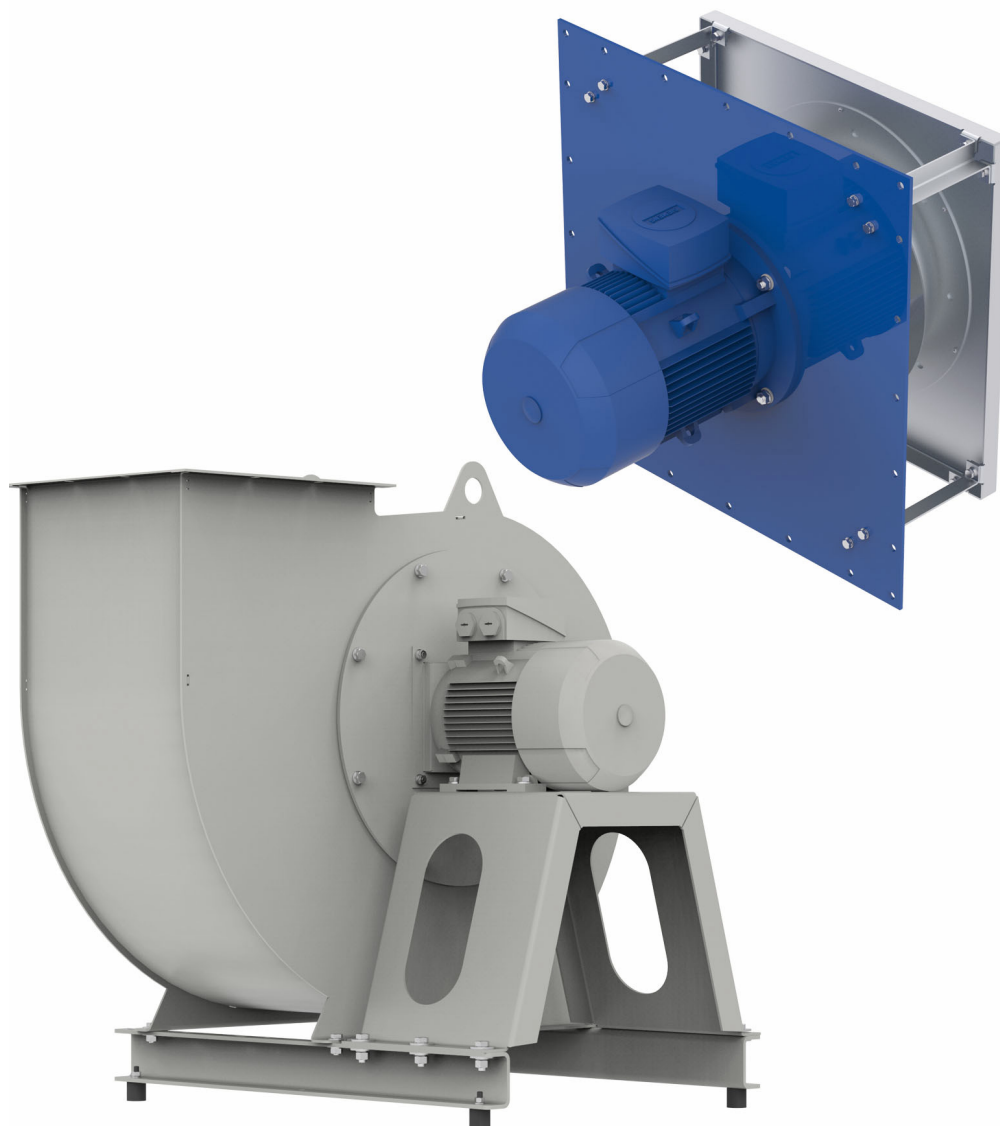


Process air centrifugal fans

Assembly instructions



PRdry & PR-T ranges and PL range impellers

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1 General notes

Compliance with the following specifications also serves to ensure product safety. Should the specified information, in particular with regard to general safety, transportation, storage, assembly, operating conditions, commissioning, service, maintenance, cleaning and disposal/recycling not be observed, safe operation of the product may not be guaranteed and can potentially pose a risk of death or injury to users and/or third parties.

For this reason, deviations from the specifications below can lead to the loss of legal materials defect liability as well as to liability of the buyer for the product rendered unsafe by deviation from the specifications.

1.1 Scope of documentation

The complete documentation for the product consists of these fan assembly instructions and the motor operating instructions.

It is absolutely imperative to observe the fan assembly instructions and the motor operating instructions. In particular, this applies to safety instructions, storage, transport, assembly and service.

If necessary, you can request the motor operating instructions from the motor manufacturer in your desired language.

1.2 Structure of the assembly instructions

Before installation and start-up, read this assembly instructions carefully to ensure correct use!

We emphasize that these assembly instructions apply to specific units only, and are in no way valid for the complete system!

Use these assembly instructions to work safely with and on the device. They contain safety instructions that must be complied with as well as information that is required for failure-free operation of the device.

Keep these assembly instructions together with the device. It must be ensured that all persons that are to work on the device can refer to the assembly instructions at any time.

Keep the assembly instructions for continued use. They must be passed-on to all successive owners, users and final customers.

1.3 Target group

The assembly instructions address persons entrusted with planning, installation, commissioning and maintenance and servicing and who have the corresponding qualifications and skills for their job.

1.4 Exclusion of liability

To allow for future developments, construction methods and technical data given are subject to alteration. We do not accept any liability for possible errors or omissions in the information contained in data, illustrations or drawings provided.

We accept no liability for damage caused by misuse, incorrect use, improper use or as a consequence of unauthorized repairs or modifications.

1.5 Copyright

These assembly instructions contain copyright protected information. The assembly instructions may be neither completely nor partially photocopied, reproduced, translated or put on data medium without previous explicit consent from ZIEHL-ABEGG SE. Infringements are liable for damages. All rights reserved, including those that arise through patent issue or registration on a utility model.

2 Safety instructions

2.1 Intended use



Attention!

- The fans are only intended for the conveyance of air or mixtures similar to air.
- Other uses which do not coincide with, or which exceed those specified will be deemed unauthorised unless contractually agreed. Damages resulting from such unauthorised uses will not be the liability of the manufacturer. The user will assume sole liability.
- Use in explosive areas for conveying gas, mist, fumes or a mixture thereof is not admissible. The conveyance of solids or solid parts in the conveying medium is not admissible either unless expressly agreed by contract.
- In case of speed control through a frequency converter, it must be ensured that the max. permissible speed cannot be exceeded due to any frequency converter malfunction.
- Do not connect built-in fans to open flue pipes of gas and other firing devices.
- VDE-approved ZIEHL-ABEGG fans (⚡ rating plate) may only be used as built-in fans for internal wiring.
- Proper use of VDE-approved ZIEHL-ABEGG fans assumes indirect wiring in the terminal unit.
- Reading these document and complying with all contained instructions -especially the safety notifications contained therein -are considered part of intended use.
- To consider is also the documentation of attached components.

2.2 Improper use

Improper use / reasonably foreseeable misuse

- Conveyance of aggressive and explosive gaseous media.
- Use in an explosive atmosphere.
- Operation with iced up impellers.
- Conveyance of abrasive or adhesive media.
- Conveyance of liquid media.
- Mobile operation on land, water or air vehicles as well as in systems which set the whole fan in motion unless expressly agreed by contract and tested for this.
- Operation outside the specified temperature limits.
- Operation in other operating modes than S1 according to IEC 60034-1 (continuous operation with constant load) unless expressly agreed by contract and tested for this.
- Operation with different installation position than planned.
- Use of the fan and add-on parts (e.g. guard grille) as a resting surface or climbing aid.
- Unauthorised constructional modifications to the fan.
- Operation of the fan as a safety component or for the performance of safety-relevant functions in the sense of EN ISO 13849-1.
- Blocking or braking of the fan by inserting objects.
- Loosening of fan blade, impeller and balancing weight.
- Fastening of the fan to other points than planned.
- If a fan is operated with a frequency inverter, unacceptably high vibrations can occur in narrowly limited speed ranges. Constant running is therefore not permitted. **The impeller can burst - danger of serious or even mortal injury!**
- All applications not listed in the intended use.

Not the manufacturer, rather the operator of the device is liable for any personal harm or material damage arising from non-intended use.

2.3 Explanations of symbols

Safety instructions are highlighted with warning triangles and are depicted according to the degree of hazard as follows.

	Attention! General hazardous area. Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!
	Danger due to electric current Danger by dangerous, electric voltage! Death or severe injury can occur if the corresponding precautions are not taken!
	Info Important additional information and advice for user.

2.4 Product safety

The device conforms to the state of the art at the time of delivery and is fundamentally considered to be reliable. The device and its accessories must only be used in a flawless condition and installed and operated in compliance with the assembly instructions and/or operating instructions. Operating outside the device's technical specifications (see name plate and attachment / technical data) can lead to a defect in the device and additional damage!



Info

A separate fault and performance monitoring-system with an alarm signal function is necessary in order to prevent personal injuries and material damages during malfunctions and in case the device fails. Substitute operation must be taken into consideration! The design and installation of the system must comply with local regulations and directives.

2.5 Requirements placed on the personnel / due diligence

Persons entrusted with the planning, installation, commissioning and maintenance and servicing in connection with the frequency inverter must have the corresponding qualifications and skills for these jobs.

In addition, they must be knowledgeable about the safety regulations, EU/EC directives, rules for the prevention of accidents and the corresponding national as well as regional and in-house regulations. Personnel to be trained or instructed and apprentices are only permitted to work on the device under the supervision of an experienced person. This also applies to personnel undergoing general training. Comply with the legal minimum age.

2.6 Work on the device



Info

Mounting, electrical connection, and start-up operation may only be carried out by an electrical specialist in accordance with electrotechnical regulations (e.g. DIN EN 50110 or DIN EN 60204)!



Danger due to electric current

- It is generally forbidden to carry out work on electrical live parts. Protection class of the device when open is IP 00! It is possible to touch hazardous voltages directly.
- The safe isolation from the supply must be checked using a **two-pole** voltage detector.
- When operating on a frequency inverter, the protective conductor carries high leakage currents (depending on switching frequency, link voltage and motor capacity). Standard-compliant earthing must therefore also be ensured under test or trial conditions (EN 50178, Art. 5.2.11). Without grounding, hazardous voltages may be present on the motor housing.
- Maintenance work may only be carried out by suitably qualified personnel.

**Danger due to hot or cold surfaces**

Depending on the temperature of the conveying medium and the operating state, surface temperatures of accessible parts of more than 70 °C or less than -10 °C are possible. Partially hot surfaces are also possible in versions with heat protection insulation for constructional reasons. Higher temperatures are to be expected especially at load application points, shaft openings, condensation drains, flanges, frames and connecting pieces between insulation and fan housing.

**Attention!**

- The fan may switch on and off automatically for functional reasons.
- After power failure or mains disconnection an automatic restart of the fan takes place after voltage return!
- Wait for the fan to come to a complete standstill before approaching it!

**Danger of being sucked in!**

Do not wear loose or hanging clothing, jewellery, etc., tie together long hair and cover it.

2.7 Modifications / interventions in the device

**Attention!**

For reasons of safety, no unauthorized interventions or modifications may be made on the device. All planned modifications must be authorized by the manufacturer in writing.

Use only genuine spare parts / genuine wearing parts / genuine accessories from ZIEHL-ABEGG. These parts were specifically designed for the device. There is no guarantee that parts from non-original sources are designed and manufactured in correspondence with load and safety requirements. Parts and optional equipment not supplied by ZIEHL-ABEGG are not approved by ZIEHL-ABEGG for use.

2.8 Operator's obligation of diligence

- The contractor or owner must also ensure that the electric systems and equipment are operated and maintained in accordance with electro-technical regulations.
- The owner is obliged to ensure that the device is operated in perfect working order only.
- The device may only be used as intended.
- You must periodically examine the safety equipment for their properly functioning condition.
- The assembly instructions and/or operating instructions are always readily available at the location where the device is being used, are complete and are in legible condition.
- These persons are regularly instructed in all applicable questions regarding occupational safety and environmental protection and are knowledgeable regarding the assembly instructions and/or operating instructions and, especially, are familiar with the safety instructions contained therein.
- All safety and warning notices attached to the device are never removed and remain legible.

2.9 Employment of external personnel

Maintenance and service work are frequently carried out by external employees who often do not recognize the specific situations and the thus resulting dangers. These persons must be comprehensively informed about the hazards in their area of activity.

You must monitor their working methods in order to intervene in good time if necessary.

3 Product overview

3.1 Application operational area

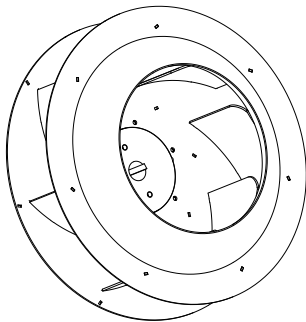
ZIEHL-ABEGG PL... series centrifugal impellers and the centrifugal fans with IEC standard motors from the PRdry and PR-T series (type designation see rating plate) are not ready-to-use products, but rather intended as components for industrial ventilation engineering.

The fans may only be operated when they are installed as intended, and when safety is ensured by safety equipment according to DIN EN ISO 13857 (DIN EN ISO 12100) or by other protection measures.

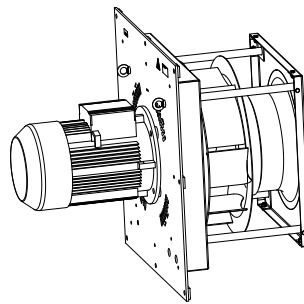
Driving is either direct or via a coupling.

ZIEHL-ABEGG centrifugal fans of the PRdry and PR-T series come with IEC standard motors. The motors can be made as flange motors (types of construction IM B5, IM V1, IM V3, IM B35, IM B14, IM V18, IM V19, IM B34) or as foot-mounted motors (types of construction IM B3, IM B6, IM B7, IM B8, IM V5, IM V6) (types of construction according to DIN EN 60034-7).

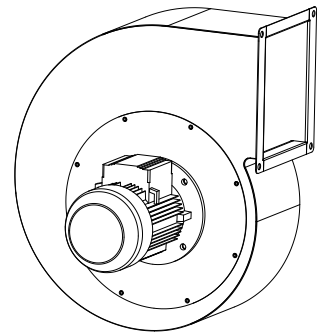
PL..



PRdry



PR-T



Any use in ambient temperatures below -10 °C is dependent on not being subjected to unusual, sudden or mechanical loads or stresses on the material (for the min. permissible ambient temperature please see the technical data).

3.2 Note on the ErP directive

ZIEHL-ABEGG SE wishes to point out that, based on the directive (EU) no. 327/2011 of the Commission of 30th of March 2011 for enforcing directive 2009/125/EC (hereinafter referred to as ErP directive), the operational area of certain fans within the EU is bound by certain prerequisites.

The fan may only be used within the EU when it meets the requirements of the ErP directive.

If the said fan does not have a CE mark (cf. especially the rating plate), use of this product within the EU is not admissible.

All ErP-relevant information comprises measurements which are determined using a standardised measurement set-up. More details can be obtained from the manufacturer.

Further information about the ErP directive (Energy related Products-Directive) can be found on www.ziehl-abegg.de search key: "ErP".

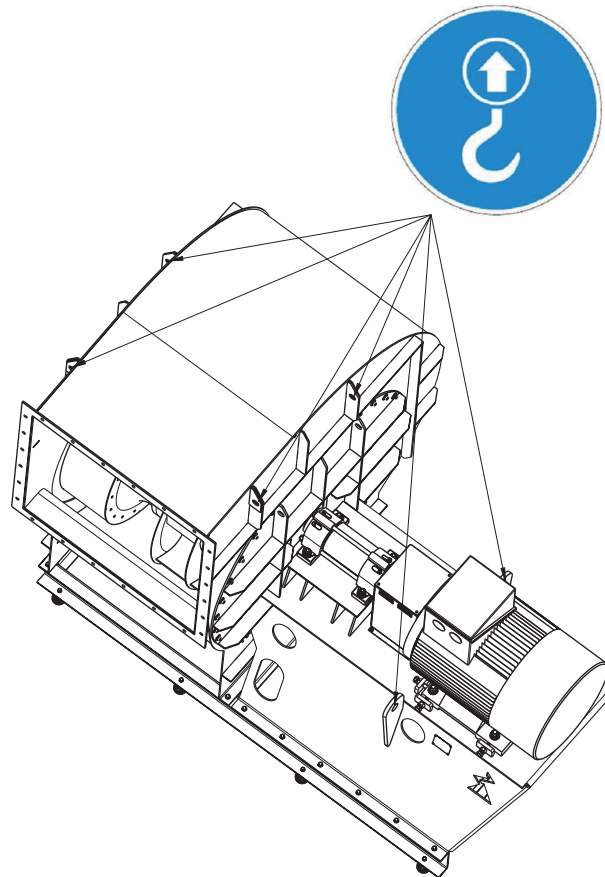
3.3 Transport



Attention!

- Always observe the weight specifications and the permissible carrying loads of the means of transport.
- Transport the fan(s) either in the original packaging or, in the case of larger fans, on the dedicated transport fixtures (holes in the wall plates) using a suitable means of transport. Observe the weight data on the identification plate.
- Only attachment eyes on the housing and motor bed, base frame, substructure and installation plate in PRdry series may be used as attachment points for lifting the fan.
- Eyes on the motor, on the gearing, on removable housing parts, fan shafts as well as flanges may not be used as attachment points for lifting the complete fan. For small frame sizes of the PR-dry series, holes in the support plate may be used as attachment points if no special eyes are available for lifting.
- Select the length of the attachment so that the load is evenly distributed.
- Wear safety shoes and gloves for handling!
- Do not transport the fan by the connecting cable!
- Avoid shocks and impacts to the device during the transport.

- Avoid extreme heat or cold (temperature range for storage and transport → Technical data).
- Watch out for possible damage to the packaging or fan.
- Secure pallets during transport.
- Do not stack pallets.
- Only handle with suitable hoisting gear.
- **Never stand underneath the suspended fan because defective transport equipment could cause death.**



3.4 Storage

- Store the fan / motor in the original packaging in a dry area protected from the weather and protect it from dirt, UV radiation, temperature fluctuations and weather until final installation.
- Do not stack pallets!
- Avoid extreme heat or cold (temperature range for storage and transport → Technical data).
- Inspect the bearing for proper operation prior to installation.
- Avoid prolonged storage; we recommend a maximum of one year (consult the manufacturer before starting if stored for longer).
- The inside of the housing must be ventilated.
- The fan may not be exposed to vibrations or impacts during standstill to avoid roller bearing damages.
- Rotate the impeller regularly during standstill time to avoid corrosion damage on the roller bearings.
- Surfaces of cast iron and steel parts without corrosion protection coatings must be treated with corrosion protection oil before storage.
- If the fan has to be stored for longer than 6 months after longer periods of operation, the bearing grease of greased bearings must be changed and distributed in the bearings. Oil must be changed in oil-lubricated bearings. In shaft seals with a grease block, the blocking grease must be changed.
- See the enclosed operating instructions.

3.5 Disposal / recycling



Disposal must be carried out professionally and in an environmentally friendly way in accordance with the respective national legal stipulations.

- ▷ Separate the materials by type and in an environmentally-friendly way.
- ▷ If necessary, commission a specialist company with the waste disposal.

4 Mounting

4.1 General notes



Attention!

- Mounting is only to be undertaken by trained service personnel. The system manufacturer or the machine builder and/or the user is responsible that the inherent installation and security information are harmonized with the valid standard and guidelines (EN ISO12100 / 13857).
- Check the fan for damage, e.g. transport damage, cracks or dents or damage to the electric cables, before assembly.
- Wear safety clothing / shoes and cut-resistant safety gloves when handling!
- At a weight greater than 25 kg for men / 10 kg for women, the fan should be lifted out by two persons (according to REFA). The values may differ from country to country.
- Do not allow drilling chips, screws and other foreign bodies to reach the device interior!
- Prior to installing the fan, it is to be checked whether the safety zone as per DIN EN ISO 13857 and in household appliances as per DIN EN 60335 are met. If the installation height (danger zone) above the reference level is greater than or equal to 2700 mm and is not reduced by auxiliary means such as chairs, ladders, work platforms or bases on vehicles, a guard grille against accidental contact is not necessary at the fan.
- If the fan is located in a danger zone, then the operator shall ensure that the included screen protections are mounted and hazards are prevented by protective constructions which meet the requirements to EN ISO 13857.
- The custom designs must suit the prevailing conditions.
- Tighten the fastenings with the specified torques.
- Any use below -10 °C is dependent on not being subjected to unusual, sudden or mechanical loads or stresses on the material (min. ambient temperature Technical data).

4.2 Mounting PRdry, PR-T

Installation, electrical connection and commissioning are only to be performed by trained service personnel.

- The system manufacturer or the machine builder is responsible that the inherent installation and security information are harmonized with the valid standard and guidelines (DIN EN ISO 12100 / 13857).
- The following is applicable to **all** types of centrifugal fans:
 - Avoid structural damage or stress with installation. Make sure the surface is flat and even.
 - Flange and mounting bracket must be level
 - Do not apply force (levering, bending).
 - Fasten using suitable fastening materials
 - Secure all screwed joints (e.g. Loctite, locking plates)
 - Electrical connection according to the circuit diagram in the terminal box
 - Connect the temperature monitor to the tripping device and/or motor cut-out switch.
- Observe the safety information!
- Vibration decoupling of the complete centrifugal fan is recommended to avoid transmission or generation of vibrations. Damping elements are not included in the standard scope of supply.
- Duct connections, connections on the condensation drain, connection of the installation plate, housing partitions must be sealed by suitable means (e.g. sealing tape) and checked for leaks. This applies particularly for conveying atmosphere with health hazardous, toxic, inflammable or aggressive materials.

Caution: All contact points must be fixed securely to the base. If the fixing is inadequate there is a risk of the fan overturning.

- Ensure adequate clearance on suction and pressure sides.
- Erect in the open air only if this is expressly mentioned and confirmed in the ordering information. There is a risk of damage to the bearings if the fan remains stopped in a moist environment. Avoid corrosion by suitable protective measures. Roofing is required.
- Modifications/conversions to the fan undertaken by the operator are not permissible - safety hazard.

Tightening torques for screws for connecting fan parts in Nm

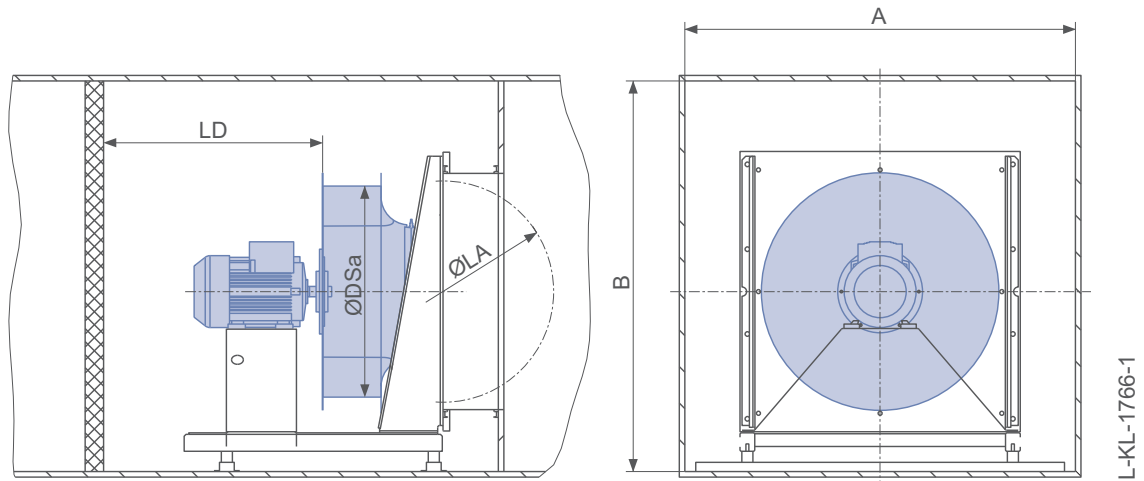
Property class	M5	M6	M8	M10	M12	M16	M20	M24
8.8 (Steel)	5.5	9.5	23	46	79	195	390	670
A4-80 (Stainless steel)	4.9	8.5	20.4	41	70	167	326	714

4.2.1 Belt drive

For the version with belt drive, note the following instructions:

- Align the two pulleys parallel to each other before final tensioning of the belt.
- Check the belt tension regularly against the manufacturer's specifications using suitable measuring instruments. After an running-in phase, the belt drive is largely maintenance free.

4.2.2 Optimal installation clearances



- Impeller blade external-diameter : $\varnothing DSa$
 - Distance on suction side: $LA \geq 0.5 \times DSa$ *
 - Distance on the pressure side: $LD PRdry \geq 1 \times DSa$
 - Housing wall distances: $A = 1.8 \times DSa$ ($A = B$)
- * In the case of disturbance flow (per example curved pipe at the suction side, flaps etc.) $LA \geq 1 \times DSa$

4.3 Mounting PL...



Attention!

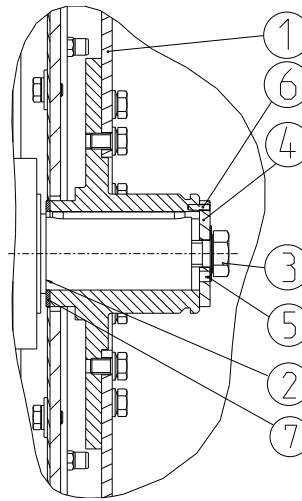
Whenever working on a fan, under no circumstances loosen the bolts that hold the impeller to the hub! Impeller and hub together form a balanced module which may only be removed and fitted as a complete unit. Loosening these bolts can lead to imbalance and therefore to vibrations, even if the bolts are tightened correctly before restarting the fan!

The following applies for loosely delivered impellers: The drive unit must be selected so that the bearings are not overloaded or underloaded and operation in the range of the bend-critical speed can be ruled out. The impellers are delivered pre-balanced. However, the total balance quality can change in connection with the drive motor or the drive shaft. After mounting or remounting the impeller, the balance quality of the assembled rotor (impeller mounted on drive motor or drive shaft) must be checked and corrected if necessary before commissioning.

The drive unit must be selected so that the bearings are not overloaded or underloaded and operation in the range of the bend-critical speed can be ruled out.

- **Impellers with fixed hub,**

- The impeller is connected to the shaft end of the drive motor using a fixed hub.
- **Disassembly:** Bend back the guard plate strap (5), loosen the axial threadlocker and pull off the impeller with the hub using a suitable extractor (in case of heavy weight, secure with lifting tackle). In some variants: remove the compensation washer between the hub and the shaft shoulder (7). Keep all parts in a safe place.
- **Mounting/installation:** Clean and slightly grease all bare surfaces (shaft end, centre hole). In some variants: put the compensation washer (7) removed during disassembly onto the shaft and push it to the limit on the shaft shoulder. Pull the impeller with the hub (1) up to the shaft shoulder (2) or the compensation washer (7) (transition fit). Secure with lifting tackle for heavy weights.
- **Shaft retainer:** Secure the axial shaft retainer with bolt (3) and washer (4) to the lockwasher DIN 432 (5) and tightening pin (6). Maintain the tightening torque in accordance with the table. Push up the lockwasher tab (5) so that it lies on a flank of the bolt head (3) to secure the bolt against twisting or loosening.

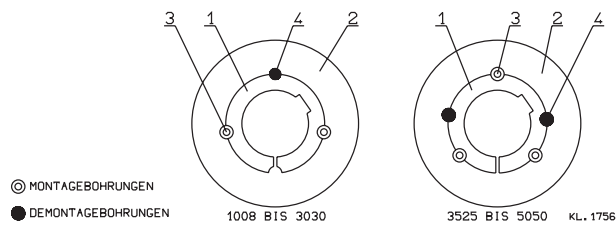


Tightening torques for screw connections in Nm

Property class	M5	M6	M8	M10	M12	M16	M20	M24
8.8 (Steel)	5.5	9.5	23	46	79	195	390	670
A4-80 (Stainless steel)	4.9	8.5	20.4	41	70	167	326	714

- **Impellers with clamping bush hub:**

- The impeller is fitted to the end of the motor shaft using bushings.
- **Mounting:** Clean and grease all bare surfaces (fitting surfaces of clamping sleeves and motor shaft). Insert clamping sleeve (1) into the hub (2) and line up the holes as shown in the fig. (pg. 3). Lightly oil and screw in the set screws (3) - do not tighten yet.
- Push the impeller with clamping sleeve (1) load-free (with lifting gear if the impeller is heavy) onto the shaft, align in axial position and tighten the set screws (3) evenly, **tighten with torque according to the table**. Fill empty bore holes with grease to prevent penetration by foreign bodies. After an **operating time of approx. 1 hour. Re-check** the tightening torque of the **screwed connection with the necessary torque**.
- **Removal:** Loosen all set-screws (3), depending on the size of the bushing, unscrew one or two set-screws completely, oil them and screw them into the removal holes (4). Pull on one or both set-screws, until the bushing (1) comes free of the hub (2). The impeller can now be taken off.

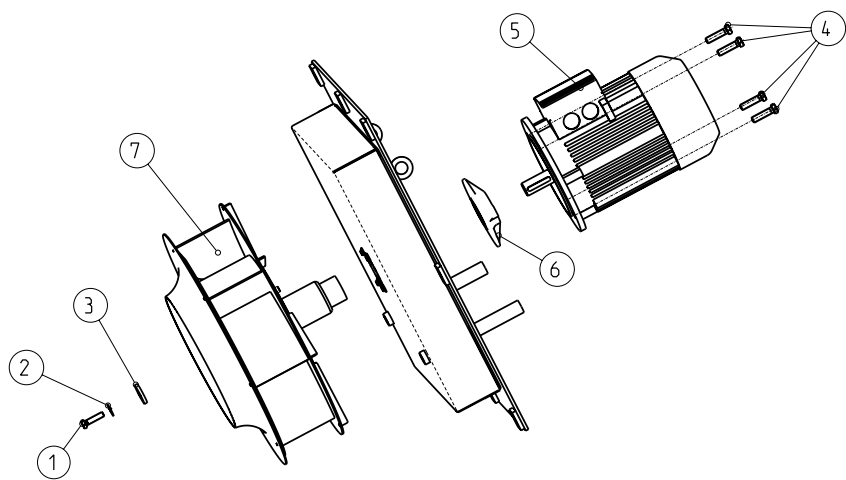


3 mounting holes, 4 removal holes

*1	1008	1108	1210	1610	1615	2012	2517	3020	3030	3525	3535	4030	4040	4535	4545	5040	5050
*2	5.6	5.6	20	20	20	30	50	90	90	115	115	170	170	190	190	270	270

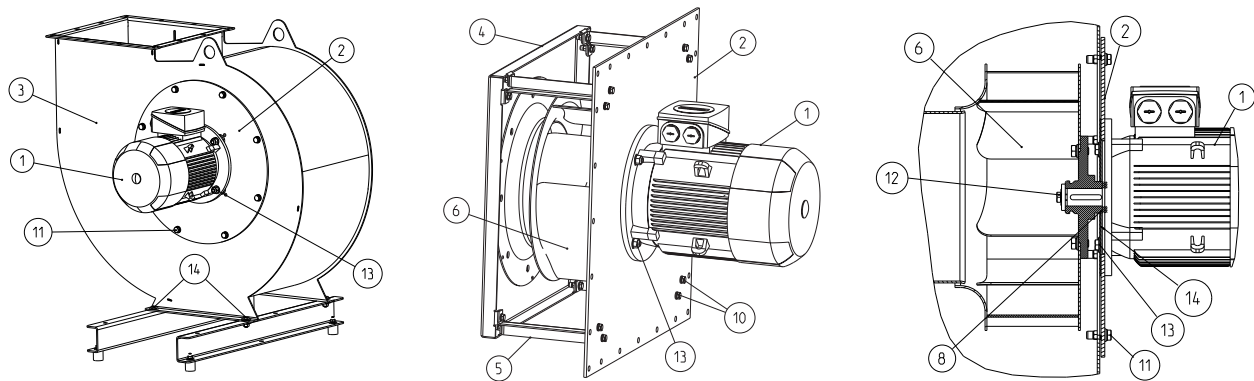
*1 clamping sleeve, *2 tightening torque in Nm

4.4 PRdry dismounting (insulated design)



Step	Operation
1	Release the screw connection (1), (2), (3)
2	Release the motor bolts (4)
3	Remove the impeller with hub (7) from the motor shaft with a suitable puller
4	Release the cooling fin bolts (6)
5	Pull out impeller with hub (7).

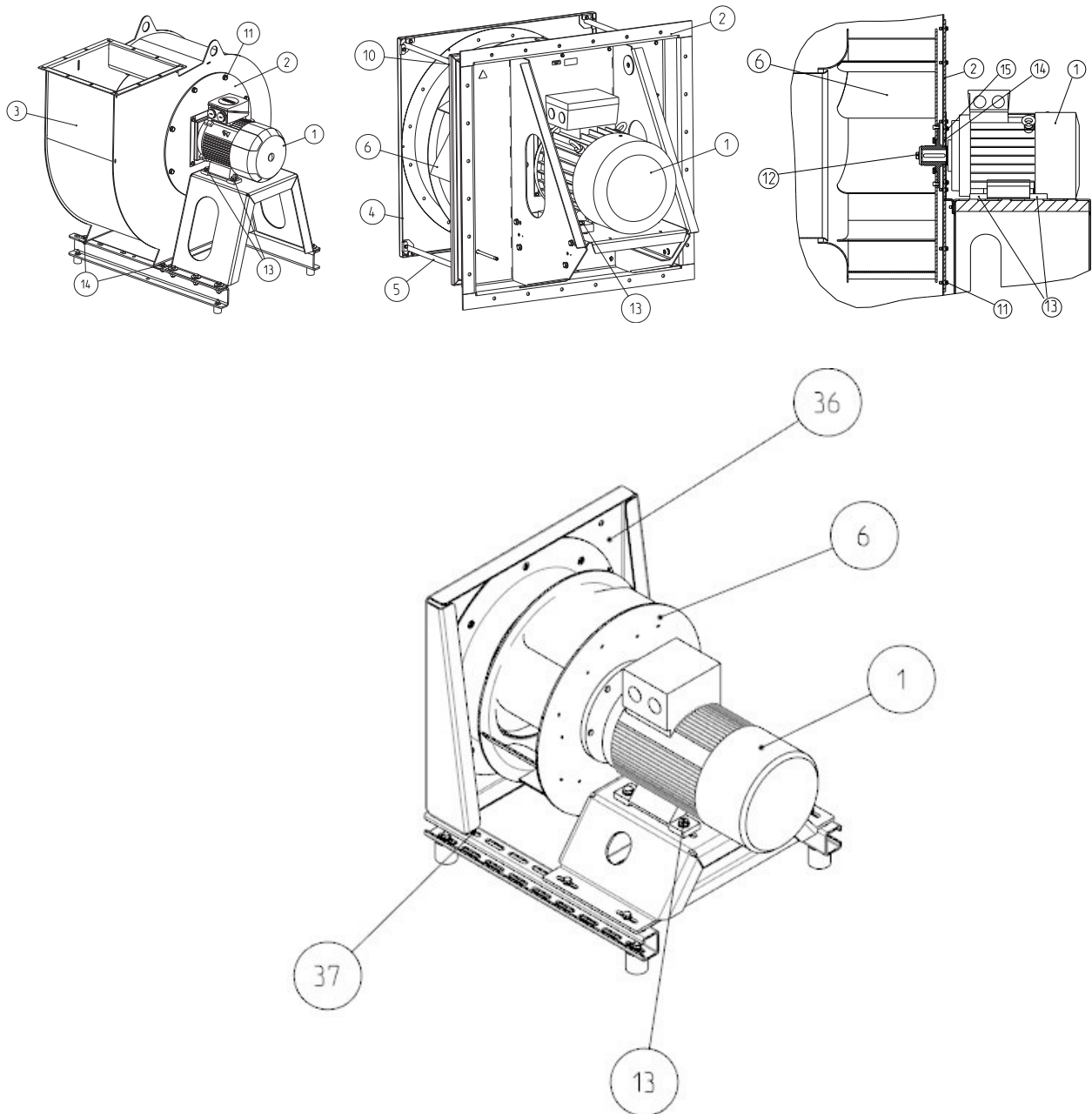
4.5 PR-T and PRdry dismounting (uninsulated design) with flange-mounted motor



Step	Operation
1	Release (11) bolts and dismount motor/impeller unit (2) (only PR-T: take out of the housing (3)) Only PRdry with built-on jet plate (4): also release the spar (10) bolts and dismount the jet plate (4) with spars (5)
2	Release the hub screw connection (12) and pull off the impeller with hub (6)
3	Release the motor screwed connection (13) and remove the motor (1) For some variants: Remove the shaft gap washer (14).

To mount the impeller, proceed as in the chapter "Mounting PL...". For some variants: before mounting the impeller, fasten the shaft gap washer (14) to with the motor bolting. While doing so, centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained!

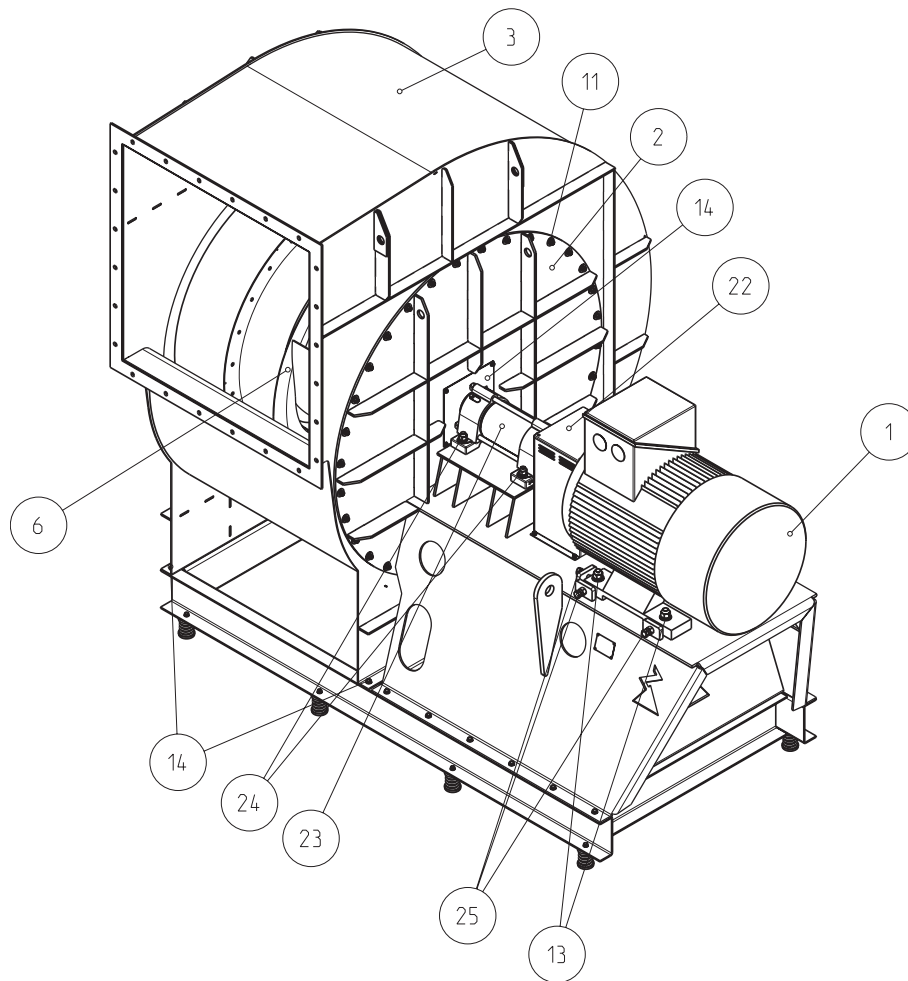
4.6 Disassembly of PR-T, PRdry (non-insulated version) and PRdry (ER module) with foot motor



Step	Operation
1	PR-T only: release cover bolts (11) and housing bolts (14) on both sides
2	Only PR-T: in versions with split housing: Take off removable housing parts. Fit cross members to stabilise the individual housing parts if necessary.
3	PR-T only: Lift the housing (3) carefully away from the impeller (6) and separate it from the fan
4	Only PRdry with built-on jet plate (4): also release the spar (10) bolts and dismount the jet plate (4) with spars (5)
5	PRdry (ER module) only: Loosen the nozzle tray screw fitting (37) and carefully lift the nozzle tray (36) over the impeller (6) and disconnect from the fan
6	Release the hub screw connection (12) and pull off the impeller with hub (6)
7	Release the motor screwed connection (13) and remove the motor (1)

To mount the impeller, proceed as in the chapter "Mounting the PL...". For some variants: Before mounting the impeller, loosen the bolted connection (15) of the shaft gap washer (14); centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained and re-tighten the bolted connection (15)!

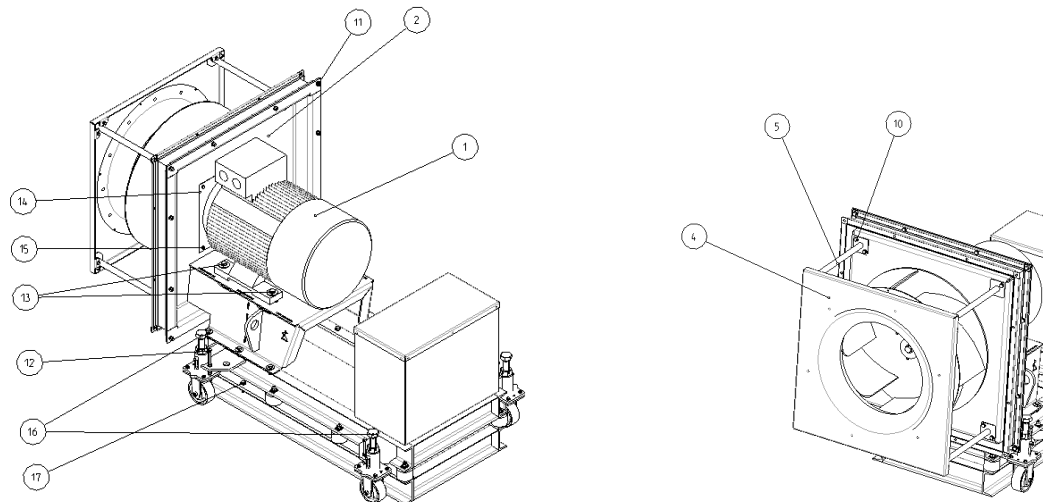
4.7 Disassembly of PR-T with block bearing and foot motor



Step	Operation
1	Release cover bolts (11) and housing bolts (14) on both sides
2	In versions with split housing: Take off removable housing parts. Fit cross members to stabilise the individual housing parts if necessary.
3	Lift the housing (3) carefully away from the impeller and separate it from the fan
4	Secure the impeller with a suitable lifting device, loosen the hub locking screw (chapter 4.3 item 3) and pull off the impeller and hub
5	Remove the coupling protection (22)
6	Remove the coupling according to manufacturer's specifications
7	Release the motor screwed connection (13) and remove the motor (1)
8	Release the bearing bolts (24) and remove the bearing (23)
9	Remove the shaft separating disc (14) or remove bearing according to chapter 4.15

- ▷ To mount the impeller, proceed as in the chapter "Mounting the PL...". For some variants: Before mounting the impeller, loosen the bolted connection (15) of the shaft gap washer (14); centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained and re-tighten the bolted connection (15)!
- ▷ Align the ball bearing (24) during assembly and securely attach to the bearing block.

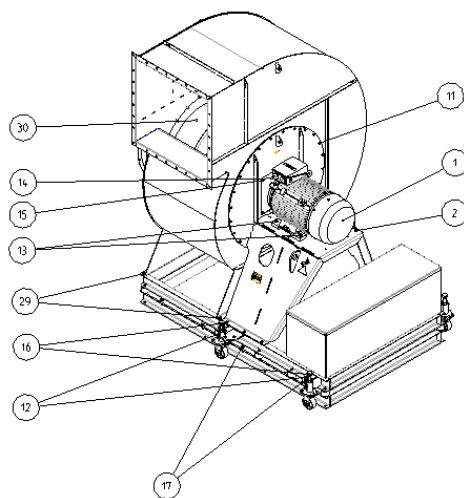
4.8 Dismantling of PRdry ZAmovevent (roll out)



Step	
1	Loosen screw fitting (11)
2	Loosen screw fitting on base frame (17)
3	Loosen safety screw (12) for roller plates
4	Evenly lower wheels by tightening screws (16), while carefully raising motor/impeller unit (2)
5	Carefully slide motor/impeller unit (2) out of housing using wheels
6	Remove screw fitting for space bars (10) and nozzle plate (4) with spacer bars (5)
7	Secure the impeller with a suitable lifting device, loosen the hub locking screw (chapter 4.3 item 3) and pull off the impeller and hub
8	Release the motor screwed connection (13) and remove the motor (1)
9	On some versions: Remove shaft separating disc (14) or remove bearing as described in chapter 4.15

To mount the impeller, proceed as in the chapter "Mounting the PL...". For some variants: Before mounting the impeller, loosen the bolted connection (15) of the shaft gap washer (14); centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained and re-tighten the bolted connection (15)!

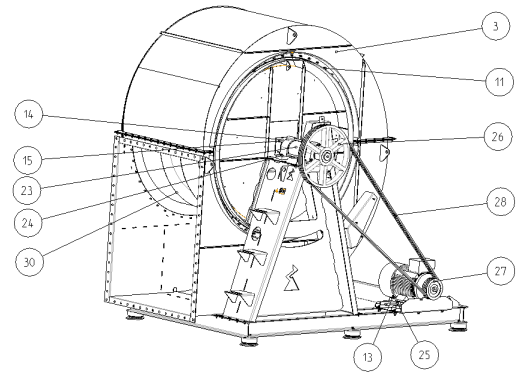
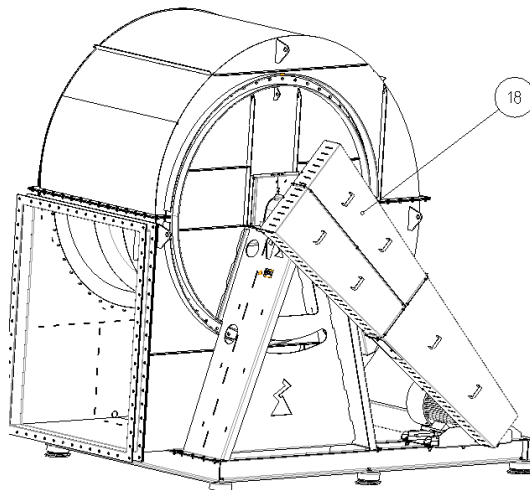
4.9 Dismantling of PR-T ZAmovevent (roll out)



Step	
1	Loosen screw fitting on base frame (17)
2	Loosen safety screw (12) for roller plates
3	Evenly lower wheels by tightening screws (16), while carefully raising motor/impeller unit (2)
4	Carefully slide motor/impeller unit (2) out of housing
5	Loosen cover screw fitting (11) and housing screw fitting (29)
6	Remove inlet nozzle (30)
7	In versions with split housing: Take off removable housing parts. Fit cross members to stabilise the individual housing parts if necessary.
8	Release the motor screwed connection (13) and remove the motor (1)
9	On some versions: Remove shaft separating disc (14) or remove bearing as described in chapter 4.15

To mount the impeller, proceed as in the chapter "Mounting the PL...". For some variants: Before mounting the impeller, loosen the bolted connection (15) of the shaft gap washer (14); centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained and re-tighten the bolted connection (15)!

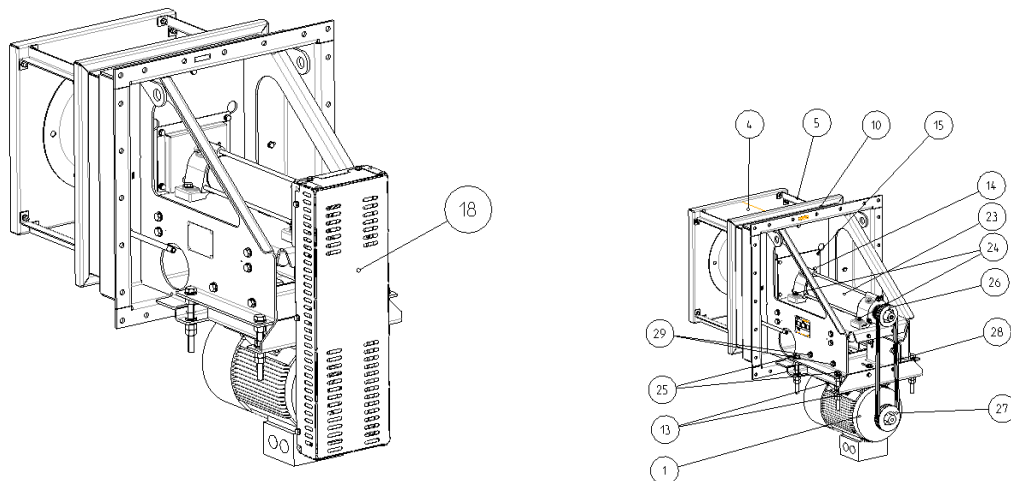
4.10 Dismantling of belt driven PR-T



Step	
1	Remove belt guard (18)
2	Loosen motor screw fitting (13) and tensioning spindles (25)
3	Remove pulleys (26 and 27) and belt (28)
4	Disassemble motor (1)
5	Loosen cover screw fitting (11) and housing screw fitting (29)
6	In versions with split housing: Take off removable housing parts. Fit cross members to stabilise the individual housing parts if necessary
7	Remove inlet nozzle (30)
8	Lift the housing (3) carefully away from the impeller and separate it from the fan
9	Secure the impeller with a suitable lifting device, loosen the hub locking screw (chapter 4.3 item 3) and pull off the impeller and hub
10	Release the bearing bolts (24) and remove the bearing (23)
11	On some versions: Remove shaft separating disc (14) or remove bearing as described in chapter 4.15
12	In the case of multi-row belt drives, always replace the belts in sets.

- ▷ To mount the impeller, proceed as in the chapter "Mounting the PL...". For some variants: Before mounting the impeller, loosen the bolted connection (15) of the shaft gap washer (14); centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained and re-tighten the bolted connection (15)!
- ▷ To fit the belt, follow the instructions in section 4.2.1 Belt drive.
- ▷ Align the ball bearing (24) during assembly and securely attach to the bearing block.

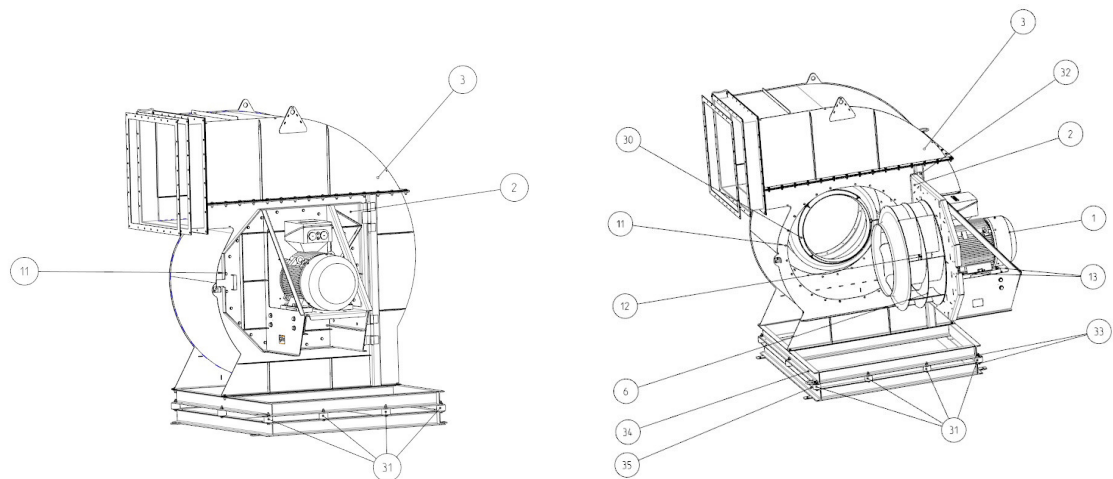
4.11 Dismantling of belt driven PRdry



Step	
1	Remove belt guard (18)
2	Loosen motor screw fitting (13), clamping screws (29) and tensioning spindles (25)
3	Remove pulleys (26 and 27) and belt (28)
4	Disassemble motor (1)
5	Remove screw fitting for space bars (10) and nozzle plate (4) with spacer bars (5)
6	Secure the impeller with a suitable lifting device, loosen the hub locking screw (chapter 4.3 item 3) and pull off the impeller and hub
7	Release the bearing bolts (24) and remove the bearing (23)
8	On some versions: Remove shaft separating disc (14) or remove bearing as described in chapter 4.15
9	In the case of multi-row belt drives, always replace the belts in sets.

- ▷ To mount the impeller, proceed as in the chapter "Mounting the PL...". For some variants: Before mounting the impeller, loosen the bolted connection (15) of the shaft gap washer (14); centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained and re-tighten the bolted connection (15)!
- ▷ To fit the belt, follow the instructions in section 4.2.1 Belt drive.
- ▷ Align the ball bearing (24) during assembly and securely attach to the bearing block.

4.12 Dismantling the PR-T swingout

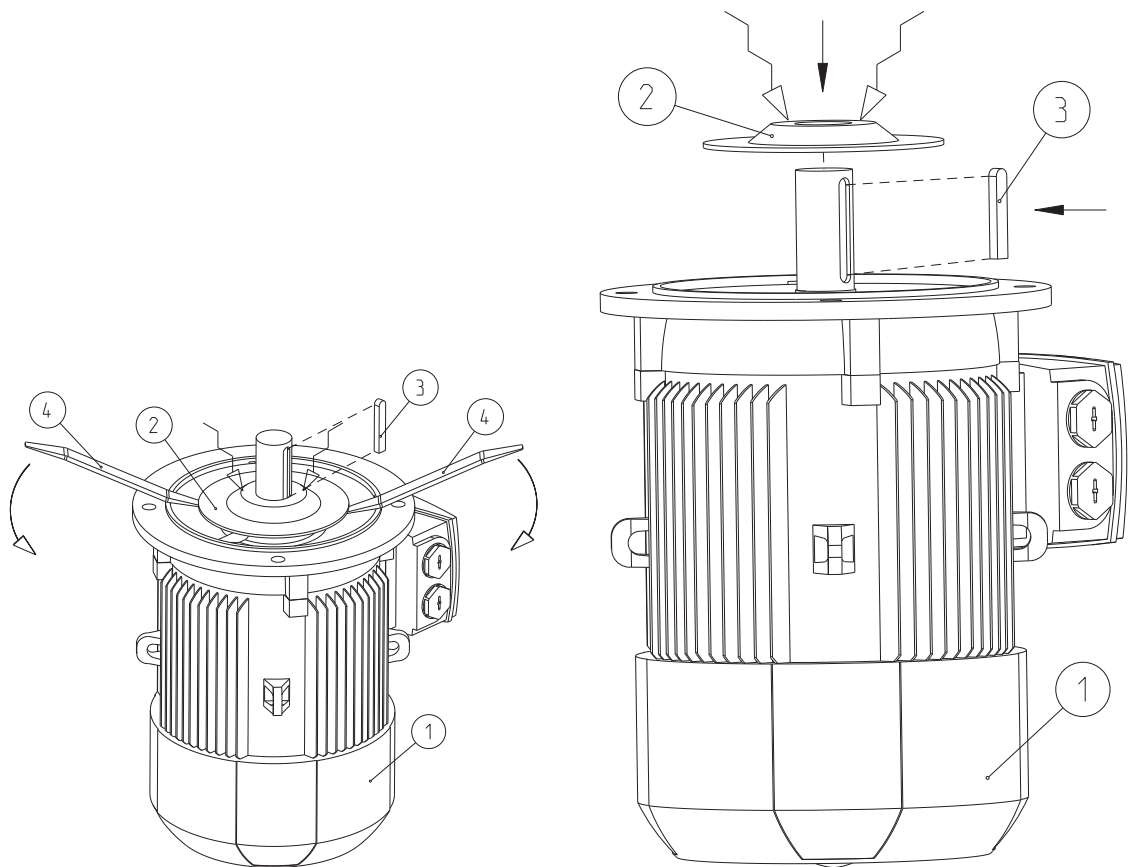


Step	
1	Relieve the damper with a suitable lifting device (31)
2	Loosen the screw fittings (11) and swing out the motor block/impeller unit (2)
3	Secure the impeller with a suitable lifting device, loosen the hub locking screw (chapter 4.3 item 3) and pull off the impeller and hub
4	Release the motor screwed connection (13) and remove the motor (1)
5	Loosen the hinges (32) and remove the motor block unit (2)
6	On some versions: Remove shaft separating disc or remove bearing as described in chapter 4.16
7	Remove inlet nozzle (30)
8	In versions with split housing: Take off removable housing parts. Fit cross members to stabilise the individual housing parts if necessary.
9	On some versions: Loosen the damper fitting (33) and remove the base frame (34) and counterframe (35)

To mount the impeller, proceed as in the chapter "Mounting the PL...". For some variants: Before mounting the impeller, loosen the bolted connection (15) of the shaft gap washer (14); centre the shaft gap washer so that a uniform gap to the impeller hub is continuously maintained and re-tighten the bolted connection (15)!

4.13 Dismounting and mounting the cooling disk (some versions)

In some versions of the fan a cooling disk is used, which is mounted using a shrunk force-fit directly on the motor shaft (between end cap and impeller hub). This is to be dismantled and mounted in accordance with the following instructions:



Dismounting the cooling disk	
The cooling disk is shrunk with a force-fit on the motor shaft and can only be released after warming:	
Step	Activity
1	Remove the motor (1) from the fan and place it in the vertical position (shaft upwards).
2	Remove the key (3) from the groove in the shaft and keep it for mounting later.
3	Heat the cooling disk (2) evenly to a temperature of approx. 130 °C - 150 °C (e.g. with a hot air blower or gas burner); while doing this, heat only the disk - do not point the jet of hot gas directly at the motor shaft!

Mounting the cooling disk	
The cooling disk must be preheated before mounting, because it is a shrunk force-fit:	
Step	Activity
1	Stand the motor (1) in a vertical position (shaft upwards).
2	Hold the edge of the cooling disk (2) with a pair of pliers and heat it evenly to a temperature of approx. 130 °C - 150 °C (e.g. with a hot air blower or a gas burner). Caution, hot surfaces - handle the cooling disk only with a tool!
3	Push the cooling disk on to the motor shaft, at the same time with the flat side facing the end cap and the conical side facing the end of the shaft; the cooling disk must be heated to the point where it can be pushed over the shaft easily and with play. Do not use force - if necessary, continue heating!

Dismounting the cooling disk		Mounting the cooling disk	
4	Place flat levers or screwdrivers (4) at two opposite positions under the edge of the cooling disk and push their ends downwards so that the cooling disk is raised up in the direction of the shaft end, as soon as the shrunk seating has released. Do not use force - if necessary, continue heating.	4	Push the cooling disk up to the shoulder on the motor shaft and allow to cool; only move or mount the motor if the cooling disk is seated firmly on the shaft.
5	Grip the edge of the cooling disk with pliers and lift off the motor shaft. Caution, hot surfaces - handle the cooling disk only with a tool!	5	Before mounting the motor, insert the key (3) into the groove on the shaft. Mount the impeller (see chapter 4.3) then check the balance quality

Removing the cooling disc may damage it. When re-assembling, it should be replaced with a new cooling disc.

4.14 Disassembling and mounting cooling wing

Attention!

If the fan was delivered with a cooling wing, operation without cooling wing is not admissible!

Operation without cooling wing can lead to overheating of the drive unit.

The cooling wing can be removed by loosening the screwed connection of the two halves of the cooling wing from the shaft.

For mounting, the two halves of the cooling wing are screwed back together in the appropriate position on the shaft. The balance quality of the fan must be checked after mounting the cooling wing.

4.15 Disassembly and mounting of the coupling

Attention!

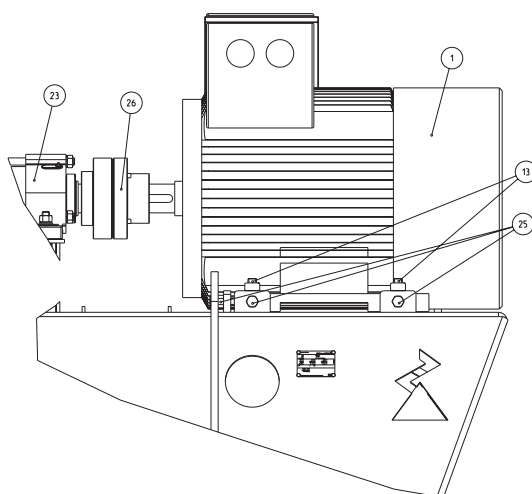
Never operate the fan with misaligned shafts!

Operation with misaligned shafts can cause severe damage to the fan! The alignment of the shafts must be checked every time the screws connection of the motor (13) or the bearing (24) is released.

4.15.1 Replacement of elastic elements

On most shafts, there is no need to remove the shafts to replace the elastic elements of the coupling. Observe the coupling manufacturer's instructions. If it should be necessary to disassemble the shaft, proceed according to chapter 4.15.2 and 4.15.3.

4.15.2 Disassembling the coupling

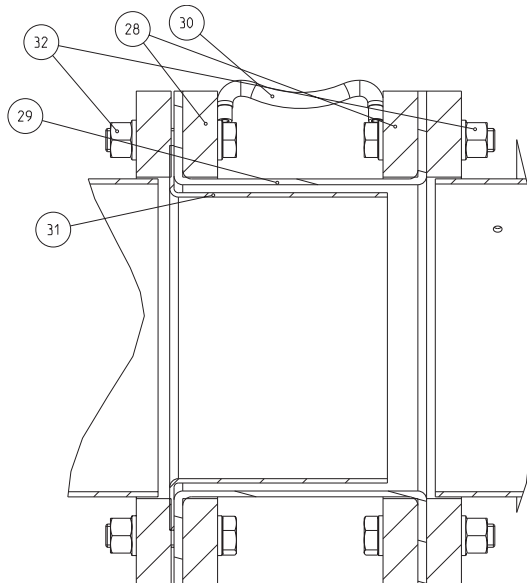


Step	
1	Remove the coupling protection (22)
2	Release the screwed connections of the coupling (26) and separate the coupling halves according to the coupling manufacturer's instructions
3	Release the motor screwed connection (13) and remove the motor (1)
4	The coupling halves can then be removed from the shaft ends.

4.15.3 Assembling the coupling

Step	Operation
1	Pull the coupling halves onto the shaft ends of the bearing (23) and the motor (1)
2	Mount the motor (1)
3	Assemble the coupling halves according to the coupling manufacturer's instructions
4	Align the shaft ends of the bearing (23) and the motor (1) to each other. See the coupling manufacturer's information for limit values for horizontal offset, vertical offset as well as angle offset.
5	The set screws (25) serve to align the motor and may not touch the motor base during operation.
6	Mount the coupling protection (22)

4.16 Disassembling and mounting compensator



The compensator can be designed with an earthing cable (30) to avoid electrostatic charging. To relieve the load on the elastic fabric (29) support sleeves (31) are used at high pressures.

4.16.1 Disassembly of the compensator

Step	Operation
1	Release the screwed connection (32) of the duct-side clamping flange
2	Remove the support sleeve (31)
3	Release the fan-side screwed connection (32) of the clamping flange

4.16.2 Mounting the compensator

Step	Operation
1	Mount fan-side clamping flange (28) with elastic fabric (29) and earthing cable (30) with screwed connection (32)
2	Insert the support sleeve (31)
3	Mount duct-side clamping flange (28) with elastic fabric (29) and earthing cable (30) with screwed connection (32)

Attention!

Compensator may not be installed under tension or with offset.

The screwed connections of the clamping flange must be fitted so that the screw heads are on the side of the elastic fabric.

4.17 Disassembling and mounting shaft seals

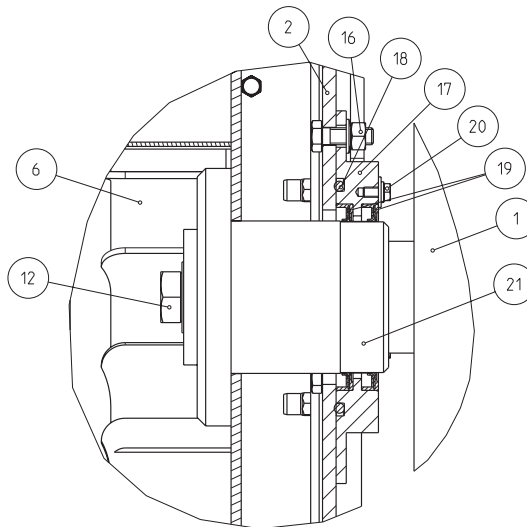
4.17.1 Disassembling and mounting shaft seal with lip seal

Sealing systems for shaft sealing can be equipped with one or more sealing lips. In sealing systems with two or more sealing rings, additional measures to reduce leakage such as inert gas blanketing or extraction can be taken.

The sealing elements (lip seal, static seal and housing) are pressed into a seal housing and can be secured against slipping out by screwed connections.

To prevent large leakages, sealing lips must be aligned exactly to the shaft and the shaft must have only very slight radial run-out deviations. See the instructions of the sealing element manufacturer for the maximum admissible run-out deviation and centre deviation.

After changing the sealing element or the opposite face, lip seals must be run in for at least one hour. There may be higher leakages and temperatures in the area of the seal in this run-in phase.



Disassembly in series PRdry with flange motor

Step	Operation
1	Remove lines for inert gas or extraction
2	Release the screwed connection of the spacer members (chapter 4.5 item 10) and remove the inlet nozzle with the nozzle tray
3	Release hub locking screw (chapter 4.5 item 12) and pull off impeller with hub.
4	Release motor screwed connection (chapter 4.5 item 13) and remove motor (chapter 4.5 item 1).
5	Release screwed connection (16) of the seal housing on the support plate and remove seal housing (17)
6	Release locking screws on the seal housing and pull sealing elements (19) out of the seal housing (17)

Mounting in series PRdry with flange motor

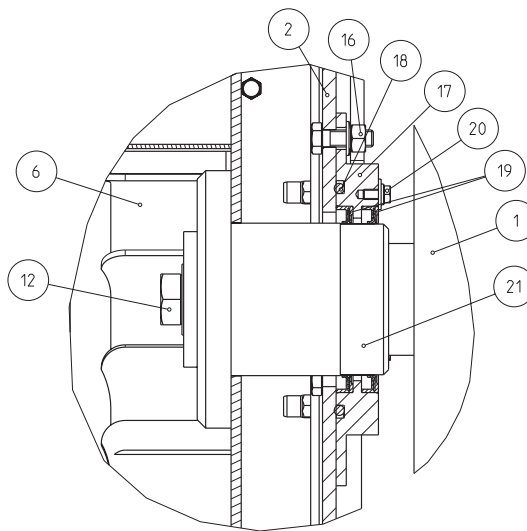
Step	Operation
1	Check sealing elements and opposite face for wear. Opposite face must observe the limit values of the admissible run-out deviation on the drive motor and may not have any score marks. Sealing lips are worn when the end of the sealing lip tapers to a point or shows other signs of damage.
2	Press the sealing elements (2) into the seal housing and fit the locking screws (20)
3	Insert O-ring (18) or flat seal into the seal housing (17) and place the seal housing on the support plate (2) and fix with screwed connection (16).
4	Mount motor (1) and align motor shaft to seal so that the maximum admissible centre deviation is not exceeded.
5	Pull the impeller with hub onto the motor shaft and fix as described in chapter 4.3
6	Screw spacer members with nozzle tray and nozzle onto the support plate (chapter 4.5 item 10) and align the inlet nozzle
7	Connect line for inert gas or extraction

Disassembly in series PR-T with flange motor

Step	Operation
1	Remove lines for inert gas or extraction.
2	Release the screwed connections between support plate and housing (chapter 4.5 item 11) and remove the motor/impeller unit from the housing
3	Release hub locking screw (chapter 4.5 item 12) and pull off impeller with hub.
4	Release motor screwed connection (chapter 4.5 item 13) and remove motor (chapter 4.5 item 1).
5	Release screwed connection of the seal housing on the support plate and remove seal housing (17)
6	Release locking screws (20) on the seal housing and pull sealing elements (19) out of the seal housing (17)

Mounting in series PR-T with flange motor

Step	Operation
1	Check sealing elements and opposite face for wear. Opposite face must observe the limit values of the admissible run-out deviation on the drive motor and may not have any score marks. Sealing lips are worn when the end of the sealing lip tapers to a point or shows other signs of damage.
2	Press the sealing elements (19) into the seal housing and fit the locking screws (20)
3	Insert O-rings (3), (4) or flat seal into the seal housing and place the seal housing on the support plate and fix with screwed connection.
4	Mount motor and align motor shaft to seal so that the maximum admissible centre deviation is not exceeded.
5	Pull the impeller with hub onto the motor shaft and fix as described in chapter 4.3
6	Install motor/impeller unit into the housing, align to the inlet nozzle and tighten screwed connections between support plate and housing (chapter 4.5 item, 11)
7	Connect line for inert gas or extraction



Disassembly in series PRdry with foot motor

Step	Operation
1	Remove lines for inert gas or extraction.
2	Release the screwed connections of the spacer members (chapter 4.6 item 10) and remove the inlet nozzle with the nozzle tray.
3	Release hub locking screw (chapter 4.6 item 12) and pull off impeller with hub.
4	Release motor screwed connection (chapter 4.6 item 13) and remove motor (chapter 4.6 item 1).
5	Release screwed connection (16) of the seal housing on the support plate and remove seal housing (17)
6	Release locking screws (20) on the seal housing and pull sealing elements (19) out of the seal housing (17)

Mounting in series PRdry with foot motor

Step	Operation
1	Check sealing elements (19) and opposite face (21) for wear. Opposite face (21) must observe the limit values of the admissible run-out deviation on the drive motor and may not have any score marks. Sealing lips are worn when the end of the sealing lip tapers to a point or shows other signs of damage.
2	Press the sealing elements (19) into the seal housing and fit the locking screws (20)
3	Insert O-ring (18) or flat seal into the seal housing (17) and place the seal housing on the support plate (2) and fix with screwed connection (16).
4	Mount motor and align motor shaft to seal so that the maximum admissible centre deviation is not exceeded.
5	Pull the impeller with hub onto the motor shaft and fix as described in chapter 4.3
6	Screw spacer members with nozzle tray and nozzle onto the support plate and align the inlet nozzle
7	Connect line for inert gas or extraction

Disassembly in series PR-T with foot motor

Step	Operation
1	Remove lines for inert gas or extraction
2	Release the screwed connections between support plate and housing (chapter 4.6 item 11) and remove the motor/impeller unit from the housing
3	Release hub locking screw (chapter 4.6 item 12) and pull off impeller with hub.
4	Release motor screwed connection (chapter 4.6 item 13) and remove motor (chapter 4.6 item 1).
5	Release screwed connection of the seal housing on the support plate and remove seal housing (17)
6	Release locking screws on the seal housing and pull sealing elements (19) out of the seal housing (17)

Mounting in series PR-T with foot motor

Step	Operation
1	Check sealing elements and opposite face (21) for wear. Opposite face must observe the limit values of the admissible run-out deviation on the drive motor and may not have any score marks. Sealing lips are worn when the end of the sealing lip tapers to a point or shows other signs of damage.
2	Press the sealing elements (19) into the seal housing (17) and fit the locking screws (20)
3	Insert O-ring (18) or flat seal into the seal housing and place the seal housing on the support plate and fix with screwed connection (16).
4	Mount motor and align motor shaft to seal so that the maximum admissible centre deviation is not exceeded.
5	Pull the impeller with hub onto the motor shaft and fix as described in chapter 4.3
6	Install motor/impeller unit into the housing, align to the inlet nozzle and tighten screwed connections between support plate and housing (chapter 4.6 item, 11)
7	Connect line for inert gas or extraction

4.17.2 Disassembling and mounting shaft seal with floating ring seals

- Floating ring seals with seal housing divided in axis direction can be changed without removing the impeller. Observe the seal manufacturer's instructions.
- Floating ring seals with seal housing divided vertically to the axis are disassembled similarly to sealing elements with lip seal. Proceed as described in 4.17.1 to disassemble the seal housing and then follow the instructions of the seal manufacturer. Mounting takes place according to the seal manufacturer's instructions and as described in 4.17.1 from mounting of the seal housing.

4.18 Assembly in a humid atmosphere



Info

If the device is not in use for longer periods in a humid atmosphere, it is recommended to operate the motor/fan for at least 2 hours every month at 80-100 % of maximum speed to remove any moisture that has penetrated inside.

4.19 Connection of pipes

- Tensions on the fan by pipe connections must be avoided. These can lead to contact between rotating and stationary parts.
- Suction and pressure side connections of pipes must be sealed.
- No vibrations, impacts or loads may be transferred to the fan from the pipes.
- Pay attention to thermal expansion of the fan and ducts
- The fan may only be fixed to the suction side flange or pressure side frame if this is expressly agreed in the contract.
- Suction and pressure side ducts must be designed so that an even inflow and outflow is possible.

5 Electrical installation

5.1 Safety precautions



Danger due to electric current

- Work on electric components may only be carried out by trained electricians or by persons instructed in electricity under the supervision of an electrician in accordance with electrical engineering regulations.
- The 5 electrical safety rules must be observed!
- Connect the motor/fan only to electrical circuits that can be disconnected with an all-pole isolating switch.
- The device owner is responsible for the EMC of the entire plant according to the locally applicable standards.
- It is forbidden to carry out work on electrically live parts!
- Cover neighbouring electrical equipment during installation work.
- Cable glands made out of metal are not allowed in plastic terminal boxes due to lack of potential equalisation.
- Electrical equipment must be checked regularly: Loose connections are to be re-tightened and damaged cables must be replaced immediately.

5.2 Connection



Attention!

The electrical connection must be carried out according to the motor operating instructions.

Be aware of the following Points:

- ▷ It must be strictly observed that the line voltage complies with specified on the rating plate and lies within the allowable tolerance specifications (see technical data).
- ▷ Observe the connection values in the motor operating instructions.
- ▷ Observe the tightening torques in the motor operating instructions.
- ▷ When using an external terminal box, the operating instructions must be taken into account.
- ▷ **The protective devices of the motor must be connected!**
- ▷ Check all components for continuity.
- ▷ Before start-up of the installation, check the direction of rotation of the impeller.

5.3 Frequency inverter and EMC

Interference emission and installation of cables

- In order to prevent faults attributable to interference and to ensure compliance with the radio interference level, the connecting leads must be kept as short as possible both in the motor terminal box as well as in the controller. Spacing between supply cables, motor cable and signal cable should thereby be kept as large as possible.
- When laying shielded lines, never use so-called "pigtailed" on shields (twisting of the shielding braid into strands).
- EMC screwed connections must be used on cable entries.
- High-frequency earthing of the complete drive system must be carried out on both sides on the motor and the inverter in a technically correct manner. Implement a contacting process on a large-scale for good discharge of high-frequency currents for a 360° contacting process by means of EMC shield clips on the inverter and an EMC screwed connection on the motor.
- **Make sure that the cable gland has an electro-conductive connection to the terminal box. If necessary, the available coating must be removed on the contact point or a tooth lock washer used on the counter ring.**
- **Maintenance or emergency switches installed between inverter and motor must also be shielded.**
- **Please observe the corresponding installation instructions of the frequency inverter that is used!**

Reducing bearing currents when operating on the inverter

- When operating on the inverter harmful bearing currents can occur in the motor. This depends on many factors which, in many cases, ZIEHL-ABEGG cannot influence. Thus, it comes down to the expert installation in the respective assembly situation. The following points serve as a guideline, but cannot always prevent bearing currents from occurring.
- To systematically reduce and prevent damage by bearing currents, you must take into account the overall system made up of motor and inverter. But further additional measures may be necessary, e.g. use of all-pole sinusoidal filters or use of hybrid bearings.
- **The ZIEHL-ABEGG Fcontrol frequency inverter is already geared to ZIEHL-ABEGG motors and possesses an all-pole sinusoidal filter so that no harmful bearing currents at all can be expected with the correct installation.**

Frequency inverter, external brand

As a general rule, only the use of ZIEHL-ABEGG frequency converters from the Fcontrol model range with all-pole sine filter ensures that no harmful bearing currents, winding damage, noise emissions and premature ageing of the components can occur. ZIEHL-ABEGG therefore recommends the use of ZIEHL-ABEGG frequency converters from the Fcontrol model range with an all-pole sine filter. However, if a non-recommended frequency converter is used, compliance with the following measures is mandatory for safe operation of the actual process air centrifugal fans:

- The specified measures with regard to EMC-compatible installation must be observed and implemented.
- For electrical bridging of vibration dampers, use high-frequency equipotential bonding conductors made of braided flat copper strips with a minimum cross-section of 16mm².
- Design the contacting process on a large-scale.
- Use symmetrically constructed shielded connection cables. In this context, note that the longer the cables, the higher the risk of damage, e.g. due to voltage peaks.
- Connect the screen on both sides on the motor and inverter.
- If the cable shield cannot be contacted or not contacted sufficiently due to special framework conditions, use a separate high-frequency equipotential bonding conductor between the motor housing and the protective earth bar of the inverter.
 - Install the separate high-frequency equipotential bonding conductor using braided flat copper strips or high-frequency stranded conductors. Solid copper lines are not suitable for high-frequency earthing due to the current displacement effect.
- Use suitable common mode filters at the inverter output.
- Limit the voltage increase by using suitable output filters (du/dt filters).
- When using all-pole sinusoidal filters, screened motor leads, metal terminal boxes and a second earth connection to the motor can be omitted.
- **General recommendation: Continuous operation of the fan / motor below 15 % of the nominal speed is not economically and technically reasonable.**

5.4 Operation with frequency inverter**During operation of the frequency inverter pay attention to the following points:**

- In order to approve its centrifugal fans with standard motors, ZIEHL-ABEGG carries out extensive qualification tests. Depending on the installation conditions and the other system components in use (e.g. frequency inverter incl. parameter configuration), in individual cases there may be unusual noises and vibrations (resonance) caused by the electrics.
- If a fan is operated with a frequency inverter, unacceptably high vibrations can occur in narrowly limited speed ranges. Constant running is therefore not permitted. The impeller can burst - danger of serious or even mortal injury!
- During start-up, check whether certain speed ranges result in high vibrations. If this is the case, these speed ranges must be faded out by programming the frequency inverter.
- In case of speed control through a frequency converter, it must be ensured that the max. permissible speed cannot be exceeded due to any frequency converter malfunction.
- If the operating voltage differs, the current may change disproportionately. This must be taken into account when selecting possible frequency inverter and the mains side fuse protection.
- Do not exceed the maximum operating speed (fan/impeller rating plate), see the safety notes. The maximum permissible operational revolution speed applies for sustained operation S. Increased switching repetitions only permissible with gentle step-up by means of frequency converter or with operation without frequency converter by means of Y/D circuit. Do not operate the fan in the

resonance range of the impeller - risk of fatigue fracture. When speed control, pass rapidly through the resonance range.

- Determine the resonance range of the impeller. If the resonance range lies in the operating range, adjust the frequency inverter so that the resonance range is quickly run through. Strong vibrations caused by irregular running (imbalance; overmodulation frequency inverter), for instance due to shipping damage, improper handling or operation in the resonance range, can lead to failure.

**Attention!**

- When in operation with a frequency converter, no overmodulation is allowed. The fan wheel may burst – danger to life!
- If the speed is excessively high due to incorrect configuration of the frequency converter, parts of the fan may come loose, which can cause serious injuries.
 - Check the settings on the frequency converter and ensure that the maximum speed “n_max” (see fan rating plate) cannot be exceeded.
 - Refer to the frequency inverter documentation for further details.

5.5 Motor protection

The thermal motor protection is to be implemented depending on the motor design, observing the motor manufacturer's instructions.

- For a motor with no temperature monitor in the winding, a motor protection switch is required.
- For a motor with “TP” temperature sensors (PTC thermistor) a PTC thermistor relay is required, e.g. ZIEHL-ABEGG type U-EK230E with disconnection via a contactor.

On the design with PTC thermistor, observe the max. permitted test voltage of 2.5 V.

- On a motor with KTY or PT100 temperature sensors, a suitable temperature monitoring unit is required.
- On a motor with “TB” thermostatic switches, a suitable motor contactor is required, e.g. ZIEHL-ABEGG type STDT16/25 or AWE/SK with disconnection via a contactor.

Caution! Thermostatic switches switch on again automatically after cooling. The constructor of the plant must ensure that the fan does not start up automatically, or that an automatic start-up does not result in any hazard. ZIEHL-ABEGG motor contactors prevent an automatic restart after the drive has cooled.

5.6 Required quality attributes for the mains voltage**Danger due to electric current**

The mains voltage must comply with the EN 50160 quality characteristics and the defined standard voltages in IEC 60038!

5.7 Speed control**Info**

When using third-party products for speed control ZIEHL-ABEGG cannot guarantee that they function properly and cause no damage to the motor.

Be aware of the following Points:

- Do not exceed the maximum allowed speed and power consumption of the fan.
- The converter must be suitable for the motor type and motor power.
- The fan is only operated in operating ranges that rule out overloading of the motor.
- Observe the operating instructions for the motor and frequency converter.

6 Commissioning

6.1 Prerequisites for commissioning

During commissioning, unexpected and hazardous conditions can arise in the entire installation due to defective adjustments, defective components or incorrect electrical connections. Remove all persons and objects from the hazardous area.



Attention!

- Before first-time start-up, check the following:
 1. Installation and electrical connection have been properly completed?
 2. Has any leftover installation material and other foreign material been removed from the fan area?
 3. That safety devices -if necessary- are mounted (EN ISO 13857)?
 4. The impeller is out of reach?
 5. Installation position and the arrangement of condensation water drains correspond to each other?
 6. Connection data complies with the specifications on the type plate?
 7. Check the oil level in oil-lubricated bearings
 8. Check whether bearings are lubricated in bearings with relubrication device. If provided, connect relubrication device, first make sure that connections are clean and lines are filled with grease.
 9. If provided, apply inert gas to seal. Inert gas must be compatible with the conveying medium.
 10. If provided, supply suitable grease to the grease block of the seal
 11. Check that impeller moves freely
 12. Check alignment of coupling
- Start-up may only begin when all safety instructions have been verified and any hazards have been ruled out.
 - Check the direction of rotation (↻ rotation direction arrow on the fan blade, impeller base plate or on the fan housing).
 - Check for quiet, low vibration operation. Strong vibrations due to erratic operation (unbalanced), e.g. caused by transportation damage or improper use, can lead to failure.
 - When operating with a frequency inverter, ensure that the function "**over-modulation**" on the frequency inverter does not lead to an increase in the resonance oscillations. It is mandatory that the overmodulation is switched off.
 - A-rated sound power levels of over 80 dB(A) are possible, see product catalogue.

6.1.1 Checking the bearing vibrations

Measure the vibration velocities on the ball bearings of the motor and the impeller bearing in normal operation (nominal speed for mains operation) or at maximum speed (for converter operation).

According to ISO 14694, application category BV-3 the following limits [mm/s r.m.s.] apply:

Requirements	Commissioning	Alarm	Switch-off
Rigid setup	4.5	7.1	9.0
Elastic setup	6.3	11.8	12.5



Attention!

Appropriate monitoring measures (manual or using monitoring device) must be taken to ensure that the maximum permissible vibration velocities are never exceeded at any time during normal operation and that the fan is shut down as immediately as possible as soon as the vibration values reach the alarm limit. Taking out of operation must occur at the latest when the shutdown limit is reached.

6.2 First Start-up

- The bearings may have increased temperature the first time that grease-lubricated bearings are started up because the amount of grease in the bearing for preservation is more than necessary. Bearing temperatures above 120 °C (measured on the roller bearing) must be avoided, however, because this can lead to damage to the bearings.
- Check power consumption of the motor **Caution!!!** Operation with a greater volume flow than in the design point of the fan can cause a much greater power requirement and lead to overloading of the motor. Therefore do not operate the fan without throttling
- When operating on the frequency inverter, run through the whole speed range in which the fan is to be operated and check and record the vibrations. Operation at speeds that cause resonances must be ruled out. Resonance ranges must be run through quickly.
- Fans that convey hot gases must be tested for their high-temperature behaviour. It must be checked whether the alignment of the inlet nozzle, the seal and the coupling is correct at operating temperature. If not, provide different thermal expansion in alignment in cold state.
- Check seals of the duct connections (leak search spray)
- Check effectiveness of the shaft seal

6.3 Operation/control

- **Heat lock / lag in devices with conveying medium temperature > 100 °C** Fans for use with gases with temperatures above 100 °C are equipped with devices such as cooling discs which prevent overheating of the motor or bearing. These devices are only effective during operation and do not prevent heat transfer to the motor or bearing during standstill. The fan must therefore run on with at least 50 % of the nominal speed until the temperature on the impeller has dropped below 100 °C. Fans which are equipped with an additional cooling air fan or are connected to a ventilation system can be switched off directly if this can rule out overheating at standstill. Flow of gases with more than 100 °C around the impeller must be prevented during standstill.
- **Overheated bearings** If, for example, an emergency switch-off causes an increased bearing temperature of more than 120 °C (measured on the roller bearing) the structure of the bearing and the bearing grease may change. The bearing must be flushed with fresh grease to ensure lubrication of the bearing. To do this, twice the amount of lubricating grease must be injected than normally used for relubrication. A change in the structure in the bearing can considerably reduce the service life. Therefore, bearings which have suffered increased bearing temperature must be inspected for damage more often than usual. Another temperature limit for the maximum bearing temperature can be defined for extreme operating conditions.
- **External ventilation** Fans that are equipped with an additional fan for ventilation or encapsulation or are connected to a ventilation system may only be operated when an adequate air flow for ventilation or pressure for encapsulation is available. When the external ventilation for cooling fails, measures must be taken to avoid overheating such as lowering the conveyor medium temperature. Overheating at standstill must also be avoided.

6.4 Restarting

- The instructions in the chapters "Start-up" and "Service work" must be observed for restarting.
- Then fan must be inspected for corrosion damage.
- Plastic and rubber parts must be inspected for signs of ageing.
- The grease level of grease-lubricated bearings must be checked when restarting the fan after a standstill time of more than 6 months. If lack of oil or contamination is detected in the bearing grease, it must be renewed. Oil must be changed in oil-lubricated bearings. In shaft seals with a grease block, the blocking grease must be changed. To renew the lubricant, see also the instructions in the motor, fan bearing and shaft seal operating instructions.

7 Trouble shooting

Type of error	Possible cause	Remedial measures
Fan does not run (any-more)	Mains voltage failure Failure of a phase	Check mains voltage
	Weight	Check the motor connection and mains voltage
	Coil closure	change motor
	Thermal motor protection has triggered (motor is overheated)	Check for free air passages; remove foreign bodies if necessary ☞ "Impeller blocked or dirty" Check supply air temperature Check voltage only for 1 ~ motors: check capacitor
	Impeller blocked or dirty	- Disconnect the motor from the power supply and secure it against switching back on - Check safe isolation from supply - Remove protective grille - Remove foreign bodies or dirt - Reinstall protective grille - proceed as described in the Commissioning chapter
Fan does not start	only for 1 ~ motors: wrong capacitor (capacity)	Select capacity according to the rating plate
	Temperature too low for bearing grease	Insert bearing with cold greasing
	Volume flow greater than planned	Reduce volume flow by throttling or check fan selection
	Density of the conveying medium different to planned	Check temperature and composition of the conveying medium, check fan selection
	☞ "Fan does not run"	
"Fan turns too slowly"	Failure of a phase Power supply undervoltage	Check mains voltage
	In two-speed motor: Circuit wrong: Y instead of D	Connect according to the voltage on the rating plate
	Only in 1~ motors: Capacitor worn	replace capacitor
	Fan rotates in the wrong direction	- - > see there
	Impeller / blade drags / scrapes	When indicated clear foreign bodies / dirt from the fan ☞ "Impeller blocked or dirty"
Fan rotates in the wrong direction	Only with 3 ~ motors: wrong connection (phase sequence)	Switch two power lines
	only for 1 ~ motors: capacitor wrong connected	Connect according to circuit diagram
air flow too low	Fan rotates too slowly or in the wrong direction	- - > see there
	Airways blocked	Check for free air passages (supply/exhaust air flaps, filters) ☞ "Impeller blocked or dirty"
	Pressure loss different to projection	Check fan selection
Vibrations	Imbalance	Check the blade(s) for damage, contamination or ice formation ☞ "Impeller blocked or dirty"
	Shaft offset (coupling-driven variant)	Realign shaft, consider thermal expansion in hot gas fans
	Fan tensioned	Connect pipes without tension, install and mount fan without tension
unusual noises	Bearing damaged / worn	Change bearings
	Impeller / blade drags / scrapes	When indicated clear foreign bodies / dirt from the fan ☞ "Impeller blocked or dirty"
	Operation beyond tear-off point	Check for free air passages (supply/exhaust air flaps, filters)

Type of error	Possible cause	Remedial measures
	Fan rotates in the wrong direction	-- > see there
	for single-speed motor: Incorrect gearshift: D instead of Y	Connect according to the voltage on the rating plate

7.1 Faults on the shaft seal

Type of error	Possible cause	Remedial measures
Inert gas consumption increased	Sealing elements worn or damaged	Change sealing elements
	Centre deviation too great (in lip seals)	Realign seal to shaft Consider thermal expansion in hot gas devices
Increased grease emergence from grease block	Sealing elements worn or damaged	Change sealing elements
	Viscosity of blocking grease too low	Use suitable blocking grease for the application, check temperature at the seal
	Blocking grease contaminated	Change blocking grease
Leakage on the shaft seal increased	Sealing elements worn	Change sealing elements
	Centre deviation too great (in lip seals)	Realign seal to shaft Consider thermal expansion in hot gas devices
	Amount of grease in grease block too low	Inject correct amount of grease into the grease lock
	Inert gas pressure too low	Increase inert gas pressure
	Flat seal or O-ring on seal housing defective	Change flat seal or O-ring on seal housing

7.2 Faults on the bearing

Type of error	Possible cause	Remedial measures
Leaking grease or oil	Seal defective or worn	Change seal
	Viscosity too low	Inject suitable grease or oil for application
Vibrations	Bearing with chattermarks	Change bearing, avoid vibrations at standstill
	Bearing worn, too great bearing gap, standstill corrosion	Change bearing, protect bearing against dirt and impermissible high temperatures, observe storage instructions
Bearing temperature increased	Lack of lubrication, too much lubricant and therefore increased fulling work, too narrow bearing clearance, bearing under tension	Insert correct amount of grease, change grease when old, after overheating or after contamination, grease must be suitable for the application, install bearing without tension
Howling or whistling bearing noises	Too low operating air, bearing damage	Insert bearing with more operating air, protect bearing against too great temperature influences

7.3 Faults on the coupling

Type of error	Possible cause	Remedial measures
Uneven running	Wear on the elastic elements	Replacement of elastic elements
	Misaligned coupling halves or shafts	Check alignment and correct if necessary
Heavy impacts when starting	Wear on the elastic elements	Replacement of elastic elements
Breakage of the coupling	Too great torque surges (e.g. when switching back on)	Change coupling, only switch back on from standstill

8 Service work

8.1 Maintenance/servicing



Attention!

- Allow maintenance work to be carried out by trained specialists only.
- Any faults detected in the electric system/modules/operating equipment must be corrected immediately. If these faults are not corrected, the device/system is potentially very dangerous. The device/system must therefore not be operated when it is faulty.
- Please observe the safety regulations and the worker's protection rules by all maintenance and service work (EN 50 110, IEC 364).
- Before working on the fan, this must be disconnected from the power supply and secured against switching back on!
- Fuses must always be only replaced; never repaired or bridged. The specifications for the maximum series fuse must always be adhered to (☞ Technical data). Only fuses cited in the electrical circuit diagram may be used.
- Keep the airways of the fan free - danger because of objects dropping out!
- No maintenance work at running fan!
- Watch out for vibration free motion! See ISO 14694 for limit values for admissible vibrations
- The impeller is subject to natural wear depending on the area of application and the conveying medium. Deposits on the impeller can lead to imbalance and damage (danger of permanent fracture). The impeller can burst!
- Maintenance interval in accordance with the degree of contamination of the impeller!
- In case of imbalance: Rebalance the impeller.
- Check the impeller, in particular the weld-seams, for possible cracks.
- Repair, e.g. by welding is prohibited!
- If the fan or the motor is equipped with life long lubricated bearings, there is need for bearing maintenance. Bearings must be changed at the end of the grease life (technical data). Bearings with a relubrication device must either supplied by an automatic relubrication device or by regular application of lubricant.
- Bolted-on impellers and/or wings may only be replaced by authorised ZIEHL-ABEGG SE staff. The manufacturer shall not be liable for damage caused through improper repair work.
- Regular inspection, if necessary with cleaning, is necessary to prevent imbalance due to ingress of dirt.
- When opening cable glands on the fan / motor, check the condition of the threaded connections and seals. Always replace defective or brittle threaded connections and seals.
- **The screen protection against accidental contact must be fixed again properly at the end of the work and before restarting!**

Maintenance should be carried out based on VDMA 24186-1. The scope and frequency of maintenance must be determined depending on operating and installation conditions. Maintenance work on the motor must be carried out according to the motor manufacturer's specifications.



Info

Confirmation number for inquiries or in service cases ☞ rating plate.

State the additionally engraved confirmation number (available depending on the motor build) if the rating plate is no longer legible. This can be found under the affixed rating plate or on the stator flange (in external rotor motors) depending on the motor size.

8.2 Cleaning



Danger due to electric current

Voltage supply for motor must be interrupted and secured against restoration!

Clean the fans's flow area.

Attention!

- Do not use any aggressive, paint solvent cleaning agents when cleaning.
- Only clean with dry compressed air or wipe off. Where electrostatic charging must be avoided, electrostatically chargeable parts may only be cleaned with a damp cloth.
- Make sure that no water gets inside the motor and the electronics (e.g. by direct contact with seals or motor openings), observe protection class (IP).
- The drain holes (if available) corresponding to the installation position must be checked for free passage.
- In case of improper cleaning work, no warranty is assumed regarding corrosion formation / paint adhesion for unpainted / painted fans.
- To avoid accumulation of moisture in the motor, the fan must be operated for at least 1 hour at 80% to 100 % of the maximum speed before the cleaning process!
- After the cleaning process, the fan must be operated for at least 2 hours at 80 to 100 % of the maximum speed for drying purposes!
- Observe the cleaning instructions in the manufacturer's operating instructions to clean components such as drive motor and bearings.

9 Enclosure

9.1 Technical data

Mains voltage ( Rating plate)	1 ~ 230 V +/- 10 %, 50/60 Hz
	3 ~ 50 Hz: 230/400 V, 400/690 V, 500 V +/- 5 %
	3 ~ 60 Hz: 460 V +/- 5 %
Switching frequency	Fans are dimensioned for continuous operation with constant load (operating mode S1 according to IEC 60034-1). Controls must not allow extreme switching operation!
Permissible minimum and maximum ambient temperature for operation	1 ~ types: with operating capacitor: -25 °C...40 °C 3 ~ types: -20 °C...40 °C Please see the technical documentation of the product for the minimum and maximum ambient temperature valid for the respective fan ; these may deviate from the specified permissible ambient temperatures.
Permissible temperature range for storage and transport	-30...+80 °C
For 1~ motors Life expectancy capacitor capacity	approx. 30,000 h per DIN EN 60252
Sound output level	 Technical data sheet for the fan
Ball bearings grease service-life	Ball bearings with life-time lubrication: 20000 h Regreasable bearings: see technical data sheet for the fan/motor Reduction of the grease life at motor speeds above nominal speed according to motor manufacturer's instructions
Protection class of motor according to EN 60034-5	IP55

9.2 EC Declaration of Incorporation

- Translation -
(english)

ZA155-GB 2021/20 Index 002

Manufacturer: ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
74653 Künzelsau
Germany

The manufacturer is solely responsible for issuance of the declaration of incorporation.

The design of the partly completed machine:

- Axial fan PA
- Centrifugal fan PR-T, PR-dry

The products are developed, designed and manufactured according to the following EC directives:

- Machinery directive 2006/42/EC

The following harmonized standards have been applied:

- EN 60204-1:2018
- EN ISO 12100:2011
- EN ISO 13857:2019

Start-up of this incomplete machine is prohibited until it is ensured that the machine in which it has been installed complies with the provisions of the EC Machinery Directive.

All ErP-relevant information comprises measurements which are determined using a standardised measurement set-up. More details can be obtained from the manufacturer.

The prerequisite for meeting the safety targets in the aforementioned guidelines and standards is that the devices are installed, maintained and used only for the corresponding field of application. Information on this can be found in the assembly instructions and on the rating plates.

The special technical documents in accordance with Appendix VII B have been created and are available in full.

Upon reasonable request, the special documents shall be transmitted to the public authority. The transfer can be made electronically, on data carriers or on paper. All property rights remain with the aforementioned manufacturer.

The following persons are authorized to compile the technical documents, address see above.

Künzelsau, 17.05.2021
(location, date of issue)

ZIEHL-ABEGG SE
Peter Koppenhöfer
Director Process Air Fan
(name, function)



(signature)

ZIEHL-ABEGG SE
Rainer Sturm
Head of Project Engineering Process Air Fan
(name, function)



(signature)

9.3 EU declaration of conformity

- Translation -
(english)

ZA154-GB 2021/20 Index 002

Manufacturer: ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
74653 Künzelsau
Germany

The manufacturer is solely responsible for issuance of the declaration of conformity.

The products:

- Centrifugal fan PR-T, PRdry
- Axial fan PA..

Motor type:

- Asynchronous internal or external rotor motor
- Asynchronous internal or external rotor motor with integrated frequency inverter
- Electronically commutated internal or external rotor motor
- Electronically commutated internal or external rotor motor with integrated EC controller

The above mentioned products of this declaration fulfil all relevant provisions of the following Directives of the Union:

- EMC Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- ErP Directive 2009/125/EC, in conjunction with Regulation (EU) no. 327/2011

The following harmonized standards have been applied:

- EN 60034-1:2010 + AC:2010
- EN 60204-1:2018
- EN 60529:1991 + A1:2000 + A2:2013 + AC:1993 + AC:2016 + AC:2019
- EN 61000-6-2:2005 + AC:2005
- EN 61000-6-3:2007 + A1:2011 + AC:2012

All ErP-relevant information comprises measurements which are determined using a standardised measurement set-up. More details can be obtained from the manufacturer.

Compliance with the EMC Directive 2014/30/EU refers only to those products when they are connected by mounting / operating instructions. If these products are integrated into a system or supplemented with other components (e.g. sensing controls) and operated, the manufacturer or operator is responsible of the overall system for compliance with the EMC Directive 2014/30/EU.

Künzelsau, 17.05.2021
(location, date of issue)

ZIEHL-ABEGG SE
Peter Koppenhöfer
Director Process Air Fan
(name, function)



(signature)

ZIEHL-ABEGG SE
Rainer Sturm
Head of Project Engineering Process Air Fan
(name, function)



(signature)

9.4 Manufacturer reference

Our products are manufactured in accordance with the relevant international regulations. If you have any questions concerning the use of our products or plan special uses, please contact:

ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
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<http://www.ziehl-abegg.com>