english

MAXvent

Type FV31...FV14 and DN31...DN14

Axial fans for an explosive atmosphere

Assembly instructions

Keep for reference!

L-BAL-F076-GB 1747 Index 001 Part.-No. 00705156-GB

ZIEHL-ABEGG

Content

1 General notes

1.1 Scope of documentation

This document is valid for MAXvent axial fans type FV… and DN… (see rating plate), which are suitable for use in an explosive atmosphere.

The complete documentation for the product consists of these fan assembly instructions and the motor operating instructions.
To ensure the final suitability of the product for the permissible conditions of use specified in the order acknowledgement, 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.

Information
In the case of fans with the quality mark (☞ rating plate), please note the related specifications depending on the application location.

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

Concurrence between the contents of these assembly instructions and the described hardware and software in the device has been examined. It is still possible that non-compliances exist; no guarantee is assumed for complete conformity. 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.
ZIEHL-ABEGG SE is not liable for damage due to misuse, incorrect use, improper use or as a consequence of unauthorized repairs or modifications.

1.5 Copyright

2 Safety

2.1 Safety instructions

This chapter contains instructions to prevent personal injury and property damage. These instructions do not lay claim to completeness. In case of questions and problems, please consult our company technicians.

Attention!

- Non-compliance with the information and safety instructions listed in these assembly instructions can cause serious health and safety risks!
- It is essential to observe the notes in the motor manufacturer's assembly instructions, which are part of the scope of supply.

It is essential to observe the following points:

- The fans are exclusively intended for use in explosive atmospheres of Zone 1 and 2 for gases or Zone 21 and 22 for dust (see rating plate).
- The conveyance of solid matter or solids content in the conveying medium is not permissible and can lead to dangerous situations. ZIEHL-ABEGG rejects any liability for damage of any kind as a result of such use.
- Frequency inverters are only permissible if explicitly specified, up to a maximum frequency of 50 Hz (for 50 Hz driven motors) or 60 Hz (for 60 Hz driven motors).
- The temperature classes of fan and motor are allowed to be different, but they must be defined according to the ignition temperature of conveying media.
- The fans must be operated in the temperature ranges specified on the rating plate.
- The operating data on the rating plate are specified for an air density of 1.2 kg/m^3.
- Assembly and electrical connection may only be carried out by skilled personnel in compliance of applicable standards and these assembly instructions.
- Start-up and maintenance of the device may only be carried out by skilled personnel, who have completed ATEX training for correct performance of their work.

For example:

- Protection of the motor against unusual heating according to EN 60204
- Motor protection switches must be installed and set to the rated current specified on the rating plate (a higher value is not permissible).
- **The motor overheating protection equipment must be connected.**
- Circuit breakers or overheating protection equipment not properly connected will invalidate the manufacturer's warranty. Furthermore, this might lead to explosion hazards.
- ...

If the impeller is accessible, protective grilles must be installed according to EN 13857. These must not be changed and must be adequately fastened.
Pay attention to objects at a greater height which might fall down.
Pay special attention to material combinations according to EN 14986.
Since a residual risk due to falling objects, incorrect behaviour, etc. cannot be completely ruled out, the designer, operator or manufacturer of the installation or system in which the fan is to be installed, must prevent any potentially hazardous situation from arising by means of appropriate safety measures in line with standard EN ISO 12100 and especially standard EN 14986.
The operator is responsible for maintenance of the fan.
Compliance with the EMC Directive only exists if the fan is directly connected to the main power supply. If the fan is installed in a system or combined with other products, the system manufacturer is responsible for compliance with the EMC Directive.

- The fans must be arranged at a reasonable distance from transmitters or be protected by suitable shielding.
- The components (tubular housing, grille, etc.) made of stainless steel 1.4031 can become magnetic through impact. This must be prevented by using austenitic and non-magnetic steels (EN 14986).

Responsibility of users

- The owner or operator must ensure that the equipment (fan and electrical system) is used according to the description in these instructions and kept in good operating condition.
- The user shall only put the fan into operation after it has been properly installed.
- The fan must be operated in accordance with the assembly instructions.
- To ensure operability, safety devices (especially the overheating protection equipment) must be checked regularly.
- The instructions for installation and use must be complete and available to users at any time.
- Users must be trained with regard to the hazards associated with the operation of an installation in an explosive atmosphere and the intended use of the installation.
- No safety and warning instructions on the fan may be removed, and the user must make sure that they are legible.
- The persons responsible for the installation, start-up, operation and maintenance of the device must be competent and possess sufficient experience to correctly perform their work.

- In addition, they must know the European standards and guidelines (at national and regional level and if applicable the in-house regulations) for safety and hazard prevention. A new user may only work under the supervision of an experienced operator.
- This device must not be used by persons with limited physical and mental abilities. Moreover, the minimum legal age must be observed, and users must be adequately trained.

2.2 Intended use

Attention!

- The fans are only intended for the conveyance of air or mixtures similar to air.
- Any other use above and beyond this is considered not for the intended purpose unless agreed otherwise by contract. The manufacturer will not be liable for any damage resulting from this. The individual or company using it bears the sole risk.
- Do not connect built-in fans to open flue pipes of gas and other firing devices.
- Built-in fans with VDE approval (see rating plate) are designed to be installed inside devices and are not suitable for the direct mains connection.
- 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.

2.3 Improper use

Attention!

Any improper use may cause material damage and serious risk of injury or danger to life. Not the manufacturer, rather the operator of the device is liable for any personal harm or material damage arising from non-intended use.

Possible consequences of improper use: Damage to bearings, formation of corrosion, imbalance, vibrations, warping, etc. as well as the development of risks for users and the environment (risk of explosion).

Examples of improper use (list not intended to be exhaustive):

- Operation with ice particles
- Conveyance of abrasive or adhesive media.
- Conveying of gases with a temperature outside the operating temperature specified on therating plate.
- Conveying of corrosive gases
- Transfer of solids or solids content in the transfer medium.
- Operation with iced up fan impellers.
- Conveyance of liquid media.
- Use of the fan and add-on parts (e.g. safety 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.
- Holding or carrying the fan on the impeller

- Loosening of fan blade, impeller and balancing weight
- Dismantling of the impeller
- Every other use which can lead to a hazardous situation
- All applications not listed in the intended use.

2.4 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!
	**Information** Important additional information and advice for user.

2.5 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!

Information
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.

2.6 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.

2.7 Work on the device

Information
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 operation with a frequency inverter the protective conductor is carrying high discharge currents (irrespective of the clock frequency, current-source voltage and motor capacity). Earthing in compliance with VDE specifications shall therefore be observed even for testing and trial conditions (EN 50 178, Art. 5.2.11). Without earthing, dangerous voltages can be present on the motor housing.
- Maintenance work may only be carried out by suitably qualified personnel.

Attention, automatic restart!
- The fan / motor 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! Therefore the fan must be disconnected from voltage before doing any work (☞ service work).
- 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.

2.8 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.

2.9 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 (see “Application”).
- 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.

2.10 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. It is the site manager's task to obtain information about potential hazards related to the ATEX Zone and to ensure that personnel are adequately trained in the tasks to be performed.
You must monitor their working methods in order to intervene in good time if necessary.

3 Product overview

3.1 Application / operational area

The fans / motors are not ready-for-use products, but conceived as components for ventilation systems (type designation see rating plate).

- Fans must be balanced according to DIN ISO 1940-1 / ISO 14694.
- These fans are equipped with internal rotor motors, whose ignition protection is determined by their area of application.
- The motor is rated for S1 continuous operation.
- MAXvent axial fans type FV … and DN… of Group II, Categories 2G, 3G for gas and 2D, 3D for dust, with ignition protection type "c" achieved by constructive safety for Groups IIA, IIB for gases in Zones 1 and 2 as well as IIIA, IIIB, IIIC for dusts in Zones 21 and 22.
- MAXvent axial fans type FV… and DN… suitable for use in an explosive atmosphere:
  – II 2G c IIB T…, II 2G c T…, II 3G c IIB T…, II 2D c IIIB T…, II 2D c IIIC T…, II 3D c IIIB T…, II 3D c IIIC T… with ignition protection type "c", constructive safety.

Attention!

- The fans may only be operated when they are installed as intended and safety is ensured by means of protective devices according to DIN EN ISO 13857 (DIN EN ISO 12100) and the required structural explosion protection measures according to EN 14986.
- Use is only permissible if the gas or dust group is the same on both sides of the tubular housing (internal/external).
- ZIEHL-ABEGG axial fans comply with the provisions of EN 14986 with regard to the regulations for selection of materials and protective measures in the possible contact areas between moving and rigid parts (tubular housing/impeller). Moving parts (impeller) can consist of parts made of steel, aluminium and composite materials.
- The installer of the system is responsible for the material selection of used accessories (protective grilles, nozzles, flange rings, etc.). Only material combinations according to EN 14986 may be used. **The installer of the system is responsible for the earth connection of all accessories!**
- Unless explicitly specified, the use of electronic devices or transformers is not permissible.
- The supplied and certified contact protection of ZIEHL-ABEGG SE fans is designed according to DIN EN ISO 13857 Table 4 (from the age of 14 onwards). In the event of deviations, further structural protective measures must be taken for safe operation.

3.2 Transport, storage

Attention!

- Always observe the weight specifications and the permissible carrying loads of the means of transport.
- Wear safety shoes and gloves for handling!
- Transport the fan(s) either in the original packaging or, in the case of larger fans, on the dedicated transportation fixtures (holes in the wall plates) using a suitable means of transportation. Observe the weight data on the identification plate.
- 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.
- Fix 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.
- Store the fan / motor in the original packaging in a dry area protected from the weather and protect it from dirt and weather until final installation.
- Avoid prolonged storage; we recommend a maximum of one year (consult the manufacturer before starting if stored for longer).
- Inspect the bearing for proper operation prior to installation.
  - Recommendation: Turn the impeller evenly by hand to avoid jamming and damaging the bearing.

3.3 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!

- Check the fan for damage, e.g. cracks, dents or damage to the electric cables, before assembly. Start-up is not allowed in the case of transport damage!
- The operator is responsible for installation and for ensuring the safety of the device. Assembly must be carried out by qualified personnel in compliance with these instructions and the motor operating instructions.
- 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 ISO 12100 / 13857).
- Take into account easy access for cleaning and maintaining the fan.
- Wear safety shoes and gloves for handling!
- Lift the fan out of the packaging with a lifting gear (lifting beam). Attachment points are solely the holes on the housing flange, motor bed, support plate, motor suspensions, fastening brackets and any crane eyes of the fan (depending on the shape of the fan).
- The chain/rope may not touch the impeller and the possibly mounted frequency inverter when lifting with the lifting beam, otherwise damage is possible.
- At a weight greater than 25 kg for men / 10 kg for women, the device should be lifted out by two persons (according to REFA). The values may differ from country to country.
- Prior to installing the fan, check whether safety distances according to EN ISO 13857 are complied with. 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 protection grating against accidental contact is not necessary on the fan.
- If the fan is located in danger zone, then the manufacturer or operator shall ensure that hazards shall be prevented by appropriare protective constuctions which meet the requirements to EN ISO 13857.
- The custom designs must suit the prevailing conditions.
- Tighten the fastenings with the specified torques.
- Do not allow drilling chips, screws and other foreign bodies to reach the device interior!
- 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).
- Before the first switch-on, remove any items that may be present (borings, screws and other foreign objects) from the intake area - risk of injury from any objects that may fly out!

4.2 Special measures for fans used in Zone 21

Attention!
For all fans used in Zone 21, a vibration monitoring system firmly attached to the fan has been stipulated since May 2007, according to standard EN 14986.

The following points must be observed by the customer:

- Only vibration sensors approved for Zone 21 may be used.
- Vibration sensors must be attached to the fastening screws under the motor:
  - 1 in front of the motor
  - 1 behind the motor
  - The sensor signal must be transmitted to a control system located outside the potentially explosive atmosphere or to evaluation equipment.
  - This controller must deactivate the fan when the critical vibration threshold value is reached.
  - Also see the operating instructions for these equipment.

The following vibration threshold values apply to fans used in industry:

Threshold values according to ISO14694	Rigid attachment mm/s (rms)	Flexible attachment mm/s
Start-up value	4.5	6.3
Alarm threshold	7.1	11.8
Switch-off value	9.0	12.5

4.3 Miscellaneous

- Do not use any materials or paints which become electrostatically charged and may lead to sparking.
- If necessary, the system must be equipped with lightning protection.
- Systems must be set up at a sufficient safety distance from transmitters or be protected by suitable shielding.
- **Do not paint over the flameproof gap on the terminal box of the motor after establishing the connection (between terminal box and cover).**

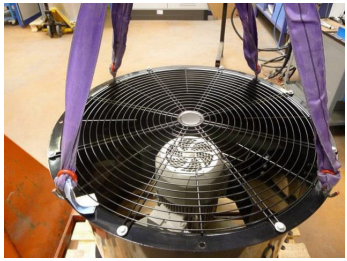
4.4 Handling

Attention!

- During handling always wear personal protective equipment (helmet, safety shoes, etc.).
- Never drive under a load or park underneath!
- Pallets must be secured when unloading and during handling.
- Never hold or carry on the impeller.
- Never hold or carry on the grille(s).
- Never hold or carry on the cable(s).
- Check the weight of elements and use suitable lifting and conveying equipment.

After unpacking proceed as follows:

▷ The fan must be fastened to 4 points during transport so the flanges do not warp.



▷ The hooks must point "outwards" (see photo).

▷ To turn the fan round, fasten the fan at 2 points so it does not warp.

▷ Handling in the "horizontal axis" must be done at 4 points to prevent the flanges from warping.

▷ The hooks must point "outwards" (see photo).

4.5 Connection lead & terminal box

Information
In demanding environments (wet areas, open air installation) all connections must incorporate water drainage curves. To ensure that water cannot penetrate through to the controller housing from the connections install a terminal box lower than the motor.

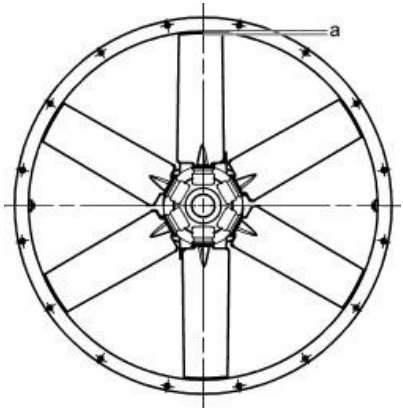
4.6 Assembly in a humid atmosphere

Information
If a fan / motor is stationary for long periods in a humid atmosphere, it should be switched ON for minimum of two hours every month to remove any moisture that may have condensed within the motor.

4.7 Assembly of the MAXvent fan

Attention!
- Motor and accessories (protective grille etc.) must be connected to earth.
- Connection points must be reliably protected against the formation of corrosion.

Observe the following points for all types of fans:
- Do not install without suitable supports/brackets.
- Ensure adequate clearance on suction and pressure sides. When installing fans in devices, ensure there is a suitable inlet opening through a minimum integration distance, which corresponds to the rough diameter of a fan.
- Warping caused by the elasticity of the components must not cause the impeller to rub against the tubular housing.
- Ensure that there is a constant gap dimension "a" (see figure below) betweenimpeller and tubular housing.



- According to EN 14986, the minimum distance between non-moving and moving parts must be complied with. The distance must not be less than 0.5 % of the diameter (at least 2 mm and at most 20 mm).

Minimum gap dimension:

fan type	a (min.)		fan type	a (min.)
FV31 / DN31	2.0 mm		FV71 / DN71	3.55 mm
FV35 / DN35	2.0 mm		FV80 / DN80	4.0 mm
FV40 / DN40	2.0 mm		FV90 / DN90	4.5 mm
FV45 / DN45	2.25 mm		FV10 / DN10	5.0 mm
FV50 / DN50	2.5 mm		FV12 / DN12	6.25 mm
FV56 / DN56	2.8 mm		FV14 / DN14	7.0 mm
FV63 / DN63	3.15 mm			

▷ Fasten the fan with suitable bolts using all the fastening points of the flanges.
▷ Fasten the accessories with suitable bolts.
▷ Ensure that all elements (including accessories) are connected to earth.

Tightening torques for fastening the fan and accessories:

Tightening torques M_A				
Thread size	M6 (Special application with 5-pitch)	M8	M10	M12
Property class 8.8, friction coefcient µges = 0.12	9.5 Nm	23 Nm	46 Nm	79 Nm
Stainless steel A2-70, friction coefcient µges = 0.12	6.4 Nm	15.3 Nm	31 Nm	52 Nm
Screw penetration	≥ 1.5 x d	≥ 1.5 x d	≥ 1.5 x d	≥ 1.5 x d

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 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.
- A second person must always be present when working on energized parts or lines who disconnects in case of emergency.
- Do not use metal compression-gland fittings with plastic terminal boxes. - Danger of an electric shock if connection is not made correctly!
- Electrical equipment must be checked regularly: Loose connections are to be re-tightened and damaged cables must be replaced immediately.

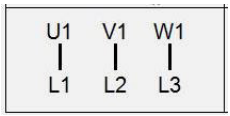
5.2 Connection

Attention!
The electrical connection must be done according to the motor operating instructions and according to EN 60079-14: "Explosive areas - Part 14: Project planning, selection and installation of electrical systems."

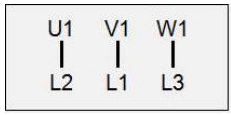
Observe the following points:

- ▷ It must be strictly observed that the line voltage complies with specified on the rating plate and lies within the allowable tolerance specifications (☞ 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.
- ▷ Only use suitable threaded gland bushings for your ATEX Zone.
- ▷ Before start-up of the installation, check the direction of rotation of the impeller:

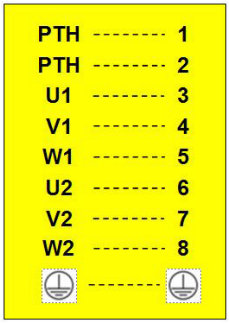
Airflow direction "V"



Airflow direction "A"

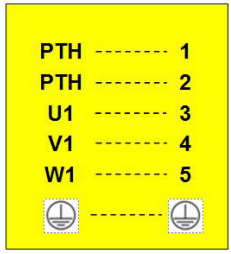


- ▷ If the fan was only delivered with one cable, but without external terminal box, the electrical connection must be carried out as follows:



9-core cable

or



6-core cable

5.3 EMC-compatible installation

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 "pigtails" 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

The following measures support the reduction of harmful bearing currents:

- 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 shielded connecting cables with as symmetrical a design as possible.
- 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).
- We recommend the use of all-pole sinusoidal 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.**

6 Start-up

6.1 Prerequisites for commissioning

Attention!

- 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.
- Do not start the fan until all safety instructions (DIN EN 50110, IEC 364) have been checked, the fan is out of range (DIN EN ISO 13857) and danger can be ruled out.

6.2 Check before commissioning

Observe the following points before the initial start-up:

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. Have all objects (tools, etc.) been removed from the air flow?
4. That safety devices -if necessary- are mounted (EN ISO 13857)?
5. The impeller is out of reach?
6. Are the condensation water drains holes (as far as available) open or respectively closed according to the suitable installation position?
7. The impeller must not rub against the tubular housing. The gap dimension must at least correspond to the gap dimension according to EN 14986 (checking of the gap dimension at the periphery).
8. Continuous potential equalisation must exist.
9. The threaded gland bushings are tightened.
10. The tubular housing flap (if available) is correctly closed and screwed together.
11. Connection data complies with the specifications on the rating plate?
12. Is the overheating protection equipment of the motor properly connected?

Start-up may only begin when all safety instructions have been verified and any hazards have been ruled out.

- Check whether the direction of rotation of the impeller corresponds to the arrow attached to the tubular housing.
- Motors with a rated output greater than or equal to 4 kW are generally connected via a "star-delta starting switch".
- If the fans were stored for a longer period or were not in operation, the insulation resistance of the motor winding must be measured before start-up. In the case of values below 1.5 MΩ the windings must be dried.

6.3 During start-up check the following

Observe the following points during start-up:

1. Check the direction of rotation (☞rotation direction arrow on the fan blade, impeller base plate or support plates on suction side or rating plate).
2. 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.
3. A-rated sound power levels of over 80 dB(A) are possible, see product catalogue.
4. Fans from ZIEHL-ABEGG SE are delivered balanced in accordance with DIN ISO 21940-11 for the appropriate fan category in accordance with ISO 14694 Check the fan for mechanical vibrations after installation. If the limit values of the corresponding fan category are exceeded in start-up, you must have the motor/impeller unit checked by an expert and rebalanced if necessary before continuous operation is permitted.

7 Trouble shooting

7.1 Code of behaviour in the event of faults

▷ In the event of faults, which represent a danger to people, installation or environment, the fan must be switched off.
▷ Search for the cause of the fault.
▷ Inform the person responsible for the operating site.
▷ Contact the manufacturer if a fault of any kind is detected!

Attention!
Repair work which is not carried out correctly can result in serious injuries and/or material damage.

- Please read the Safety instructions chapter before working on the fan!
- Before working on the fan, this must be disconnected from the power supply and secured against switching back on!

7.2 Possible causes and remedial measures

Type of error	Possible cause	Adjustment
Fan does not run (anymore)	No line voltage Line failure	Check linevoltage
	Earth fault	Check motor connection and line voltage
	Short circuit winding	Replace fan
	thermal motor protection has triggered (motor is overheated)	Check for free air passages; remove foreign bodies if necessary see "Impeller blocked or dirty" Check temperature of supply air Check voltage only for 1 ~ motors: check capacitor
	Impeller blocked or dirty	- Switch off power to the motor and secure against switching back on - Check safe isolation from supply - Remove safety grille - Remove foreign bodies or soiling - Remount the safety grille - Further procedure as in the chapter “Start-up”
Fan will 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
	☞ "Fan does not run"	
Fan turns too slowly	Line failure Undervoltage	Check line voltage
	In two-speed motor: Circuit wrong: Y instead of D	Connect to suit voltage according to rating plate
	Only in 1~ motors: Capacitor worn	replace capacitor
	Fan turns in wrong direction	- - > see there
	Impeller / blade scrapes / brushes	When indicated, clear foreign bodies/dirt from the fan see "Impeller blocked or dirty"
Fan turns in wrong direction	Only in 3 ~ motors: Wrong connection (phase sequence)	Switch two mains phases
	only for 1 ~ motors: capacitor wrong connected	Connect according to circuit diagram
Air flow to low	Fan turns too slowly or in wrong direction	- - > see there
	Airways blocked	Check for free air passages (supply/exhaust air vents, filters) see "Impeller blocked or dirty"
	Pressure loss different to planned	Check fan selection

Type of error	Possible cause	Adjustment
Vibrations	Imbalance	Check wings/blades for damage, soiling or ice ☞ "Impeller blocked or dirty"
Unusual noises	Bearing damaged / worn	see motor manufacturer's operating instructions
	Impeller / blade scrapes / brushes	When indicated, clear foreign bodies/dirt from the fan see "Impeller blocked or dirty"
	Operation beyond stall point	Check for free air passages (supply/exhaust air vents, filters)
	Fan turns in wrong direction	- - > see there
	In one-speed motor: Circuit wrong: D instead of Y	Connect to suit voltage according to rating plate

8 Service work

8.1 Repairs / maintenance

Attention!

- For safety reasons, changes to the fan may only be carried out after receipt of written approval from ZIEHL-ABEGG. Unapproved changes can lead to risk of injury!
- The equipment in explosion-proof version must neither be opened nor repaired. Bearing changes are also not permitted by the customer or normal service technician.
- ZIEHL-ABEGG ATEX fans/motors are partially or completely equipped with antistatic, conductive painting or coating. Repainting can lead to dangerous, static charges and is therefore not permissible!
- After removal of the motor and/or impeller, the fan must be balanced again! To do so, please contact your manufacturer.
- In the case of complete dismantling and reinstallation of the fan, checking must be carried out before start-up (see start-up).
- Please read the Safety instructions chapter before working on the fan!
- Before working on the fan, this must be disconnected from the power supply and secured against switching back on!
- No maintenance work at running fan!
- 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.
- Wear safety shoes and gloves for handling!
- Please observe the safety regulations and the worker´s protection rules by all maintenance and service work (EN 50 110, IEC 364).
- Fuses must always be only replaced; never repaired or bridged. The specifications for the maximum series fuse must always be adhered to (see Technical data). Only fuses cited in the electrical circuit diagram may be used.
- Keep the fan airways free. There is the danger of foreign bodies being sucked in and objects flying out!
- Watch out for vibration free motion!
- The impeller is subject to natural wear depending on the area of application and the conveying medium. Regularly check that no deposits have formed on the impeller which can lead to an imbalance and thus damage (see Chapter: Cleaning).
- If highly aggressive media for which the product is not suited are conveyed, the severe corrosion may result in the impeller breaking. Any impellers corroded in this way must be replaced immediately.
- Deposits on the motor, particularly on the cooling fins and in recesses on the stator – can lead to reduced cooling and the motor switching off prematurely. For this reason, remove deposits in good time (see Chapter: Cleaning).
- Maintenance interval in accordance with the degree of contamination of the impeller!
- Check the fan at regular intervals (recommendation: every 6 months) for mechanical oscillations. Observe the limits specified in ISO 14694 and, if they are exceeded, implement remedial measures (e.g. rebalancing by specialist staff).
- Check the impeller, in particular the weld-seams, for possible cracks.

- Repair, e.g. by welding is prohibited!
- Bolted-on wheels 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.
- Compliance with the minimum head gap must be checked at least once a year. Depending on the application this interval can also be shorter.
- 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.
- Regularly check the earth connection of all components.

Information
Confirmation number for inquiries or in service cases see rating plate.

8.2 Cleaning

To avoid risks of imbalance, the impeller must be checked and cleaned regularly. The impeller must be cleaned and dusted at least once a year. Depending on the place of use, this interval can also be shorter to exclude all risks of imbalance.

Information
For fans operated in Zone 21 and 22 (dust), special requirements for careful cleaning apply.

Danger due to electric current
Voltage supply for motor must be interrupted and secured against restoration!

Observe the following points:

- Clean the fans`s flow area.
- Keep the fan airways free. There is the danger of foreign bodies being sucked in and objects flying out!
- Do not use any aggressive, paint solvent cleaning agents when cleaning.
- Make sure that no water gets into the inside of the motor, note protection class (IP).
- The condensation bores (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!

9 Enclosure

9.1 EC Declaration of Incorporation

- Translation -
(english)

ZA99ex-GB 1727 Index 001

as defined by the EC Machinery Directive 2006/42/EC, Annex II B

The design of the incomplete machine:

- Axial fans with ignition protection type "c", constructive safety, for use in explosive atmospheres, with internal rotor asynchronous motor, protection type "e", "de", "nA", "tD" for the product series: MAXvent DN…, FV…

meet the essential health and safety requirements of Appendix I, Section 1.1.2, 1.1.5, 1.4.1, 1.5.1, 1.5.7 of the EC Machinery Directive 2006/42/EC

The manufacturer is the

ZIEHL-ABEGG SE
Heinz-Ziehl-Strasse
D-74653 Künzelsau

The following harmonised standards have been used:

EN 1127-1:2011	Explosive atmospheres - Explosion protection - Part 1: Fundamentals and methodology
EN 60204-1:2006	Safety of machinery; electrical equipment of machines; Part 1: General requirements
DIN EN ISO 80079-36:2016	Non-electrical devices for use in explosive areas – Part 1: Basic principles and requirements
EN ISO 80079-37:2016	Non-electrical devices for use in explosive atmospheres – protection achieved by constructive safety "c"…
EN 14986:2017	Design of fans working in potentially explosive atmospheres
EN ISO 13857:2008	Safety of machinery; safety distances to prevent danger zones being reached by the upper limbs
Note:	Compliance with standard EN ISO 13857 concerns the protective device against contact, insofar as this is part of the supply scope. If the grille is not part of the supply scope, the system manufacturer is responsible for compliance with standard EN ISO 13857.

The specific technical documentation in accordance with Appendix VII B has been written and is available in its entirety.

The person authorised for compiling the specific technical documentation is: Dr. W. Angelis, address see above.

The specific documentation will be transmitted to the official authorities on justified request. The transmission can be electronic, on data carriers or on paper. All industrial property rights remain with the above-mentioned manufacturer.

It is prohibited to commission this incomplete machine until it has been secured that the machine into which it was incorporated complies with the stipulations of the EC Machinery Directive.

Künzelsau, 06.4.2017
(Location, date of issue)

ZIEHL-ABEGG SE
Dr. W. Angelis
Technical Director Air Movement Division
(Name, Function)

i.V. W. Angelis

(signature)

9.2 EU declaration of conformity

- Translation -
(english)

ZA100ex-GB 1727 Index 001

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

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

The products:

- **Axial fans MAXvent DN…Y/Z… and FV…Y/Z… as well as axial fans for use in explosive atmosphere**, ignition protection type "c", constructive safety, from Group II, device category 2G or 3G or 2D or 3D, for conveying potentially explosive atmospheres in Zone 1 and Zone 2 or in Zone 21 and Zone 22, explosion group IIB, or with internal rotor motor, protection type according to the specified Zone.

Description

- II 2G c II/, II 2D c III

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

- EMC Directive 2014/30/EU
- ATEX Directive 2014/34/EU

The following harmonised standards have been used:

EN 61000-6-3:2007
EN 61000-6-2:2005
EN 60079-0:2012
EN 60079-7:2014
EN 60079-15:2010
EN 60079-31:2014
EN 1127-1:2011
DIN EN ISO 80079-36:2016
DIN EN ISO 80079-37:2016
DIN EN 14986:2017
EN ISO 13857:2008

Name , address and identification number of the notified location:

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 (eg. sensing controls) and operated , the manufacturer or operator is responsible of the overall system for compliance with the EMC Directive 2014/30 / EU .

Künzelsau, 06.4.2017
(Location, date of issue)

ZIEHL-ABEGG SE
Dr. W. Angelis
Technical Director Air Movement Division
(Name, Function)

i.V. W. Angelis

(signature)

9.3 Index

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9.4 Manufacturer reference CE

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:

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