HANSA-FLEX

TECHNICAL INFORMATION
LOW-VOLTAGE ELECTRIC MOTORS

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Technical information Low-voltage electric motors

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1. General

Low-voltage motors are efficient and powerful. Their high levels of efficiency make them ideal for use as drives. These IEC-compliant drives with optimum energy efficiency fit perfectly into your system and fulfil the technical requirements.

We have 4-pole single-phase and three-phase asynchronous motors with outputs ranging from 0.18 kW to 63 kW available from stock and fitted with B3/B14 or B3/B5 flanges as standard. In addition, we can supply 2, 6 and 8-pole electric motors at short notice.

All three-phase asynchronous motors in voltage class 400/690 V are fitted with thermal protection (PTC thermistor) as standard.

Motors can be supplied in energy efficiency classes IE2 and IE3 (IE4 on request).

The design and project planning of the complete drive, as well as all work activities involved in transport, connection for commissioning and regular maintenance of all motors must be performed by suitable, qualified, instructed and authorised skilled personnel (observe the provisions of VDE 0105; IEC 364). Skilled personnel as referred to in this document are persons who, on the basis of their training and experience, are able to analyse possible risks and avoid potential hazards in their field of activities.

2. Safety instructions

2.1. Fundamental safety rules

All connection work activities must be carried out only in the de-energised state. Connection must be performed by skilled personnel who are familiar with the VDE safety requirements. The manufacturer is not liable for damages that can be attributed to inexpert installation or use.

The safety risks arising from the motor must be re-evaluated after installation in the end device. For the purpose of avoiding material damage and for the safety of personnel, the following safety rules in accordance with EN 50110-1 must be observed:

1. Disconnect all electrical circuits (including auxiliary circuits)
2. Secure against reconnection
3. Verify absence of operating voltage
4. Carry out earthing and short-circuiting
5. Provide protection against adjacent live parts

The locally applicable occupational health and safety regulations, specific regulations, operator's agreements and agreements in force in the area of use as well as the safety symbols and information on the motor, in the operating and maintenance manuals, and the supplied documentation must always be observed for all work activities on the motor.

2.2. Dangers

DANGER - Electrical charge on the motor

Regularly check the electrical fittings of the motor. Replace loose connections and defective cables immediately. Never remove protective covers from the motor before it is in a voltage-free state. Observe the fundamental safety rules. When you are working on an electrically charged motor, stand on a rubber mat in order to avoid an electric shock.

DANGER - Voltage at the terminals, even with motor switched off

Do not open the terminal box until five minutes have elapsed since the electricity supply was switched off.

DANGER - Reconnection

Do not linger in the danger zone of the motor. When performing work activities on the motor, disconnect the electricity supply and secure it against reconnection. In the case of an applied control voltage or stored set speed, the motor starts up automatically after the end of an interruption in its electricity supply.

DANGER - Rotating rotor

Body parts that come into contact with rotating components can be injured. Pieces of clothing, jewellery and similar items can get caught and drawn into the motor. Secure the motor against contact. Do not wear loose clothing when performing work activities on the motor. Perform a test run without a shaft key (projectile hazard - danger of key being thrown out). Never remove protective covers from the motor before it is in a voltage-free state. Observe the fundamental safety rules.

DANGER - Surface temperature

Individual motor parts can become hot during operation. Do not touch motor parts during operation. Ensure adequate contact protection to prevent burn hazard.

DANGER - Sound pressure level

During operation, the motor can create noise emissions above those permitted for prolonged work activities in the immediate surroundings. Employ technical protection measures and protect operating personnel with the appropriate personal protective equipment, such as hearing protection.

DANGER - Electromagnetic fields

The whole system creates electromagnetic fields during operation. These can interfere with the functions of medical implants, such as pacemakers. Protect personnel by taking suitable measures.

DANGER - Improper slinging, transporting and lifting

Overturning or falling motors represent a hazard for people and property. Use only suitable equipment. Perform the work activities carefully and prudently.

2.3. Proper use

The motors comply with the EN / IEC 60034 (VDE 0530) series of harmonised standards and are approved as industrial drives only for the intended purpose and in accordance with the associated technical documentation. This also includes observation of all associated product regulations. Any other use or use beyond the above shall be considered as improper use.

Modifications or conversions of the motor are not permitted. Third-party products or components that are used with or mounted on the motor must be recommended or permitted by the manufacturer. Unauthorised modifications and conversions of the motor lead to the loss of warranty.

Take the ambient conditions into account when using standard versions of motors. Standard versions of motors are not suitable for operation in salt-laden or corrosive atmospheres nor for use in the open air.

Use of motors in potentially explosive atmospheres (Ex) is forbidden unless this use is expressly specified as an intended use.

2.4. Improper use

The following uses of the motor in particular are **forbidden** and can lead to risks and loss of warranty:

Unbalanced operation of the motor, caused by e.g. deposits of dirt or ice.

Operation of the motor in resonance conditions, operation with vibrations or oscillations that are transmitted from the whole system to the motor and are above the maximum permissible values specified in ISO 10816-3. Periodic impact loads are permitted only up to 1G .

- Painting the motor (if not permitted).
- Releasing connections (e.g. screws) during operation.
- Opening the terminal box during operation.
- Operating the motor in the vicinity of combustible materials or components.
- Operating the motor in potentially explosive atmospheres.
- Operation with fully or partially dismantled or manipulated safety devices.
- Cleaning of motors using media at high pressures and their application to sealing surfaces.

3. Technical information

3.1. Installation instructions

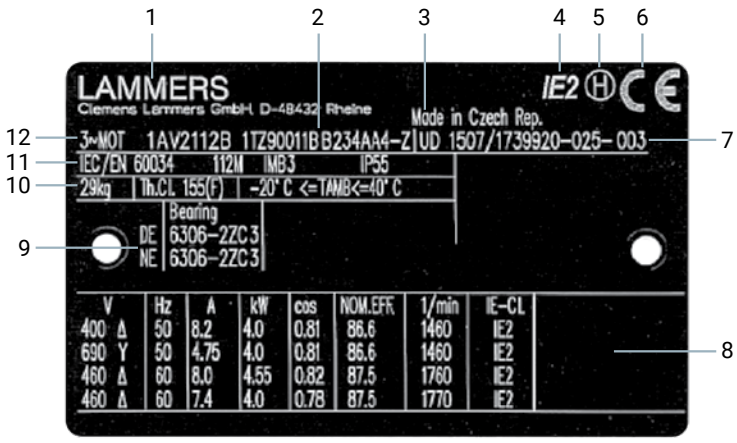
The installation set-up and mounting of the motor must be in accordance with that of the model type shown on the identification plate. Take note that the flow of an adequate supply of cooling air must remain unobstructed. For flange motors with B14 flanges, the maximum screw-in-depth of the installation screws must be observed (to avoid damaging the winding).

Observe the following instructions during installation and assembly:

- The operating manual must be available to the personnel (for ATEX motors, the ATEX operating manual must be observed).
- The thread sizes specified in standard EN 50347 for feet and flange mounting and the required strength class of the threaded connections must be used.
- When installing motors with feet and direct coupling, ensure that an even support, precise alignment and the specified alignment tolerances are achieved.
- When installing motors with a flange, ensure the correct fit of the counter flange and the centring ring.
- Ensure that the motor operates in a vibration-free environment. Construction-related resonances at the rotation frequency and at twice the frequency of the power supply are to be avoided.
- Turn the rotor by hand and listen for any unusual grinding noises. Check the direction of rotation in the coupled state.
- Use only suitable devices to pull the drive elements (belt pulley, coupling etc.) off and on, and ensure contact protection measures are in place to prevent contact. The part to be pulled on must be heated.
- Transmission elements must not be hammered onto the shaft. Avoid tensioning the belt above the permitted value.
- Ventilation must not be obstructed. Ensure that the expelled, heated coolant medium is not drawn back in again. Observe the minimum distances from the fan to the wall.
- Take care to ensure that all components mounted on the shaft are dynamically balanced. The rotor is balanced in the factory with a half shaft key.
- The permissible radial and axial shaft loads must be observed for all bearing types.
- Large radial forces or masses on the motor shaft end can be accommodated through the optional use of cylindrical roller bearings. In these cases, the minimum radial force at the shaft end must be a quarter of the permissible radial force.
- The user must ensure that the condensate water drain holes on motors in frame sizes 56 – 132 with increased IP protection (IPX6/IP6X) are sealed in a water- or dust-tight manner after draining and during transport and storage.
- If the motor is used without flange attachments, the user must take the appropriate precautions to protect against the ingress of foreign particles and liquids into the threaded holes. This must also be considered for the storage of motors. The maximum screw-in depths must be observed.

3.2. Technical parameters

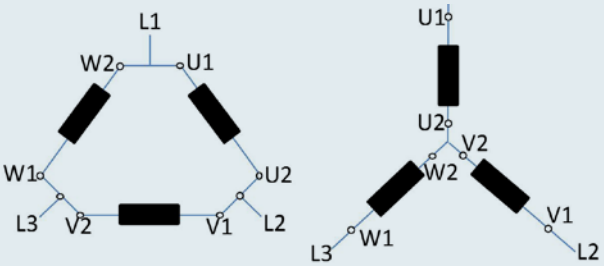
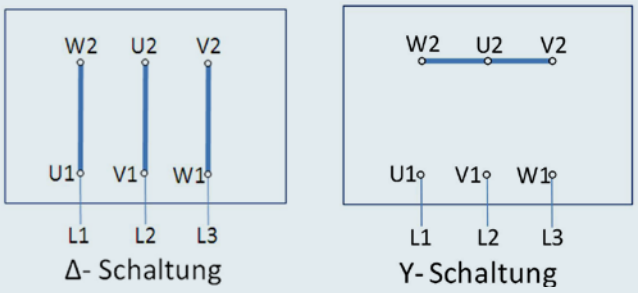
3.2.1. Identification plate information



1 Manufacturer
2 Type designation
3 Country of origin
4 Efficiency class
5 Balancing type
6 CE marking
7 Serial number / Year of manufacture
8 Motor data
9 Bearings
10 Weight / Thermal class / Temperature range
11 Standard / Frame size / Construction type/ IP code
12 Number of phases

3.2.2. WIRING DIAGRAM IEC SQUIRREL-CAGE MOTORS

Motors can generally be driven using a frequency inverter (VFD). Some motors require special measures. These include PTC temperature monitoring and, from 75 kW (frame size BG280), current-insulated bearings.

Winding design 400 V A / 690 V Y switched on directly at operating voltages of 400 V / 690 V		YIA – started up at operating voltage of 400 V
Connection of windings		The ends of the windings go to a Y/A switch
Connections at terminal block		

3.2.3. MINIMUM EFFICIENCY CLASSES (extract)

Since January 2017

Minimum efficiency in Commission Regulation (EC) No. 640/2009

- Minimum efficiency IE3 for three-phase motors with 2-6 poles, power rating 0.75 kW – 375 kW
- IE2 may continue to be used in combination with frequency inverters
- ATEX excluded

Since July 2021

Minimum efficiency in Commission Regulation (EC) No. 2019/1781
Changes for standard, Ex db/ec/tb/tc, operating modes S1, S3/S6 >80%, brake and TEAO motors

- Minimum efficiency IE3 for motors with 2-8 poles, power rating 0.75 kW to 1000 kW
- Minimum efficiency IE2 for motors with 2-8 poles, power range 0.12 kW< 0.75 kW
- Minimum efficiencies also apply for frequency inverter operation

Since July 2023

Extension of scope in Commission Regulation (EC) No. 2019/1781

- Minimum efficiency IE2 for Ex eb motors with 2-8 poles, 0.12 kW to 1000 kW
- Minimum efficiency IE2 for AC motors, power rating >= 0.12 kW
- Minimum efficiency IE4 for standard motors with 2-6 poles, 75 kW to 200 kW

4. MAINTENANCE, STORAGE

Work activities on motors must always be performed taking into account the safety regulations and instructions. Careful and regular servicing and inspections are required for early detection of malfunctions and their rectification before they can lead to consequential damage. The generally recommended schedules must be observed (schedules should be adjusted to suit local circumstances, such as contamination, loadings etc.). All deviations and abnormalities detected during servicing and inspections must be rectified immediately.

Although our electric motors require no particular servicing, the provisions of the servicing manuals supplied by the manufacturer should be observed. The housing surface and air inlet openings should always be kept clean so that heat dissipation is not adversely affected by deposits of dust and dirt. Motors of frame size 63 – 250 are fitted with permanently lubricated bearings and therefore cannot be re-lubricated. Therefore these bearings must be replaced on expiry of their fatigue life or the service life of the grease.

Motors must be supported in such a way that they are dry and vibration free. Cable inlet openings and holes through flanges for mounting must be temporarily sealed. If motors are to spend prolonged periods out of operation, it is recommended that the insulation resistance is measured before they are switched on again. In the case of insulation resistances less than 0.6 Mohm (measured at 500 V), the motor winding must first be allowed to dry.

5. INFORMATION ABOUT REMOVAL AND DISPOSAL

5.1. REMOVAL

The removal of the motor must be performed by qualified personnel.

1. Check with a local specialist disposal company to see the level of disassembly required and the condition in which the components should be made available.

2. To ensure your own personal safety and to avoid material damage, observe the safety rules for “Dead working” (work activity on electrical installations that are neither live nor charged, carried out after having taken all measures to prevent electrical danger).

   - Completely disconnect the motor, including the auxiliary circuits for equipment such as external ventilation.
   - Secure the motor against reconnection.
   - Verify absence of operating voltage.
   - Carry out earthing and short-circuiting of the motor.
   - Provide protection against adjacent live parts.

3. Release all electrical connections and remove all cables.

4. Remove all liquids such as oil. The liquids should be collected separately and disposed of in a proper manner.

5. Release the electric motor attachment fastenings.

6. Dismantle the electric motor in a suitable location. Secure individual parts against falling before you release them. Depending on the frame size, an electric motor consists of individual parts that may be very heavy and may drop or fall during dismantling.

5.2. DISPOSAL

Electric motors and their components may not be thoughtlessly placed in the ordinary refuse; they must be collected and disposed of in accordance with the applicable waste disposal regulations. The national requirements of the respective country and, if appropriate, the information given in the safety data sheets must be observed.

An electric motor consists for the most part of steel and has various components made from copper or aluminium. Metallic materials can generally be repeatedly recycled without limit. The individual components should be separated into various categories, such as steel and ferrous metals, aluminium, cable and wiring, electronic scrap, bright metals (e.g. copper from the windings) and insulation.