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.

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 will restart automatically, e.g. after a mains failure.
Risk of injury
→ Keep out of the device hazard zone. When working on the device, switch off the mains power and ensure that it cannot be switched back on.
→ Wait until the device stops.
→ After working on the device, remove any tools used or other objects from the device.

1.5 Safety and protective functions

DANGER
Protective device missing and protective device not functioning
Without a protective device there is a risk of serious injury, for instance when reaching 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 a protective device is found to be missing or ineffective.

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, dangling items of clothing, jewellery and similar items can become entangled and be pulled into the device. Risk of injury.
→ Do not wear any loose-fitting or dangling clothing or jewellery while working on rotating parts. Protect long hair with 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 housing
Risk of burns
→ Ensure sufficient contact protection.

1.10 Transport

NOTE
Transporting the device
→ Transport the device in its original packaging only.

1.11 Storage

→ Store the device, partially or fully assembled, in the original packaging in a clean, dry and weatherproof place free of vibrations.
→ 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 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 3.6 Transport and storage conditions.
2. PROPER USE

The device is exclusively designed as a built-in device for conveying air according to its technical data. 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.

Proper use also includes:

- Use of the device in stationary systems only.
- Conveying of air at an ambient air pressure of 800 mbar to 1050 mbar.
- Using the device in accordance with the permitted ambient temperature, see chapter 3.6 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.
- Resonance mode, operation with heavy vibrations. These also include vibrations that are transmitted from the customer system to the fan.
- 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. TECHNICAL DATA

#### 3.1 Product drawing

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Accessory part: Inlet nozzle 96358-2-4013, not included in the standard scope of delivery</td>
</tr>
<tr>
<td>2</td>
<td>Thread reach max. 5 mm</td>
</tr>
<tr>
<td>3</td>
<td>Thread reach max. 10 mm</td>
</tr>
<tr>
<td>4</td>
<td>Connection line PVC 3G AWG20; 3x lead tips crimped</td>
</tr>
<tr>
<td>5</td>
<td>Connection line PVC 4X AWG22; 4x lead tips crimped</td>
</tr>
</tbody>
</table>

All measures have the unit mm.
All measures have the unit mm.

| 1 | Accessory part: Inlet nozzle 96358-2-4013 not included in scope of delivery |
3.2 Nominal data

| Motor | M3G055-DF |
| Nominal voltage / VAC | Phase 1~ |
| Nominal voltage range / VAC | 200 .. 240 |
| Frequency / Hz | 50/60 |
| Type of data definition | ml |
| Speed (rpm) / min⁻¹ | 2860 |
| Power input / W | 170 |
| Current draw / A | 1.4 |
| Min. ambient temperature / °C | -25 |
| Max. ambient temperature / °C | 60 |

ml = Max. load · me = Max. efficiency · fa = Running at free air
ca = Customer specs · cu = Customer unit

Subject to alterations

3.3 Data in accordance with ecodesign regulation EU 327/2011

<table>
<thead>
<tr>
<th>Actual</th>
<th>Request 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Overall efficiency ηes / %</td>
<td>61.7</td>
</tr>
<tr>
<td>02 Measurement category</td>
<td>A</td>
</tr>
<tr>
<td>03 Efficiency grade N</td>
<td>Static</td>
</tr>
<tr>
<td>04 Efficiency grade N</td>
<td>80.6</td>
</tr>
<tr>
<td>05 Variable speed drive</td>
<td>Yes</td>
</tr>
<tr>
<td>07 Manufacturer</td>
<td>ebm-papst Mulfingen GmbH &amp; Co. KG</td>
</tr>
<tr>
<td>07 Manufacturer</td>
<td>County court Stuttgart · HRA 590344</td>
</tr>
<tr>
<td>07 Manufacturer</td>
<td>D-74673 Mulfingen</td>
</tr>
<tr>
<td>08 Type</td>
<td>R3G225-RE07-03</td>
</tr>
<tr>
<td>09 Power input Pₑd / kW</td>
<td>0.16</td>
</tr>
<tr>
<td>09 Air flow qᵥ / m³/h</td>
<td>705</td>
</tr>
<tr>
<td>09 Pressure increase total pₛ / Pa</td>
<td>458</td>
</tr>
<tr>
<td>10 Speed (rpm) n / min⁻¹</td>
<td>2865</td>
</tr>
<tr>
<td>11 Specific ratio*</td>
<td>1.00</td>
</tr>
<tr>
<td>12 Recycling/disposal</td>
<td>Information on recycling and disposal is provided in the operating instructions.</td>
</tr>
<tr>
<td>13 Maintenance</td>
<td>Information on installation, operation and maintenance is provided in the operating instructions.</td>
</tr>
<tr>
<td>14 Additional components</td>
<td>Components used to calculate the energy efficiency that are not apparent from the measurement category are detailed in the CE declaration.</td>
</tr>
</tbody>
</table>

* Specific ratio = 1 + pₛ / 100 000 Pa

Data definition with optimum efficiency. The ErP data is determined using a motor-impeller combination in a standardised measurement configuration.

3.4 Technical features

| Mass | 1.75 kg |
| Size | 225 mm |
| Surface of rotor | Thick layer passivated |
| Material of electronics housing | Die-cast aluminium |
| Material of impeller | PA plastic |
| Number of blades | 7 |
| Direction of rotation | Clockwise, seen on rotor |
| Type of protection | IP 54 |
| Insulation class | “B” |
| Mounting position | Any |
| Condensate discharge holes | None, open rotor |
| Operation mode | S1 |
| Motor bearing | Ball bearing |

Technical features
- Output 10 VDC, max. 10 mA
- Tach output
- Motor current limit
- Soft start
- Control input 0-10 VDC / PWM
- Control interface with SELV potential safely disconnected from the mains
- Overvoltage detection
- Over-temperature protected electronics / motor
- Line undervoltage detection

Touch current acc. IEC 60990 (measuring network Fig. 4, TN system) <= 3.5 mA

Motor protection | Locked-rotor protection

Cable exit | Variable

Protection class | I (if protective earth is connected by customer)

Product conforming to standard | EN 60335-1; CE

Approval | CCC; C22.2 Nr.77 + CAN/CSA-ES0730-1; UL 1004-7 + 60730; 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 for support.

→ Use the device in accordance with its protection type.

Notes on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may vary during the production period. Strength, dimensional stability and dimensional accuracy are not affected by this.

The colour pigments of the paints used react perceptibly to UV light over the course of time. This does not however have any influence on the technical properties of the products. To prevent the formation of patches and fading, the product is to be protected against UV radiation. Changes in colour are not a reason for complaint and are not covered by the warranty.
3.5 Mounting data
For depth of screw, see chapter 3.1 Product drawing

| Strength class for mounting screws | 8.8 |

→ 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 or Section chapter 4.1 Connecting the mechanical system.

3.6 Transport and storage conditions

| Max. permissible ambient motor temp. (transp./storage) | + 80 °C |
| Min. permissible ambient motor temp. (transp./storage) | - 40 °C |

4. CONNECTION AND START-UP

4.1 Connecting the mechanical system

CAUTION Cutting and crushing hazard when removing the fan from the packaging
→ Carefully hold the impeller to remove the device from its packaging. Make sure to avoid any shock.
→ Wear safety shoes and cut-resistant safety gloves.

NOTE Damage to device from vibration
Bearing damage, reduced service life
→ Forces or impermissibly high vibration levels must not be transmitted to the fan from system components. #If the fan is connected to air ducts, it should be isolated from vibrations, for example using compensators or similar elements. #Fasten the fan to the substructure without distorting it.
→ Check the device for transport damage. Damaged devices must no longer be installed.
→ Install the undamaged device according to your application.

CAUTION Possibility of damage to the device
Serious damage may result if the device slips during assembly.
→ Keep the device fixed in position at the installation location until all attachment screws have been tightened.
→ The fan must not be strained on fastening.

4.2 Connecting the electrical system

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

4.2.1 Prerequisites
→ Check that the data on the type plate match 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.

Protective earth contact resistance as per EN 60335
Compliance with the resistance specifications as per EN 60335 for the protective earth connection circuit must be verified in the application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.
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 are typically in the range < 50 mA
- At the same time, the effective power in this operating state (operational readiness) is typically < 2 W.

4.2.3 Residual current operated device

If the use of a residual current device (RCD) is required in your installation, only pulse current-sensitive and/or universal residual current devices (type A or B) are permissible. Residual current devices (RCD) cannot provide personal safety while operating the device, as is also the case with frequency converters. When the device power supply is switched on, charging current pulses from the capacitors in the integrated EMC filter can lead to the instant triggering of residual current devices. We recommend residual current circuit breakers (RCCB) with an activation threshold of 300 mA and delayed tripping (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.
4.4 Connection screen

<table>
<thead>
<tr>
<th>No.</th>
<th>Conn.</th>
<th>Designation</th>
<th>Colour</th>
<th>Function / assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON10</td>
<td>L</td>
<td>black</td>
<td>Mains connection, power supply, phase, see type plate for voltage range</td>
<td></td>
</tr>
<tr>
<td>CON11</td>
<td>N</td>
<td>blue</td>
<td>Mains connection, power supply, neutral conductor, see type plate for voltage range</td>
<td></td>
</tr>
<tr>
<td>CON12</td>
<td>PE</td>
<td>green/yellow</td>
<td>Earth connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0-10V PWM</td>
<td>yellow</td>
<td>0-10 V/PWM control input, R=100 kΩ, SELV</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Tach</td>
<td>white</td>
<td>Speed monitoring output, open collector, 1 pulse per revolution, Isink max = 10 mA, SELV</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>+10V</td>
<td>red</td>
<td>Fixed voltage output 10 VDC +/−3 %, Imax. 10 mA, short-circuit-proof, power supply for ext. devices (e.g. potentiometer), SELV</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>GND</td>
<td>blue</td>
<td>Signal ground for control interface, SELV</td>
<td></td>
</tr>
</tbody>
</table>

---

Translation of the original operating instructions

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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
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 is not to be switched on until it has been installed properly and in accordance with its intended use, including the required protective devices and professional electrical connection. This also applies to 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.
→ Start the device by changing the input signal.

NOTE
Damage to device by vibrations
Bearing damage, reduced service life

→ The fan must operate free of vibrations throughout its speed control range. #Strong vibrations can result from improper handling, imbalance resulting from damage during transport, or component-induced or structural resonances. #When putting the fan into service, determine the speed ranges with excessive vibration levels and also any resonance frequencies that may be present. #When regulating the speed, pass through resonance ranges as quickly as possible or find another remedy. #Operation at excessive vibration levels can lead to premature failure.

4.7 Switching off the device

Switching off the device during operation:
→ Switch off 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 off 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.

<table>
<thead>
<tr>
<th>Malfunctions</th>
<th>Description / Function of safety feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotor position detection error</td>
<td>An automatic restart occurs.</td>
</tr>
<tr>
<td>Locked rotor</td>
<td>After the blockage is removed, the motor restarts automatically.</td>
</tr>
</tbody>
</table>

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 will restart automatically, e.g. after a mains failure.
Risk of injury

→ Keep out of the device hazard zone. #When working on the device, switch off the mains power and ensure that it cannot be switched back on.
→ Wait until the device stops.
→ After working on the device, remove any tools used 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.

<table>
<thead>
<tr>
<th>Malfunction/error</th>
<th>Possible cause</th>
<th>Possible remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impeller running roughly</td>
<td>Imbalance in rotating parts</td>
<td>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.</td>
</tr>
<tr>
<td>Motor does not turn</td>
<td>Mechanical blockage</td>
<td>Switch off, de-energise, and remove mechanical blockage.</td>
</tr>
<tr>
<td>Mains supply voltage faulty</td>
<td></td>
<td>Check mains supply voltage, restore power supply, apply control signal.</td>
</tr>
</tbody>
</table>
Operating instructions

Faulty connection
De-energise, correct connection, see connection diagram.

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.

Check the insulation of the wires for damage
Visual inspection
At least every 6 months
Replace wires

Impeller for wear/deposits/corrosion and damage
Visual inspection
At least every 6 months
Clean or replace impeller

Abnormal bearing noise
acoustic
At least every 6 months
Replace device

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 cleaner. Do not use any acid, alkali or solvent-based cleaning agents. Do not use any pointed or sharp-edged objects for cleaning.

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 to test | 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

6.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

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, 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 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 lines
- 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.