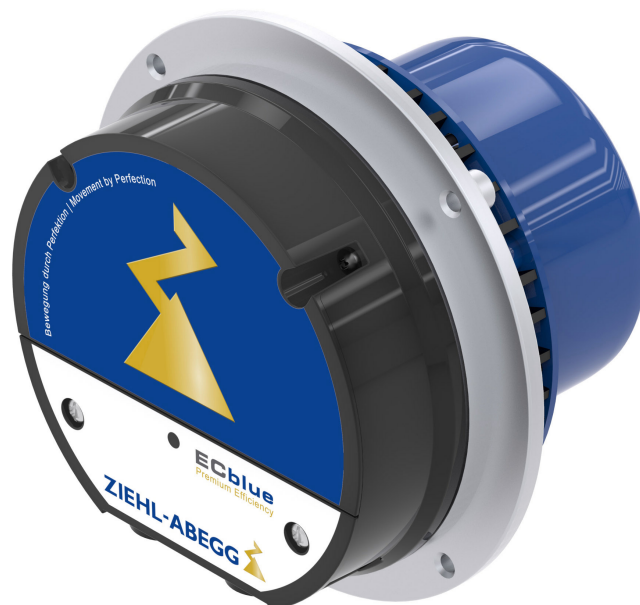


# ECblue

Motor size B (IP54)

**EC-fans and motors with highest efficiency**

**Assembly instructions**



**Keep for reference!**

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## 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.
- 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.

## 2.2 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 diffusor 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 (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.

**2.5 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****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!
- Only remove the lid from the terminal compartment (available depending on the model) with the line voltage switched off!
- Opening of the base lid is prohibited. Loosening the safety screws will void the guarantee!
  - Protection class of the device when complete open is IP00! It is possible to touch hazardous voltages directly.
  - Through use of capacitors, danger of death exists even after switching off the device!
- The rotor is not protected against indirect contact neither by supplementary or reinforced insulation nor by connection to safety-earth in accordance with EN 60204-1, therefore the system constructor must provide protection by enclosure in accordance with EN 61140 before the motor is connected to a power source. This protection can be achieved for example by a guard grille (☞ Product overview: Application operational area and Mounting: General notes).
- When the motor runs independently due to air flowing through or if it continues to run down after being turned off, dangerous voltages of over 50 V can arise on the motor internal connections through operation of the generator.
- The safe isolation from the supply must be checked using a **two-pole** voltage detector.
- Even after disconnecting the mains voltage, life-threatening charges can appear between the protective ground "PE" and the mains connection.
- The protective earth is conducting high discharge currents (dependent on the switching frequency, current-source voltage and motor capacity). Earthing in compliance with EN 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 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!
- The exterior rotor turns during operation of the external rotor motor!

**Danger of being sucked in!**

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

**Attention, hot surface!**

- Temperatures of above 85 °C can occur on the motor surfaces, especially on the controller housing!

**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 (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.

**2.9 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 see rating plate).

The fans may not be operated until they are installed in line with their intended use. The supplied and certified guard grille of ZIEHL-ABEGG SE fans is designed in accordance with DIN EN ISO 13857 Table 4 (from the age of 14 up). In the event of deviations, further structural protective measures must be taken for safe operation.

**3.2 Functional description**

ECblue stands for EC fans and motors with maximum efficiency. Highly efficient, electronically commutated motors with permanent magnets are used the speed of which is controlled by the integrated controller.

The devices are constructed in accordance with the general requirement in EN 61800-2 for adjustable speed electrical power systems and is intended for one-quadrant drives.

**3.3 Criteria for long service life**

The service life of devices with power electronics is decisively dependent on the ambient temperatures. The longer electronic components are exposed to high ambient temperatures, the faster the deterioration and the more probable the failures.

The device is designed with a service life of at least 40,000 h when S1 operated at full power in the maximum permissible ambient-temperature environment.

In order to achieve this, the device protects itself by active temperature management.

### 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.com](http://www.ziehl-abegg.com), search key: "ErP".

### 3.5 Transport, storage



#### Attention!

- Observe the weight specifications (see rating plate) 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.
  - axial fans: holes drilled in support arms, wall ring plates and motor block
  - centrifugal fans depending on type: holes drilled in the housing flange, motor block, fastening brackets and support plates,
- 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 (see Technical Data).
- Watch out for possible damage to the packaging or fan.
- Radial impellers, fans with scroll RG.., RD.. or built-in fans type ER../GR.. are generally delivered on europallets, and can be transported using lift trucks.
- Fix pallets during transport.
- Do not stack pallets.
- Only handle with suitable hoisting gear.
- **Design RG.. / RD.. / ER.. / GR..** : Fan unit may only be lifted and transported when using a suitable hoisting device (load spreader). Ensure sufficient cable or chain length.
- Position the lifting beam transversely to the motor axis. Pay attention to adequate width of the lifting beam.
- 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.

### 3.6 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).
- 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 fan should be lifted out by two persons (according to REFA). The values may differ from country to country.
- 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.
- Protective measures must be taken against falling parts when mounting with a hanging rotor.
- 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).
- Corrosion is possible at the cutting edges on sendzimir galvanised parts.
- 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 Connecting lead, position terminal compartment



#### 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 fan.

In vertical mounting (installation position "H" = motor shaft horizontal), install the fan for protection against penetrating moisture with the terminal compartment vertically downwards (up to max. 30° lateral inclination).

Optimum heat dissipation of the power loss resulting in the device is achieved in this position ( Diagnostic/ Faults / Temperature Management).

### 4.3 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.

#### 4.4 Motorheating

A continuous power supply is required for safe operation down to the minimum permitted ambient temperature (see technical data).

If the motor is not switched on with an existing power supply (no setting signal, switch off by enable), the motorheating switches back off automatically at a controller inside temperature of -19 °C and heating up to -15 °C.

Heating takes place via the motor winding whereby a current is induced which cannot cause rotation.

#### 4.5 Installation of axial fans

##### 4.5.1 Fans design A, D, K, S and W (without nozzles)

For attachment to fixed motor flange use screws with property class 8.8 or A2-70 (stainless steel) to EN ISO 4014 and provide with suitable screw locking.

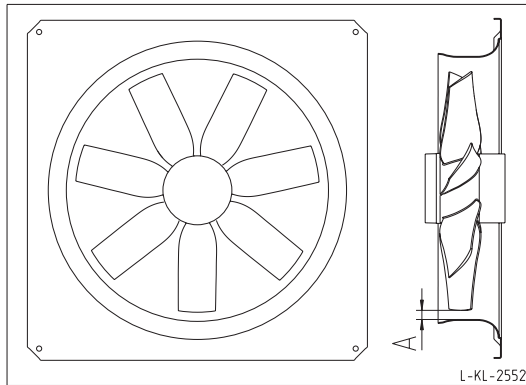
Permissible tightening torques $M_A$		
Thread size	M6	M8
Property class 8.8, friction coefficient $\mu_{ges} = 0.12$	9.5 Nm	23 Nm
Stainless steel A2-70, friction coefficient $\mu_{ges} = 0.12$	7 Nm	17 Nm
Screw penetration	$\geq 1.5 \times d$	$\geq 1.5 \times d$

When using screws with different friction values or strength classes, different tightening torques may be necessary.



#### Information

- Pay attention to a sufficient screw-in length in the motor flange.
- An excess screw length of max. 3 mm is permissible.
- Every screwing case is different. The tightening torque adapted to it must be determined by the appropriate screw tests.
- In the case of a vertical motor axis, the respective lower condensation drain hole must be open.
- Secure fan connection cable with cable fasteners or cable clips.



A minimum head gap "A" of 2.5 mm in all installation positions but especially in installation position "H" (horizontal motor shaft) is necessary. Distortion due to uneven surface may lead to fan failure due to brushing against the fan wheel.



#### Attention!

Avoid structural damage or stress with installation. Make sure the surface is flat and even.

**4.5.2 ZAplus fans**

**ZAplus fans Type ZN:** When mounting ZAplus, ensure plastic-compliant connectors.

If flat washers as per EN ISO 7089 or DIN125 are used for fastening, a permissible torque for Strength class 8.8 and a frictional value  $\mu_{tot} = 0.12$  of M8 = 12 Nm / M10 = 24 Nm / M12 = 40 Nm is recommended.

Since the concrete bolt or screw varies by customer unit, these recommendations must be checked for each respective situation.

Tighten the grate connector with 6 Nm torque.

Secure the cable covering against loss after connecting the motor by securing with 2 cable ties.

For a version with a square rear wall (design Q), removal of this square plastic plate is prohibited.

**4.6 Mounting of centrifugal fans**

**4.6.1 Mounting of centrifugal fans design RE, RH, RZ**

For attachment to fixed motor flange use screws with property class 8.8 to EN ISO 4014 and provide with suitable screw locking.

Permissible tightening torques $M_A$	
Thread size	M6
Property class 8.8, friction coefficient $\mu_{ges} = 0.12$	9.5 Nm
Screw penetration	$\geq 1.5 \times d$

When using screws with different friction values or strength classes, different tightening torques may be necessary.

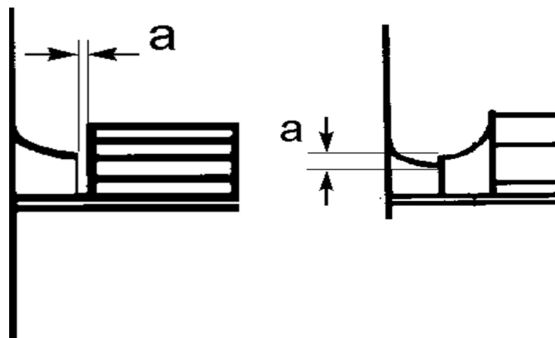
**Mounting of centrifugal fans, RZ design**

Attachment to motor fan wheel mounting according to device manufacturer's specifications.



**Information**

- Pay attention to a sufficient screw-in length in the motor flange.
- An excess screw length of max. 3 mm is permissible.
- Every screwing case is different. The tightening torque adapted to it must be determined by the appropriate screw tests.
- In the case of a vertical motor axis, the respective lower condensation drain hole must be open.



Ensure that the clearance (gap) "a" see fig. between the fan impeller and the stationary housing section is constant. Distortion due to uneven surface may lead to fan failure.



**Attention!**

- Avoid structural damage or stress with installation. Flange and mounting bracket must be fixed flat on a level surface.
- The fan must be securely mounted, with vibration dampers if necessary.

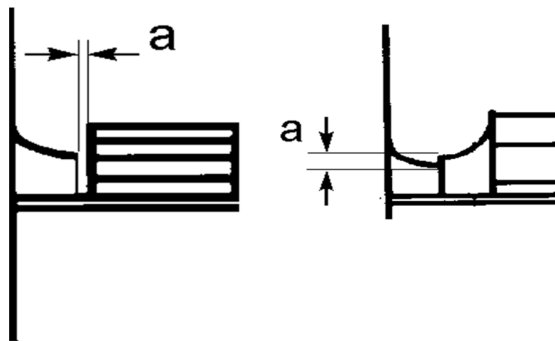
**4.6.2 Mounting of centrifugal fans design RG.. / RD..**

Fastening depending on housing design on flange or fastening brackets.



**Information**

An additional bracket is required for fastening to the flange. This is available as an accessory.



Ensure that the clearance (gap) "a" see fig. between the fan impeller and the stationary housing section is constant. Distortion due to uneven surface may lead to fan failure.



**Attention!**

- Avoid structural damage or stress with installation. Flange and mounting bracket must be fixed flat on a level surface.
- Provide screwed connections with suitable screw locking.

**4.6.3 Erecting the equipment: Design ER... / GR...**

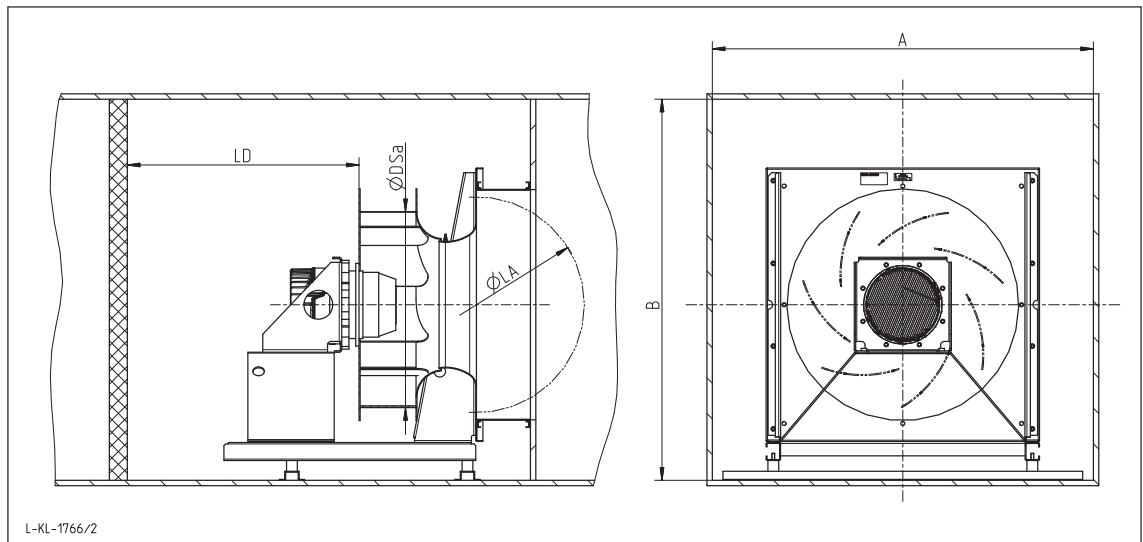
- To avoid the transference of disruptive vibrations, we recommend de-coupling the entire plug fan to avoid sounds transmitted through solids. (Spring and/or attenuation units are not a constituent part of the standard scope of delivery). Look at our catalogue for positioning the decoupling elements or request a dimensions sheet stating the type designation and Part.-No.
- 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.
- In the case of a vertical motor axis, the respective lower condensation drain hole must be open.
- The GR design in position "H" (horizontal shaft) should be installed in the preferred direction. The cable guides should point downwards (angled sideways by approx. 30°). This is indicated by the "OBEN/TOP" warning sign on the device.



**Attention!**

- All contact points must be fixed securely. If the fixing is inadequate there is a risk of the fan overturning.
- Making your own alterations/conversions on the fan module is unacceptable - safety risk.

4.6.4 Optimal installation distances according to for RH../ ER../ GR.. fans



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

4.7 Mounting the motor

**Motors design MK**

Fastening to fixed motor flange (assembly of axial fans / fans of design A, D ..) and (assembly of radial fans of design RH).

- If the motor is used to drive fan impellers or other components, please note the maximum permissible speeds of the impeller or the component to be driven.
- The max. permissible mass of the impeller or the component to be driven must be inquired from and confirmed in writing by ZIEHL-ABEGG.

**Design K (with rotor flange) or D (with offset rotor flange) as a drive for fans:**

- During assembly of the fan impellers or other components, no inadmissible force may be applied to the motor bearing.
- Centre the fan impeller accurately and mount without tension on the rotor flange, the fan wheel must lie flat.
- Use suitable screws for fastening the fan impeller on the rotor flange and fit as suitable screw lock.
- Every screwing case must be tested for suitability.
- The permissible area pressing of the rotor flange may never be exceeded (depending on the contact surface).
- Too great a screw overhang is not permitted and can lead to scraping or blocking of the rotor on the fixed motor flange.
- Motors are not balanced as standard, a complete balancing with mounted fan impeller is necessary. The balancing must be done on the fan impeller. The pertinent regulations must be observed.

Permissible tightening torques $M_A$	
Thread size	M6
Property class 8.8, friction coefficient $\mu_{ges} = 0.12$	9.5 Nm
Screw penetration	$\geq 1.0 \times d$
Max. permissible screw overhang	1.0 mm

## 5 Electrical installation

### 5.1 Safety precautions

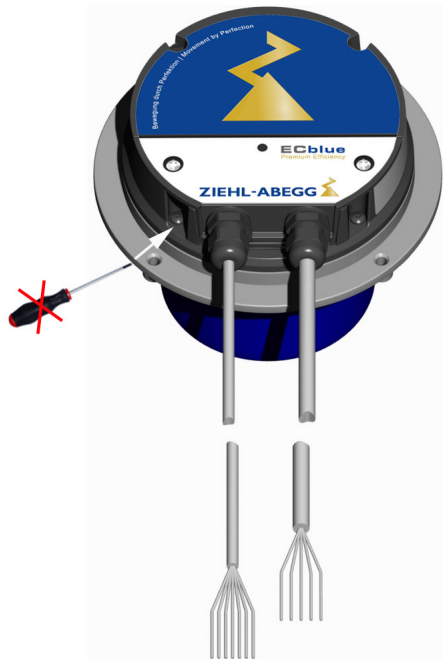


#### **Danger due to electric current**

- 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!
- It is forbidden to carry out work on electrically live parts! Even after disconnection, the dc-link is still live. Always wait at least 3 minutes.
- Cover neighbouring electrical equipment during installation work.
- Other measures may be necessary to achieve safe electrical isolation.
- Connect fan only to electrical circuits that can be disconnected with an all-pole isolating switch.
- Operating the device with the housing cover removed is prohibited because energized, exposed parts are present inside the device. Disregarding this regulation can lead to severe personal injury.
- The device owner is responsible for the EMC of the entire plant according to the locally applicable standards.
- Inspect electrical equipment periodically: retighten loose connections – immediately replace damaged lines and cables.

### 5.2 Version with connection cables

In versions with connecting lead the connection is made to the colour coded wires.



	RD	10V	
Lead Color	BU	GND	
	YE	E1	0-10V/PWM
on field side according to local/national requirements	GN	D1	Digital In
	WH	A1	Analog Out
e.g. NEC/NFPA	BK	A	Data+
	BN	B	Data-
	WH	RC	
	WH	RC	
GN or GNYE	GNYE	PE	
WH or GR	BU	N	
BU or RD	BN	L1	

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28.08.2013

The bands around the cables show national colour codes which may be available on the field side.

Do not loosen the safety screws from the housing!

For line and relay: hose cable 5 x 1.0 mm <sup>2</sup> (18 AWG) comparable LiYY-JB			
<p>length approx. 0.6 m *</p>	brown	L1	Line
	blue	N	
	green-yellow	PE	Relay
	white	11	
	white	14	

For control: hose cable 7 x 0.34 mm <sup>2</sup> (22 AWG) comparable LiYY-OB			
<p>length approx. 0.6 m *</p>	brown	B (D-)	MODBUS (RS-485)
	black	A (D+)	MODBUS (RS-485)
	white	A1	OC Out Status (Tacho)
	green	D1	Digital In 1
	yellow	E1	Analog In 1
	blue	GND	
	red	10V	DC Out

\* The lead length can vary according to the version.

### 5.3 Version without connection cables



29.08.2013  
v\_anschluss\_ecblue\_B.vsd

- 1 Cover for terminal compartment
- 2 Cable glands (2 x M16)  
seal insert with two holes 5 mm for two cables applicable if necessary
- 3 Do not loosen the safety screws from the housing!
- 4 Connection control system
- 5 Connection alarm relay and mains connection
- 6 Status LED

#### Procedure:

1. Remove the cover from the terminal compartment for the connection.
2. Both cable entry points are in a sealed condition at delivery.
  - Turn in cable gland until seal breaks.
  - Unused entry points must be sealed!
3. When using the seal insert for two cables it is not permissible to use the corresponding cable gland with only one cable.
4. Insert and connect cables properly and ensure tightness of the cable glands.
5. Attach connection cover again carefully in correct position before start-up.



#### Attention!

- Temperatures up to 80 °C can be present on the controller housing.
- To connect, always use heat resistant wires or, as an alternative, silicon tubes.
- Only use lines which can guarantee a permanent seal around the cable glands (pressure-resistant, dimensionally-stable, round-centred jacket; e.g. by means of gusset filling)! Lines with filling fleece are not permissible because moisture can penetrate due to the capillary effect!
- Make absolutely sure that different connections do not come into contact (e.g. by splaying or loose connecting wires).
- Remnants from installation and foreign object may not remain on the inside!



**Connection data of terminals**

Terminal	Line, relay	Modulation
Stripping length	10 mm	10 mm
Conductor cross-section rigid min.	0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>
Conductor cross-section rigid max.	4 mm <sup>2</sup>	1.5 mm <sup>2</sup>
Conductor cross-section flexible min.	0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>
Conductor cross-section flexible max.	2.5 mm <sup>2</sup>	1.5 mm <sup>2</sup>
Conductor cross section flexible with wire end ferrule without plastic sleeve min.	0.25 mm <sup>2</sup> (stripping length 8 mm)	0.25 mm <sup>2</sup> (stripping length 8 mm)
Conductor cross section flexible with wire end ferrule without plastic sleeve max.	2.5 mm <sup>2</sup> (stripping length 8 mm)	1.5 mm <sup>2</sup> (stripping length 8 mm)
Conductor cross section flexible with wire end ferrule with plastic sleeve min.	0.25 mm <sup>2</sup> (stripping length 8 mm)	0.25 mm <sup>2</sup> (stripping length 8 mm)
Conductor cross section flexible with wire end ferrule with plastic sleeve max.	1.5 mm <sup>2</sup> (stripping length 8 mm)	0.75 mm <sup>2</sup> (stripping length 8 mm)
Conductor cross-section AWG/kcmil min.	24	24
Conductor cross-section AWG/kcmil max.	12	16
The data refer to the connection possibilities of the terminals. The necessary conductor cross section must be dimensioned according to the respective prevailing conditions.		

**Push-In Terminals**



Rigid conductors and conductors with wire end ferrules can be plugged directly into the terminal without tools.

**Permissible tightening torques M<sub>A</sub>**

	Thread size	Tightening torque M <sub>A</sub>	Remarks
Cable gland	M16	2.5 Nm	Sealing area: cable diameter 4... 10 mm
Cover for terminal compartment	4.0	2.5 Nm	

## 5.4 EMC-compatible installation of control lines

Pay attention to sufficient distance from powerlines and motor wires to prevent interferences. The control cable may not be longer than 30 m. Screened control cables must be used when the cable length is longer than 20 m. When using a shielded cable connect the shielding to one side only, i.e. only to the signal source with the protective earth (keep cable short and with as little inductance as possible!).

## 5.5 Mains connection

### 5.5.1 Line voltage

Mains connection: PE, L1, and N. Here, it must be strictly observed that the mains voltage lies within the allowable tolerance specifications (see technical data).

**Alternatively a supply of DC voltage is possible (see Technical data).**

The polarities on "L1" and "N" are irrelevant.



#### Danger due to electric current

- Between the mains connection of the device and the protective earth "PE" is in no case a higher voltage permissible than the indicated line voltage of the device!
- To activate the on current limitation, you must **wait** at least **90 seconds** after switching off the line voltage before switching back on!

### 5.5.2 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!

### 5.5.3 Line protection fuse

The mains connection must be fused depending on the used cable, the type of routing, the operating conditions and according to the standards applicable on site. The specification for the maximum admissible line fuse of the device must be observed (see technical data).

Possible components for the line protection (recommendation):

- Safety fuses of operating class "gG" (whole range fuse cartridges for general applications according to EN 60269-1).
- Line protection switch with characteristic "C" (according to EN 60898-1).
- Motor protection switch with overload and short-circuit trigger (according to EN 60947-4-1). Setting overcurrent trigger to maximum permissible current of the line.

### 5.5.4 Operating in IT-System



#### Danger due to electric current

- In the IT-System the neutral point of voltage supply is not grounded; in the case of a short-circuit between a phase (e.g. "L1") and protective earth "PE" becomes the protective earth potential = phase.
- Between the mains connection of the device and the protective earth "PE" is in no case a higher voltage permissible than the indicated line voltage of the device!

1 ~ types can be used in IT-System in standard version. These may only be used in 3 ~ IT-Systems if no higher voltage to the "PE" can occur than the specified mains voltage of the device even in case of a fault to earth of a mains phase which is not used by the device (of none of the two power supplies). In order to ensure a trouble free operation in IT-System the "GND" potential of the control ports have to be connected with the protective earth potential.

As a consequence of these connection must be considered for the control ports (exception floating relay contacts):

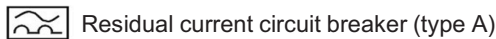
1. Connection only with wires, suitable for mains voltage and surrounding area.
2. Connection with suitable isolated amplifiers only.

### 5.6 Residual-current-operated protective device



**Danger due to electric current**

To ensure as high a degree of reliability as possible we recommend a release current of 300 mA, where a residual current circuit breaker (type A) is used.



**Exception: All-current-sensitive fault current circuit breaker on the 3 ~ 230 V line**

When connecting the device between two outer conductors, “all-current-sensitive” fault current circuit breakers must be used (see EN 50 178, Art. 5.2).

### 5.7 Motor protection

Integrated overload protection, preceding motor protection device unnecessary (max. line fuse see Technical data).

### 5.8 Analog input “E1” for setting speed

The device has an analog input for setting the motor speed. Connection “E1” / “GND” (R<sub>f</sub> Technical data).

If the analogue input “E1” is not required for specifying the speed, this can reprogrammed as a digital input.



**Danger due to electric current**

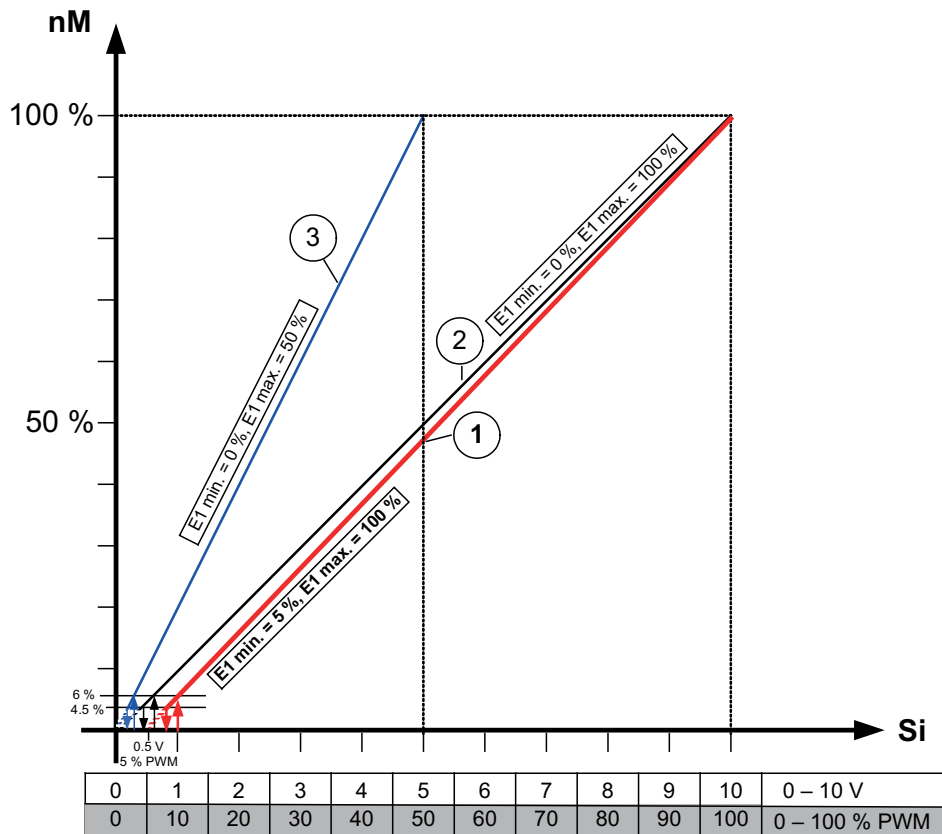
- Ensure correct polarity!
- Never apply line voltage to analog inputs!

Possibilities for speed setting	
	<ul style="list-style-type: none"> <li>• Control via external setting signal <b>0...10 V</b>.</li> <li>• Control by inverted setting signal <b>10...0 V</b> (reprogramming necessary).</li> <li>• By external wiring with a resistor (499 Ω / 0,25 W) between the terminals “E1” and “GND” parallel to the input signal, activation with a <b>0...20 mA</b> signal is possible.</li> </ul>
	<ul style="list-style-type: none"> <li>• Speed setting by 10 kΩ potentiometer at terminals “+10 V” and “GND” pick-off at terminals “E1”.</li> </ul>
	<ul style="list-style-type: none"> <li>• Control via external setting signal PWM.</li> </ul>

The motor always starts with at least 6 % of the rated speed and stops below 4.5 % of the rated speed (providing that the “Min. Speed” setting is “0”).

With the settings “E1 min.” and “E1 max.” it is possible to adapt the setting signal / speed characteristic, e.g. for setting signal: 0...5 V, 2...10 V.

Diagram setting signal and motor speed



21.07.2015  
v\_ecblue\_nmotor\_at\_0\_10v\_pwm.vsd

nM Motor speed  
 100 % Rated speed  
 6 % Height of start speed  
 4.5 % Height of stop speed  
 0.5 V / 5 % PWM Value start analog input (factory setting)  
 Si Speed setting signal 0...10 V / 0...100 % PWM

①	<b>Factory setting:</b> E1 min. = 5 %, E1 max. = 100 % 0.5...10 V $\hat{=}$ 0...100 % speed setting I.e. the motor starts with 6 % of the rated speed at a setting signal of approx. 1 V.
②	Example: E1 min. = 0 %, E1 max. = 100 % 0...10 V $\hat{=}$ 0...100 % speed setting
③	Example: E1 min. = 0 %, E1 max. = 50 % 0...5 V $\hat{=}$ 0...100 % speed setting

### 5.9 Voltage supply “10 V DC”

Voltage supply for activation of the digital input and external components, e.g. for a potentiometer for speed setting (PELV current source according to EN 60204-1).

Connection: “10 V” - “GND” (max. load Technical data und connection diagram).

During an overload or short-circuit (10 V - GND), the control voltage (and thus the device) is disconnected. Automatic start after elimination of the cause of error.

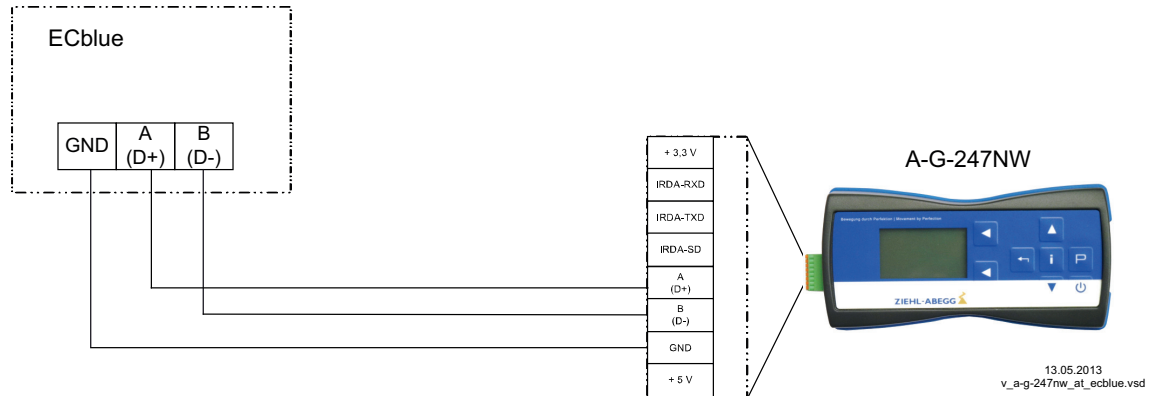
It is not permissible to connect outputs of several devices to each other!

**5.10 Connection terminal type A-G-247NW for service**

If necessary an external terminal can be connected. This can be e.g. necessary to adapt the pre-setting during start-up.

The connection is made by a 4-wire cable at the terminals: A (D+), B (D-) and GND. E. g. telephone cable type: J-Y (St) Y 2x2x0.6 (or similar), maximum cable length approx. 250 m.

The voltage supply of the terminal is made by the accumulators inserted there or the plug power supply unit.



**5.11 Digital input “D1” for enable (device ON / OFF)**

Electronic ON / OFF control via floating contact at terminals “+10V” - “D1” (input resistance and voltage range Technical data).

Function factory setting for “D1”:

- Device “ON” for closed contact.
  - Device “OFF” with opened contact.
- Relay “K1” remains energized, connections 11 - 14 bridged.  
Status Out with flash code: 1 ( Diagnostics / Faults).



**Danger due to electric current**

- No disconnection (no potential isolation in accordance with VBG4 §6) in remote control of the device!
- Never apply line voltage to the digital input!

**5.12 Relay output “K1” for fault indication**

An external fault indicator is available over the potential-free contact of the built-in relays (max. contact rating Technical data and connection diagram).

Function factory setting for “K1”:

- For operation the relay is energized, connections “11” and “14” are bridged. For fault the relay is de-energized ( Diagnostics / faults).
- When switching off via enable (D1 = Digital In 1), the relay remains energized.



**Information**

After switching on the line voltage, an initialisation time of a maximum 7.5 seconds is required for the device's electronics to be operational. Subsequently, a reliable status message will be possible. If no malfunction is detected, the relay will be energised after the initialisation time.

Since both line voltage fluctuations and ambient conditions affect the initialisation time, a different delay might occur in individual cases.

### 5.13 Communication

#### 5.13.1 Networking via MODBUS-RTU

The device comes equipped with a RS-485 interface for networking via MODBUS. Connection at: "A (D+)", "B (D-)" and "GND".  
The address must be set in the "IO Setup" menu.



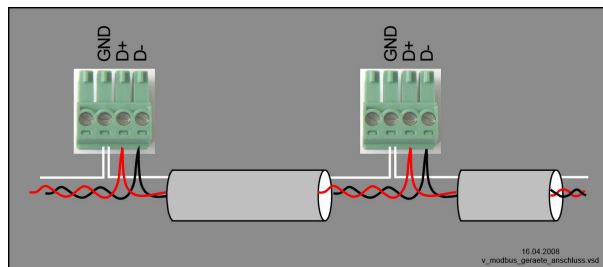
#### Information

A maximum of 64 members can be directly connected to one another, and another 63 members via a repeater.

#### 5.13.2 RS-485 - network design and interface parameter

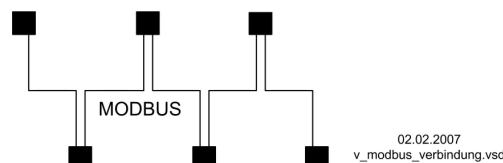
Please ensure the correct connection; i.e. "A (D+)" must always be connected to "A (D+)" of the next devices. The same applies to "B (D-)" .

In addition, a "GND" connection must be established, as dissimilar potential (over 10 V!) will lead to the destruction of the RS-485 interface (e.g. lightning).



general example for MODBUS device connection

The data line must be connected from one device to the next. No other type of wiring is allowed!  
Always use only two wires of one lead (twisted pair) for the connection.



Example for MODBUS connection

#### Recommended wire types

1. CAT5 / CAT7 cables
2. J-Y (St) 2x2x0.6 (telephone wire)
3. AWG22 (2x2 twisted pair)

When using telephone flex with four cable cores, we recommend the following allocation:  
"A (D+)" = red, "B (D-)" = black, "GND" = white



#### Information

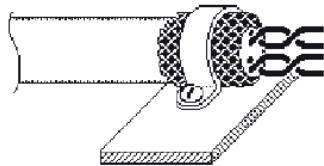
- Pay attention to sufficient distance from powerlines and motor wires (min. 20 cm).
- Except the data link "A (D+)", "B (D-)" and "GND"- connection may no further cable cores of the data line be used.
- Max allowed wire length 1000 m (CAT5/7 500 m).

**Shielding**

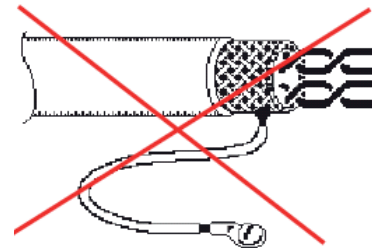
The use of shielded cables is normally not demanded but offers high protection against electro-magnetic interferences, especially high frequencies. However, the effectiveness of the shield depends on careful installation of the line.

If shielded cables are used, the shield should be placed at “PE” on at least one side (preferably on the master connection). The occurrence of compensating currents may have to be considered if the shield is contacted on both sides.

Shield connection correct



Shield connection incorrect



**Default interface parameter**

- Baudrate = 19200
- Bits = 8
- Parity = Even (None, exception of devices agriculture)
- Stop bits = 1
- Handshake = none



**Information**

If any matters are unclear, please contact our V-STE support department for control systems - ventilation technology. The information sheet "Network structure of MODBUS" R-TIL08\_01 contains detailed information about "MODBUS".

**5.14 Open-Collector output “A1” (status / tacho)**

Open-Collector pulse output for status display or speed display.

<p><b>Status display</b> (function for factory setting)</p> <p>Depending on the operating state of the device, the output “A1” is switched to GND potential for a certain number of pulses.</p> <p>The status of the device can be displayed by this digitally coded signal.</p> <p>With the output voltage “+10 V” a standard LED / low-power LED can be controlled by using a pull-up resistor.</p> <p>This lights when the output “A1 Status Out OC” (OC = Open-Collector) is on GND potential.</p> <p>The details of which pull-up resistor needs to be used depend on the specification on the LED that is used.</p> <p>Explanation of flash codes  Diagnostic / Status Out with flash code.</p>	<p style="text-align: right; font-size: small;">06.11.2013 i_ecblue_a1_status_oc.eps</p>
<p><b>Tacho out</b></p> <p>Alternatively, via output “A1”, the current motor speed can be output.</p> <p>The frequency (duty cycle 50 : 50) that can be measured by a pull-up resistor at the output “A1” corresponds to the motor speed.</p> <p>Example: 10 Hz x 60 = 600 rpm</p>	<p style="text-align: right; font-size: small;">06.11.2013 i_ecblue_a1_tacho_oc.eps</p>

A1 more specifications Technical data!

### 5.15 Potential at control voltage connections

The control voltage connections (< 50 V) relate to the joint GND potential (Exception: Relay contacts are potential free). There is a potential separation between the control voltage connections and the protective earth. It must be ensured that the maximum external voltage at the control voltage connections cannot exceed 50 V (between "GND" terminals and "PE" protective earth). If necessary, a connection to the protective earth potential can be established, install bridge between "GND" terminal and the "PE" connection (terminal for screening).

## 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.

#### 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. Are the condensation water drains holes (as far as available) open or respectively closed according to the suitable installation position?
6. Connection data complies with the specifications on the rating plate?


#### During start-up check the following:

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. If resonance vibrations occur, it is possible to hide certain speed ranges (↻ Motor Setup or Add-on module).
5. Fans from ZIEHL-ABEGG SE are delivered balanced in accordance with ISO 1940-1 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 Operating hand held terminal A-G-247NW


### 7.1 Menu operation




- ▷ Switch over between actual value\* and "Start" with **Esc** arrow key.
- ▷ Switch over between "Start" and actual value\* with **i** key.



\* Actual value depending on device type: "Speed" / rpm,, "Frequency" / Hz, "Modulation" / %



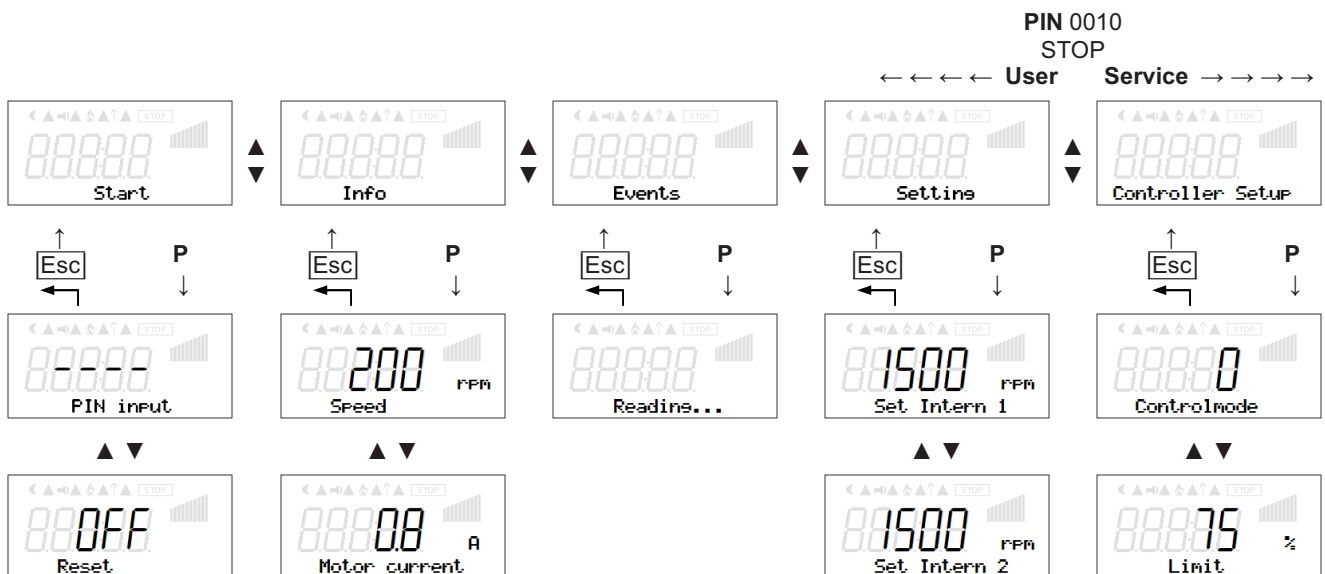
- ▷ By pushing the **P**- key one reaches the menu item "Start".
- ▷ Return to the menu group "Start" using arrow key **Esc**.



- ▷ One moves up and down within the menu group using the arrow keys.

Display for english menu language = "GB "

### 7.2 Menu structure



Display for english menu language = "GB "

Selection of the menu group (e.g. "Setting") to the right through the ▼-key, to the left through the ▲-key. You can go to the menu items in the menu groups (e.g. "Set Intern1") by using the P-key. Use the arrow keys to move up and down within the menu group. The menu groups consist of one area for the user (user menu) and one area for installation (service). The service area can be protected against unauthorized access by using a PIN. To make adjustments, press the P-key after selecting the menu item. If the previously set value starts to flash, it can be adjusted with the ▼ + ▲ keys and then saved with the P-key. To exit the menu without making any changes, use the "Esc" key, i.e., the originally set values remain.

## 8 Programming by hand held terminal A-G-247NW

### 8.1 Information

The menu language can be set on the hand held terminal type A-G-247NW (see operating instructions). The text in the graphic display (left column) is shown in the factory-set menu language English.

### 8.2 Menu group Setting



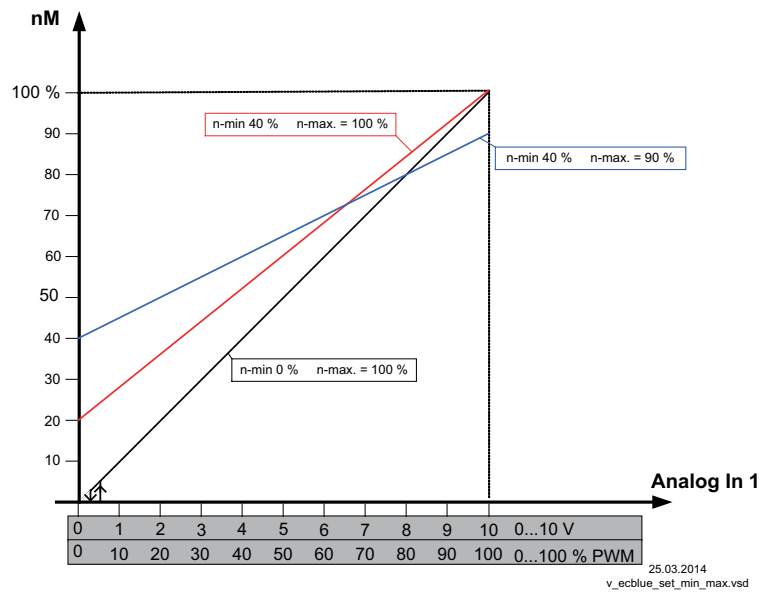
#### Information

**Factory setting:** Activation by external signal (0 - 10 V / PWM) at input "E1" (control mode = 0 Controller Setup). I.e. the following settings "Set Internal1", "Set Internal2", "Set Internal3" are not active!

	<p><b>Setting</b></p>
	<p><b>Set Internal1</b>                      Setting only in Controlmode <b>4</b> active ( Controller Setup).                      Via the inputs "D1" / "E1" it is possible to switch to "Set Internal2" or "Set Internal3" ( IO Setup).                      Setting range manual speed setting: 0...100 % (Rated speed)                      Factory setting*: 100 % (Rated speed)</p>
	<p><b>Set Internal2</b>                      Setting only in control mode <b>5</b> active only in control mode <b>4</b>, if activated via inputs "D1" / "E1" ( Controller Setup / IO Setup).                      Setting range manual speed setting: 0...100 % (Rated speed)                      Factory setting*: 100 % (Rated speed)</p>
	<p><b>Set Internal3</b>                      Setting only in control mode <b>6</b> active only in control mode <b>4</b>, if activated via inputs "D1" / "E1" ( Controller Setup / IO Setup).                      Setting range manual speed setting: 0...100 % (Rated speed)                      Factory setting*: 100 % (Rated speed)</p>
	<p><b>Min. Speed</b>                      The basic speed is active in every control mode.                      Setting range: 0...100 % (Rated speed)                      Factory setting*: 0 %</p>
	<p><b>Max. Speed</b>                      The speed limiting is active in every control mode.                      Setting range: 100 % (Rated speed)... "Min.Speed"                      Factory setting*: 100 % (Rated speed)</p>

\* Specifications not binding, these values can differ depending on the software version and customer-specific pre-setting.

Diagram setting signal and speed








nM: Motor speed  
 Analog In 1: Speed setting signal  
 n-min: Min. Speed  
 n-max: Max. Speed  
 100 % Rated speed

### 8.3 Menu group Start

	<p><b>Start</b></p>
	<p><b>PIN input</b></p> <p>The service menu for the installation can be protected against unintentional changes by a pin code. With further pin codes putting back to pre-setting is possible.</p> <p><b>PIN 0010</b>                  Release of the service settings with programmed PIN-Accesslevel <b>0</b> (↵ "Controller Setup").                  Menu groups Service: "Controller Setup", "IO Setup", "Motor Setup"</p> <p><b>PIN 1234</b>                  Opening "setting".                  Release of the menu group for the user "Setting" with programmed PIN-Accesslevel <b>0</b> (↵ "Controller Setup").</p> <p><b>PIN 3698</b>                  Communications parameters take-over.</p> <p><b>PIN 9095</b>                  Loading the factory settings.                  Only the parameters which are released by the currently set PIN-Accesslevel are loaded.</p>
	<p><b>Reset</b></p> <p>Complete re-start of the device</p>
	<p><b>Software version</b></p>
	<p>Parameter sets can be saved by the module in the terminal type A-G-247NW and transferred to other devices (↵ Operating Instructions Terminal Type A-G-247NW). Name parameterset with the keys <b>▼</b>, <b>▲</b> + <b>P</b> and load in the terminal with the <b>P</b>-key.</p>

### 8.4 Menu group Info

	<p><b>Info</b></p>
	<p><b>Speed</b> Motor speed</p>
	<p><b>Motor current</b> Display of internal motor current (metering precision approx. +/-10 %)</p>
	<p><b>Modulation</b> Display of modulation 0...100 % (metering precision approx. +/- 10 %)</p>
	<p><b>Motor input power</b> Display of output power (metering precision approx. +/-10 %)</p>

### 8.5 Menu group Controller Setup


	<p><b>Controller Setup</b></p>
--	--------------------------------



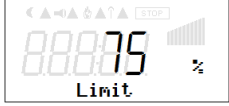
**Information**

The following factory settings specifications are not binding, these values can differ depending on the software version and customer-specific pre-setting.

8.5.1 Controlmode

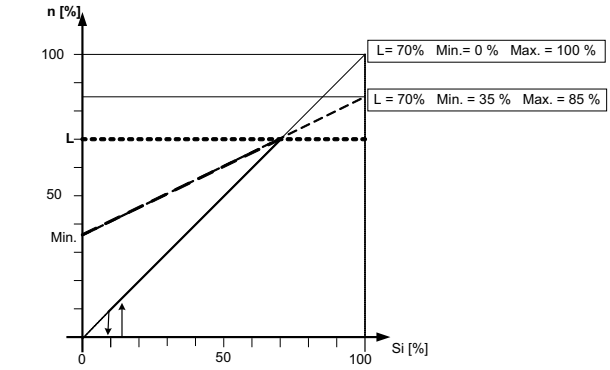
	Type of device modulation.
0	<b>Factory setting</b> Control by external signal (0 - 10 V / PWM) at the input "E1". Switching to fixed speed "Default Internal2" or "Default Internal3" via digital input possible (☞ IO Setup).
1	no function
2	no function
3	no function
4	constant speed "Set Internal1". Switching to fixed speed "Default Internal2" or "Default Internal3" via digital input possible (☞ IO Setup).
5	Fixed speed "Default Internal2" (without switching possibility to other default).
6	Fixed speed "Default Internal3" (without switching possibility to other default).

8.5.2 Limit

	After allocation of a digital input (☞ IO Setup) an adjustable limitation of the modulation can be activated via a digital input.
---	---

"Limit value" = max. possible modulation (e.g. speed reduction during night operation by time switch).  
 Setting range: 0 - 100 %  
 Factory setting: 75 % ≙ max. modulation, i. e. no limit.

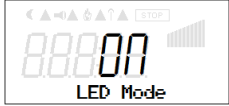
**Limit (idealized principle diagram)**



*n [%] Motor speed*  
*L Limit*  
*Si Speed setting signal*


07.10.2010  
v\_limit\_101\_rpm.vsd

8.5.3 LED Mode

	<b>LED Mode</b> Only for versions with integrated status LED!
---	--

Setting	Function
ON	Status LED in ECblue active i.e. operating conditions are indicated by flash code (factory setting).
OFF	Status LED not active, i.e. always OFF.

### 8.5.4 PIN-Accesslevel

	<p><b>PIN-Accesslevel</b> The PIN-Accesslevel determines for which setting ranges a PIN must be entered.</p>
---	--


Setting	Function
2	<p><b>Factory setting</b> All menu groups are visible, settings are possible without a PIN.</p>
1	<ul style="list-style-type: none"> <li>The menu group "Setting" is free, i.e. changes are possible without a PIN.</li> <li><b>PIN 0010</b>: for changes in the menu groups: "Controller Setup", "IO Setup" and "Motor Setup" (these menu groups are not visible without a PIN).</li> </ul>
0	<p><b>All settings are only possible after entering a PIN.</b></p> <ul style="list-style-type: none"> <li><b>PIN 1234</b> for changes in the menu group: "Setting"</li> <li><b>PIN 0010</b>: for changes in the menu groups: "Controller Setup", "IO Setup" and "Motor Setup" (these menu groups are not visible without a PIN).</li> </ul>



#### Information

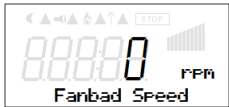

Changes for the PIN protection which effect a reduced access right only become active after switching off the device or executing the "Reset" (Start menu group) function.

### 8.5.5 Tacho output f<sub>out</sub>

	<p><b>Tacho out</b> See the function description Electrical installation / Open-Collector output "A1"</p>
--	---

Setting	Function
OFF	A1 = Status output
ON	A1 = Tacho output ( $n = f \times 60$ )

### 8.5.6 Message at speed deviation "Fan Bad"

	<p><b>Fanbad Speed</b> Speed deviation Factory setting: 0 rpm Setting range: 0 - 255 rpm</p>
	<p><b>Fanbad Time</b> Time delay Factory setting: 0 sec Setting range: 0 - 255 sec.</p>

## 8.6 Menu group IO Setup



	<p><b>IO Setup</b></p>
---	------------------------



#### Information

The following factory settings specifications are not binding, these values can differ depending on the software version and customer-specific pre-setting.

8.6.1 Digital inputs “D1” (“E1” \*)

	<p><b>D1 Function</b>                  Different functions can be assigned to the digital inputs “D1” and “E1”*.                  Activation via floating contacts (a low voltage of approx. 10 V DC is connected).                  “D1” is programmed for the “Enable” function at the factory.</p>
	<p><b>D1 Inverting</b>                  For inverting switch to “ON”.                  The input inversion is set at the factory to “OFF” (when a function is programming).</p>

\* If the analogue input “E1” is not required for specifying the fan speed, this can be used as a digital input (☞ E1 function).  
 The same functions can be assigned for “E1” as for “D1”.

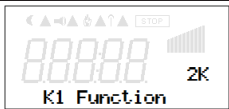






**Attention!**  
 Never apply line voltage to the digital input!

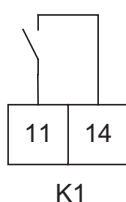
Function	Description
OFF	No function
1D	<p><b>Enable ON / OFF (factory setting)</b>                      Remote ON/OFF (electronic switch-off) by potential-free contact. The power unit is switched off electronically, the device can still be operated in the switched-off state after pressing the “Esc” key combination. Signal inputs and outputs remain active.                      A programmed alarm relay (factory set “K1 function” = <span style="border: 1px solid black; padding: 0 2px;">2K</span>) does not report the switch-off.  <b>Attention!</b>                      No disconnection (no potential isolation in accordance with VBG4 §6) in remote control of the device!</p>
3D	<p><b>Limit ON / OFF</b>                      ☞ Controller Setup / Limit</p>
5D	<p><b>Set Internal2</b>                      Fixed speed “Default Internal2” active. Function with selected “Control mode”: 0 (☞ “Controller Setup”).                      With simultaneous activation of “Default Internal3” with function <span style="border: 1px solid black; padding: 0 2px;">6D</span>, <span style="border: 1px solid black; padding: 0 2px;">5D</span> has priority).</p>
6D	<p><b>Set Internal3</b>                      Constant speed “Set Internal3”, also with selected “Control mode”: 0 (☞ “Controller Setup”).</p>
13D	<p><b>Switch over direction of rotation</b>                      Switch over between direction of rotation “RIGHT” = <span style="border: 1px solid black; padding: 0 2px;">CW</span> and direction of rotation “LEFT” <span style="border: 1px solid black; padding: 0 2px;">CCW</span>.                      When “switching” over via a digital input, the device works with the opposite direction of rotation than the one set in Motor Setup.                      If the rotary direction is reversed with an available modulation, it is initially reduced to “0” (disconnected) and subsequently increased back to the default value.</p>

15D	<p><b>Smoke extraction: Switch off temperature management, operation at max. speed</b></p> <p>To make the ECblue as durable as possible, the devices have active temperature management. The modulation is reduced when internal temperature limits are exceeded.</p> <p>In venting systems in which the fan must run at max. speed in the event of a fire, the temperature management can be switched off by a digital input. At the same time, the fan is operated independently of the speed default for regular operation at maximum speed.</p> <p>The function is activated at the digital input with the contact open (at factory setting <b>[D1/E1 Inverting]</b> = OFF) so that the maximum speed of the fan is also possible with the line to the digital input interrupted in case of fire.</p> <p><b>Attention!</b></p> <p>The device and its internal components are no longer protected against overtemperature when this function is activated (this affects the life installation instructions ECblue).</p>
-----	--

8.6.2 Relay outputs “K1”

	<p><b>K1 Function</b></p> <p>Various functions can be allocated to the relay outputs “K1”. This is preset at the factory for fault indication.</p>
	<p><b>K1 Inverting</b></p> <p>For switching inversion to “ON” (switching behaviour dependent on assigned function). The relays can only pull up basically when the voltage supply of the electronics is working. Three-phase current devices must have at least 2 line phases! The relay inversion “K1” is set at the factory to “OFF” (when a function is programming).</p>

Function	Description
OFF	<b>No function</b> Relays remain always de-energized .
1K	<b>Operating indication</b> Operation without fault, reports enable “OFF”.
2K	<b>Fault indication (factory setting)</b> Pulled up in operation without fault, with release “OFF” not dropped out. Drops out at: line fault, motor fault, etc.  Events / Fault indications
4K	<b>Limit</b> Alarm when the speed exceeds the value set under “Set Internal3” (  menu group “Setting”) (output power > 0 %). The function is active in every Controlmode (  menu group: “Controller Setup”).
17K	no function
20K	<b>Fault indication or message for active temperature management</b> In addition to the fault indication, a message will appear in the case of active temperature management, i.e. if the specified temperature limits are exceeded resulting in a reduction in modulation (function from software version 13.31 and upwards).



17.09.2009  
v\_relais\_k1\_11\_14.vsd

**K1**  
**1** = energized, terminals 11 - 14 bridged  
**0** = de-energized 11 - 14 not bridged



Function	Status Controller	K1	
		1 = energized 0 = de-energized	
		Inverting	
		OFF	ON
1K	Operation without fault, line supply okay	1	0
2K	Fault with indication by relay	0	1
4K	Exceed Frequency / Speed > setting "Set Internal3"	1	0
20K	Fault indication or message for active temperature management	0	1

### 8.6.3 Input "E1"




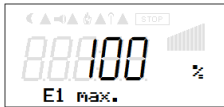
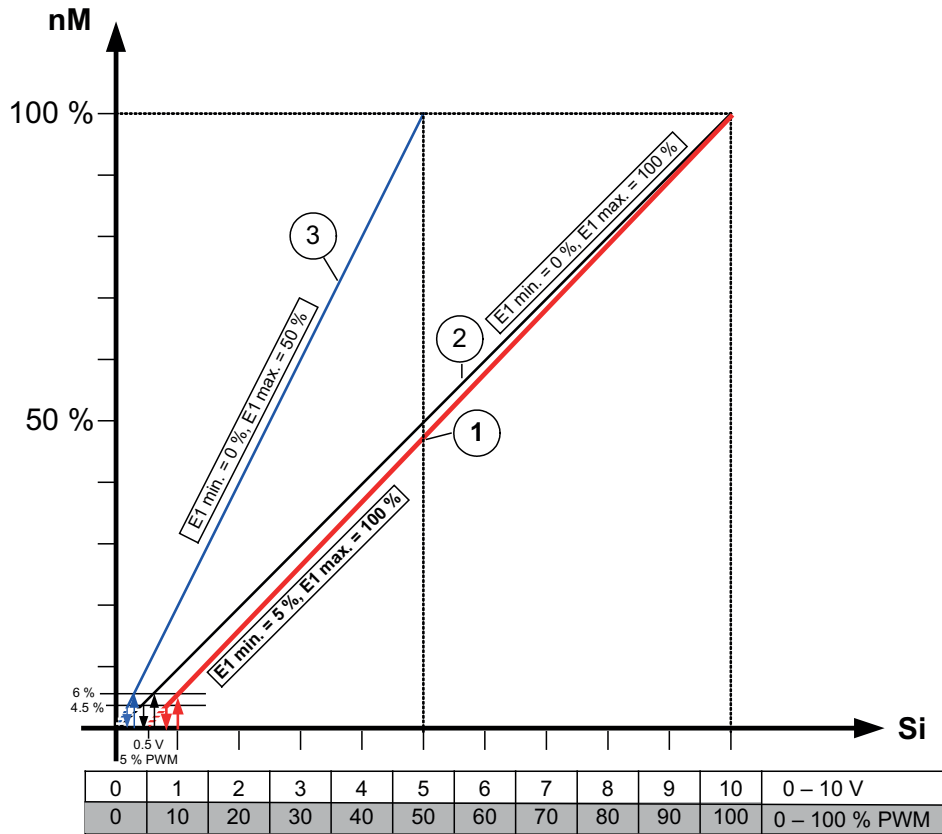
	<p><b>E1 Function</b>                      [1E] (factory setting) = speed setting by external signal (0 - 10 V / PWM).                      For settings via [1E] "E1" operates like "D1" as a digital input (Digital inputs / function).</p>
	<p><b>E1 Inverting</b>                      Factory setting inverting to "OFF".                      For control with inverted setting signal switch to "ON" (setting signal: 10 - 0 V).</p>
	<p><b>E1 min.</b>                      Value of the input signal at which the controller starts at minimum modulation.                      Setting range: 0 - 100 %                      Factory setting: 5 %</p>
	<p><b>E1 max</b>                      Value of the input signal at which the maximum modulation of the controller is reached.                      Setting range: 0 - 100 %                      Factory setting: 100 %</p>

Diagram setting signal and motor speed



21.07.2015  
v\_ecblue\_nmotor\_at\_0\_10v\_pwm.vsd


*nM* Motor speed  
 100 % Rated speed  
 6 % Height of start speed  
 4.5 % Height of stop speed  
 0.5 V / 5 % PWM Value start analog input (factory setting)  
*Si* Speed setting signal 0...10 V / 0...100 % PWM

①	<b>Factory setting:</b> E1 min. = 5 %, E1 max. = 100 % 0.5...10 V $\hat{=}$ 0...100 % speed setting I. e. at a setting signal of approx. 1 V the motor starts with 6 % of the rated speed.
②	Example: E1 min. = 0 %, E1 max. = 100 % 0...10 V $\hat{=}$ 0...100 % speed setting
③	Example: E1 min. = 0 %, E1 max. = 50 % 0...5 V $\hat{=}$ 0...100 % speed setting

**8.6.4 MODBUS communication watchdog**



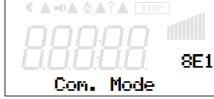
The MODBUS communication watchdog defines the behaviour in case of a communication fault.

	<p><b>Watchdog Time</b>                  If the device receives no message in the time window, a definable function is executed.</p> <p>Watchdog time in seconds.                  Setting range: 0 - 255 sec.                  Factory setting: 0 sec. = off</p>
--	---

	<p><b>Watchdog Mode</b>                  Watchdog Mode:                  0: No function (default) = OFF from FW 13                  1: Fault (K1 function, h15) in case of communication fault (WDT)                  2: Constant speed 1 * in case of communication fault (WDT)                  3: Fault + constant speed 1 * in case of communication fault (WDT)                  4: Fault by E1 Fault ** (only ECblue)                  5: Constant speed 1 by E1 Fault (only ECblue)                  6: Fault constant speed 1 in case of E1 fault (only ECblue)</p> <p>* in this condition it is possible by digital input function 5, 6 or digital control function to change between the constant speeds (Holding register h4).</p> <p>** E1 fault is triggered when E1 falls below E1 min x 0.5. E1 fault is cancelled when E1 rises above E1 min x 0.9.</p>
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**8.6.5 Networking via MODBUS**

It is possible to network several devices with each other. The device uses the MODBUS-RTU as the protocol for the RS-485 interface.


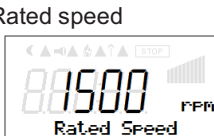


	<p><b>Bus Address</b>                  The device address is factory set to the highest available MODBUS address: 247.                  Setting range MODBUS Address: 1 - 247.</p>
	<p><b>UART Baudrate</b>                  Setting transfer rate                  Valid values: 4800, 9600, 19200, 38400                  Factory setting: 19200                  Illegal value: 115200</p>
	<p><b>UART Mode</b>                  Setting transfer format                  Valid values: 8O1, 8N1, 8E1                  Factory setting: 8E1</p>

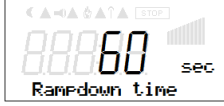













**Information**

If it is attempted to change the baud rate to an impermissible value (e.g. 115200), the following exception code will be sent back: [Exception Code 3: Illegal Data Value].

**8.7 Menu group “Motor Setup”**

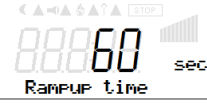
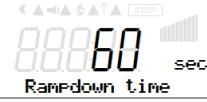
	<p><b>Motor Setup</b></p>	
<p>Rated speed</p> 		
	<p><b>Motor rated current</b></p>	<p>*The following controller presets are dependent on the respective motor design. These are shown for informational purposes and must only be changed after consultation with ZIEHL-ABEGG and entering a password.</p>
	<p><b>Rampup time</b></p>	<ul style="list-style-type: none"> <li>• Rated speed</li> <li>• Motor rated current</li> <li>• Rotat. Direction</li> <li>• Value motorheating</li> </ul>

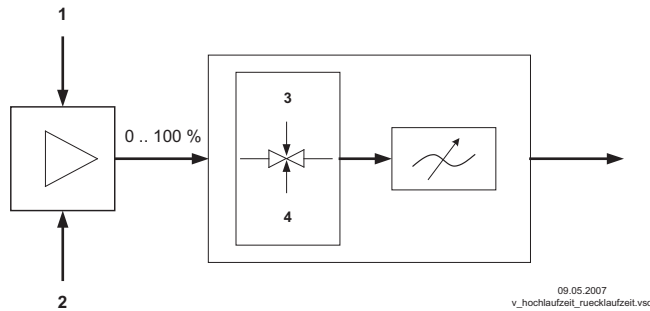
 <p>88860 sec Rampdown time</p>	<p>Rampdown time</p>
 <p>88888 CW Rollins direct.</p>	<p>Rotat. Direction</p>
 <p>88850 % Motorheat value</p>	<p>Value motorheating</p>
 <p>880FF Suppression1</p>	<p>Suppression1</p>
 <p>88100 RPM Range 1 min.</p>	<p>Range1 min.</p>
 <p>88200 RPM Range 1 max.</p>	<p>Range1 max.</p>
 <p>880FF Suppression2</p>	<p>Suppression2</p>
 <p>88400 RPM Range 2 min.</p>	<p>Range2 min.</p>
 <p>88500 RPM Range 2 max.</p>	<p>Range2 max.</p>
 <p>880FF Suppression3</p>	<p>Suppression3</p>
 <p>88700 RPM Range 3 min.</p>	<p>Range3 min.</p>
 <p>88800 RPM Range 3 max.</p>	<p>Range3 max.</p>

**8.7.1 Setting for Rampup time and Rampdown time**

By separate menus for Rampup time and Rampdown time an adjustment is possible to individual system conditions.

This function is switched behind the actual controller function.

	<p><b>Rampup time</b>                  Time setting in which the automatic controller output from 0 % to 100 % rises.                  Setting range: 0...250 sec.                  Factory setting depending on motor</p>
	<p><b>Rampdown time</b>                  Time setting in which the automatic controller output from 100 % to 0 % reduces.                  Setting range: 0...250 sec.                  Factory setting depending on motor</p>



- 1 external Signal
- 2 Setting
- 3 Rampup time
- 4 Rampdown time

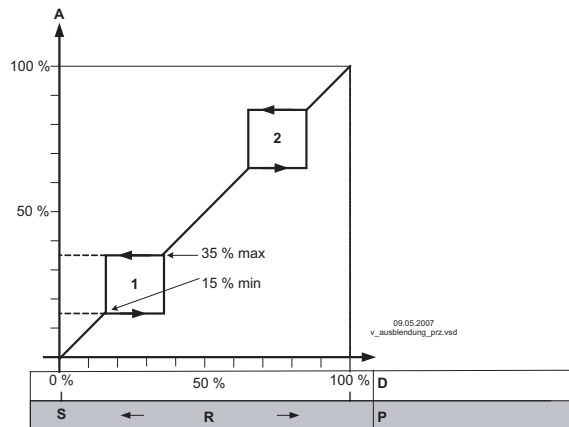
09.05.2007  
 v\_hochlaufzeit\_ruecklaufzeit.vsd

### 8.7.2 Suppression of speeds

Suppression of up to three speed ranges.

Under certain circumstances, it is possible to prevent disturbing noises that can arise at certain speeds due to resonances.

#### Example for suppression of 2 ranges (Idealized principle diagram)



Setting depending on device type  
in: %, Hz, rpm

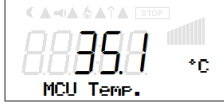
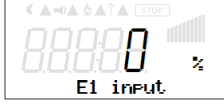
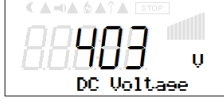

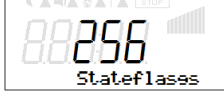
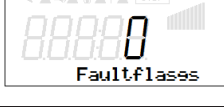

- A Modulation
- S Setpoint
- R Pband
- D Speed controller: setting signal
- P P-controller: control deviation

	Suppression active = "ON"
	Setting for "Range1 min." Setting range: "0" - "Range 1 max."
	Setting for "Range1 max." Setting range: "Range 1 max." - "Rated speed"
	Identical procedures for Suppression2 and Suppression3, as far as desired




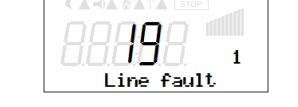
### 8.8 Diagnostics menu

The diagnostics menu supplies information about the momentary operating condition of the device.

	<b>Diagnostic</b>
	<b>IGBT temp.</b> Display of the internal temperature of the power semiconductor.
	<b>Inside Temp.</b> Display of electronics internal temperature.

	<p><b>MCU Temp.</b> Display of the internal temperature of the microcontroller.</p>
	<p><b>E1 Input</b> no function</p>
	<p><b>DC-Voltage</b> DC-link voltage constant approx. 400 V.</p>
	<p><b>Line voltage</b></p>
	<p><b>Stateflags</b></p>
	<p><b>Faultflags</b></p>
	<p><b>PIN-Accesslevel</b> Momentarily adjusted PIN-Accesslevel (⚙️ Controller Setup).</p>

### 8.9 Display and query of events and malfunctions

	<p><b>Events</b></p>
	<p>The event memory is read out after pressing the <b>P</b> key. [Reading »»»]</p>
	<p>Beispiel: keine vorliegenden Störungen [Empty] = no entry = no event in the memory</p>
	<p>Example line fault Position 1 = latest event The last 10 (1 - 10) events are saved. The desired position can be selected with the <b>▼+ ▲</b> keys. 19 = number of all previous faults</p>

An error message appears alternately with the actual value display (⚙️ Diagnostic faults).


## 9 Diagnostics / Faults

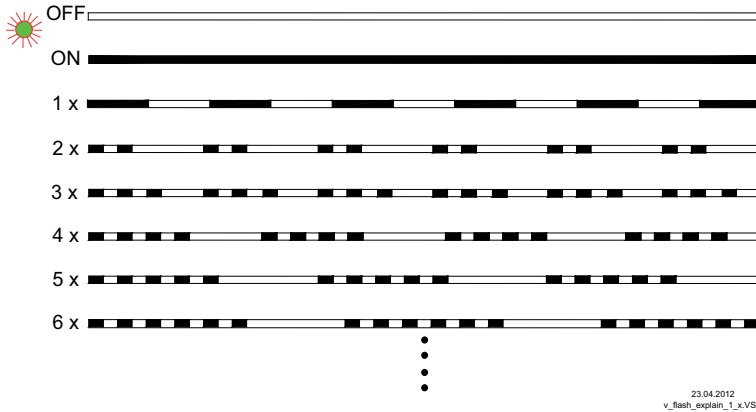
### 9.1 Trouble shooting

Type of error	Possible cause	Adjustment
Fan does not run (anymore)	No line voltage line failure Under - or overvoltage	Check line voltage
	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
	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	Temperature too low for bearing grease	Insert bearing with cold greasing
	Air stream wrong direction (Motor turns in wrong direction at high speed)	Check air stream (see behaviour in rotation by air current in reverse direction)
	see "Fan does not run"	
Fan turns too slowly	Impeller / blade scrapes / brushes	When indicated, clear foreign bodies/dirt from the fan
	Active temperature management effective (Motor or electronics overheated)	Check for free air passages; remove foreign bodies if necessary see "Impeller blocked or dirty" Check temperature of supply air Check installation space (air speed over heat sink)
Air flow to low	Fan turns too slowly	see "Fan turns too slowly"
	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
Vibrations	Imbalance	Check blades for damage, soiling or ice (see "Impeller blocked or dirty")
	No or wrong vibration dampers (only in radial)	Install correct vibration dampers
Unusual noises	Bearing damaged / worn	Change bearings in motor size 055("Z" / "B" at cross flow) change the fan.
	Impeller / blade scrapes / brushes	When indicated clear foreign bodies / dirt from the fan (see "Impeller blocked or dirty")
	Operation beyond stall point (for axial fans)	Check for free air passages (supply/exhaust air vents, filters)
	Wrong overlap on nozzle (for centrifugal fans)	Observe the installation instructions








### 9.2 Status Out with flash code

Status LED in the lid of the terminal compartment.  
Output A1 Status Out OC  Electrical installation.



23.04.2012  
v\_flash\_explain\_1\_x.VSD

LED Code	Relays K1*	Cause Explanation	Reaction of Controller
			Adjustment
<b>OFF</b>	de-energized, 11 - 14 interrupted	No line voltage	Line voltage available? Unit switch OFF and automatically ON when the voltage has been restored
<b>ON</b>	energized, 11 - 14 bridged	Normal operation without fault	
<b>1 x</b>	energized, 11 - 14 bridged	<b>No enable = OFF</b> Terminals "D1" - "10 V" (Digital In 1) not bridged or switch off by Bus.	Switch-off  digital input or Bus
<b>2 x</b>	energized, 11 - 14 bridged	<b>Temperature management active</b> The device has an active temperature management to protect it from damage due to too high inside temperatures. In case of a temperature rise above the fixed limits, the modulation is reduced linearly. To prevent the complete system being switched off externally (in this operation permissible for the controller) in case of reduced operation due to too high an internal temperature, no fault message is sent via the relay.	With a drop in temperature the modulation rises again linear. Check installation of the device and cooling of the controller.
<b>3 x</b>	de-energized, 11 - 14 interrupted	<b>HALL-IC</b> Incorrect signal from the Hall-ICs, error in the commutation. Internal plug connection faulty.	The controller switches the motor off. Automatic restart if no faults are recognised. Replace fan / motor
<b>5 x</b>	de-energized, 11 - 14 interrupted	<b>Motor blocked</b> If after 8 seconds of commutation no speed is measured > 0, the fault "Motor blocked" is released.	EC-Controller switches off, renewed attempt to start after about 2.5 sec. Final shutoff, when fourth starting test fails. It is then necessary to have a reset by disconnecting the line voltage. Check if motor is freely rotatable.
<b>6 x</b>	de-energized, 11 - 14 interrupted	<b>IGBT Fault</b> Short circuit to earth or short circuit of the motor winding.	EC-Controller switches off, renewed attempt to start after about 60 sec.  Code 9. Final shutoff, if - following a second starting test – a second fault detection is detected within a period of 60 seconds. It is then necessary to have a reset by disconnecting the line voltage.
<b>7 x</b>	de-energized, 11 - 14 interrupted	<b>ZK undervoltage</b> If the DC-link voltage drops below a specified limit the device will switch off.	If the DC-link voltage rises above the limit within 75 seconds, then the controller will attempt to start. Should the DC-link voltage stay for more than 75 seconds below the limit, the device will switch off with a fault message.

LED Code	Relays K1*	Cause Explanation	Reaction of Controller
			Adjustment
8 x	de-energized, 11 - 14 interrupted	<b>ZK overvoltage</b> If the DC-link voltage increases above a specified limit, the motor will switch off. Reason for excessively high input voltage or alternator motor operation.	If the DC-link voltage drops below the limit within 75 seconds, then the controller will attempt to start. Should the DC-link voltage stay above the limit for more than 75 seconds, the device will switch off with a fault message.
9 x	energized, 11 - 14 bridged	<b>IGBT cooling down period</b> IGBT cooling down period for approx. 60 sec. Final shutoff after 2 cooling-off intervals  Code 6	IGBT cooling down period for approx. 60 sec. Final shutoff after 2 cooling-off intervals  Code 6.
11 x	de-energized, 11 - 14 interrupted	<b>Error motor start</b> If a starting command is given (enable available and Setpoint > 0) and the motor does not start to turn in the correct direction within 5 minutes, then an error message will appear.	If it is possible to start the motor in the target direction of rotation after the error message, the error message will disappear Should a voltage interruption occur in the meantime, the time taken up to the switch off will begin again. Check if motor is freely rotatable. Check if the fan is driven in reverse direction by an air stream (  Behaviour in rotation by air current in reverse direction).
12 x	de-energized, 11 - 14 interrupted	<b>Line voltage too low</b> If the DC-link voltage drops below a specified limit the device will switch off.	If the line voltage rises above a specified limit within 75 seconds, then the controller will attempt to start. Should the line voltage stay below the specified limit for more than 75 seconds, the device will switch off with an error message
13 x	de-energized, 11 - 14 interrupted	<b>Line voltage too high</b> Cause to high input voltage If the line voltage increases above a specified limit, the motor will switch off.	If the line voltage drops below the specified limit within 75 seconds, then the controller will attempt to start. Should the line voltage stay above the specified limit for more than 75 seconds, the device will switch off with an error message.
14 x	de-energized, 11 - 14 interrupted	<b>Error Peak current</b> If the motor current increases above the specified limit (even in a short time-frame) the device will switch-off.	After a switch off the controller waits for 5 seconds then the controller attempt a start. Arises within 60 sec. in series 5 further disconnections a final switch off with fault indication follows. Should no further switch off be exceeded in 60 sec. the counter will be reset.
17 x	de-energized, 11 - 14 interrupted	<b>Temperature alarm</b> Excess of the max. permissible inside temperature.	Controller switches off motor. Automatic re-starting after cooling down. Check installation of the device and cooling of the controller.

\* K1: programmed function at factory: Fault indication not inverted

### 9.3 Brake function and behaviour in rotation by air current

At applied line voltage, enable and a setting signal above "0", the speed control is active and the speed is stable even under load fluctuations.

If the motor is not controlled with line voltage applied, i.e. without enable or with enable with setting signal "0", the brake function becomes active to hold the motor until start (holding brake).

- If the line voltage is switched on whilst the fan is rotating in reverse (wrong turning direction), this is decelerated and started in the correct turning direction at a setting signal above "0". To protect the electronics against too high braking current, this function is partly (fan-dependent) only possible up to a certain speed value.
- The braking function also becomes active to bring the fan to a standstill when this is driven with a speed below  $100 \text{ min}^{-1}$  (without control). At speeds above  $100 \text{ min}^{-1}$  the motor control does not intervene.
- When driven in correct direction of rotation and with enable with a setting signal above "0", the motor is started whilst the fan is rotating.

#### Behaviour in strong drive in reverse direction (e.g. suction)

The braking effect with applied line voltage is limited, strong reverse acting forces can lead to rotational movement despite the holding brake.

From a certain level (fan-dependent) it is no longer possible to start the fan in the correct turning direction (=> message: Fault motor start). Further start attempts follow; the error message disappears if start is successful.



#### Information

- Do not switch off the line voltage so that the braking function can prevent rotation of the fan in reverse (wrong) direction and safe starting is possible.
- If the application requires safe starting after switching on the line voltage, too strong an air current (suction effect) in reverse direction must be prevented by suitable measures.
- Special settings are possible which can lead to deviations from the above functional description.

## 10 Service work

### 10.1 Repairs / maintenance



#### Attention!

- 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.
- Generator operation can produce dangerous voltages (see safety instructions)!
- Keep the airways of the fan free - danger because of objects dropping out!
- 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!
- 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 vanes and in recesses on the rotor, can lead to reduced cooling performance and the motor switching off prematurely. For this reason, remove deposits quickly (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.
- The fan or motor is maintenance-free due to the use of ball bearings with "life-time lubrication". At the end of the grease service life (see Technical Data), it is necessary to change the bearing. The grease service life 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. Please consult our Service Department with regard to changing the bearing as for all other damage (e.g. to the coil or electronics).
- Regular inspection and possibly cleaning is necessary to prevent imbalance and blockage of the condensation bores 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.

**Information**

Confirmation number for inquiries or in service cases see 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.

**10.2 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.
- 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 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!

# 11 Enclosure


## 11.1 Technical data


Line voltage* (DC supply not UL and VDE approved!)	Voltage specifications see rating plate	DC voltage range
	1 ~ 200...277 V, 50/60 Hz	280...400 V (+/- 2 %)
	1 ~ 100...130 V, 50/60 Hz	140...400 V (+/- 2 %)
	DC 110 V	110...400 V (+/- 2 %)
Maximal line fuse**	16 A	
Max. load limit integral of cut-in current approx.	2.0 A <sup>2</sup> s	
Switching Freq.	16 kHz	
Voltage supply for external devices	+10 V (-2 %), I <sub>max</sub> 50 mA (short-circuit-proof)	
Analogue input "E1"	Input resistance: R <sub>i</sub> > 100 kΩ Specification speed setting signal PWM Voltage: 15...28 VDC Switching Frequency: 1...10 kHz On-off ratio: 0...100 %	
Digital input "D1"	Input resistance: R <sub>i</sub> approx. 2 kΩ Voltage range high level: 7.1...19 V DC Voltage range low level: 0...2.7 V DC	
Open-Collector output "A1"	I <sub>max</sub> : 20 mA U <sub>CE max</sub> : 30 V DC	
Contact rating of the internal relay "K1"	AC 250 V 2 A	
Permissible minimal and maximal ambient temperature for operation	-35...60 °C (☞ rating plate) *** 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. To avoid condensation the drive must be continuously energized due to the application of heat, with interruptions such that cooling to the point of condensation does not occur.	
Max. permissible installation height	height 1000 m amsl without derating	
Permissible rel. humidity	The motor is released for a relative humidity of 100 % at continental climate without other ambient influences. Other ambient conditions on request.	
Permissible temperature range for storage and transport	-40...+80 °C	
Electromagnetic compatibility for the standard voltage 230 / 400 V according to IEC 60038	Interference emission EN 61000-6-3 (domestic household applications)	
	Interference immunity EN 61000-6-2 (industrial applications)	
Harmonics current	Active power factor adjustment for sinusoidal input current (PFC = Power - Factor - controller), harmonic current in accordance with EN 61000-3-2 are guaranteed.	
Max. leakage current according to the defined networks of EN 60990	< 3.5 mA	
dB(A) values	☞ product catalog	
Ball bearings grease service-life (F <sub>10h</sub> )	during standard usage ca. 30 - 40,000 h	
Protection class of motor according to EN 60529	IP54	

\* Regarding the mains connection, these devices are to be classified as category "C2" devices according to the relevant DIN EN 61800-3. The increased requirements placed on electrical interference > 2 kHz for category "C1" devices are complied with in addition.

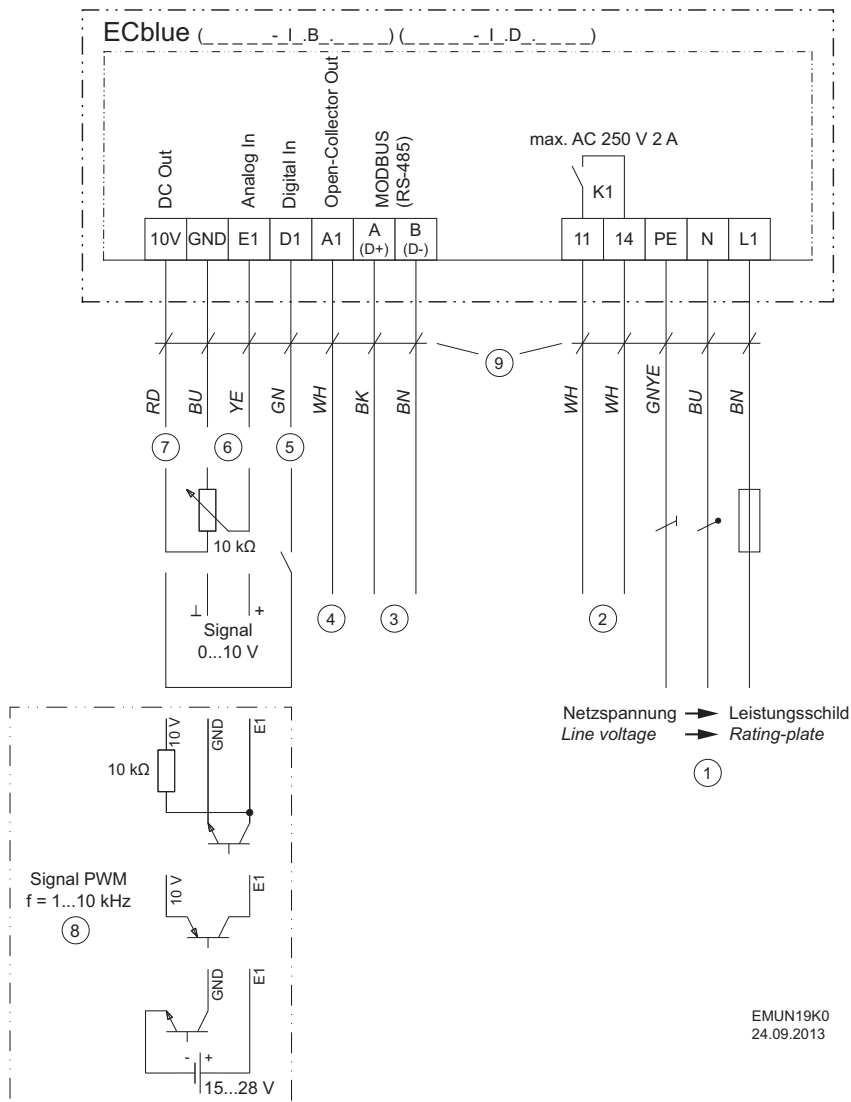
\*\* Max. line fuse on site (line protection fuse) according to EN 60204-1 Classification VDE0113 Part 1 (see also Assembly instructions / Electrical installation / Mains connection / Line protection fuse).

\*\*\* In case of a temperature increase above the predetermined threshold values modulation is linearly reduced by active temperature management.

For motors with the corresponding quality mark (☞ rating plate)		
Authorization:	FILE No. E347018	UL 1004-1, 1004-3, UL 1004-7; CAN CSA C22.2 No. 100, No. 77
		Electronically Protected Motors

For motors with the corresponding quality mark (☞ rating plate)		
Rated voltage 200 - 250 V, 50/60 Hz		
Zulassung	REG.-Nr. E418 Certificate number 40039441	DIN EN 60335-1 (VDE-0700-1): 2012-10; EC 60335-1: 2012
	 REG.-Nr. E418	Einbaumotor (Built-in-motor)

### 11.2 Connection diagram



- 1 Line voltage rating plate
- 2 Relay output for fault indication (contact rating max. AC 250 V 2 A)
- 3 MODBUS (RS-485) interface
- 4 Open-Collector output status / tacho ( $I_{max}$  20 mA)
- 5 Digital input for enable ( $R_i$  approx. 2 kΩ)
- 6 Input for speed setting by 0...10 V signal / potentiometer ( $R_i$  > 100 kΩ)
- 7 Voltage supply 10 V DC ( $I_{max}$  50 mA)
- 8 Speed setting by PWM signal ( $f = 1...10$  kHz)
- 9 Version with connection cables

## 11.3 EC Declaration of Incorporation

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

- Translation -  
(english)

87 01/16 Index 005  
00296702-GB

### The design of the incomplete machine:

Axial fan FA..., FB..., FC..., FE..., FF..., FS..., FT..., FH..., FL..., FN..., FV..., DN..., 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 EG Machinery Directive 2006/42/EG.

### The manufacturer is the

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

### The following harmonised standards have been used:

EN 60204-1:2006+A1:2009	Safety of machinery; electrical equipment of machines; Part 1: General requirements
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 13857:2008	Safety of machinery; safety distances to prevent danger zones being reached by the upper limbs
Note:	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.

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, 29.01.2016



ZIEHL-ABEGG SE  
Dr. W. Angelis  
Technical Director Ventilation Division

*i.v. W. Angelis*

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## 11.5 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**  
**74653 Künzelsau**  
**Telephone: +49 (0) 7940 16-0**  
**Telefax: +49 (0) 7940 16-504**  
**info@ziehl-abegg.de**  
**http://www.ziehl-abegg.de**

## 11.6 Service information

If you have any technical questions while commissioning or regarding malfunctions, please contact our technical support for control systems - ventilation technology.

**phone: +49 (0) 7940 16-800**

**Email: fan-controls-service@ziehl-abegg.de**

Our worldwide contacts are available in our subsidiaries for deliveries outside of Germany, see [www.ziehl-abegg.com](http://www.ziehl-abegg.com).

If you make returns for inspections or repairs we need certain information in order to facilitate focused trouble shooting and fast repair. Please use our repair ticket for this. It is provided to you after you have consulted our support department.

In addition, you can download it from our homepage. Support - Downloads - General documents.