

ECblue BASIC-MODBUS, ECblue BASIC

Motor sizes: D (116), G (152)

EC-fans and motors with highest efficiency

Assembly instructions



Keep for reference!

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1 General notes

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, start-up, maintenance, repair, cleaning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

1.1 Validity

This document is valid for motors and fans of the ECblue series. Motor sizes D (116) and G (152). The used motor size is recognisable from the type designation (see rating plate).

Examples for type designations with motor size D = 116		
Motors Type	Axial fans type	Centrifugal fans type
MK116 - _ _ . _ _ . _ _	F _ _ _ - _ . D _ . _ _ _	RH _ _ - _ . D _ . _ _
	D _ _ - _ . D _ . _ _ _	GR _ _ - _ . D _ . _ _
	Z _ _ - _ . D _ . _ _ _	ER _ _ - _ . D _ . _ _
		WR _ _ - _ . D _ . _ _
		HR _ _ - _ . D _ . _ _

A total of 2 connection versions are available (see rating plate)

1. ECblue MB $\hat{=}$ ECblue BASIC-MODBUS
2. ECblue BASIC



Information

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

1.2 Structure of the assembly instructions

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

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

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

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

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

1.3 Target group

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

1.4 Exclusion of liability

Concurrence between the contents of these assembly instructions and the described hardware and software in the device has been examined. It is still possible that non-compliances exist; no guarantee is assumed for complete conformity. To allow for future developments, construction methods and technical data given are subject to alteration. We do not accept any liability for possible errors or omissions in the information contained in data, illustrations or drawings provided.

ZIEHL-ABEGG SE is not liable for damage due to misuse, improper use or as a consequence of unauthorized repairs or modifications.

1.5 Copyright

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

1.6 Use of auxiliary modules in Europe (RED)

The AM-MODBUS-WB and AM-STICK-WB modules comply with the Radio Equipment Directive (RED) 2014/53/EU.

- Article 3.1[a]: Protection of health and safety of persons and of domestic animals
 - ETSI EN 300 328 V2.1.1
 - EN 301 489-1 V2.1.1 (2017-02)
 - AM-MODBUS-WB: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + AC:2011 + A2:2013
 - AM-STICK-WB: EN 62368-1:2014 + AC:2015 + A11:2017
- Article 3.1[b]: Adequate level of electromagnetic compatibility
 - EN 301 489-17 V2.2.1:2012-09
- Article 3.2: Effective and efficient use of radio spectrum
 - EN 300 328 V2.1.1:2016-11

The CE symbol confirms compliance with the directive.

Das Endprodukt, in welches das Modul und der Ventilator oder Frequenzumrichter eingebaut wird, muss den Anforderungen der 2014/53/EU entsprechen.

Die Module dürfen in folgendenden Ländern eingesetzt werden:

Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, the Netherlands, the United Kingdom, Switzerland and Norway

1.7 Use of auxiliary modules in the USA (FCC) or Canada (IC)



Information

The following information is intended for using the product in the USA or Canada and is therefore not taken into consideration in translations.

1.7.1 FCC/IC Statements @ AM-MODBUS-W, AM-PREMIUM-W

In case that the AM-MODBUS-W module or the AM-PREMIUM-W module is installed in the ECblue, the following applies:

FCC Compliance (US)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Warning

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IC Compliance (Canada)

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Note: If AM-MODBUS-W module or AM-PREMIUM-W module is used and installed by the user, the FCC/IC label (AM-MODBUS-W inside label for AM-MODBUS-W module, EM-W inside label for AM-PREMIUM-W module) have to stick on the housing of the ECblue.



Sticking the AM-MODBUS-W inside label on the ECblue housing.



Sticking the EM-W inside label on the ECblue housing.

Note: The modules (AM-MODBUS-W and AM-PREMIUM-W) are strictly limited for the integration and usage with host devices manufactured by ZIEHL-ABEGG SE.

1.7.2 FCC Statements for US @ AM-MODBUS-WB, AM-STICK-WB

FCC Notice

This device contains **FCC ID: T7V1740 (PAN1740)**, including the antennas, which are listed below, complies with Part 15 of the FCC Rules.

The device meets the requirements for modular transmitter approval as detailed in FCC public Notice DA00-1407 transmitter.

Operation is subject to the following two conditions

1. this device may not cause harmful interference
2. this device must accept any interference received, including interference that may cause undesired operation

Caution

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by ZIEHL-ABEGG SE may void the user's authority to operate the equipment.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

Labeling Requirements

The Original Equipment Manufacturer (OEM) must ensure that FCC labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Panasonic FCC identifier for this product as well as the FCC Notice above. The FCC identifier is FCC ID: T7V1740. This FCC identifier is valid for all PAN1740 modules.

In any case the end product must be labelled exterior with "Contains FCC ID: T7V1740"

Antenna Warning

For the related part number of PAN1740.

This device is tested with a standard SMA connector and with the antennas listed below. When integrated in the OEMs product, these fixed antennas require installation preventing end-users from replacing them with non-approved antennas. Any antenna not in the following table must be tested to comply with FCC Section 15.203 for unique antenna connectors and Section 15.247 for emissions.

Item	Part Number	Manufacturer	Frequency Band	Type	Gain (dBi)
1	LDA212G3110K	Murata	2.4 GHz	Chip-Antenna	+0.9

RF Exposure

The radiated output power of PAN1740 with mounted ceramic antenna (FCC ID: T7V1740) is far below the FCC radio frequency exposure limits.

Nevertheless, the PAN1740 shall be used in such a manner that the potential for human contact during normal operation is minimized

1.7.3 Industry Canada Certification @ AM-MODBUS-WB, AM-STICK-WB

This device contains "Contains IC: 216Q-1740".

PAN1740 is licensed to meet the regulatory requirements of Industry Canada (IC), license: IC: 216Q-1740.

Manufacturers of mobile, fixed or portable devices incorporating this module are advised to clarify any regulatory questions and ensure compliance for SAR and/or RF exposure limits. Users can obtain Canadian information on RF exposure and compliance from www.ic.gc.ca.

This device has been designed to operate with the antennas listed in the Table above, having a maximum gain of 0.9 dBi. Antennas not included in this list or having a gain greater than 0.9 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms. The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Due to the model size the IC identifier is displayed in the installation instruction only and can not be displayed on the modules label due to the limited size (8.7x15.6mm).

IC Notice

The devices contains "Contains **IC: 216Q-1740**", including the antennas, which are listed in above, complies with Canada RSS-GEN Rules. The device meets the requirements for modular transmitter approval as detailed in RSS-GEN.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes :

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

PAN1740 est garanti conforme aux dispositions réglementaires d'Industry Canada (IC), licences: IC: 216Q-1740 Il est recommandé aux fabricants d'appareils fixes, mobiles ou portables de consulter la réglementation en vigueur et de vérifier la conformité de leurs produits relativement aux limites d'exposition aux rayonnements radiofréquence ainsi qu'au débit d'absorption spécifique maximum autorisé

Des informations pour les utilisateurs sur la réglementation Canadienne concernant l'exposition aux rayonnements RF sont disponibles sur le site www.ic.gc.ca.

Ce produit a été développé pour fonctionner spécifiquement avec les antennes listées dans le tableau ci-dessus, présentant un gain maximum de 0.9dBi. Des antennes autres que celles listées ici, ou présentant un gain supérieur a 0.9dBi ne doivent en aucune circonstance être utilisées en combinaison avec ce produit. L'impédance des antennes compatibles est 50Ohm. L'antenne utilisée avec ce produit ne doit ni être située à proximité d'une autre antenne ou d'un autre émetteur, ni être utilisée conjointement avec une autre antenne ou un autre émetteur. En raison de la taille du produit, l'identifiant IC est fourni dans le manuel d'installation.

Labeling Requirements

The Original Equipment Manufacturer (OEM) must ensure that IC labelling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate Panasonic IC identifier for this product as well as the IC Notice above. The IC identifier is 216Q-1740. This IC identifier is valid for all PAN1740 modules. In any case the end product must be labelled exterior with "Contains IC: 216Q-1740"

Obligations d'étiquetage

Les fabricants d'équipements (OEM) doivent s'assurer que les obligations d'étiquetage du produit final sont remplies. Ces obligations incluent une étiquette clairement visible à l'extérieur de l'emballage externe, comportant l'identifiant IC du module Panasonic inclus, ainsi que la notification ci-dessus.

Les identifiants IC sont: IC: 216Q-1740

Ces identifiants sont valides pour tous les modules PAN1740. Dans tous les cas les produits finaux doivent indiquer sur leur emballage externe une des mentions suivantes: "Contient IC: 216Q-1740"

2 Safety instructions

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.
- 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 impellers.
- Conveyance of abrasive or adhesive media.
- Conveyance of liquid media.
- Operation of plug fans outside devices.
- Connect built-in fans to open flue pipes of gas and other firing devices.
- Use of the fan and add-on parts (e.g. guard grille) as a resting surface or climbing aid.
 - Fans are not designed for walking on even with an additive diffuser attachment (retrofit kit)! Do not climb onto fans without suitable aids.
- Unauthorised constructional modifications to the fan.
- Operation of the fan as a safety component or for the performance of safety-relevant functions in the sense of EN ISO 13849-1.
- Blocking or braking of the fan by inserting objects.
- Use with direct contact with foodstuffs or cosmetic and pharmaceutical products.
- Use of the fan as an independent household appliance.
- Use as a fire gas or smoke extraction fan (special application according to DIN EN 12101-3).
- Loosening of fan blade, impeller and balancing weight.
- All applications not listed in the intended use.



Attention!

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

2.3 Explanations of symbols

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

	<p>Attention! General hazardous area. Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!</p>
	<p>Danger due to electric current Danger by dangerous, electric voltage! Death or severe injury can occur if the corresponding precautions are not taken!</p>
	<p>Information 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. Protection class of the device when open is IP00! It is possible to touch hazardous voltages directly.
- 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 motor/fan must be installed so that it is not touchable.
- 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 voltage supply.
- 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.

Waiting period at least 3 minutes!

- Through use of capacitors, danger of death exists even after switching off the device through directly touching the energized parts or due to parts that have become energized due to faults.
- The controller housing may only be removed or opened when the power line has been switched off and a period of three minutes has elapsed since switching it off.



Attention, automatic restart!

- The fan / motor may switch on and off automatically for functional reasons.
- After power failure or mains disconnection an automatic restart of the fan takes place after voltage return!
- Wait for the fan 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.
- 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 Area of application/Notes on use

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.

- Any use below -10 °C is dependent on not being subjected to unusual, sudden or mechanical loads or stresses on the material (see minimal permissible ambient temperature).
- Corrosion is possible at the cutting edges on sendzimir galvanised parts.



Attention!

If the motor/fan is used in applications where a ignitable atmosphere can form in the event of a fault, e.g. due to leakage, the user must assess the risks of ignition and take appropriate precautions to prevent ignition.

3.2 Functional description

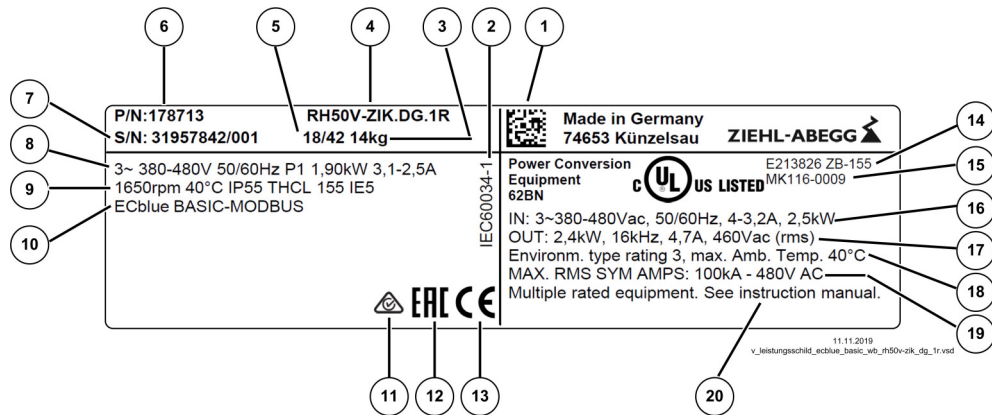
ECblue stands for EC fans and motors with maximum efficiency. Highly efficient, electronically commutated motors with permanent magnets are used the speed of which is controlled by the integrated controller.

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 Name plate

The rating plate contains the technical data valid for the product supplied. The plate has two sections. The left-hand half shows information relating to the manufacturer and the right-hand half contains the UL related data.

Example of rating plate on stator flange



no.	Explanation	no.	Explanation
	ZIEHL-ABEGG related data		UL related data
1	Datamatrix-Code Seriennummer	14	UL file and insulation system
2	Product standard	15	Motor identification UL
3	Weight	16	Electronic input values: Rated voltage Rated frequency Rated current Power
4	Type designation Fan/motor	17	Electronic output values: Power Switching frequency Rated current Rated voltage
5	Date of manufacture	18	Protection rating Max. ambient temperature authorisation at rated power
6	Partnumber ZIEHL-ABEGG SE	19	Current output in case of short circuit
7	Series number	20	Indication of more detailed information in the assembly instructions
8	Rated voltage Rated frequency Power Rated current		
9	Rated speed max. ambient temperature Protection rating Temperature class Efficiency class		
10	Product name		
11	Australian acma mark of conformity (optional)		
12	Eurasian mark of conformity		
13	European mark of conformity		

3.4 Temperature management

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 power electronics protects itself against excessive temperatures by active temperature management (power reduction).

However, this cannot provide complete protection in all circumstances. Observe the rated data - particularly the maximum permitted ambient temperature - on the rating plate.

3.5 Note on the ErP directive

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

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

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

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

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

3.6 Transport, storage



Attention!

- Observe the weight specifications (see rating plate) and the permissible carrying loads of the means of transport.
 - Wear safety clothing / shoes and cut-resistant safety gloves when handling.
 - 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.
 - Fix pallets during transport.
 - Do not stack pallets.
 - Only handle with suitable hoisting gear.
 - 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.
 - 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,
 - Radial impellers, fans with scroll RG.., RD.. or built-in fans type ER../GR.., WR.. are generally delivered on europallets, and can be transported using lift trucks.
 - **Design RG.. / RD.. / ER.. / GR.. / WR../HR..** : Fan unit may only be lifted and transported when using a suitable hoisting device (load spreader). Ensure sufficient cable or chain length.

- **Design FV.. / DN..** : The fan must be fastened to 4 points during transport so the flanges do not warp.
- **Design WR**: maximum permissible number for lifting fan units mounted on top of one another

Size	External dimensions [mm]	Permissible number
1	607 x 607	5
2	760 x 760	4
3	912 x 912	3

Attention!

Lifting several fan units next to one another is prohibited!

3.7 Disposal / recycling



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

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

4 Mounting

4.1 General notes

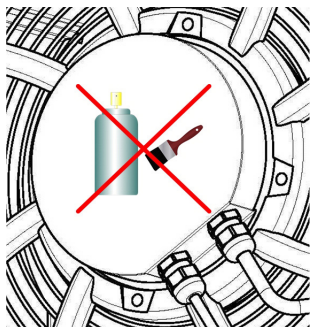


Attention!

- Mounting is only to be undertaken by trained service personnel. The system manufacturer or the machine builder and/or the user is responsible that the inherent installation and security information are harmonized with the valid standard and guidelines (EN ISO12100 / 13857).
- Check the fan for damage, e.g. cracks, dents or damage to the electric cables, before assembly. Start-up is not allowed in the case of transport damage!
- Wear safety clothing / shoes and cut-resistant safety gloves when handling.
- At a weight greater than 25 kg for men / 10 kg for women, the fan should be lifted out by two persons (according to REFA). The values may differ from country to country.
- 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 design 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.
- The custom designs must suit the prevailing conditions.
- Take into account easy access for cleaning and maintaining the fan.
- Before installing the fan, make sure the safety distances are maintained compliant with EN ISO 13857 or in household equipment according to EN 60335.
 - If the mounting height (danger area) above the reference plane is greater than or equal to 2700 mm and is not reduced by auxiliary means such as chairs, ladders, working platforms or floor space on vehicles, a guard grille is not necessary on the fan.
 - If the fan is located in danger zone, then the manufacturer or operator shall ensure that hazards shall be prevented by 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.
- Tighten the fastenings with the specified torques.
- Drilling chips, screws and other foreign bodies must not be located inside the device! Before the first switch-on, remove any items that may be present (drilling chips, screws and other foreign objects) from the intake area - risk of injury from any objects that may fly out!
- For fans, the alignment must be adhered to during operation, e.g. if this is indicated by "Oben/Top".

4.2 Connection lead & terminal box

- In demanding environments (wet rooms, outdoor installation), connecting cables must have water draining pipe elbows.
- If using a terminal box, install this lower than the motor to ensure that water cannot penetrate through to the controller housing from the connecting cables.



Do not coat connection components!

Coating connecting cables, cable glands and electronics covers (e.g. by painting, lacquering, powder-coating), is not permissible without consulting ZIEHL-ABEGG!

4.3 Ausführung mit abgesetztem Anschlusskasten

For products supplied by ZIEHL-ABEGG with a separate junction box, note the following information.

	1	Separate junction box made of plastic or metal		
		Lid screws		
	2	Tightening torque: Plastic box 1.3 Nm/12 Lb In, metal box 2.6 Nm/23 Lb In		
	3	Cable glands (see table below)		
		Screw plugs, plastic/brass		
	4	Tightening torque: 2,5 Nm/22 Lb In		
	Cable glands			
	Thread size	Material	Tightening torques M_A	
	M12x1.5	Synthetic material	1.5 Nm	13 Lb In
		Brass	4 Nm	35 Lb In
M16x1.5	Synthetic material	2,5 Nm	22 Lb In	
	Brass	5 Nm	44 Lb In	
M20x1.5	Synthetic material	4 Nm	35 Lb In	
	Brass	6.5 Nm	58 Lb In	
M25x1.5	Synthetic material	6.5 Nm	58 Lb In	
	Brass	6.5 Nm	58 Lb In	
M32x1.5	Synthetic material	6.5 Nm	58 Lb In	

4.4 Assembly in a humid atmosphere



Information

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

4.5 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 operated with an existing power supply (no setting signal, switch off by enable), the motor heating switches back on automatically at a controller inside temperature of -19 °C and back off when heated up to -15 °C.

Heating takes place via the motor winding through induction of a current that causes rotation of the rotor (approx. 5 revolutions per hour). This enables seizing of the rotor to be prevented.



Information

- Special settings are possible which can lead to deviations from the above functional description.
- Do not switch off the line voltage to ensure that the motor heating prevents the rotor from freezing.
- The motor has no sensors to be able to detect the danger of freezing in good time. In order to completely prevent fans from freezing, on-site measures are required.

4.6 Connection according UL and CSA in different applications

Only for motors/fans with the corresponding quality mark (see rating plate)



4.6.1 Connecting the conduit for NEC and CEC approval



Conduits



Attention!

The MK116 and MK152 series of integrated variable speed drives for the ECblue fan type for the North American economic region (identifiable from the rating plate) are approved as frequency inverters (Adjustable Speed Electrical Power Drive System) in compliance with UL61800-5-1 and CAN/CSA C22.2 No. 274.

Furthermore, the motors have environmental type rating class 3 according UL50(E) for outdoor use.

Compliance with the following specifications is mandatory for this:

- Metric to inches threaded adapters, used to connect the conduits, can be ordered from ZIEHL-ABEGG in a package of:
 - for MK116: part number 00297623
 - for MK152: part number 00297624
- These are to be used to connect the motor as per the on-site conditions according to the specifications of the NEC[®] (National Electrical Code, ANSI/NFPA 70) and the relevant parts of UL508/UL60497.
- The electrician / plant contractor is responsible for correct connection of the adapter and the conduits so that no damage can occur due to infiltrating moisture or water. When sealing the conduit connections make sure the supplied O-rings are used. When screwing the conduits into the thread adapters, use UL approved sealing tape (e.g., Teflon tape).
- The opposite end of the installation tube to the motor must be sealed so that moisture and dust cannot be sucked in by the slight vacuum pressure existing in the terminal compartment.
- The locking screws used within the MK116 and MK152 series are only for shipment. For installation the locking screws must be removed.
- It must be used a connection technology suitable for the environmental type rating of the drive!



Alternative: flexible connection

If the connection of the conduits is not possible with the thread adapter due to a lack of installation space, ZIEHL-ABEGG recommends its customers use an UL514B approved flexible connection hose system.

As an example it can also be used on equipment and machines. However, applicable here is that the equipment / machine must be configured / approved in accordance with UL508/UL60497.

Possible suppliers: - Anamet, - Flexa GmbH, - Thomas & Betts

Attention! ZIEHL-ABEGG cannot provide any warranty on the environmental type rating, class 3 for this.

Independent of the type and manner of the conduit / tube connection, correct connection of the supply line(s), the safety of people and objects must be provided at all times.

4.6.2 Connection in NFPA 79 Applications

In applications where the NFPA 79 (Electrical Standard for industrial machinery) applies the **enclosed** cable glands can be used.



Attention!

- Independent of the type and manner of the conduit / tube connection, correct connection of the supply line(s), the safety of people and objects must be provided at all times.
- The locking screws used within the MK116 and MK152 series are only for shipment. For installation the locking screws must be removed.
- It must be used a connection technology suitable for the environmental type rating of the drive!

4.7 Installation of axial fans

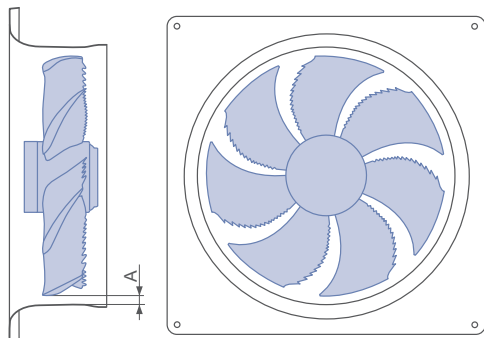
- Pay attention to a sufficient screw-in length in the motor flange.
- Excess screw length not permissible and it may result in the rotor being brushed against or blocked.
- Every screwing case is different. The tightening torque adapted to it must be determined by the appropriate screw tests.
- Avoid structural damage or stress with installation. Make sure the surface is flat and even.
- In the case of a vertical motor axis, the respective lower drain hole must be open.
- Secure fan connection cable with cable fasteners or cable clips.

4.7.1 Fan designs 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			
Motor size	D	D	G
Thread size	M6 (Special application with 5-pitch)	M8	M10
Property class 8.8, friction coefficient $\mu_{ges} = 0.12$	9.5 Nm	23 Nm	40 Nm
Stainless steel A2-70, friction coefficient $\mu_{ges} = 0.12$	7 Nm	17 Nm	33 Nm
Screw penetration	$\geq 1.5 \times d$	$\geq 1.5 \times d$	$\geq 1.5 \times d$

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



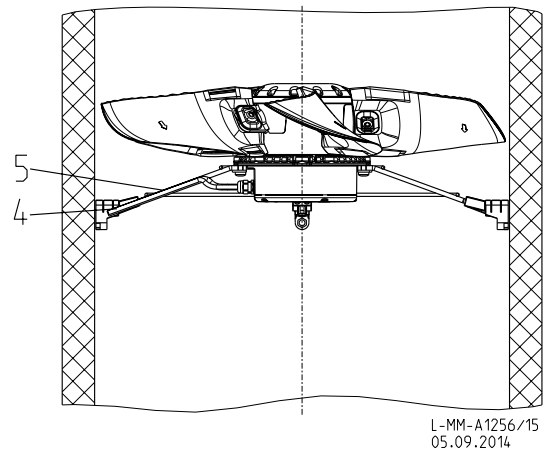
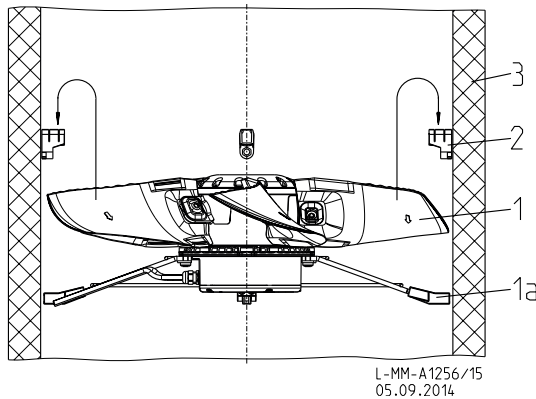
A minimum head gap "A" of 2.5 mm in all installation positions but especially in installation position H (horizontal motor shaft) is necessary. Distortion due to uneven surface may lead to fan failure due to brushing against the fan wheel.

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4.7.2 Installation in an exhaust air stack, design T

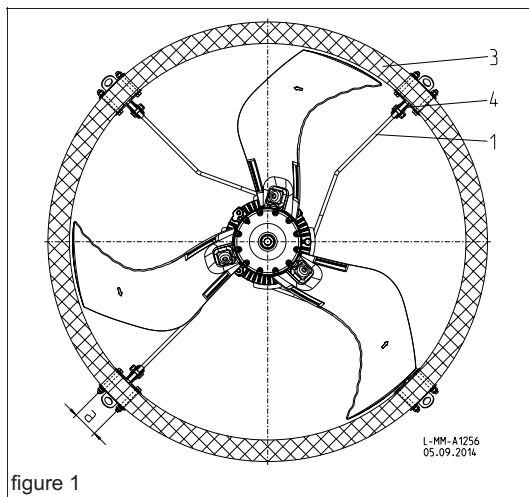
4.7.2.1 Mounting with plastic brackets

- Mark and bore position of the mounting brackets (2) in the chimney (3) by means of a stencil 4x90°. In the case of soft foam tubing, place a sufficiently dimensioned washer made of corrosion-resistant material under mounting brackets and the screwed connection from outside.
- Feed the fan (1) with the plastic end-pieces (1a) into the chimney (3) and latch into the mounting bracket (2) after overriding the spring preload. During disassembly, hold fan on the support arms and push quickly in the opposite direction (upward) in order to once again overcome the spring preload.
- Guide the motor connection cable (4) through chimney wall and tighten with cable tie (5) to fan support arm.



4.7.2.2 Mounting with stainless steel brackets

Mounting the stainless steel brackets is done with a separately obtainable installation kit.



Mark the mounting bracket (4) in accordance with **fig. 1** in the chimney (3) using a 4 x 90° template, drill hole center distance "a" in accordance with the mounting bracket (4).

Fan size	Adjustable diameter area	
	min.	max.
F_063	640	660
F_071	725	745
F_080	815	835
F_091	915	935
F_125	1265	1285

Tighten the mounting bracket (4) and the support bracket (5) **fig. 2** with screws (6) only so far that the mounting bracket and support bracket do not dig into the chimney wall (3). Self-locking nuts (7) are used for securing the screws. The enclosed protective caps (8) are to be pushed onto the ends of the fan supports (1), **fig. 2**.

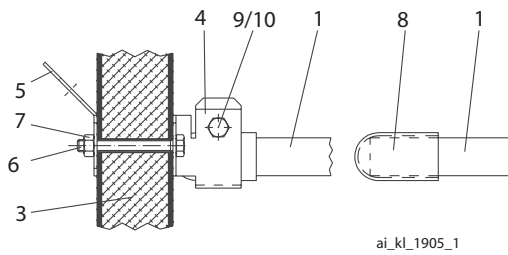


figure 2

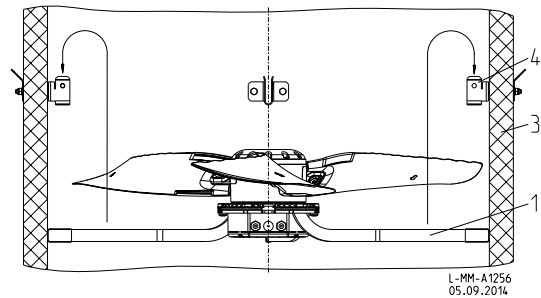


figure 3

Feed the fan (1) into the chimney in accordance with **fig. 3**, and center it in the mounting bracket (4). In addition, the support is to be secured in accordance with **fig. 2** by using bolts (9/10). The four support clamps (5) are used as support eyelets for additional fixings (e.g. by standing ropes) in order to relieve the chimney of the weight of greater fans.

Installation kit (Part.-No. 00370979 / 00372782)

Pos.	Designation	Piece
1	Axial fan	-
3	Chimney	-
4	Mounting bracket	4
5	Support bracket	4
6	M8x70 screws EN ISO 4014	8
7	M8 nuts EN ISO 10511 self-locking	8
7a	8.4 washer EN ISO 7089	8
8	Protective cap	4
9	Screw M8x30 EN ISO 4017 / screw M8x25 EN ISO4017	4
10	M8 nuts EN ISO 10 511 self-locking	4
10a	8.4 washer EN ISO 7089	4

All fastening elements made of stainless steel

4.7.3 ZAplus fans

When mounting ZAplus fans, ensure plastic-compliant connectors.

Recommended tightening torques M_A when using flat fastening discs according to EN ISO 7089 or DIN125			
ZAplus size ((tye: ZC., ZN., ZF..))	040	045 - 063	> 071
Thread size	M8	M10	M12
Property class 8.8, friction coefcient $\mu_{ges} = 0.12$	12 Nm	24 Nm	40 Nm

Tightening torque guard grille fitting: 6 Nm



Information

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

4.7.4 Assembly of MAXvent fans type FV, DN,

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.

Observe the following points for all types of fans:

- Do not install without suitable supports/brackets.
- Fasten the fan with suitable bolts using all the fastening points of the flanges.
- Fasten the accessories with suitable bolts.

Tightening torques for fastening the fan and accessories:

Tightening torques M_A				
Thread size	M6 (Special application with 5-pitch)	M8	M10	M12
Property class 8.8, friction coefficient $\mu_{ges} = 0.12$	9.5 Nm	23 Nm	46 Nm	79 Nm
Stainless steel A2-70, friction coefficient $\mu_{ges} = 0.12$	6.4 Nm	15.3 Nm	31 Nm	52 Nm
Screw penetration	$\geq 1.5 \times d$	$\geq 1.5 \times d$	$\geq 1.5 \times d$	$\geq 1.5 \times d$

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

4.8 Mounting of centrifugal fans

4.8.1 Mounting of centrifugal fans design RE, RH, RM, RZ

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

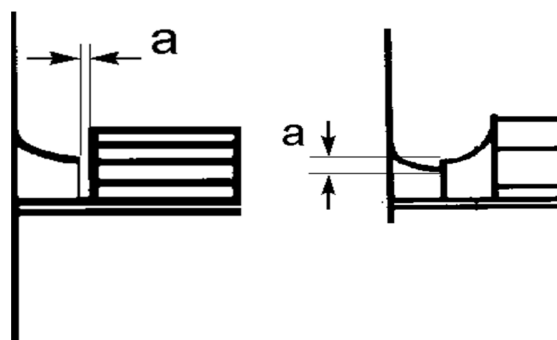
Permissible tightening torques M_A		
Motor size	D	G
Thread size	M8	M10
Property class 8.8, friction coefficient $\mu_{ges} = 0.12$	23 Nm	40 Nm
Screw penetration	$\geq 1.5 \times d$	$\geq 1.5 \times d$

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

Mounting of centrifugal fans, RZ design

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

- Pay attention to a sufficient screw-in length in the motor flange.
- Excess screw length not permissible and it may result in the rotor being brushed against or blocked.
- 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 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.

4.8.2 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.



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.

4.8.3 Erecting the equipment: Design ER.. / GR.. / WR..

- 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 drain hole (if available) 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.
- Design ER.. / WR.. is only permissible with horizontal motor shaft.

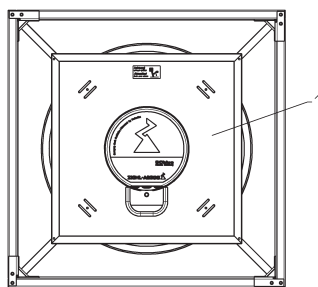


Attention!

- 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.

Design WR: maximum permissible number for installing several fan units on top of one another		
Size	External dimensions [mm]	Permissible number
1	607 x 607	5
2	760 x 760	5
3	912 x 912	5

Version with Optimizer



1 Optimizer

The optimizer can be removed temporarily for better accessibility (e.g. for laying of cables or cleaning).

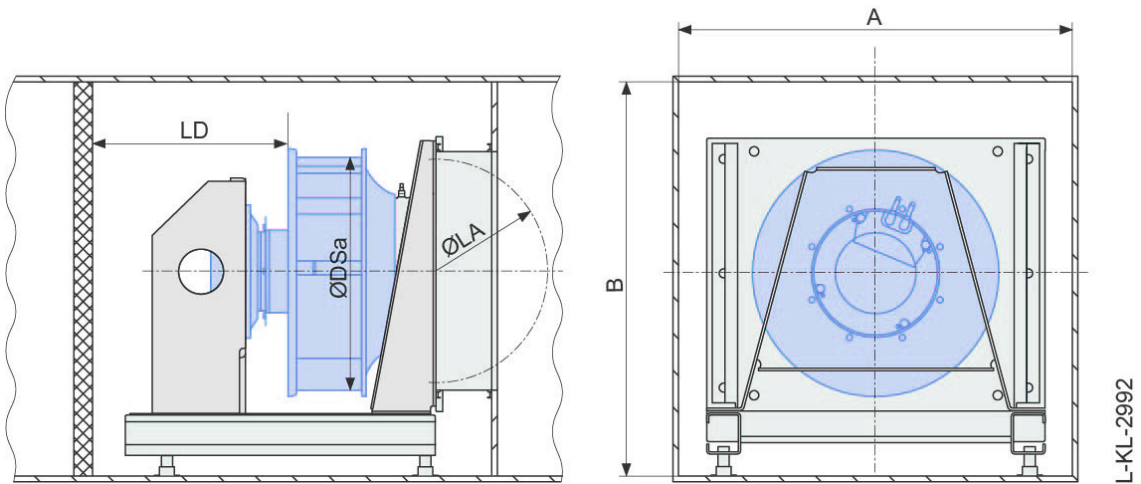
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Attention!

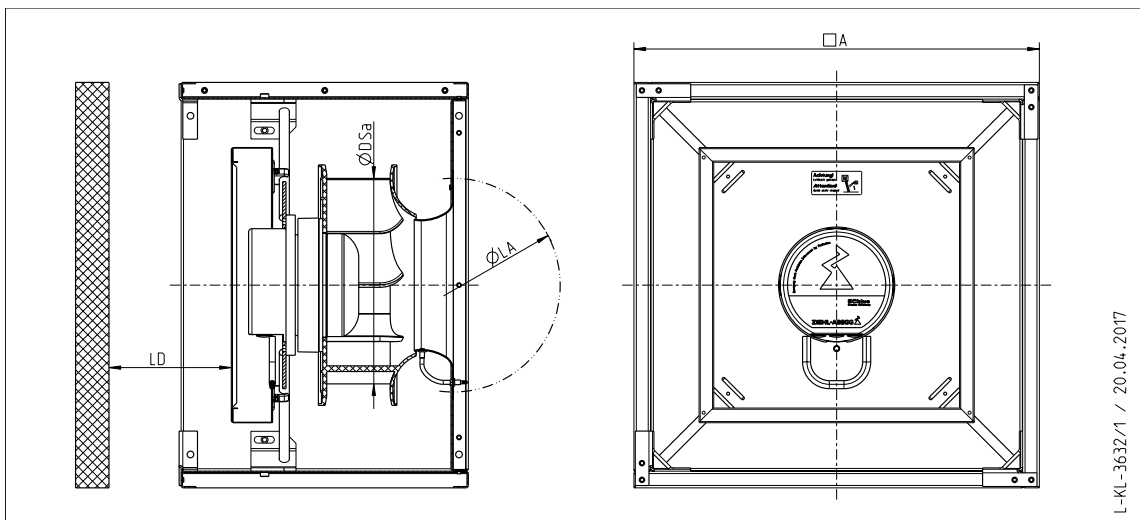
The optimizer is only engaged. External mechanical stress (e.g. securing or fastening of installation elements) is prohibited.

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



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

4.8.5 Optimal installation distances according to for WR..fans



- Distance on suction side: $LA \geq 0.5 \times DSa$ *
 - Distance on the pressure side: $LD \geq 0.3 \times DSa$
 - Impeller blade external-diameter : $\varnothing DSa$
 - Housing wall distances: $A = 1.8 \times DSa$ ($A = B$)
- * In the case of disturbance flow (per example curved pipe at the suction side, flaps etc.) $LA \geq 1 \times DSa$

4.9 Mounting the motor

Motors design MK

Fastening to fixed motor flange, see 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 steel 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		
Motor size	D	G
Thread size	M6	M8
Property class 8.8, friction coefficient $\mu_{ges} = 0.12$	9.5 Nm	23 Nm
Screw penetration	$\geq 0.83 \times d$	$\geq 0.83 \times d$
Max. permissible screw overhang	1.0 mm	1.5 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.
- Cable glands made out of metal are not allowed in plastic terminal boxes due to lack of potential equalisation.
- 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 final application must ensure that the fundamental health and safety requirements are met.
- The device owner is responsible for the EMC of the entire plant according to the locally applicable standards.
- Electrical equipment must be checked regularly: Loose connections are to be re-tightened and damaged cables must be replaced immediately.

5.2 Version with connection cables



Information

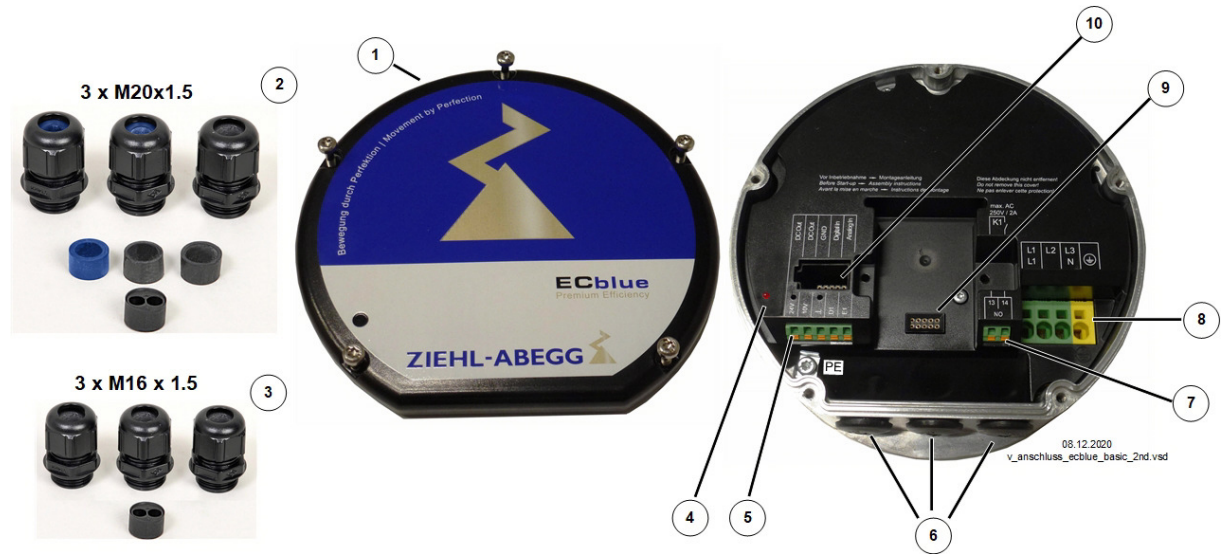
- In versions with connecting leads the connection is made to the colour coded wires. Note the cable bands on the connecting leads and the respective connection diagram.
- The type, length, colour coding and connection assignment of the connecting leads may vary depending on the version.
- Read the following chapter “Version without connection cables” for a new connection to the terminals in the terminal compartment.

ECblue BASIC connection version example

1 ~ ECblue, for line and relay: hose cable 5 x 1.5 mm ² (LiF9Y11Y-JB)				
	BN	brown	L1	Voltage supply
	BU	blue	N	
	GNYE	green-yellow	PE	
	WH	white	11	Relay
	WH	white	14	K1
3 ~ ECblue, for line and relay: hose cable 6 x 1.5 mm ² (LiF9Y11Y-JB)				
	BN	brown	L1	Voltage supply
	BU or GY	blue or grey	L2	
	BK	black	L3	
	GNYE	green-yellow	PE	
	WH	white	11	Relay
	WH	white	14	K1
1 ~ and 3 ~ ECblue, for control: hose cable 5 x 0.5 mm ² (LiF9Y11Y-0B)				
	YE	yellow	E1	Analog In 1
	BU	blue	GND	
	GN	green	D1	Digital In 1
	RD	red	10V	DC Out
	BN	brown	24V	DC Out

5.3 Version without connection cables

ECblue BASIC connection version example



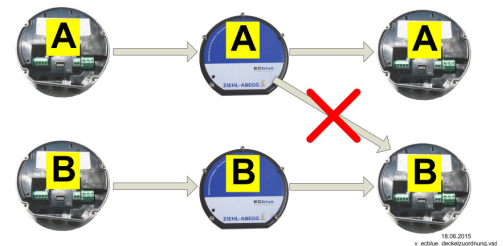
- 1 Cover of controller housing
- 2 Version with cable glands 3 x M20x1.5
inserted: 1 x Black seal insert for cables with 8...12 mm outer diameter
inserted: 2 x Blue seal insert for cables with 6...7.9 mm outer diameter
optional: 2 x Black seal insert for cables with 8...12 mm outer diameter
optional: 1 x Blue seal insert for cables with 6...7.9 mm outer diameter
optional: 1x Seal insert with 2 boreholes (6 mm) for two cables
- 3 Version with cable glands 3 x M16x1.5
inserted: 3 x Seal insert for cables with 4...10 mm outer diameter
optional: 1 x Seal insert with 2 boreholes (5 mm) for two cables
- 4 Status LED
- 5 Connection control system
- 6 Cable entry points with plastic fastener
- 7 Connection Relays
- 8 Voltage supply
- 9 Slot for AM auxiliary module ("add-on" module function)
- 10 Slot for AM-STICK-WB

Procedure:

1. Remove the cover from the controller housing for the connection.
2. All 3 cable entry points are in a sealed condition at delivery. Remove plastic fastener if necessary, and insert enclosed cable glands, entry points that are not used must remain sealed!
3. Insert and connect lines correctly (note the respective connection diagram).
4. Attach cover of controller housing again carefully in correct position before start-up.

Attention!

The seal of the end cap can adopt the contour of the stator bushing in time. Therefore mount the cover on the same motor that it was removed from to achieve maximum tightness.



Do not mix the covers!



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!
Remnants from installation, foreign objects and dirt has to be removed from the sealing area between cover and controller housing!

Tightening torques M_A

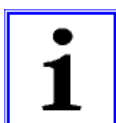
	Thread size	Tightening torques M_A		Remarks
		[Nm]	[Lb In]	
Plastic cable gland	M16x1.5	2.5	22	Sealing area for cables with outer diameter 4...10 mm
Plastic cable gland	M20x1.5	4	35	Sealing area with black seal insert for cables with outer diameter 8...12 mm Sealing area with blue seal insert for cables with outer diameter 6...7.9 mm
Brass cable gland	M16x1.5	5	44	Sealing area for cables with outer diameter 5.5...10 mm
Brass cable gland	M20x1.5	6.5	58	Sealing area for cables with outer diameter 6...12 mm
Locking screw	M16x1.5 M20x1.5	2.5	22	Slotted screwdriver
Cover of controller housing *	M4	2.5	22	
Protective earth connection *	M4	2.5	22	
Fastening add-on module *	M4	1.2	11	
Terminals add-on module *	M2	0.24	2.2	

* Recommended tightening speed maximum 400 min⁻¹

Connection data of terminals

Terminal	Voltage supply	Brake control	Add-on module AM-
Stripping length	15 mm	10 mm	4 mm
Conductor cross-section rigid min.	0.2 mm ²	0.2 mm ²	0.2 mm ²
Conductor cross-section rigid max.	10 mm ²	1.5 mm ²	1.5 mm ²
Conductor cross-section flexible min.	0.2 mm ²	0.25 mm ²	0.2 mm ²
Conductor cross-section flexible max.	6 mm ²	1.5 mm ²	1.5 mm ²
Conductor cross section flexible with wire end ferrule without plastic sleeve min.	0.25 mm ²	0.25 mm ²	0.25 mm ²
Conductor cross section flexible with wire end ferrule without plastic sleeve max.	6 mm ²	1.5 mm ²	0.75 mm ²
Conductor cross section flexible with wire end ferrule with plastic sleeve min.	0.25 mm ²	0.25 mm ²	0.25 mm ²
Conductor cross section flexible with wire end ferrule with plastic sleeve max.	4 mm ²	1.5 mm ²	0.75 mm ²
Conductor cross-section AWG/kcmil min.	24	24	28
Conductor cross-section AWG/kcmil max.	8	16	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.



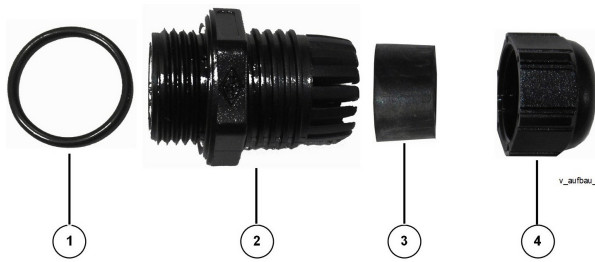
UL: note for cable entrances

According to UL the attached locking screws (made of plastic) are acceptable for transport.
According to UL the supplied cable glands can be used without conduit when they are being used in an installation according to **NFPA79**.

5.3.1 Assembly notes for cable glands

Correct use of the cable glands is of crucial importance for high operational reliability; note the following instructions.

Construction of a cable gland



- 1. O-ring
- 2. Collar with connecting thread
- 3. seal insert
- 4. Union nut



Attention!

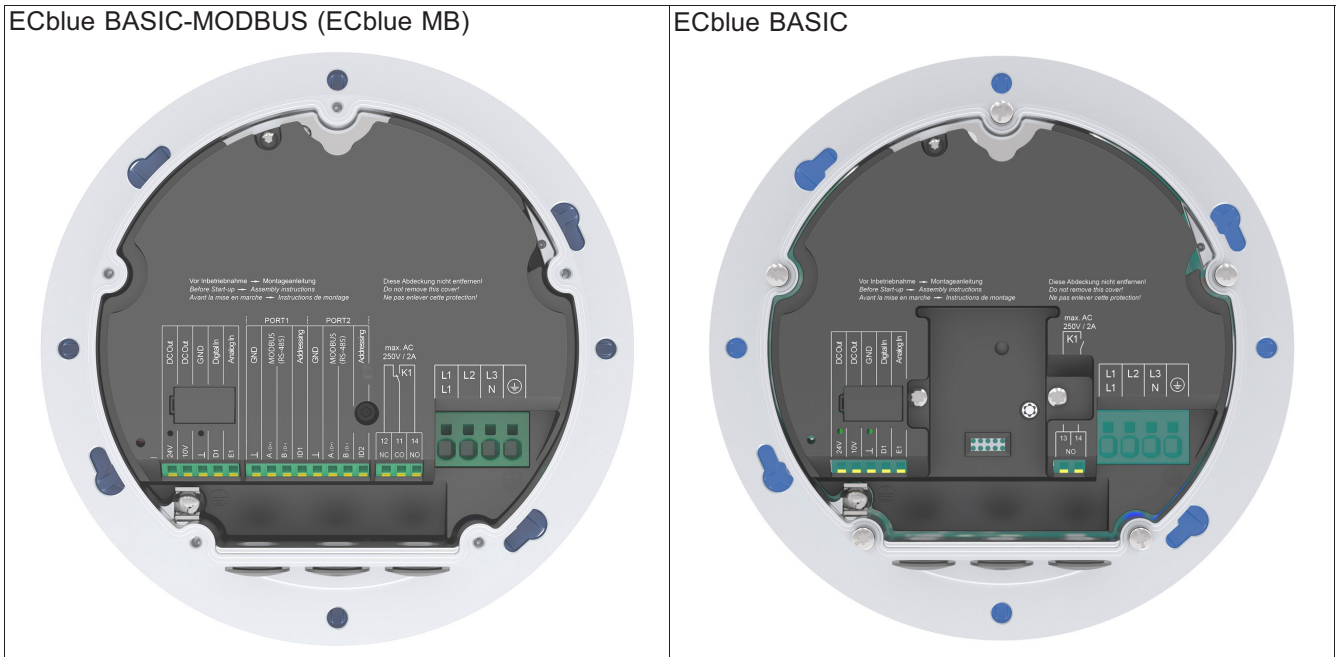
If the tightening torque of the cable gland is too low or too high, this prevents the O-ring from having sufficient contact with the housing and the seal insert on the cable. This results in leaks and/or poor strain relief on the cables.

		<p>Fitting cable glands</p> <ul style="list-style-type: none"> ▷ Select the size of the cable gland and the seal insert to match the outer diameter of the cable. ▷ Check the housing for damage in the area of the sealing surface before installing the cable gland. ▷ Ensure that the O-ring and seal insert are fitted. ▷ Place the cable gland at a right angle on the housing and screw in.
		<p>Inserting the cable, tightening method</p> <ul style="list-style-type: none"> ▷ Tighten the collar to the specified torque with a suitable torque wrench. ▷ Insert the cable through the cable gland into the housing. ▷ Fit the union nut by hand and tighten slightly. ▷ Tighten the union nut to the specified torque of the cable gland using the torque wrench. ▷ To insert two cables through one cable gland, use a seal insert with 2 boreholes. ▷ The seal insert supplied can only be used for a limited range of cable diameters. It is also possible to use seal inserts with a different inner diameter.
<p>Seal insert for 2 cables</p>		<p>Version with cable glands 3 x M20x1.5</p> <ul style="list-style-type: none"> ▷ As delivered, the 3 enclosed cable glands are fitted with one black seal insert and two blue seal inserts. ▷ In addition, two black and one blue seal inserts are included separately, and can be used if required. <p>Sealing areas Black seal insert: For cables with 8...12 mm outer diameter Blue seal insert: For cables with 6...7.9 mm outer diameter</p>
<p>2 x black Sealing area 8...12 mm</p>	<p>1 x blue Sealing area 6...7.9 mm</p>	<p>Sealing areas Black seal insert: For cables with 8...12 mm outer diameter Blue seal insert: For cables with 6...7.9 mm outer diameter</p>

		<p>Cables and installation position</p> <p>▷ Depending on the installation position and load, run the connecting cables to the cable gland from below or fit a water draining pipe elbow.</p>
		<p>Notes</p> <p>▷ Do not use any additional cable sheathing (e.g. with insulating tape or shrink hose) in the area of the sealing ring.</p> <p>▷ The cable must be dry and free of contamination (grease, dust or other impurities).</p> <p>▷ Use of a damaged cable is not allowed.</p> <p>▷ Two lines may only be fed through one cable gland with a sealing insert for two lines.</p>
		<p>▷ When using the seal insert for two cables it is not permissible to use the corresponding cable gland with only one cable.</p> <p>▷ Only use cables with a cylindrical cross-section. For other cross-sections (e.g. ribbon cables), special seal inserts are required.</p>

5.4 Connection versions

Each version can be supplied with an integrated AM-STICK-WB Bluetooth communication module, and this option is indicated by the addition of “WB” to the type designation (see rating plate), e.g. ECblue BASIC WB.



Connection options	Versions	
	ECblue BASIC-MODBUS	ECblue BASIC
Analog input for rotational speed specification via analog signal, PWM signal, potentiometer	0...10 V, 0...20 mA, 4...20 mA, PWM, R 10 kΩ	0...10 V, 0...20 mA, 4...20 mA, PWM, R 10 kΩ
Bus interface for MODBUS (RS-485) with 2 ports, automatic addressing possible	X	- *
Voltage supply for external devices	10 V, 24 V	10 V, 24 V
Digital input functional programmable, factory enable (device ON/OFF)	X	X
Digital output functional programmable, factory fault indication	Changeover contact	Normally open contact (NO)
Slot for auxiliary module with universal control function or for integration into different networks	-	X

* With AM-MODBUS auxiliary module possible

5.5 EMC-compatible installation

5.5.1 Harmonics current for 3 ~ types

According to EN 61000-3-2 these devices are to be classified as “professional” devices. Connection to a low voltage supply (public networks) is allowed insofar as this has been clarified with the respective energy supply company responsible.

5.5.2 Control cables

During the subsequent installation of the cable, ensure that there is sufficient distance between the mains supply lines and control cables to avoid electrical interferences on the control cable. Shielded cables are only useful if it is possible to connect the shield at least on one side with the protective conductor “PE” (as short and with as little induction as possible). Please note the connection options for the components used. In case of double-sided contacting of the shield, any compensation currents that may occur must be taken into account!

5.6 Voltage supply

5.6.1 Line voltage



Danger due to electric current

- It must be strictly observed that the line voltage complies with specified on the rating plate and lies within the allowable tolerance specifications (see technical data).
- Between the voltage supply of the device and the protective earth "PE" is in no case a higher voltage permissible than the indicated line voltage of the device!

For 1 ~ fan types

- Mains connection to: PE, L1 and N.
- **Attention!**
 - To activate the on current limitation, you must wait at least 90 seconds after switching off the line voltage before switching back on!

For 3 ~ fan types

- Mains connection to: PE, L1, L2 and L3.
- **Attention!**
 - A pulse-shaped current (in-rush current) flows when switching on the line voltage. When selecting switching elements and fuses, make sure that they are suitable for switching capacitive loads (approx. 15 µF per motor).

5.6.2 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!

5.6.3 Line protection fuse

The 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).

5.6.4 UL: Short-circuit protection for branch circuits (NEC, CEC)



Danger due to electric current

This power conversion equipment is suitable for connection to electric circuits that cannot supply more than a certain symmetrical current effective.

Please note the additional information under appendix / UL specifications / UL: Short Circuit Current Rating.

5.6.5 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 connection of the voltage supply of the device and the protective earth "PE" is in no case a higher voltage permissible than the indicated line voltage of the device!

For 1 ~ fan types

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.

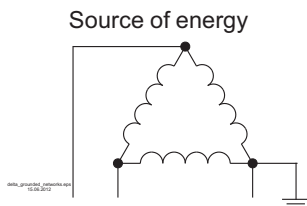
For 3 ~ fan types

3 ~ types in the version described here are suitable for use in the IT-System!

Capacitors are installed between the housing potential and the intermediate circuit to reduce radio interference voltages. This must be considered for the choice of insulation monitoring device!

5.6.6 Operation in Grounded Delta System

A device must be selected which allows operation on the existing network type.



In Delta System with earthed line phase the maximum voltage between a phase and the protective earth is as high as the voltage between two phases. In the versions described here, the specified voltage supply (see Technical Data) is permitted at the maximum between the mains connection and the "PE" conductor and they are therefore suitable for use in a Grounded Delta System!

5.7 Systems with residual current protective devices

Whether the use of a residual current protective device (RCD) is necessary or allowed depends on the design of the low-voltage system on which the device is to be operated.

The assessment whether or which residual current protective device should be used is the responsibility of the system operator or electrician commissioned by it.



Danger due to electric current

When selecting the tripping characteristics of the residual current protective device, the possible residual current form of the power electronics (system with semiconductors) must be observed in conjunction with the standards and regulations applicable at the place of use.

Design of the power electronics

- The design of the power electronics of a 1 ~ ECblue motor corresponds to a frequency inverter with two-pulse bridge circuit and PFC (Power Factor Correction).
- The design of the power electronics of a 3 ~ ECblue motor corresponds to a frequency inverter with six-pulse bridge circuit.



Information

To prevent false tripping due to pulse-like charging currents of the integrated EMC filter, we recommend a rated differential current of 300 mA for reasons of operational reliability in the case of fixed connection and use of a residual current protective device.

5.8 Motor protection

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

5.9 Analogue input “E1”

Analog input for motor speed specification, connection to “E1” and “GND” (Analog In).



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"> • Activation via external setting signal 0...10 V (factory setting for E1). • Through external wiring with a resistor (499 Ω / 0.25 W) between terminals “E1” and “GND” parallel to the input signal, activation with a 0...20 mA signal is possible (input programmed to 0...10 V). • Activation via external setting signal 4...20 mA (see programming control mode “E1” Function).
	<ul style="list-style-type: none"> • Speed setting by 10 kΩ potentiometer at terminals “+10 V” and “GND” pick-off at terminals “E1”.
	<ul style="list-style-type: none"> • Control via external setting signal PWM.

5.10 Output voltage “10 V”

Voltage supply e.g. for speed setting by external potentiometer (PELV current source according to EN 60204-1).

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

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

5.11 Output voltage “24 V”

For external devices, a voltage supply is integrated (PELV current source according to EN 60204-1).

Connection: “24 V” - “GND” (max. load see Technical data und connection diagram).

During an overload or short-circuit, 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!

5.12 Digital input “D1”

Different functions can be assigned to the digital input “D1” (see IO Setup). Actuation by potential-free contacts at terminals “D1” - “24V”, see technical data for input resistance and voltage range.

Function with factory setting for “D1”= Enable:

- Device “ON” for closed contact.
- Controller “OFF” with opened contact.
 - This status is indicated by a flashing code 1 (see Diagnostics/Faults).
 - The relay “K1” remains energised during factory programming. In other words, on the ECblue BASIC contacts 13-14 are bridged, and on the ECblue BASIC-MODBUS contacts 11-14.



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!

5.13 Relay outputs “K1”

The relay output “K1” can have different functions assigned to it (see IO Setup). Max. contact rating see technical data and connection diagram.

Changeover contact for ECblue BASIC-MODBUS	NO contact in ECblue BASIC
<p style="text-align: center;">K1</p>	<p style="text-align: center;">K1</p>

Function with factory setting for “K1”= Fault indication:

- The relay is energised during operation. I.e. on the ECblue BASIC-MODBUS contacts 11-14 are bridged, and on the ECblue BASIC contacts 13-14. In case of failure, the relay is de-energised (see Diagnostics/Faults).
- When switching off via enable (D1 = Digital In 1), the relay remains energized.



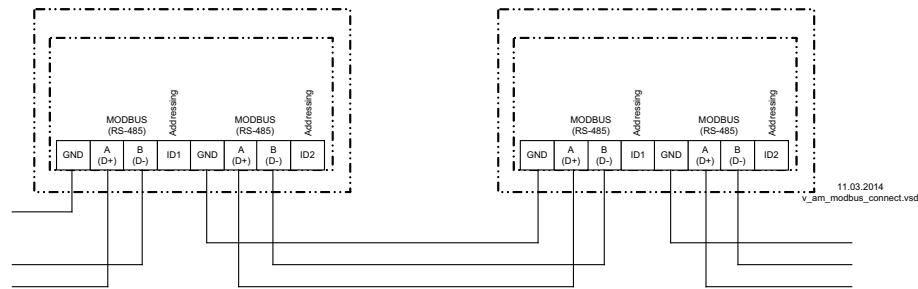
Information

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.

5.14 RS-485 interface for MODBUS

RS-485 interface for networking via MODBUS, on ECblue BASIC in connection with AM-MODBUS auxiliary module. Connection to: "A (D+)", "B (D-)" and "GND".



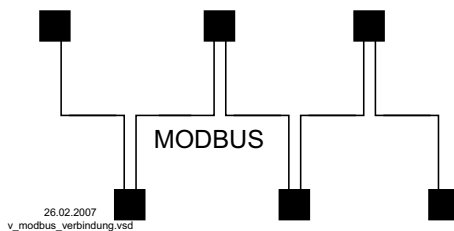
The connections for MODBUS "A (D+)", "B (D-)" are available double and are connected with each other internally.



Information

- You must ensure correct connection; i.e. "A (D+)" must also be connected on the following devices to "A (D+)". The same applies to "A (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).
- Except the data link "A (D+)", "B (D-)" and "GND" (for automatic addressing additional "ID1" - "ID2" see following chapter) no further cable cores of the data line may be used.
- Pay attention to sufficient distance from powerlines and motor wires (min. 20 cm).
- A maximum of 64 participants can be directly connected to one another, and a further 63 participants via a repeater. The precise number depends on the respective master.

Example for MODBUS connection



The data line must be conducted 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.

Recommended wire types

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

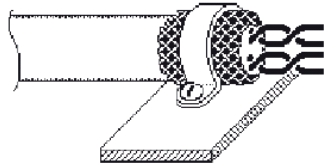
Max allowed wire length 1000 m (CAT5/7 500 m).

Shielding

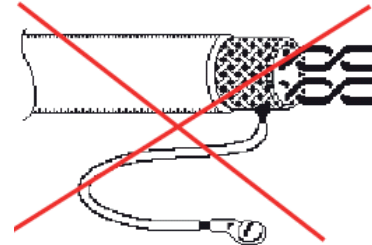
The use of shielded cables is normally not needed but offers high protection against electromagnetic interferences, especially high frequencies. However, the effectiveness of the shield depends on careful installation of the line.

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



When using telephone cable with four cable cores, we recommend the following allocation:

- A (D+) = red
- B (D-) = black
- ID1 - ID2 = yellow (for automatic addressing)
- GND = white

Default interface parameter

- Baudrate = 19200
- Bits = 8
- Parity = Even
- Stop bits = 1
- Handshake = none

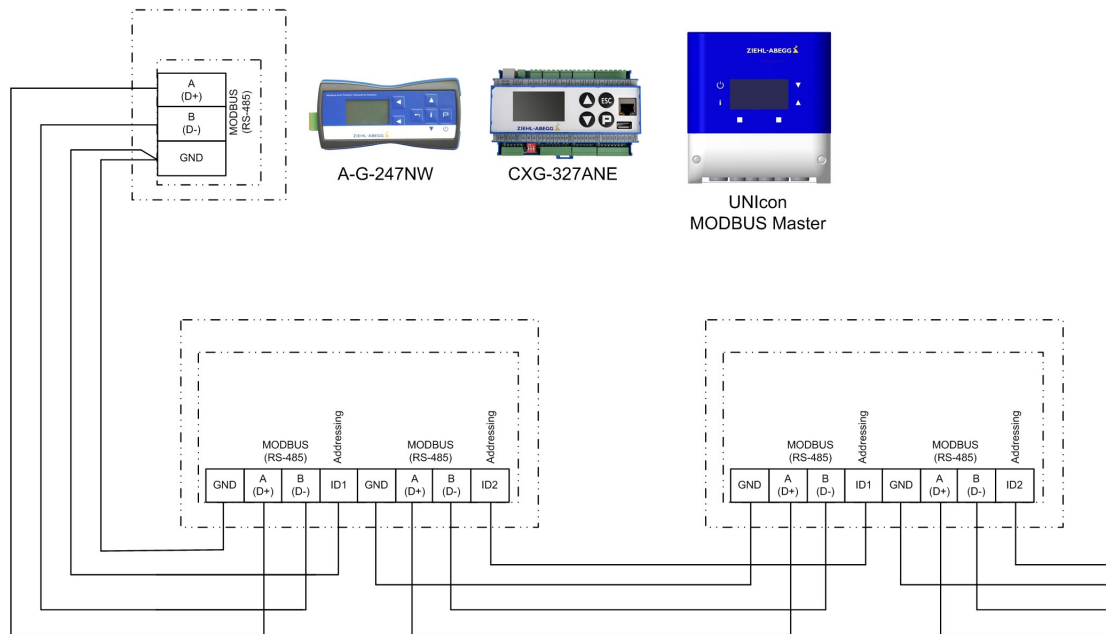


Information

- Addressing is performed depending on version by display, an external terminal or a PC with the appropriate software (automatic addressing following chapter).
- The MODBUS register description and the information sheet "Network structure of MODBUS" can be requested from our Support Department V-STE for control systems - ventilation.

5.14.1 Automatic addressing

Automatic addressing can be started when the connections “ID1” and “ID2” for “Addressing” are connected with each other additionally next to the bus connection. I.e. it is no longer necessary to address every user manually in the network.



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v_am_modbus_autoadr_A-G.vsd

Connection at terminal device via the terminals: A (D+), B (D-) and GND.
Connection of the Slave members via the terminals: A (D+), B (D-), GND und ID1 / ID2



Information

- Except the data link “A (D+)”, “B (D-)” the “ID1 - ID2” and the “GND” connection may no further cable cores of the data line be used.
- The connections for the automatic addressing “ID1” and “ID2” are not directly connected electrically with each other. These may not be bridged; any order of connection is possible.
- If a repeater is necessary and automatic addressing should be carried out, only the repeater of the Z-G-1NE type can be used, only it can relay the addressing signal.
- Maximum number of members in automatic addressing:
 - With hand held terminal type A-G-247 and control unit NETcon type A-G-102ANE max. **63** members.
 - With control module UNIcon MODBUS master type CXE/AV(E) and CXG-24AV(E) a max. **32** participants.
 - With control module UNIcon MODBUS master type CXG-327AN(E)-R a max. **62** participants for interface 1 and a max. **62** participants for interface 2.

On the first user that is connected directly to a terminal, MODBUS Master or PC, “GND” and “ID1” or “ID2” must be bridged. This is recognised as a result and occupied by address **1**.

For the following users the connection “ID1” or “ID2” of a user respectively is connected with connection “ID1” or “ID2” of the next user.

The automatic addressing of other users is initiated by the previous user via this connection.

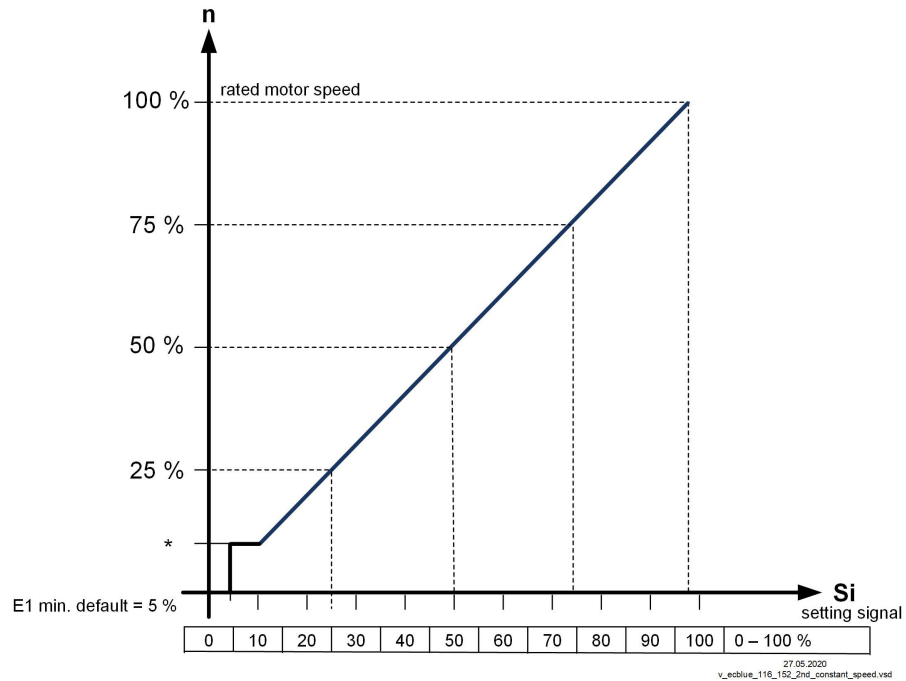
5.15 Specification signal/speed characteristic curve

Depending on the fan type and agreement, different operating modes/characteristic curves are possible.

5.15.1 Specification signal/speed characteristic curve

In "Constant speed" mode, the motor speed is proportional to the specification signal.

Characteristic curve: Motor speed proportional to specification signal



n Motor speed

100 % rated speed motor = maximum speed (@ approx. 97 % setting signal)

E1 Min. Internal offset for analog input E1

Si Rotational speed specification signal (depending on connection version) 0...10 V, 4...20 mA, 0...100 % PWM, 0...100 MODBUS

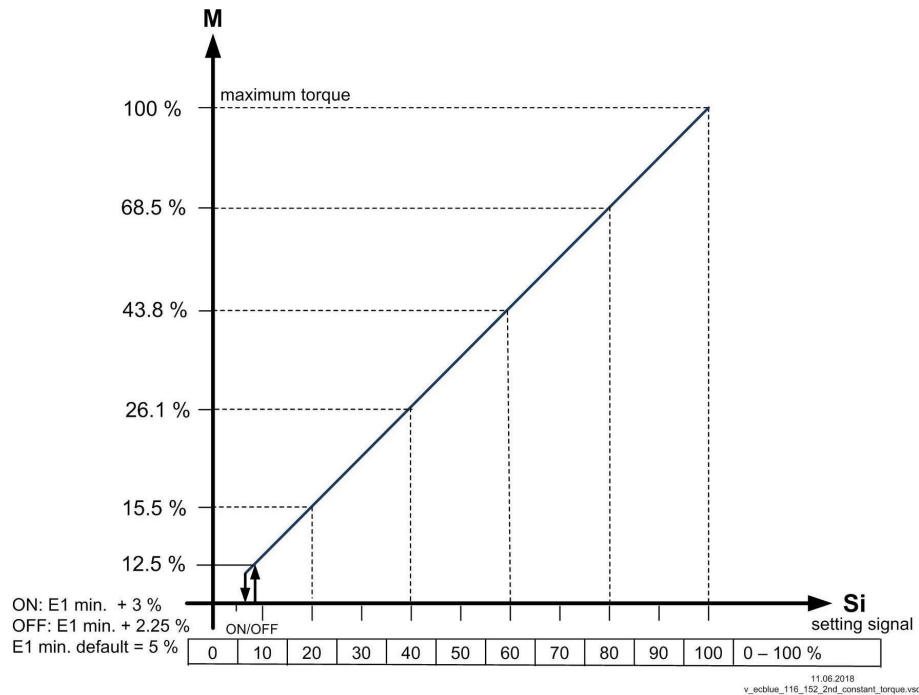
* If the internal setting "E1 min." (factory setting 5 %) is exceeded, the system starts the motor with a factory-set minimum speed depending on the motor type (typically 9 % of the rated speed, see rating plate).

If the specification signal has exceeded the value corresponding to the minimum speed, the motor speed is proportional to the specification signal.

5.15.2 Specification signal/torque characteristic curve

In “Constant torque” mode, the max. motor torque is achieved at the maximum specification, according to the motor type (10 V / 100 % PWM). The fan reaches its maximum speed, from which the preset characteristic curve can be derived.

Characteristic curve: Motor torque proportional to square of specification signal



M Torque
 100 % Maximum torque
 E1 Min. Internal offset for analog input E1
 Si Rotational speed specification signal (depending on connection version) 0...10 V, 4...20 mA, 0...100 % PWM, 0...100 MODBUS

Relations:

The torque is set proportionally do the square of the specification signal: $M \sim Si^2$.

It is important to consider that a minimum torque of 12 % must be added to improve the start-up behaviour.

Torque specification = 100 % x (((Si/10 V) x 0.94)²+0.12) [Si in V]

This means that on fans with a quadratic torque characteristic curve $M \sim n^2$, the speed is effectively proportional to the specification signal: $n \sim Si$.

5.16 Potential at control voltage connections

The connections for the control voltage (< 30 V) relate to the common GND potential (exception: relay contacts are potential-free). There is a potential isolation between the connections for the control voltage and the PE conductor. It must be ensured that the maximum external voltage at the connections for the control voltage cannot exceed 30 V (between the “GND” and “PE” conductor terminals). A connection to the PE conductor potential can be made if required; fit a bridge between the “GND” terminal and the “PE” connection (terminal for shield).

5.17 add-on modules for ECblue BASIC



The ECblue BASIC connection version has an “add-on” module function. I.e. if necessary, you can retrofit an “AM-..” auxiliary module in the slot provided (see auxiliary module operating instructions for assembly).

Currently available auxiliary modules

Type	Part-No.	Function
AM-MODBUS	349087	Communication module
AM-MODBUS-W	349050	To integrate the device into a MODBUS network. The members can be addressed automatically by an additional connection. The device can be communicated with using the hand-held terminal type A-G-247NW. Connection by cable via the MODBUS interface or wirelessly by radio (AM-MODBUS- W). On the AM-MODBUS- WB this can be done wirelessly using Bluetooth and the “Zaset Mobile” app.
AM-MODBUS-WB	349077	
AM-PREMIUM	349092	Universal control module
AM-PREMIUM-W	349051	By plugging on the “AM-PREMIUM” module, the device becomes a universal controller, sensors can be connected directly. The device can be communicated with using the hand-held terminal type A-G-247NW. Connection by cable via the MODBUS interface or wirelessly by radio (AM-MODBUS- W).
AM-CAN-OPEN	349064	CANOPEN module To integrate the device into a CANOPEN network.
AM-LON	349049	LON module To integrate the device into a LON network.
AM-PROFIBUS	349063	PROFIBUS module To integrate the device into a PROFIBUS network.
AM-ETHERCAT	349071	ETHERCAT module To integrate the device into an ETHERCAT network.
AM-PROFINET	349072	PROFINET Modul To integrate the device into a PROFINET network.
AM-BACNET	349084	BACNET Modul To integrate the device into a BACNET network.

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.
- A-rated sound power levels of over 80 dB(A) are possible, see product catalogue.

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 drain 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 (see 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. If resonance vibrations occur, it is possible to hide certain speed ranges (see Motor Setup).
4. Fans from ZIEHL-ABEGG SE are delivered balanced in accordance with DIN ISO 21940-11 for the appropriate fan category in accordance with ISO 14694 Check the fan for mechanical vibrations after installation. If the limit values of the corresponding fan category are exceeded in start-up, you must have the motor/impeller unit checked by an expert and rebalanced if necessary before continuous operation is permitted.

7 Communication options for programming

Depending on the connection version and the auxiliary modules installed, there are different options for communicating with the ECblue motor.

- The AM-STICK-WB Bluetooth communication module can be installed for programming using the "ZAsset Mobile" app.
- With the ECblue BASIC connection version, the "AM-MODBUS-WB" auxiliary module provides an additional option for programming using the "ZAsset Mobile" app.
- The MODBUS interface in the ECblue BASIC-MODBUS connection version and ECblue BASIC with AM-MODBUS auxiliary module enables programming using the A-G-247NW hand held terminal or the ZAsset PC software.



Information

- For information on installation (creating the connection) and operation, refer to the separate documentation for the auxiliary module.
- Information on presets are not binding; these values can differ depending on the software version and customer-specific pre-settings.



Attention!

- Very powerful electrical devices which you may not be able to see can be operated remotely. Considerable damage could be caused if the necessary knowledge of the connected components is not available and appropriate safety precautions are not taken!
- Make absolutely certain that no one is standing in the danger area and that no unauthorised persons operate the software!

8 Bluetooth communication module AM-STICK-WB

8.1 Bluetooth communication module AM-STICK-WB (option)



Available with integrated AM-STICK-WB Bluetooth communication module on request, and this option is indicated by the addition of "WB" to the type designation (see rating plate), e.g. ECblue BASIC WB. Alternatively, you can purchase the AM-STICK-WB communication module as an accessory and upgrade.



Attention!

- The module, and therefore also the end device in which it is installed (fan/frequency inverter), is not designed for use in life-sustaining devices or systems where a malfunction can lead to serious personal injury.
- It is not permissible to use the module, or the end device in which it is installed, as a critical component if the failure or malfunction of the component can impair the safety or functionality of life-sustaining devices.
- Customers who sell or use these ZIEHL-ABEGG products for these applications do so at their own risk. They undertake to reimburse ZIEHL-ABEGG in full for any possible costs that may occur.
- Those customers also agree to assign a new and secure access code (PIN) during the installation of the module device. They are required to disclose the access code to their customers.

8.2 Function

The AM-STICK-WB includes a Bluetooth LE (BLE) module that enables the user to take advantage of the 4.0+ Bluetooth technology with an Android device, iPhone, iPad or laptop.

BLE stands for **B**luetooth **L**ow **E**nergy or Bluetooth Smart as of Bluetooth version 4.0.

The "Zaset Mobile" app supplied by ZIEHL-ABEGG can be downloaded from the Google Play Store or Apple App Store.

The app requires Android devices from version 4.4 onwards and iOS devices from version 11 onwards.

In a hard-wired system, wireless communication is primarily designed to provide a second interface for communicating with the device (e.g., for configuration and diagnostics). The wireless communication uses the MODBUS protocol (MODBUS-TCP). The Bluetooth addressing takes place via the Bluetooth address.

The Bluetooth scan automatically detects all devices within range. The app can then connect with these devices via the Bluetooth address.

It is necessary to use the app to create a link between the device serial number and the AM-STICK-WB.

Unlike in the case of RS-485 communication, you can protect your device with an access code by PIN (0 - 9999) for wireless communication via the AM-STICK-WB.

During installation, it is essential to assign a dedicated secure PIN to a Bluetooth device or an associated group of Bluetooth devices.

If the PIN is set to the factory setting, the app will prompt you to change it.



Information

- You can change the PIN later in the "Controller Setup" under the "Wireless Network Key" parameter; after making a change you must re-establish the Bluetooth connection.
- The connection to the AM-STICK-WB is only possible with the correct PIN. If you have forgotten the PIN, the only option is to export it using the device MODBUS RS-485 interface.

The MODBUS address is read and displayed as part of a Bluetooth scan. This means that you can also identify the device via its MODBUS address if one has been assigned. Therefore, it is a good idea to assign a MODBUS address even if the MODBUS network is not in use.

You can change the MODBUS address via the app in the device "IO Setup"; see the "Bus Address" parameter. Then apply the same procedure to the next device.

Technical data for wireless Communication

Frequency	2.4 GHz
Communications range	Approx. 10 m in rooms, up to 30 m in the free field, generally depends strongly on external influences and the installation situation. For ECblue fans with aluminum controller housing cover, the communication range is reduced by at least 50 %.

8.3 Label Datamatrix-Code serial number

Every ZIEHL-ABEGG product (fan/inverter), supplied with a built-in AM-STICK-WB or with a slot for it, comes with an additional sticker for addressing via Bluetooth®.

This sticker is individualized for the final product. On the sticker is the serial number, which is unique to each product and matches the serial number on the product rating plate. For fans with two rating plates (GR/ER) only the rating plate on the stator flange has the correct serial number for Bluetooth addressing.

Attach the additional sticker at an easily accessible position and make sure that clear assignment to the relevant product is possible. This enables you to guarantee that even if the rating plate is covered up (e.g. due to the installation situation) easy commissioning and service via Bluetooth are possible. There is also a QR code on the sticker, which is used to download the "ZAsset Mobile" app. The serial number to link to the AM-STICK-WB can be entered manually or be scanned.

Example of sticker and rating plate with identical serial numbers

Additional sticker

1: Serial number data matrix code (only the code on the additional adhesive label has the necessary size for scanning the serial number)
 2: Article number Product
 3: Serial number for manual entry
 4: QR code for ZIEHL-ABEGG website to download the "ZAsset Mobile" app

Rating plate on stator flange

- 1 Serial number data matrix code (only the code on the additional adhesive label has the necessary size for scanning the serial number)
- 2 Article number Product
- 3 Serial number for manual entry
- 4 QR code for ZIEHL-ABEGG website to download the "ZAsset Mobile" app



Information

When simultaneously unpacking multiple products, make sure the enclosed stickers remain with the relevant product and do not get mixed up.

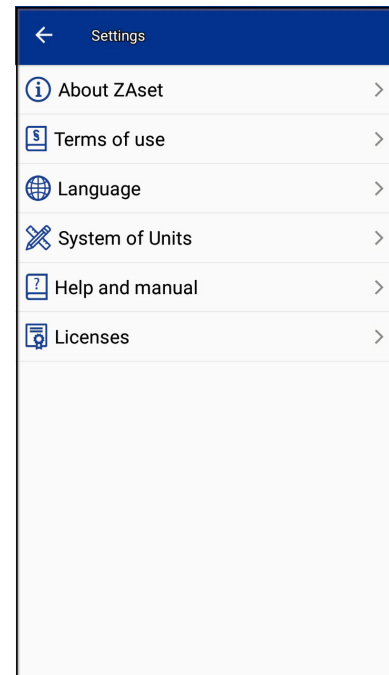
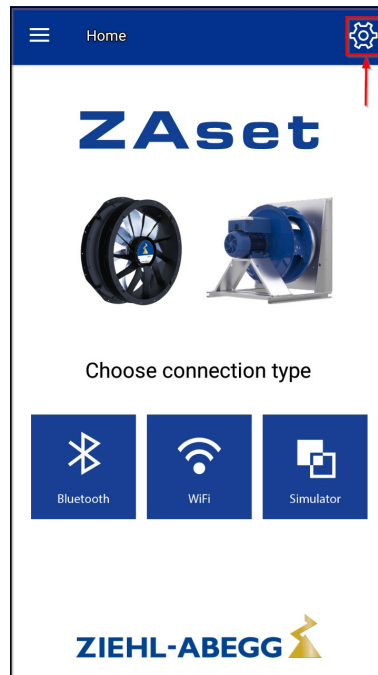
8.4 Establishing the Bluetooth connection

Proceed as follows:

1. Depending on your device, download and install the "ZAsset Mobile" app from Google Play Store or Apple App Store.

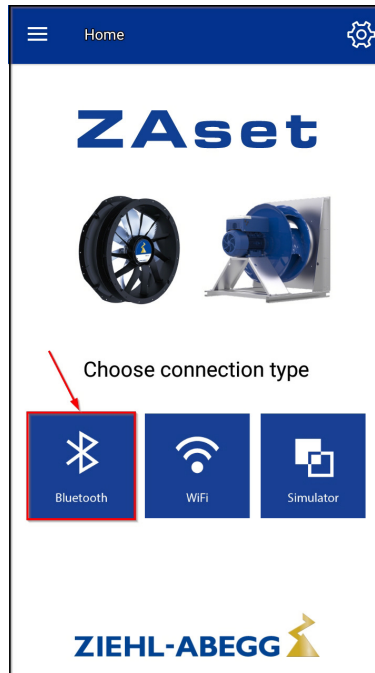


2. Start the app and, if necessary, open the Settings area with the gear wheel symbol.

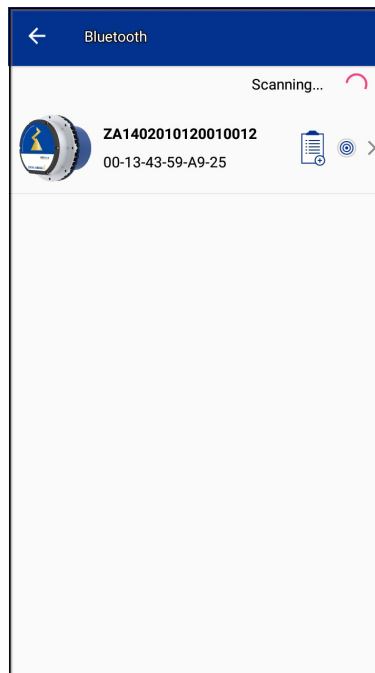


3. Switch on the line voltage to the fan/frequency converter in compliance with the safety instructions.
4. Activate the Bluetooth connection on the mobile device (smartphone). Additionally allow location determination in Android.

5. Tap the "Bluetooth" button to create a system with a Bluetooth LE data connection. ZAsset checks whether Bluetooth is activated on your smartphone, and prompts you to activate it if necessary.

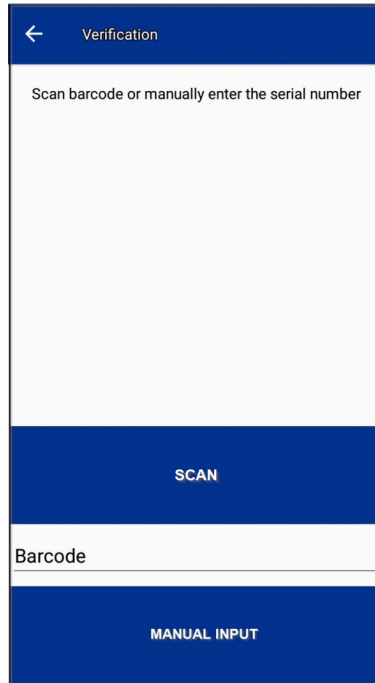


6. ZAsset then starts searching for devices in range and adds compatible devices to a list.

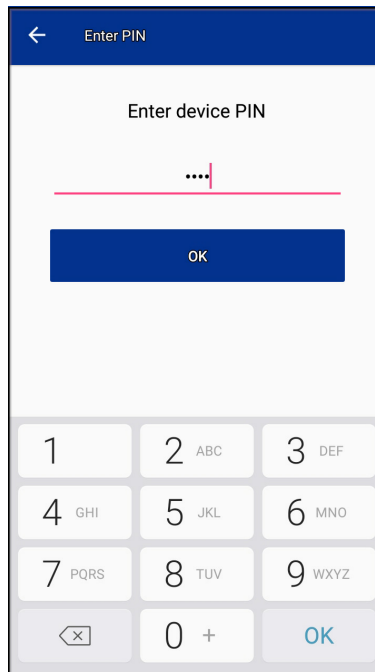


7. Briefly tap the desired device in the list to select it. ZAsset Mobile then immediately establishes a data connection with this device.

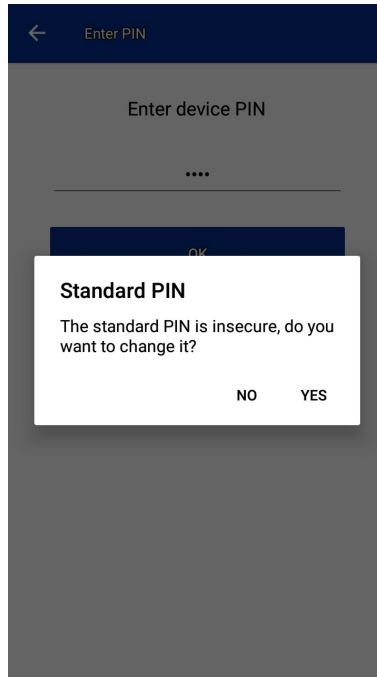
8. As soon as a connection to the device is established, a two-stage authentication process is initiated.
- First stage: Binding (linking AM-STICK-WB with device serial number).
The app checks whether the MAC address of the stick has already been assigned a serial number. If not, a dialog automatically opens to link with the serial number. If a binding already exists, you have to enter the PIN (see second stage).
The serial number can either be entered manually by reading it off and entering it in a text field or by scanning the data matrix code (see additional adhesive label).



- Second stage: Access code (PIN)
Enter the PIN **9999** (factory setting) and confirm with “OK”.

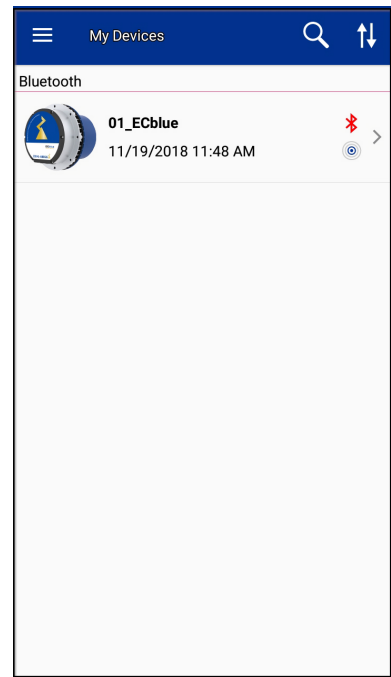
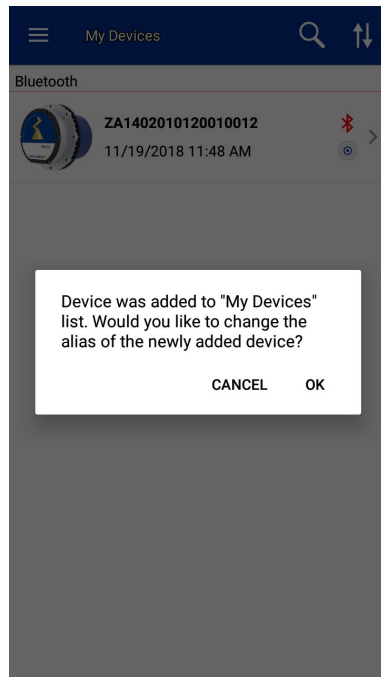


- Set a new PIN to prevent unauthorised access.

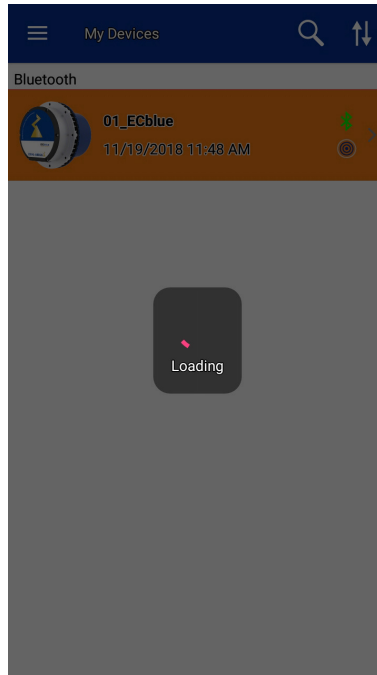


- 9. If required, enter a name of your choice (alias)

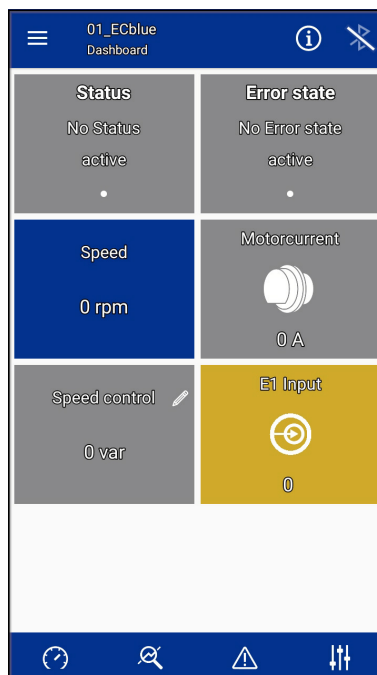
Example: 01_ECblue



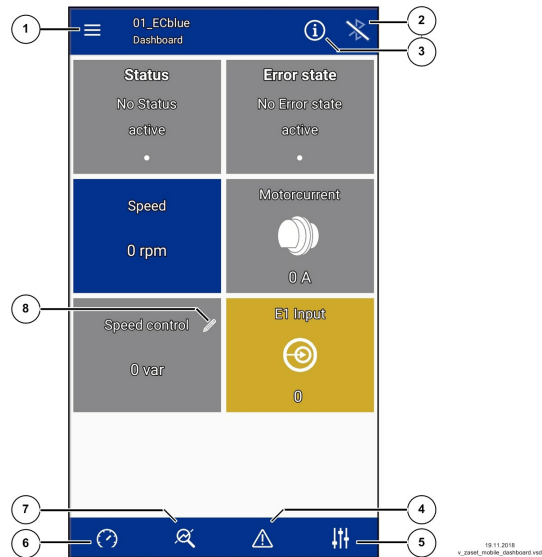
10. Press the button on the device to establish the connection (the colour of the Bluetooth symbol changes from red to green).



11. Actual values on Dashboard when connection is established successfully.



12. Buttons for subsequent operation can be found on the dashboard.



- 1 Menu: Start, List my devices, Settings
- 2 Disconnecting the Bluetooth connection
- 3 Info: BLE version, MODBUS address, identification etc.
- 4 Error history
- 5 Parameter
- 6 back to Dashboard
- 7 Analysis
- 8 Speed control by variable



Information

Please observe the additional information in the app documentation and the operating instructions (download) for the AM-STICK-WB.

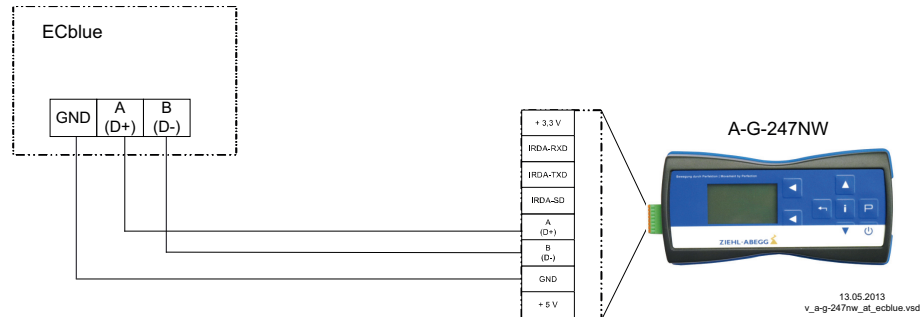
9 Hand held terminal A-G-247NW

In the ECblue BASIC-MODBUS version, a direct connection is possible, with ECblue BASIC it is via the AM-MODBUS auxiliary module.

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.

Connection terminal type A-G-247NW for service



Information

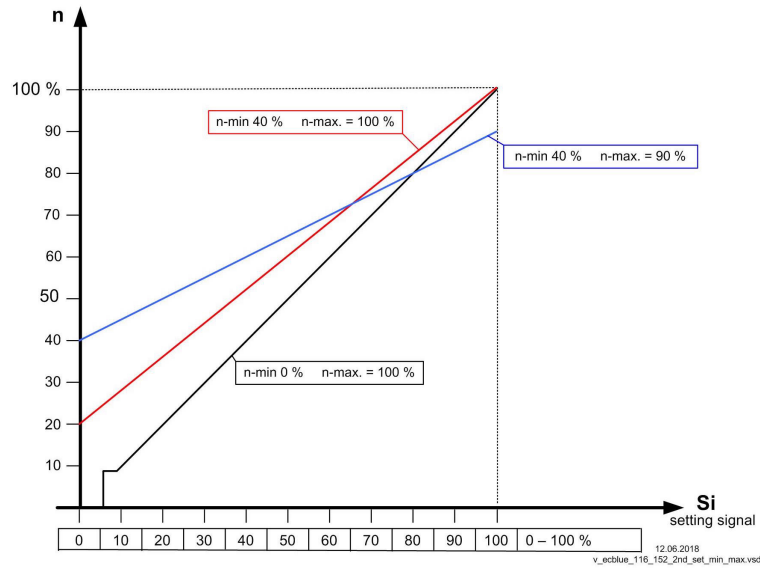
- Programming of the ECblue BASIC-MODBUS version using the A-G-247NW hand held terminal is described below. Programming of the ECblue BASIC version depends on the optional auxiliary modules. For further details, refer to the operating instructions for the module used.
- When programming using the "Zaset Mobile" app, the parameters are displayed in a different way.

9.1 Menu group Setting

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

Example: Specification signal and speed characteristic curve



n Motor speed

S_i Rotational speed specification signal (depending on connection version) 0...10 V, 4...20 mA, 0...100 % PWM, 0...100 MODBUS


$n\text{-min}$: Min. Speed

$n\text{-max}$: Max. Speed



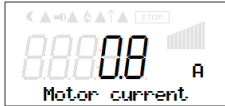

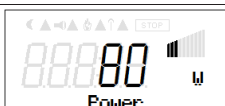
100 % Rated speed

9.2 Menu group Start

	<p>Start</p>
	<p>PIN input 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>PIN 0010 Release of the service settings with programmed PIN-Accesslevel <input type="text" value="0"/> (see "Controller Setup"). Menu groups Service: "Controller Setup", "IO Setup", "Motor Setup"</p> <p>PIN 1234 Freischalten Menu group "Setting". Release of the menu group for the user "setting" with programmed PIN-Accesslevel <input type="text" value="0"/> (see "Controller Setup").</p> <p>PIN 3698 Communications parameters take-over.</p> <p>PIN 9095 Loading the factory settings. Only the parameters which are released by the currently set PIN-Accesslevel are loaded.</p>
	<p>Reset Complete re-start of the device</p>
	<p>Software version</p>

	<p>Parameter sets can be saved by the module in the terminal type A-G-247NW and transferred to other devices (see Operating Instructions Terminal Type A-G-247NW). Name parameterset with the keys ▼, ▲ + P and load in the terminal with the P-key.</p>
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9.3 Menu group Info

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

9.4 Menu group Controller Setup


	<p>Controller Setup</p>
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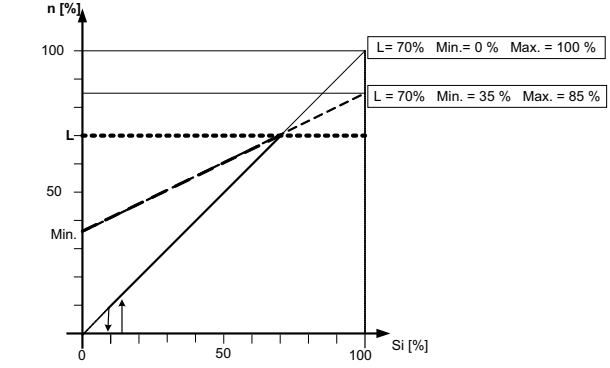
9.4.1 Controlmode

	<p>Type of device modulation.</p>
<p>0</p>	<p>Factory setting 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 (see IO Setup).</p>
<p>1</p>	<p>Speed control register h2 (absolute) Example: setting 500 $\hat{=}$ 500 rpm</p>
<p>2</p>	<p>Speed control register h2 (fractional 0 - 32767 = 0 - 100 %) * Example: setting 16383 $\hat{=}$ 50 % of rated speed Switching to fixed speed "Default Internal2" or "Default Internal3" via digital input possible (see IO Setup).</p>
<p>3</p>	<p>Speed control register h2 (fractional 0 - 100 = 0 - 100 %) * Example: setting 50 $\hat{=}$ 50 % of rated speed</p>
<p>4</p>	<p>constant speed "Set Internal1". Switching to fixed speed "Default Internal2" or "Default Internal3" via digital input possible (see IO Setup).</p>
<p>5</p>	<p>Fixed speed "Default Internal2" (without switching possibility to other default).</p>
<p>6</p>	<p>Fixed speed "Default Internal3" (without switching possibility to other default).</p>
<p>7</p>	<p>Control by E1 (quadratic characteristics)</p>
<p>8</p>	<p>Control by E1 (custom characteristics)</p>
<p>9</p>	<p>Control by E1 (air flow control)</p>
<p>10</p>	<p>Speed control register h2 (fractional; air flow control)</p>
<p>11</p>	<p>Speed control register h2 (quadratic characteristics)</p>
<p>12</p>	<p>Speed control register h2 (fractional; custom characteristics)</p>
<p>13</p>	<p>Control by external signal (4 - 20 mA) at the input "E1".</p>
<p>14</p>	<p>Control by E1 (constant moment)</p>
<p>15</p>	<p>Speed control register h2 (fractional; constant moment)</p>

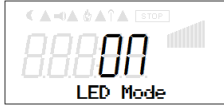
* These functions can only be read using the hand held terminal; programming is only possible using the ZAsset Mobile app or using the ZAsset software.

9.4.2 Limit

	<p>After allocation of a digital input (see IO Setup) an adjustable limitation of the modulation can be activated via a digital input.</p>
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<p>“Limit value” = max. possible modulation (e.g. speed reduction during night operation by time switch). Setting range: 0 - 100 % Factory setting: 75 % $\hat{=}$ max. modulation, i. e. no limit.</p>	<p>Limit (idealized principle diagram)</p>  <p><i>n [%] Motor speed</i> <i>L Limit</i> <i>Si Speed setting signal</i></p> <p><small>07.10.2010 v_limit_101_rpm.vsd</small></p>
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9.4.3 LED Mode

	<p>LED Mode Only for versions with integrated status LED!</p>
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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.

9.4.4 PIN-Accesslevel

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



Information

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

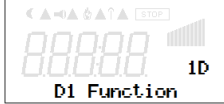
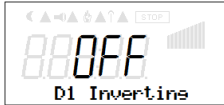
9.4.5 Message at speed deviation “Fan Bad”

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

9.5 Menu group IO Setup

	<p>IO Setup</p>
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9.5.1 Digital inputs “D1” (“E1” *)

	<p>D1 Function Different functions can be assigned to the digital inputs “D1” and “E1”*. Activation via floating contacts (a low voltage of approx. 10/24 V DC is connected). “D1” is programmed for the “Enable” function at the factory.</p>
	<p>D1 Inverting 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 (see E1 function).
The same functions can be assigned for “E1” as for “D1”.



Attention!
Never apply line voltage to the digital input!

Function	Designation
OFF	No function
1D	<p>Enable ON / OFF (factory setting) 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” = 2K) does not report the switch-off. Attention! No disconnection (no potential isolation in accordance with VBG4 §6) in remote control of the device!</p>
3D	<p>Limit ON / OFF see Controller Setup / Limit</p>
5D	<p>Set Internal2 Fixed speed “Default Internal2” active. Function with selected “control mode”: 0, 1, 2, 3 (see “Controller Setup”). With simultaneous activation of “Default Internal3” with function 6D, 5D has priority).</p>
6D	<p>Set Internal3 Constant speed “Set Internal3”, also with selected “control mode”: 0 (see “Controller Setup”).</p>

<p>13D</p>	<p>Switch over direction of rotation Switch over between direction of rotation "RIGHT" = CW and direction of rotation "LEFT" CCW. 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>
<p>15D</p>	<p>Bypass temperature management (operation at max. speed) To make the ECblue as durable as possible, the devices have active temperature management. The modulation is reduced when internal temperature limits are exceeded. In ventilation systems in which the fan has to continue operating at maximum speed despite overtemperature, temperature management can be deactivated using a digital input. At the same time, the fan is operated at maximum speed regardless of the specified speed for regular operation. The function is active at the digital input when the contact is open (in factory setting D1/E1 Inverting = OFF), so that the maximum fan speed is still possible even when the line to the digital input is interrupted.</p> <p>Attention!</p> <ul style="list-style-type: none"> • This function is implemented by switching to "Set Intern3". A setting of 100 % (= rated speed) of "Set Intern3" is a prerequisite for operation at maximum speed. • 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>19D</p>	<p>Bypass temperature management (operation with variable speed) This function differs from 15D due to operation at variable speed. When temperature management is switched off by a digital input, speed setting by an external signal is still possible. The speed set in "Set Intern3" is the maximum speed at 100 % setting signal (limitation).</p>


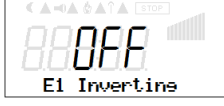


9.5.2 Relay outputs “K1”

	<p>Function K1 Various functions can be allocated to the relay outputs “K1”. This is preset at the factory for fault indication.</p>
	<p>K1 Inverting 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	Designation
OFF	No function Relays remain always de-energized .
1K	Operating indication Operation without fault, reports enable “OFF”.
2K	Fault indication (factory setting) Pulled up in operation without fault, with release “OFF” not dropped out. Drops out at: line fault, motor fault, etc. see Events / Fault indications
4K	Limit Alarm when the speed exceeds the value set under “Set Internal3” (see menu group “Setting”) (output power > 0 %). The function is active in every control mode (see menu group: “Controller Setup”).
17K	Bus control The relay output can be controlled by bus if networked.
20K	Fault indication or message for active temperature management 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).



Function	State 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

9.5.3 Input “E1”

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



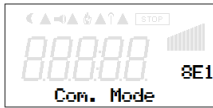
9.5.4 MODBUS communication watchdog

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



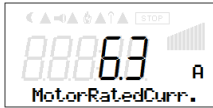
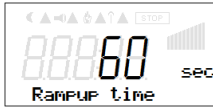






	<p>Watchdog Time If the device receives no message in the time window, a definable function is executed.</p>
<p>Watchdog time in seconds. Setting range: 0 - 255 sec. Factory setting: 0 sec. = off</p>	
	<p>Watchdog Mode Watchdog Mode: 0: No function (default) = OFF from FW 13 1: Fault (K1 function, h15) 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>	



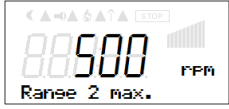



9.5.5 Networking via MODBUS

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>Bus Address The device address is factory set to the highest available MODBUS address: 247. Setting range MODBUS Address: 1 - 247.</p>
	<p>UART Baudrate Setting transfer rate Valid values: 4800, 9600, 19200, 38400, 115200 Factory setting: 19200</p>
	<p>UART Mode Setting transfer format Valid values: 8N1, 8O1, 8E1, 8N2 Factory setting: 8E1</p>

9.6 Menu group “Motor Setup”

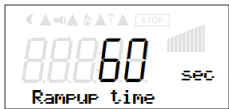
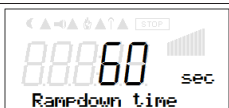
	<p>Motor Setup</p>	
	<p>Rated speed</p>	
	<p>MotorRatedCurr.</p>	<p>* The following controller presettings are dependent on the respective motor design and are only shown for information.</p> <ul style="list-style-type: none"> • Rated speed • MotorRatedCurr. • Rotat. Direction • Value motorheating
	<p>Rampup time</p>	
	<p>Rampdown time</p>	
	<p>Rotat. Direction</p>	
	<p>Value motorheating</p>	
	<p>Suppression1</p>	
	<p>Range1 min.</p>	
	<p>Range1 max.</p>	

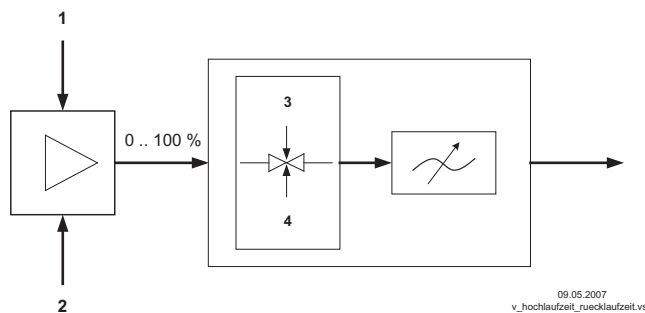
	Suppression2	
	Range2 min.	
	Range2 max.	
	Suppression3	
	Range3 min.	
	Range3 max.	

9.6.1 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.

	Rampup time Time setting in which the automatic controller output from 0 % to 100 % rises. Setting range: 0...255 sec. Factory setting depending on motor
	Rampdown time Time setting in which the automatic controller output from 100 % to 0 % reduces. Setting range: 0...255 sec. Factory setting depending on motor



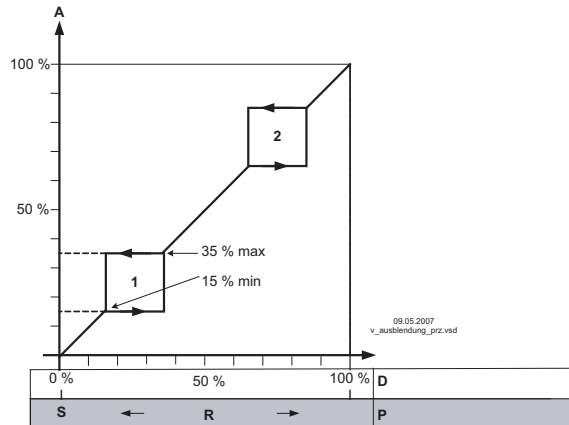
- 1 external Signal
- 2 Setting
- 3 Rampup time
- 4 Rampdown time

9.6.2 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

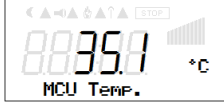
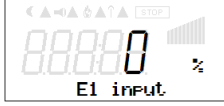
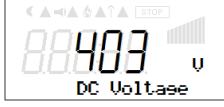

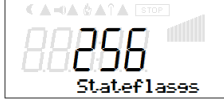
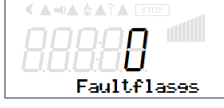

- A Brake control
- S Setpoint
- R Pband
- D Speed controller: setting signal
- P P-controller: control deviation

	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




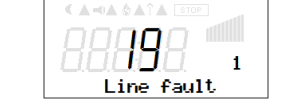
9.7 Diagnostics menu

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

	Diagnostic
	IGBT temp. Display of the internal temperature of the power semiconductor.
	Inside Temp. Display of electronics internal temperature.

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

9.8 Display and query of events and malfunctions

	<p>Events</p>
	<p>The event memory is read out after pressing the P 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 ▼+ ▲ keys. 19 = number of all previous faults</p>

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

10 Diagnostics / Faults

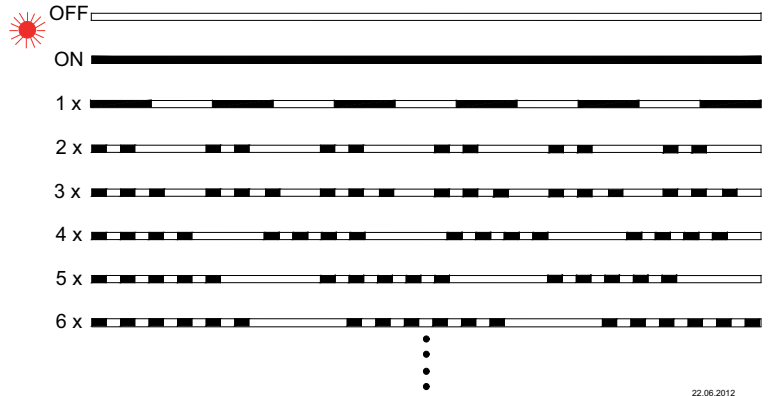
10.1 Trouble shooting

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) and 072 (O) 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

10.2 Status output with flashing code



Vision panel for status LED in the case of plastic cover design



22.06.2012
v_flash_exp_red_1_x_VSD

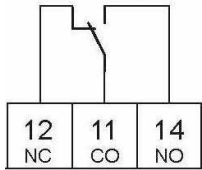
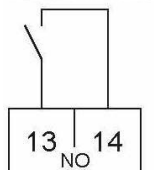
LED Code	Relays K1*	Cause Explanation	Reaction of Controller
			Adjustment
OFF	0	No voltage supply.	Unit switch off and automatically on when the voltage has been restored. Check voltage supply.
ON	1	Normal operation without fault.	
1 x —	1	No enable = OFF Terminals “D1” - “24 V” (Digital In 1) not bridged.	Switch OFF by external contact (see digital input).
2 x -	1	Temperature management active The device has integrated active temperature management to protect the device from damage caused by excessively high interior temperatures.	In case of a temperature increase above the pre-determined limits the modulation is linearly reduced. With a drop in temperature the modulation rises again linear. Check installation of the device and cooling of the motor.
3 x -	0	Error rotor position Determination of the rotor position has failed.	After 8 starting tests, an error message is displayed. Check whether the motor can rotate freely (without line voltage).
4 x -	0	Line failure (only for 3 ~ types) The device is provided with a built-in phase-monitoring function for the mains supply. In the event of a mains interruption (failure of a fuse or mains phase) the unit switches off after a delay (approx. 200 ms). Only functioning with an adequate load for the controller.	Following a shutoff, a startup attempt is made after approximately 15 seconds, if the voltage supply is high enough. This keeps occurring until all 3 supply phases are available again. Check power supply.
5 x -	0	Motor blocked If after 8 seconds of commutation no speed is measured > 0, the fault “Motor blocked” is released.	Device 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.
6 x -	0	Failure power module Short circuit to earth or short circuit of the motor winding.	EC-Controller switches off, renewed attempt to start after about 70 sec. see code 9. Final shutoff, if - following a second starting test - a second fault detection is detected within a period of 75 seconds. It is then necessary to have a reset by disconnecting the line voltage.
7 x -	0	Intermediate undervoltage 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 –	0	Intermediate circuit overvoltage 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 –	1	Cooling down period power module Cooling down period power module for approx. 70 sec. Final shutoff after 2 cooling-off intervals see code 6.	Power module cooling down period for approx. 70 sec. Final shutoff after 2 cooling-off intervals see code 6.
10 x –	0	Communication fault If the communication watchdog is active, it signals that MODBUS communication is interrupted.	Response dependent on set watchdog mode (see MODBUS communication description). Check MODBUS communication.
11 x –	0	Error motor start 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 whether the motor can rotate freely (without line voltage). Check if the fan is driven in reverse direction by an air stream (see behaviour in rotation by air current in reverse direction).
12 x –	0	Line voltage too low 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 –	0	Line voltage too high 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 –	0	Error peak current 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 –	0	Temperature alarm Excess of the max. permissible inside temperature.	Controller switches off motor. Automatic restarting after cooling down. Check installation of the device and cooling of the controller.
18 x –	0	System error Device has detected a system error. Only limited operation, or no operation at all, is possible.	The error is displayed immediately. The motor is switched off depending on the system error. Reset by disconnecting the voltage supply. If the error message persists, repair by the manufacturer is necessary.
20 x –	0	a) Vibration values If the vibration velocity rises above the specified limits, an error message is issued.	The error is displayed after the set time. The device continues to operate unchanged. Check the impeller for damage, contamination or ice formation.
		b) Lifetime If the remaining service determined life falls below the defined limit, an error message is issued.	The error is displayed immediately. The device continues to operate unchanged. After consultation with the manufacturer, perform maintenance.

LED Code	Relays K1*	Cause Explanation	Reaction of Controller
			Adjustment
∞ x –	0	Internal communication error Internal communication failure	Fault indication If error message persists, repair by the manufacturer is necessary.
1 x — 2 x –	1	MODBUS Recovery function A failure in the MODBUS communication has been detected, e.g. incorrect communication parameters (baud rate, parity), wiring error.	The motor can be accessed in recovery mode using the following parameters: Address 254, 19200Baud / 8E1 Check the bus wiring and communication parameters.

- * Relays K1 programmed function at factory (Fault indication not inverted)
- 0 Relays de-energized
- 1 Relays pulled up

Display for relay K1 de-energised = “0”

Changeover contact for ECblue BASIC-MODBUS	NO contact in ECblue BASIC
 <p>K1</p>	 <p>K1</p>

10.3 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 min^{-1} (without control). At speeds above 100 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.

11 Service work

11.1 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 clothing / shoes and cut-resistant safety gloves when 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 impellers and/or wings may only be replaced by authorised ZIEHL-ABEGG SE staff. The manufacturer shall not be liable for damage caused through improper repair work.
- Please consult our service department with regard to changing the bearing as for all other damage (e.g. to the coil).
- Regular inspection and possibly cleaning is necessary to prevent imbalance and blockage of the drain holes 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.

11.2 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 drain holes (if available) corresponding to the installation position must be checked for free passage.
- In case of improper cleaning work, no warranty is assumed regarding corrosion formation / paint adhesion for unpainted / painted fans.
- To avoid accumulation of moisture in the motor, the fan must be operated for at least 1 hour at 80% to 100 % of the maximum speed before the cleaning process!
- After the cleaning process, the fan must be operated for at least 2 hours at 80 to 100 % of the maximum speed for drying purposes!


12 Enclosure


12.1 Technical data

Line voltage* (see rating plate)	1 ~ 200...277 V, 50/60 Hz 3 ~ 200...240 V, 50/60 Hz 3 ~ 380...480 V, 50/60 Hz 3 ~ 200...480 V, 50/60 Hz (Versions for DC power supply on request)
Maximal line fuse**	16 A for all types 1 ~ and 3~
Max. load limit integral of cut-in current approx.	1,22 A ² s
Switching Freq.	16 kHz
Input resistance for signal set for the rotational speed	@ 0...10 V: R _i = 300 kΩ @ 4...20 mA: R _i = 350 Ω @ PWM: R _i = 3 kΩ
Specification speed setting signal PWM	Switching frequency: 1...10 kHz On-off ratio: 0...100 % U _{in} high level: 15...28 V U _{in} low level: 0...10 V
Voltage supply for external devices	+10 V, I _{max} 10 mA (short-circuit-proof)
	+24 V ±20 %, I _{max} 70 mA (short-circuit-proof)
Digital input "D1"	Input resistance: R _i approx. 4 kΩ @ 24 V U _{in} high level: 7...30 V U _{in} low level: 0...2 V
Duty type of motor/fan	Continuous operation with occasional starts (S1) according to DIN EN 60034-1:2011-02. Occasional starting between -35 °C and -25 °C is permissible. Continuous operation below -25 °C only with special bearings for refrigeration applications on request.
Permissible minimal and maximal ambient temperature for operation	Please refer to the technical documentation of the product for the minimum and maximum ambient temperature valid for the respective fan. Operation below -25 °C as well as partial load operation for refrigeration applications is only possible with special bearings for refrigeration applications on request. If special bearings for refrigeration applications are installed in the fan, please observe the permissible maximum temperatures in the technical documentation of the product. 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.
Permissible temperature range for storage and transport	-40...+80 °C
Permissible installation height	In "Constant speed mode" 0...4000 m amsl ≤ 1000 m: no limitation > 1000 m: max. permissible input current = current indication rating plate minus 5 % / 1000 m > 2000 m: max. permissible line voltage = max. voltage indication name plate minus 1.29 % / 100 m
	In "Constant torque mode" 0...4000 m amsl Max. permitted specification signal = 10 V (100 % PWM, 20 mA, MODBUS) minus 2.3 % / 1000 m > 2000 m: max. permissible line voltage = max. voltage indication name plate minus 1.29 % / 100 m
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.

Ball-bearings service life	The according to standard calculation methods determined bearing service life expectation of the motor-integrated ball bearings is mainly determined by the grease service life F10h and amounts for standard application to approx. 30.000 - 40.000 operating hours. The fan or motor is maintenance-free due to the use of ball bearings with "lifetime lubrication". Once the grease operating life F10h has been reached, it may be necessary to replace the bearing. The bearing service life expectation may change compared to the specified value, if operating conditions such as increased vibrations or shocks, increased or too low temperatures, humidity, dirt in the ball bearing or unfavourable control modes are present. A service life calculation for special applications can be provided on request.
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	For 1 ~ types Active power factor adjustment for sinusoidal input current (PFC = Power - Factor - controller), harmonic current in accordance with EN 61000-3-2 are guaranteed.
	For 3 ~ types According to EN 61000-3-2 (see Assembly instructions / Electrical installation / EMC-compatible installation / Harmonics current for 3 ~ types).
Contact rating of the internal relay	AC 250 V 2 A
Max. leakage current according to the defined networks of EN 60990	< 3.5 mA
dB(A) values	see product catalog
Protection class of motor according to EN 60529	IP55
Weight	see rating plate

* In terms of the mains connection, according to the applicable standard EN 61800-3 these devices are classed as category "C2" equipment. The increased requirements for interference emissions > 2 kHz for category "C1" devices are also met.
 ** Max. line fuse on site (line protection fuse) according to EN 60204-1 Classification VDE0113 Part 1 (see also Assembly instructions / Electrical installation / Voltage supply / Line protection fuse).

For motors/fans with the corresponding quality mark (see rating plate)		
Authorization:	FILE No. E213826	UL 61800-5-1 CAN/CSA C22.2 No. 274
		Power Conversion Equipment 62BN
Environment type rating: 3		

For motors/fans with the corresponding quality mark (see rating plate)		
Authorization:	FILE No. E213826	UL 61800-5-1 CAN/CSA C22.2 No. 274
		Power Conversion Equipment 62BN
Environment type rating: 3		

12.2 UL specifications

12.2.1 UL: Ratings

RATINGS:

Model	Input at 50 / 60 Hz	Output	Ambient Temperature [C°]
MK116			
MK 116-##.07.#A MK 116-##.11.#A	3x 380–480 Vac, 2500W, 4.0-3.2A	2400 W / 16kHz 4.7 A, 460Vac (rms)	40
MK 116-##.##.#A-A16 MK116-0009, MK116-0017	3x 380–480 Vac, 2500W, 3.2-3.6A	2350 W / 16kHz 4.4 A, 460Vac (rms)	60
MK 116-##.07.#B MK 116-##.11.#B	3x 380–480 Vac, 1560-1880W, 2.4A	1480-1780 W / 16kHz 2.3 A 460Vac (rms)	70
MK 116-##.##.#B-A16 MK116-0010, MK116-0018	3x 200–240 Vac, 1900-2300W, 6.1A	1800-2175 W / 16kHz / 6.6 A 215Vac (rms)	40
	3x 200–240 Vac, 1650-2000W, 5.4A	1550-1900 W / 16kHz / 5.7 A 215Vac (rms)	60
	3x 200–240 Vac, 1050-1300W, 3.9A	1000-1200 W / 16kHz / 3.7 A 215Vac (rms)	70
MK 116-##.07.#C MK 116-##.11.#C	1x 200–277 Vac, 1440W, 5.2A	1320 W / 16kHz 3.3 A 340Vac (rms)	40
MK 116-##.##.#C-A19 MK116-0008, MK116-0023	1x 200–277 Vac, 900W, 3.3A	830 W / 16kHz 2.3 A 340Vac (rms)	60
	1x 200–277 Vac, 750W, 2.7A	690 W / 16kHz 1.2 A, 340Vac (rms)	70
MK 116-##.07.#F MK 116-##.11.#F	3x 380-480 Vac at 4000W, 6.15-5.0A	3880W/16kHz, 436Vac (rms), 5.8A	60
MK 116-##.##.#F-A17 MK116-0013, MK116-0020	3x 380–480 Vac 3050W 4.1A	2960 W / 16 kHz 4.0 A, 422 Vac (rms)	70
MK 116-##.07.#G MK 116-##.11.#G	3x 200–240 Vac 3090W, 8.1 A	3000 W / 16 kHz 9.2 A, 218 Vac (rms)	40
MK 116-##.##.#G-A18 MK116-0015, MK116-0022	3x 200–240 Vac 2850W, 7.6 A	2770 W / 16 kHz 8,6 A, 218 Vac (rms)	50
	3x 200–240 Vac 2670W, 7 A	2590 W / 16 kHz 8.1 A, 218 Vac (rms)	60
	3x 200–240 Vac 2400W, 6.4 A	2330 W / 16 kHz 7.4 A, 218 Vac (rms)	70
MK 116-##.07.#H MK 116-##.11.#H	3x 200–480 Vac 1300-2500W, 4.0-3.2A	2400 W / 16kHz 4.7 A, 460Vac (rms)	40
MK 116-##.##.#H-A16 MK116-0011, MK116-0019	3x 200–480 Vac 1180-2500W, 3.2-3.6A	2350 W / 16kHz 4.4 A, 460Vac (rms)	60
	3x 200–480 Vac 820-1880W, 2.4A	1780 W / 16kHz 2.3 A, 460Vac (rms)	70
MK 116-##.07.#I MK 116-##.11.#I	1x 100–130 Vac, 630 W, 4.9A	580 W / 16kHz 1.45 A 240Vac (rms)	40
MK 116-##.##.#H-A19 MK116-0012, MK116-0021	1x 100–130 Vac, 615 W, 4.7A	565 W / 16kHz 1.40 A 240Vac (rms)	50
	1x 100–130 Vac, 620W, 4.8A	570 W / 16kHz 1.40 A, 240Vac (rms)	60
	1x 100–130 Vac, 520 W, 4.0 A	470 W / 16kHz 1.20 A, 240Vac (rms)	70
MK152			
MK 152-##.11.#A MK 152-##.17.#A	3x 380–480 Vac 4100W, 6.6-5.2A	3950 W / 16kHz 7.2 A, 460Vac (rms)	50
MK 152-##.24.#A MK152-##.##.#A-A17 MK152-0008, MK152-0015	3x 380–480 Vac 4100W, 6.6-5.2A	3950 W / 16kHz 7.2 A, 460Vac (rms)	60
	3x 380–480 Vac 3180-4020 W, 5.1 A	3020-3820 W / 16kHz 5.0 A 460Vac (rms)	70
MK 152-##.11.#B MK 152-##.17.#B	3x 200–240 Vac 3050-3650W, 9.7A	2900-3450 W / 16 kHz 10.5 A, 215Vac (rms)	50
MK 152-##.24.#B MK152-##.##.#B-A18 MK152-0012, MK152-0019	3x 200–240 Vac 2650-3150W, 8.6A	2500-3000 W / 16 kHz 9.1 A, 215Vac (rms)	60
	3x 200–240 Vac 1650-1950W, 6A	1550-1850 W / 16 kHz 5.7 A, 215Vac (rms)	70
MK 152-##.11.#D MK 152-##.17.#D	3x 380–480 Vac, 2500W, 4.0-3.2A	2400 W / 16kHz 4.7 A, 460Vac (rms)	50
MK 152-##.24.#D MK152-##.##.#D-A18 MK152-0012, MK152-0019	3x 380–480 Vac, 2500W, 3.2-3.6A	2350 W / 16kHz 4.4 A 460Vac (rms)	60
	3x 380–480 Vac, 1560-1880W, 2.4A	1480-1780 W / 16kHz 2.3 A 460Vac (rms)	70

Model	Input at 50 / 60 Hz	Output	Ambient Temperature [C°]
MK 152-#I#.11.#E MK 152-#I#.17.#E MK 152-#I#.24.#E MK152-#I#.##.#E-A17 MK152-0011, MK152-0018	3x 200–240 Vac, 1900-2300W, 6.1A	1800-2175 W / 16kHz / 6.6 A 215Vac (rms)	50
	3x 200–240 Vac, 1650-2000W, 5.4A	1550-1900 W / 16kHz / 5.7 A 215Vac (rms)	60
	3x 200–240 Vac, 1050-1300W, 3.9A	1000-1200 W / 16kHz / 3.7 A 215Vac (rms)	70
MK 152-#I#.11.#F MK 152-#I#.17.#F MK 152-#I#.24.#F MK152-#I#.##.#F-A18 MK152-0013, MK152-0020	3x 380–480 Vac 6000W, 7.6A	5850 W / 16kHz, 11.9-9.3 A, 360-460Vac (rms)	40
	3x 380–480 Vac 5600W, 7.1 A	4790 W / 16kHz 9.7-7.6 A, 360-460Vac (rms)	50
	3x 380–480 Vac 4600W, 6.0 A	3720 W / 16kHz 7.2-5.9 A, 360-460Vac (rms)	60
	3x 380–480 Vac 3200W, 4.2 A	2660 W / 16kHz 5.4-4.2 A, 360-460Vac (rms)	70
MK 152-#I#.11.#G MK 152-#I#.17.#G MK 152-#I#.24.#G MK152-#I#.##.#G-A18 MK152-0014, MK152-0021	3x 200–480 Vac 2500-6000W, 7.6A	4500-5700 W / 16kHz, 8.7 A, 180-440Vac (rms)	40
	3x 200–480 Vac 2300-5600W, 7.1A	4200-5300 W / 16kHz 8 A, 180-440Vac (rms)	50
	3x 200–480 Vac 1900-4600W, 6.0A	3450-4370 W / 16kHz 6.6 A, 180-440Vac (rms)	60
	3x 200–480 Vac 1300-3200W, 4.2A	2400-3040 W / 16kHz 4.6 A, 180-440Vac (rms)	70
MK 152-#I#.11.#H MK 152-#I#.17.#H MK 152-#I#.24.#H MK152-#I#.##.#H-A17 MK152-0009, MK152-0016	3x 200–480 Vac 3000-4100W, 9.7-5.5A	2850-3900 W / 16kHz 10.3-5.8 A, 180-440Vac (rms)	50
	3x 200–480 Vac 2600-4100W, 8.6-5.6A	2470-3900 W / 16kHz 9-5.8 A, 180-440Vac (rms)	60
	3x 200–480 Vac 1600-3000 W, 6.0-4.7A	1500-2850 W / 16kHz 5.5-4.3 A 180-440Vac (rms)	70

#: Placeholder see ZIEHL-ABEGG Nomenclature

Power data of the motor in the fan standing nearby the above data on the rating-plate.

12.2.2 UL: Overload protection

The integrated variable speed drives are equipped with a solid state motor overload protection and a solid state short circuit protection.

The solid state motor overload protection protects the motor under overload conditions by reducing current flow to the internal motor output terminals. This protection is achieved through algorithms based on I^2t of the current of the motor.

The overload protection circuitry is optimally configured to the specific motor and the specific final application of the integrated variable speed drive. This is typically 100 % of the full-load current of the motor.

The solid state short circuit protection acts to suspend current flow to the internal motor output terminals upon sensing output current to the motor and bus voltage. The protection of the motor is comprised of hardware and firmware.

12.2.3 UL: Short Circuit Current Rating

The integrated variable speed drives are suitable to be used on a circuit capable of delivering no more than 100 kA RMS symmetrical. Details can be found in the following table.

The fusing for the short-circuit protection must comply with the requirements in UL248.			
Tests were made with RK fuses without semiconductor protection:			
Protection rating	Maximum AC Voltage	Rating of Fuse	used motor type
RK1	277 V	20 A / 600 V (e.g Ferraz Shawmut / TRS20R)	MK116- #l#.##.#C
RK1	130 V	10 A / 250 V (e.g Ferraz Shawmut / TRS10R)	MK116- #l#.##.#I
RK5	240 V	25 A / 250 V (e.g. Ferraz Shawmut / TR25R)	MK116- #l#.##.#B MK116- #l#.##.#G MK152- #l#.##.#E
RK5	240 V	50 A / 250 V (e.g. Ferraz Shawmut / TR50R)	MK152- #l#.##.#B
RK5	480 V	15 A / 600 V (e.g. Ferraz Shawmut / TR15R)	MK116- #l#.##.#A MK116- #l#.##.#F MK116- #l#.##.#H MK152- #l#.##.#D
RK5	480 V	30 A / 600 V (e.g. Ferraz Shawmut / TR30R)	MK152- #l#.##.#A MK152- #l#.##.#H
RK5	480 V	25 A / 600 V (e.g. Ferraz Shawmut / TR30R)	MK152- #l#.##.#F MK152- #l#.##.#G
Integrated solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes, or the equivalent.			

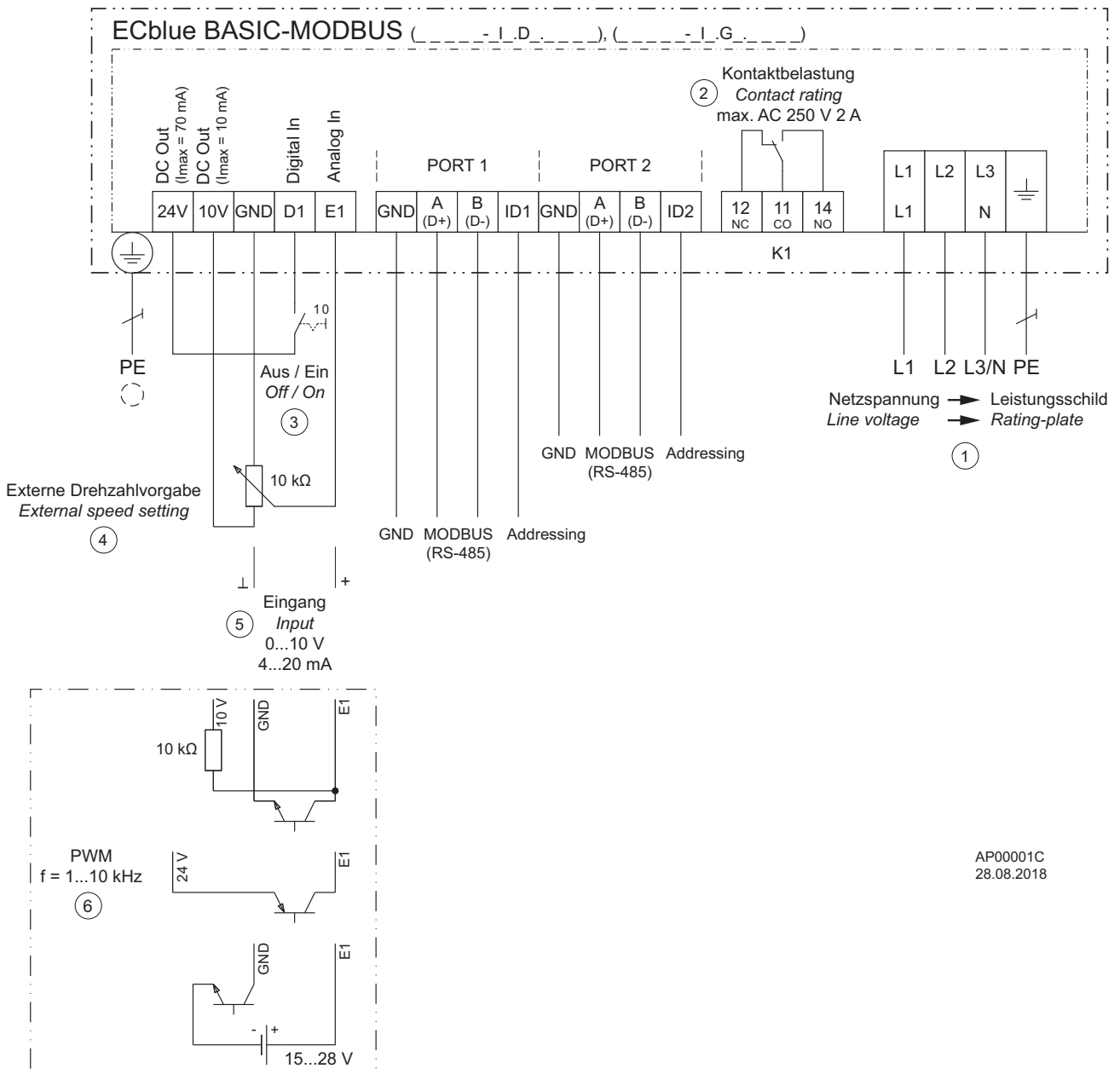
12.3 Connection diagrams

Adhere to the further information under Mains connection.



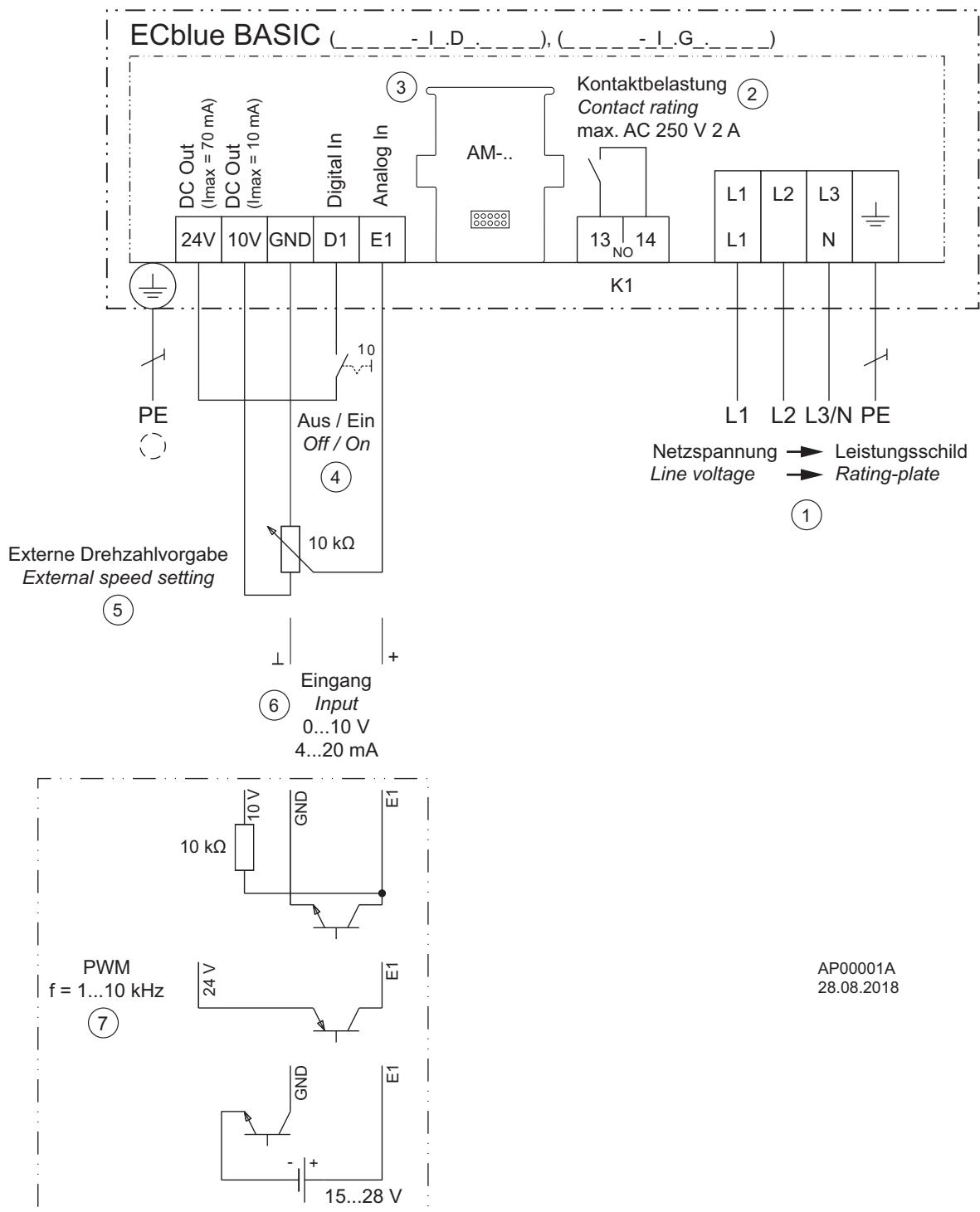
UL: Input (Line)

Copper connecting leads with an insulation temperature of at least 80 °C must be used!



AP00001C
28.08.2018

- 1 Line voltage see rating plate
- 2 Relay output "K1" for fault reporting (factory function), max. contact load AC 250 V 2 A
 - During operation the relay is energised, i.e. the connections "11" and "14" are bridged
 - In case of a fault, the relay is de-energised, i.e. the connections "11" and "12" are bridged
 - In case of a shutdown using the enable (D1 = Digital In 1) the relay remains energised
- 3 Digital enable input (factory function)
 - Device "ON" when contact closed
 - Device "Off" when contact open
- 4 External speed setting
- 5 Input 0...10 V, 4...20 mA
- 6 PWM input, f = 1...10 kHz



AP00001A
28.08.2018

- 1 Line voltage see rating plate
- 2 Relay output "K1" for fault reporting (factory function), max. contact load AC 250 V 2 A
 - During operation the relay is energised, i.e. the connections "13" and "14" are bridged
 - In case of a fault, the relay is de-energised
 - In case of a shutdown using the enable (D1 = Digital In 1) the relay remains energised
- 3 Slot for AM-add-on module
- 4 Digital enable input (factory function)
 - Device "ON" when contact closed
 - Device "Off" when contact open
- 5 External speed setting
- 6 Input 0...10 V, 4...20 mA
- 7 PWM input, $f = 1...10$ kHz

12.4 **EC Declaration of Incorporation**

- Translation -
(english)
ZA87-GB 2044 Index 009

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

The design of the incomplete machine:

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

Motor type:

Asynchronous 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

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

The following harmonised standards have been used:

- EN 60204-1:2006 + A1:2009 + AC:2010 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, 28.10.2020
(location, date of issue)

ZIEHL-ABEGG SE
Dr. W. Angelis
Head of Technics Ventilation Technology
(name, function)



(signature)

ZIEHL-ABEGG SE
Dr. D. Kappel
Head of Electrical Systems
(name, function)



(signature)

12.5 Index

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12.6 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
phone: +49 (0) 7940 16-0
info@ziehl-abegg.de
http://www.ziehl-abegg.com

12.7 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.