

Operating instructions

for built-in fans with size 110 and 138 motors

The device type, date of manufacture (calendar week/year) and the conformity sign are located on the nameplate on the fan.

For questions about the fan or the delivery of spare parts, please provide the entire content of the nameplate.

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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 danger to persons.

Ensure that the operating instructions are always readily available at the 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.

Symbols used

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



Danger!

Indicates a potentially hazardous situation, which, if not avoided, could constitute a risk for life and limb. Exercise extreme caution while working.

Warning!

Indicates a potentially hazardous situation, which, if not avoided, can result in injuries. Exercise extreme caution while working.

Caution!

Indicates a potentially hazardous situation, which, if not avoided, can result in minor injuries or property damage.

Attention!

Indicates a potentially harmful situation, which, if not avoided, can result in property damage.

Staff qualification

Only specialised electrical personnel may install the device, perform the test run and work on electrical system.

Only trained and authorised specialist personnel are permitted to transport, unpack, assemble, operate or maintain the device, or to use it in any other manner.

Basic safety rules

Observe the following when working with the unit:

Warning!

Rotating fan

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

→ Do not wear any loose clothing or jewellery while working on moving parts. Protect long hair with a hood.

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

1.1 Electrical voltage and current

Check the electrical equipment of the device at regular intervals. Remove loose connections and defective cables immediately.

1.2 Safety and protective functions



Danger!

Missing safety device and non-functioning protective features

Risk of fatal injury

→ Shut down the device immediately if you detect a missing or ineffective protective feature. The device is an installation item that has no function on its own. As the operator, you are responsible for ensuring that the device is adequately secured.

1.3 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, suitable shielding measures must be taken before the device is commissioned.

1.4 Mechanical movement



Danger!

Rotating fan

Body parts that come into contact with the fan while it is rotating can be injured.

→ Secure the fan to prevent contact. Before working on the installation/machine, wait until all parts have come to a standstill.

Warning!

Ejected parts in the exhaust zone

Danger of injury

In the event of a fault, balancing weights or broken fan blades may be ejected.

→ Take appropriate safety measures. Do not stay in the exhaust zone.

Caution!

Self-starting fan

Danger of injury

The motor automatically restarts when voltage is applied, for example after a power failure an.

→ Do not stay in the danger area of the fan. When working on the fan, switch off the mains supply voltage and secure it from being switched on again.

1.5 Hot surface



Caution!

High temperature at the motor housing

Danger of burn injuries

→ Ensure that sufficient protection against accidental contact is provided.

1.6 Emission

Warning!

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

Danger of noise-induced hearing loss

→ Take appropriate technical safety measures. Safeguard the operating personnel with appropriate protection measures, e.g. ear protectors.

1.7 Transport



Caution!

Transport of fan

Cutting and crushing hazard

→ Wear safety shoes and cut-resistant safety gloves. Transport the fan in its original packaging only. The vibration values listed in the technical data must not be exceeded during the entire transport. Secure the fan so that it does not slip, for example using a lashing strap.



1.8 Storage

Store the device in a dry place, where it is protected in a clean environment. Keep to the specified storage temperatures, *please refer to Chapter 3, Technical data*. If the device is shut down for some time, you are advised to run the device once a month for about 15 minutes to move the bearings.

1.9 Cleaning

Attention!

Damage to the device during cleaning.

Malfunction possible

→ Do not clean the device using a water jet or high-pressure washer. Do not use any cleaners containing acids, bases or solvents.

1.10 Disposal

When disposing of the device, please comply with all relevant requirements and regulations applicable in your country.

2. PROPER USE

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

Any other or secondary use is deemed improper use and a misuse of the device. Installations necessary on the part of the commissioning party must meet the mechanical, thermal and service life-related stresses that can occur.

Proper use also includes:

- Operating the device with all protective features.
- Observing the operating instructions.
- Use of the device in accordance with the permissible ambient temperature, see Chapter 3 "Technical data".

Improper use

In particular, the following uses of the fan are prohibited and can lead to dangerous situations:

- Moving air that contains abrasive particles.
- Moving highly corrosive air.
- Moving air that contains dust pollution, e.g. suctioning off saw shavings.
- Using the fan to move flammable gases/particles.
- Operating the fan in the vicinity of flammable materials or components.
- Operating the fan in an explosive atmosphere.
- Using the fan as a safety component or for taking on safety-related functions.
- Operation in medical equipment with a life-sustaining or lifesaving function.
- Operation in non-stationary installations such as railroad vehicles, aircraft and spacecraft.
- Operation with completely or partially disassembled or modified protective features.
- Operation with external vibrations that exceed the permissible vibration load.
- In addition, all application options that are not listed under proper use.

If you have specific questions, contact ebm-papst for support.

3. TECHNICAL DATA

Additional device-specific data are available upon request from ebm-papst.

Mounting data

The following must be observed:

- Tightening torque of the screwed cable gland: 2.0 Nm
- Tightening torque of mounting screws of terminal box cover: 0.8 Nm
- Property class of mounting screws: 8.8

Ambient conditions

	Transport & storage	Operation
Permitted ambient temperature for motor	-40 °C to +80 °C	-25 °C...+40 °C (60 °C)
Resistance to vibrations	1 g (acc. to IEC 60068-2-6)	0.5 g (acc. to IEC 60068-2-6)

4. CONNECTION AND START-UP

4.1 Connecting the mechanical system

Install the device according to your application.
Use the device according to its moisture class.



Caution!

Cutting and crushing hazard when removing the fan from the packaging

→ Carefully lift the device out of the packing at using inside area of the blades (axial fan) or the impeller (radial fan). Be certain to avoid any shock. Wear safety shoes and cut-resistant safety gloves. Two people should lift the device out of its packaging if it is heavier than 10 kg.

Warning!

Hot motor housing

Danger of fire

→ Ensure that no combustible or flammable materials are located in the vicinity of the fan.

4.2 Connecting the electrical system

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

- Before connecting the device, ensure that the mains supply voltage matches the fan voltage.
- Check whether the data on the nameplate agree with the connection data and the data of the operating capacitor (single-phase motors only).
- Only use cables that are configured for current according to the type plate.



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.

4.3 Connection in terminal box

(valid for axial fans)

Stripping connecting cables

Strip the cable just enough so that the screwed cable gland is tight and the terminals are relieved of strain (for tightening torques, refer to Chapter 3 "Technical data").

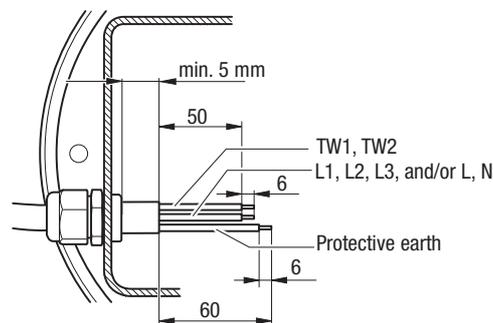


Figure 1: Recommended stripping lengths in mm (inside the terminal box)

Connecting cables with terminals

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.

- Open the terminal box.
- Open the screwed cable gland.

Axial fans with size 110 motors

are supplied with a sealing cap and insert for cables with $\varnothing 6 - 12$ mm, see Fig. 2.

- Remove the cap, see figure 3.
- Guide the cable through the cable gland



Figure 2.
Screwed cable gland with cap



Figure 3.
Cap removed

- Connect up the protective earth (PE) wire.
- Connect the remaining leads to the respective terminals. See Fig. 4.
- Connect up the thermal overload protector (T.O.P.) an.

During the connection work, ensure that no cables splice off.

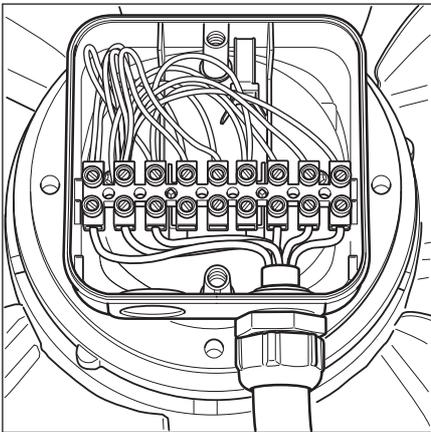


Figure 4: Connecting the wires to terminals

The terminal strip is equipped with a penetration prevention device.

- Insert the strands until they meet resistance.

There must be no voltage applied between the terminal and the cable gland. The cable must be relieved of strain.

Terminal area

single-strand up to 4 mm²
fine-strand up to 2.5 mm²



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

The cable must be relieved of strain.

Mounting position of fan: shaft vertical, rotor at bottom

Ensure that the cable is routed in the form of a loop ("water trap" - see Figure 5).

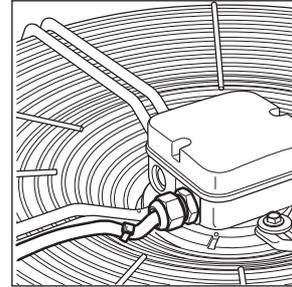


Figure 5: Fan installed lying flat (shaft vertical, rotor on bottom), cable routed as "water trap"

Mounting position: shaft horizontal

When routing cables, ensure that the screwed cable glands are arranged at the bottom, see Figure 6. The cables must always be routed downwards.

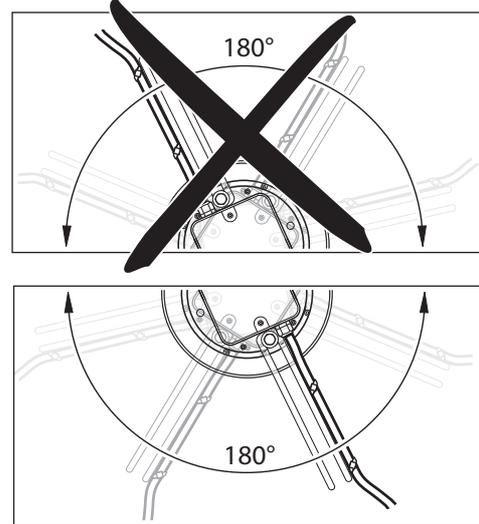
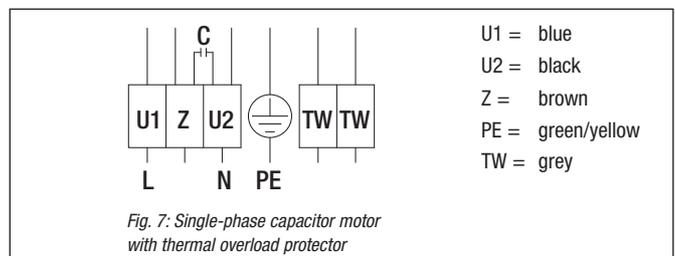
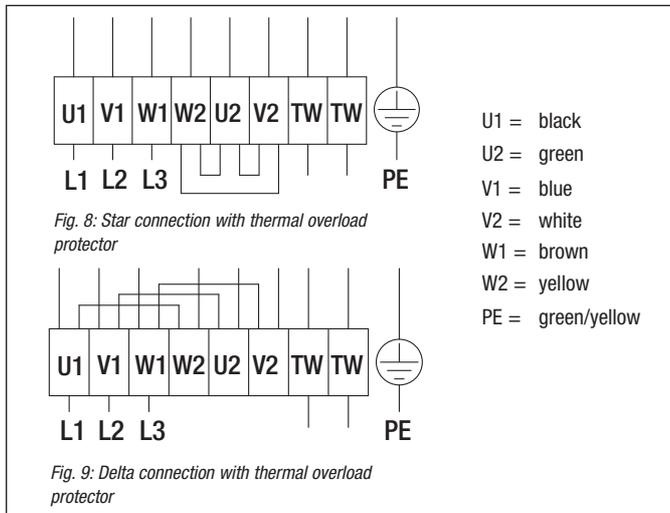


Figure 6: Cable routing for upright built-in fans (shaft horizontal)

Interface diagram - single-phase capacitor motor

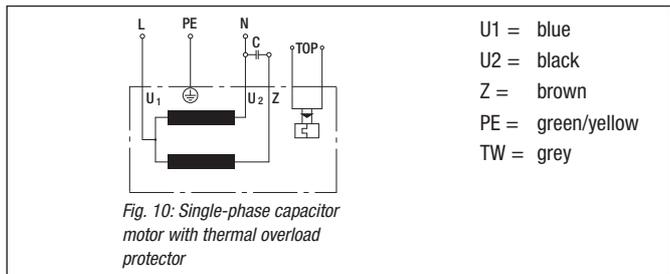


Interface diagram - three-phase motor

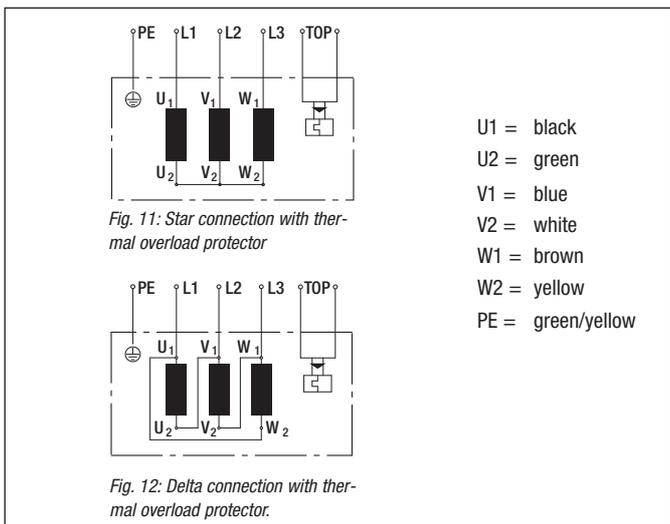


Reverse direction of rotation by interchanging two phases.

Interface diagram - single-phase capacitor motor



Interface diagram - three-phase motor



Reverse direction of rotation by interchanging two phases

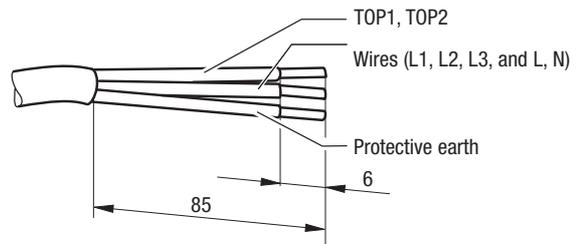
4.4 Connection via wires from stator bush

(valid for centrifugal fans)

Motor size	Cable length*
110	800 mm
138	1000 mm

Connect up the wires according to your application.

Stripping connecting cables*



With single-phase motors, make sure that the capacitors are also connected.

4.5 Motor protection

The motors are equipped with thermal overload protectors to protect the devices. Check to make sure that the thermal overload protector is correctly connected before each operation. Failure to correctly connect up the thermal overload protector will invalidate defect warranty cover.



Danger!

Lack of motor protection

The motor becomes hot. Body parts that come into contact with the motor can be injured.

→ Connect up the thermal overload protector installed in the coil. Wire the freed thermal overload protectors in the control current circuit so that no automatic switch-on can occur after cooling down following a malfunction.

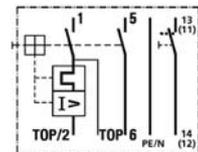
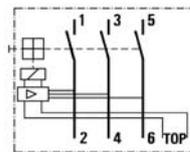


Fig. 13: Interface diagram - motor protecting switch, three-phase

Fig. 14: Interface diagram - motor protecting switch, single-phase

Attention!

Lack of motor protection

The motor becomes too hot and thus suffers damage. The motor is not switched on automatically.

→ Locate the source of the error and eliminate the error. Connect up the thermal overload protector installed in the coil.

Voltage control



With open loop speed control using transformers or electronic voltage regulators (e.g. phase control), excessive current may occur. In addition, noises can occur with phase control, depending on the manner in which the device is installed.

* Customer-specific differences possible

Frequency inverter



Fit sinusoidal filters that work on all poles (live-live and live-earth) between the frequency inverter and the motor for operation with frequency inverters.

4.6 Connecting up several devices

If you intend to connect up more than one device, you may use the second screw hole on the terminal box to route another wire.

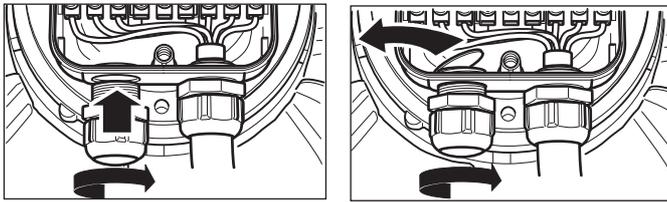
Warning!

Electric voltage on cable gland

Electric shock

→ Do not use plastic terminal boxes with metal cable glands.

- Screw the cable gland (size M20) into the pre-cut thread a spanner. Note the specified tightening torques, *please refer to Chapter 3, Technical data.*
- Remove the plastic tab that has become loose when the wire is pressed through into the terminal box.



When connecting, note *Chapter 4.2, Connecting the electrical system and Chapter 4.3, Connection in terminal box.*

4.7 Checking the connections



Danger!

Electric voltage on the device

Electric shock

→ Always install an earth wire. Check the protective earth.

Make sure the power is off.
Secure it from being switched on again.

- Check the correct fit of the connecting cables.
- Fasten the screwed cable gland again.
- Ensure that the cable gland is securely tightened.
- Tighten the cable gland enough to ensure that water cannot ingress. *Refer to Chapter 3, "Mounting data" section, for the maximum tightening torque*
- Fasten the terminal box again.
Refer to Chapter 3, "Mounting data" section, for the maximum tightening torque

Make sure that the terminal box is correctly closed and sealed after completing the work and that all screws are properly tightened.

Residual current operated device



Only universal (type B) RCD protective devices are permitted. Like frequency inverters, RCD protective devices cannot provide personal safety while operating the device.

4.8 Switching on the device

Inspect the device for visible external damage and the proper function of the protective features before switching it on.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

Malfunction/error	Possible cause	Possible remedy
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	Correct connection, see connection configuration
	Thermal overload protector responded	Allow engine to cool off, locate and rectify cause of error, if necessary cancel switch-on inhibitor
Overtemperature of motor	Ambient temperature too high	If possible, reduce ambient temperature
	Insufficient cooling	Improve cooling
	Unacceptable operating point	Examine operating point, e.g. reduce throttle resistance on axial fan



If you have any other problems, contact ebm-papst.

5.1 Safety examination

What has to be tested?	How to test?	Frequency
Contact prevention clothing	Visual inspection	at least every 6 months
Fan for damage	Visual inspection	at least every 6 months
Mounting of fan	Visual inspection	at least every 6 months
Mounting of connecting cables	Visual inspection	at least every 6 months
Mounting of protective earth connection	Visual inspection	at least every 6 months
Insulation of the cables	Visual inspection	at least every 6 months
Tightness of screwed cable gland (only with connection via terminal box)	Visual inspection	at least every 6 months
Condensate discharge hole against blockage	Visual inspection	at least every 6 months