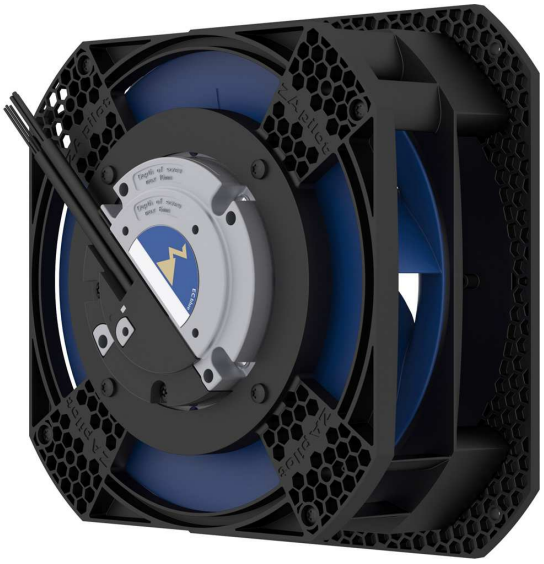
ECblue

Motor sizes Z and O

EC-centrifugal fans with top efficiency

Assembly instructions



Keep for reference!

L-BAL-F066-GB 2024/04 Index 012 Part.-No. 00702826-GB

ZIEHL-ABEGG

Content

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 ECblue-centrifugal fans of motor size Z (055) and O (072) .
The used motor size is recognisable from the type designation (see rating plate).

Examples for type designations with motor size Z = 55

- Type: RH _ _ _-_ I _. **Z** _._ _
- Type: GR_ _ _-_ I_. **Z**_._ _

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.

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 diffusor attachment (retrofit kit)! Do not climb onto fans without suitable aids.
- Unauthorised constructional modifications to the fan.
- Operation of the fan as a safety component or for the performance of safety-relevant functions in the sense of EN ISO 13849-1.
- Blocking or braking of the fan by inserting objects.
- 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).
- Use with vibration loading by customer device. Resonant operation and operation with severe vibrations or oscillation.
- Loosening of fan blade, impeller, motor suspension 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.

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

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

2.6 Work on the device

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

Danger due to electric current

- It is generally forbidden to carry out work on electrical live parts!
- The 5 electrical safety rules must be observed!
- Opening of motor is prohibited. Loosening the screws will void the warranty!
  - Protection class of the device when complete open is IP00! It is possible to touch hazardous voltages directly.
  - Through use of capacitors, danger of death exists even after switching off the device!
  - 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 motor is a built-in device and therefore only protected by basic insulation.
- 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.

Attention, automatic restart!

- The motor may switch on and off automatically for functional reasons.
- Automatically restart after a power failure or mains disconnection!
- Wait until the motor has stopped before approaching.
- 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 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.

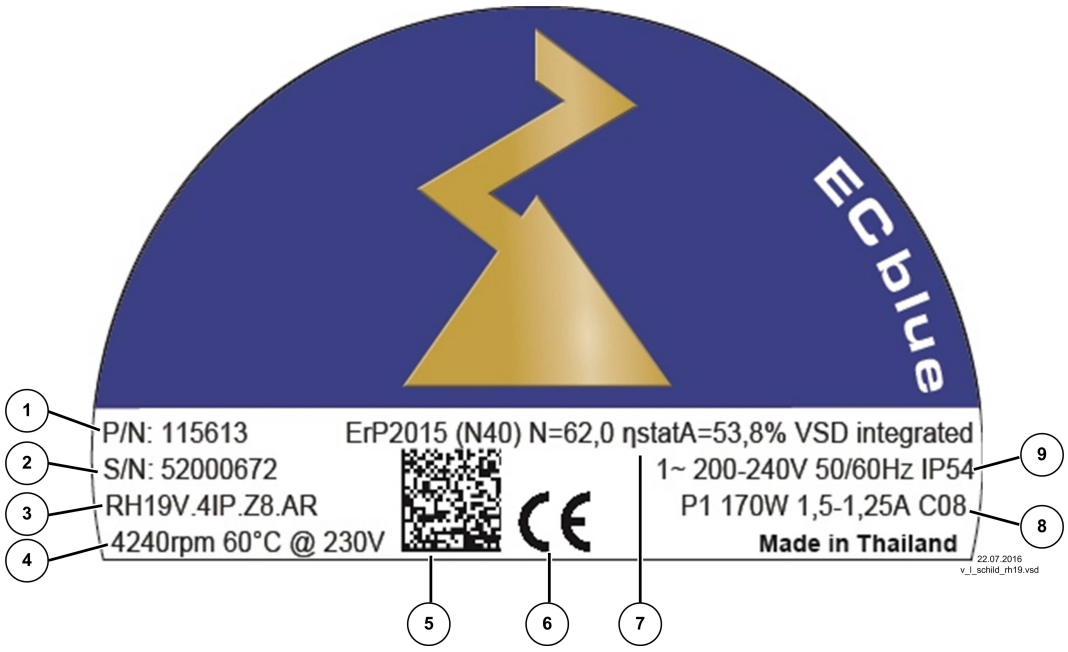
3.3 Rating plate

There are two rating plates on the product:

1. The rating plate on the front of the stator relates to the fan end product; the data on this plate must be taken for installation and operation.
2. The side rating plate on the outside of the stator relates to the motor component; the data and symbols on this plate are relevant for any authorisations.

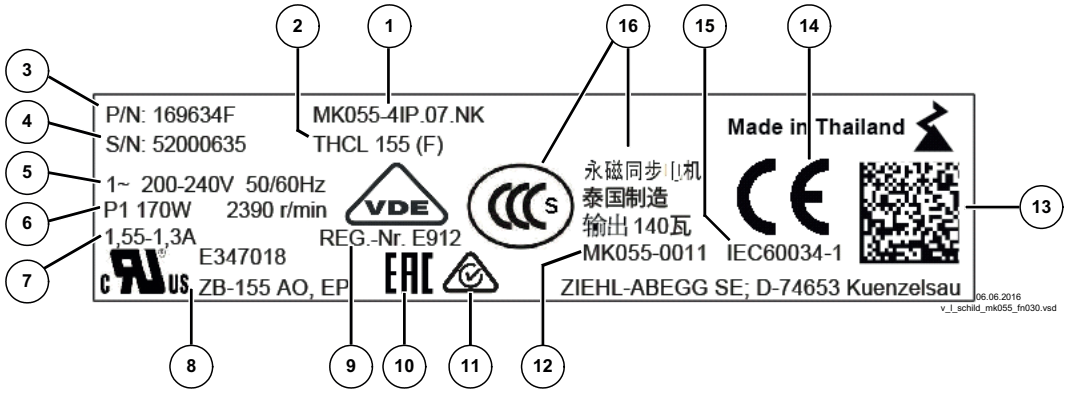
Information
The technical data on the fan rating plate may differ from the technical data on the motor rating plate.

Example of fan rating plate



no.	Designation	no.	Designation
1	Partnumber ZIEHL-ABEGG SE	6	European mark of conformity
2	Confirmation number	7	Efficiency data in accordance with the ErP directive (also see the chapter 'Note on the ErP directive')
3	Series	8	Power Rated current Electronics hardware index
4	Rated speed at rated voltage and rated temperature	9	Symbols current type and rated voltage range Rated frequency Protection rating
5	DATA MATRIX Code confirmation number		

Example of motor rating plate



no.	Designation	no.	Designation
1	Series	9	Mark for VDE approval and registration number (optional)
2	Thermal class F	10	Eurasian mark of conformity
3	Partnumber ZIEHL-ABEGG SE	11	Australian acma mark of conformity (optional)
4	Confirmation number	12	Approval-relevant motor identification
5	Symbols current type and rated voltage range Rated frequency	13	DATA MATRIX Code confirmation number
6	Power Rated speed	14	European mark of conformity
7	Rated current	15	Product standard
8	Relevant information for UL approval (optional)	16	Relevant information for CCC approval (optional)

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!

- Always observe the weight specifications and the permissible carrying loads of the means of transport.
- Use the original packaging materials when transporting the device.
- Wear safety clothing / shoes and cut-resistant safety gloves when handling!
- Do not transport on the connecting cable!
- Avoid shocks and impacts to the device during the transport.
- Avoid extreme heat or cold (for the temperature range for storage and transport please see the technical data).
- Watch out for possible damage to the packaging or fan.
- Secure pallets during transport.
- Do not stack pallets.
- Only handle with suitable hoisting gear.
- Never stand underneath the suspended fan because defective transport equipment could cause death.
- Store the fan / motor in the original packaging in a dry area protected from the weather and protect it from dirt and weather until final installation.
- Avoid prolonged storage; we recommend a maximum of one year (consult the manufacturer before starting if stored for longer).
- Inspect the bearing for proper operation prior to installation.
  – Recommendation: Turn the impeller evenly by hand to avoid jamming and damaging the bearing.

3.7 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.
- If necessary, lift the fan out of the packing with a hoisting unit.
- The fan is to be used exclusively as a built-in component.
- 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 appropriare protective constuctions which meet the requirements to EN ISO 13857.
- 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!

⚠ WARNING

Parts of the rotor or the entire rotor coming loose in case of a fault (e.g. excessive vibrations) can result in personal injury and material damage.

▷ Use guard grilles or suitable design measures for critical applications (e.g. refrigerating systems with refrigerant subject to the ordinance on hazardous substances).

4.2 Mounting of centrifugal fans, RH design

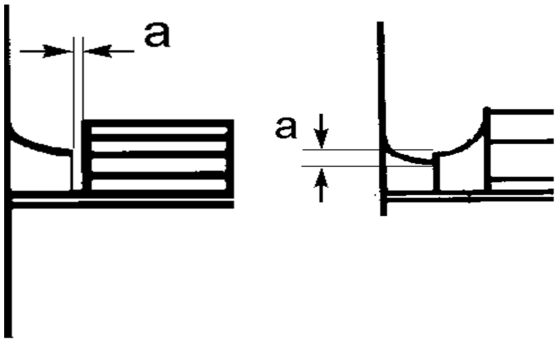
For attachment to fixed motor flange use screws with property class 8.8 to EN ISO 4014 and provide with suitable screw locking.

Permissible tightening torques M_A		
Thread size	M6	M4
Property class 8.8, friction coefcient µges = 0.12	7 Nm	2.5 Nm
Screw penetration	≥ 1.25 x d	≥ 1.0 x d

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

Information

- Pay attention to a sufficient screw-in length in the motor flange.
- An excess screw length of max. 3 mm is permissible.
- Every screwing case is different. The tightening torque adapted to it must be determined by the appropriate screw tests.



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

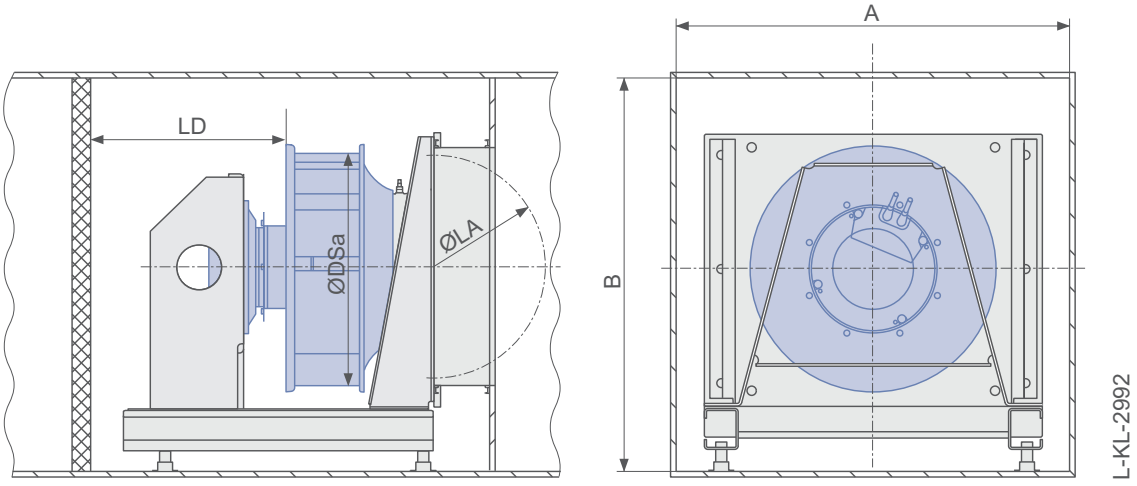
Attention!
Avoid structural damage or stress with installation. Flange and mounting bracket must be fixed flat on a level surface.

4.3 Unit installation: Design GR..

- Erect in the open air only if this is expressly mentioned and confirmed in the ordering information. There is a risk of damage to the bearings if the fan remains stopped in a moist environment. Avoid corrosion by suitable protective measures. Roofing is required.
- In the case of a vertical motor axis, the respective lower condensation drain hole (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.

Attention!
- All contact points must be fixed securely.
- Making your own alterations/conversions on the fan module is unacceptable - safety risk.

4.4 Optimal installation distances according to for RH fans



- Distance on suction side: LA ≥ 0.5 x DSa *
- Distance on the pressure side: LD ≥ 1 x DSa
- Impeller blade external-diameter : Ø DSa
- Housing wall distances: A = 1.8 x DSa (A = B)

* In the case of disturbance flow (per example curved pipe at the suction side, flaps etc.) LA ≥ 1 x DSa

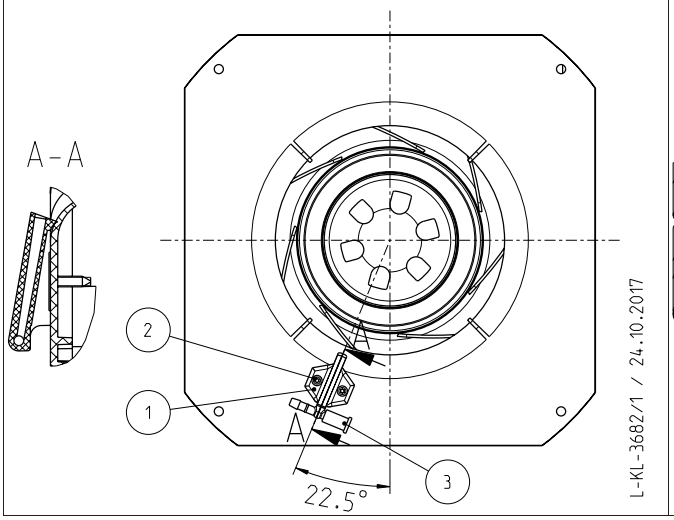
4.5 Measuring device for volume flow determination

For GR-/RH fans, a measuring device for volume flow determination is available as an accessory. The content of the accessory bag is intended for a single pressure tapping point or ring measuring cable for all frame sizes. The required assembly material depends on the version.

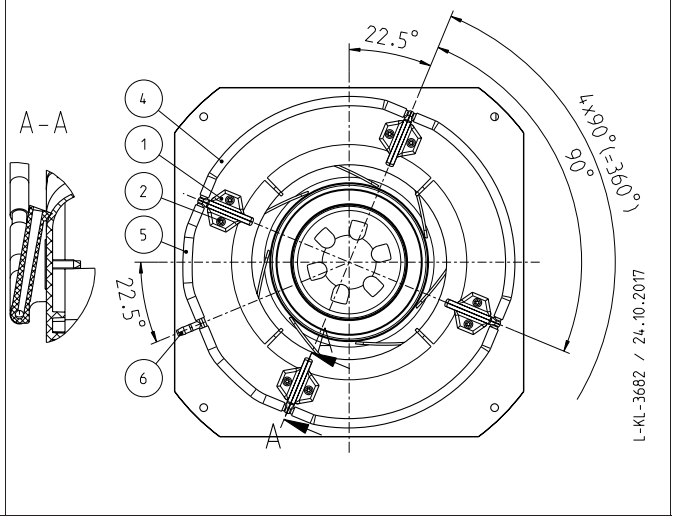
Important information!

- When positioning the pressure socket, make sure that the radius of the pressure socket rests on the radius of the inlet nozzle (as shown in section A-A).
- When assembling series devices with just one pressure socket, make sure that the pressure tapping point in each device is identically positioned.

Assembly of individual pressure tapping point



Mounting ring measuring cable



1 Pressure socket
2 Self-drilling screw (tightening torque 0.4 Nm)
3 Sealing plug
4 Plastic pipe long
5 Plastic pipe short
6 T-piece

For version with ring measuring cable cut plastic pipe according to the table.				
Fan Size	Plastic pipe length, approx. mm			
	GR		RH	
	Position 4	Position 5	Position 4	Position 5
160	-	-	148	71
175/190/200	164	79	164	79
220/225	200	96	200	96
250	200	96	210	101

4.6 Connection cable & junction box

Information

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

4.7 Version with separate junction box

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

1	Separate junction box made of plastic or metal
2	Screws for end cover Tightening torque: Plastic box 1.3 Nm/12 Lb In, metal box 2.6 Nm/23 Lb In
3	Cable glands (see table below)
4	Screw plugs, plastic/brass Tightening torque: 2.5 Nm/22 Lb In

Cable glands

Thread size	Material	Tightening torques M_A	
M12x1.5	Plastic	1.5 Nm	13 Lb In
	Brass	4 Nm	35 Lb In
M16x1.5	Plastic	2.5 Nm	22 Lb In
	Brass	5 Nm	44 Lb In
M20x1.5	Plastic	4 Nm	35 Lb In
	Brass	6.5 Nm	58 Lb In
M25x1.5	Plastic	6.5 Nm	58 Lb In
	Brass	6.5 Nm	58 Lb In
M32x1.5	Plastic	6.5 Nm	58 Lb In

4.8 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 2 hours every month at 80-100 % of maximum speed to remove any moisture that has penetrated inside.

4.9 Motorheating

A continuous power supply is required for safe operation down to the minimum permitted ambient temperature (see technical data).
If the motor is not switched on with an existing power supply (no setting signal, switch off by enable), the motorheating switches back off automatically at a controller inside temperature of -19 °C and heating up to -15 °C.
Heating takes place via the motor winding whereby a current is induced which cannot cause rotation.

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 the 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 EMC-compatible installation

5.2.1 Harmonics current

The device is classified as "professional equipment" in accordance with EN 61000-3-2 due to unknown system conditions, the operation of multiple built-in components in the end device (e.g. air handling unit) and unknown impedances at the connection point which affect the harmonics current. Connection to the low voltage supply (public networks) is allowed insofar as this has been clarified with the respective energy supply companies responsible.
Input impedance can be used if necessary to meet the limit values for harmonics current without restriction (accessory is available according to the system conditions).

5.2.2 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 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!

5.3 mains

5.3.1 Mains voltage

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

Danger due to electric current

- The fan / motor is to be used exclusively as a built-in component. The connecting cable (power supply connection) should therefore be viewed as an internal cable. A direct mains connection is not allowed.
- 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!
- To activate the on current limitation, you must **wait** at least **90 seconds** after switching off the line voltage before switching back on!

5.3.2 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!

5.3.3 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!

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

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

5.4 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 corresponds to a frequency inverter with two-pulse bridge circuit and PFC (power factor correction).

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.

5.5 Motor protection

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

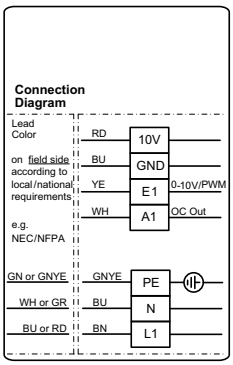
5.6 Version with 0...10 V/PWM input

5.6.1 Connection

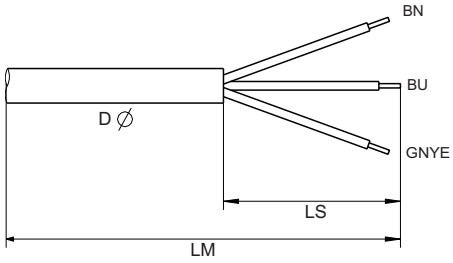
Information
- The respective connections are represented in the enclosure of this assembly instructions (see Connection diagram)!
- Opening of motor is prohibited. Loosening the screws will void the warranty!

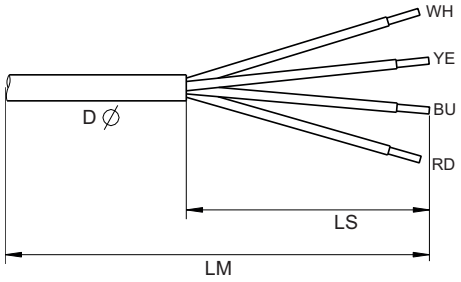
Version with connection cables

Cable banderole



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

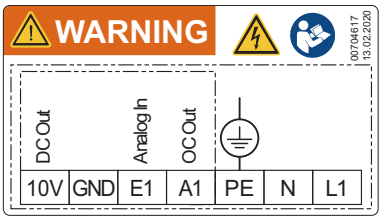
Connecting cable voltage supply		
		**Connecting lead depending on motor version** • MK055 version A and MK072 (stator diameter 101 mm): – hose cable 3 x 18 AWG (1.0 mm²) – LS: Length of stripping approx. 60 mm – D: Outside diameter approx. 5.8 mm • MK055 version B (stator diameter 89 mm): – hose cable 3 x 20 AWG (0.75 mm²) – LS: Length of stripping approx. 60 mm – D: Outside diameter approx. 5.0 mm • LM: Length to motor 0.5 m or 1.0 m depending on version (other cable lengths on request).
Mains voltage	L1	brown = BN
	N	blue = BU
	PE	Green/yellow = GNYE

Connecting cable control		
		• hose cable 4 x 22 AWG (0.34 mm²) • LS: Length of stripping approx. 60 mm • D: Outside diameter approx. 5.2 mm • LM: Length to motor 0.5 m or 1.0 m depending on version (other cable lengths on request).
OC Out Tacho	A1	white = WH
Analog In 1 (0 - 10 V, PWM)	E1	yellow = YE
	GND	blue = BU
DC Out	10V	red = RD

Version with terminal box

2 x cable glands M16 with protective plug

Connection diagram



Screw terminals

- Nominal torque: 0.8 Nm
- Stripping length: 7 mm +/-0.5 mm
- Clamping range
  - rigid: 0,75...6 mm^2
  - flexible: 0,75...4 mm^2
  - 18...12 AWG

Proceed as follows:

1. Remove terminal box cover.
2. Insert and connect cables properly and ensure tightness of the cable glands.
3. Close the lid again carefully before start-up (tightening torque for lid screws 1.7 Nm).

Attention!

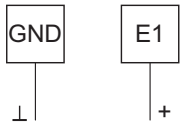
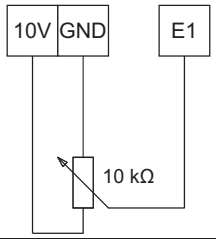
- Only use lines which can guarantee a permanent seal around the cable glands (pressure-resistant, dimensionally-stable, round-centred jacket; e.g. by means of gusset filling)! Lines with filling fleece are not permissible because moisture can penetrate due to the capillary effect!
- Two lines may only be fed through one cable gland with a sealing insert for two lines.
- Make absolutely sure that different connections do not come into contact (e.g. by splaying or loose connecting wires).

5.6.2 Analog input “E1” for setting speed

The device has an analog input for setting the motor speed. Connection “E1” / “GND” (for further specifications see technical data).

Danger due to electric current

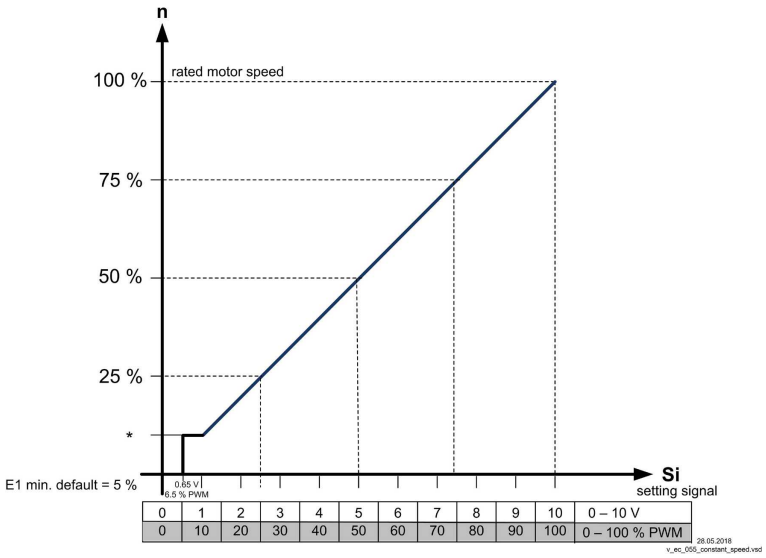
- Ensure correct polarity!
- Never apply line voltage to analog inputs!

Possibilities for speed setting	
	• Activation via external setting signal **0...10 V** or **0...100 % PWM** (PWM average value corresponds analog setting signal). • By external wiring with a resistor (499 Ω / 0,25 W) between the terminals “E1” and “GND” parallel to the input signal, activation with a **0...20 mA** signal is possible.
	• Speed setting by 10 kΩ potentiometer at terminals “+10 V” and “GND” pick-off at terminals “E1”.

5.6.3 Characteristic curve signal/speed

In “Constant speed” mode, the motor speed is proportional to the specification signal.
On certain designs in this ventilator series, the maximum speed of the fan is set higher than the maximum motor power allows at some operating points. At these operating points, the maximum motor power is the limit, which means that the maximum fan speed (see reference speed on motor rating plate) can no longer be increased, i.e. the maximum speed of the fan can be reached at a partial voltage (e.g. 7 V rotational speed specification signal).
This is an example - other operating modes/characteristic curves are possible by agreement.

Characteristic curve: Motor speed proportional to specification signal



n Motor speed
100 % rated speed motor = maximal Speed
E1 Min. Internal offset for analog input E1
Si Speed setting signal 0...10 V / 0...100 % PWM

***** If the internal setting "E1 min." (factory setting 5 %) is exceeded by 0.15 V, the system starts the motor with a factory set minimum speed depending on the motor type(typically 9 % of the reference speed).
If the specification signal has exceeded the value corresponding to the minimum speed, the motor speed is proportional to the specification signal.

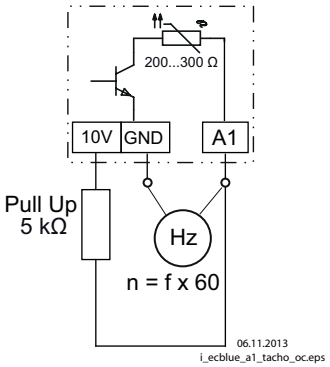
5.6.4 Voltage supply “10 V DC”

Voltage supply for external components, e.g. for a potentiometer for speed setting (SELV current source according to EN 60204-1).
Connection: “10 V” - “GND” (max. load see Technical data und connection diagram).
During an overload or short-circuit (10 V - GND), the control voltage is disconnected . Automatic start after elimination of the cause of error.
It is not permissible to connect outputs of several devices to each other!

5.6.5 Tacho-output “A1”

Via the Open-Collector output “A1” the current motor speed can be output (further specifications for “A1”see Technical data).
The frequency (duty cycle 50 : 50) that can be measured by a pull-up resistor at the output “A1” corresponds to the motor speed.

Example: 10 Hz x 60 = 600 rpm



5.6.6 Potential at control voltage connections

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

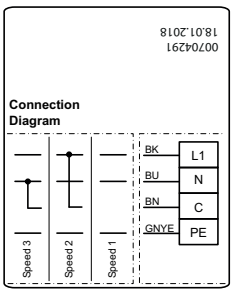
5.7 Version with 3 speeds

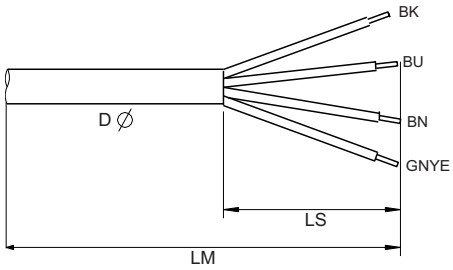
5.7.1 Connection

Information
- The respective connections are represented in the enclosure of this assembly instructions (see Connection diagram)!
- Opening of motor is prohibited. Loosening the screws will void the warranty!

Version with connection cables

Cable banderole

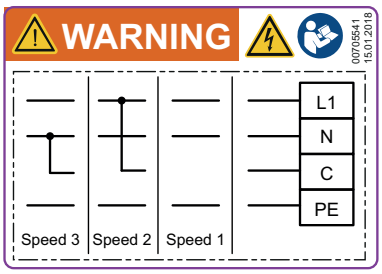


Connection		
		**Connecting lead depending on motor version** • MK055 version A (stator diameter 101 mm): – Hose cable 4 x 20 AWG (0.75 mm²) – LS: Length of stripping approx. 60 mm – D: Outside diameter approx. 6.1 mm • MK055 version B (stator diameter 89 mm): – Hose cable 4 x 20 AWG (0.75 mm²) – LS: Length of stripping approx. 60 mm – D: Outside diameter approx. 5.5 mm • LM: Length to motor 0.5 m or 1.0 m depending on version (other cable lengths on request).
Mains voltage	L1	black = BK
	N	blue = BU
	PE	Green/yellow = GNYE
Control input speed	C	brown = BN

Version with terminal box

2 x cable glands M16 with protective plug

Connection diagram



Screw terminals
- Nominal torque: 0.8 Nm
- Stripping length: 7 mm +/-0.5 mm
- Clamping range
  – rigid: 0,75...6 mm²
  – flexible: 0,75...4 mm²
  – 18...12 AWG

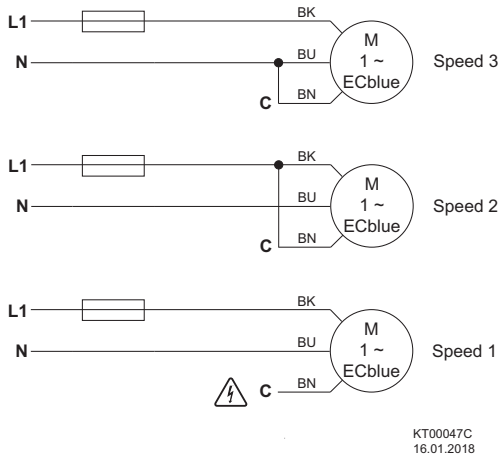
Proceed as follows:

1. Remove terminal box cover.
2. Insert and connect cables properly and ensure tightness of the cable glands.
3. Close the lid again carefully before start-up (tightening torque for lid screws 1.7 Nm).

Attention!

- 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).

5.7.2 Selecting the 3 speeds



N - **C** bridged = Speed step 3

L1 - **C** bridged = Speed step 2

C not connected = Speed setting 1

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

Danger due to electric current

A dangerous voltage (maximum mains voltage) is applied at the speed **C** control input if it is not used (speed 1). Therefore this wire must be connected to a terminal for insulation.

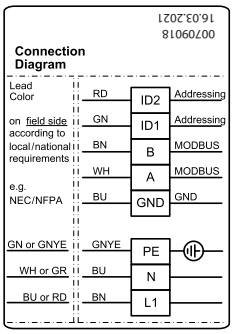
5.8 Version with MODBUS interface

5.8.1 Connection

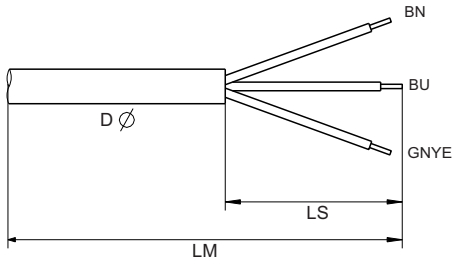
Information
- The respective connections are represented in the enclosure of this assembly instructions (see Connection diagram)!
- Opening of motor is prohibited. Loosening the screws will void the warranty!

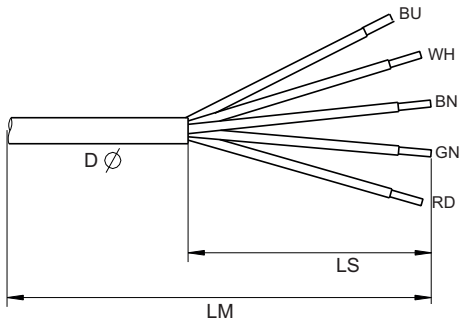
Version with connection cables

Cable banderole



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

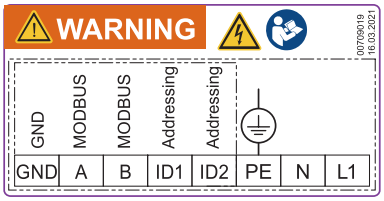
Connecting cable voltage supply			
			• hose cable 3 x 18 AWG (1.0 mm²) • LS: Length of stripping approx. 60 mm • D: Outside diameter approx. 5.8 mm • LM: Length to motor 0.5 m or 1.0 m depending on version (other cable lengths on request).
Mains voltage	L1	brown = BN	
	N	blue = BU	
	PE	Green/yellow = GNYE	

Connecting cable control			
			• hose cable 5 x 22 AWG (0.34 mm²) • LS: Length of stripping approx. 60 mm • D: Outside diameter approx. 5.2 mm • LM: Length to motor 0.5 m or 1.0 m (maximum length) depending on version.
Ground	GND	blue = BU	
MODBUS (RS-485)	A	white = WH	
MODBUS (RS-485)	B	brown = BN	
Addressing	ID1	green = GN	
Addressing	ID2	red = RD	

Version with terminal box

2 x cable glands M16 with protective plug

Connection diagram



Screw terminals

- Nominal torque: 0.5 Nm
- Stripping length: 6.5 mm +/-0.5 mm
- Clamping range
  - rigid: 0.5...4 mm^2
  - flexible: 0.5...2.5 mm^2
  - 20...12 AWG

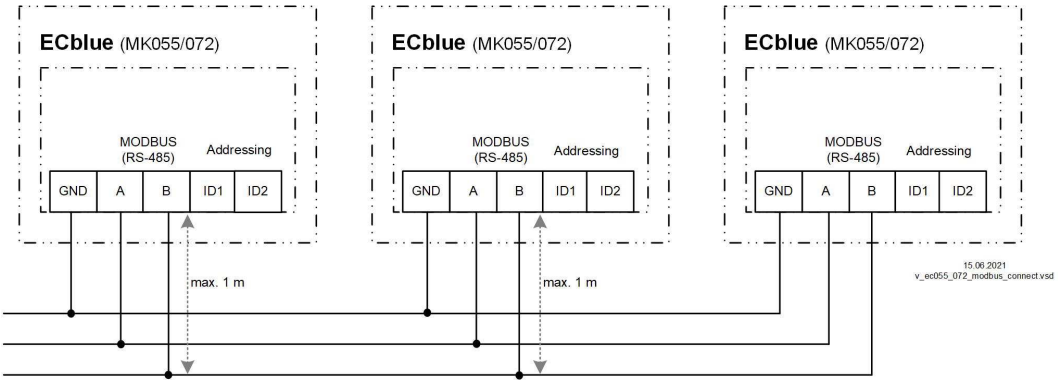
Proceed as follows:

1. Remove terminal box cover.
2. Insert and connect cables properly and ensure tightness of the cable glands.
3. Close the lid again carefully before start-up (tightening torque for lid screws 1.7 Nm).

Attention!

- 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!
- Two lines may only be fed through one cable gland with a sealing insert for two lines.
- Make absolutely sure that different connections do not come into contact (e.g. by splaying or loose connecting wires).

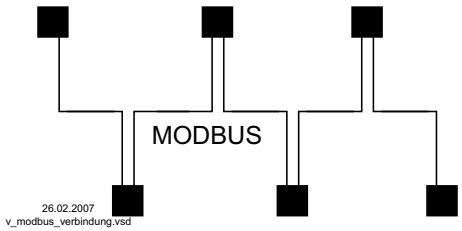
5.8.2 Networking via MODBUS



Information

- You must ensure correct connection; i.e. “A” must also be connected on the following devices to “A”. The same applies to “B”.
- 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”, “B” and “GND” (for automatic addressing additional “ID1” - “ID2” see following chapter) no further cable cores of the data line may be used.
- Between the branch of the bus line and the internal MODBUS connection (branch line) is **max. 1 m cable length** permissible!
- 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

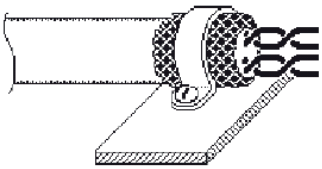
1. CAT5 / CAT7 cables
2. J-Y (St) 2x2x0.6 (telephone cable)
3. AWG22 (2x2 twisted pair)

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

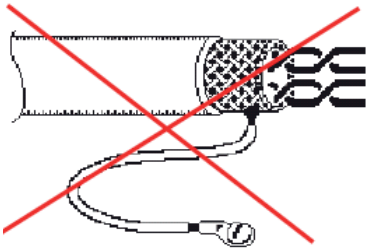
Shielding

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

Default interface parameter

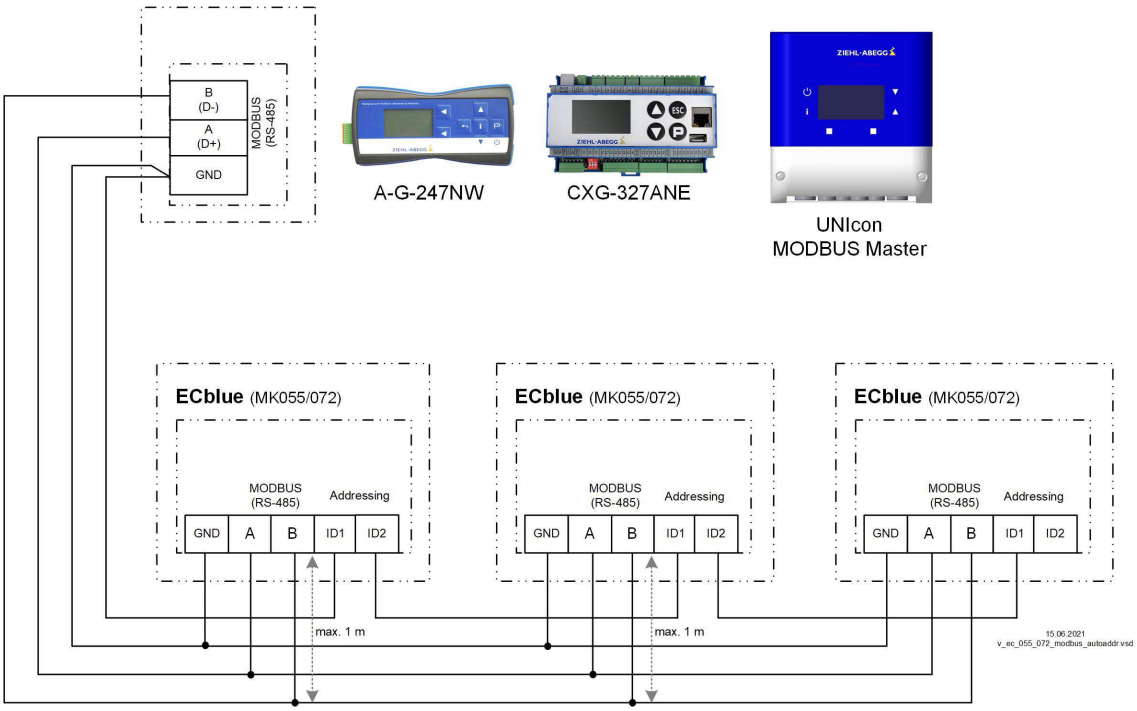
- Baudrate = 19200
- Bits = 8
- Parity = Even
- Stop bits = 1
- Handshake = none

Information

- Addressing is performed by 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.

5.8.3 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.



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 first address.

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.

Information

- Except the data link “A”, “B” the “ID1 - ID2” and the “GND” connection may no further cable cores of the data line be used.
- Between the branch of the bus line and the internal MODBUS connection (branch line) is **max. 1 m cable length** permissible!
- 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.

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 (EN 50110, IEC 60364-1)have been checked, the fan is out of range (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 rotat. direction (see the rotat. direction arrow on the fan blade, impeller base plate or intake-side support 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. Check the system for resonances. If they lead to unacceptably high vibrations on the fan, the system must not be started up.
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 Diagnostic

7.1 Troubleshooting

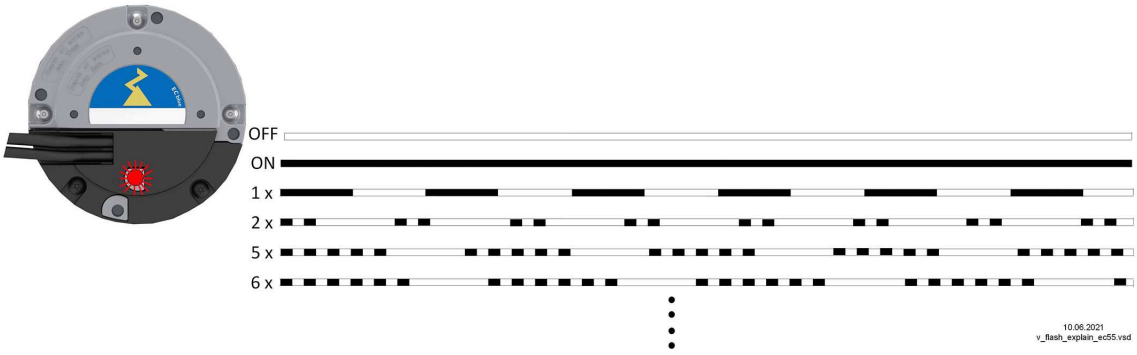
Type of error	Possible cause	Remedial measures
Fan does not run (anymore)	Mains voltage failure Failure of a phase Under - or overvoltage	Check mains voltage
	Earth fault	Check the motor connection and mains voltage
	Coil closure	Replace fan
	thermal motor protection has trig-gered (motor is overheated)	check for free air passages; remove foreign bodies if necessary See “Impeller blocked or dirty” Check supply air temperature Check voltage
	Impeller blocked or dirty	- Disconnect the motor from the power supply and secure it against switching back on - Check safe isolation from supply - Remove protective grille - Remove foreign bodies or dirt - Reinstall protective grille - proceed as described in the Commissioning chapter
Fan does not start	Temperature too low for bearing grease	Insert bearing with cold greasing

Type of error	Possible cause	Remedial measures
	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 drags / scrapes	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 supply air temperature Check installation space (air speed over heat sink)
air flow too low	“Fan turns too slowly”	see "Fan turns too slowly"
	Airways blocked	Check for free air passages (supply/exhaust air flaps, filters) See “Impeller blocked or dirty”
	Pressure loss different to projection	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 drags / scrapes	When indicated clear foreign bodies / dirt from the fan (see "Impeller blocked or dirty")
	Operation beyond tear-off point (for axial fans)	Check for free air passages (supply/exhaust air flaps, filters)
	Wrong overlap on nozzle (for centrifugal fans)	Observe the installation instructions

Additionally for version with MODBUS interface

Type of error	Possible cause	Remedial measures
MODBUS connection to the motor not (no longer) possible	Wrong connection, data lines A and B mixed up.	Check wiring.
	Wrong communication parameters.	Check communication parameters, standard settings see chapter Networking via MODBUS.
	Wrong slave address set.	Carry out automatic addressing again. Carry out the MODBUS recovery function after consulting ZIEHLABEGG support.
Speed dropout in operation	Motor bus control incorrect.	Do not use MODBUS registers marked with NV (non-volatile) for control purposes!

7.2 Status message via LED flashing code



LED Code	Cause Explanation	Reaction of Controller Remedial measures
OFF	Mains voltage failure	Line voltage available? Unit switches OFF and automatically ON when the voltage has been restored.
ON	Normal operation without fault	
1 x ——	**No enable = OFF** (only version with MODBUS interface) Control mode for enable activated, enable not set.	Shutdown via MODBUS interface.
2 x –	**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 predetermined limits the modulation is linearly reduced. With a drop in temperature the modulation rises again llinear. Check installation of the device and cooling of the motor.
3 x –	**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).
5 x –	**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 –	**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 shutdown if a fault is detected again within 70 sec. after a second start attempt. It is then necessary to have a reset by disconnecting the line voltage.
7 x –	**DC link 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 cotroller 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.
8 x –	**DC- link 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 cotroller 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 –	**Cooling down period power module** Cooling down period power module for approx. 60 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.

LED Code	Cause Explanation	Reaction of Controller Remedial measures
10 x –	**Communication error** (only version with MODBUS interface) 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 –	**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 –	**Line voltage too low** If the line 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 –	**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 –	**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 –	**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 –	**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.
1 x —— 2 x –	**MODBUS Recovery Function** (only version with MODBUS interface) 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.

7.3 Behaviour in rotation by air current in reverse direction

In the STOP state (no preset signal, no voltage supply) the motor controller does not intervene when the motor / fan turns in the wrong direction (e.g. due to a draught).
If the motor / fan is started (= voltage ON), while being driven in the opposite direction to that set, the speed is reduced controlled to “0” and restarted in the set direction of rotation.
The higher the speed to be reduced, the longer this process lasts.
In cases in which the motor / fan is driven very powerfully in the wrong direction, it may not be possible to start the motor / fan with the set direction of rotation.

Information

- Do not switch off line voltage that the motor / fan can start again!
- Safe starting of motors / fans is not guaranteed if it is started in reverse. If the application demands safe starting, the machine manufacturer or owner must prevent reverse driving rotation by suitable measures.

8 Service work

8.1 Maintenance/servicing

Attention!

- Allow maintenance work to be carried out by trained specialists only.
- Any faults detected in the electric system/modules/operating equipment must be corrected immediately. If these faults are not corrected, the device/system is potentially very dangerous. The device/system must therefore not be operated when it is faulty.
- 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 60364-1).
- Before working on the fan, this must be disconnected from the power supply and secured against switching back on!
- Fuses must always be only replaced; never repaired or bridged. The specifications for the maximum series fuse must always be adhered to (see Technical data). Only fuses cited in the electrical circuit diagram may be used.
- Keep the airways of the fan free - danger because of objects dropping out!
- No maintenance work at running fan!
- Watch out for vibration free motion!
- The impeller is subject to natural wear depending on the area of application and the conveying medium. Deposits on the impeller can lead to imbalance and damage (danger of permanent fracture). The impeller can burst!
- Maintenance interval in accordance with the degree of contamination of the impeller!
- Check the impeller, in particular the weld-seams (in the appropriate versions), for possible cracks.
- Repair, e.g. by welding or gluing is prohibited!
- Bolted-on or pressed on impellers and/or wings may only be replaced by authorised ZIEHL-ABEGG SE staff. The manufacturer shall not be liable for damage caused through improper repair work.
- Regular inspection and possibly cleaning is necessary to prevent imbalance and blockage of the drain holes (if available)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.

8.2 Cleaning

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

Clean the fans`s flow area.

Attention!

- Do not use any aggressive, paint solvent cleaning agents when cleaning.
- 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!

9 Enclosure

9.1 Technical data

Line voltage* (see rating plate)	1 ~ 200...240 V, 50/60 Hz 1 ~ 100...130 V, 50/60 Hz (Versions for DC power supply on request)
Maximal line fuse	10 A Line protection switch with charakteristik B (Recommendation: max. 3 motors on one circuit breaker)
Max. load limit integral of cut-in current approx.	2.0 A^2s
Switching frequency	16 kHz
Voltage supply for external devices (Only on version with 0...10 V/PWM input)	+10 V (-5...+17 %), I_{max} 10 mA (short-circuit-proof)
Analogue input “E1” (Only on version with 0...10 V/PWM input)	maximum permissible voltage at “E1”: 11 V
	Input resistance: R_i > 150 kΩ
	Specification speed setting signal PWM Switching frequency: 1...10 kHz On-off ratio: 0...100 % U_{in} high level: 10 V U_{in} low level: 0 V
Open-Collector output “A1” (Only on version with 0...10 V/PWM input)	I_{max}: 10 mA $U_{CE\ max}$: 35 V DC
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. *according UL -30 °C (see FILE No. E347018)

Permissible minimum and maximum 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	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 rating plate minus 1.29 % / 100 m
Permissible rel. humidity	In installation position H (shaft horizontal) and VU (shaft horizontal, rotor down) the motor is approved for a relative air humidity of 100 % in a continental climate with no other environmental influences. In installation position VO (shaft vertical, rotor up) it is 85 % non-condensing. Additional ambient conditions on request.
Ball bearing life	The bearing service life of the motor-integrated ball bearings determined in accordance with the standard calculation method is largely determined by the grease service life F10h and is approx. 30,000 to 40,000 operating hours in standard use, taking into account a temperature and load spectrum. The fan or motor is maintenance-free due to the use of ball bearings with life-time lubrication. Once the grease service life F10h has been reached, it may be necessary to change the bearing. The bearing service life may change compared to the specified value if operating conditions such as increased vibrations, increased shocks, increased or excessively low temperatures, humidity, dirt in the ball bearing or unfavourable control modes are present. A service life calculation for special applications can be created on request.
Electromagnetic compatibility for the standard voltage 230 / 400 V according to IEC 60038	Interference emission EN IEC 61000-6-3 (domestic household applications)
	Interference immunity EN IEC 61000-6-2 (industrial applications)
Harmonics current	According to EN 61000-3-2 (see Electrical installation / EMC-compatible installation / Harmonics current).
Max. leakage current according to the defined networks of EN 60990	< 3.5 mA
dB(A) values	see product catalogue
Protection class of motor according to EN 60529	IP54
Weight	see data sheet and rating plate

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

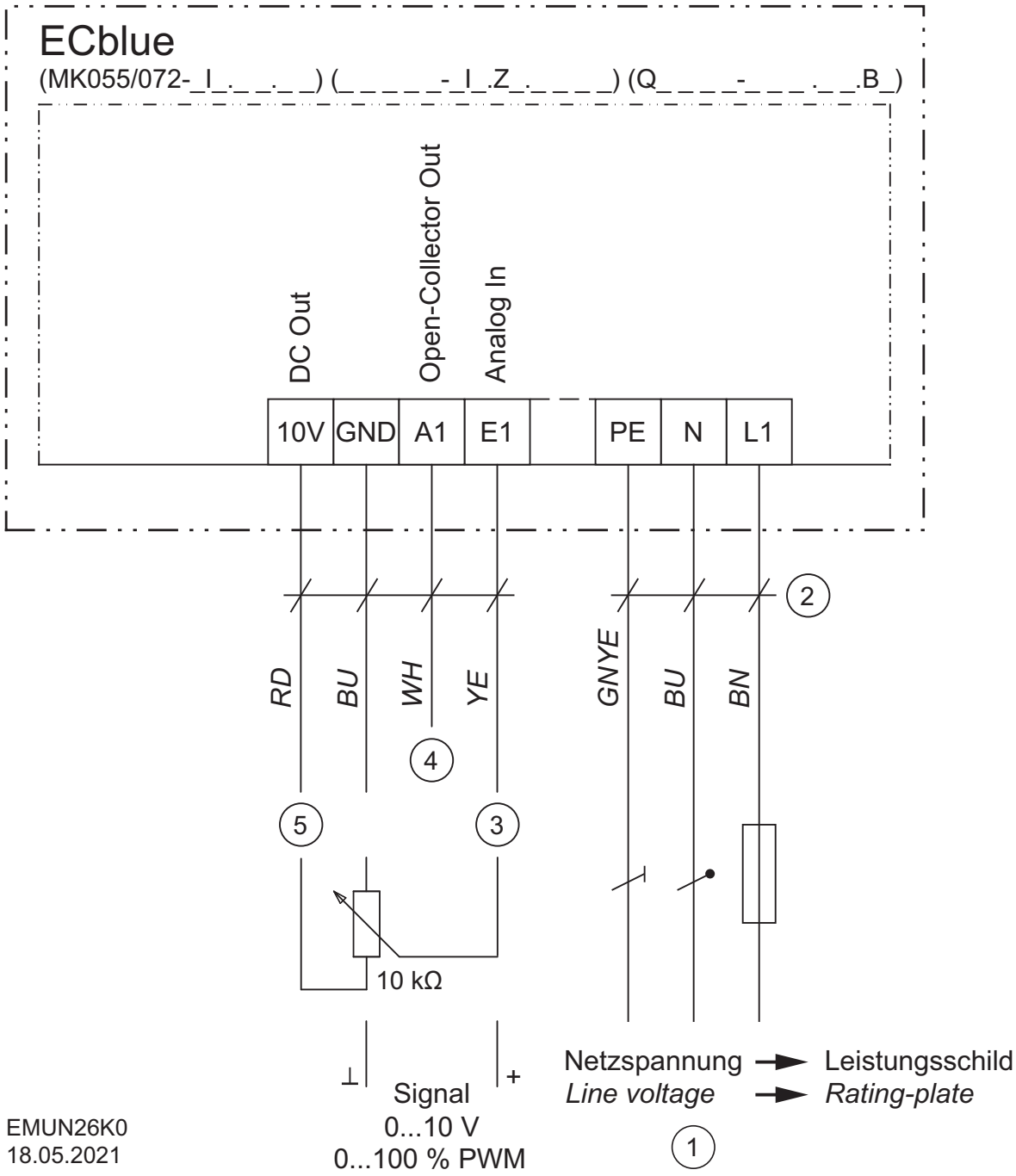
For motors with the corresponding quality mark (see rating plate)		
Authorization:	FILE No. E347018	UL 1004-1, UL 1004-7; CAN/CSA-C22.2 No.100, CAN/CSA-C22.2 No. 77
	c UL us	Electronically Protected Motors

For motors with the corresponding quality mark (see rating plate) Rated data: 200 - 240 V, 50/60 Hz, 90 W 100 - 130 V, 50/60 Hz, 65 W		
Authorisation:	REG.-Nr. F862 Certificate number 40051237	EN 60335-1:2012 + AC:2014 + A11:2014 + A13:2017 + A1:2019 + A2:2019 + A14:2019
	VDE REG F862	Built-in motor

For motors with the corresponding quality mark (see rating plate) Rated data: 200 - 240 V, 50/60 Hz, 170 W 100 - 130 V, 50/60 Hz, 120 W		
Authorisation:	REG.-Nr. E912 Certificate number 40043846	EN 60335-1:2012 + AC:2014 + A11:2014 + A13:2017 + A1:2019 + A2:2019 + A14:2019
	VDE REG E912	Built-in motor

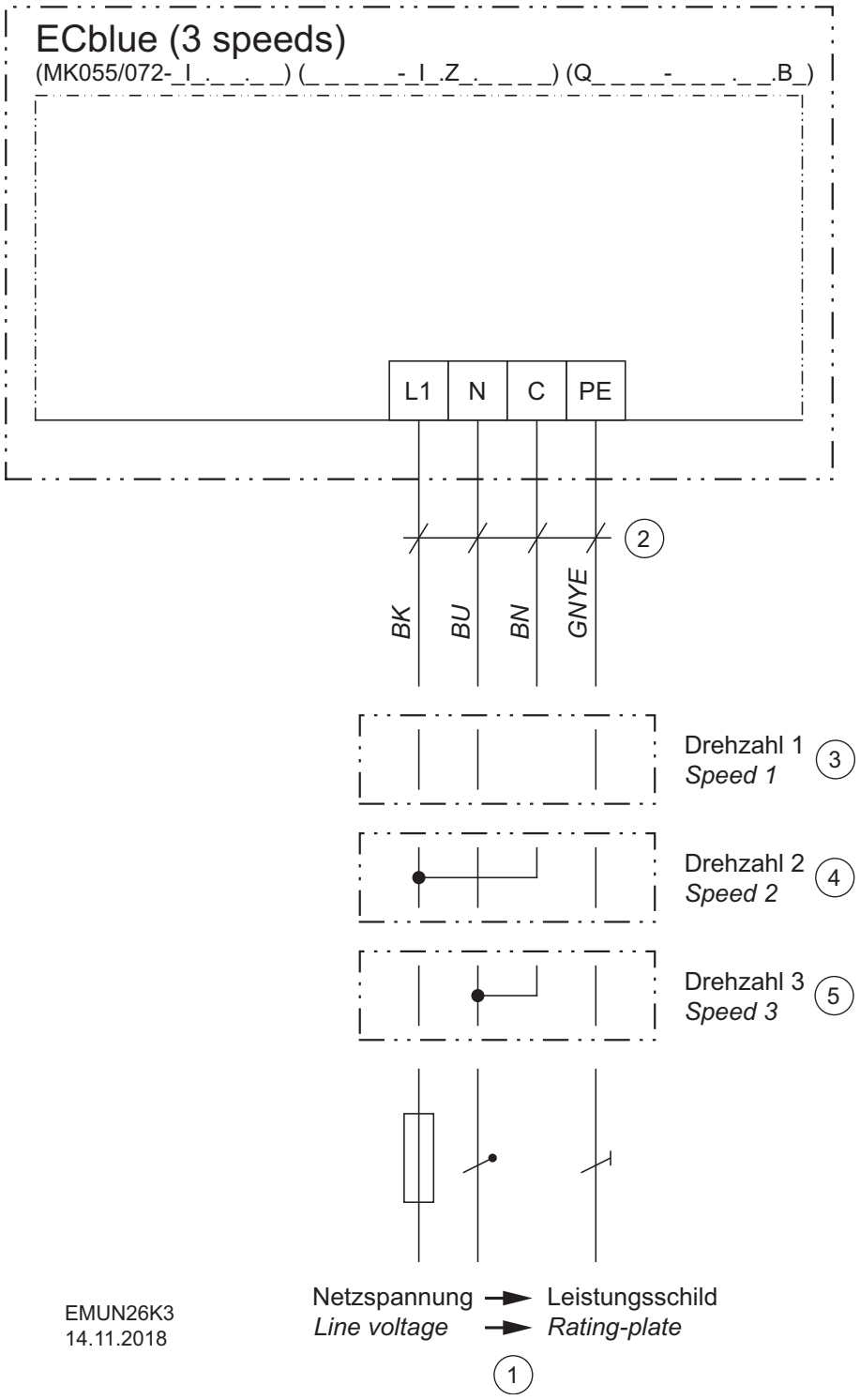
9.2 Connection diagrams

Version with 0...10 V input



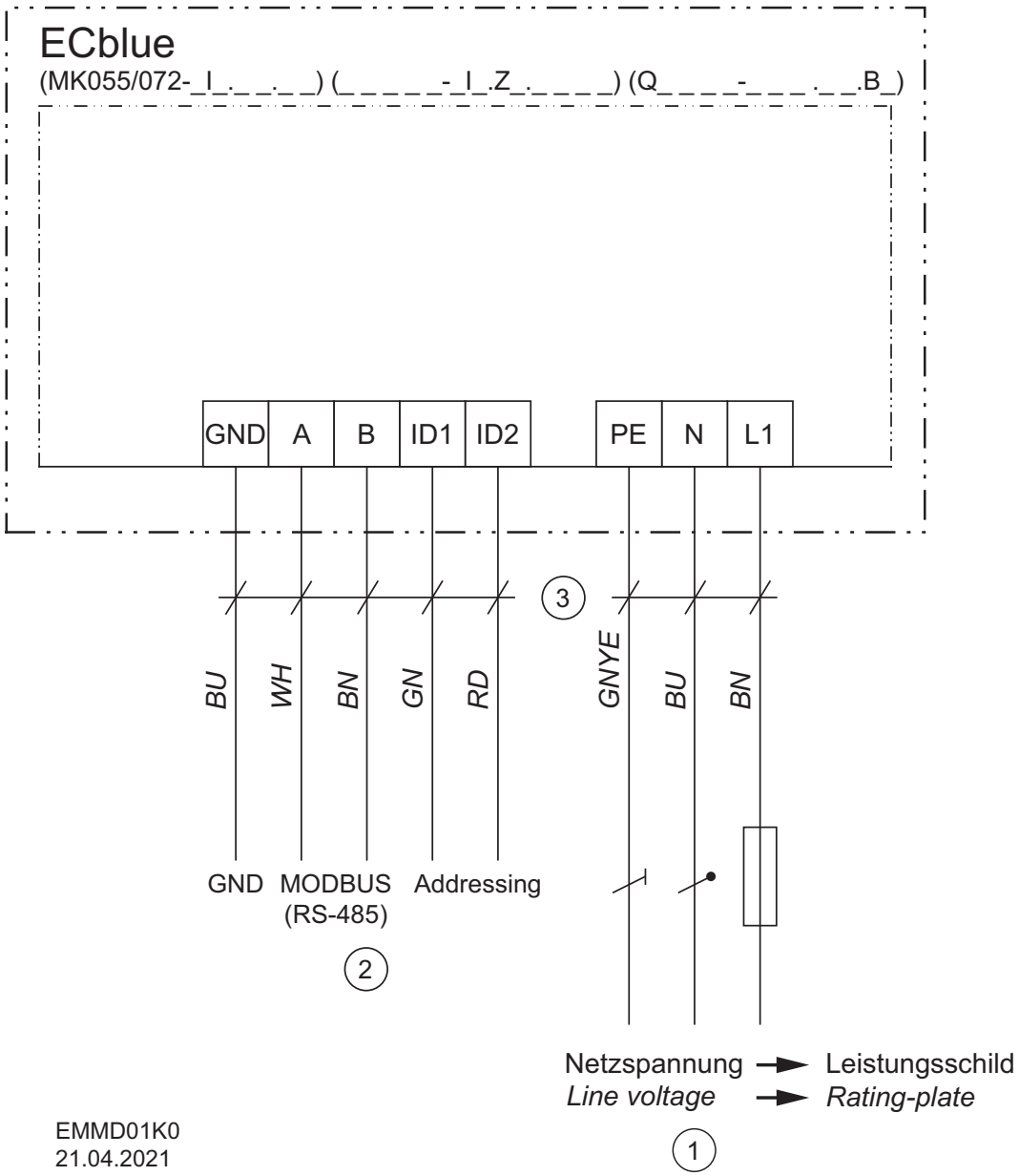
1 Line voltage see rating plate
2 Version with connection cables
3 Input for speed setting by 0...10 V signal / potentiometer (R_i > 150 kΩ)
4 Tacho output Open-Collector (I_{max} 10 mA)
5 Voltage supply 10 V DC (I_{max} 10 mA)
6 Speed setting by PWM signal (f = 1...10 kHz)

Version with three speeds



1 Line voltage see rating plate
2 Version with connection cables
3 Speed 1 = brown not connected
4 Speed 2 = brown and black connected
5 Speed 3 = brown and blue connected

Version with MODBUS interface



1 Line voltage see rating plate
2 MODBUS interface
3 Version with connection cables

Information
It is essential to observe the notes in the chapter Electrical installation/Version with MODBUS interface!

9.3 EC Declaration of Incorporation

- Translation -
(english)

ZA87-GB 2023/47 Index 013

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

The design of the partly completed machine:

- Axial fan DN.., FA.., FB.., FC.., FE.., FF.., FG.., FH.., FL.., FN.., FP.., FS.., FT.., FV.., SG.., 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:

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

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

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

The following harmonized standards have been applied:

EN 60204-1:2018	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 13857:2019	Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs
Note:	Compliance with EN ISO 13857:2019 relates only to the installed contact protection if it is part of the scope of delivery.

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

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

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

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

Künzelsau, 22.11.2023
(Location, date of issue)

ZIEHL-ABEGG SE
Moritz Krämer
Director Product Development
Ventilation Technology
(name, function)

i.V.

(signature)

ZIEHL-ABEGG SE
Ralf Oesselke
Director Projects & Series Development
Ventilation Technology
(name, function)

i.V.

(signature)

9.4 UKCA Declaration of Incorporation

- Original -
(english)

ZA87_UK-GB
2023/47 Index 003

as defined by the Supply of Machinery (Safety) Regulations 2008
No. 1597, PART 2 / Annex II B

The design of the incomplete machine:

- Axial fan DN.., FA.., FB.., FC.., FE.., FF.., FG.., FH.., FL.., FN.., FP.., FS.., FT.., FV.., SG.., 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..,

The 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 Annex I, Articles 1.1.2, 1.1.5, 1.4.1, 1.5.1 in Supply of Machinery (Safety) Regulations 2008 No. 1597.

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

The following harmonised standards have been used:

EN 60204-1:2018	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 13857:2019	Safety of machinery; safety distances to prevent danger zones being reached by the upper limbs
Note:	The maintenance of the EN ISO 13857:2019 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 Annex VII B has been written and is available in its entirety.

The following persons are authorized to compile the technical documents, 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 Machinery (Safety) Regulations.

Künzelsau, 22.11.2023
(location, date of issue)

ZIEHL-ABEGG SE
Moritz Krämer
Director Product Development
Ventilation Technology
(name, function)

i.V.

(signature)

ZIEHL-ABEGG SE
Ralf Oesselke
Director Projects & Series Development
Ventilation Technology
(name, function)

i.V.

(signature)

9.5 Manufacturer reference CE

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

ZIEHL-ABEGG SE
Heinz-Ziehl-Straße
74653 Künzelsau
phone: +49 (0) 7940 16-0
info@ziehl-abegg.de
http://www.ziehl-abegg.com

9.6 Service note

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.