



Operating Instructions

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1. SAFETY REGULATIONS AND NOTES

Please read these operating instructions carefully before starting to work with the device. Observe the following warnings to prevent malfunctions or physical damage to both property and people. These operating instructions are to be regarded as part of this device. If the device is sold or transferred, the operating instructions must accompany it. These operating instructions may be duplicated and forwarded for information about potential dangers and their prevention.

1.1 Levels of hazard warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Compliance with the measures is mandatory.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage of property.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualification

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by qualified, trained and authorised technical staff.

Only authorised specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The safety hazards associated with the device must be assessed again following installation in the final product. The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Observe the following when working on the unit:

- Do not make any modifications, additions or conversions to the device without the approval of ebm-papst A&NZ.

1.4 Electrical voltage

- Check the electrical equipment of the device at regular intervals, refer to chapter 6.2 Safety test.
- Replace loose connections and defective cables immediately.



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**DANGER****Electrical load on the device**

Risk of electric shock

- Stand on a rubber mat if you are working on an electrically charged device.

WARNING**Terminals and connections have voltage even with a unit that is shut off**

Electric shock

- Wait five minutes after disconnecting the voltage at all poles before opening the device.

CAUTION**The motor restarts automatically when operating voltage is applied, e.g. after a power failure.**

Danger of injury

- Keep out of the danger zone of the device.
- When working on the device, switch off the mains supply voltage and secure the latter from being switched on again.
- Wait until the device stops.
- After working on the device, remove any used tool or other objects from the device.

1.5 Safety and protective functions

**DANGER****Missing safety device and non-functioning safety device**

If there is no safety device, you could be seriously injured, for example by reaching into the running device with your hands.

- Operate the device only with a fixed and isolating safety protection and a fixed guard grille. The guard must withstand the kinetic energy of a fan blade detaching at maximum speed.
- The safety device must be able to withstand the kinetic energy of the fan during operation and remain attached even at maximum speed levels. Ensure gaps are not present during the installation of the safety device to prevent extremities (i.e. fingers) coming in contact with the rotating components of the device during operation.
- The device is a built-in component. You, the owner/operator, are responsible for providing adequate protection for the device.
- Shut down the device immediately if you detect a missing or ineffective protective feature.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open and closed-loop control devices.

If unacceptable emission intensities occur when the fan is installed, appropriate shielding measures have to be taken by the user.

NOTE**Electrical or electromagnetic interferences after integrating the device in installations on the customer's side.**

- Verify that the entire setup is EMC compliant.

1.7 Mechanical movement

**DANGER****Rotating device**

Body parts that come into contact with the rotor and impeller can be injured.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING**Rotating device**

Long hair, loose items of clothing and jewellery could become entangled and pulled into the device. You could be injured.

- Do not wear any loose clothing or jewellery while working on rotating parts.
- Protect long hair by wearing a cap.

1.8 Emission

WARNING**Depending on the installation and operating conditions, a sound pressure level greater than 70 dB(A) may arise.**

Danger of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment, e.g. hearing protection.
- Also observe the requirements of local agencies.



1.9 Transport

NOTE**Transport of device**

- Take appropriate technical safety measures
- Transport the device in its original packaging only.

1.10 Storage

- Store the device, partially or fully assembled, in a dry and weatherproof manner in the original packing in a clean environment.
- Protect the device from environmental impacts and dirt until the final installation.
- We recommend storing the device for a maximum up to one year to guarantee proper operation and longest possible service life.
- Even devices explicitly suited for outdoor use are to be stored as described prior to being commissioned.
- Maintain the storage temperature, see chapter 3.5 Transport and storage conditions.



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2. PROPER USE

The device is exclusively designed as a built-in device for moving air according to its technical data.

Any other or secondary use is deemed improper and constitutes a misuse of the device.

Installations on the customer's side must meet the mechanical, thermal and service life-related stresses that can occur.

Proper use also includes:

- Use of the device in stationary systems only.
- Moving air with a density of 1.2 kg/m³.
- Using the device in accordance with the permitted ambient temperature, see chapter 3.5 Transport and storage conditions and chapter 3.2 Nominal data.
- Operating the device with all protective features in place.
- Minding the operating instructions.

Improper use

Using the device in the following ways is particularly prohibited and may cause hazards:

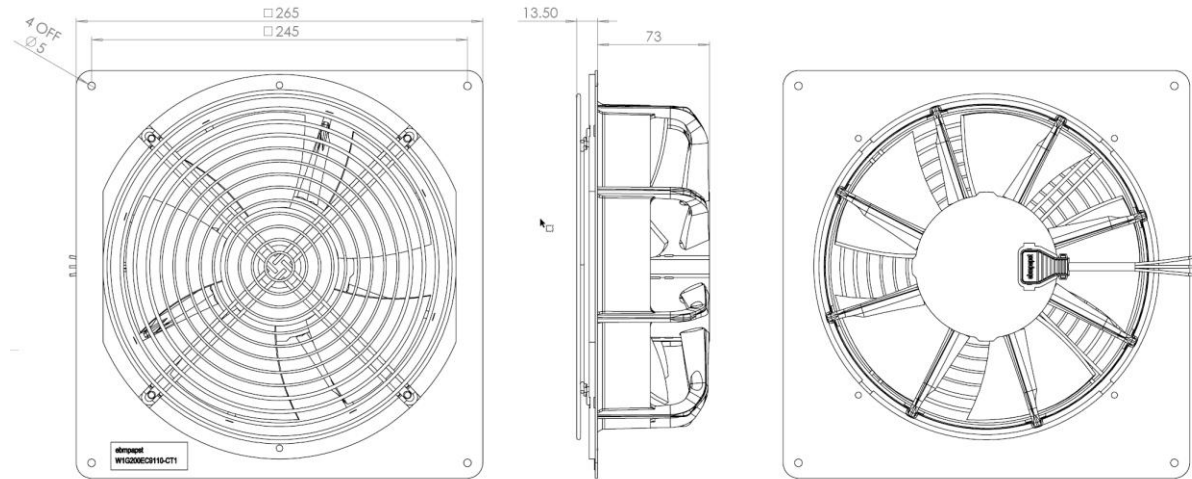
- Operating the device with an imbalance, e.g. caused by dirt deposits or icing.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the device from the customer installation.
- Moving air that contains abrasive particles.
- Moving highly corrosive air, e.g. salt spray mist. Exceptions are devices that are intended for salt spray mist and protected accordingly.
- Moving air that contains dust pollution, e.g. suctioning off saw dust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or for taking on safety-related functions.
- Operation with completely or partially disassembled or modified protective features.
- Opening the terminal box during operation.
- In addition, all application options that are not listed under proper use.



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3. TECHNICAL DATA

3.1 Product drawing



450mm CABLE WITH
3x BRASS LEAD TIPS CRIMPED
NOT SHOWN

DIRECTION OF AIRFLOW "V" →

All dimensions are in mm



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3.2 Nominal data

| | | |
|-----------------------|-----------|-------|
| Motor | M1G055-BD | |
| Phase | 1~ | 1~ |
| Nominal Voltage / VAC | 230 | 230 |
| Frequency / Hz | 50/60 | 50/60 |

| | | |
|-------------------------------|--------------|------|
| Type of data definition | maximum load | |
| Speed / rpm | 2100 | 1800 |
| Power input / W | 31 | |
| Current draw / A | 0.24 | |
| Max. Back pressure / Pa | 55 | |
| Min. ambient temperature / °C | -30 | -30 |
| Max. ambient temperature / °C | 50 | 50 |

Subject to alterations

3.3 Technical features

| | |
|---------------------------------|--|
| Mass | TBC |
| Size | 200 mm |
| Material of fan housing | PP plastic |
| Material of blades | PA plastic |
| Number of blades | 5 |
| Material of guard grille | Steel phosphate, coated in black plastic |
| Direction of airflow | "V" |
| Direction of rotation | Counter clockwise, seen on rotor |
| Type of protection | IP 54 |
| Insulation class | "B" |
| Humidity class | H1 |
| Mounting position | Any |
| Condensate discharge holes | None |
| Operation mode | S1 |
| Motor bearing | Ball bearing |
| Technical features | - Speed selection max./min. - Soft start - Thermal overload protection for motor |
| Speed levels | 2 |
| Motor protection | Thermal overload protector (TOP) wired internally |
| Cable exit | Lateral |
| Protection class | II |
| Product conforming to standards | EN 60335-1; EN 60335-2-24; EN 60335-2-80; EN 60335-2-89; CE |
| Product approvals | CSA C22.2 No. 77; UL 1004-3; VDE; EAC |



For cyclic speed loads, note that the rotating parts of the device are designed for maximum one million load cycles. If you have specific questions, contact ebm-papst A&NZ for support.

Information on surface quality

The surface finish of products conform to the relevant and applicable industrial standards. While the surface quality of the product may vary, effects on the strength, dimensional stability and dimensional accuracy are negligible and unaffected during production.

The paint applied on product surfaces react to UV light over time, which can affect the colour of the product surface. While this does not affect the technical properties of the product, the product surface can be protected against UV radiation to prevent surface colour fading. Superficial discrepancies in the surface finish, such as colour fading due to UV radiation, are not covered by the warranty.

3.4 Mounting data

→ Secure the mounting screws against accidentally coming loose (e.g. by using self-locking screws).

You can obtain additional mounting data from the product drawing if necessary.

| | |
|--------------------------|-----|
| Strength class of screws | 8.8 |
|--------------------------|-----|

3.5 Transport and storage conditions

→ Use the device in accordance with its protection type.

| | |
|--|---------|
| Max. permissible ambient motor temp. (transp./storage) | + 80 °C |
| Min. permissible ambient motor temp. (transp./storage) | - 40 °C |

3.6 Electromagnetic compatibility

| | |
|---------------------------|---|
| EMC interference immunity | Acc. to EN 61000-6-2 (industrial environment) |
| EMC harmonics | Acc. to EN 61000-3-2/3 |
| EMC interference emission | Acc. to EN 61000-6-3 (household environment) |



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4. CONNECTION AND START-UP

4.1 Mechanical connection



CAUTION

Cutting and crushing hazard when removing the fan from the packaging.

- Carefully remove the device from its packaging only touching the guard grille. Make sure to avoid any shock.
- Wear safety shoes and cut-resistant safety gloves.



NOTE

Damage to the device from vibration

Bearing damage, shorter service life

- The device must not be subjected to force or excessive vibration from sections of the installation. i.e. If the fan is connected to air ducts, the connection should be isolated from vibration to ensure stress-free attachment of the fan to the substructure.
- Severe vibration can arise for instance from poor handling, transportation damage and the resultant imbalance.

- Check the device for transport damage. Damaged devices are not to be installed.
- Install the undamaged device according to your application.

4.2 Electrical connection

The connection of the electrical system is made after the connection to the mechanical system.



DANGER

Incorrect insulation

Risk of fatal injury from electric shock

- Use only cables that meet the specified installation requirements for voltage, current, insulation material, load etc.
- Route cables such that they cannot be touched by any rotating parts.

CAUTION

Electrical voltage

The fan is a built-in component and features no electrically isolating switch.

- Only connect the fan to circuits that can be switched off with an all-pole separating switch.
- When working on the fan, you must switch off the installation/machine in which the fan is installed and secure it from being switched on again.

NOTE

Water ingress into leads or wires

Water enters at the cable end on the customers' side and can damage the device.

- Make sure that the cable end is connected in a dry environment.
- The IP protection is guaranteed only if the provided cable gland and terminal box are installed.



Connect the device only to circuits that can be switched off using an all-pole disconnecting switch.

4.2.1 Requirements

- Check whether the data on the type plate agree with the connection data and the data of the operating capacitor.
- Before connecting the device, ensure that the supply voltage matches the operating voltage of the device.
- Only use cables designed for current according to the type plate. For determining the cross-section, follow the basic principles in accordance with EN 61800-5-1. The protective earth must have a cross-section equal to or greater than the outer conductor cross-section. We recommend the use of 105°C cables. Ensure that the minimum cable cross-section is at least AWG26/0.13 mm².

4.2.2 Reactive currents



Because of the EMC filter integrated for compliance with EMC limits (interference emission and interference immunity), reactive currents can be measured in the supply line even when the motor is at a standstill and the mains voltage is switched on.

- The values are typically < 250 mA.
- At the same time, the effective power in this operating state (operational readiness) is typically < 5 W.

4.2.3 Locked rotor protection



Due to the locked-rotor protection, the starting current (LRA) is equal to or less than the nominal current (FLA)..

4.3 Connection in terminal box

4.3.1 Cable routing

No water may penetrate along the cable in the direction of the cable gland.

Fans installed lying flat

Make sure that the cable is routed in the form of a loop (water trap).

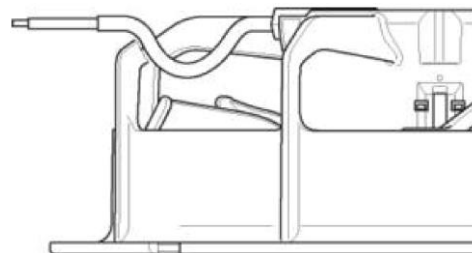


Fig. 1: Fan installed lying flat, cable routed in a loop



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Fans installed in upright position



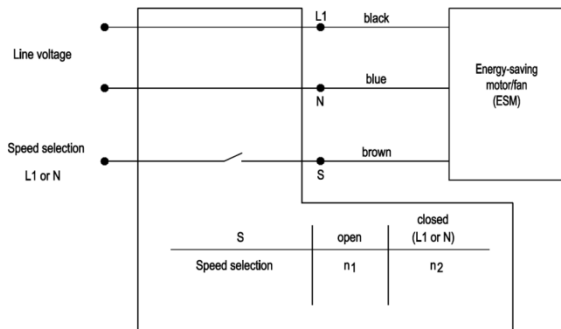
Fig. 2: Cable routing for fans installed upright.



NOTE

Perform cable routing whenever the ESM plug-in module is used to connect the fan.

4.4 Connection Screen



4.5 Checking connections

- Ensure isolation from supply (all phases).
- Make sure a restart is impossible
- Check the cables for proper fit.

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical connections. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING

Hot motor housing

Risk of fire

- Ensure that no combustible or flammable materials are located close to the fan.
- Before switching on, check the device for visible external damage and ensure any external protective devices are functional.
- Apply the nominal supply voltage



NOTE

Damage to the device from vibration

Bearing damage, shorter service life

- Low-vibration operation of the device must be ensured over the entire speed control range.
- Severe vibration can be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possible resonant frequencies must be determined in the course of fan commissioning. Either run through the resonant ranges as quickly as possible with speed control or find another remedy. Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- Disconnect the device from the supply voltage at the main switch for the supply line.
- When disconnecting, be sure to disconnect the earth wire connection last.



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5. INTEGRATED PROTECTIVE FUNCTIONS

The integrated protective functions cause the motor to switch off automatically in the event of the faults described in the table.

| Fault | Safety feature description / function |
|--------------------------------|--|
| Rotor position detection error | An automatic restart follows. |
| Blocked rotor | → After the blockage is removed, the motor restarts automatically. |
| Motor overload | The device restarts automatically after a cooling off period. |

6. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

Do not perform any repairs on your device. Return the device to ebm-papst A&NZ for repair or replacement.

WARNING

Live terminals and connections have voltage even with a device that is switched off

Electric shock

- Wait five minutes after disconnecting the voltage at all poles before opening the device.

CAUTION

If control voltage or a speed set value is applied, the motor will restart automatically, e.g. after a power failure.

Risk of injury

- Keep out of the device danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device stops.
- After working on the device, remove any used tools or other objects from the device.



If the device remains out of use for some time, e.g. when in storage, we recommend switching the device on for at least two hours to allow any condensate to evaporate and to move the bearings.

| Malfunction/error | Possible cause | Possible remedy |
|--------------------------|-----------------------------|---|
| Impeller running roughly | Imbalance in rotating parts | Clean the device; if imbalance is still evident after cleaning, replace the device. If you have attached any weight clips during cleaning, make sure to remove them afterwards. |
| Motor does not turn | Mechanical blockage | Switch off, de-energise, and remove mechanical blockage. |

| | | |
|----------------------------------|---|---|
| | Mains supply voltage faulty | Check mains supply voltage, restore power supply. |
| | Faulty connection | De-energise, correct connection, see connection diagram. |
| | Thermal over-load protector responded | Allow motor to cool off, locate and rectify cause of error, if necessary cancel restart lock-out. |
| | Unacceptable operating point | Check operating point. |
| Over temperature of motor | Ambient temperature too high | Lower ambient temperature if possible. |
| | Insufficient cooling | Improve cooling. |
| | Unacceptable operating point (e.g. back pressure is too high) | Correct the operating point. Let the device cool down. |



If you have any other problems, contact ebm-papst A&NZ

6.1 Cleaning

NOTE

Damage to the device during cleaning

Malfunctions possible

- Do not clean the device using a water jet or high-pressure washer.
- Do not use any cleaners containing acids, bases or solvents.
- Do not use any pointed or sharp-edged objects to clean.

6.2 Safety test

NOTE

High-voltage test

The integrated EMC filter contains Y capacitors. Therefore, the trigger current is exceeded when AC testing voltage is applied.

- Test the device with DC voltage when you carry out the high-voltage test required by law. The voltage to be used corresponds to the peak value of the AC voltage required by the standard.
-

| What to check? | How to check? | Frequency | What action? |
|---|-------------------|-------------------------|-------------------------------------|
| The protective casing against accidental contact for damage and to ensure that it is intact | Visual inspection | At least every 6 months | Repair or replacement of the device |



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| | | | |
|---|-------------------|-------------------------|---------------------------|
| Device for damage to blades and housing | Visual inspection | At least every 6 months | Replacement of the device |
| Fastening the cables | Visual inspection | At least every 6 months | Fasten |
| Insulation of the cables for damage | Visual inspection | At least every 6 months | Replace cables |
| Unexpected bearing noise | Acoustic | At least every 6 months | Replacement of the device |

6.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals, ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

6.3.1 Country-specific legal requirements



NOTE

Country-specific legal requirements

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

6.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.



WARNING

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

6.3.3 Component disposal

The products are mostly made of steel, copper, aluminium and plastic.

Metallic materials are generally considered to be fully recyclable. Separate the components for recycling into the following categories:

- Steel and iron
- Aluminium
- Non-ferrous metal, e.g. motor windings

- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst

Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



Please contact ebm-papst for any other questions on disposal.