Operating Instructions

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CONTENTS

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

Any safety hazards stemming from the device must be re-evaluated once it is installed in the end device.

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 5.2 Safety test.
- ➢ Replace loose connections and defective cables immediately.

DANGER
Electrical load on the device
Risk of electric shock
→ Stand on a rubber mat if you are working on an electrically charged device.

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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 failure, there is electric voltage at the rotor and impeller
The rotor and impeller are base insulated.
→ Do not touch the rotor and impeller once they are installed.

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 if you reach into the running device or your hands are sucked into it.
→ 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. 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. 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 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.

1.7 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.

1.8 Hot surface

CAUTION
High temperature at the motor housing
Danger of burn injuries
→ Ensure that sufficient protection against accidental contact is provided.

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 clamping 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.

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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:

- 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 fan 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.
- In addition, all application options that are not listed under proper use.

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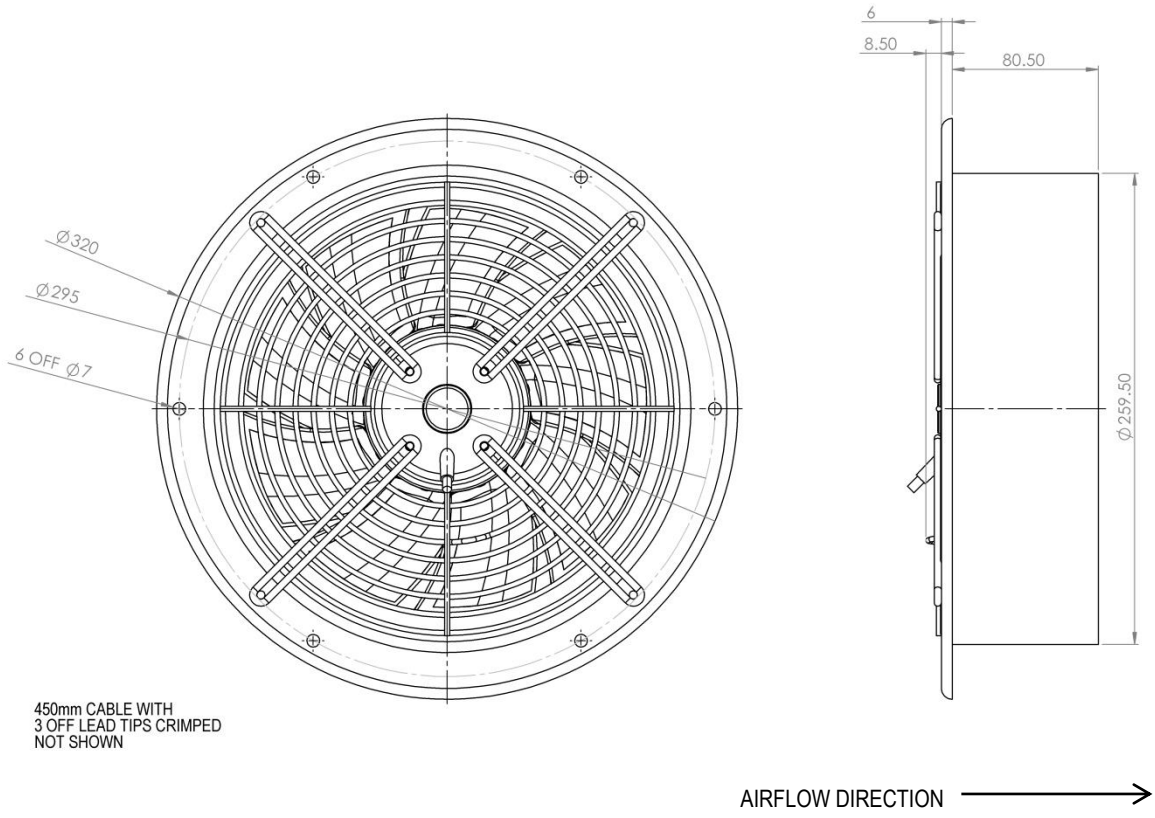
3. TECHNICAL DATA

3.1 Product drawing



All dimensions are in mm

Direction of air flow "V"

Cable requirements

Connection line PVC 3G 0.5mm^2; 3x lead tips crimped.

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3.2 Nominal data

Motor	M4S0658-CF	
Phase	1~	1~
Nominal Voltage / VAC	230	230
Frequency / Hz	50	60

Type of data definition	Running at free air	
Valid for approval / standard	CE	CE
Speed / rpm	1390	1600
Power input / W	69	63
Current draw / A	0.53	0.45
Max. Back pressure / Pa	80	80
Min. ambient temperature / °C	-25	-25
Max. ambient temperature / °C	50	65
Starting current / A	0.85	0.7
Max. safe operating speed / rpm	2950 @ 85 °C	2950 @ 85 °C

Subject to alterations

3.3 Technical features

Mass	3.005 kg
Size	250 mm
Surface of rotor	Coated in black
Material of blades	Sheet steel, coated in black
Number of blades	9
Material of guard grille	Steel phosphate and coated in black
Material of wall ring	Sheet steel, pregalvanised and coated in black plastic
Direction of airflow	"A"
Direction of rotation	Counter clockwise, seen on rotor
Type of protection	IP 44
Insulation class	"B"
Humidity class	F1-2
Mounting position	Shaft horizontal or rotor on bottom; rotor on top on request
Condensate discharge holes	Rotor-side
Operation mode	S1
Motor bearing	Ball bearing
Touch current acc. IEC 60990 (measuring network Fig. 4, TN system)	< 0.75 mA
Motor protection	Thermal overload protector (TOP) wired internally
Cable exit	Lateral
Protection class	I (if protective earth is connected by customer)
Product conforming to standard	CE
Approval	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 surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.
The color pigments in the paints used perceptibly react to UV light over the course of time. This does not however in any way affect the technical properties of the products. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and 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.

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

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4. CONNECTION AND START-UP

4.1 Connecting the mechanical system

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.

- ➢ Check the device for transport damage. Damaged devices must no longer be installed.
- ➢ Install the undamaged device according to your application.

4.2 Connecting the electrical system

DANGER
Electric voltage on the device
Electric shock
→ Always install a protective earth first.
→ Check the protective earth.

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 penetration 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.

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

4.2.1 Prerequisites

- ➢ Check whether the data on the type plate agree with the connection data.
- ➢ 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 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 Frequency inverter

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

Fit sinusoidal filters that work on all poles (live-live and live-earth) between the frequency inverters and the motor for operation with frequency inverters. Depending on how the device is installed, noises may occur.

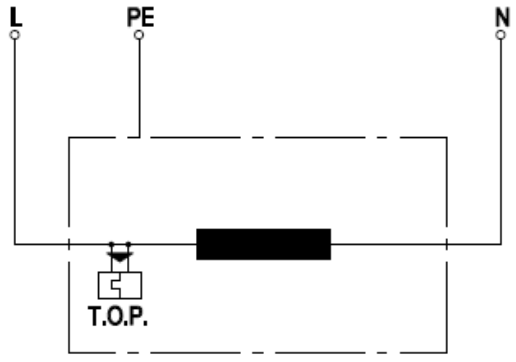
Heating of the motor due to use of a frequency converter must be checked in the application by the customer.

4.3 Connection of the cables

External leads are brought out of the device.

- ➢ First connect the "PE" (protective earth) connection.
- ➢ Connect the lines according to your application. When doing so, observe chapter 4.4 Connection Screen.

4.4 Connection Screen



Label	Colour	Function / assignment
L	blue	Live
PE	green / yellow	Protective earth
N	black	Neutral
TOP		Temperature controller

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4.5 Checking the connections

- Make sure that the power is off (all phases).
- Secure it from being switched on again.
- Check the correct fit of the connection lines.

4.6 Switch on 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.

- Inspect the device for visible external damage and the proper function of the protective features before switching it on.
- Check the air flow paths of the fan for foreign objects and remove any that are found.
- Apply the nominal voltage to the voltage supply.

NOTE
Damage to the device from vibration
Bearing damage, shorter service life
→ Low-vibration operation of the fan must be ensured over the entire speed control range.
→ Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
→ Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
→ Either run through the resonant range 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.

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
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.

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.

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

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5.1 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.

5.2 Safety test

What has to be tested?	How to test?	Frequency	Which measure?
Check 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
Check the device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of the device
Mounting the connecting lines	Visual inspection	At least every 6 months	Fasten
Mounting of protective earth connection	Visual inspection	At least every 6 months	Fasten
Check the insulation of the wires for damage	Visual inspection	At least every 6 months	Replace wires
Condensate discharge holes for clogging, as necessary	Visual inspection	At least every 6 months	Open bore holes
Weld seams for crack formation	Visual inspection	At least every 6 months	Replace 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 form 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.

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