

ebm-papst Mulfingen GmbH & Co. KG
 Bachmühle 2
 D-74673 Mulfingen
 Phone +49 (0) 7938 81-0
 Fax +49 (0) 7938 81-110
 info1@de.ebmpapst.com
 www.ebmpapst.com

CONTENTS

| | |
|---|----------|
| 1. SAFETY REGULATIONS AND NOTES | 1 |
| 1.1 Levels of hazard warnings | 1 |
| 1.2 Staff qualification | 1 |
| 1.3 Basic safety rules | 1 |
| 1.4 Electrical voltage | 1 |
| 1.5 Safety and protective functions | 2 |
| 1.6 Electromagnetic radiation | 2 |
| 1.7 Mechanical movement | 2 |
| 1.8 Emission | 2 |
| 1.9 Hot surface | 2 |
| 1.10 Storage | 2 |
| 1.11 Disposal | 2 |
| 2. PROPER USE | 3 |
| 3. TECHNICAL DATA | 4 |
| 3.1 Product drawing | 4 |
| 3.2 Nominal data | 5 |
| 3.3 Technical features | 5 |
| 3.4 Mounting data | 5 |
| 3.5 Transport and storage conditions | 5 |
| 3.6 Electromagnetic compatibility | 5 |
| 4. CONNECTION AND START-UP | 6 |
| 4.1 Connecting the mechanical system | 6 |
| 4.2 Connecting the electrical system | 6 |
| 4.3 Connection of the cables | 6 |
| 4.4 Connection screen | 7 |
| 4.5 Checking the connections | 8 |
| 4.6 Switch on device | 8 |
| 4.7 Switching off the device | 8 |
| 5. INTEGRATED PROTECTIVE FUNCTIONS | 8 |
| 6. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES | 9 |
| 6.1 Cleaning | 9 |
| 6.2 Safety test | 9 |

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

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

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.

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.



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

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

If control voltage is applied or a speed setpoint is stored, the motor automatically restarts, 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 tools 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 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 Hot surface**CAUTION**

High temperature at the electronics enclosure

Danger of burn injuries

→ Ensure that sufficient protection against accidental contact is provided.

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.

1.11 Disposal

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

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.
- 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.

3.2 Nominal data

| | |
|-------------------------------|-----------|
| Motor | M3G055-BD |
| Phase | 1~ |
| Nominal voltage / VAC | 115 |
| Frequency / Hz | 50/60 |
| Type of data definition | ml |
| State | prelim. |
| Speed / min ⁻¹ | 2320 |
| Power input / W | 46 |
| Current draw / A | 0.70 |
| Min. back pressure / Pa | 0 |
| Min. ambient temperature / °C | -25 |
| Max. ambient temperature / °C | 60 |

ml = max. load · me = max. efficiency · fa = running at free air
 cs = customer specs · cu = customer unit

Subject to alterations

3.3 Technical features

| | |
|--|---|
| Mass | 1.8 kg |
| Size | 120 mm |
| Surface of rotor | Galvanised |
| Material of electronics housing | Die-cast aluminium |
| Material of impeller | Hot-dip galvanized sheet steel |
| Housing material | Die-cast aluminium |
| Direction of rotation | Clockwise, seen on rotor |
| Type of protection | IP 44 |
| Insulation class | "B" |
| Humidity class | F3-1 |
| 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 |
| Technical features | Control input 0-10 VDC / PWM, output 10 VDC max. 1.1 mA, tach output, locked rotor protection |
| Touch current acc. IEC 60990 (measuring network Fig. 4, TN system) | <= 3.5 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 60335-1 |
| Approval | UL 2111; GOST |



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 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).

| | |
|------------------------------------|-----|
| Strength class for mounting screws | 8.8 |
|------------------------------------|-----|

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 |

3.6 Electromagnetic compatibility

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

4. CONNECTION AND START-UP

4.1 Connecting the mechanical system



CAUTION

Cutting and crushing hazard when removing the blower from the packaging



→ Carefully remove the blower from its packaging, only touching the housing. 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.



DANGER

Electrical load (>50 µC) between mains wire and protective earth connection after switching of the supply when switching multiple devices in parallel.

Electric shock, risk of injury

→ Make sure that sufficient protection against accidental contact is provided.

Before working on the electrical connection, the connections to the mains supply and PE must be shorted.

CAUTION

Electrical voltage

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

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

→ When working on the device, you must switch off the system/machine in which the device 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 Idle current



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

- The values lie in a range of typical < 50 mA.
- The effective power in this operating state (readiness for operation) is simultaneously at typical < 2 W.

4.2.3 Residual current operated device



Only pulse-current sensitive and/or universal RCD protective devices (Type A or B) are permitted. Like frequency inverters, RCD protective devices cannot provide personal safety while operating the device. When switching on the power supply of the device, pulsed charge currents from the capacitors in the integrated EMC filter can lead to the RCD protective devices triggering without delay. We recommend residual current devices with a trigger threshold of 300 mA and delayed triggering (super-resistant, characteristic K).

4.2.4 Locked-rotor protection



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

4.3 Connection of the cables

External leads are brought out of device.

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

The figure consists of two main circuit diagrams: the 'Customer circuit' on the left and the 'Interface' circuit on the right.

Customer circuit: This diagram shows two input methods for speed control. The top section, labeled 'adjustable speed', shows a 1-10V potentiometer connected to terminals 6, 7, and 4. It includes a note: '10V → n=max', '1.4V → n=min', and '<1V → n=0'. The bottom section, labeled 'adjustable speed above PWM 1-10kHz', shows a 15V source connected to a 10mA current source and a 12V diode, which is then connected to terminals 7 and 4. It includes a note: '100% PWM → n = max', '14% PWM → n = min', and '< 10% PWM → n=0'.

Interface: This diagram shows the connection between the customer circuit and the 'ebm-papst side'. It includes a 2AT transformer for AC input (AC1, AC2) connected to terminals 2, 3, and 1 (PE). A +10V source is connected to terminal 6, and a 10V/PWM source is connected to terminal 7. A 47k resistor and a 47k resistor are connected between terminals 7 and 4 (GND). A 1uF capacitor is connected between terminals 7 and 4. A 680R resistor and a ZMM47 diode are connected between terminals 5 (Tach) and 4 (GND). A 10K resistor is connected between terminals 6, 7, and 4. The ebm-papst side includes a 2AT transformer, a 10V/PWM source, a 47k resistor, a 47k resistor, a 1uF capacitor, a ZMM47 diode, and a 680R resistor.

| Line | No. | Signal | Colour | Function / assignment |
|------|-----|-----------------|------------------|--|
| | 1 | PE | green/ yellow | Protective earth |
| | 2 | L | brown | Power supply 115 VAC, 50-60 Hz, see type plate for voltage range |
| | 3 | N | blue | Neutral conductor |
| | 4 | GND | blue | GND - Connection for control interface |
| | 5 | Tach | white | Tach output: open collector, 1 pulse per revolution, electrically isolated |
| | 6 | 10V/ max. 1,1mA | red | Voltage output 10 V/ 1.1 mA, electrically isolated |
| | 7 | 0-10V PWM | yellow | Control input 0 - 10 V or PWM, electrically isolated |

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.
- ⇒ Route the connecting cables in the terminal box so that the terminal box cover closes without resistance.
- ⇒ Use all plug screws (the entire number). In doing so, insert the screws manually to avoid damage to the thread.

4.6 Switch on device



WARNING
Hot motor housing
 Fire hazard

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

- ⇒ 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.
- ⇒ Start the device by changing the input signal.

4.7 Switching off the device

Switching off the device during operation:

- ⇒ Switch on the device via the control input.
- ⇒ Do not switch the motor (e.g. in cyclic operation) on and off via power supply.

Switching off the device for maintenance work:

- ⇒ Switch on the device via the control input.
- ⇒ Do not switch the motor (e.g. in cyclic operation) on and off via power supply.
- ⇒ Disconnect the device from the supply voltage.
- ⇒ When disconnecting, be sure to disconnect the earth wire connection last.

5. INTEGRATED PROTECTIVE FUNCTIONS

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

| Malfunctions | Description / Function of safety feature |
|--------------------------------|--|
| Rotor position detection error | An automatic restart occurs. |
| Locked rotor | ⇒ After the blockage is removed, the motor restarts automatically. |
| Motor overload | After cooling the device restarts automatically. |

6. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

Do not perform any repairs on your device. Return the device to ebm-papst 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

If control voltage is applied or a speed setpoint is stored, the motor automatically restarts, 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 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, apply control signal. |
| | Faulty connection | De-energise, correct connection, see connection diagram. |
| | Thermal overload protector responded | Allow motor to cool off, locate and rectify cause of error, if necessary cancel restart lock-out |

| | | |
|--------------------------------------|------------------------------|--|
| Overtemperature of electronics/motor | Insufficient cooling | Improve cooling. Let the device cool down. To reset the error message, switch off the mains supply voltage for a min. of 25 s and switch it on again. |
| | Ambient temperature too high | Reduce the ambient temperature. Reset by reducing control input to 0. |
| | Unacceptable operating point | Correct the operating point. Let the device cool down. |



If you have any other problems, 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 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 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 connection 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 |
| Check the ball bearings to ensure they are quiet, can move easily and are free of play | Manual check by turning the rotor in shut-off state | At least every 6 months | Replace device in case of noise, difficulty of movement or clearance of the bearings |



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.