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Translation of the original operating instructions

1. SAFETY REGULATIONS AND INFORMATION

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 qualifications

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

1.4 Voltage

⇒ Check the device's electrical equipment at regular intervals; see Chapter 6.2 Safety inspection.

⇒ Replace loose connections and defective cables immediately.

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
In the event of a fault, the rotor and the impeller will be energized
The rotor and the impeller have basic insulation.

→ Do not touch the rotor and impeller once installed.

CAUTION
If control voltage or a stored 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.

→ After working on the device, remove any tools or other objects from 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 motor's danger zone.

→ When working on the motor, switch off the line voltage and ensure that it cannot be switched back on.

→ Wait until the motor comes to a stop.

1.5 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices.
If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

NOTE
Electrical or electromagnetic interference after installing the device in customer equipment.

→ Verify that the entire setup is EMC-compliant.

1.6 Mechanical movement



DANGER
Ejected parts
Missing protective devices may cause balancing weights or broken fan blades to be ejected and cause injuries.

→ Take appropriate safety measures.

WARNING
Rotating device
Long hair and dangling items of clothing, jewelry 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 jewelry while working on rotating parts.#Protect long hair with a cap.

WARNING
Ejected parts
If the motor is operated with attached fan blades, missing protective devices may allow balancing weights or broken fan blades to be ejected and cause injuries.

→ Take appropriate safety measures such as installing guard grilles.

→ Keep out of the exhaust zone.

1.7 Hot surface



CAUTION
High temperature on electronics housing
Risk of burns

→ Ensure sufficient protection against accidental contact.

1.8 Transport





CAUTION
Transporting the motor
Crushing hazard

→ Wear safety shoes and cut-resistant safety gloves.

→ Transport the motor in its original packaging only.

→ Secure the device so it cannot slip, e.g. by using a lashing strip.

1.9 Storage

⇒ Store the device, partially or fully assembled, in a dry and weatherproof manner in the original packaging in a clean environment.

⇒ Protect the device against environmental effects and dirt until final installation.

⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.

⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.

⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.

Translation of the original operating instructions

2. INTENDED USE

The device is designed exclusively for use as a drive motor.
Any other usage above and beyond this does not conform with the intended purpose and constitutes 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 this product is installed.

Intended use also includes

- Using the device only in stationary systems.
- Performing all maintenance work.
- 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

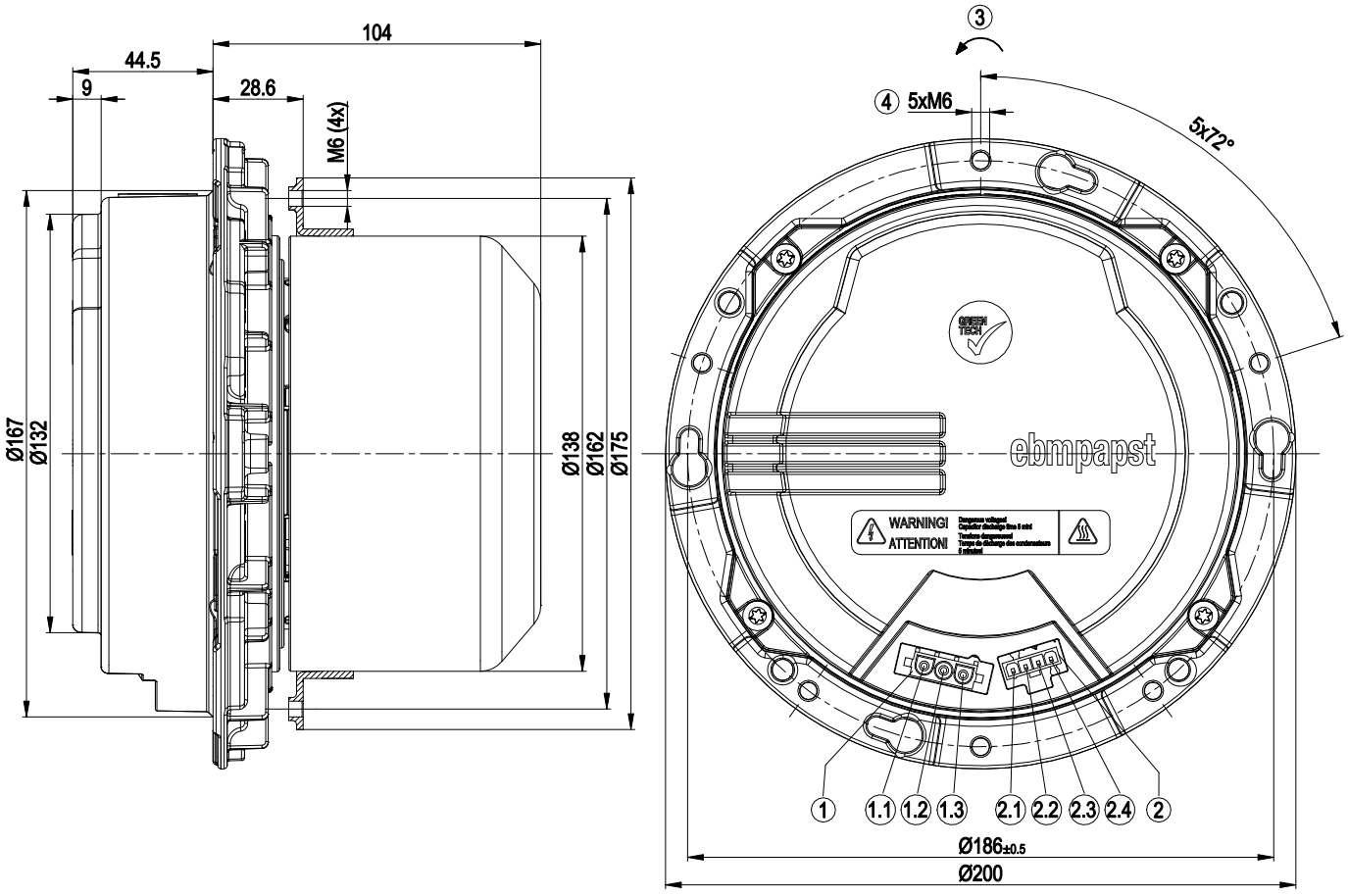
In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operation in medical equipment with a life-sustaining or life-support function.
- Operation with external vibrations.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- 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 applications not listed among the intended uses.

Translation of the original operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Lonco 3-pole header C63502-3A, pluggable with AMP connector housing 350 766-1
1.1	PE
1.2	N
1.3	L
2	4-pole header Molex 39-30-2040, pluggable with Molex connector housing 39-01-4041
2.1	RSB
2.2	RSA
2.3	+15 V-0 V
2.4	0 V-15 V
3	Direction of rotation counterclockwise, viewed toward rotor
4	Max. clearance for screw 16 mm

Translation of the original operating instructions

3.2 Nominal data

Motor	M3G112-EA

Phase	1~
Nominal voltage range / VAC	200 .. 277
Frequency / Hz	50/60

Method of obtaining data	cs
Speed / min^{-1}	1150
Power consumption / W	376
Power output / W	340
Current draw / A	1.9 @ 230 V
Min. ambient temperature / °C	-25
Max. ambient temperature / °C	40

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

3.3 Technical description

Weight	6 kg
Fan size	112 mm
Rotor surface	Painted black
Electronics housing material	PA plastic
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP20
Insulation class	"B"
Moisture (F) / Environmental (H) protection class	F4-1
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Technical features	- Operation and alarm display: reversible voltage output 0 V / +15 V - Integrated PID controller - Motor current limitation - PFC, active - RS-485 ebmBUS - Soft start - Control interface with SELV potential safely disconnected from supply - Thermal overload protection for electronics/motor
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	<= 3.5 mA
Electrical hookup	With plug
Motor protection	Thermal overload protector (TOP) internally connected
with cable	Variable
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 61800-5-1
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 special questions, consult ebm-papst for support.

3.4 Mounting data

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

Strength class of screws	8.8

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)	+ 80 °C
Min. permitted ambient temp. for motor (transport/ storage)	- 40 °C

3.6 Electromagnetic compatibility

EMC immunity to interference	According to EN 61000-6-2 (industrial environment)
EMC circuit feedback	According to EN 61000-3-2/3
EMC interference emission	According to EN 61000-6-4 (industrial environment)

Translation of the original operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



WARNING
Hot motor housing
Risk of fire

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



CAUTION
Cutting and crushing hazard when removing motor from packaging



→ Carefully remove the device from its packaging. 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 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Electrical charge (>50 µC) between phase conductor and protective earth connection after switching off supply with multiple devices connected in parallel.
Electric shock, risk of injury

→ Ensure sufficient protection against accidental contact. Before working on the electrical hookup, short the supply and PE connections.

CAUTION
Voltage
The motor is a built-in component and has no disconnecting switch.

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

→ When working on the motor, secure the system/machine in which the motor is installed so as to prevent it from being switched back on.

NOTE
Water ingress into wires or cables
Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



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.

⇒ 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
AWG 26 / 0.13 mm².

Ground conductor contact resistance according to EN 61800-5-1

Compliance with the impedance specifications according to EN 61800-5-1 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 earth conductor to the extra protective earth terminal on the device.
The protective earth terminal is on the housing and has a ground conductor symbol and a bore hole.

4.2.2 Reactive currents



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

- The values are typically less than 250 mA.
- At the same time, the effective power in this operating state (operational readiness) is typically < 4 W.

4.2.3 Residual current circuit breaker (RCCB)



Only universal residual current devices (type B or B+) are allowed. As with variable frequency drives, residual current devices cannot provide personal safety while operating the device.
When the device's power supply is switched on, pulsed charging currents from the capacitors in the integrated EMC filter can lead to the residual current devices tripping without delay. We recommend the use of residual current circuit breakers with a trip threshold of 300 mA and delayed tripping (super-resistant, characteristic K).

4.2.4 Locked-rotor protection



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

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4.3 Plug connection

4.3.1 Making supply connections

⇒ Check your connector's pin assignment.

⇒ Connect the built-in connector with the mating connector.

⇒ Ensure that the connector is properly engaged.

4.4 Factory settings

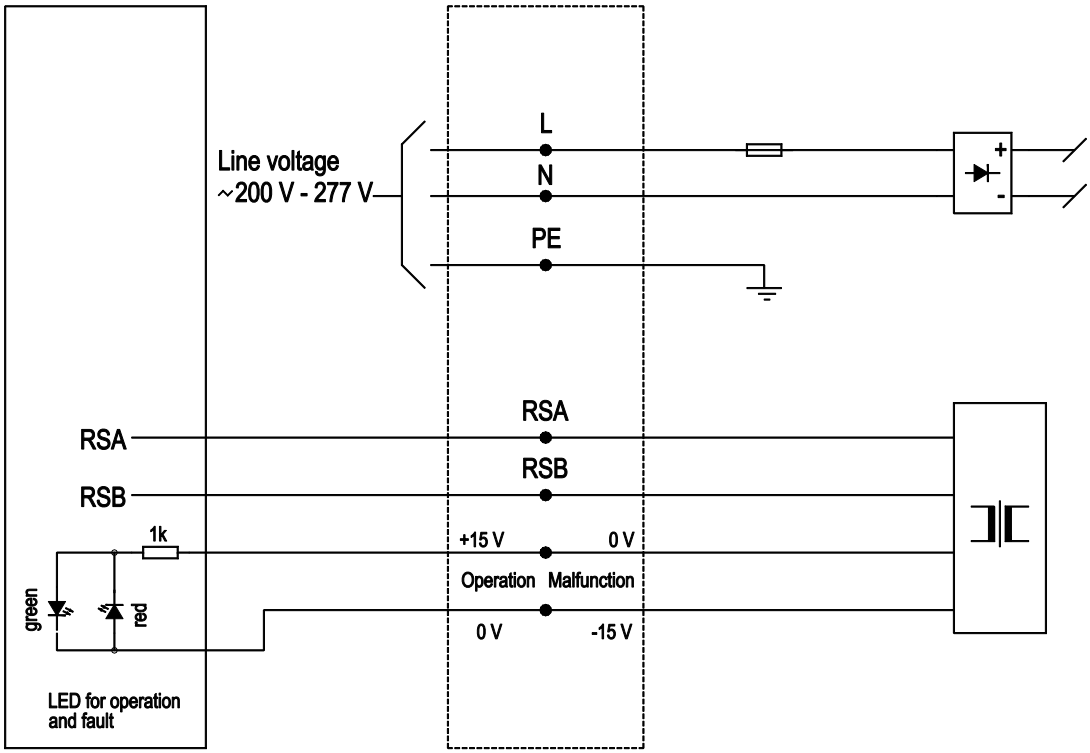
Factory settings made for the device by ebm-papst.

Mode	Speed control
Group address	01
Fan/device address	01
Max. PWM / %	100
Min. PWM / %	0
Save set value to EEPROM	Yes
Set value requirement	RS485 (ebm-Bus)
Direction of action	Positive (heating)

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4.5 Connection diagram

Customer circuit | Connection | Fan / Motor



Drawing preliminary!

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4.6 Checking connections

⇒ Ensure isolation from supply (all phases).

⇒ Make sure a restart is impossible

⇒ Check whether the mating connector is properly engaged with the built-in connector.

⇒ Check that the mating connector is correctly attached to the cable.

4.7 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 hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.

⇒ 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 foreign matter found.

⇒ Apply the nominal supply voltage.

⇒ Start the device by changing the input signal.

4.8 Switching off the device

⇒ Disconnect the device from the power supply at the supply line's main switch.

⇒ When disconnecting, be sure to disconnect the ground connection last.

5. INTEGRATED PROTECTIVE FEATURES

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.
Line undervoltage (line voltage outside of permitted nominal voltage range)	⇒ If the line voltage returns to permitted values, the motor restarts automatically.

6. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

Do not perform any repairs on your device. Send the device to ebm-papst 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
The motor restarts automatically when operating voltage is applied, e.g. after a power failure.
Risk of injury

→ Keep out of the motor's danger zone.

→ When working on the motor, switch off the line voltage and ensure that it cannot be switched back on.

→ Wait until the motor comes to a stop.

CAUTION
If control voltage or a stored 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.

→ After working on the device, remove any tools or other objects from the device.

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

Malfunction/fault	Possible cause	Possible remedy
Rotor not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.

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	Line voltage faulty	Check line voltage, restore power supply, apply control signal.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Thermal overload protector activated	Allow motor to cool off, locate and rectify cause of error, release restart lockout if necessary
Motor/electronics overtemperature	Deficient cooling	Improve cooling. Let the device cool down. To reset the error message, switch off the line voltage for at least 25 s and then switch it on again.
	Ambient temperature too high	Reduce the ambient temperature. Let the device cool down.
	Impermissible point of operation	Correct the operating point. Let the device cool down.

In the event of further malfunctions, contact ebm-papst.

6.1 Cleaning

NOTE
Damage to the device during cleaning
Malfunction possible

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

6.2 Safety inspection

NOTE
High-voltage test
The integrated EMC filter has Y capacitors. The tripping current is exceeded when AC testing voltage is applied.

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

What to check	How to check	How often	What action?
Device for damage	Visual inspection	At least every 6 months	Replace device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

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

- Steel and iron
- Aluminum
- 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 Mulfingen GmbH & Co. KG.

⇒ 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

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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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