of insufficiently competent persons
- Unauthorised modifications
- Incompetent mounting and installation
- Incompetent electrical connection
- Improper operation
- Any use other than use as intended
- Deficient or incompetent maintenance
- Utilisation of accessory parts or spare parts other than specifically designated (original) parts

Moreover, the provisions stipulated in the delivery agreement, the General Terms and Conditions, as well as the delivery conditions of the manufacturer and the legal stipulations valid at the time of signing the contract apply for this operating manual.

Upon receipt of delivery, the entire consignment should be inspected for transport damage and completeness.

Document any transport damage, preferably with photos, and notify the following of this damage immediately:

- the shipping company
- the insurance company
- the manufacturer REITZ

2.2 EC Declarations

The EC Declaration of Conformity and the EC Declaration of Incorporation will be delivered as separate documents.

2.3 Utilisation of the operating manual

The following symbols appear in this operating manual with their meanings listed as follows:

➤ Handling instructions:
Perform these instructions step-by-step and in the specified sequence.

- Listings:
Enumerations are listed by dashes.



NOTICE!

Signifies useful information and explanations.



NOTICE!

Signifies separate documentation of the respective manufacturer.

2.4 Regulations and standards

The fan is configured in conformity with the standards specified as follows:

- DIN 24166 "Fans; technical delivery conditions" (German Industrial Standard)
- VDMA 24167 "Ventilatoren – Sicherheitsanforderungen" (Industrial fans, safety requirements - VDMA – Verband Deutscher Maschinen- und Anlagenbau eV – German Engineering Federation)
- DIN EN ISO 12100 "Safety of machinery - General principles for design"
- DIN EN ISO 12499 "Industrial fans - Mechanical safety of fans - Guarding"
- DIN EN 60204-1 "Safety of machinery - Electrical equipment of machines"
- DIN EN 61000-6-2 "Electromagnetic compatibility (EMC) - Immunity standard for industrial environments"
- DIN EN 61000-6-4 "Electromagnetic compatibility (EMC) - Emission standard for industrial environments"

The impeller has been balanced in accordance with DIN ISO 21940-11 "Mechanical vibration – Rotor balancing – part 11".

Fan configuration in accordance with ATEX (optional):

If the fan is intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), the fan complies additionally with the standards specified as follows:

- DIN EN 1127-1 "Explosive atmospheres - Explosion prevention and protection"
- DIN EN 14986 "Design of fans working in potentially explosive atmospheres"
- EN ISO 80079-36 "Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements"
- EN ISO 80079-37 "Explosive atmospheres - Part 37: "Non-electrical equipment for explosive atmospheres – Non-electrical type of protection constructional safety 'c', control of ignition sources 'b', liquid immersion 'k'.

3. Fundamental safety instructions

Please observe all safety instructions in this operating manual, as well as the safety instructions in the documentation of the respective manufacturers.

3.1 Symbols and warning information

A warning sign featuring the following symbols and instructions for the protection of persons, as well as protection against material damage to property and harm to the environment is mounted on the fan.



DANGER!

Risk of fatalities!

Serious physical injury with potentially fatal consequences.



DANGER!

Risk of fatalities due to electrocution!

Serious physical injury with potentially fatal consequences.

→ To be performed exclusively by an electrical specialist!



DANGER!

Risk of fatalities from entanglement, drawing-in or trapping!

Serious physical injury with potentially fatal consequences.

→ Warning against automatic operation!

**DANGER!****Risk of burns!**

Severe personal injury, burns.

→ Personal protective equipment must be worn!

**DANGER!****Risk of fatalities or severe damage to health due to inhalation or contact with eyes**

Release of hot or dangerous gases.

→ Personal protective equipment must be worn!

**WARNING!****Damage to hearing resulting from noise!**

→ Ear protectors must be worn!

**NOTICE!**

Read the operating manual.

**ATTENTION!****Harmful to the environment!**

→ Dispose of materials in an environmentally-friendly manner.

Fan configuration in accordance with ATEX (optional):

If the fan is intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), the warning sign mounted on the features the additional symbols:

**NOTICE!**

Observe the connection to the system earth and ensure the potential equalisation.

**NOTICE!**

Observe the safety instructions concerning the explosion protection.

3.2 Authorised personnel

Any involvement with the radial fan presupposes certain minimum levels of knowledge. Only qualified persons may perform work on the fan.

Additionally, each qualified person must be granted respective authorisation by the person responsible for the plant prior to commencing work.

See below the list of user groups and their assignment to the fan's phases of life.

Phase of life	Requirements on user group
Transport	Forklift operators with industrial truck certificate / crane operators with crane certificate / truck drivers with driving license and certificate for securing of loads
Mounting and assembly	Metalworkers, fitters, technicians (for mechanical assembly) / electricians, specialist electricians (for electrical connections) / programmer for integration in the plant control system
Commissioning/start-up	qualified personnel (e.g. engineers, technicians or similarly trained persons)
Normal operation, use	Operating personnel who have undergone on-site training and instruction from the relevant specialist personnel
Troubleshooting	Qualified personnel (e.g. engineers, technicians or similarly trained personnel)
Maintenance	Qualified personnel (e.g. engineers, technicians or similarly trained personnel), fitters, specialist electricians
Repair, servicing	Qualified personnel (e.g. engineers, technicians or similarly trained personnel), fitters, specialist electricians
Decommissioning	Qualified personnel (e.g. engineers, technicians or similarly trained personnel), fitters, specialist electricians
Recommissioning	Qualified personnel (e.g. engineers, technicians or similarly trained personnel), specialist electricians with fitter's support
Disassembly	Metalworkers, fitters, technicians (for mechanical work) / electricians / specialist electricians (for electrical connections) / programmer for integration in the plant control system
Disposal	Metalworkers, fitters, technicians / electricians, specialist electricians / environmental engineers, environmental technicians or persons with comparative training

Table 3-1 User groups

3.2.1 Qualified persons

Qualified persons in terms of the § 2, clause 7 German Health and Safety at Work Regulations (“Betriebssicherheitsverordnung BetrSichV”) is personnel that due to professional training, work experience and their current occupational activity has the necessary expert knowledge for testing the working devices.

Qualified persons performing work on the fan must also possess adequate knowledge in the following areas:

- Regulations for the prevention of accidents (e.g. German BG regulations)
- Safety regulations
- Directives and accepted engineering standards.

Furthermore, qualified persons must also fulfil the following requirements:

- Ability to assess the work allocated to them with regard to dangers
- Ability to identify and prevent possible hazards to persons, as well as material damage to property and harm to the environment

3.2.2 Electrical specialists

Work on the electrical components of the fan may only be performed by trained electrical specialists. These electrical specialists must also fulfil the requirements stipulated for qualified persons.

3.3 Personal protective equipment



Personal protective equipment must be worn as health protection and as prevention against injury at all times when performing work on the fan.

	DANGER
All tasks with and on the fan!	
Fatalities or extremely serious injuries as a result of transport, mounting, commissioning and start-up, operation, operating, troubleshooting, inspection, maintenance, repair, shutting-down, dismantling and disposal.	
→ Wear personal protective equipment. → Observe safety regulations. → Observe the regulations for the prevention of accidents.	

The minimum equipment includes:

- Head protection (e.g. protective helmet)
- Eye protection (e.g. safety glasses)
- Protective footwear (e.g. industrial footwear with steel toe caps)
- Hand protection (e.g. industrial gloves)
- Hearing protection (e.g. ear plugs)
- Reflective jacket
- Appropriate working clothes

NOTICE!



Additional protective equipment must be worn wherever required for the respective work or due to the hazardous nature of the work, e.g. safety harness as fall arrester.

The following Occupational Safety Regulations for safety and health at work apply in Germany (BG rules - BGR):

- Wearing of protective clothing (BGR 189)
- Wearing of foot and leg guards (BGR 191)
- Wearing of head protection (BGR 193)
- Wearing of ear protection (BGR 194)
- Wearing of industrial gloves (BGR 195)
- Use of protective equipment against falling (BGR 198)

Familiarise yourself with the respective rules, regulations and guidelines applicable to your situation (country in which installation is performed) and ensure that they are observed accordingly.



NOTICE!

When lifting heavy parts always use suitable lifting gears like overhead cranes or chain hoists. Avoid unfavourable postures. Pay attention to your health.

3.4 Overview of hazards

The following overview of hazards is generally applicable for all fans and all structural designs.

Familiarise yourself with the hazards and residual risks outlined herein for all tasks involving the fan.

Furthermore, observe all instructions conveyed in the respective chapters of this operating manual.

Manner of hazard	Location of hazard	Hazard	Preventative measures
Crushing, shearing, impact, tipping, falling	During transport of the fan and during assembly and installation	Risk of fatalities, injury to persons, material damage to property and harm to the environment	Never stand beneath suspended loads, always use appropriate lifting equipment, secure the load for transport, only set loads down on suitable ground surfaces, wear personal protective equipment
Rubbing, generation of sparks, risk of explosion	All rotating parts (e.g. impeller, motor shaft), hot surfaces	Risk of fatalities, injury to persons, material damage to property and harm to the environment	Observe minimum gap, avoid rubbing of rotating parts on fixed parts
Seizing, entanglement, drawing-in, trapping, friction, grazing	All rotating parts	Risk of fatalities, injury to persons, material damage to property and harm to the environment	Fit protective hoods, never reach into gap, wear close-fitting clothing, tie up and cover long hair, wear personal protective equipment, never stand in front of the inlet opening
Electric shock	All electrical parts	Risk of fatalities	Never carry out work on live parts, disconnect the power and secure against unintentional reactivation, cordon off the danger zone, replace faulty parts, renew insulation, only to be carried out by electrical specialists

Table 3-2 Overview of hazards and preventative measures (all structural designs)

Manner of hazard	Location of hazard	Hazard	Preventative measures
Squirting of fluids, leaking of gases, ejection of parts	Housing sectional splitting, connection points, inspection openings, shaft seal, condensate drain	Risk of fatalities, injury to persons, material damage to property and harm to the environment	Never switch on the fan unless the inspection opening and condensate drain are closed, seal any points of leakage with the impeller at a standstill, wear personal protective equipment
Cutting	All sharp edges, parts with corners	Physical injury (injury from cuts)	Wear personal protective equipment
Burns	Hot surfaces (e.g. housing, pedestal, bearings, lifting lugs, condensate drain)	Physical injury	Never touch hot surfaces, wear personal protective equipment, cordon off the danger zone
Noise	Fan in general	Physical injury (damage to hearing)	Wear ear protectors
Slipping, tripping, tumbling	Accessible parts of the fan (e.g. pedestal), area immediately surrounding the fan	Risk of fatalities, injury to persons, material damage to property and harm to the environment	Clean up any escaping lubricants, feed in the supply lines from above, maintain order and cleanliness, rectify tripping hazards (e.g. kinks in cables)
Falling	All working positions higher than 1 metre above the ground, all openings at height (e.g. inspection openings), ladders	Risk of fatalities, injury to persons, material damage to property and harm to the environment	Mount working platforms, erect secure barriers (not warning tape), wear fall arresters (e.g. safety harness), never carry out work from a ladder, never use damaged ladders, ensure stability of ladders
Combination of hazards	All danger zones	Risk of fatalities, injury to persons, material damage to property and harm to the environment	All work on the fan may only be carried out by qualified persons in compliance with the regulations for the prevention of accidents and safety regulations

Table 3-3 Overview of hazards and preventative measures (all structural designs) - continued

3.5 Obligations of the operating company and plant manufacturer

The operating company and/or plant manufacturer is responsible for:

- the necessary protective measures on site, such as barriers, enclosures, working platforms
- provision of personal protective equipment
- ensuring use of the fan as intended
- protection of the motor against overload and overheating
- transport, installation and commissioning of the fan
- inspections, maintenance, repairs on the fan and its accessories to ensure correct functioning
- rectification of faults
- decommissioning, recommissioning, dismantling and disposal of the fan



NOTICE!

Refer to further obligations of the operating company outlined in chapter 8.7 Electrical connection.

3.5.1 Intermediate storage

If the fan is not installed in the plant within three months following delivery, the operating company and/or the plant manufacturer is responsible for correct intermediate storage of the fan and its accessories.



NOTICE!

Refer to the separate instructions for storage and corrosion protection for fans.

3.5.2 Measures in the event of a power failure

The control system of the plant in which the fan is installed must be configured to ensure that no hazards are posed in the event of the power supply failing, for example as a result of inflow at inlet, back pressure or reverse flow at discharge.

Shut-off devices must be installed and incorporated in the control system of the plant in order to prevent this hazardous situation.

As the power supply is re-established, the original state must be restored once again.

3.6 Risk of slipping, tripping or tumbling

Ensure safety and the prevention of accidents for all tasks.

Ensure that all necessary measures for occupational health and safety and accident-prevention have been implemented by the operating company and/or the plant manufacturer.

	DANGER
Transport routes, installation sites, workplaces	
Fatalities or extremely serious injuries resulting from accidents.	
→ Observe the regulations for the prevention of accidents. → Observe safety regulations. → Ensure safety in the workplace.	

The following list outlines a few essential points for establishing safe working conditions:

- Mark out traffic routes, keep these routes clear and ensure that they are sufficiently illuminated
- Keep the working environment clean and tidy
- Level any unevenness of floors and installation sites
- Rectify any risk of slipping, e.g. snow and icy conditions, wet conditions, leaking lubricants
- Keep walking and standing areas clean and clear of obstacles
- When using ladders for access: wear a fall arrester (e.g. safety harness)
- Risk of falling when working higher than 1 metre above the ground, as well as with openings and depressions
- Secure hazard zones with fixed barriers or railings or working platforms. Never use warning tape!

4. Product description

The fan of KXE design is a welded single-stage radial fan. Power is transmitted from motor shaft to fan shaft by a flexible coupling.

There are four variants of bearing:

Lubricant	Bearings	For re-lubrication intervals and oil quantities, refer to chapter ...
Grease	Single bearing	13.2.1
Grease	Multiple bearing block	13.2.2
Oil	Single bearing	13.2.3 and 13.2.5
Oil	Multiple bearing block	13.2.4 and 13.2.5

Table 4-1 Variants of bearing

The bearing is lubricated with grease or oil.

All variants of bearing are described in this operating manual in their own respective chapter.



NOTICE!

Refer to the weight specifications and the dimensions in the separate general drawing of the fan.



Any independent modification on the fan will invalidate the declaration of conformity and is strictly prohibited. Modifications which have first been agreed with REITZ, however, are permitted.

4.1 Intended use

The fan has been constructed for the requirements specified in the order. Only the handled gas specified in the order may be conveyed.

Any other use is prohibited.

Any other use or excessive use is not considered use as intended. The manufacturer will not accept any responsibility for damage resulted in this regard.

Refer to the specifications in this operating manual and in the documents specified as follows:

- Fan data sheet
- Performance curve, Technical data (optional)
- General drawing of fan
- Additional drawings (optional)
- Documentation of the respective manufacturers
- and the information plates on the fan

Unless otherwise agreed, the following design conditions apply for electrical components within the scope of delivery:

- Maximum ambient temperature of +40 °C
- Maximum altitude of 1000 m above sea level for installation

Fan handling gas mixtures containing dust or other solid matter (optional):

If the fan is intended to handle gas mixtures containing dust or other solid matter the indication of the solid matter content can be found in the separate document "Technical data / Fan characteristic curve". Do not exceed the indication to the solid matter content there stated.

Fan configuration in accordance with ATEX (optional):

If the fan is intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), intended use is restricted to:

- the field of application
- the equipment group and category
- the explosion group for gases and vapours
- the gas or dust type
- the temperature class

These specifications can be obtained from the ATEX nameplate on the fan.

Utilisation of the fan is prohibited if the ambient conditions at the installation site do not comply with these specifications.

The boundary conditions for utilisation of the fan pursuant to Directive 2014/34/EU (ATEX) are:

- Maximum inlet temperature of -20 ... +60 °C
- Absolute pressure of 0.8 ... 1.1 bar
- Maximum oxygen percent by volume of 21 %

Deviations from these boundary conditions are permissible in the following exceptional cases:

- fan configured for inlet temperatures $> +60^{\circ}\text{C}$
- fan configured for inlet temperatures $< -20^{\circ}\text{C}$
- fan configured for ambient temperatures $> +40^{\circ}\text{C}$
- fan configured for ambient temperatures $< -20^{\circ}\text{C}$

In these exceptional cases the maximum permissible inlet temperature can be obtained from the following sources:

- on the nameplate on the fan
- on the fan data sheet
- in the declaration of conformity pursuant to Directive 2014/34/EU (ATEX)

In these exceptional cases the identification is augmented with the character "X":

Examples:

CE...Ex II 3D c T135°C X, (X = -52°C)

alternative:

CE... (Ex) II 2/3 D Ex h IIIA 135°C Db/Dc
 $-20^{\circ}\text{C} \geq T_{\text{amb}} \leq +45^{\circ}\text{C}$

CE... (Ex) II 2/3 G Ex h IIA T3 Gb/Gc X

alternative

CE... (Ex) II 2/3 G Ex h IIA T3 Gb/Gc
 $-20^{\circ}\text{C} \geq t_1 \leq +65^{\circ}\text{C}$

Additional instructions for fans pursuant to Directive 2014/34/EU (ATEX):

Any modification on the fan will invalidate the declaration of conformity. The declaration of conformity will retain its validity in the following exceptional cases:

- Modifications or conversions must be agreed with REITZ in writing in advance
- Following conversion work, a qualified person performs all necessary testing, such as gap measurements, vibration metering, checks for alignment
- This qualified person guarantees that the measuring results are within the required tolerances → Forward measurement records to REITZ for approval
- This qualified person guarantees that all possibilities for the generation of sparks are eliminated and that the minimum gaps are observed
- This qualified person is familiar with the fundamentals of explosion protection and the professional mounting and assembly of the fan components.

This qualified person must meet the following requirements:

- Has been assigned by the operating company for assembly of the components pursuant to §15 (1)-(3) and §16 of the German Health and Safety at Work Regulations
- Is able to identify and prevent possible hazards to persons, as well as material damage to property and harm to the environment
- Is familiar with utilisation of the measuring equipment

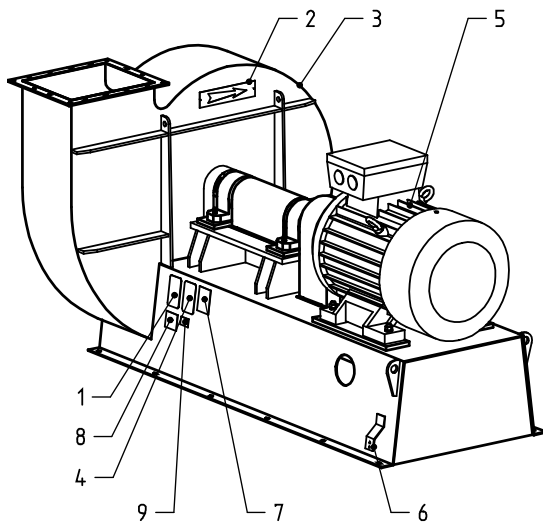
Should you require any assistance, please do not hesitate to contact us.

4.2 Product identification and labelling

The serial number of the respective fan must be specified for all queries with the manufacturer.

The serial number of the fan can be obtained from the following sources:

- On the nameplate on the fan
- On the fan data sheet
- On the equipment card
- In the spare parts list
- On the characteristic curve (technical data)
- On the overall drawing.



Observe all identification and labelling affixed to the fan, such as nameplates, warning signs, information plates and rotational direction indicators.

- 1 Nameplate
- 2 Rotational direction indicator
- 3 Warning sign "inspection opening" (optional)
- 4 Information plate for maintenance of the bearings
- 5 Motor nameplate
- 6 Earthing clamp (optional)
- 7 Warning sign "hazard symbols with explanations"
- 8 Sign "Read operating manual"
- 9 Sign "Attention – do not weld"

Fig. 4-1 Labelling and identification (example)

4.3 Technical data

CREITZ VENTILATOREN Radial Fan		Konrad Reitz Ventilatoren GmbH & Co. KG Konrad-Reitz-Strasse 1 D-37671 Hötter Radialventilator	
type Typ	KXE 080-000930-00		
serial no./year of constr. Fabr.-Nr. / Baujahr	369840	2019	
consignment no. Kom.-Nr.	200400 Sorfert		
temperature at inlet Ansaugtemperatur	t	NP 20 25	°C
density at inlet Dichte im Saugstutzen	P ₁	1,205 1,185	kg/m ³
volume flow Volumenstrom	V ₁	9 6,6	m ³ /min
total pressure increase Totaldruckerhöhung	Δp _t	800 774	daPa
shaft power Wellenleistung	PW	2,93 2,37	kW
speed Drehzahl	n	2900 2900	
max. speed max. Drehzahl	n _{max}	3074	rpm
max. temperature max. Temperatur	t _{max}	80	°C
			

Fig. 4-2 Nameplate (example)

The technical data for the fan can be obtained from the following sources:

- On the nameplate on the fan
- On the fan data sheet



NOTICE!

Additional flow data, as well as the design conditions can be obtained from the separate performance curve (Technical data).

CREITZ VENTILATOREN Radial Fan		Konrad Reitz Ventilatoren GmbH & Co. KG Konrad-Reitz-Strasse 1 D-37671 Hötter Radialventilator	
efficiency grade N 61, measurement category C, η _{ziel}	62,3		
type Typ	KXE 035-047515-00		
serial no./year of constr. Fabr.-Nr. / Baujahr	369845	2019	
consignment no. Kom.-Nr.	Rheinkalk Wülfrath		
temperature at inlet Ansaugtemperatur	t	NP 20 20	°C
density at inlet Dichte im Saugstutzen	P ₁	1,205 1,205	kg/m ³
volume flow Volumenstrom	V ₁	475 500	m ³ /min
total pressure increase Totaldruckerhöhung	Δp _t	355 341	daPa
efficiency grade Wirkungsgrad	η _{opt}	79,7	%
shaft power Wellenleistung	PW	35,21 35,97	kW
speed Drehzahl	n	1470 1470	
max. speed max. Drehzahl	n _{max}	1558	rpm
max. temperature max. Temperatur	t _{max}	80	°C
			

Fig. 4-3 Nameplate in accordance with ErP Directive (example)

Fan configuration in accordance with ErP Directive 2009/125/EC:

If the fan has been configured in accordance with ErP Directive 2009/125/EC, the following additional specifications are noted on the nameplate:

- Efficiency level
- Measurement category
- Overall efficiency η_{target}
- Efficiency η_{opt}

REITZ
VENTILATOREN
D-37671 Hoxter Konrad-Reitz-Straße 1



Fan
Ventilator KXE 056-075015-00

Serial no.
Fabrik-Nr. 381604

Deposit of the technical documentation with the
"Bundesanstalt für Materialforschung und -prüfung"
(BAM) in Berlin (German Federal Institute for
Material Research and Testing)
Hinterlegung der technischen Dokumentation bei der
"Bundesanstalt für Materialforschung und -prüfung"
(BAM) in Berlin
BAM Az.: 20011265; 2.1-53 588

Fan configuration in accordance with ATEX (optional):

If the fan is configured for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), an additional nameplate is mounted on the fan.

If the equipment category is 2D or 2G the nameplate also contains the information on the deposit of the technical documentation with the BAM Berlin (Bundesanstalt für Materialprüfung – German Federal Institute for Materials Testing).

If the fan is of other equipment category, the BAM information is omitted.

Fig. 4-4 Nameplate in accordance with ATEX (example)

Explosionsdruckstossfest / Explosion Pressure Shock-resistant			
Hersteller / manufacturer	REITZ Ventilatoren		
Fabr.-Nr. / Baujahr / serial no. / year built	123456 / 2017		
max. abs. Vordruck / max. abs. initial pressure	1,02	bar	
max. Temperatur / max. temperature	80	°C	
Behälterinhalt / vessel content	30	l	
Schrauben / screws	16x M10		
Anziehdrehmoment / tightening torque	49	Nm	
Werkstoff / material	1.0577		

Fig. 4-5 Vessel plate (example)

Pressure resistant or pressure shock proof fan configuration (optional):

If the fan has been constructed with pressure resistant or pressure shock proof configuration, an additional nameplate is mounted on the fan with the following specifications:

- Maximum pressure
- Maximum temperature
- Vessel content
- Test pressure

Maintenance of bearings Wartung der Lager

The information about “Maintenance of bearings” can be obtained from the corresponding sign on the fan.

Fan type Ventilatorotyp	KXE 080-000930-00				
Serial number Fabriknummer	369840				
Bearing type Wälzlager	<table> <tr> <th>non-driven end Lauftradseite</th><th>driven end Antriebsseite</th></tr> <tr> <td>6307</td><td>6307</td></tr> </table>	non-driven end Lauftradseite	driven end Antriebsseite	6307	6307
non-driven end Lauftradseite	driven end Antriebsseite				
6307	6307				
Lubricant (first filling) Schmierstoff (Erstbefüllung)	SHELL GADUS S2 V100 2				

Re-lubrication interval for bearing temperature 75°C Nachschmierfrist bez. auf 75°C Lagertemperatur

	first erstmalig	then every dann ca. alle	
Re-lubrication quantity per anti-friction bearing Nachschmiermenge je Wälzlager	6000	6000	op.h
	12		g

Bearings with grease quantity control are re-lubricated with a grease gun during operation. Please observe the corresponding instructions in the operating manual.

Lager mit Fettmengenreglerscheiben werden mit einer Fettpresse während des Betriebes nachgeschmiert. Hierzu sind die Informationen aus der Betriebsanleitung zu beachten.

Please use the first filling lubricant type for re-lubrication.

Als geeignetes Fett ist der Schmierstoff der Erstbefüllung zu verwenden.

Fig. 4-6 Maintenance of bearings (example)

4.4 Drive

Incorporate the drive of the fan in the control system of the plant.

Refer to the following chapters in this regard:

- Chapter 8.7 Electrical connection
- Chapter 9 Start-up
- Chapter 10 Operation

4.4.1 Motor

No description is provided in this manual for the actual motor. Relevant data for the motor can be obtained from the fan data sheet.

**NOTICE!**

Refer also to the separate instructions of the motor manufacturer.

4.4.2 Variable speed control (optional)

If the motor of the fan is connected to a variable speed control, refer to chapter 9.3.3 Variable speed control.

**NOTICE!**

Refer also to the separate instructions of the variable speed control manufacturer.

4.5 Additional components

A description of additional components can be obtained in these chapters:

- Coupling, refer to chapter 8.1 Aligning the coupling
- Bearing, refer to chapter 13.2 Bearings
- Shaft seal, refer to chapter 13.3 Shaft seal

5. Accessories

The fan can be equipped with various accessory parts.

5.1 Anti-vibration mounts

Refer to the following chapters in this regard:

- Chapter 7.4.1 Anti-vibration mount
- Chapter 7.4.2 Spring phonolators (spring type anti-vibration mounts)

5.2 Flexible connections

Refer to the following chapter in this regard:

- Chapter 8.4 Fitting the flexible connections

5.3 Monitoring devices

Refer to the following chapters in this regard:

- Chapter 8.8 Connecting the monitoring devices
- Chapter 8.9 Monitoring devices limit values

5.4 Additional accessories

Additional accessories include for example:

- Automatic re-lubrication device
- Axial fan for forced ventilation
- Brake
- Dampers (inlet guide vane, louvre damper, throttle damper, non-return valve)
- External oil supply system
- Silencers
- Sound cabin
- Actuators for dampers
- Round filters



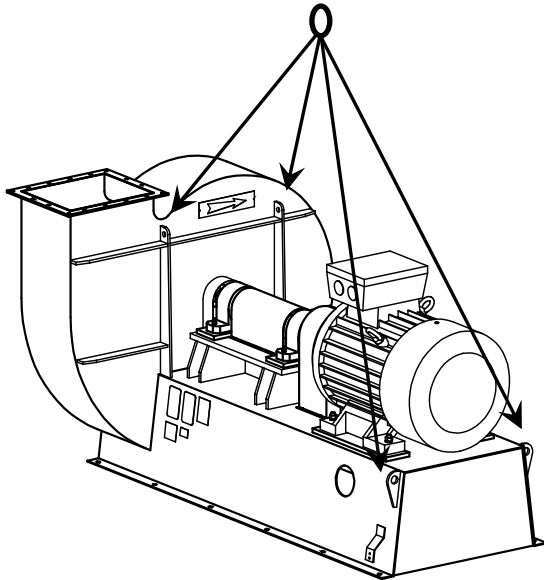
NOTICE!

Refer also to the separate instructions of the respective manufacturer.

6. Transport



Only persons who are trained in the handling of floor conveyor vehicles (e.g. forklift trucks) and lifting equipment (e.g. overhead cranes) are permitted to transport the fan.

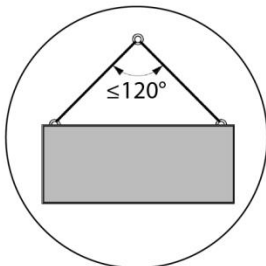


DANGER

Suspended load!

Fatalities or extremely serious injuries resulting from falling or tipping.

- Never stand beneath suspended loads.
- Use suitable means only for transport and lifting.
- Always use the positions indicated for slinging of the fan.
- Set the fan down only on suitable ground surfaces.

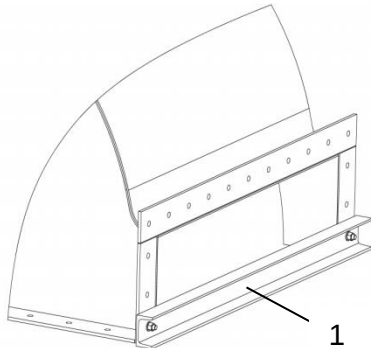


Transport the fan carefully ensuring that the fan is not subjected to collisions.

Fig. 6-1 Slinging points
(example)

6.1 Transport with a crane

The transport and lifting lugs on the fan are clearly indicated with the following symbol.



Attach the lifting tackles (e.g. crane hook) to the indicated positions only. If necessary, use suitable shackles.

Fan configuration with acoustic hood (optional):

Remove the acoustic hood prior to transporting with the crane in order to prevent damage.

If transporting with a forklift truck or pallet truck, the acoustic hood may remain fitted.

Fan configuration with transport bracing (optional):

Never use the transport bracing (1) for lifting.

Fig. 6-2 Transport bracing

6.2 Transport with a truck

Secure the fan and the accessories against tipping and sliding using suitable load securing equipment (e.g. lashing straps / chains).

The slinging points for the load securing equipment on the fan are clearly indicated with the following symbol.



Always attach the load securing equipment at the respective positions indicated.

6.3 Packaging

The fan and the accessories are packaged and are thus protected to the greatest possible extent against exposure to weather.

Types of packaging:

- Fan mounted on a wooden pallet or wooden timbers and shrink-wrapped in foil
- Accessories either with the fan or separate
- Fan and accessories in a sealed wooden crate (packaging for sea travel)

Only remove the complete packaging directly before assembly and installation.



ATTENTION!

Harmful to the environment!

Dispose of all packaging in an environmentally-friendly manner, and in accordance with the requirements of the respective country of use.

6.4 Transport damage

Document any transport damage, preferably with photos, and notify the following of this damage immediately:

- the shipping company
- the insurance company
- the manufacturer REITZ

	DANGER
Damaged fan or accessories!	
Fatalities or extremely serious injuries resulting from starting up damaged components.	
→ Never use damaged parts.	
→ Arrange for damaged parts to be repaired or replaced.	

6.5 Intermediate storage

If the fan is not installed in the plant within three months following delivery, the operating company and/or the plant manufacturer is responsible for correct intermediate storage of the fan and its accessories.

	WARNING
Storage of fan and accessories in the open air!	
Damage to electrical components (e.g. motor, monitoring devices) and risk of corrosion.	
→ Store the fan and accessories with protection against exposure to weather: • In enclosed rooms or storage areas with roof wherever possible. • When storing in the open air, the fan and the accessories must be packaged in weather-resistant sheeting as protection against the ingress of water.	



NOTICE!

Refer to the separate instructions for storage and corrosion protection for fans.

7. Installation

Go through the following sections of this chapter in the respective order.

	DANGER
Weight of fan!	
Fatalities or extremely serious injuries resulting from falling or tipping.	
→ Mount the fan horizontally. → Use shims as required. → If a risk of tipping is evident: Stabilise the fan and secure the fan with the substructure. → Ensure that the installation site is suitable to support the weight of the fan. → Never allow the fan to become deformed, warped or twisted by mechanical means.	

7.1 Preparing for installation

Inspect the installation site before commencing assembly and installation of the fan.

The installation site must meet the following requirements:

- Level, clean-swept and free of oil
- Affords stability
- Capable of supporting the weight of the fan and its accessories
- Equipped with suitable lifting devices and accessible for floor conveyor vehicles (e.g. forklift truck)
- Affords sufficient space and remains accessible for installation, maintenance and repair work (e.g. replacing the impeller)
- Not subjected to vibrations with the fan at a standstill, as well as during operation of the fan
- Affords sufficient space to allow cooling air for the motor
- Equipped with all required connections (e.g. power supply)
- Features all necessary protective measures (e.g. working platforms) prescribed within the context of regulations for the prevention of accidents or safety regulations



NOTICE!

Refer to the weight specifications and the dimensions in the separate general drawing of the fan.

7.2 Mounting and alignment

Level the fan at the installation site.

Inlet and discharge must be flush with the duct work. Differences in height can be compensated easily using shims.

	DANGER
Weight of fan!	
Fatalities or extremely serious injuries resulting from falling or tipping.	
→ Mount the fan horizontally. → Use shims as required. → If a risk of tipping is evident: Stabilise the fan and secure the fan with the substructure. → Ensure that the installation site is suitable to support the weight of the fan. → Never allow the fan to become deformed, warped or twisted by mechanical means.	



NOTICE!

For mounting in chemically-aggressive atmospheres, and when mounting in the open air, the shims used must be of stainless steel. Shims and other material required for installation can be obtained from the manufacturer.

7.3 Assembling the fan

If the fan has been delivered in several sections for reasons of transport, please refer to the chapters specified below:

- Chapter 7.3.1 Procedure
- Chapter 7.3.2 Screw connections

If the rotor has been delivered in a transport fixture, this transport fixture must also be retained for subsequent commissioning work and return deliveries.

The assembly site must meet the following requirements:

- Affords ample room
- Level, clean-swept and free of oil
- Affords stability
- Capable of supporting the weight of the fan and its accessories
- Equipped with suitable lifting devices or accessible for floor conveyor vehicles (e.g. forklift truck)



NOTICE!

Refer to the weight specifications and the dimensions in the separate general drawing of the fan.

If several fans of the same structural design are delivered together, the following components are clearly identified with a six-digit serial number (e.g. 300851):

- Housing lower sections
- Housing upper sections
- Rotors (impeller shaft bearing units)
- Other accessory parts

Only components featuring the same serial number may be assembled with one another.

7.3.1 Procedure

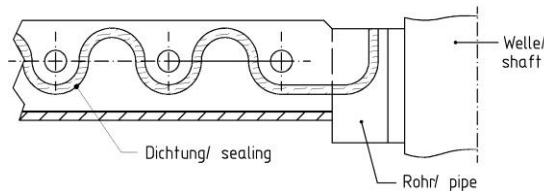


Fig. 7-1 Sealing material of partition flanges

Procedure for assembly of the fan:

- Mount and level the lower section of the fan
- Set the rotor down onto the fan lower section and align
- Clean the partition flanges with rags and remove solids residues with scraper. The surfaces must be clean and free of grease.
- Apply the sealing material in a sinuous line on the partition flange
- Mount the housing upper section carefully, ensuring that the sealing material does not shift or sustain damage
- Align the inlet cone and nozzle with one another and perform an inspection of the gap
- Observe the minimum gap and check several points around the circumference, refer to chapter 8.2 Checking the impeller gap
- The measured minimum gap between inlet cone and nozzle must be within the range of 3 ... 15 mm. Permissible deviations are indicated in the order-related drawings
- Wherever no other order-related minimum gaps are specified on the separate general drawing for the fan, the aforementioned specification applies for the minimum gap
- Align the shaft seal centrally to the shaft and screw with the housing (where featured: remove the transport locking plates of the shaft seal; transport locking is clearly identified with an information plate)
- If the motor has not yet been fitted:
Assemble, align and fit the motor
- Align the coupling halves with one another in accordance with the instructions of the manufacturer and chapter 8.1 Aligning the coupling
- Fit all protective covers
- Perform a final inspection for installation, see chapter 8.13 Checking the final installation condition
- Tighten the screws with the corresponding tightening torque, refer to Table 7-1 Tightening torques

7.3.2 Screw connections

Screw connections:

- Observe the insertion direction of the screws for vertical screw connections:
Always insert upwards from beneath, thus the screw head is at the bottom and the nut is at the top, ensuring that any loss of screws due to loosening of the nut is immediately evident
- Observe the tightening torques (refer to Table 7-1)

	Screws 8.8 * [Nm]	Screws 10.9 * [Nm]	Screws (stainless steel) A4 / 70* [Nm]
M6	10	14	6
M8	25	35	16
M10	49	69	32
M12	86	120	56
M16	210	295	135
M20	410	580	280
M24	710	1000	455
M27	1050	1500	-
M30	1450	2000	1050
M36	2400	3555	-
* Property class			

Table 7-1 Tightening torques

Wherever no other tightening torques are specified in the order-related drawings, the specifications here apply.

Exception:

Tightening torques for couplings are specified by the coupling manufacturer in the separate instruction



NOTICE!

Refer also to the separate instructions of the coupling manufacturer.

7.4 Securing the fan

Secure the fan with the substructure prior to initial commissioning.

	DANGER
Securing the fan to the installation site!	
Fatalities or extremely serious injuries resulting from tipping.	
→ Mount the fan horizontally. → Secure the fan with the substructure. → Observe the limit values for vibrations, refer to chapter 8.9.1.	



NOTICE!

Approval for securing of the fan to the installation site must be granted by the construction supervisor or by the person responsible for the plants (e.g. positions of boreholes, depths of boreholes, fixing material).

7.4.1 Anti-vibration mount

Fan configuration with anti-vibration mount (optional):

There are two variants:

- Anti-vibration mount with mounting plate
- Anti-vibration mount without mounting plate

The specifications in Table 7-2 correspond with the specifications for Fischer brand high-performance anchors FH II – B. For the utilisation of alternative high-performance anchors, the specifications of the respective manufacturer apply

Specifications for the respective anti-vibration mount can be obtained from the following sources:

- on the equipment card
- on the spare parts list

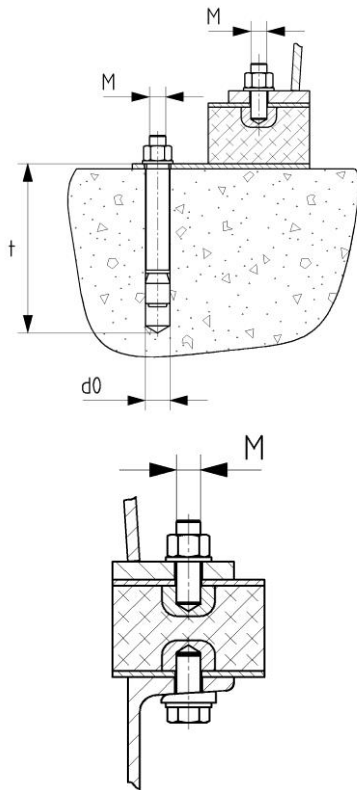


Fig. 7-2 Securing of anti-vibration mounts

SPZ	Drill d0 [mm]	Min. drilling depth t [mm]	Thread	Tightening torque [Nm]
423 – 050...	15	115	M10	38
423 – 075...	18	130	M12	80
423 – 100...	24	150	M16	120
423 – 150...	24	150	M16	120

Table 7-2 Boreholes and tightening torques

7.4.2 Spring phonolators (spring type anti-vibration mounts)

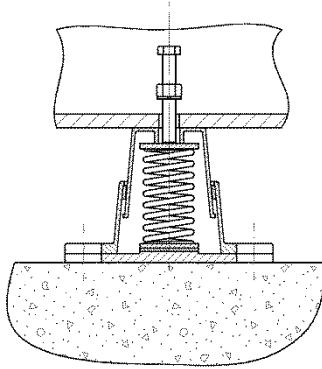


Fig. 7-3 **Securing of spring phonolators**

Fan configuration with spring phonolators (optional):

The applied spring phonolator is specified

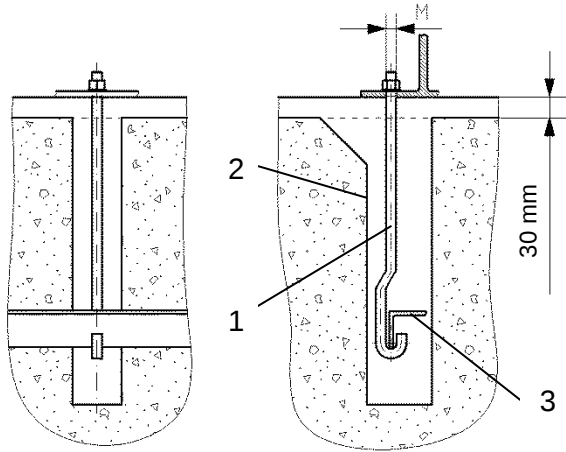
- on the equipment card
- on the spare parts list



NOTICE!

Refer to the separate instructions of the spring phonolator manufacturer.

7.4.3 Stone bolts



- 1 Stone bolts in accordance with DIN 529 Form B
- 2 Anchor box
- 3 Angle iron

Fig. 7-4 Securing of stone bolts

Fan configuration with stone bolts (optional):

Concrete foundations with anchor boxes must be prepared at the installation site in accordance with our specifications. Ensure precise positioning of the anchor boxes.

Further information regarding fastening using stone bolts can be obtained from the separate fan drawings.

Once the fan has been mounted and levelled, the stone bolts must be tightened with the tightening torque indicated in Table 7-3, unless otherwise specified in the general drawing.

The anchor boxes are then to be filled with concrete.



NOTICE!

Apply a grouting to a height of 30 mm to compensate for any unevenness. The grout must comply with the DAfStb Directive (Directive of the German Committee for Reinforced Concrete) or a comparable directive for high-tensile, cement-bonded and non-shrink grout, e.g. BETEC 140 or PAGEL V1/50.

	Tightening torque [Nm] *
M 24	144
M 30	290
* For stone bolt in accordance with DIN 529 form B, property class 4.6	

Table 7-3 Tightening torques for stone bolts

7.5 Insulation of the fan

If insulation for the fan or a provision for on-site insulation is included within the scope of delivery, refer to the following section.

There are three variants:

- Insulation realised entirely at the factory
- Insulation not entirely realised at the factory (insulation must be finalised at the construction site)
- Provision from the factory for implementation of complete insulation at the construction site

The variant of insulation applicable for your respective installation is specified at the following sources:

- On the fan data sheet
- On the general drawing of the fan



NOTICE!

Our separate insulation requirement is available upon request in the event that insulation work must be performed on site.

Perform all insulation work prior to mounting the fan wherever insulation work will be rendered impossible following mounting due to insufficient space or other impairments.

8. Measures prior to commissioning



It is possible that components of the power train are inadvertently shifted during transport. Likewise, components of the intake mechanism are also susceptible to shifting. This in turn will lead to misalignment of the components with one another.

Alignments of the components of the power train must therefore be checked prior to initial commissioning and rectified as necessary.

	DANGER
Damaged coupling!	
Fatalities or extremely serious injuries as a result of explosion caused by sparks generated by breakage of the coupling.	
→ Align the coupling, refer to chapter 8.1. → Never use damaged couplings or couplings exhibiting signs of rusting. → Never switch on the fan if the protective covers for rotating parts are not fitted.	

	DANGER
Rubbing of the impeller!	
Fatalities or extremely serious injuries as a result of explosion caused by sparks generated by rubbing.	
→ Ensure that all possibilities of rubbing against other parts for the impeller are eliminated. → Observe the minimum gap, refer to chapter 8.2.	

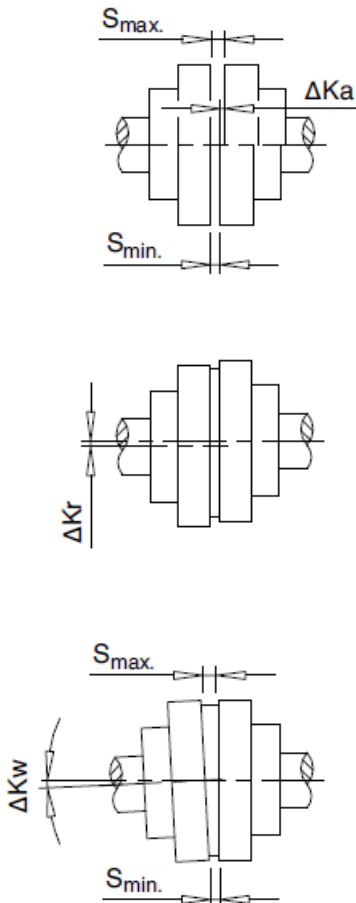


Go through the following sections of this chapter in the respective order.

8.1 Aligning the coupling

Procedure for aligning the coupling:

- Remove the protective cover
- Check alignment of the coupling halves with one another and compare with the maximum permissible values. Refer to Table 8-1 and Table 8-2
- Do not exceed the maximum permissible values for axial offset (ΔK_a), radial offset (ΔK_r) and angular offset (ΔK_w)
- Specifications for the respective coupling can be obtained from the following sources:
 - On the fan data sheet
 - In the spare parts list
- Loosen the fastening screws for motor and bearing
- Perform fine adjustment and align the coupling
- Where necessary, insert thin shims to compensate any differences in height
- Tighten the fastening screws with the tightening torque prescribed in the instructions of the coupling manufacturer; refer to the separate instructions for the coupling
- Mount the protective cover of the coupling



Axial clearance s

Axial offset (ΔK_a)

Radial offset (ΔK_r)

Angular offset (ΔK_w)

Example:

Make: Siemens Flender
 Series: N-Eupex
 Size: A 315
 Fan speed: 1,500 rpm

Maximum permissible offsets in accordance with Table 8-1:

Axial clearance s : 5.5 mm
 Maximum axial offset (ΔK_a): ± 2.5 mm
 Maximum radial offset (ΔK_r): 0.4 mm
 Maximum angular offset (ΔK_w): 0.1 degrees

Fig. 8-1 Coupling offsets

**NOTICE!**

Check radial offset with a straightedge, check angular offset with a feeler gauge.

**NOTICE!**

Refer also to the separate instructions of the coupling manufacturer.

Coupling configuration in accordance with ATEX (optional):

If the coupling is intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), corresponding identification is provided in this regard.

Regard the type of configuration when ordering spare parts.

Specifications in the table are general reference values for the maximum permissible offsets.

An alignment precision of ≤ 0.1 mm is to be targeted for all three offsets with extremely high demands regarding the quiet running and for impeller speeds $> 3,000$ rpm.

The following tables show the reference values for these couplings:

- Series N-EUPEX, Type A, B
- Series RUPEX, Type RWN, RWS

The applied coupling is specified

- on the fan data sheet
- on the spare parts list

N-EUPEX series, type A, B															
		80	95	110	125	140	160	180	200	225	250	280	315	350	400
n [rpm]	S [mm]	3	3	3	3	3	4	4	4	4	5.5	5.5	5.5	5.5	5.5
	ΔK_a [mm]	± 1	± 1	± 1	± 1	± 1	± 2	± 2	± 2	± 2	± 2.5	± 2.5	± 2.5	± 2.5	± 2.5
3000	ΔK_r [mm]	0.15	0.15	0.15	0.15	0.2	0.2	0.2	0.2	0.25	-	-	-	-	-
	ΔK_w [degrees]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	-	-
1500	ΔK_r [mm]	0.2	0.2	0.2	0.25	0.25	0.3	0.3	0.3	0.35	0.35	0.4	0.4	0.5	0.5
	ΔK_w [degrees]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1000	ΔK_r [mm]	0.2	0.25	0.25	0.25	0.3	0.35	0.35	0.4	0.4	0.4	0.5	0.5	0.6	0.6
	ΔK_w [degrees]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 8-1 Reference values for maximum permissible offsets, N-EUPEX series, type A, B

RUPEX series, type RWN, RWS															
		162	178	198	228	252	285	320	360	400	450	500	560	630	710
n [rpm]	S [mm]	3.5	3.5	3.5	3.5	3.5	4.5	4.5	4.5	4.5	5.5	5.5	6.0	6.0	7
	ΔK_a [mm]	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5	± 1.5	± 2.0	± 2.0	± 2.0
3000	ΔK_r [mm]	0.15	0.2	0.2	0.2	0.25	0.25	0.3	0.3	-	-	-	-	-	-
	ΔK_w [degrees]	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	-	-	-	-	-	-
1500	ΔK_r [mm]	0.25	0.25	0.3	0.3	0.35	0.4	0.4	0.45	0.5	0.55	0.6	0.65	0.75	0.8
	ΔK_w [degrees]	0.1	0.09	0.09	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1000	ΔK_r [mm]	0.3	0.35	0.35	0.4	0.45	0.45	0.5	0.55	0.6	0.7	0.75	0.8	0.9	1.0
	ΔK_w [degrees]	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.09	0.09	0.08	0.08	0.08

Table 8-2 Reference values for maximum permissible offsets, RUPEX series

8.2 Checking the impeller gap

There are two variants of impeller configuration:

- Impeller with shroud
- Impeller without shroud (unshrouded impeller)

Variant "impeller with shroud":



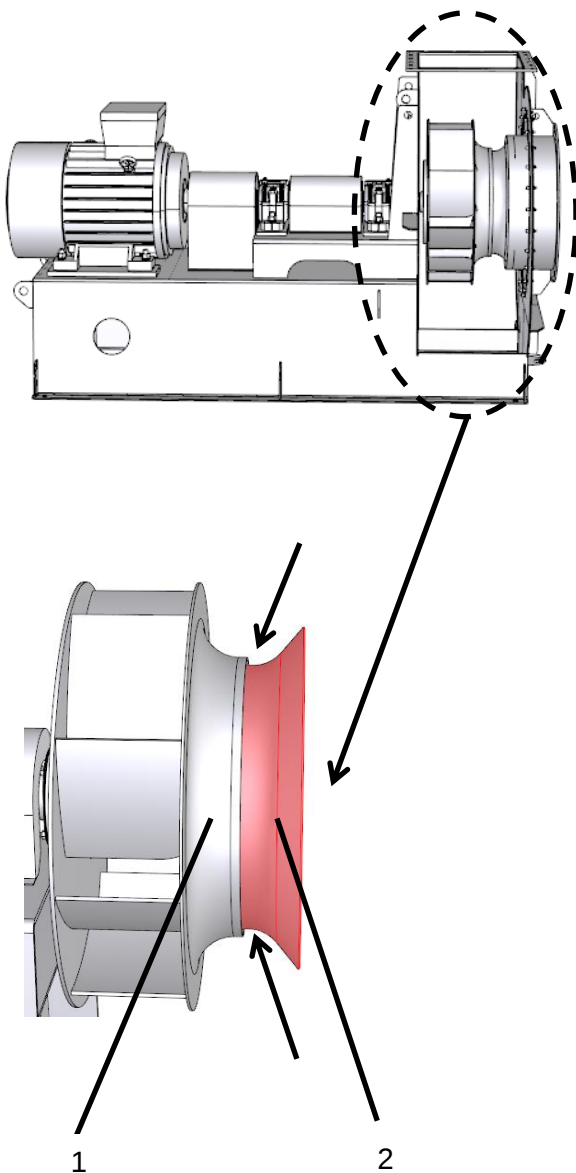
The nozzle (rotating part) must indicate sufficient clearance to the inlet cone (fixed part) around the entire circumference to ensure that any possibility of rubbing is eliminated. Never allow sparks to be generated as a result of rubbing.

Procedure for checking the gap:

- Measure the minimum gap at a minimum of eight measuring points around the circumference (e.g. using a taper plug gauge)
- The minimum gap measured between inlet cone (2) and nozzle (1) must be within the range 3 ... 15 mm. Permissible deviations are indicated in the order-related drawings
- Mark the position of the impeller and then turn the impeller around 90° degrees by hand (a quarter of a full turn)
- Measure the minimum gap once again at a minimum of eight measuring points around the circumference
- Continue to turn the impeller around a quarter of a full turn in the same direction and measure the minimum gap
- Repeat the measurements and turning of the impeller until the marking has once again reached its original position following one complete turn



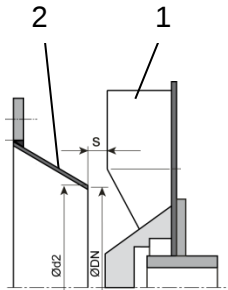
If the measured minimum gaps are less than 3 mm, the inlet cone must be aligned to the nozzle. Loosen the screw connections on the housing and position the inlet cone concentrically to the nozzle.



- 1 Nozzle
- 2 Inlet cone

Fig. 8-2 Impeller gap

Variant “impeller without shroud (unshrouded impeller)”:



The unshrouded impeller (rotating part) must indicate sufficient clearance to the inlet cone (fixed part) around the entire circumference to ensure that any possibility of rubbing is eliminated. Never allow sparks to be generated as a result of rubbing.

Procedure for checking the gap:

- 1 Unshrouded impeller
- 2 Inlet cone

- Measure the clearance of each blade (1) to the inlet cone (2)
- The measured clearance may not be less than 10 mm

Fig. 8-3 Impeller gap for unshrouded impeller

8.3 Connecting the duct work



The fan may only ever be switched on if the duct work is connected to inlet and discharge.

Exception:

For free inlet fans, the corresponding accessory is to be fitted in place of the duct work at inlet (e.g. round filter, silencer, suction box with additional accessory, protective grid).

	DANGER
Inlet of fan!	
Fatalities or extremely serious injuries resulting from suction.	
→ For free inlet fans: • Never stand in immediate proximity of the inlet. • Remove all objects from the area in front of the inlet. • Cordon off the area in front of the inlet.	

Work must be performed in the sequence as follows:

- Remove the transport shutters and shrink-wrap foil from the inlet and discharge of the fan
- Guide the duct work of the plant toward the inlet and discharge of the fan
- Fit the flexible connections (optional) to inlet and discharge → refer to chapter 8.4
- Align the duct work to the fan openings and mount onto the fan, ensuring that the duct work is not exhibiting any warping

	DANGER
Connection of the duct work to the fan!	
Fatalities or extremely serious injuries as a result of explosion caused by sparks generated by rubbing of the impeller due to warping of the fan.	
→ Align the duct work to the fan before connecting the duct work to the fan. → Where necessary, ensure fine precision of the alignment by readjusting the fan to the duct work (e.g. using shims). → Stabilise the duct work by installing suitable supporting structures. → Never allow the weight of the duct work to be upheld by the fan. → Never allow the fan to become deformed, warped or twisted by mechanical means.	



NOTICE!

Ensure as smooth and as unobstructed an inflow and outflow of the fan as possible. Do not position pipe bends and transition pieces directly at the fan openings. Intermediate sections in the duct work reduce the risk of stalling and vortexes.

8.4 Fitting the flexible connections

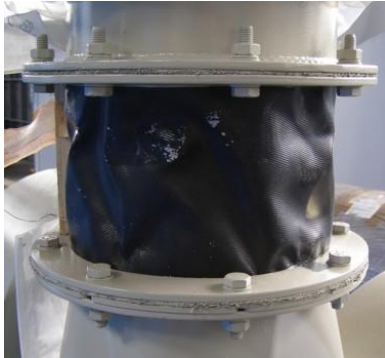


Fig. 8-4 Fitted flexible connection

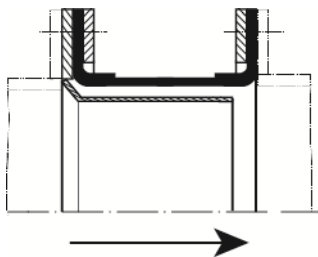


Fig. 8-5 Chute (standard configuration) in direction of flow

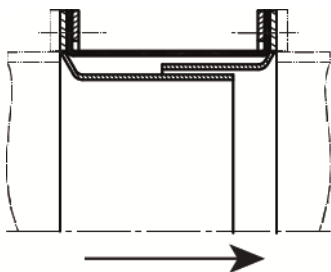


Fig. 8-6 Chute (overlapping configuration) in direction of flow

Fit the flexible connections after the duct work of the plant has been guided toward the inlet and discharge of the fan.

Please consider the following points when fitting the flexible connections:

- Install the flexible connections together with the chutes (optional)
- Install the chutes (optional) in the direction of flow
- Never subject the flexible connections to pressure or negative pressure
- Avoid contact with sharp points and sharp-edged objects
- Always fit the flexible connections directly at the inlet or the discharge of the fan
- Exception: For fans featuring damper, the flexible connection is to be fitted on the damper
- Ensure correct insertion direction of screws:
The ends of the screws must always point away from the flexible connection, even if this results in the screw head being on top and the nut being on the bottom
- Observe the tightening torques of the screws, refer to Table 7-1 in chapter 7.3.2 Screw connections
- Retighten the screws after a few days of operation

NOTICE!



Flexible connections have the following functions:

- Compensation of minor misalignments
- Accommodating changes in length
- Preventing conveyance of noise and vibrations



NOTICE!

Refer to the separate instruction of the flexible connection manufacturer.

There are several variants of flexible connections:

- Flanged flexible connections with back flanges
- Hose flexible connections with hose clamps
- Belt-type flexible connections with insulation packing
- Stainless steel flexible connections

Observe the following additional information.



NOTICE!

For flanged flexible connections with back flanges:

Push the flexible connection carefully over the chute together with the back flanges, then fit and install between the mounting flanges of the fan opening and duct work.



NOTICE!

For hose flexible connections with hose clamps:

Push the flexible connection carefully over the duct work and fix with hose clamps.

8.5 Activating the re-lubrication devices



Fig. 8-7 Re-lubrication device on the bearing (example)

The fan can be equipped with automatic re-lubrication devices.

Re-lubrication devices can be applied:

- for re-lubrication of the bearings
- to enhance the sealing of the shaft seal

Procedure:

- The re-lubrication devices (grease injector) must always be activated prior to initial commissioning of the fan.

- Note down the activation date and the date of the exchange:

Example:

Activation in January 2020: 01/2020

Replacement in July 2020: 07/2020

(in case the dispensing period is set to 6 months)

- Replace the grease cartridges and/or the re-lubrication devices upon expiry of the set dispensing period.

Observe the correction values for the calculation of the dispensing period, see table Table 8-3 Correction values for ambient temperatures.



Fig. 8-8 Cartridge for re-lubrication device on the shaft seal (example)



NOTICE!

Refer also to the separate instructions of the manufacturer of the re-lubrication devices for installation and activation.



NOTICE!

Refer also to the following chapters:

- chapter 8.5.1 Bearings
- chapter 8.5.2 Shaft seal



NOTICE!

The dispensing periods depend on the ambient temperature. Use the correction values of Table 8-3

Correction values for ambient temperatures when setting and modifying the dispensing periods.

The indicated dispensing periods refer to an ambient temperature of +25°C.

Where the ambient temperature differs from this value, calculate an adapted dispensing period.

Example:

original dispensing period = 6 Monate

ambient temperature = +45°C

- correction value = 0,50
- adapted dispensing period: $6 \times 0,50 = 3$
- replace the re-lubrication device every 3 months.

dispensing period modification subject to ambient temperatures	
ambient temperature	correction value
-15°C	x 6,00
-5°C	x 4,00
+5°C	x 2,00
+25°C	x 1,00
+45°C	x 0,50
+65°C	x 0,15

**Table 8-3 Correction values for
ambient temperatures**

8.5.1 Bearings

Re-lubrication device for the bearing:

Regular re-lubrication by the maintenance personnel is no longer applicable when using automatic re-lubrication devices (grease injectors).

Set the dispensing period at the grease injector in accordance with the respective size of the bearing in accordance with Table 8-5.

Specifications for the respective bearing can be obtained from the following sources:

- On the corresponding information plate on the fan
- On the fan data sheet
- In the spare parts list

The dispensing periods were determined taking the following conditions into account:

- Grease injector with 250 grams of grease
- Fan operation of 80 operating hours per week

Setting of the dispensing periods can be modified if the actual conditions deviate from these conditions.

	WARNING
Fan shaft bearings!	
Damage to the bearing as a result of insufficient lubrication.	
→ Ensure sufficient lubrication of the bearings at all times with the measures specified as follows: • Activate the automatic re-lubrication device (grease injector). • Ensure correct connection of the lubricating line. • Inspect the lubricating line for blockages. • Replace used or faulty re-lubrication devices (grease injectors).	

Housing	Rolling bearing	Dispensing period for an ambient temperature of +25°C
SN...		[Months]
607	2307KC3	12
608	2308KC3	12
609	2309KC3	12
610	2310KC3	12
611	2311KC3	12
612	2312KC3	12
613	2313KC3	12
615	2315KC3	12
616	2316KC3	12
617	2317KC3	12
618	2318KC3	12
619	2319KC3	12
515	22215KC3	9
516	22216KC3	9
517	22217KC3	9
518	22218KC3	6
519	22219KC3	6
520	22220KC3	6
522	22222KC3	3
524	22224KC3	3

Table 8-4 Dispensing periods for grease injectors for single bearings (recommended)

Observe the correction values for the calculation of the dispensing period, see Table 8-3 Correction values for ambient temperatures.

Information regarding multiple bearing blocks:

Set the dispensing period for all multiple bearing blocks, regardless of bearing size, to 12 months at the grease injector.

8.5.2 Shaft seal

Re-lubrication device for the shaft seal:

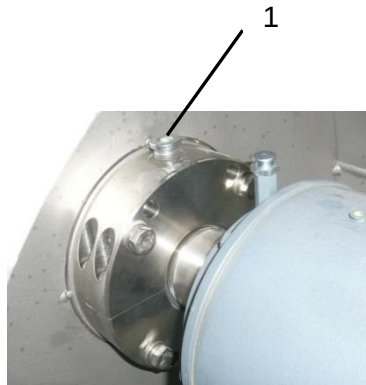
Grease is pressed into the sealing gap via the automatic re-lubrication device to increase effectiveness of the shaft seal.

Handled gas of fan:

If the fan is used for the conveyance of explosive or toxic media, or media which is harmful to health, refer to the information on hazards as follows.

	DANGER
Ineffective shaft seal!	
Fatalities or extremely serious injuries resulting from explosion. Hazard to health as a result of leaking gases.	
→ Seal the shaft seal with the impeller at a standstill using the measures specified as follows: • Activate the automatic re-lubrication device (grease injector). • Replace used or faulty re-lubrication devices. • Replace damaged or worn sealing rings. • In the event of damage or the onset of rust, replace the complete shaft seal.	

8.6 Connecting the shaft seal



1 Connection for barrier gas

Fig. 8-9 Shaft seal with connection for barrier gas

If the fan is equipped with a shaft seal which has been provided for connection to a barrier gas line, the shaft seal must be connected to the barrier gas line before starting up the fan for the first time.

The standard configuration features connection thread G1/2".

	DANGER
Ineffective shaft seal!	
Fatalities or extremely serious injuries resulting from explosion. Hazard to health as a result of leaking gases.	
→	
Seal the shaft seal with the impeller at a standstill using the measures specified as follows:	
• Connect the shaft seal to the barrier gas line. • Ensure that sufficient barrier gas pressure is available at all times. Perform pressure measurements. • Inspect all connections for leaks. • Replace damaged or worn sealing rings. • In the event of damage or the onset of rust, replace the complete shaft seal.	



NOTICE!

Set the barrier gas pressure at the shaft seal approx. 30 ... 50 mbar higher than the actual pressure of the medium within the fan housing (perform a measurement).



NOTICE!

Refer also to the separate instructions of the shaft seal manufacturer.

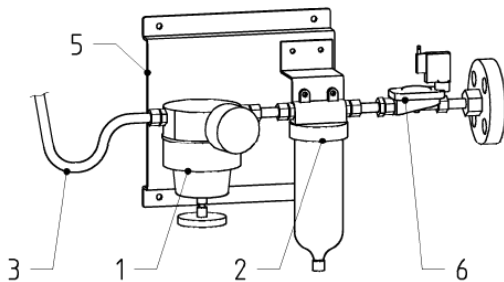
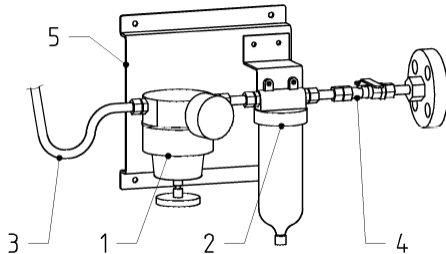
Configuration of shaft seal with barrier gas instrument panel (optional):

If the shaft seal is connected to a barrier gas instrument panel, or is configured for this purpose, set the barrier gas via the pressure controller.

Change the filter in accordance with the instructions of the instrument manufacturer.

There are two variants of the instrument panel for shaft seals with barrier gas supply:

- With ball valve (4)
- With solenoid valve (6)



NOTICE!

Refer also to the separate instructions of the instrument manufacturer.

- 1 Pressure controller
- 2 Filter with water separator
- 3 Hose connection with shaft seal
- 4 Ball valve
- 5 Stainless steel pedestal
- 6 Solenoid valve

Fig. 8-10 Instrument panel for shaft seals with barrier gas supply (example)

8.7 Electrical connection



All tasks on the electrical connections may only be carried out by electrical specialists.

Refer to the guidelines of the local energy supplier.



NOTICE!

The fan itself does not feature an ON/OFF main switch, an EMERGENCY STOP device or EMERGENCY OFF device. We recommend connection of an EMERGENCY OFF device to the fan.

	DANGER
All electrical connection points!	
Fatalities or extremely serious injuries resulting from electric shock.	
→ Ensure that the supply of voltage to the connecting cables has been disconnected. → Secure against unintentional activation and mount an information sign in this regard. → Only the electrical specialist may perform work on the electrical connections. All other persons must remain outside of the danger zone. → Secure live parts, as well as other parts in immediate proximity against direct contact. → Cordon off the danger zone.	

Please observe the obligations of the operating company prescribed as follows:

➤ Avoidance of bearing currents:

The operating company is responsible for protection of the electrical drive components (motor, variable speed control, etc.) against harmful bearing currents.

➤ Avoidance of stray currents:

The operating company is responsible for the avoidance of stray currents. These currents can be harmful to components of the fan. Stray currents are electric currents which do not flow through the electrical mains network.

These currents could cause:

- corrosion and pitting
- the development of new magnetic fields
- disruptions of existing magnetic fields
- faults in electrical components (monitoring equipment, connecting cables, data lines)

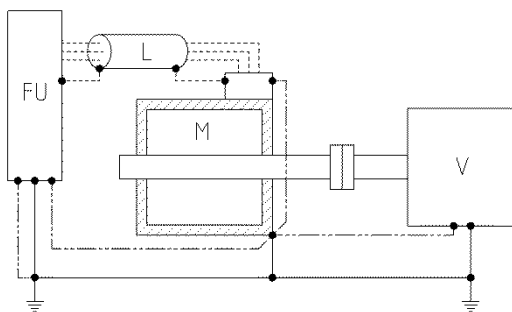
➤ Optimum potential equalisation system:

The operating company is responsible for the earthing of all drive components. Connect all electrical and mechanical drive components to the system earth.

When using variable speed control, an optimum connection of the drive components with high-frequency technology must be additionally established. Use shielded cables for the connection of variable speed control and motor. Connect the variable speed control to the system earth with special cables featuring good high-frequency properties.

Ensure that an optimum potential equalisation exists throughout the entire drive system. Particular attention must be afforded here to technically sound connection of the potential equalisation in the terminal box of the motor.

Perform measurements of the electromagnetic compatibility. Electric equipment should not interfere with other equipment, or allow interference from other equipment.



FU	Variable speed control
L	Cables with good high-frequency properties
M	Motor
V	Fan

Fig. 8-11 Drawing of potential equalisation system

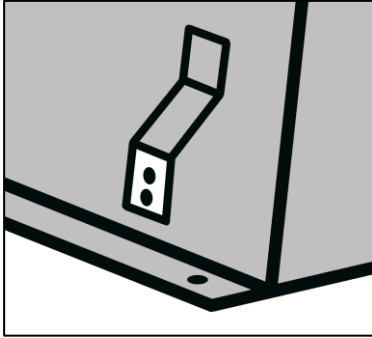


Fig. 8-12 Earthing clamp (example)

Fan configuration with earthing clamps (optional):

If the fan and/or accessories are configured with earthing clamps, the fan must be connected to the system earth prior to initial activation. The earthing cable is not included within the scope of delivery.



Use a suitable earthing cable and ensure complete earthing of the fan.

Fan configuration in accordance with ATEX (optional):

If the fan is intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), the electrical installation must comply with the requirements of DIN EN 60079-14.

8.8 Connecting the monitoring devices

Fan configuration with monitoring devices (optional):

Wherever monitoring devices are included within the scope of delivery, they are generally delivered as individual parts. Professional installation and setting must be performed on site by electrical specialists.



All tasks on the electrical connections may only be carried out by electrical specialists.

Refer to the guidelines of the local energy supplier, as well as the standard valid for Germany:
DIN EN 60204-1 "Safety of machinery - Electrical equipment of machines"

Familiarise yourself with the respective rules, regulations and guidelines applicable to your situation (country in which installation is performed) and ensure that they are observed accordingly.



NOTICE!

Refer to the separate instructions of the respective manufacturer of the monitoring devices.

The following monitoring devices may be installed:

- Bearing vibration monitoring
- Bearing temperature monitoring
- Impeller speed monitoring
- Motor speed monitoring
- Bearing condition monitoring
- Bearing oil level monitoring
- Handled gas temperature monitoring



NOTICE!

Refer to the instructions in chapter 8.9 Monitoring devices limit values.

Fan configuration in accordance with ATEX (optional):

If the fan is intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), the vibration monitoring must imperatively be installed:

- When the equipment category on the ATEX nameplate is 2D (internal) or 2G (internal),
- When there is the risk of deposits of sticking material to the impeller,
- When there is the risk of damage to the impeller due to abrasion/wear.

The information about the equipment category 2G or 2D can be obtained from the following sources:

- On the additional ATEX nameplate on the fan, see chapter 4.2 Product identification and labelling
- On the fan data sheet in the section “Fan design” in the field “ATEX marking”.

8.9 Monitoring devices limit values

Refer also to chapter 8.8 Connecting the monitoring devices in this regard.

Set the monitoring devices in accordance with the following limit values for “pre-alarm” and “disconnection”.

Incorporate these limit values in the control system of the plant. If the limit values for “pre-alarm” and “disconnection” are exceeded, a visual signal must be displayed or an acoustic signal sounded in the control room.



For values above the limit values for “disconnection”, shut down the fan immediately and rectify the cause of the fault. Only when the fault has been rectified may the fan be restarted.

	DANGER
Extremely high fan vibrations or bearing temperatures!	
Fatalities or extremely serious injuries resulting from tipping due to fixings of the fan becoming loose, or due to the ejection of parts.	
→ Ensure continuous monitoring of the fan condition. → Check functional efficiency of the monitoring devices. → Shut down the fan if the limit values are exceeded. Refer to chapter 8.9. → Rectify the faults. Refer to chapter 11.	

Measures to be implemented if the limit values are exceeded:

Exceeding limit value for ...	Measure
Pre-alarm	Operation of the fan permissible for a few minutes under observation. The fan could sustain damage.
Disconnection	Shut down and switch off the fan immediately. Rectify the fault. Refer to chapter 11.

Table 8-5 Measures to be implemented if the limit values are exceeded

8.9.1 Vibrations

Limit values for “pre-alarm” and “disconnection”:

Machinery class	Rated motor power	Substructure or type of assembly	Measure	Limit values for effective velocity v_{eff}
	[kW]			[mm/s]
2 *)	$> 15 \leq 300$	Rigid	Pre-alarm	> 2.8
			Disconnection	> 4.5
		Flexible	Pre-alarm	> 4.5
			Disconnection	> 7.1
1	> 300	Rigid	Pre-alarm	> 4.5
			Disconnection	> 7.1
		Flexible	Pre-alarm	> 7.1
			Disconnection	> 11
*) Motors smaller than 15 kW are not listed separately in DIN ISO 10816-3. They are therefore allocated to machine group 2.				

Table 8-6 Vibration limit values in accordance with DIN ISO 10816-3

Explanation of terms “rigid” and “flexible”

- Rigid substructure signifies a fan mounted without vibration damper (e.g. anti-vibration mounts, spring phonolators)
- Flexible substructure signifies a fan mounted with vibration damper

Example:

Rated motor power: 90 kW
 Assembly: Anti-vibration mount
 Type of assembly: Flexible

Limit values for vibrations in accordance with Table 8-6 are:

Pre-alarm at $v_{\text{eff}} > 4.5 \text{ mm/s}$
 Disconnection at $v_{\text{eff}} > 7.1 \text{ mm/s}$

8.9.2 Temperatures

After the start-up phase, a virtually constant bearing temperature (T) is set, approximately three hours following activation of the fan and with maximum permissible speed.

The normal bearing temperature during operation of the fan is within a range of +55 ... +80 °C, regardless of bearing size and bearing lubrication.

Limit values for “pre-alarm” and “disconnection”:

Pre-alarm at T > 80 °C

Disconnection at T > 100 °C

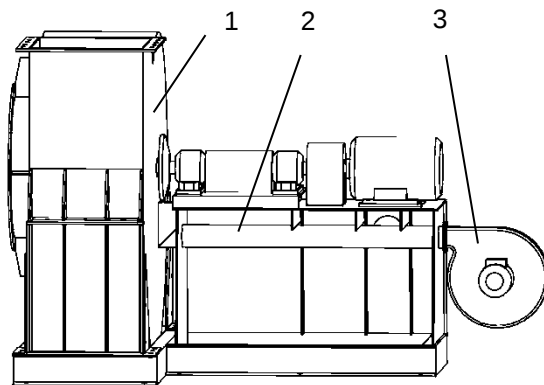


NOTICE!

After initial activation of the fan, the bearing temperature for grease-lubricated bearings can rise above the limit value for “pre-alarm”. When the excess grease has been exuded, the bearing temperature must return to normal operating temperature within the range of +55 ... +80 °C.

8.10 Connecting the cooler fan

Fan configuration with additional cooler fan (optional):



- 1 Main fan
- 2 Feed line
- 3 Cooler fan



All tasks on the electrical connections may only be carried out by electrical specialists.

The cooler fan itself does not feature an ON/OFF main switch, an EMERGENCY STOP device or EMERGENCY OFF device.



Activation and deactivation of the cooler fan must be realised from the control room and must be incorporated in the control system of the plant. Only specialist personnel who have been contracted by the person responsible for the plant may activate or deactivate the cooler fan. In addition, the provisions of the operating company apply.

Fig. 8-13 Cooler fan

	WARNING
Main fan and additional components of the power train!	
Damage to the main fan and additional components of the power train due to an impermissible rise in temperature.	
→ Incorporate the cooler fan in the control system of the plant. → Check functional efficiency of the cooler fan. → Always start up the main fan together with the cooler fan. → In the event of the cooler fan failing, switch off the main fan immediately.	



NOTICE!

Refer also to the separate instructions of the cooler fan manufacturer, as well as additional order-related instructions and other documents for the electrical components (e.g. wiring diagrams).

8.11 Checking the lubricant

Fan configuration with grease-lubricated bearings:

Grease-lubricated bearings are filled with lubricating grease at the factory and are fully operational.



NOTICE!

The type of grease used is specified on the fan, on an additional information plate next to the nameplate. Only this grease type may be used for re-lubrication.

Specifications regarding the re-lubrication intervals and re-lubrication quantities can be obtained from this information plate and from chapter 13.2 Bearings.

The lubricating greases to be used in accordance with the respective requirement are listed as follows:

Requirement	Lubricating grease
For normal climatic conditions, i.e. ambient temperatures of -20 °C ... +40 °C	SHELL GADUS S2 V100 2
For low temperatures, i.e. ambient temperatures down to -40 °C	TOTAL MULTIS COMPLEX SHD100
Suitable for foodstuffs (FDA compliant)	Klübersynth UH1 14-222

Table 8-7 Lubricating greases

Fan configuration with oil-lubricated bearings:

If the fan is equipped with an oil bearing, the oil level and the respective oil type must be checked before starting up the fan for the first time.

The oil bearings are filled with oil at the factory.

Specifications for the respective oil can be obtained from the following sources:

- On the corresponding information plate on the fan
- On the fan data sheet

Type of oil	Producer's designation
Operating oil (mineral)	MOBIL NUTO H68
	SHELL TELLUS S3 M68
	MOBIL UNIVIS HVI26
Operating oil (synthetic)	Klübersynth GEM 4-46N
	Klübersynth GEM 4-68N
Special anti-corrosion oil	MOBILARMA 524

Table 8-8 Lubricating oils

	WARNING
Fan shaft bearings!	
Damage to the bearing as a result of insufficient lubrication.	
→ Check the respective oil type and replace the anti-corrosion oil with operating oil prior to initial commissioning of the fan. → Check the oil level (optimum oil level is between the "min." and "max." markings). → Where necessary, refill oil when the impeller is at a complete standstill. → Inspect the bearings for possible leaks.	



NOTICE!

If special anti-corrosion oil has been filled, the bearings are identified with a corresponding information plate.

Information plate for bearing filled with special anti-corrosion oil:

ACHTUNG:

Die Stehlager sind mit einem Spezial-Konservierungsöl gefüllt.

Maßnahmen vor Erstinbetriebnahme:

Schritt 1: Spezialkonservierungsöl ablassen

Bei Verwendung von mineralischem Öl als Betriebsöl:

Schritt 2: Lager mit Betriebsöl füllen (Ölsorte und Ölmenge gemäß Angaben des Lagerschildes beachten)

Bei Verwendung von synthetischem Öl als Betriebsöl:

Schritt 2: Lager bis zum maximalen Betriebsfüllstand mit Betriebsöl füllen, anschließend ca. 30 Minuten lang spülen, danach dieses Öl betriebswarm ablassen und schließlich erneut mit frischem Betriebsöl die Lager füllen (Ölsorte und Ölmenge gemäß Angaben des Lagerschildes beachten)

ATTENTION:

The single bearings are filled with special anti-corrosion oil.

Measures before initial start-up and commissioning:

Step 1: Drain the special anti-corrosion oil.

In case the operating oil is mineral oil:

Step 2: Fill the bearing with the operating oil. Oil type and quantity according to the oil bearing plate.

In case the operating oil is synthetic oil:

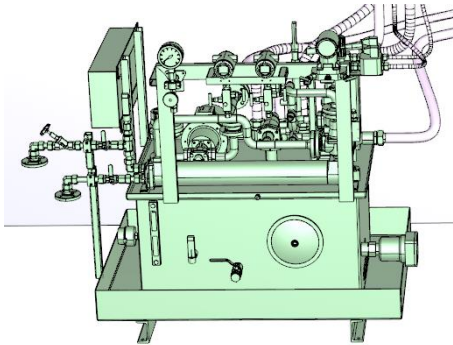
Step 2: Fill the bearings up to maximum operating oil level with the operating oil and rinse the bearings with this oil filling for about 30 minutes. Afterwards, drain the oil still warm and re-fill the bearings with fresh operating oil. Oil type and quantity according to the oil bearing plate.

Fig. 8-14 Anti-corrosion oil information plate

8.12 Connecting the external oil supply system

Fan configuration with external oil supply system (optional):

If the fan is equipped with an external oil supply system, the oil supply system must also be started up for activation of the fan.



NOTICE!

Refer also to the separate instructions of the oil supply system manufacturer, as well as the documentation for electrical components (e.g. wiring diagrams).

Fig. 8-15 External oil supply system



All tasks on the electrical connections may only be carried out by electrical specialists.



NOTICE!

Refer to the separate instruction "Interaction of the oil supply system with the radial fan".

8.13 Checking the final installation condition

Check the final installation condition of the fan prior to initial commissioning in accordance with the following checklist:

- Ensure freedom-of-movement for the impeller (turn 1x by hand), no rubbing noises should be audible and the impeller should rotate freely
- Check the impeller gap (refer to chapter 8.2)
- Remove any foreign objects and accumulations of water from the interior of the housing
- Inspect all external screws for secure fastening (protective covers, duct work connections, etc.) and ensure correct tightening torques (refer to Table 7-1 in chapter 7.3 Assembling the fan)
- Close the inspection opening (optional)
- Close the condensate drain (optional) or place a collecting vessel underneath
- Remove the transport locking devices (optional)
- Remove the transport bracing (optional)
- Remove all objects (such as tools, ladders, appliances)
- Connect the duct work to inlet and discharge (refer to chapter 8.3)
- Fit the flexible connections (optional) (refer to chapter 8.4)
- Activate the re-lubrication devices (optional) (refer to chapter 8.5)
- Connect the shaft seal to the barrier gas line (optional) (refer to chapter 8.6)
- Connect all electrical components (refer to chapter 8.7)
- Connect all monitoring devices (refer to chapter 8.8)
- Fit all protective covers
- Align the coupling (refer to chapter 8.1)
- Ensure easy freedom-of-movement and correct functioning of regulating devices installed in front of and behind the fan



The fan may then only be switched on when the final installation condition has been checked.

	DANGER
Fan openings and rotating parts!	
Fatalities or extremely serious injuries as a result of ejected parts and seizing of body parts and clothing.	
→ Close all fan openings. → Fit all protective covers. → Wear personal protective equipment.	

9. Start-up



The fan may only ever be switched on if the duct work is connected to inlet and discharge.

	DANGER
Inlet of fan!	
Fatalities or extremely serious injuries resulting from suction.	
→ For free inlet fans: • Never stand in immediate proximity of the inlet. • Remove all objects from the area in front of the inlet. • Cordon off the area in front of the inlet.	



The fan may only ever be switched on if all instructions prescribed in chapter 8 Measures prior to commissioning have been meticulously observed!

9.1 Switching on the fan



All tasks on the electrical connections may only be carried out by electrical specialists.

Measures for initial activation:

Ensure professional wiring, connection and electrical safeguarding of the fan, including accessories.



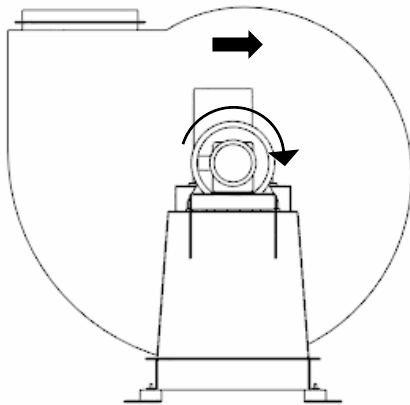
NOTICE!

Refer also to the separate instructions of the motor manufacturer, as well as additional order-related instructions and other documents for the electrical components (e.g. wiring diagrams).

9.2 Checking the sense of rotation

The technical data of the fan, such as pressure increase and volume flow, can only be attained with the correct sense of rotation.

Check the sense of rotation prior to initial start-up of the fan using the following procedure.



All tasks on the electrical connections may only be carried out by electrical specialists.

Only electrical specialist personnel are permitted to access the danger zone of the fan for the purpose of checking the sense of rotation.

Procedure for checking the sense of rotation:

- Switch on the fan briefly in order to ascertain the sense of rotation
- Switch off the fan and secure against unintentional activation
- Compare the actual sense of rotation with the rotational direction indicator on the fan (rotational directions must correlate)
- If the sense of rotation is incorrect, reverse polarity of the motor by exchanging any two connecting cables

Fig. 9-1 Checking the sense of rotation

9.3 Powering up the fan

Regard the following points when powering up the fan:

- Close the damper (such as throttle damper or shut-off damper) to alleviate the power-up phase
- A sufficient level of acceleration torque must be available throughout the entire period of the power-up phase up to nominal speed

	DANGER
Bursting of the fan, ejection of parts!	
Fatalities or extremely serious injuries as a result of exceeding the maximum speed.	
→ Never exceed the maximum speed specified on the nameplate of the fan.	

Observe and record the following parameters:

Period of operation	Parameters
During power-up	Power consumption, voltage, vibrations, noises
Following power-up (without load)	Power consumption, voltage, vibrations, noises
Following power-up (with load, i.e. setting of operating point)	Power consumption, voltage, vibrations, noises, and additionally: bearing temperatures temperature increase at fan housing due to compression of handled gas

Table 9-1 Inspections during power-up

Refer to the specifications on the motor nameplate.

	WARNING
Motor and additional components of the power train!	
Damage to the motor and to additional components of the power train as a result of exceeding the specified values.	
→ Observe the specifications of the motor manufacturer.	

Gasproof fan configuration (optional):

If the fan has been constructed in a gasproof configuration and has been dismantled and afterwards re-assembled, perform a leak test of the fan.

A “gasproof fan configuration” is signified on the fan data sheet with the designation “gasproof” in the “configuration of fan” column.

Use a suitable test medium (e.g. E-COLL leak finder spray) for the leak test and spray it on the area being tested, e.g. shaft seal, flange and all other connection points following the power-up phase of the fan.

If leaks are detected, replace the respective components, for example the flat seals between the flanges or the sealing rings of the shaft seal.



NOTICE!

If the fan is intended for handling poisonous gas or gases that are hazardous to health install a gas monitor or comparable gas alarm device near the fan.

9.3.1 Direct connection

The starting current for direct starting (delta starting) of the motor can total 6 - 8 times the rated current.

Ensure appropriate electrical safeguarding

9.3.2 Star-delta starting

Ensure prompt continued connection from star to delta starting to facilitate power-up of the fan.

Consider the current peak in this regard and ensure appropriate electrical safeguarding.

The activation frequency of the motor totals a maximum 3 connection processes per hour.

9.3.3 Variable speed control

Set the variable speed control as “slow-reacting” as possible via the frequency converter in order to prevent fatigue fractures due to rapid speed changes.

Consider sufficiently extensive time periods for:

- power-up up to operating speed or maximum speed
- powering down from operating speed or maximum speed down to a standstill
- change of operating point, and thus the fan speed

Observe the ramp times which may not be fallen short of. Refer to Table 9-2

Fan speed [rpm]	Ramp time [s]
750	38
1000	50
1200	60
1500	75
1800	90
3000	150
3600	180

Table 9-2 Ramp times

Example 1:

Fan speed 1500 rpm

When powering up from a standstill, the ramp time of 75 seconds may not be fallen short of.

Example 2:

Change of operating point from 3000 rpm to 2000 rpm

Allow 50 seconds time for this speed change.

	WARNING
Motor and additional components of the power train!	
Damage to the motor and to additional components of the power train as a result of continuous regulation within short periods of time.	
→ The fan should then only be switched on again when the impeller has come to a standstill. → Allow sufficient time for after-run of the fan until a standstill is attained.	

Regard the boundary conditions (e.g. mass moment of inertia for the impeller, acceleration torque of motor, power consumption, regulation of the plant) in accordance with respective utilisation of the fan.

Natural frequency of the fan:

The fan can be operated with constant nominal speed; natural frequencies are not anticipated with this speed.

Furthermore, the fan has been designed for the operating points stipulated in the order → see the individual documents on Technical Data. Speeds that deviate from these operating points may fall within the ranges of the natural frequencies of the fan. In these cases, accelerate the fan quickly through these critical speeds when powering up and powering down the fan.

	DANGER
Fan and all connected components!	
Fatalities or extremely serious injuries resulting from excessive resonance vibrations. Damage to the fan and to all connected components due to excessive resonance vibrations.	
→ Operate the fan exclusively with non-critical speeds. → When powering up and powering down the fan, accelerate quickly through possible critical speeds.	

Parameterisation of the variable speed control:

Never change the settings on the variable speed control performed by REITZ (minimum and maximum speed, ramp times, blocked speeds, etc.)

	WARNING
Fan and all connected components!	
Damage to the fan and to all connected components due to excessive incorrect setting values.	
→ Never change the performed settings and parameterisations.	



NOTICE!

Refer also to the following chapters

- Chapter 3.5.2 Measures in the event of a power failure
- Chapter 10.1 Regulation via variable speed control
- Chapter 10.5 Minimum speeds



NOTICE!

Refer also to the separate instructions of the variable speed control and motor manufacturers.

9.4 Switching off the fan

The fan itself does not feature an ON/OFF main switch, an EMERGENCY STOP device or EMERGENCY OFF device.



Activation and deactivation of the fan must be realised from the control room and must be incorporated in the control system of the plant.

Only specialist personnel who have been contracted by the person responsible for the plant may activate or deactivate the fan.

In addition, the provisions of the operating company apply.

Allow the fan to run down unbraked following shutdown.

The control system of the plant in which the fan is installed must be configured to ensure that no hazards are posed by shutting down the fan, for example as a result of inflow at inlet, back pressure or reverse flow at discharge.

Shut-off devices must be installed and incorporated in the control system of the plant in order to prevent this hazardous situation.

Upon reactivation of the fan, the original state must be restored once again.

10. Operation

Operation of the fan is only permissible if the limit values of the monitoring devices remain below that prescribed. Refer to chapter 8.9 Monitoring devices limit values.



For values above the limit values for “disconnection”, shut down the fan immediately and rectify the cause of the fault. Only when the fault has been rectified may the fan be restarted.

Operation of the fan without flow (with shut-off devices closed at inlet and discharge) is only permissible briefly as a start-up aid. This mode is prohibited for continuous operation.

	DANGER
Extremely high fan vibrations or bearing temperatures!	
Fatalities or extremely serious injuries resulting from tipping due to fixings of the fan becoming loose, or due to the ejection of parts.	
→ Ensure continuous monitoring of the fan condition. → Check functional efficiency of the monitoring devices. → Shut down the fan if the limit values are exceeded. Refer to chapter 8.9. → Rectify the faults. Refer to chapter 11.	

The control of the plant in which the fan is installed must be configured to ensure that the fan is powered down and switched off with the shut-off devices closed.

	WARNING
Extremely vibrations of the fan!	
Damage to the fan and additional components of the power train, formation of cracks on the fan and on the installation site (e.g. foundation), loosening of fastenings, increase of noise.	
→ Ensure continuous monitoring of the fan condition. → Check functional efficiency of the monitoring devices. → Shut down the fan if the limit values are exceeded. Refer to chapter 8.9. → Rectify the faults. Refer to chapter 11. → Check the fastenings and retighten the screws with the prescribed tightening torque. Refer to chapter 7.3.2.	

Fan without permanently installed monitoring devices:

If the fan is not equipped with monitoring devices, measurements of the following must be performed at least once per week using suitable measuring equipment:

- Vibrations of the bearings
- Temperatures of the bearings

Depending on respective utilisation of the fan, the following additional parameters must also be measured at least once per week:

- Impeller speed
- Motor speed
- Condition of bearings
- Oil level in bearings
- Temperature of handled gas



NOTICE!

These weekly measurements must be documented in order that any deviations from the normal condition can be duly ascertained. Prompt rectification of faults will prevent the occurrence of damage to fan components and will guarantee prolonged life-expectancy of the fan. Create a file for the fan in which all performed measurements are recorded. A master template can be obtained in chapter 19.1 Inspections in accordance with the checklist.

10.1 Regulation via variable speed control

Refer to chapter 9.3.3 Variable speed control

10.2 Emergency shutdown

The fan itself does not feature an ON/OFF main switch, an EMERGENCY STOP device or EMERGENCY OFF device.



Activation and deactivation of the fan must be realised from the control room and must be incorporated in the control system of the plant.

Only specialist personnel who have been contracted by the person responsible for the plant may activate or deactivate the fan.

In addition, the provisions of the operating company apply.

Allow the fan to run down unbraked following shutdown.

The control system of the plant in which the fan is installed must be configured to ensure that no hazards are posed by shutting down the fan, for example as a result of inflow at inlet, back pressure or reverse flow at discharge.

Shut-off devices must be installed and incorporated in the control system of the plant in order to prevent this hazardous situation.

Upon reactivation of the fan, the original state must be restored once again.



NOTICE!

Refer also to the following chapters

- Chapter 3.5.2 Measures in the event of a power failure
- Chapter 10.5 Minimum speeds

10.3 Exceeding limit values

Refer to chapter 8.9 Monitoring devices limit values

10.4 Minimum duration of operation

If the fan is not switched off for a lengthy period of time (more than 2 months), oil separation could occur in the lubricating grease.

**NOTICE!**

Switch on the fan for short-term operation for a few minutes at least once every 2 months. Refer to chapter 9.3 Powering up the fan in this regard.

**NOTICE!**

Refer also to the separate instructions of the motor manufacturer.

10.5 Minimum speeds

This chapter is only applicable for fans featuring oil-lubricated single bearings.

No minimum speed must be observed for oil-lubricated multiple bearing blocks and for grease-lubricated bearings.



NOTICE!

Oil bearings with oil supply ring require a minimum speed to facilitate flawless oil supply within the bearing housing. If the fan is operated with a variable speed control, never allow the minimum speed to fall below the value prescribed in Table 10-1.

Minimum speed is dependent upon respective size of the bearing. The bearing size can be obtained from the following sources:

- On the corresponding information plate on the fan
- On the fan data sheet
- In the spare parts list

Bearing size	Minimum speed [rpm]
..218	480
..220	429
..222	387
..224	358
..226	333
..228	308
..230	286
..232	267
..234	250
..236	240
..238	226
..240	214
..244	200
..248	200
..316	480

Table 10-1 Minimum speeds for oil-lubricated single bearings

Fan configuration with freewheel or backstop (optional):

**NOTICE!**

Refer also to the separate instructions of the respective manufacturer.

10.6 Maximum speeds

The maximum permissible speed for the fan can be obtained from the following sources:

- On the nameplate on the fan
- On the fan data sheet

**NOTICE!**

Refer also to chapter 9.3 Powering up the fan.

11. Fault and rectification

In the event of faults occurring, the following measures must be implemented:

- Allow the fan to run down and switch it off
- Wait until the impeller comes to a complete standstill
- Secure the fan against unintentional restart
- Secure the impeller against unintentional rotation due to flue draught or other air flows in the connected duct work

	DANGER
Fan openings and rotating parts!	
Fatalities or extremely serious injuries as a result of ejected parts and seizing of body parts and clothing.	
→ Switch off the fan. → Wait until the impeller comes to a complete standstill. → Only remove the covers of the fan openings when the impeller is at a complete standstill. → Only remove the protective hoods of rotating parts when the impeller is at a complete standstill.	

Refer to the following table for potential faults and remedial measures.



NOTICE!

When ascertaining the cause of faults, take the entire periphery of the fan into account, including motor, variable speed control, plant control, installation site, etc.

All fan structural designs are susceptible to the following faults		
Fault	Possible cause	Remedial measure
Fan not running smoothly	Build-up of material on the impeller	Clean the impeller with a scraper or brush
	Impeller worn due to solid matter in the handled gas	Replace the impeller
	Impeller deformed as a result of hot handled gas	Replace the impeller
	Warping of the fan due to fixing with uneven mounting surface	Loosen the fixing, even out the mounting surface (e.g. using washers), tighten the screws with the prescribed tightening torque. Refer to chapter 7.3.2 Screw connections
	Warping of the fan due to connections with duct work which are not flush with the fan openings	Align the duct work with the fan openings and mount onto the fan with warping removed. Refer to chapter 8.3 Connecting the duct work
	Improper fixing of the anti-vibration mounts	Check the fixing and rectify as necessary. Refer to chapter 7.4 Securing the fan
Rubbing noise audible	Nozzle scraping on the inlet cone	Check the impeller clearance and ensure correct minimum gaps. Refer to chapter 8.2 Checking the impeller gap
	Nozzle scraping on the inlet cone	Align the duct work to the fan and mount onto the fan with warping removed
	Protective hood scraping on rotating part	Fit the protective hood with clearance to the rotating part or replace the protective hood in the event of warping
	Motor damage	Replace or repair the motor
Handled gas escaping	Shaft seal faulty or worn	Replace the sealing rings or complete shaft seal. Refer to chapter 13.3 Shaft seal
	For shaft seal with barrier gas connection: barrier gas pressure too low	Increase the barrier gas pressure and check connections. Refer to chapter 8.6 Connecting the shaft seal
	For shaft seal with grease injector: grease cartridge empty or faulty	Replace the grease cartridge

Table 11-1 Faults and remedial measures (all structural designs)

All fan structural designs are susceptible to the following faults (continued)		
Fault	Possible cause	Remedial measure
Power consumption as prescribed on the motor nameplate exceeded in the operating condition	Fan conveying excessive flow volume	Reduce the flow volume with damper (throttle damper, shut-off damper, etc.) / for frequency-controlled fan: reduce speed
	Operation with 60 Hz rather than with 50 Hz	
Fan will not start	Motor not connected correctly	Check the connection of motor
	Motor faulty	Replace the motor
	Control unit of fan in plant not configured correctly	Check control unit in the control room
	Motor protection has been triggered as a result of impermissibly high temperature	Allow the motor to cool, regulate the fan with damper or variable speed control
	Fuse for motor has tripped	Establish the cause and replace the fuse
	Shutdown has been triggered as a result of exceeding the limit values of the monitoring devices	Rectify the faults, resetting of alarm signal by the person responsible for the plant
Fan is not powering up to nominal speed	With star-delta connection, motor remains in star connection	Switch over to delta connection, reduce the switchover time
	Duration for powering up too long	Close the damper
	Starting current too high	Execute star-delta connection, local mains network too weak, check safeguarding
Fan output too low	Incorrect direction of rotation	Change direction of rotation by reversing polarity of the motor. Refer to chapter 9.2
	Pressure loss too great in the duct work	Check duct work
	Dampers not opened or not opened completely	Open dampers completely
	Duct work blocked, damaged or not correctly connected	Remove foreign bodies from duct work, replace damaged parts, inspect connections for leaks

Table 11-2 Faults and remedial measures (all structural designs) - continued

NOTICE!

A REITZ service technician can be requested to rectify all manner of faults. Refer to chapter 14.1 Requesting a REITZ service technician.

The following faults can occur on fan structural designs K (coupling)		
Fault	Possible cause	Remedial measure
Fan not running smoothly	Damage to bearings of the fan shaft	Replace the bearings
	Lubrication of bearings for fan shaft insufficient	For grease bearings: Re-lubricate. For oil bearings: Refill oil.
Bearing temperature too high (above the permissible operating temperature)	For grease bearings: Excessive lubricating grease pressed into the bearings of the fan shaft	Excess grease is exuded automatically, bearing temperature then reduces to normal operating temperature
	For grease bearings: Insufficient lubricating grease pressed into the bearings of the fan shaft	Replace the bearings and re-lubricate at regular intervals as prescribed in the manual
	Bearing damage	Replace the bearings
	For configuration with cooler fan: Insufficient cooling air	Switch on the cooler fan, clean the discharge of the cooling air line
	For oil bearings: Minimum speed below permissible value	Increase speed

Table 11-3 Faults and remedial measures (for structural designs K)

The following faults can occur on fan structural design K (coupling)		
Fault	Possible cause	Remedial measure
Fan not running smoothly	Coupling is not aligned	Align the coupling. Refer to chapter 8.1
	Coupling rubbers damaged or worn	Replace the coupling rubbers
Severe impacts during start-up	Coupling rubbers damaged or worn	Replace the coupling rubbers
	Start-up torque of motor too high	Change connection to star-delta connection
Coupling rupture	High torque impacts upon restart with residual speed	Restart only when the impeller is at a complete standstill

Table 11-4 Faults and remedial measures (for structural design K) - continued

12. Inspecting the fan

Inspections to be performed regularly are described in this chapter. These inspections are prerequisite if operational reliability of the fan is to be maintained. Additional inspections may be necessary, depending on respective utilisation of the fan. In this case, the time intervals for the inspections must be adapted accordingly.

Maintenance of the fan is described in a separate chapter (refer to chapter 13 Maintenance).



NOTICE!

Create a file for the fan in which all performed inspections and maintenance are recorded. A master template can be obtained in chapter 19.1 Inspections in accordance with the checklist.



NOTICE!

Ensure that the fan remains accessible for all inspections, maintenance tasks and repairs.

12.1 Weekly inspections

Inspections must be performed in compliance with Table 12-1 during operation of the fan.

Component	Weekly inspections during operation
Bearings	If the fan is not equipped with permanently installed monitoring devices, checks must be performed using mobile measuring equipment: - Bearing vibrations - Bearing temperatures These weekly measurements must be documented in order that any deviations from the normal condition can be duly ascertained. Power down the fan immediately if the “disconnection” limit values are exceeded. Refer to chapter 8.9.
Shaft seal	<u>For gasproof fan configuration (optional):</u> Inspect the shaft seal for leaks. Use a suitable test medium (e.g. E-COLL leak finder spray) for the leak test and spray it on the area being tested, e.g. shaft seal, flange and all other connection points. A “gasproof fan configuration” is signified on the fan data sheet with the designation “gasproof” in the “configuration of fan” column.
Condensate drain (optional)	Make sure that there is no overpressure in the fan interior, then open the condensate drain carefully, allow accumulated condensate to drain into a suitable collecting vessel, dispose of the condensate in an environmentally-friendly manner and in accordance with requirements of the respective country of use.
Motor	Inspect the motor for unusual noises and smooth running. Remove any build-up of dust for unobstructed heat dissipation via the cooling fins. Refer to the instructions of the motor manufacturer.
Monitoring devices (optional)	Check the connections on the fan for secure fastening.
Flexible connections (optional)	Inspect the flexible connections for damage.
Fan in general	Inspect the fan in general for unusual noises and smooth running.
Additional accessories (optional) such as re-lubrication devices, brake, dampers, oil supply system, silencer, round filter, actuators	Check the accessories for functionality and leaks. Refer also to the separate instructions of the manufacturer.

Table 12-1 Weekly inspections

12.2 Monthly inspections

Component	Monthly inspections during operation
Oil bearing	Check the oil level (optimum oil level is between the “min.” and “max.” markings).
Anti-vibration mounts (optional)	Check condition of the anti-vibration mounts with regard to cracks or other damage. Replace damaged parts within the context of maintenance tasks with the fan at a standstill.
Re-lubrication for bearing (optional)	Check filling level of the grease cartridge. Refer to chapter 8.5. Replace used or faulty re-lubrication devices.
Re-lubrication for shaft seal (optional)	Check filling level of the grease cartridge. Refer to chapter 8.5. Replace used or faulty re-lubrication devices.
Fan in general	Check all external screw connections for secure fastening. Where necessary, tighten loose screw connections with a torque wrench. Refer to Table 7-1 Tightening torques.
Fan in general	Remove dirt and dust layers from all static components (motor, housing, pedestal, etc.). Make certain that water cannot enter into electric components. Do not use aggressive or coat removing cleansing agents that would damage the coating.

Component	Monthly inspections with the impeller at a standstill
Shaft earthing (optional)	Inspect condition of the shaft earthing with the impeller at a complete standstill. Refer to chapter 13.5.
Impeller	Inspect the impeller gap for build-up of material, damage, cracks or deformations with the impeller at a complete standstill.

Table 12-2 Monthly inspections

12.3 Annual inspections

Component	Annual inspections with the impeller at a standstill
Shaft seal	Inspect condition of the shaft seal with the impeller at a complete standstill. Replace worn sealing rings. Refer to chapter 13.3.
Impeller	Inspect the impeller for build-up of material, damage, cracks or deformations with the impeller at a complete standstill
Bearings	Retighten the screws using a torque wrench. Refer to Table 7-1 Tightening torques
Coupling	Check alignment of the coupling with the impeller at a complete standstill. Refer to chapter 8.1
Motor	Retighten the screws using a torque wrench. Refer to Table 7-1 Tightening torques
Motor terminal box	To be performed by an electrical specialist only, with the impeller at a complete standstill and with supply of voltage disconnected: Clean the motor terminal box from the inside and remove any condensate. Check the motor connection cables for secure fastening. Check earthing of the motor.

Table 12-3 Annual inspections

13. Maintenance

Observe the tasks for inspection of the fan in chapter 12 Inspecting the fan.

The maintenance tasks pertaining to inspections to be performed regularly are described in this chapter.



All maintenance tasks must be performed with the impeller at a complete standstill. Re-lubrication tasks for the bearings and for the shaft seal, however, are an exception to this rule.

	DANGER
Fan openings and rotating parts!	
Fatalities or extremely serious injuries as a result of ejected parts and seizing of body parts and clothing.	
→ Switch off the fan. → Wait until the impeller comes to a complete standstill. → Only remove the covers of the fan openings when the impeller is at a complete standstill. → Only remove the protective hoods of rotating parts when the impeller is at a complete standstill.	



NOTICE!

Ensure that the fan remains accessible for all inspections, maintenance tasks and repairs.

The maintenance tasks are to be performed as follows:

- Allow the fan to run down and switch it off
- Wait until the impeller comes to a complete standstill
- Secure the fan against unintentional restart
- Secure the impeller against unintentional rotation due to flue draught or other air flows in the connected duct work

	WARNING
Fan bearing, housing and pedestal!	
Serious injuries as a result of burns from hot fan parts.	
→ Wear personal protective equipment. → Where possible: Switch off the fan and allow the fan to cool.	



NOTICE!

Observe also the separate instructions of the manufacturers, as well information regarding maintenance of the respective components (e.g. motor, shaft seal, re-lubrication devices).

13.1 Lubricants

Fan configuration with grease-lubricated bearings:

Grease-lubricated bearings are filled with lubricating grease at the factory and are fully operational.

Lubricating greases to be used in accordance with Table 13-1:

Requirement	Lubricating grease
For normal climatic conditions, i.e. ambient temperatures of -20 °C ... +40 °C	SHELL GADUS S2 V100 2
For low temperatures, i.e. ambient temperatures down to -40 °C	TOTAL MULTIS COMPLEX SHD100
Suitable for foodstuffs (FDA compliant)	Klübersynth UH1 14 - 222

Table 13-1 Lubricating greases

Fan configuration with oil-lubricated bearings:

The oil bearings are filled at the factory. Lubricating oils and barrier greases to be used in accordance with Table 13-2:

	Oil designation	Respective barrier grease
1	MOBIL NUTO H68	SHELL GADUS S2 V100 3
	SHELL TELLUS S3 M68	SHELL GADUS S2 V100 3
	MOBIL UNIVIS HVI26 *	TOTAL MULTIS COMPLEX SHD100 *
2	Klübersynth GEM 4-46N	Klüber Staburags NBU 30K
	Klübersynth GEM 4-68N	Klüber Staburags NBU 30K
3	MOBILARMA 524	SHELL GADUS S2 V100 3

- 1 Mineral oil
- 2 Synthetic oil
- 3 Special anti-corrosion oil
- * For ambient temperatures down to -40 °C

Table 13-2 Lubricating oils and barrier greases

If any lubricants other than the products specified here are to be used, the following procedure must be observed:

- Alternative lubricants must comply with at least those requirements prescribed by the technical data sheets for the lubricants specified here
- Request the product data sheet and safety data sheet for the respective lubricant from REITZ
- An approval in writing must be obtained from the lubricant supplier with regard to suitability of their products, as well as confirmation of compliance with all requirements prescribed in the technical data sheets provided by REITZ
- Ensure compatibility of the alternative products with the lubricants already filled by REITZ at the time of delivery
- Only when all of the aforementioned prerequisites have been satisfactorily met may the alternative lubricant(s) be used

**NOTICE!**

Please understand that no approval may be granted by REITZ for alternative lubricants.

13.2 Bearings

There are four variants of bearing:

Lubricant	Bearings	For re-lubrication intervals and oil quantities, refer to chapter ...
Grease	Single bearing	13.2.1
Grease	Multiple bearing block	13.2.2
Oil	Single bearing	13.2.3 and 13.2.5
Oil	Multiple bearing block	13.2.4 and 13.2.5

Table 13-3 Variants of bearing

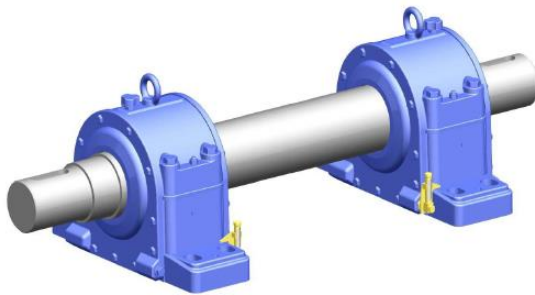


Fig. 13-1 Single bearing

Specifications for the respective bearing can be obtained from the following sources:

- On the corresponding information plate on the fan
- On the fan data sheet
- In the spare parts list

The information plate on the fan relays the following specifications:

- Bearing type and bearing size (e.g. 22216 KC3)
- Lubricant (grease type or oil type)
- Re-lubrication intervals
- Re-lubrication quantity
- Oil change intervals
- Oil quantity



Fig. 13-2 Multiple bearing block

All variants of bearing are described in this operating manual in their own respective chapter.

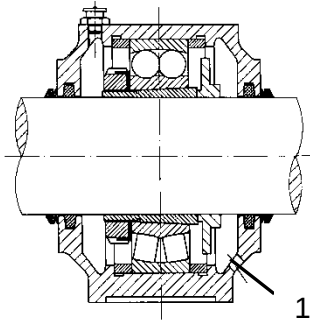
The optimum oil level is between the “min.” and “max.” markings. If the system features an oil inspection glass, filling up to half way is the optimum level.



ATTENTION!

Harmful to the environment!

Dispose of all exuded lubricants in an environmentally-friendly manner, and in accordance with the requirements of the respective country of use.



1 Grease exuded here

Fig. 13-3 Borehole for exuding of grease (example)

General information regarding re-lubrication

Observe the following points regarding re-lubrication of the bearings:

- Lubricate both bearings with the corresponding quantity of grease with the fan switched on
- Use the lubricating grease specified on the information plate on the fan and in accordance with specifications in this operating manual
- Ensure that the boreholes provided for exuding of the grease remain clear
- Remove the exuded lubricating grease



NOTICE!

Following re-lubrication, it is possible for the bearing temperature to rise above the limit value for "pre-alarm". When the excess grease has been exuded, the bearing temperature must return to normal operating temperature within the range of +55 ... +80 °C.



NOTICE!

Ensure sufficient filling of the bearings, in particular for ambient temperatures above +40 °C and with utilisation of a bearing acoustic cover or other housing.

Configuration with lubricating lines (optional):

With extracted lubrication points, approximately 20 grams of lubricating grease can be calculated for each running meter of lubricating line for filling of this lubricating line.

13.2.1 Grease-lubricated single bearing

Configuration with clamping sleeve (tapered bearing)

Housing	Rolling bearing	Re-lubrication intervals [operating hours] n_L = impeller speed (rpm)			Grease quantity * [g]	Re-lubrication quantity [g]
SN...		$n_L = 3000 \text{ min}^{-1}$	$n_L = 1500 \text{ min}^{-1}$	$n_L = 1000 \text{ min}^{-1}$		
607	2307KC3	4000	4000	4000	65	25
608	2308KC3	3600	4000	4000	85	30
609	2309KC3	3200	4000	4000	115	35
610	2310KC3	2950	4000	4000	150	45
611	2311KC3	2700	4000	4000	185	55
612	2312KC3	2500	4000	4000	220	60
613	2313KC3	2250	4000	4000	270	70
615	2315KC3	2000	3800	4000	370	85
616	2316KC3	1900	3600	4000	460	100
617	2317KC3	1800	3400	4000	550	110
618	2318KC3	1700	3300	4000	650	120
619	2319KC3	1600	3100	4000	750	135
515	22215KC3	-	800	1350	350	45
516	22216KC3	-	750	1250	460	50
517	22217KC3	-	700	1200	550	55
518	22218KC3	-	650	1100	650	65
519	22219KC3	-	580	1000	750	75
520	22220KC3	-	540	950	850	85
522	22222KC3	-	460	850	1100	100
524	22224KC3	-	410	750	1150	125
* Grease quantity for initial filling or refilling						

Table 13-4 Re-lubrication intervals grease single bearing with clamping sleeve

13.2.2 Grease-lubricated multiple bearing block

Use both grease nipples for re-greasing

Configuration AA and AK

RZF	Non-locating bearing	Locating bearing	Re-lubrication intervals [operating hours] n_L = impeller speed [rpm]					initial filling per bearing position [g]	re-lubrication quantity per bearing position [g]
			≤ 3600 > 3000	≤ 3000 > 1800	≤ 1800 > 1500	≤ 1500 > 1000	≤ 1000		
306	6306	6306	7300	8700	12400	13500	15600	48	8
307	6307	6307	6500	7900	11700	12900	15200	80	11
308	6308	6308	5600	7000	10800	12100	14500	95	17
309	6309	6309	4800	6200	10000	11300	13900	143	22
310	6310	6310	4100	5400	9300	10700	13300	177	29
311	6311	6311	3600	4800	8600	10000	12800	220	39
312	6312	6312	3100	4200	8000	9400	12300	251	48
313	6313	6313	2600	3700	7400	8800	11800	313	59
314	6314	6314	2300	3300	6900	8300	11300	395	72
315	6315	6315	1900	2900	6400	7800	10800	494	87
316	6316	6316	1700	2500	5900	7300	10400	579	101
317	6317	6317	1400	2200	5500	6900	9950	554	121
318	6318	6318	1200	2000	5100	6400	9500	647	142
320	6320	6320	900	1500	4200	5600	8600	947	195
324	6324	6324	400	1000	3100	4200	7200	997	318

Table 13-5 Re-lubrication intervals grease multiple bearing block, configuration AA and AK

Configuration AC

RZF	Non-locating bearing	Locating bearing	Re-lubrication intervals [operating hours] n_L = impeller speed [rpm]					initial filling per bearing position [g]	re-lubrication quantity per bearing position [g]
			≤ 3600 > 3000	≤ 3000 > 1800	≤ 1800 > 1500	≤ 1500 > 1000	≤ 1000		
315		6315	1900	2900	6400	7800	10800	494	87
	NJ315		-	800	2500	3400	5600	494	71
316		6316	1700	2500	5900	7300	10400	579	101
	NJ316		-	600	2360	3100	5000	579	84
317		6317	1400	2200	5500	6900	9950	554	121
	NJ317		-	500	2000	2800	4900	554	96
318		6318	1200	2000	5100	6400	9500	647	142
	NJ318		-	400	1800	2600	4600	647	117
320		6320	900	1500	4200	5600	8600	947	195
	NJ320		-	300	1400	2000	4000	947	155
324		6324	400	1000	3100	4200	7200	997	318
	NJ324		-	100	800	1400	3000	997	272

Table 13-6 Re-lubrication intervals grease multiple bearing block, configuration AC

RZF	Grease quantity in the inside configuration AA & AK		Grease quantity inside configuration AC			
	possible amount of grease [g]	quantity of possible re-lubrications per bearing position	possible amount of grease [g]	number of possible re-lubrications locating bearing (63xx)	possible amount of grease [g]	number of possible re-lubrications non-locating bearing (NJ 3xx)
306	452	29	-	-	-	-
307	674	31	-	-	-	-
308	1053	31	-	-	-	-
309	1483	34	-	-	-	-
310	2004	35	-	-	-	-
311	2632	34	-	-	-	-
312	3273	34	-	-	-	-
313	4263	36	-	-	-	-
314	5061	35	-	-	-	-
315	5804	34	5829	33	5829	41
316	7398	37	7428	37	7428	44
317	7834	33	7866	32	7866	41
318	8198	29	8242	29	8242	35
320	12899	33	12970	33	12970	42
324	21148	34	21326	33	21326	39

Table 13-7 Possible amounts of grease, number of possible re-lubrications

The values of Table 13-7 refer to the interior space between the regulator discs minus the shaft.

Example: RZF 306 (multiple bearing block)

→ re-lubrication quantity = 8 g per anti-friction bearing

→ 2 anti-friction bearings = 16 g in total

→ 452 g (possible grease quantity)

→ $452 / 16 = 29$ (rounded up)

Hence, the multiple bearing block RZF 306 can be re-greased 29 times in the course of its service life until the interior is completely filled with grease.

The indicated lubricating intervals refer to a bearing temperature of 75°C. For other temperatures the interval must be corrected in accordance with the table shown below:

Change of lubrication intervals in dependence of bearing temperature	
temperature bearing housing	correction factor
75°C	x 1,00
80°C	x 0,85
85°C	x 0,70
90°C	x 0,55
95°C	x 0,45
100°C	x 0,35

Table 13-8 Correction factors re-lubrication intervals

If the bearing temperature exceeds 75°C, the bearings must be re-greased in shorter intervals.

Example:

Bearing size RZF 318 configuration AC

Impeller speed 3000 rpm

- Re-lubrication deep groove ball bearing 6318:
after every 2,000 operating hours for bearing temperature = 75 °C
- Use correction factor 0.45 for bearing temperature = 95°C
- Calculation: $2000 \times 0,45 = 900$
- Re-lubrication deep groove ball bearing 6318 every 900 operating hours for bearing temperature = 95°C

Regardless of bearing size and bearing lubrication type the normal bearing temperature during fan operation is within a range of +55 ... +80 °C.

Limit values for “pre-alarm” and “disconnection”:

pre-alarm at $T > 80 \text{ °C}$

disconnection at $T > 100 \text{ °C}$

Please observe the “Measures to be implemented if the limit values are exceeded” → see chapter 8.9

13.2.3 Oil-lubricated single bearing

Type	Oil quantity * [litres]	Type	Oil quantity * [litres]	Type	Oil quantity * [litres]
SNOE 214	1.4	GOF 214	-	GOS 214	-
SNOE 217	1.4	GOF 217	1.2	GOS 217	0.7
SNOE 218	1.5	GOF/ROF 218	1.3	GOS 218	0.8
SNOE 220	1.7	GOF/ROF 220	1.5	GOS 220	1.0
SNOE 222	2.1	GOF/ROF 222	1.9	GOS 222	1.3
SNOE 224	2.3	GOF/ROF 224	2.1	GOS 224	1.7
SNOE 226	2.3	GOF/ROF 226	2.1	GOS 226	2.3
SNOE 228	3.7	GOF/ROF 228	3.5	GOS/ROS 228	2.4
SNOE 230	4.2	GOF/ROF 230	4.0	GOS/ROS 230	2.8
SNOE 232	4.7	GOF/ROF 232	4.0	GOS/ROS 232	3.3
SNOE 234 II	5.2	GOF/ROF 234	5.7	GOS/ROS 234	5.0
SNOE 236 II	5.2	GOF/ROF 236	5.7	GOS/ROS 236	5.2
SNOE 238 II	6.5	GOF 238	7.0	GOS/ROS 238	5.8
SNOE 240 II	6.3	GOF 240	8.0	GOS/ROS 240	7.0
SNOE 244 II	8.2	GOF 244	10.0	GOS/ROS 244	8.5
SNOE 248 II	10.0	GOF 248	14.0	GOS/ROS 248	9.5
SNOE 316	1.6				
* Specifications for approximate oil quantity in litres per bearing housing					

Table 13-9 Oil quantities single bearing

13.2.4 Oil-lubricated multiple bearing block

Type	Oil quantity *
	[litres]
ZLOE / DLOE 218	0.8
ZLOE / DLOE 220	1.3
ZLOE / DLOE 222	1.7
ZLOE / DLOE 315	0.8
ZLOE / DLOE 317	1.3
ZLOE / DLOE 319	1.8
* Specifications for approximate oil quantity in litres per bearing housing	

Table 13-10 Oil quantities multiple bearing block

13.2.5 Oil change intervals

Type of oil	Manufacturer's designation	Oil change intervals [operating hours]
Operating oil (mineral)	MOBIL NUTO H68	5000
	SHELL TELLUS S3 M68	
	MOBIL UNIVIS HVI26	
Operating oil (synthetic)	Klübersynth GEM 4-46N	8000
	Klübersynth GEM 4-68N	

Table 13-11 Oil change intervals



NOTICE!

Change mineral oils every 5000 operating hours and synthetic oils every 8000 operating hours.

13.2.6 Sealing oil-lubricated bearings

Re-lubricate the seals of oil-lubricated bearings with barrier grease once a month in order to make them completely tight.

Specifications for the respective barrier grease can be obtained from the following sources:

- On the corresponding information plate on the fan
- In chapter 13.1 Lubricants

Press in grease until fresh grease leaks out around the seal gap. Always use the indicated grease type.

NOTICE:



Re-greasing can be done during fan operation, fan shutdown is not required.

Maintenance of bearings

Fan type	KXE 250-125015-00
Serial number	371323
Operational lubricant	MOBIL NUTO H68
Lubricant (first filling)	MOBIL NUTO H68

	non-driven end	driven end
Bearing type	22228	22226
Oil quantity in litre	3,5	2,1

	first oil change	then every
Oil change intervals	5000	5000

Data in operating hours

Attention:

Only change the oil when the fan has fully stopped.

Check oil level once a month.

Attention:

Oil has to be filled to the upper mark (max.) of the oil level indicator. The oil level must not fall below the lower mark as this would damage the bearing due to deficient lubrication.

Oil-lubricated bearings with labyrinth seals

The oil-lubricated bearings are provided with labyrinth seals. The labyrinth seals are to be lubricated regularly when the fan is in operation.

Lubricant of labyrinth seal	SHELL GADUS S2 V100 3
-----------------------------	-----------------------

Press in grease until fresh grease leaks out all around the seal gap.

Fig. 13-4 Information sign oil-lubricated bearings (example)

13.3 Shaft seal

There are three variants of shaft seal:

Shaft seal (previous designation in brackets)	Structural design	Maintenance and description in accordance with chapter ...
REW1 (DBW)	Seal locking plate	13.3.1
REW6 (DSW)	Chamber seal	13.3.2
REW7 (WDKF, WDKS, ADKF, ADKS, SDW)	Labyrinth seal	13.3.3

Table 13-12 Shaft seals

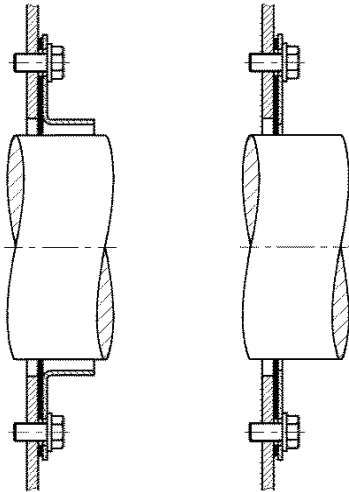
Specifications for the respective shaft seal can be obtained from the following sources:

- On the fan data sheet
- In the spare parts list

	DANGER
Ineffective shaft seal!	
Fatalities or extremely serious injuries resulting from explosion. Hazard to health as a result of leaking gases. Damage to the fan.	
→ Seal the shaft seal with the impeller at a standstill using the measures specified as follows: • Activate the automatic re-lubrication device (grease injector). • Replace used or faulty re-lubrication devices. • Replace damaged or worn sealing rings. • In the event of damage or the onset of rust, replace the complete shaft seal.	

13.3.1 Seal locking plate

A soft fibre ring is used for the seal locking plate (e.g. UNITEC 300). There are two variants of seal locking plate:



Type	Structural design
REW101-10	With coupling guard collar
REW102-10	Without coupling guard collar

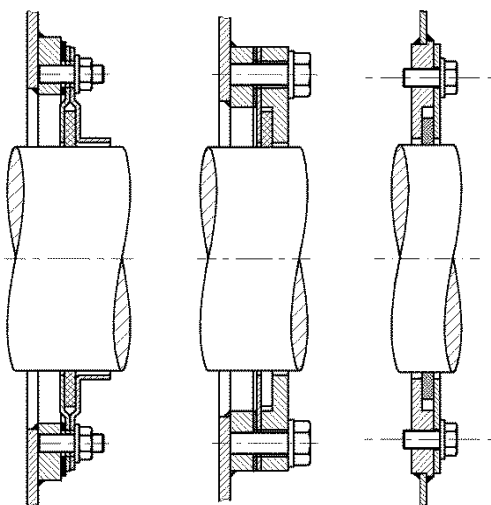
Table 13-13 Seal locking plates

The seal locking plate is maintenance-free.
Lubrication is not required.

Fig. 13-5 Seal locking plate

13.3.2 Chamber seal

A carbon graphite sealing ring is used for the chamber seal. There are three variants of chamber seal:



Type	Structural design
REW601-20	Sheet metal design
REW602-20	Twisted design
REW603-20	Twisted design, welded into the housing, screw-down cover

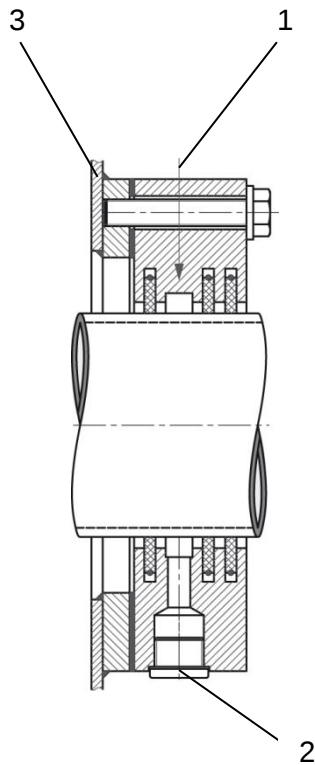
Table 13-14 Chamber seals

The chamber seal is maintenance-free.
Lubrication is not required.

Fig. 13-6 Chamber seal

13.3.3 Labyrinth seal

Several carbon graphite sealing rings are used for the labyrinth seal. There are four variants of labyrinth seal:



- 1 Connection to grease injector or barrier gas
- 2 Drainage (optional)
- 3 Fan housing

Fig. 13-7 Labyrinth seal

Type	Structural design
REW701-01	Suitable for connection to re-lubrication device (grease injector), maximum handled gas temperature +80 °C
REW701-11	Suitable for connection to re-lubrication device (grease injector), maximum handled gas temperature +180 °C
REW701-22	Suitable for connection to barrier gas line
REW702-22	Suitable for connection to barrier gas line and with drainage

Table 13-15 Labyrinth seals



NOTICE!

Refer also to the separate instructions of the labyrinth seal manufacturer.



NOTICE!

Sealing rings and complete seals may be ordered directly from REITZ. Always specify the serial number of the fan when ordering.

Fan configuration in accordance with ATEX (optional):

If the fan is intended for use in potentially explosive environments pursuant to Directive 2014/34/EU (ATEX), the shaft seal must be connected to a barrier gas line. Connection to a re-lubrication device (grease injector) is generally not allowed.

Exception:

A re-lubrication device (grease injector) may be installed if the following conditions are met:

- fan is not of gasproof design (see notice below)
- ATEX marking of the fan is for equipment category 2G or 3G
- fan handles clean gas (no contamination by dust)
- temperature of handled gas $\leq +80^{\circ}\text{C}$
- re-lubrication device (grease injector) is provided with electrochemical drive
- professional usage of re-lubrication device is ensured, which includes activation and immediate replacement after expiry of the dispensing period → see chapter → siehe 8.5 Activating the re-lubrication devices

NOTICE:

„Gasproof fan design“ can be discerned on the fan data sheet where the gasproof design is indicated in section „Fan Design“.

Usage of re-lubrication devices is prohibited when one or more prerequisites are not fulfilled.

**ATTENTION!****Harmful to the environment!**

Dispose of the worn sealing rings and other parts which are no longer required in an environmentally-friendly manner, and in accordance with requirements of the respective country of use

Variant “connection to re-lubrication device (grease injector)”:

Refer to chapter 8.5 Activating the re-lubrication devices in this regard.

Variant “connection to barrier gas line”

Refer to chapter 8.6 Connecting the shaft seal in this regard.

13.4 Inspection opening

Fan configuration with inspection opening (optional):

	DANGER
Fan openings and rotating parts!	
Fatalities or extremely serious injuries as a result of ejected parts and seizing of body parts and clothing.	
→ Switch off the fan. → Wait until the impeller comes to a complete standstill. → Only remove the covers of the fan openings when the impeller is at a complete standstill. → Only remove the protective hoods of rotating parts when the impeller is at a complete standstill.	

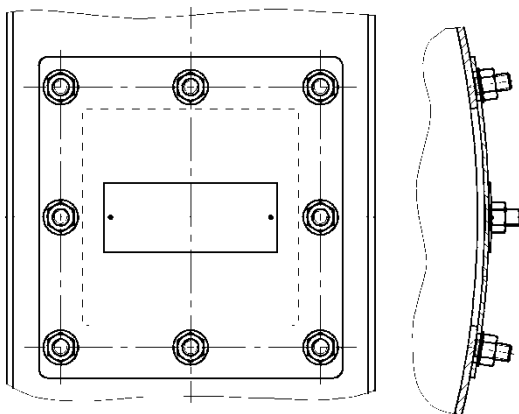


Fig. 13-8 Inspection opening (example)

Detach the nuts with suitable tools in order to remove the inspection opening cover.

Observe the following tightening torques of the screws when re-fixing the inspection opening cover in case of welded studs.

	thread	tightening torque [Nm]
welded stud made of 4.8	M8	15
welded stud made of stainless steel (A2-50)	M8	9,5

Table 13-16 Tightening torques for welded studs

13.5 Shaft earthing

Fan configuration with shaft earthing (optional):

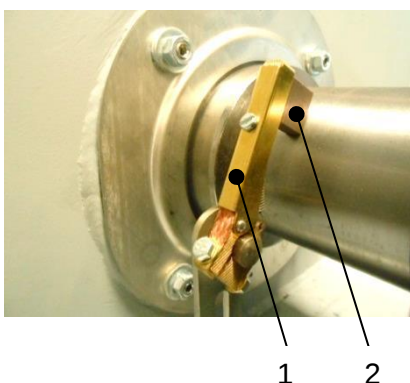
Check the shaft earthing once a month using the procedure as follows.



Fig. 13-9 Shaft earthing information plate

Procedure for checking the shaft earthing:

- Allow the fan to run down and switch it off
- Wait until the impeller comes to a complete standstill
- Secure the fan against unintentional restart
- Remove the protective hood beneath which the shaft earthing is situated (protective hood is indicated with a corresponding information plate)
- Check the thickness of the carbon brush by measuring up to the retainer, refer to Fig. 13-11 Measuring the carbon brush
 - thickness > 10 mm, measured up to the retainer sufficient thickness
 - thickness < 10 mm, measured up to the retainer
 - Carbon brush is worn
 - Replace the carbon brush (see next page)



- 1 Retainer
- 2 Carbon brush

Fig. 13-10 Shaft earthing complete

	DANGER
Worn or non-functioning shaft earthing! Fatalities or extremely serious injuries from explosions resulting from the generation of sparks. → Inspect condition of the shaft earthing with the impeller at a complete standstill. → Ensure that the grinding surface of the carbon brush makes light contact with the shaft. → Replace worn carbon brushes.	



Fig. 13-11 Measuring the carbon brush

Procedure for replacing and setting the shaft earthing:

- Loosen the screw on the retainer slightly
- Remove the used carbon brush
- Check the setting of the retainer and adjust as required:
 - With the carbon brush removed, the retainer may not make contact with the shaft, retain a minimum gap of 5 mm
- Pull back the retainer slightly and insert the carbon brush
- Tighten the screw on the retainer



With the carbon brush removed, the retainer may not make contact with the shaft. Retain a minimum gap of 5 mm. Never allow sparks to be generated as a result of rubbing.

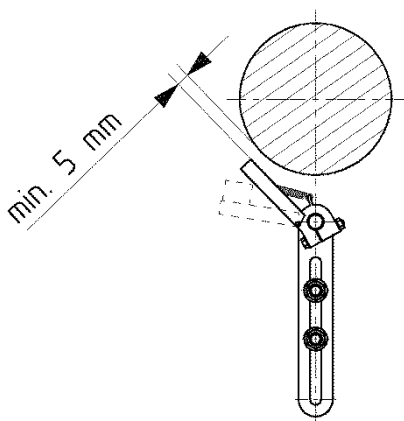


Fig. 13-12 Correct setting (shaft earthing without carbon brush)



NOTICE!

Carbon brushes, retainers and other spare parts can be ordered from REITZ. Always specify the serial number of the fan when ordering.



ATTENTION!

Harmful to the environment!

Dispose of all worn carbon brushes and other parts which are no longer required in an environmentally friendly manner.

14. Repair



All work on the fan must be carried out exclusively by competent persons with the fan switched off and the impeller at a complete standstill.

This applies in particular for repairs and servicing work, such as replacement of the impeller or replacement of the bearings.



All tasks on the electrical connections may only be carried out by electrical specialists.

Basic procedure for repairs and servicing work:

- Allow the fan to run down and switch it off
- Wait until the impeller comes to a complete standstill
- Secure the fan against unintentional restart
- Following conclusion of the repair, ensure correct installation condition and secure fastening of the replaced part

	DANGER
All tasks with and on the fan!	
Fatalities or extremely serious injuries as a result of transport, mounting, commissioning and start-up, operation, operating, troubleshooting, inspection, maintenance, repair, shutting-down, dismantling and disposal.	
→ Wear personal protective equipment. → Observe safety regulations. → Observe the regulations for the prevention of accidents.	



NOTICE!

Ensure that the fan remains accessible for all inspections, maintenance tasks and repairs.

The following must be noted for all repairs:

- Use suitable extraction and installation devices (e.g. extracting tool for the replacement of impeller and bearings)
- For shrink-fitted bearings, corresponding heating devices must be used (e.g. induction heater)
- Always use suitable lifting beams and lifting straps for the lifting of heavy components
- Use original parts only
- Allow plenty of room for the carrying out of repairs and allocate a storage area for replacement parts, lifting equipment and tools
- Ensure that the working area is kept clean and tidy

	DANGER
Induction heater!	
Extremely serious injuries or cardiac arrhythmia resulting from improper use of the induction heater.	
→ The induction heater must not be used by persons with pacemakers or other electromedical devices. → Refer also to the instructions of the induction heater manufacturer.	



NOTICE!

Refer also to the separate instructions of the respective manufacturers, e.g. for shaft seals, couplings.



NOTICE!

Special mounting instructions for replacement of the impeller / bearings, etc. can be requested directly from REITZ. In addition, all repairs and remedial maintenance can be carried out by a REITZ service technician.

14.1 Requesting a REITZ service technician

Describe the reason for the assembly work (e.g. replacement of impeller / bearings, balancing of impeller, performing of measurements) and provide us with the following information in order that we can organise the required assistance as quickly as possible:

- Serial number of the fan (e.g. 300851) → The serial number can be obtained from the nameplate on the fan and on the fan data sheet
- Specific address and contact partner of the operating company to which our service technician is to report
- Time frame scheduled for the assembly work
- Spare parts required
- Auxiliary materials or equipment available on site, or which must be provided by the service technician

Please request our „Certificate of non-objection for service and site activity“ and return the filled-in form to us.

The certificate serves as a checklist to assess possible hazards and contaminations on-site to sustain the health of our service technicians.

All addresses, telephone numbers and e-mail addresses for the REITZ Group can be obtained in chapter 20 Addresses of the REITZ group

14.2 Requesting spare parts

Spare parts for the fan can be easily located in the order-related spare parts list supplied as a separate document to this operating manual.

Please advise us of the spare parts which will be required.

All addresses, telephone numbers and e-mail addresses for the REITZ Group can be obtained in chapter 20 Addresses of the REITZ group



ATTENTION!

Harmful to the environment!

Dispose of all used parts and lubricants in an environmentally-friendly manner, and in accordance with the requirements of the respective country of use.

15. Decommissioning

If the fan has been out of operation for a period exceeding 3 months, the following steps should be performed.



All work on the fan must be carried out exclusively by competent persons with the fan switched off and the impeller at a complete standstill.



All tasks on the electrical connections may only be carried out by electrical specialists.

Basic procedure for decommissioning:

- Allow the fan to run down and switch it off
- Wait until the impeller comes to a complete standstill
- Secure the fan against unintentional restart
- Disconnect the supply of energy to the fan
- Protect all untreated machine parts against corrosion by applying an anticorrosive
- If the fan features a grease-lubricated bearing, apply additional grease to the bearing as protection against corrosion as follows

Specifications for the respective bearing can be obtained from the following sources:

- On the corresponding information plate on the fan
- On the fan data sheet
- In the spare parts list



NOTICE!

The type of grease to be used is specified on the corresponding information plate on the fan. Only this grease type may be used for re-lubrication.

Variant “grease-lubricated single bearings”:

Apply additional grease to both bearings until fresh grease is exuded and turn the shaft a few times by hand.

Variant “grease-lubricated multiple bearing blocks”:

Fill the space between housing cover and rolling bearing with grease and turn the shaft a few times by hand. The grease quantities below are provided as reference values.

Type	Re-lubrication quantity [g]
RZF 306	20
RZF 307	26
RZF 308	36
RZF 309	50
RZF 310	67
RZF 311	86
RZF 312	108
RZF 313	132
RZF 314	160
RZF 315	192
RZF 316	227
RZF 317	271
RZF 318	316
RZF 319	308
RZF 320	368
RZF 322	466
RZF 324	657

Table 15-1 Grease-lubricated multi bearing blocks, re-lubrication for decommissioning



NOTICE!

If the time frame for decommissioning is longer than 12 months, condition of the grease must be checked. Should de-oiling or contamination of the grease be ascertained, the grease must be replaced completely.

16. Recommissioning

If the fan has been out of operation for a period exceeding 3 months, the following procedure is to be observed.

Procedure for recommissioning:

- Check the bearings and shaft seals for leaks
- If leaks are ascertained, replace the corresponding components
- Ensure adequate filling level of all lubricants
 - Oil level for oil bearings
 - Filling level of automatic re-lubrication device (where featured) for grease bearings
 - Filling level of automatic re-lubrication device (where featured) for shaft seals
 - Where necessary, top up the oil to ensure optimum oil level between “min.” and “max.” markings
 - Where necessary, replace the grease cartridges of the automatic re-lubrication devices
- Remove the anti-corrosion coating from all bright machine parts which could impair functioning (e.g. shaft seal, shaft earthing)
- Remove any accumulated water from inside the housing
- Remove any condensate from the terminal boxes of motor and other electrical components, such as actuators (where featured)



Corroded, damaged or non-functioning components will impair operational safety of the fan. Only use components which exhibit a flawless condition.

	DANGER
Corroded, damaged or non-functioning parts!	
Fatalities or extremely serious injuries from explosions resulting from the generation of sparks. Damage to the fan.	
→ Replace old parts with new parts. → Remove any accumulations of water from all fan parts. → Ensure adequate lubrication of bearings. → Observe the instructions in the chapters specified as follows: - Chapter 8 Measures prior to commissioning - Chapter 9 Start-up	

17. Dismantling

Dismantling of the fan may be necessary for the following reasons:

- Relocation to another installation site
- Replacement with a new fan
- Scrapping

Close the duct work which was connected to the fan.



All work on the fan must be carried out exclusively by competent persons with the fan switched off and the impeller at a complete standstill.



All tasks on the electrical connections may only be carried out by electrical specialists.

	DANGER
All tasks with and on the fan!	
Fatalities or extremely serious injuries as a result of transport, mounting, commissioning and start-up, operation, operating, troubleshooting, inspection, maintenance, repair, shutting-down, dismantling and disposal.	
→ Wear personal protective equipment.	
→ Observe safety regulations.	
→ Observe the regulations for the prevention of accidents.	



ATTENTION!

Harmful to the environment!

Dispose of individual parts of the fan, accessory parts and lubricants in an environmentally-friendly manner, and in accordance with the requirements of the respective country of use.



NOTICE!

Allow dismantling to be carried out professionally by a REITZ service technician.

In the event that the fan is to be reassembled following dismantling, please observe the following points:

- Mark the parts which fit together with one another prior to commencing dismantling
- These parts must be fitted together in precisely the same manner as was realised prior to dismantling
- Replace flattened or damaged seals with new seals
- Replace all worn or damaged parts

	DANGER
Damaged fan or accessories! Fatalities or extremely serious injuries resulting from starting up damaged components. → Never use damaged parts. → Arrange for damaged parts to be repaired or replaced.	

	DANGER
Corroded, damaged or non-functioning parts! Fatalities or extremely serious injuries from explosions resulting from the generation of sparks. Damage to the fan. → Replace old parts with new parts. → Remove any accumulations of water from all fan parts. → Ensure adequate lubrication of bearings. → Observe the instructions in the chapters specified as follows: • Chapter 8 Measures prior to commissioning • Chapter 9 Start-up	

18. Waste disposal

Dispose of the fan components once they have been dismantled.

Refer to the instructions in chapter 17 Dismantling.



ATTENTION!

Harmful to the environment!

Dispose of individual parts of the fan, accessory parts and lubricants in an environmentally-friendly manner, and in accordance with the requirements of the respective country of use.



NOTICE!

Observe the guidelines of the operating company valid for the respective installation site, as well as the environmental guidelines of the respective country in which the fan has been installed.

19. Annex

19.1 Inspections in accordance with the checklist

The following checklist should be observed as a record of the inspections performed.

Checklist for inspections performed (example)				
REITZ fan no.	319660	Date of initial commissioning	12/2/2015	
Time	Measures implemented	Date	Authorised person	
			Printed name	Signature
1 st month	Bearing of fan shaft inspected, shaft seal checked, condensate drained, fan running smoothly	12/3/2015	T. MILLER	<i>Miller</i>
Checklist for inspections performed				
REITZ fan no.		Date of initial commissioning		
Time	Measures implemented	Date	Authorised person	
			Printed name	Signature
1 st month				
2 nd month				
3 rd month				
4 th month				
5 th month				

Checklist for inspections performed (master template)				
REITZ fan no.		Date of initial commissioning		
Time	Measures implemented	Date	Authorised person	
			Printed name	Signature

20. Addresses of the REITZ group



Konrad Reitz Ventilatoren GmbH & Co. KG

Konrad-Reitz-Straße 1

D-37671 Höxter-Albaxen

Phone: +49 5271 964 - 000

E-mail: reitzventilatoren@reitzgroup.com

www.reitzgroup.com

24-h hotline +49 174 97 16 726



Reitz Umwelttechnik + Ventilatoren GmbH & Co. KG

Gutenbergstraße 20-24

D-37235 Hessisch Lichtenau

Phone: +49 5602 936 - 60

E-mail: reitzumwelttechnik@reitzgroup.com

www.reitzgroup.com

24-h hotline +49 174 97 16 726



Reitz Retrofit GmbH & Co. KG

Röttgerweg 12

D-51371 Leverkusen

Phone: +49 214 20 299 100

E-mail: reitzretrofit@reitzgroup.com

www.reitzgroup.com



Reitz Fans (Suzhou) Co., Ltd.

Unit 712, International Building, No. 2

215021 SIP Suzhou, PRC

Phone: +86 512 62 85 61 00

E-mail: reitzchina@reitzgroup.com

www.reitzgroup.com



Reitz India Limited

116 & 117, Pashamylaram

Patancheru, Hyderabad

Telangana – 502 307, India

phone: +91 8455 676666, +91 8455 261888

E-mail: info@reitzindia.com, enquiry@reitzindia.com

www.reitzindia.com



Reitz Wentylatory Polska Sp. z o.o.

ul. Wrocławska 24

64-000 Kościan, Polska

Phone: +48 61 62 42 772

E-mail: gwp@reitzgroup.com

www.reitzgroup.com



Reitz Middle East FZE

P.O. Box – 9383, X4, Building 32
Sharjah Airport Free Zone
Sharjah, UAE
phone: +971 6 557 0506
E-mail: spk@reitzindia.com



Reitz SE-ASIA PTE LTD

31, Cantonment Road
Singapore-089747
Phone: +65 622 44991
E-mail: sa@reitzindia.com



Reitz Phelps Fan LLC

10701 Interstate 30
Little Rock, AR 72209, USA
phone: +1 501 554 1282
E-mail: info@ReitzPhelpsFan.com
www.reitzgroup.com

21. List of figures

Fig. 4-1	Labelling and identification (example)	26
Fig. 4-2	Nameplate (example)	27
Fig. 4-3	Nameplate in accordance with ErP Directive (example)	27
Fig. 4-4	Nameplate in accordance with ATEX (example)	28
Fig. 4-5	Vessel plate (example)	28
Fig. 4-6	Maintenance of berings (example)	29
Fig. 6-1	Slings points (example)	32
Fig. 6-2	Transport bracing	33
Fig. 7-1	Sealing material of partition flanges	40
Fig. 7-2	Securing of anti-vibration mounts	43
Fig. 7-3	Securing of spring phonolators	44
Fig. 7-4	Securing of stone bolts	45
Fig. 8-1	Coupling offsets	48
Fig. 8-2	Impeller gap	51
Fig. 8-3	Impeller gap for unshrouded impeller	52
Fig. 8-4	Fitted flexible connection	55
Fig. 8-5	Chute (standard configuration) in direction of flow	55
Fig. 8-6	Chute (overlapping configuration) in direction of flow	55
Fig. 8-7	Re-lubrication device on the bearing (example)	57
Fig. 8-8	Cartridge for re-lubrication device on the shaft seal (example)	57
Fig. 8-9	Shaft seal with connection for barrier gas	62
Fig. 8-10	Instrument panel for shaft seals with barrier gas supply (example)	63
Fig. 8-11	Drawing of potential equalisation system	65
Fig. 8-12	Earthing clamp (example)	66
Fig. 8-13	Cooler fan	72
Fig. 8-14	Anti-corrosion oil information plate	75
Fig. 8-15	External oil supply system	76
Fig. 9-1	Checking the sense of rotation	80
Fig. 13-1	Single bearing	105
Fig. 13-2	Multiple bearing block	105
Fig. 13-3	Borehole for exuding of grease (example)	106
Fig. 13-4	Information sign oil-lubricated bearings (example)	114
Fig. 13-5	Seal locking plate	116
Fig. 13-6	Chamber seal	116
Fig. 13-7	Labyrinth seal	117
Fig. 13-8	Inspection opening (example)	119
Fig. 13-9	Shaft earthing information plate	120
Fig. 13-10	Shaft earthing complete	120
Fig. 13-11	Measuring the carbon brush	121
Fig. 13-12	Correct setting (shaft earthing without carbon brush)	121

22. Tables index

Table 3-1	User groups	13
Table 3-2	Overview of hazards and preventative measures (all structural designs)	17
Table 3-3	Overview of hazards and preventative measures (all structural designs) - continued	18
Table 4-1	Variants of bearing	21
Table 7-1	Tightening torques	41
Table 7-2	Boreholes and tightening torques	43
Table 7-3	Tightening torques for stone bolts	45
Table 8-1	Reference values for maximum permissible offsets, N-EUPEX series, type A, B	50
Table 8-2	Reference values for maximum permissible offsets, RUPEX series	50
Table 8-3	Correction values for ambient temperatures	58
Table 8-4	Dispensing periods for grease injectors for single bearings (recommended)	60
Table 8-5	Measures to be implemented if the limit values are exceeded	69
Table 8-6	Vibration limit values in accordance with DIN ISO 10816-3	70
Table 8-7	Lubricating greases	73
Table 8-8	Lubricating oils	74
Table 9-1	Inspections during power-up	81
Table 9-2	Ramp times	83
Table 10-1	Minimum speeds for oil-lubricated single bearings	91
Table 11-1	Faults and remedial measures (all structural designs)	94
Table 11-2	Faults and remedial measures (all structural designs) - continued	95
Table 11-3	Faults and remedial measures (for structural designs K)	96
Table 11-4	Faults and remedial measures (for structural design K) - continued	96
Table 12-1	Weekly inspections	98
Table 12-2	Monthly inspections	99
Table 12-3	Annual inspections	100
Table 13-1	Lubricating greases	103
Table 13-2	Lubricating oils and barrier greases	103
Table 13-3	Variants of bearing	105
Table 13-4	Re-lubrication intervals grease single bearing with clamping sleeve	107
Table 13-5	Re-lubrication intervals grease multiple bearing block, configuration AA and AK	108
Table 13-6	Re-lubrication intervals grease multiple bearing block, configuration AC	109
Table 13-7	Possible amounts of grease, number of possible re-lubrications	110
Table 13-8	Correction factors re-lubrication intervals	111
Table 13-9	Oil quantities single bearing	112
Table 13-10	Oil quantities multiple bearing block	113
Table 13-11	Oil change intervals	113
Table 13-12	Shaft seals	115
Table 13-13	Seal locking plates	116
Table 13-14	Chamber seals	116
Table 13-15	Labyrinth seals	117
Table 13-16	Tightening torques for welded studs	119
Table 15-1	Grease-lubricated multi bearing blocks, re-lubrication for decommissioning	126