



# Operating Instructions

ebm-papst A&NZ Pty Ltd  
10 Oxford Road  
Laverton North VIC 3026  
Australia  
Phone: +61 3 9360 6400  
Fax: +61 3 9360 6464  
[sales@ebmpapst.com.au](mailto:sales@ebmpapst.com.au)  
[www.ebmpapst.com.au](http://www.ebmpapst.com.au)

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## 1. SAFETY REGULATIONS AND NOTES

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

### 1.1 Hazard levels for 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 will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

#### WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

#### CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

#### 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 suitably qualified, trained and authorised 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.

Note the following when working on the device:

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

### 1.4 Voltage

- Check the electrical equipment of the device at regular intervals, see Chapter 5.2 Safety inspection.
- Replace loose connections and defective cables immediately.



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**DANGER****Electrically charged device**

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

**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****In the event of fault, the rotor and the impeller will be energised**

The rotor and impeller have basic insulation.

- Do not touch the rotor and impeller once installed.

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

Risk of injury

- Keep out of the device's 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 comes to a stop.
- After working on the device, remove any used tool or other objects from the device.

## 1.5 Safety and protective features

**DANGER****Protective device missing and protective device not functioning**

Without a protective device there is a risk of serious injury, for instance if the hands reach or are sucked into the device during operation.

- Operate the device only with a fixed protective device and guard grille. The fixed protective device must be able to withstand the kinetic energy of a fan blade that becomes detached at maximum speed. There must not be any gaps which it is possible to reach into with the fingers, for example.
- The device is a built-in component. As the operator, you are responsible for ensuring that the device is secured adequately.
- Stop the device immediately if you notice a missing or ineffective protective device.

## 1.6 Mechanical movement

**DANGER****Rotating device**

Risk of injury to body parts coming into contact with the rotor or impeller.

- 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 and dangling items of clothing, jewellery and the like can become entangled and be pulled into the device. Injuries can result.

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

## 1.7 Emission

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

Risk of noise-induced hearing loss

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

## 1.8 Hot surface

**CAUTION****High temperature at the motor housing**

Risk of burns

- Ensure sufficient protection against accidental contact.

## 1.9 Transport

**NOTE****Transport of device**

- Transport the device in its original packaging only.
- Secure the device so that it does not slip, e.g. by using a lashing strap.

## 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.
- Please make sure that all cable glands are fitted with dummy plugs.



# Operating Instructions

## 2. INTENDED 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.

Customer equipment must be capable of withstanding the mechanical and thermal stresses that can arise from this product. This applies for the entire service life of the equipment in which the product is installed.

### Intended use also includes:

- Conveying air at an ambient air pressure between 750 mbar and 1050mbar.
- Using the device within the permitted ambient temperature range, see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

### Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

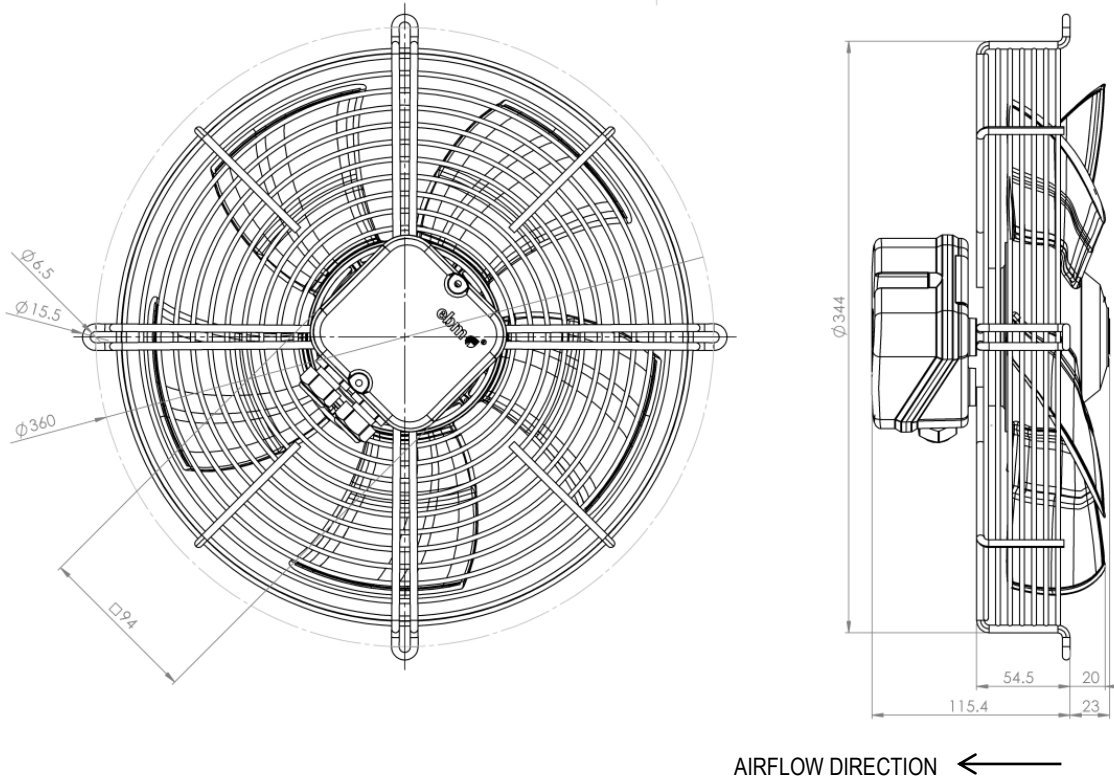
- Operating the device in an unbalance state, e.g. due to dirt deposits or ice formation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exceptions: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, 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 to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all application not listed among the intended uses.



# Operating Instructions

## 3. TECHNICAL DATA

### 3.1 Product drawing



All dimensions are in mm

Direction of air flow "V"

#### Fan cable requirement

Power supply and control cable diameter; max. 5 mm, tightening torque for cable gland  $1.3 \pm 0.2$  Nm.

#### Fan junction box requirements

Tightening torque  $3.5 \pm 0.5$  Nm for 2x screws on lid.



# Operating Instructions

## 3.2 Nominal data

Motor	M4E0680-CF	
Phase	1~	1~
Nominal voltage / VAC	230	230
Frequency / Hz	50	60

Method of obtaining data	maximum load	
Valid for approval / standard	CE	CE
Speed / rpm	1320	1500
Power consumption / W	72	90
Current draw / A	0.32	0.4
Capacitor / $\mu$ F	2	2
Capacitor voltage / VDB	400	400
Capacitor standard	P0 (CE)	P0 (CE)
Max. Back pressure / Pa	60	60
Min. ambient temperature / °C	-40	-40
Max. ambient temperature / °C	50	50
Starting current / A	0.6	0.57

Subject to alterations

## 3.3 Technical description

Mass	2.90 kg
Size	300 mm
Rotor surface	Coated in black
Terminal box material	ABS plastics
Blade material	Press-fitted sheet steel blank, sprayed with PP plastics
Number of blades	5
Guard grille material	Steel phosphate and coated in black
Airflow direction	"V"
Direction of rotation	Counter clockwise, seen on rotor
Degree of protection	IP 44; Depending on installation and position
Insulation class	"B"
Moisture (F) / Environmental (H) protection class	F2-2
Installation position	Shaft horizontal or rotor on bottom; rotor on top on request
Condensate drainage holes	Rotor-side
Mode	S1
Motor bearing	Ball bearing with anti-freezing grease
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Motor protection	Thermal overload protector (TOP) wired internally
Cable exit	Variable
Protection class	I (if protective earth is connected by customer)
Product conforming to standard	EN 60335; CE
Approval	CCC



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

## 3.4 Mounting data

For depth of screw, see Chapter 3.1 Product drawing.

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

Any further mounting data required can be taken from the product drawing.

## 3.5 Transport and storage conditions

→ Use the device in accordance with its degree of protection.

Max. permitted ambient temp. for motor (transport/storage)	+ 70 °C
Min. permitted ambient temp. for motor (transport/storage)	- 40 °C



# Operating Instructions

## 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, touching it only by the wall ring. Strictly avoid shocks.
- Wear safety shoes and cut-resistant safety gloves.

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

**CAUTION**

**Possible damage to the device**

If the device slips during installation, serious damage can result.

- Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened

### 4.2 Connecting the electrical system

**DANGER**

**Voltage on the device**

Electric shock

- Always connect a protective earth first.
- Check the protective earth.

**DANGER**

**Faulty insulation**

Risk of fatal injury from electric shock

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

**CAUTION**

**Voltage**

The fan is a built-in component and has no disconnecting switch.

- Only connect the fan to circuits that can be switched off with an all-pole separating switch.
- When working on the fan, secure the system/machine in which the fan is installed so as to prevent it from being switched back on.

**NOTE**

**Water ingress into wires or cables**

Water enters at the customer end of the cables can damage the device.

- Make sure the end of the cable is connected in a dry environment.
- The degree of protection is only assured when the intended cable guard and terminal box are installed.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

### 4.2.1 Requirements

- Check whether the data on the nameplate match the connection data and the data of the operating capacitor.
- Before connecting the device, make sure the power supply matches the device voltage.
- Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105°C cables. Ensure that the minimum cable cross-section is at least AWG26/0.13 mm².

### Ground conductor contact resistance according to EN 60335

Compliance with the impedance specifications in according to EN 60335 for the protective earth connection circuit must be verified in the end application.

Depending on the circumstances of installation, it may be necessary to connect an additional protective earthing conductor to the extra protective earth terminal on the device

### 4.2.2 Voltage control



With open loop speed control using transformers or electronic voltage regulators (e.g. phase angle control), excessive current may occur.

In addition, noises can occur with phase angle control depending on the mounting situation.

### 4.2.3 Variable frequency drive

Please use a variable frequency drive only after consultation with ebm-papst A&NZ.



For operation with variable frequency drives, install sinusoidal filters that work on all poles (phase-phase and phase-ground) between the drive and the motor. During operation with variable frequency drives, an all pole sine filter protects the motor against high-voltage transients that can destroy the coil insulation system, and against harmful bearing currents.

Heating of the motor due to use of a variable frequency drive must be checked in the application by the customer.



# Operating Instructions

## 4.3 Connecting the cables

The device has external leads.

- First connect the "PE" (protective earth).
- Connect the cables according to your application. When doing so, refer to Chapter 4.4 Connection diagram.

### 4.3.1 Preparing connection lines for the connection

Strip the cable just enough so that the screwed cable gland is tight and the terminals are relieved of strain. Tightening torque, see Chapter 3.1 Product drawing.

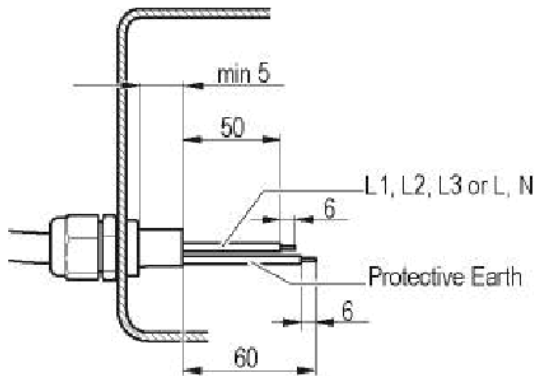


Fig. 1: Preparing cables for terminal box.

### 4.3.2 Connecting cables with terminals

#### 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.

- Remove the cap from the screwed cable gland. Remove the cap only in those places where cables are inserted.
- Insert the line(s) (not included in the standard scope of delivery) into the terminal box.
- First connect the "PE" (protective earth) connection. Use a screwdriver to do so.
- Connect the lines to the corresponding terminals. During the connection work, ensure that no cables splice off.
- Seal the terminal box.

### 4.3.3 Cable routing

Water must be prevented from reaching the cable exit along the cable.

#### Fans installed lying flat

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

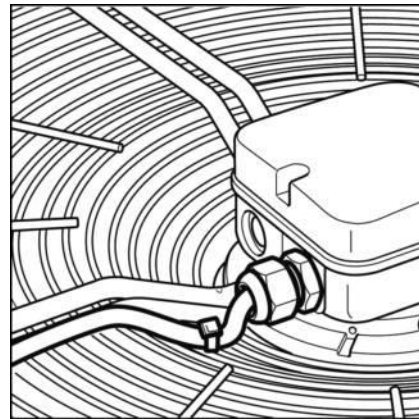


Figure 2: Fan installed lying flat, cable routed in a U-shaped loop.

#### Fans installed in upright position

When routing the cable, ensure that the screwed cable glands are arranged at the bottom. The cables must always be routed downwards.

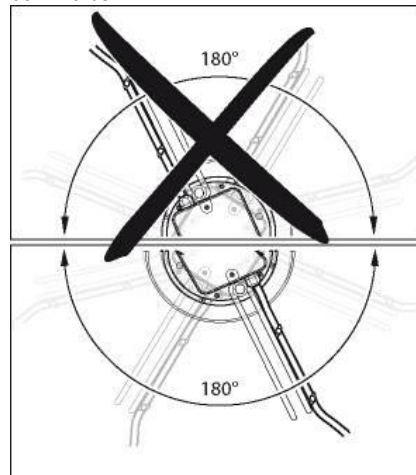
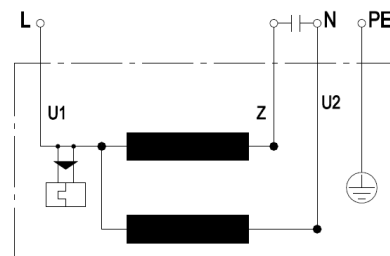


Figure 3: Cable routing for fans installed upright. The cables must always be routed downwards.

## 4.4 Connection diagram



Label	Colour	Function / assignment
L	U1 = blue	Live
Z	brown	
N	U2 = black	Neutral
PE	green/ yellow	Protective earth



# Operating Instructions

## 4.5 Checking the connections

- Ensure isolation from supply (all phases).
- Make sure a restart is impossible.
- Check the cables for proper fit.
- Screw the terminal box cover closed again. Terminal box tightening torque, see Chapter 3.1 Product drawing.
- Make sure that the terminal box is correctly closed and sealed and that all screws and screwed cable glands are properly tightened.

## 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 mechanism and professional electrical connection. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



### **WARNING** Hot motor housing Fire hazard

→ Ensure that no combustible or flammable materials are located close to the fan.

- Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- Check the fan's air flow paths for foreign matter and remove any matter found.
- Apply the nominal supply voltage.

## 4.7 Switching off the device

- Disconnect the device from the power supply at the main switch.
- When disconnecting, be sure to disconnect the ground connection last.

## 5. 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 even with device switched off**

Electric shock

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

### **CAUTION**

#### **Electrical charge on capacitor after device is switched off**

Electric shock, risk of injury

→ Discharge the capacitors before working on the device.

### **CAUTION**

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

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the mains voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



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 / fault	Possible cause	Possible remedy
<b>Impeller not running smoothly</b>	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
<b>Motor not turning</b>	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection, see connection diagram.
	Thermal over-load protector activated	Allow motor to cool off, locate and rectify cause of error, release restart lock-out in necessary.
	Impermissible point of operation	Check point of operation.
<b>Motor over temperature</b>	Ambient temperature too high	Reduce ambient temperature if possible.
	Deficient cooling	Improve cooling.



In the event of further malfunctions, contact ebm-papst A&NZ





# Operating Instructions

## 5.1 Cleaning

### NOTE

#### Damage to the device during cleaning

Malfunctions possible

- Do not clean the device using a water jet or high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.
- Do not use any pointed or sharp-edged objects to clean.

## 5.2 Safety inspection

What to check?	How to check?	How often?	What action?
Contact protection cover for intactness or damage.	Visual inspection	At least every 6 months	Repair or replacement of the device
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
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Replace cables
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables
Condensate discharge holes for clogging, as necessary	Visual inspection	At least every 6 months	Open holes
Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Contact protection cover for intactness or damage.	Visual inspection	At least every 6 months	Repair or replacement of the device

## 5.3 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.

### 5.3.1 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.

### 5.3.2 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.

### 5.3.3 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.