

MMG-H IE4

50 Hz

Installation and operating instructions



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MMG-H IE4

English (GB)

Installation and operating instructions 4

English (GB) Installation and operating instructions

Original installation and operating instructions

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1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:

SIGNAL WORD



Description of the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or grey circle with a white graphical symbol indicates that an action must be taken.



A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

2. Product introduction

2.1 Product description

The electrical machines mentioned in these instructions are intended as components for use in industrial areas. The information contained in this documentation is designed for use by qualified persons who are familiar with the current rules and regulations in force. They are not intended to replace any installation regulations issued for safety purposes. Low voltage motors are to be considered as components to be installed on machines. Commissioning is forbidden until the final product has been checked for conformity.

This manual applies to all the standard series of MMG-H and various series of motors derived from it. Frame size: 56-355. (For some special designed types of motors or those for special applications, it needs to refer to other special instructions.)

2.1.1 Electromagnetic compatibility

Low voltage induction motors, if installed correctly and connected to the power supply, respect all immunity and emission limits as set out in the regulations relating to electromagnetic compatibility (EMC generic standard for industrial environments).

In the case of supply by means of electronic impulse (inverters, soft starters, etc.), all verifications and any modifications necessary to ensure that emission and immunity limits stated within the regulations are respected, are the responsibility of the installer.

2.1.2 Motors for classified areas

Motors to be used in dangerous areas are designed in compliance with European standards, using protection methods that are suitable for guaranteeing safety in areas subject to risk of fire and explosion. Where these motors are used improperly or modified, their safety may be impaired.

2.2 Standards and specifications

Title	International IEC	EU CENELEC	I CEI-EN	GB BS	F NFC	D DIN/VDE
Electrical rotating machines/rated operation and characteristic data	IEC 60034-1	EN 60034-1	CEI-EN 60034-1 (CEI 2-3)	BS 4999-1 BS 4999-69	NFC51-100 NFC 51-111	VDE 0530-1
Methods for determining losses and efficiency of rotating electrical machinery	IEC 60034-2	EN 60034-2	CEI-EN 60034-2 (CEI 2-6)	BS 4999-34	NFC 51-112	VDE 0530-2
Protection types of rotating electrical machines	IEC 60034-5	EN 60034-5	CEI-EN 60034-5 (CEI 2-16)	BS 4999-20	NFC 51-115	VDE 0530-5
Cooling methods of rotating electrical machines	IEC 60034-6	EN 60034-6	CEI-EN 60034-6 (CEI 2-7)	BS 4999-21	IEC 34-6	DIN IEC 34-6
Construction types of rotating electrical machines	IEC 60034-7	EN 60034-7	CEI-EN 60034-7 (CEI 2-14)	BS 4999-22	NFC 51-117	DIN IEC 34-7

Title	International I IEC	EU CENELEC	I CEI-EN	GB BS	F NFC	D DIN/VDE
Terminal markings and direction of rotation for electrical machines	IEC 60034-8	EN 60034-8	CEI 2-8	BS 4999-3	NFC 51-118	VDE 0530-8
Noise emission, limit values	IEC 60034-9	EN 60034-9	CEI-EN 50034-9 (CEI 2-24)	BS 4999-51	NFC 51-119	VDE 0530-9
Start-up behaviour of squirrel-cage motors at 50 Hz up to 660 V	IEC 60034-12	EN 60034-12	CEI-EN 60034-12 (CEI 2-15)	BS 4999-112	IEC 34-12	VDE 0530-12
Vibration severity of rotating electrical machines	IEC 60034-14	EN 60034-14	CEI EN 60034-14 (CEI 2-23)	BS 4999-50	NFC 51-111	DIN ISO 2373
Fixing dimensions and output for IM B3	IEC 60072	EN 50347	IEC 60072	BS 4999-10	NFC 51- 104/110	DIN 42673
Fixing dimensions and output for IM B5, IM B14	IEC 60072	EN 50347	IEC 60072	BS 4999-10	NFC 51- 104/110	DIN 42677
Cylindrical shaft ends for electrical machines	IEC 60072	EN 50347	IEC 60072	BS 4999-10	NFC 51-111	DIN 748-3
Electrical equipment for hazardous area General Provisions	IEC 60079-0	EN 60079-0	(CEI 31-8)	BS 5501-1	NFC 23-514	VDE 0171-1
Electrical equipment for hazardous area Flame-proof enclosure "d"	IEC 60079-1	EN 60079-1	(CEI 31-1)	BS 5501-5	NFC 23-518	VDE 0171-5
Electrical equipment for hazardous area Increased safety "e"	IEC 60079-7	EN 60079-7	(CEI 31-7)	BS 5501-6	NFC 23-519	VDE 0171-6
Checking and maintenance at electrical systems in places in danger of explosion due to the presence of gas	IEC 60079-17	EN 60079-17	CEI EN 60079-17	---	---	---
Electrical systems in places in danger of explosion due to the presence of gas	IEC 60079-14	IEC 60079-14	IEC 60079-14	---	---	---

Title	International IEC	EU CENELEC	I CEI-EN	GB BS	F NFC	D DIN/VDE
Classification of dangerous places due of the presence of gas	IEC 60079-10	EN 60079-10	CEI EN 60079-10	---	---	---
Checking and maintenance of electrical systems in places in danger of explosion due to the presence of dust	IEC 61241-17	EN 61241-17	CEI EN 61241-17	---	---	---
Electrical systems in places in danger of explosion due to the presence of dust	IEC 61241-14	EN 61241-14	CEI EN 61241-14	---	---	---
Classification of dangerous places due of the presence of dust	IEC 61241-10	EN 61241-10	CEI EN 61241-10	---	---	---

3. General safety warnings

WARNING

Rotating parts

Death or serious personal injury



- Improper use, removal and disconnection of protection devices, and lack of inspection and maintenance can cause death or serious personal injury.

WARNING

Electric shock

Death or serious personal injury



- Switch off the power supply before you start any work on the product.

WARNING

Hot surface

Death or serious personal injury



- In normal working conditions, the temperature of the motor exceeds 50 °C. Use personal protective equipment when working on the product.

- ability to recognise and avoid all possible dangers.

Work on the electric machine should be carried out with the authorisation of the safety manager after having ensured the following:

- The motor has been disconnected from the power supply and no parts of the motor, including auxiliary parts, are active.
- The capacitor of single-phase motors has been discharged.
- The motor is completely stopped and there is no danger of accidental restart.
- The right precautions against faulty braking operations have been taken for self-braking motors.

Where thermal protection with automatic reset is used, care must be taken to ensure that automatic restart cannot occur. As the motor is intended to be used in industrial areas where more stringent protective measures are needed, additional protective measures must be taken and guaranteed by the person responsible for the installation.

The safety manager must ensure and guarantee that:

- the machine is moved, installed, put into service, inspected, maintained and repaired only by qualified persons who should have:
 - specific technical training and experience
 - knowledge of technical standards and applicable laws
 - knowledge of general safety regulations as well as national, local and installation regulations

4. Receiving the product

The motors are shipped ready for installation. Upon receipt, remove packaging and turn the shaft to check the motor has not been damaged, also check all physical aspects of the machine for damage. In the case where the machine is damaged, an immediate notification must be given in writing by the storeman and the representative of the carrier to Grundfos within three days.

5. Mechanical installation



Work on the electric machine must be carried out when the machine has stopped and been disconnected from the power supply (including auxiliary parts, such as anticondensation heaters).

5.1 Lifting the product



Before using the lifting rings, make sure they have been tightened.



The lifting rings are big enough to bear the weight of a single motor, therefore they must not be used to lift the equipment connected to the motor.



In environments where the temperature is below -20 °C, these lifting rings should be used with caution as they could break at low temperatures and cause damage.

5.2 Assembling the connecting device



Fitting pulley, coupling or gear to the motor shaft must be carried out with care to ensure no damage is caused to the bearing.



Fitments not balanced properly can cause anomalous vibrations during operation that jeopardizes the proper working of the motor and drastically reduces its life.

1. Remove the protective paint finish from the shaft and smear with oil.
2. Fit the device, heating before fitting, if possible, to ensure an easy fit.

Any component that is assembled on the motor shaft must be accurately balanced. The motor is normally balanced using a half key and the letter H is punched on the shaft.

5.3 Direct connection

Use couplings that have been made and balanced perfectly to align the motor shaft and the operating machine precisely.



Inaccurate alignment may cause vibrations and damage to the bearings or breakage of the shaft end.

5.4 Connection by means of pulley

Check that alignment with the pulley of the operating machine has been carried out perfectly. The tension of the belts must be enough to avoid slipping.

Excessive tension of the belts causes harmful radial loads on the motor shaft and bearings, reducing their life.



Excessive tension of the belts causes harmful radial loads on the motor shaft and bearings, reducing their life.



We recommend assembling the motor on belt-tensioning slides in order to accurately adjust the tension of the belts.

A connection with belts must be such as to avoid accumulation of static charges in the moving belts which could cause sparks.

5.5 Connecting to the power supply



Use cables with sufficient section to bear the maximum current absorbed by the motor, avoiding overheating and/or drops in voltage.



Connections to the terminals must be made in order to guarantee safe distances between live uncovered parts.



Earthing is through the screw located inside the terminal box. Earths must be of sufficient size and installed according to relevant standards. The area of contact of connections must be cleaned and protected against corrosion.



When the cable inlet is made by means of a cable gland, it must be chosen properly in relation to the type of equipment and type of cable used. The cable gland must be tightened so that the retaining rings create the pressure necessary to:

- prevent transmission of mechanical stress to the motor terminals
- ensure the mechanical (IP degree) protection of the terminal box.

1. Connect the cables to terminals by following the instructions on the nameplate or on the diagram included in the terminal box.
2. Make sure that the terminal nuts are tightened.

5.6 Connection of auxiliary parts

Thermal protection

Check which type of protection is installed before making connections. If thermistors (PTC) are used, it is necessary to utilise a suitable relay.



Do not apply a tension over 6 V during the thermistor continuity test.

Anticondensation

If the motor is fitted with anticondensation heaters, their power supply must be separated from that of the motor, using the terminals housed in the terminal box.



The supply of the heater is always mono-phase and the voltage is different from that of the motor. Check that it corresponds to the one indicated on the nameplate.

Auxiliary ventilation

Connect the supply of the auxiliary ventilation motor separately from that of the main motor.



Use a device that allows starting and operation of the main motor only when the auxiliary fan is working.

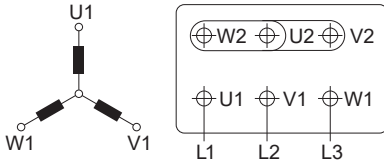
5.7 Fixing to the base

The bolts fixing the motor to the base must be fitted with washers to ensure adequate load distribution.

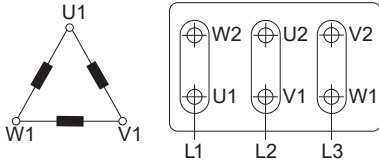
6. Electrical connection

6.1 Wiring diagrams

Connection for single-speed motors



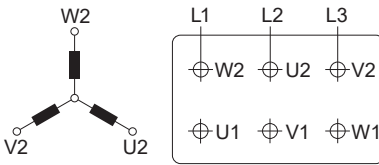
Y-connection



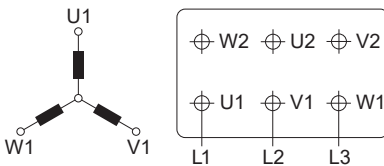
D-connection

Number of poles: 2, 4, 6, 8. Synchronous speed at 50 Hz: 3000, 1500, 1000, 750, etc.

Two separate windings for two-speed motors



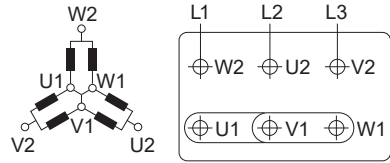
High speed



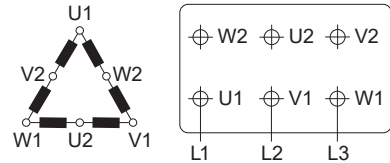
Low speed

Number of poles: 2/6, 2/8, 4/6, 6/8, etc. Synchronous speed at 50 Hz: 3000/1000, 3000/750, 1500/1000, 1000/750, etc.

Dahlander system for two-speed motors, constant torque



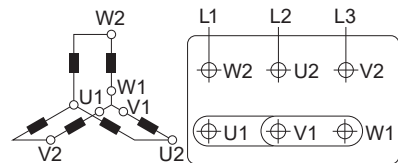
High speed



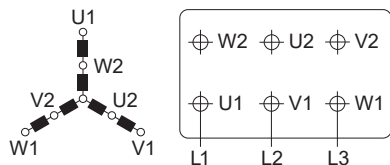
Low speed

Number of poles: 2/4, 4/8. Synchronous speed at 50 Hz: 3000/1500, 1500/750.

Dahlander system for two-speed motors, quadratic torque



High speed



Low speed

Number of poles: 2/4, 4/8. Synchronous speed at 50 Hz: 3000/1500, 1500/750.

Connection for single-phase and special motors

For single-phase motors and motors with special connections, refer to the diagrams provided with the motor.

Related information

[7.2.3 Electrical characteristics](#)

[10.1 The motor does not start](#)

[10.5 Functioning of the protective device](#)

7. Startup

It is the responsibility of the installer to determine whether the motor is suitable to be used in a certain plant, after analysing the characteristics of danger existing in the installation area with respect to current provisions of the law and to those issued for safety purposes.

7.1 Initial controls

Before starting the motor, it is important to check that:

- installation has been carried out properly
- the bearings have not been damaged during installation
- the motor base is sturdy enough, and the foundation bolts have been tightened
- the design data corresponds to those given on the nameplate and in the technical documentation.

The electric motor is a component made to be mechanically connected to another machine (single or part of a plant). Consequently, it is the task of the person responsible for the installation to guarantee that during operation there is an adequate degree of protection for people or things against the danger of accidental contact with moving parts.

7.2 Control of design data

Make sure that the motor is suited for use in the working conditions foreseen.

7.2.1 Environmental conditions

Check the following:

- Ambient temperature: standard closed motors can operate between -15 to +40 °C.
- Altitude: normal motors are designed to work between 0 and 1000 m above sea level.
- Protection against mechanical stress, vibrations and the presence of harmful substances like sand, corrosive media, dust, fibre and water.
- Mechanical protection: install indoors or outdoors considering the harmful effects of the weather, the combined effect of temperature and humidity and the formation of condensation.
- Adequate space around the motor, especially on the fan side to allow proper ventilation.
- Motors mounted in the vertical orientation and shaft down require a protective cowl over the fan inlet.
- Any danger of explosion or fire.

7.2.2 Operating conditions

Check the following:

- The motor must only be assembled and operated in the construction form indicated on the motor's nameplate.
- Operation type: the motors are normally for S1 duty (continuous operation).

- Load type: carefully evaluate the high moments of inertia and the relative starting time of the motor.
- For self-braking motors, see the special applications in the relevant catalogue.

7.2.3 Electrical characteristics

Check the following:

- Voltage and frequency should correspond to those on the nameplate.
- Motor power should be adequate as required by the load.
- Power supply protection against overloads and/or short circuits should be adequate for the nominal current and the starting current.
- For connection to control circuits, follow the wiring diagrams supplied with the motor. See section about wiring diagrams.

Abnormal operating conditions must always be defined when placing the order to ensure that the on-site conditions do not hinder the proper operation of the motor.

Related information

6.1 Wiring diagrams

7.2.4 Other checks before commissioning

- Make sure that the motor rotates in the correct direction and that the speed limit is not exceeded when the inverter is activated.
- Make sure that the motor is protected as prescribed in the standards.
- When using a star-delta starter, avoid the risk of overloading and make sure that the switchover from star to delta only takes place when the starting current has been adequately reduced.
- Make sure that all auxiliary accessories are working.

7.3 Starting

7.3.1 Earthing connection

Before starting the motor, make sure that the incoming supply cables are connected correctly.

7.3.2 Motors with auxiliary ventilation

For motors with forced ventilation by means of external ventilation, make sure that the motor starter is interlocked with the contactor of the external ventilator to ensure the fan is operational.

7.3.3 Motor startup

When all previous checks have been made satisfactorily, the motor may be started. Unless otherwise stated, all motors can be direct-on-line started.

If you intend to start the motor by means of static starters, rheostats or the star-delta system, they must be chosen and set properly to avoid incorrect functioning of the motor.

7.4 Conditions of use

7.4.1 Operating characteristics

Once the motor has started, make sure that the operating conditions are within the required limits and that the following does not occur:

- overload
- rise in ambient temperature
- excessive drop in voltage.

Every time there is a change in the operating conditions, make sure that the motor is completely appropriate to the new operating conditions.

Examples of changes in the operating conditions:

- changes in operating cycle
- changes in motor functions
- moving the motor to a different environment
- moving the motor to a higher temperature environment.

7.4.2 Protection against overloading

According to the IEC 60079-14 standard, all motors must be protected using a suitable switch, such as one with a delayed trip that is triggered by the current, and the motors must also be protected against phase loss. The protective device must be set according to the nominal current shown on the nameplate. This device must be chosen so that the motor is thermally protected when a rotor jam occurs.

The windings connected in delta must be protected in such a way that the switches or relays are connected in series with the winding phase. Switches are to be chosen and set taking 0.58 times the nominal phase current of the motor as the base value.

8. Service

Any operation on the motor must be carried out with the machine stopped and disconnected from the power supply (including auxiliary circuits, especially the anticondensation heaters). Maintenance of the original characteristics of electric machines over time must be ensured by a schedule of inspection, maintenance and installation managed by qualified technicians.

The type and frequency of maintenance depends on environmental and working conditions. As a rule, it is recommended that the first inspection is made after about 500 hours of operation or within 1 year, while subsequent inspections should follow the schedules established for lubrication and general inspection.

8.1 Checking

8.1.1 Normal operation

Check that the motor works normally without anomalous noise or vibrations. If it does not, locate the cause of the anomaly.

8.1.2 Cleaning the surface

Make sure that the ventilation is not obstructed. Clean the motor by removing any dust or fibre deposits from the fins and from the fan cover.

8.1.3 Checking the supply and earthing cable

Check that the supply cable does not show signs of wear and that the connections are tight. Make sure that the earth and supply cables are not damaged.

8.1.4 Transmission elements

Check that the transmission elements are in perfect condition and that the screws and nuts are tight.

8.1.5 Protection against water

When the motor is installed in a very damp environment or is subject to drips of water, check regularly that the seal and retaining devices work efficiently. Make sure that there is no infiltration inside the casing or terminal box.

8.1.6 Drainage devices

The motors equipped with drainage devices should be checked and cleaned regularly so that such devices continue to work properly.

8.1.7 Thermal protection

Make sure that thermal protections have not cut out and have been set properly.

8.1.8 Unauthorised modifications

Check that no modifications have been made that alter the electric and mechanical operation of the motor.

8.1.9 Painting

When the motor is installed in an environment where there are corrosive agents, it is recommended painting the motor itself to protect the outer surfaces from corrosion if necessary.

8.1.10 Repairing operations

Any faults found during inspection must be fixed immediately.

8.2 Lubrication

8.2.1 Permanently lubricated bearings

Motors with shielded or sealed bearings do not require lubrication. They do not require maintenance if used properly.

8.2.2 Bearings with lubricator

Motors with unshielded bearings are equipped with lubricators. The lubrication interval depends on the type of grease, the ambient temperature (any excessive operating temperature), and the type of operation the motor carries out. The table below shows the predicted intervals for 70 °C as an operating temperature of the bearings in normal operating conditions. It is recommended using a good quality lithium-based grease with great penetration capacity and high dropping point. If the velocity is different from the one given in the table, the intervals must be modified in inverse proportion.

Example:

Bearing 6314 at 1800 rpm.

$$1 = 1500/1800 \times 3550 \text{ h} = 2950 \text{ h}$$

Regardless of the operating hours, the grease must be renewed after 1 or 2 years or during a complete overhaul. When the motor is equipped with a lubrication plate, refer to the dates shown on it.

Lubrication intervals in hours for unshielded bearings

Ball bearings		Lubrication intervals in duty hours						
Frame size	Amount of grease [g]	3600 rpm	3000 rpm	1800 rpm	1500 rpm	1200 rpm	1000 rpm	500-900 rpm
112, 132	15	4200	4800	7000	7800	8500	10000	10500
160, 180	20	3200	4200	6000	7000	8000	9000	10000
200, 225	25	1800	3100	5500	6500	7500	8500	9500
250, 280	35	800	2000	5000	6000	7000	8000	9000
315	50	800	2000	4600	5500	6500	7500	8000
355, 400	60		1000	4000	5000	6000	7000	8000

8.3 Dismantling and reassembling



All operations must be carried out conforming to health and safety regulations.

8.3.1 Consulting the catalogue



Before working on the motor, we recommend that you consult the relevant catalogue and have all the tools ready.

8.3.2 Disconnection from power supply



Before proceeding with dismantling, the motor must be disconnected from the power supply. Make sure that the power is off, and disconnect the supply cables and auxiliary cables, if any.

8.3.3 Placing on work stand

In order to work on the motor satisfactorily, it should be removed from its mounting and placed on a work stand.

8.3.4 Dismantling procedure



When the motor is dismantled and before it is reassembled, it is necessary to protect the various components (particularly the bearings and windings) to avoid damage caused by dust or knocks.

1. Take off the fan cover by removing the screws.
2. Use an extractor to remove the cooling fan.
3. Remove the end shields and withdraw the rotor being careful not to damage the windings.

8.3.5 Additions for self-braking motors

For dismantling self-braking motors, follow the instructions shown in the relevant catalogue.

8.4 Bearing replacement

8.4.1 Dismantling the bearings

- Bearings interference fit to shaft: remove the bearings with the aid of a suitable extractor.
- Bearings interference fit to end shield: heat end shield to a temperature between 140 and 160 °C, and then remove the bearings with the aid of a suitable extractor.

In both cases, check that the respective housings have not been damaged. Then proceed with fitting the new bearings that should be identical to those being replaced.

8.4.2 Fitting new bearings

- Bearings interference fit to shaft: heat the bearings to 120-130 °C and push them quickly onto the shafts. If required, use a mallet and a brass sleeve which must rest on the inner race of the bearing. Alternatively, if it is not possible to heat the bearings, we recommend using a press and a suitable sleeve which must rest on the inner race of the bearing.
- Bearings interference fit to end shield: heat the end shield to a maximum temperature of 140 °C, then position the bearing in its housing and push it until it rests against the snap ring.

8.4.3 Checking the bearings

- Bearings interference fit to shaft: after assembly has been completed, the inner ring of the bearing must rest against the relevant shaft shoulder.
- Bearings interference fit to end shield: after assembly has been completed, the inner ring of the bearing must rest against the snap ring.

8.4.4 Reassembling the motor

1. Before reassembling, clean the internal parts of the motor carefully and check that the components have not been damaged.

2. Apply a new layer of grease where needed on the abutting spigots, and proceed with the reassembling.

8.5 Repairs and overhauls

8.5.1 Spare parts

When needed, all motor components should be replaced by original spare parts. To request spare parts, use the technical terms shown in the catalogues and always provide the following:

- motor type
- serial number
- year of production.

8.5.2 Authorised service workshops

Overhauls and repairs must be carried out by trained persons who guarantee restoration of the motor to its original condition. We recommend that you contact an authorised service workshop. For further information, contact your local Grundfos sales company.

9. Storage

All operations listed below must be carried out by qualified persons. In case of flame-proof motors, it is necessary:

- to be very careful the flame-proof characteristics are not altered
- to have the procedure described in section about checking the bearings carried out by authorised service workshops
- to be aware that dismantling or opening the motor during the warranty period without authorisation of Grundfos may invalidate the warranty.

9.1 Storage conditions

If the motors are not used immediately, they should be stored in a clean, dry environment with moderate temperature, free of vibrations and protected from the weather. In this case, it is necessary to specify these particular storage conditions during the ordering stage so that proper precautions can be taken during building and packaging.



If stored below -15 °C, the motor temperature must be restored to the permissible operating temperature range from -15 to +40 °C before starting.

9.2 Checking the bearings

When the motors are stored properly, no maintenance is needed. However, it is a good idea to turn the shaft by hand every three months. After storage of over one year, motors with unshielded bearings (usually such motors have a lubricator and bear a lubrication plate), we recommend checking the condition of the lubrication and motor components.

9.3 Checking the insulation

Before installation, check the motor windings using the appropriate instruments to ensure the condition of the insulation between phases and earth are of the correct resistance values. Do not touch the terminals during and immediately after measuring as they are live. If the insulation resistance value is less than 10 megaohm or after storage in a damp environment, the motors must be dried in an oven for about eight hours by gradually bringing the temperature up to 100 °C. To ensure that the dampness has been completely expelled, the motors must be dismantled.

10. Fault finding the product

10.1 The motor does not start

Cause	Remedy
Fuses damaged due to start overloading	<ul style="list-style-type: none"> Replace the fuses with similar ones of the correct size.
Opening of the overload switch	<ul style="list-style-type: none"> Check and reset the switches.
Insufficient power available	<ul style="list-style-type: none"> Check that the power required is as shown on the nameplate of the motor.
Connections incorrect	<ul style="list-style-type: none"> Check that the connections are as shown in the wiring diagram of the motor.
Mechanical fault	<ul style="list-style-type: none"> Check that the motor and the machine to which it is coupled turn freely. Check the bearings and lubricant.
Short circuit on the stator	<ul style="list-style-type: none"> The motor must be rewound.
Defective rotor	<ul style="list-style-type: none"> Check whether the bars and the rings are broken. If necessary, replace the rotor.
One phase is down	<ul style="list-style-type: none"> Check the connection cables.
Incorrect application	<ul style="list-style-type: none"> Check the sizing with the manufacturer.
Overload	<ul style="list-style-type: none"> Reduce the load.
Voltage too low	<ul style="list-style-type: none"> Make sure that the motor is powered with the voltage shown on the nameplate.

Related information

[6.1 Wiring diagrams](#)

10.2 The motor does not reach its nominal speed or the acceleration times are too long and/or absorption excessive

Cause	Remedy
Voltage drop on the line	<ul style="list-style-type: none"> Check the connections. Check that the cables are of the correct size.
Excessive inertia	<ul style="list-style-type: none"> Check the size of the motor. Check that the cables are of the correct size.
Defective motor	<ul style="list-style-type: none"> Check the state of the rotor cage. Replace the rotor if necessary.

10.3 The motor overheats when working under load

Cause	Remedy
Overload	<ul style="list-style-type: none"> Reduce the load.

Cause	Remedy
Cooling fins and/or fan cover blocked by dirt	<ul style="list-style-type: none"> Clean the ventilation slots to ensure a continuous flow of air over the motor.
One phase on the motor is down	<ul style="list-style-type: none"> Check that all the cables are connected tightly and correctly.
One phase on the winding is earthed	<ul style="list-style-type: none"> Check the winding and remove the fault.
Phase voltages asymmetrical	<ul style="list-style-type: none"> Check the power supply and voltage supply, and rebalance the loads.
Duty too high	<ul style="list-style-type: none"> Follow the instructions on the nameplate to use the motor.

10.4 Incorrect rotation

Cause	Remedy
Incorrect phase sequence	<ul style="list-style-type: none"> Invert two phases.

10.5 Functioning of the protective device

Cause	Remedy
The motor has one phase down	<ul style="list-style-type: none"> Check the power supply.
Wrong connection	<ul style="list-style-type: none"> Follow the wiring diagram for the connections and the performance data shown on the nameplate.
Overload	<ul style="list-style-type: none"> Compare against the data on the nameplate, and reduce the load if necessary.

Related information

[6.1 Wiring diagrams](#)

10.6 Abnormal vibrations

Cause	Remedy
Motor not aligned	<ul style="list-style-type: none"> Align the motor with the machine it controls.
Base weak	<ul style="list-style-type: none"> Reinforce the base. Check the bolts.
Coupling or pulley not balanced	<ul style="list-style-type: none"> Balance the device.
Coupled machine unbalanced	<ul style="list-style-type: none"> Balance the coupled machine.
Defective bearings	<ul style="list-style-type: none"> Replace the bearings.
Motor balanced differently from the coupling (half key - full key)	<ul style="list-style-type: none"> Balance the coupling using the half key.
Three-phase motor working with one phase down	<ul style="list-style-type: none"> Check the phases and reinstate the three-phase system.
Excessive play on the bearings	<ul style="list-style-type: none"> Replace the bearings or the shield, or add a shim to the bearing seating.

10.7 Irregular noise

Cause	Remedy
Mechanical friction (including stator and rotor friction)	<ul style="list-style-type: none"> • Check the gap between the rotating part and the stationary part. • Find out the reason for the friction and correct it.
Defective bearings	<ul style="list-style-type: none"> • Replace the bearings.

10.8 Bearings overheating

Cause	Remedy
Motor fitted incorrectly	<ul style="list-style-type: none"> • Check that the motor is adequate for the type of fitting.
Belts overtensioned	<ul style="list-style-type: none"> • Reduce the belt tension.
Pulleys too far from the shaft shoulder	<ul style="list-style-type: none"> • Move the pulley nearer to the shoulder on the motor shaft.
Pulley diameter too small	<ul style="list-style-type: none"> • Use a bigger pulley.
Alignment incorrect	<ul style="list-style-type: none"> • Correct the alignment of the motor and the machine coupled to it.
Insufficient grease	<ul style="list-style-type: none"> • Keep the correct amount of lubricant in the bearings.
Lubricant ineffective or contaminated	<ul style="list-style-type: none"> • Remove the old grease, wash contaminated bearings carefully and grease them with new lubricant.
Excessive lubricant	<ul style="list-style-type: none"> • Reduce the amount of lubricant. The bearing must not be more than half full.
Bearing overloaded	<ul style="list-style-type: none"> • Check the alignment and any radial and/or axial thrust.
Bearing balls or race damaged	<ul style="list-style-type: none"> • Replace the bearing.

11. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way.

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

See also end-of-life information at www.grundfos.com/product-recycling.



The crossed-out wheellie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities.

The separate collection and recycling of such products will help protect the environment and human health.

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