



## OPERATING AND MAINTENANCE INSTRUCTIONS ALUMINUM CASE

### 1. INTRODUCTION

The performance of standard motors is considered at a maximum height of 1000m above sea level (a.s.l.) with motors running in continuous duty S1 at nominal voltage and frequency and a maximum ambient temperature of 40°C. The motors which are subject to these instructions are designed for application in INDUSTRIAL AREAS (machines / plants) and therefore cannot be treated as retail goods. This documentation contains information that is only suitable for use by qualified personnel, This documentation must be used in compliance with the regulations, laws and technical standards in force, This documentation can't replace the plant's safety procedure or additional regulations under any circumstances, including any which are not legally enforceable, which have been issued with the scope of ensuring safety.

Machines which are manufactured with constructional difference according to customer specifications may differ in details from the motors described herein.

### 2. SAFETY NOTES



GENERAL SAFETY INFORMATION: DANGER! Electric rotating machines have dangerous parts: when operating, they have live and rotating components. Therefore:

- improper use.
- the removal of protective covers and the disconnection of protection devices.
- inadequate inspection and maintenance.

can result in severe personnel injury or property damage.

### 3. QUALIFIED PERSONNEL

The person responsible for safety must therefore ensure that:

The machine is transported, installed, operated, maintained and repaired by qualified personnel only, it must have:

- specific training and experience.
- knowledge of applicable standards and laws.
- knowledge of the general safety regulations, national and local codes and plants requirements.
- the skill to recognize and avoid possible danger.

All maintenance and inspection operations must be carried out only with the authorization of the person responsible for safety, with the machine at a standstill, disconnected from the power supply, including the auxiliary circuits.

As the electric machine is a product to be installed in industrial areas, additional protective measures must be taken and assured by the person responsible for the installation, if stricter protection conditions are required.

As the electric motor is a component to be coupled to another machine, it is the responsibility of the installing engineer to ensure, during operation, proper protection against the risk of contact with bare rotating parts and to prevent people or things from approaching the machine.

If the machine shows deviations from the normal performance (higher power input, increase in temperature, noise and vibrations), promptly advise the personnel responsible for maintenance to inspect the machine.

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## 4. TECHNICAL DESCRIPTION

**DESCRIPTION:** the machines which are subject to these instructions are aluminium housing motors, fan cooled type for low voltage supply, manufactured in compliance with the standards indicated on the nameplate.

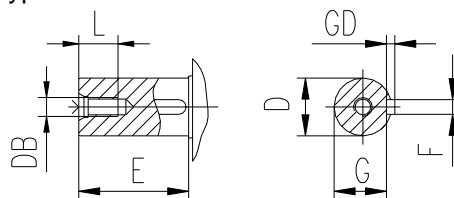
Application in special ambient conditions should be specified when ordering so that the most suitable solutions can be taken.

**Features:** the machines are newly designed aluminum housing motors which comply with IEC60034 standards.

- the motor housing is made of die-cast aluminium with removable feet
- protection degree IP55
- continuous rating follows TEFC IC0141 continuous rated duty S1 required in IEC60034/1
- terminal box is on the top of the motor and can turn to four directions 4 x 90°
- front and rear bearing configurations, and size configurations of cable entry on terminal box and rubber seal on shaft extension are in the table below:

| Frame No.     | Poles       | Driving End | Non-driving End | Cable Entry | Rubber seal size |
|---------------|-------------|-------------|-----------------|-------------|------------------|
| HIE1-63       | 2,4,6 poles | 6201-ZZ/C3  | 6201-ZZ/C3      | 2-M16x1.5   | Φ24 x Φ12 x 6    |
| HIE1-71       | 2,4,6 poles | 6202-ZZ/C3  | 6202-ZZ/C3      | 2-M16x1.5   | Φ28 x Φ15 x 7    |
| HIE2-80       | 2,4,6 poles | 6204-ZZ/C3  | 6204-ZZ/C3      | 2-M25x1.5   | Φ30 x Φ20 x 7    |
| HIE2-90(2P)   | 2 poles     | 6205-ZZ/C3  | 6304-ZZ/C3      | 2-M25x1.5   | Φ40 x Φ25 x 7    |
| HIE2-90(4,6P) | 4,6 poles   | 6205-ZZ/C3  | 6205-ZZ/C3      | 2-M25x1.5   | Φ40 x Φ20 x 7    |
| HIE2-100      | 2,4,6 poles | 6206-ZZ/C3  | 6206-ZZ/C3      | 2-M25x1.5   | Φ45 x Φ30 x 8    |
| HIE2-112      | 2,4,6 poles | 6306-ZZ/C3  | 6306-ZZ/C3      | 2-M32x1.5   | Φ45 x Φ30 x 8    |
| HIE2-132      | 2,4,6 poles | 6308-ZZ/C3  | 6308-ZZ/C3      | 2-M32x1.5   | Φ62 x Φ40 x 8    |
| HIE2-160      | 2,4,6 poles | 6309-ZZ/C3  | 6309-ZZ/C3      | 2-M40x1.5   | Φ62 x Φ45 x 8    |

- front shaft extension uses A type key slot, drill C type central hole and tap thread in both front and rear shaft extension ends; front shaft extension size and C type central screw hole size are in the table below:



| Frame No. | D   | E   | F  | G    | GD | DB  | L  |
|-----------|-----|-----|----|------|----|-----|----|
| HIE1-63   | Φ11 | 23  | 4  | 8.5  | 4  | M4  | 10 |
| HIE1-71   | Φ14 | 30  | 5  | 11   | 5  | M5  | 12 |
| HIE2-80   | Φ19 | 40  | 6  | 15.5 | 6  | M6  | 16 |
| HIE2-90   | Φ24 | 50  | 8  | 20   | 7  | M8  | 19 |
| HIE2-100  | Φ28 | 60  | 8  | 24   | 7  | M10 | 22 |
| HIE2-112  | Φ28 | 60  | 8  | 24   | 7  | M10 | 22 |
| HIE2-132  | Φ38 | 80  | 10 | 33   | 8  | M12 | 28 |
| HIE2-160  | Φ42 | 110 | 12 | 37   | 8  | M16 | 50 |

- Motors from frame size 90 and below with rear bearing fitted with wave washer on NDE
- Motors from frame size 100 and above with the front bearing locked on DE and the rear bearing fitted with wave washer on NDE

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## 4. TRANSPORTATION AND STORAGE

Every motor is dispatched from the factory ready for installation, after quality control during manufacture as well as a final test that is to verify if the motors are accordance with all required standards.

The motors with shaft height 100 and above have the lifting eyebolt for hoisting and transport.

The lifting eyebolt is suitable for lifting the motor only and not the unit in which the motors are installed.

When lowering the motor always make sure that it will rest on safe and stable supports.

Motor approximate weight is indicated on the nameplate.

If the motor is not to be used immediately, it should be stored in a covered area that is clean, dry and vibration-free.

It is advisable to replace the bearings after the motor has been stored for a long time in favorable conditions.

## 5. PREPARATION FOR USE

BEFORE INSTALLING AND STARTING UP THE MOTOR, MAKE SURE THAT DATA SHOWN ON THE NAMEPLATE IS SUITABLE FOR THE POWER SUPPLY OF ELECTIRC GRID AND FOR THE TYPE OF DUTY AND THAT THE INSTALLATION & THE CONNECTION OF THE MOTOR COMPLY WITH THE MANUFACTURER'S RECOMMENDATIONS.

Install the motor in a ventilated room away from sources of heat. The motor foundation should be even solid in order to absorb vibrations and sufficiently rigid in order to keep alignment.

Make sure that there is no obstacle impeding air flow.

Make sure that inspection and maintenance operations can be carried out without difficulty.



Pay special attention to providing suitable guards to prevent from accidentally contacting moving parts of the frame.



The surfaces of the machines can reach higher temperature more than +50°C, which can lead to burns if touched.

If thermal cutouts are being used, make sure that the system has been designed to prevent from sudden restarts.

Equip the motor with devices (Magnet thermal circuit brakers, thermistors (PTC), bimetallic protections, a.s.o.) to prevent from short circuit, over temperature, overload.

## 6. BALANCING AND FITTING THE COUPLING UNIT

Unless stated otherwise, the motor's rotor is balanced dynamically using a half-key fitted on the shaft extension in compliance with IEC60034-14.

The transmission member should therefore be balanced before fitting using a half-key. The transmission member should be fitted in a conscientious workmanlike manner without any blows that could damage the bearings.

One method is to heat the part to be mounted (if possible) or to mount it on the shaft extension using the threaded hole. If it subsequently needs to be removed, this should be done using an extractor. The motor and machine it drives should be carefully aligned to prevent from damaging vibration.

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## 7. INSULATION RESISTANCE

Three phase winding class F insulation and class B temperature rise, adopted Vacuum Pressure Impregnation (VPI) insulation dip coating process to ensure a good insulation quality.



Never touch the terminals during and after measurement because they are live.

The insulation resistance, measured on the windings at a measuring circuit voltage 500V and at a temperature of 25°C, should never be less than

- 10 MΩ for a new winding.
- 1 MΩ for a winding on a motor which has been in operation for some time.

If the measurements are performed at winding temperature  $\neq 25^{\circ}\text{C}$ , convert the measured value to the reference temperature of 25°C in order to be able to compare the values with the above limit values.

Lower values normally indicate the presence of moisture in the windings. If the case occurs, dry them.

## 8. ELECTRICAL CONNECTION



Work on electric machines should be carried out with the machine stopped and disconnected from the power supply, including auxiliary circuits.

The standard specification version adopts the main motor connections shown in the connection diagrams on the terminal box lid.

It is important to confirm that the connection is correct for the type of motor to be connected.

The potential-equalizing connections to the earth terminals on the casing and in the terminal box must be sized with a suitable cross-section area and made in compliance with the standards in force. The connection contact surfaces must be clean and protected against corrosion. Use power supply cables with a suitable cross-section area that is suitable for withstanding the maximum current absorbed by the motor, avoiding overheating and/or voltage drops. Prevent the transmission of mechanical stresses to the motor terminals. Check that the terminal nuts are tightened firmly and that the seals are in perfect conditions. Make sure that any unused cable holes are blanked off to ensure the terminal box achieves the protection degree shown on the rating plate.

Connecting the auxiliary circuits (if present):

- Thermal protection device: check the type of protective device before connecting it. Thermistors require a suitable trip relay.
- Anti-condensation heater: must be powered by separate lines. They must never be powered under any circumstances when the motor is running.
- Auxiliary ventilation fan: connect the power to the electric fan separately from the main motor circuit. Incorporate a device which only enables operation of the main motor when the auxiliary ventilation fan is power on.

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## 9. DIRECTION OF ROTATION

The standard specification motors can operate in either direction of rotation. If a normal right-hand L1, L2, L3 is connected to terminals U, V, W, the motor will rotate in a clockwise direction viewed at drive end. The direction of rotation can be reversed by exchanging the connections to two terminals (connecting L1,L2 L3 to V, U, W or U, W, V or W,V,U).

## 10. MAINTENANCE AND WARRANTY



Any operation whatsoever on the motor must only be carried out with the machine stopped and disconnected from the power supply, including auxiliary circuits.

At regular interval check whether the motor is operating correctly and within its specifications with no abnormal noise or vibration and that the ventilation air inlet is not blocked. The inspection and maintenance intervals depend on the actual operating conditions (loads, number of starts, a.s.o.) and the ambient condition (dust, a.s.o.).

As a result, no more than general guidelines can be supplied. The normal version of the motors is provided with the bearings of the size as above table. The type of bearing can be changed in special versions of the motor. You can check what type of bearings have been used from the code stamped on the side edge of the outer ring of the bearing itself. The bearings used on the standard version on motors from size 63 up to size 160 are life-lubricated maintenance-free designs. Under normal operating conditions, the grease packed in the bearings is sufficient for several years. It is good practice to change the bearings every 3 years.

Use an extractor to remove the bearings. Heat the bearings (to approximate 80°C) to fit. Never hit the bearings with a hammer to avoid damaging them. When changing the bearings, it is good practice to also replace any rubber seal on the shaft, lightly greasing the slip zone of the seal lip.

Make sure that the various different parts are assembled in the correct order when disassembling and reassembling the motor (marking the different parts during disassembly if necessary).



Pay particular care to avoid damaging the windings when sliding the rotor out from the stator.

**SPARE PARTS:** always specify the code and type of motor indicated on the rating plate when ordering any spare parts.



**WARNING:** never operate the motors without coupling unit without fixing or removing the key.

It is recommended to always use original spare parts.

The producer will not be responsible for damage by improper use of the motor, non-compliance with periodic maintenance / replacement prescriptions and use of non-original parts.

Disassembly of the motor to dispute, even if partial, is prohibited.

Warranty: the period of warranty is twelve months from invoice.

The warranty is extended to each part of the motor, it includes spare parts. But it doesn't include accidental damages, improper use or indirect damages.

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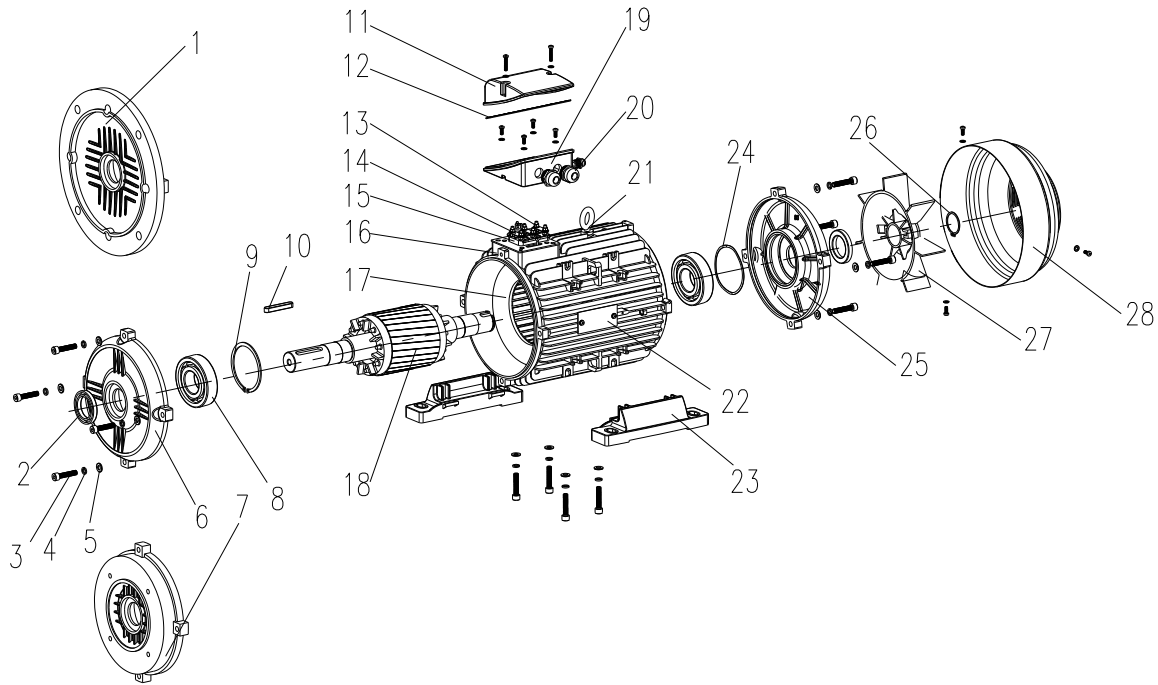
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## 11. EXPLODED VIEW



|                      |                      |                   |
|----------------------|----------------------|-------------------|
| 1 B5 Flange          | 11 Terminal Box Lid  | 21 Eyebolt        |
| 2 Oil Seal           | 12 Gasket            | 22 Nameplate      |
| 3 Bolt               | 13 Brass Lug         | 23 Removable Feet |
| 4 Spring Washer      | 14 Brass Lug         | 24 Wave Washer    |
| 5 Flat Washer        | 15 Terminal Board    | 25 Rear Endshield |
| 6 B3 Front Endshield | 16 Frame             | 26 Fan Clamp      |
| 7 B14 Flange         | 17 Stator            | 27 Fan            |
| 8 Bearing            | 18 Rotor             | 28 Fan Cowl       |
| 9 Bearing Clamp      | 19 Terminal Box Base |                   |
| 10 Key               | 20 Cable Gland       |                   |

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