

# FE2owlet-ECQ

Motor size U

**EC-fans with top efficiency**

**Assembly instructions**



**Keep for reference!**

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# 1 General notes

## 1.1 Validity

This document is valid for ECblue-axial fans of motor size **U** (060).  
The used motor size is recognisable from the type designation (☞ rating plate).  
e.g. type: FN023-4QA.UA.V5P3

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

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

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.

### 2.1 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.
- The designated use of ZIEHL-ABEGG fans with VDE certification (see rating plate) assumes connection in a device or via a control 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 areas at risk of explosion for conveying gas, mist, vapours or mixtures of the above.
- Transfer of solids or solids content in the transfer medium.
- Operation with iced up fan impellers.
- Conveyance of abrasive or adhesive media.
- Conveyance of liquid media.
- Use of the fan and add-on parts (e.g. safety grille) as a resting surface or climbing aid.
- Fans are not designed for walking on even with an additive diffuser attachment (retrofit kit)! Do not climb onto fans without suitable aids.
- 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.
- All applications not listed in the intended use.

Not the manufacturer, rather the operator of the frequency inverter 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.

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

### 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 (☞ name plate and attachment / technical data) can lead to a defect in the device and additional damage!

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 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



### Information

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



### Danger due to electric current

- It is generally forbidden to carry out work on electrical live parts!
- The 5 electrical safety rules must be observed!
- The safe isolation from the supply must be checked using a **two-pole** voltage detector.
- Opening of motor is prohibited. Loosening the screws will void the warranty!
- 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.
- 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.



### Attention, automatic restart!

- The motor may switch on and off automatically for functional reasons.
- Automatically restart after a power failure or mains disconnection!
- Wait for the motor 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 (☞ “area of 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.

## 2.9 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

The fans motors are not ready-for-use products, but conceived as components for ventilation systems (type designation ☞ rating plate). The fans may only then be operated when they are installed in accordance with their intended use, and safety has been secured through protective devices in accordance with EN ISO13857 (EN ISO 12100) or other structural protective measures.

## 3.2 Functional description

**ECQ** motors from ZIEHL-ABEGG are highly efficient, electronically commuted motors (EC) with an integrated controller. They are designed exclusively for driving axial fans. The motors are designed for continuous operation (S1-operation) and are thermally protected.

Depending on version motors with a fixed speed or motors with three speeds (☞ rating plate).



**Motors with three speeds**

- Three pre-programmed speeds are possible (☞ rating plate) which are activated depending on the connection of the additional control input at “L1” or “N”.
- With the “Motor Programmer” (accessory) and a PC with the appropriate software, individual speeds and the rotation direction can be programmed.

This assembly manual describes ECQ fans in different models and sizes. Connection, structure and technical details depend partly on the fan size.

**3.3 Motor protection**

The motor has devices to protect it from overloading, these include protection in case of blocked rotor and overload protection with running motor.

On exceeding the maximum permissible operating temperature, this can lead to stopping of the motor and can cause permanent damage!

**3.4 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](http://www.ziehl-abegg.de) ☞ search key: "ErP".

**3.5 Transport, storage****Attention!**

- Use the original packaging materials when transporting the device.
- Do not transport the fan by the connecting cable!
- Avoid shocks and impacts to the device during the transport.
- Avoid extreme humidity, heat or exposure to cold (☞ Technical Data).
- Pay attention to possible damage of the packaging or the equipment.
- 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.

### 3.6 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!
- 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).
- 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 EN ISO 13857 and in household appliances as per 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 danger zone, then the manufacturer or operator shall ensure that hazards shall be prevented by appropriate 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).
- Corrosion is possible at the cutting edges on sendzimir galvanised parts.
- The chemical after-treatment of the nozzle can lead to visible residues. These do not have any technical effect however.

## 4.2 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.

## 4.3 Mounting fans design A and E

To attach the fan unit, use screws with a property class of 4.8 as per EN ISO 4014 and provide with suitable thread lockers.

Permissible tightening torques $M_A$			
Fastening element	Central screw connection	Fastening element for add-on parts	Motor fastening
Material	Steel	Steel	Brass
Motor size	U		
Thread size	M4		
Property class	4.8	4.8	
Friction value	$\mu_{ges} = 0.12$		
Tightening torque	1.7 Nm	1.7 Nm	1.4 Nm

When using other connection elements with different friction values or property classes, different tightening torques may be necessary.



### Information

- Every screwing case is different. The tightening torque adapted to it must be determined by the appropriate screw tests.
- Avoid structural damage or stress with installation. Make sure the surface is flat and even.
- Secure fan connection cable with cable fasteners on guard grille or support struts.

L-KL-2552

### Fans design E

A minimum head gap "A" of 3.5 mm in all installation positions, but especially in installation position H (horizontal motor shaft), is necessary. Installation surfaces must be level.

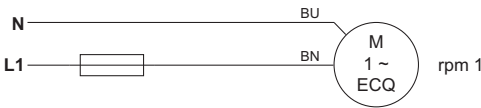
### 4.4 Connection of the motor



**Danger due to electric current**

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

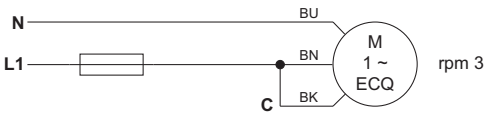
**Connection diagram for motors with one speed**



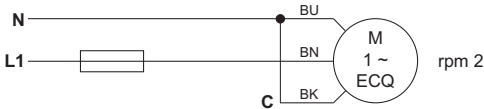
KT00047B  
18.11.2015

N, L1 Line voltage rating plate  
BN brown  
BU blue

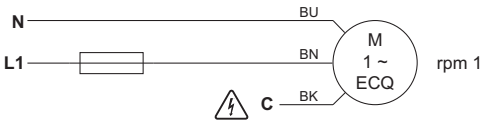
**Connection diagram for motors with three speeds**



If the black wire is not connected, the motor runs at speed 1 (e.g. 1000 min<sup>-1</sup>)



If the black wire is connected with the blue wire, the motor runs at speed 2 (e.g. 1300 min<sup>-1</sup>)



If the black wire is connected with the brown wire, the motor runs at speed 3 (e.g. 1750 min<sup>-1</sup>)

KT00047A  
14.04.2016

N, L1 Line voltage rating plate  
C Control input speed  
BK black  
BN brown  
BU blue  
rpm 1 Speed 1  
rpm 2 Speed 2  
rpm 3 Speed 3



**Danger due to electric current**

- Connection to the 3 ~ 230 V line between two phases is not permitted!
- A dangerous voltage (maximum line voltage) is applied at the **black** connecting wire (speed control input) when it is not used (speed 1). Therefore this wire must be connected to a terminal for insulation.

## 5 Start-up

### 5.1 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. Connection data complies with the specifications on the rating plate?

• **Commissioning may only take place if all safety instructions have been checked and danger can be excluded.**

- Control rotation direction (↻ rotation direction arrow on fan blade).
- 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.

## 6 Diagnostics / Faults

### 6.1 Trouble shooting

Type of error	Possible cause	Adjustment
Fan does not run (anymore)	No line voltage line failure Under - or overvoltage	Check line voltage
	Short circuit winding	Replace fan
	Thermal protection has triggered (motor is overheated)	Check for free air passages; remove foreign bodies if necessary ☞ "Impeller blocked or dirty" Check temperature of supply air Check voltage
	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	Air stream wrong direction (Motor turns in wrong direction at high speed) ☞ "Fan does not run"	Check air stream
Fan turns too slowly	Impeller / blade scrapes / brushes	When indicated, clear foreign bodies/dirt from the fan Check for free air passages; remove foreign bodies if necessary ☞ "Impeller blocked or dirty"
Air flow to low	Fan turns too slowly	☞ "Fan turns too slowly"
	Airways blocked	Check for free air passages (supply/exhaust air vents, filters) ☞ "Impeller blocked or dirty"
	Pressure loss different to planned	Check fan selection
Vibrations	Imbalance	Check blades for damage, soiling or ice ☞ "Impeller blocked or dirty"
Unusual noises	Impeller / blade scrapes / brushes	When indicated clear foreign bodies / dirt from the fan ☞ "Impeller blocked or dirty"
	Operation beyond stall point (for axial fans)	Check for free air passages (supply/exhaust air vents, filters)

## 7 Service work

### 7.1 Repairs / maintenance



#### 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.
- 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).
- 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!
- 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!
- Check the impeller, in particular the weld-seams (in the appropriate versions), for possible cracks.
- Repair, e.g. by welding is prohibited!
- The fan or motor is maintenance-free due to the use of ball bearings with "life-time lubrication". The grease service life (☞ Technical data) may be lower than the theoretical value stated there ( $F_{10h}$ ) if particular operating conditions such as vibrations, humidity or soiling in the bearing, unfavourable control modes, etc. are present.
- Bolted-on or pressed 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 and possibly cleaning is necessary to prevent imbalance and blockage of the condensation bores due to ingress of dirt.



#### Information

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

## 7.2 Cleaning



### Danger due to electric current



- Voltage supply for motor must be interrupted and secured against restoration!
- Do not use any aggressive cleaning agents when cleaning.
- Make sure that no water gets into the inside of the motor and electronics.



# 8 Enclosure

## 8.1 Technical data

Line voltage* (☞ rating plate)	1 ~ 200...264 V, 50/60 Hz 1 ~ 100...134 V, 50/60 Hz
Power consumption (P1)	Version with one speed: max 18 W Version with three speeds: max. 34 W
Maximal line fuse	4 A
Max. load limit integral of cut-in current approx.	0.118 A <sup>2</sup> s
Permissible minimal and maximal ambient temperature for operation	-40...+50 °C
Permissible temperature range for storage and transport	-40...+80 °C
Permissible rel. humidity	85 % no condensation
Electromagnetic compatibility for the standard voltage 230 / 400 V according to IEC 60038	Interference emission according to EN 55014-1 (domestic household applications) Interference immunity according to EN 61000-4-4 (industrial applications)
Harmonics current	In accordance with EN 61000-3-2 Please ask manufacturer for the individual harmonic oscillation levels of the current as a percentage of the fundamental oscillation of the rated current.
Ball bearings grease service-life (F <sub>10h</sub> )	The device is designed with a life time for the bearings and a bearings service-life of at least 40.000 h when S operated at full power in the maximum permissible ambient-temperature environment.
Connection cable	Version with one speed: H03VVH2-F 2 x 0.5 mm <sup>2</sup> , length approx. 54 cm Version with three speeds: H03VVH2-F 3 x 0.5 mm <sup>2</sup> , length approx. 54 cm
Protection class of motor according to EN 60529	IP55
Weight	☞ rating plate



For motors with one speed and corresponding quality mark (  rating plate)		
Authorization:	FILE No. E347018	UL 1004-7
		Electronically-Protected Motor - Component

For motors with three speeds and corresponding quality mark (  rating plate)		
Authorization:	FILE No. E123518	UL 1004-3
		Thermal-device-protected Motor - Component

## 8.2 EC Declaration of Incorporation

ZA87-GB-12/13 Index 004  
00296702-GB

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

### The design of the incomplete machine:

- Axial fan FA.., FB.., FC.., FE.., FF.., FS.., FT.., FH.., FL.., FN.., VR.., VN.., ZC.., ZF.., ZN..
- Centrifugal fan RA.., RD.., RE.., RF.., RG.., RH.., RK.., RM.., RR.., RZ.., GR.., ER..
- Cross-flow fan QK.., QR.., QT.., QD.., QG..

### Motor type:

- Induction internal or external rotor motor (also with integrated frequency inverter)
- Electronically commutated internal or external rotor motor (also with integrated EC controller)

complies with the requirements in Appendix I, Articles 1.1.2, 1.1.5, 1.4.1, 1.5.1 in  
EC Machinery Directive 2006/42/EC.

The manufacturer is the **ZIEHL-ABEGG SE**  
**Heinz-Ziehl-Strasse**  
**D-74653 Künzelsau**

### The following standards are applied:

EN 60204-1:2006 Safety of machinery; electrical equipment of machines; Part 1: General requirements  
EN ISO Safety of machinery; basic concepts, general principles for design  
12100:2010

EN ISO 13857:2008 Note:	Safety of machinery; safety distances to prevent danger zones being reached by the upper limbs The maintenance of the EN ISO 13857:2008 relates only to the installed accidental contact protection, provided that it is part of the scope of delivery.
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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, 22.11.2013 Dr. W. Angelis - Technical Director Ventilation Division

*i.v. W. Angelis*

### 8.3 **Manufacturer**

Our products are manufactured in compliance with valid international standards and regulations.

If you have any questions about how to use our products or if you are planning special applications, please contact:

**ZIEHL-ABEGG SE**  
**Heinz-Ziehl-Straße**  
**D-74653 Künzelsau**  
**Phone 07940/16-0**  
**Fax 07940/16-300**  
**info@ziehl-abegg.de**

### 8.4 **Service address**

Please refer to the homepage at [www.ziehl-abegg.com](http://www.ziehl-abegg.com) for a list of our subsidiaries worldwide.