

SIEMENS



Installation . Operation .
Maintenance Instructions

	⚠ WARNING
	Supply Voltage is hazardous and can cause Electric Shock and burns. Disconnect Power before proceeding with any work on this equipment.

Operating Instruction and Maintenance Manual

Three-phase induction motor Type 1SE0/1LA2
63-132 frame sizes

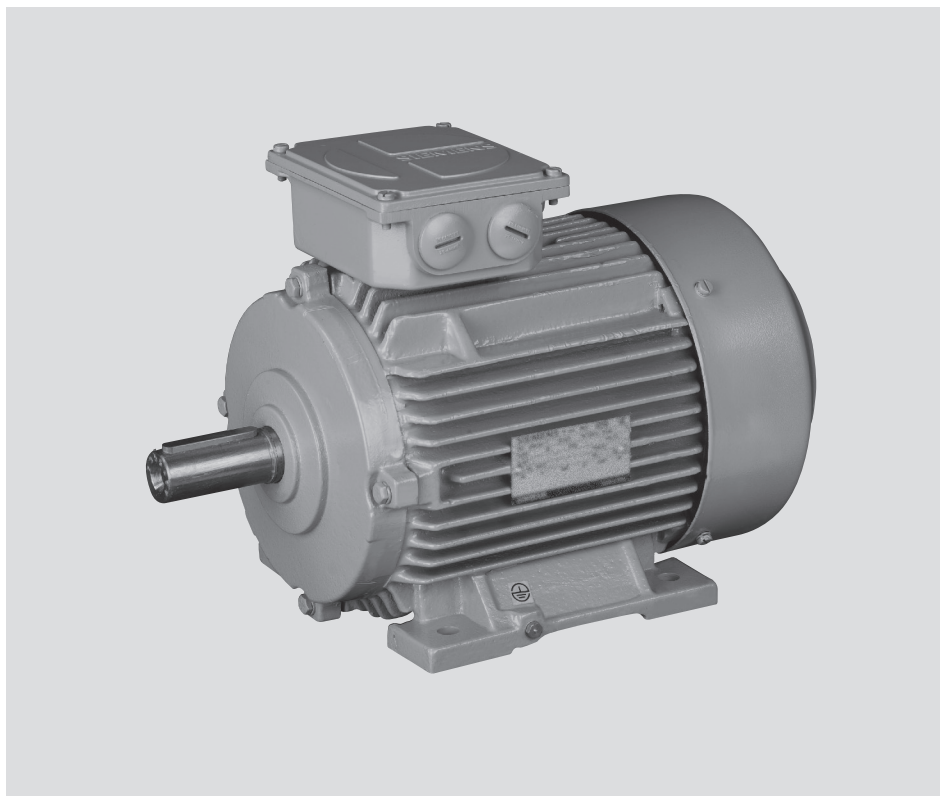


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1 Safety information

1.1 Definitions, warning information

General Note



Warning

The data and recommendations specified in all the instructions supplied, and in all other related instructions, must always be observed in order to avoid **hazardous situations** and the **risk** of possible injury or damage.

Furthermore, the **pertinent national, local and plant-specific regulations** and **requirements** should be kept in mind!

Special designs and **other versions** may vary in technical details! If in doubt, be sure to contact the manufacturer, quoting the **type designation** and **serial number**, or have maintenance work done by one of SIEMENS Service Centers.



Warning

The disposal of waste generated during operation & maintenance of the motor should be done as per the applicable local environmental legislations.

- Waste grease & greased cloth to be collected as hazardous waste and sent to hazardous waste disposal facility for incineration.
- Waste copper windings to be collected as hazardous waste and sent to registered recyclers approved by the respective State Pollution Control Board.

Qualified persons

Only qualified persons who have carefully read and understood the content of this documentation should be entrusted with the commissioning and operation of machines, equipment or systems. Qualified persons as far as the safety instructions given in this documentation are concerned are those who have the necessary authorization to commission, earth and identify equipment, systems and circuits in accordance with the relevant safety standards.

Safety guidelines

This documentation contains instructions, which must be followed closely in order to ensure personal safety and avoid damage to the equipment and machines.

Personal safety instructions are highlighted in the manual by a warning triangle, while damage avoidance instructions are marked as follows depending on the level of danger:



Danger

Danger means that death or grievous injury will occur if the appropriate precautions are not taken.



Warning

Warning means that death or grievous injury may occur if the appropriate precautions are not taken.



Caution

Caution with a warning triangle means that minor personal injury may occur if the appropriate precautions are not taken.

Caution

Caution without a warning triangle means that damage to property may occur if the appropriate precautions are not taken.

Notice

Notice means that an undesirable result or state might occur if the relevant instructions are not followed.

Note

Note draws particular attention to an important item of information about the product, its use or the corresponding section of the documentation, which could be useful to the user or operator.

Proper usage

Please pay close attention to the following:



Warning

The electrical equipment contains components that are at a dangerous voltage. Before any work is carried out, it must be ensured that the equipment is isolated from the supply.

Only qualified persons may work with this equipment.

These persons must be familiar with all instructions and precautions to be taken / specified in this documentation that are relevant for safety.

Safe and satisfactory operation of this motor presumes satisfactory transport, proper storage, installation and assembly and careful subsequent operation and maintenance.

This motor may only be used for the applications specified in the catalog and the technical description or for which it is selected, and only in conjunction with third-party devices and components recommended and/or approved by SIEMENS.

Failing to adhere to these instructions may result in severe injury and/or damage to property.

National safety regulations must be closely observed.

1.2 Safety and application information

The safe use of electrical machines



Danger

These electrical machines are designed for use in industrial power systems.

Rotating or live and uninsulated parts pose a danger.

There is consequently a risk of fatal or severe personal injury or substantial damage to property if the necessary covers are removed without authorization or if the equipment is handled improperly, operated incorrectly or maintained inadequately.

If the motors are used outside industrial areas, the installation site must be safeguarded against unauthorized access by means of suitable protection facilities (e.g. fencing) and appropriate warning signs.

The persons responsible for the safety of the system are under an obligation to ensure that:

- The basic planning work for the system and all work relating to transportation, assembly, installation, commissioning, maintenance and repairs are carried out by qualified persons and checked by responsible, suitably skilled persons.
- These instructions and the motor documentation are made available at all times while work is in progress.
- The technical data and specifications relating to the permissible installation, connection, ambient and operating conditions are taken into account at all times.
- The system-specific erection and safety regulations are observed and personal protective gear is used.

- Work on these machines, or in the vicinity of these machines, by unqualified persons is prohibited.

These instructions therefore only contain the information, which is necessary for the motors to be used by qualified persons in accordance with their intended purpose.

Note

We recommend engaging the support and services of your local SIEMENS service center for all planning, installation, commissioning and maintenance work.

2 Description

2.1 General

The Champion series motors are three phase cage induction motors, totally enclosed fan cooled (TEFC) type for low voltage supply. General-purpose motors type 1SE0/1LA2 conform to IS:12615. The motors comply with the type of protection IP55 in accordance with IS 4691/IS/IEC - 60034-5. The degree of protection of the motor is specified on the rating plate.

IMB3 is the standard mode of construction. Other constructions are given on customer request.

Unless otherwise specified, the rated outputs apply to continuous duty (S1) at a frequency of 50 Hz, an ambient temperature between 0°C and 50°C and site altitude not exceeding 1000m above mean sea level.

2.2 Terminal box

The terminal box conforms to type of protection IP55 in accordance with IS:4691/IS/IEC - 60034-5.

For foot-mounted motors, the terminal box is provided on the top with cable entry from RHS (as seen from drive end) as a standard feature. If specifically ordered, terminal box

position on the right or the left-hand side (when viewed from the drive end) can be supplied for frame size 90 and above.

In order to provide for different directions for cable entry, the orientation of the terminal box can be altered in steps of 90°.

In case of motor provided with Brake, the possibility of terminal box rotation in steps of 90° to be checked physically.

3 Operation



Warning

Before starting any work on the machine, be sure to isolate it from the power supply.



Warning

All covers which are designed to prevent active or rotating parts from being touched, or which are necessary to ensure correct air guidance and thus effective cooling, must not be opened during operation.

All deviations from normal operation (higher power consumption, temperature or vibration level, unusual noises or odours, tripped monitoring devices, etc.) are indications that the motor is no longer functioning correctly. In such cases, the maintenance technician must be immediately notified in order to prevent disturbances that could either directly or indirectly lead to severe personal injury or substantial material damage. If in doubt, power-down the motor immediately in conformance with the system-specific safety requirements!



Caution

The surfaces of the machines can reach high temperatures, which can lead to burns in case of contact. Appropriate measures to avoid accidental contact must be taken.

3.1 Inspection, Storage & Transport



Warning

The motors may only be transported and hoisted in a position corresponding to their type of construction (i.e. horizontal construction types in horizontal position and vertical construction types in vertical position). The motors may only be hoisted using the lifting eyebolt(s) provided on the stator housing. Use appropriate rope guidance or spreading equipment (for weight see rating plate or technical data).



Warning

For lifting assembled machine sets (such as built-on gearboxes, fan units), always use the lifting eyebolt(s) or lifting pegs provided on both the units! Machine sets should not be lifted by suspending the individual machines! Check the lifting capacity of the hoist!



Warning

Only the intended openings, eyebolts and lifting pin on the base plates may be used for transporting motor sets. Always pay attention to the carrying capacity of the lifting device. Motor sets must not be lifted by attachment to the individual motors.

NOTE: The motors should not be lifted using the centre holes on the shaft DE and NDE, because the weight of the motor shall harm the bearing and reduce its performance and operational life.

Check the packing of the motor on arrival and in case any damage is observed, please report to the nearest Siemens office.

Make sure that the right type of motor as ordered has arrived. The motor nameplate provides relevant information.

If the motor is not installed immediately, it should be stored in a dry and vibration free room.



Caution (Environmental Protection)

Disposal of packing material: On unpacking the motors, the packing material shall be disposed as per the Local / Statutory requirements.

Special attention should be given to Polythene bags, thermocole packing and nylon straps etc., which are not biodegradable.

3.2 Mounting

All standard motors are suitable for horizontal as well as vertical mounting. i.e.

Standard foot mounted motors can be used in IM-B3, B6, B7, B8, V5, V6 constructions or flange-mounted motor can be used in IM-B5, V1, and V3 constructions. Face mounted motors can be used in IMB14, IMV18 and IMV19 constructions. For installation of foot mounted motors on a wall, adequate support should be provided to the mounting feet. The motor must be securely installed to a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft load. Failure to provide a proper mounting surface may cause vibration, misalignment and bearing damage.

After installation is complete and accurate alignment of the motor and load is accomplished, the base should be grouted to the foundation to maintain this alignment. All motors which have a shaft extension pointing upwards (V6 construction) must have a means (provided by the user) of preventing the ingress of dust and of liquids along the shaft.

3.3 Installation

After installation, **screwed-in lifting eyebolt(s)** should either be removed or tightened down.

Check the free running of the rotor by rotating the shaft by hand.

The shaft extension, face and spigot of the flange of the motor are coated with an anticorrosion agent. To remove this coating use kerosene / thinner. Do not use sandpaper or scraper.

Before mounting the motor, see that the motor feet are properly cleaned.

The transmission elements to be fitted to the motor should be dynamically balanced. Please note that the rotors of the motors are dynamically balanced with half key inserted in the shaft extension of the

motor. Preferably tolerance of the bore of pulley/coupling/pinion should be H7. Transmission elements must be fitted and removed only by means of suitable tool. Refer fig.2. Transmission elements should never be hammered as this will damage the bearings.



Caution

The keys are only secured against falling-out during transport. If the motor has two shaft ends, and a power take-off element is only fitted to one end, steps must be taken to prevent the key at the other end from being slung out.

Install the motor in such a manner that the cooling air has free access and can escape unobstructed. Discharged air or hot air from neighboring equipment, must not be sucked in again. Clean the entire path of air over the motor (between ribs and air inlet in fan cowl) at regular intervals to remove any foreign deposits, preferably by means of compressed air.

For foot mounted motors to be fixed on the wall a support should be provided for the mounting feet from below.

In the **case of motors with shaft end facing upwards or downwards**, measures must be taken (by the user) to ensure that no water or dust can penetrate into the upper bearing.

Motors that are directly coupled should be carefully & correctly aligned. The axes of the driven machine shaft and motor shaft should be in a straight line and there should be no angular displacement between these two. Shafts can be aligned perfectly by keeping metal shims under the foot of the motor. The center-lines of the shafts should be parallel and the parallel

displacement between the two center-lines should not be more than 0.03mm. The clearance between the couplings halves measured at four peripheral points must also be within 0.03mm.

If belt drive is used, install the machine in such a manner that it can be shifted on its base (e.g. on slide rails) to obtain correct belt tension. Excessive belt tension may result in damage to the bearing and /or shaft. For permissible radial loads on shaft extension and recommended pulley sizes refer the Siemens catalog or contact our office.



Caution

Excessive belt tension may result in damage to the shaft / bearings; for permissible values, see catalog or enquire.

Due attention should be given to the measures necessary to prevent accidental touching of rotating parts (couplings, pulleys, etc.)

Quiet running

Stable foundations or mounting conditions, exact alignment of the motors and a well-balanced transmission element are essential for quiet vibration-free running. If necessary, shims should be inserted under the motor feet to prevent strain.

3.4 Electrical connection

Examine the rating plate data and ensure that it matches with the power circuit to which the motor is to be connected. Check to see that system voltage and frequency agree with the data given on the rating plate. Motors up to 1.5kW are connected in star & above 1.5kW are connected in delta.

In both the cases 6 terminals are brought out & connection is made externally by terminal links. Select the size of supply cables as required for the particular current rating. Connect the supply cables in accordance with the connection diagram shown inside the terminal box cover.

- Minimum air-clearance (>10mm upto 500V. >14mm upto 1000V) is maintained.
- Unused cable entries are sealed off with the plugging elements firmly screwed in.
- All sealing surfaces have adequate contact.



Danger

All work on the motor must only be performed by qualified personnel, with the motor in a stationary state. The supply should be secured so that it cannot be switched back on again. Check that no voltage is present before commencing work.

In humid environments, motors which are not in used should be connected to Anti-Condensation Heaters to prevent condensation of moisture. In case there are no anti-condensation heater, a suitable voltage (1ph) approximately 4 to 10 % of the rated motor voltage should be applied to stator terminals U1 and V1; 20 to 30 % of rated motor current is generally sufficient to heat the motor enough to prevent condensation. For safety reasons, rotor should be locked to prevent rotation.

Connection and arrangement of the terminal links must agree with the diagram provided in the terminal box.

When the motors are provided with anti-condensation heaters, ensure that the supply to heaters is switched off before switching on the motor.

Refer fig. 3 and fig. 4 for various Terminal box arrangements.

Before starting and during operation, make sure that all the relevant safety and statutory regulations pertaining to the area of operation is complied with.

Please refer to the table below for tightening torques for terminal bolts and nuts (except for terminal strips).

Thread- ϕ	Nm	M4	M5	M6	M8	M10	M12
Tightening Torque(Nm)	Min	0.08	0.18	0.28	0.56	0.92	1.43
	Max	0.12	0.25	0.41	0.82	1.33	2.04

Ensure that the direction of rotation of the motor is as required. For induction motors, the direction of rotation can be reversed by interchanging two supply phase connections in the terminal box. All motors of type 1SE0 / 1LA2 are suitable for bi-directional rotation.

3.4.1 Earthing

Connect the earthing conductor to the terminal with the earth marking in the Terminal box as well as on the Stator housing.

Before closing the terminal box ensure that:

Clean the area underneath the earthing terminal and smear it with petroleum jelly before making earthing connections.

- Interior of the terminal box is clean and free of cable residue.
- All terminal screws and bolts are firmly tightened.

3.5 Checking the insulation resistance

The insulation resistance of the windings must be measured prior to initial startup of the machine, and after long periods of storage or standstill (approximately 6 months).



Warning

While the measurement is being taken and immediately afterwards, some of the terminals carry dangerous voltages and must not be touched.

Measurement

The **insulation resistance** of the windings to ground is measured with 500V DC. The winding temperature should be $30^{\circ}\text{C} \pm 15^{\circ}\text{C}$.

Checking

Minimum insulation resistance value (at 40°C) as specified in IS: 4722 is $R_m = kV + 1$, where kV is the rated voltage of the machine. Thus, for 415V rated voltage the insulation resistance of the winding should not be less than 1.42 MOhm.

If less the winding must be suitably dried as per IS: 900

3.6 Bearing and lubrication

All motors, as a standard feature, are provided with floating bearing at drive end and fixed bearing at non-drive end.

62 series deep groove ball bearings shielded on both the sides (ZZ) are provided in motors upto 132 frame. Motors up to and including frame 112 will have bearing with "Normal" clearance whereas bearings for 132 will have C3 clearance. The grease used is lithium complex soap based Exxon Mobil, UNIREX N3, NLGI Class 3 or equivalent.

The double sealed (ZZ) bearings are pre-lubricated for life. Under normal operating condition, these offer a service life of 20,000 continuous working hours and must be replaced after such period or 3 years whichever is earlier.

3.7 Balancing, transmission elements

A suitable device should always be used for fitting and removing the transmission elements (coupling halves, pulleys, pinions).

As standard, the rotors are dynamically balanced with the half key inserted.

When fitting the transmission element, keep the type of balance in mind!
Balance with half key.



Warning

The usual measures should be taken to guard transmission elements from touch. If a motor is started up without transmission element attached, the key should be secured to prevent it being thrown out.

3.8 Commissioning

NOTE: Where the torque is very uneven (the drive of a reciprocating type compressor, for example), the inevitable result is a non-sinusoidal motor current, whose harmonics can lead to excessive system perturbation or excessive electromagnetic interference.

In case of converter-fed motors, high-frequency current or voltage harmonics in the motor cables can give rise to electromagnetic interference. This is why the use of shielded cables is recommended.



Warning

Only expert persons should be entrusted with work on power installations. All covers which are designed to prevent active or rotating parts from being touched, or which are necessary to ensure correct air guidance and thus effective cooling, must be installed prior to commissioning.

Before commissioning, check that:

- The minimum insulation resistances are adhered to.
- The rotor turns freely without rubbing.
- The motor is properly assembled and aligned.
- The transmission elements are correctly adjusted (e.g. belt tension) and the transmission element is suitable for the given operating conditions.
- All electrical connections, mounting screws and connecting elements are properly fitted and tightened.
- All protective conductors are properly installed.
- Any auxiliaries that may be fitted (brakes, speedometer, separate fan) are in working order.
- Touch protection guards are installed around moving and live parts.
- The maximum speed n_{\max} is not exceeded, especially for motors with variable speed drive.

NOTE: The maximum speed n_{\max} is the highest operating speed permitted for short periods. It should be kept in mind that motor noise and vibration are worse at this speed, and bearing life is reduced. (For details refer catalogue or contact nearest Siemens office).



Caution

After motor installation, the brake, if fitted, should be checked for proper functioning.

It is not possible to formulate a complete checklist for all operations and applications. Other checks may also be necessary!

For motors fitted with brakes, also refer to manual of brake enclosed with the motor.

For motors fitted with encoder, also refer to manual of encoder enclosed with the motor.

4. Electromagnetic Compatibility

When used for their intended purpose and operated on electrical supply systems with features specified (in EN 50160), the machines satisfy the requirements of the EU Directive on Electromagnetic Compatibility 89/336/EU, and IEC 60034-1 Clause 13.

Electromagnetic interference emission:

Note: Very uneven torque (such as with reciprocating compressor drives) forces a non sinusoidal motor current, the harmonics of which can cause both impermissible reaction on the system and impermissibly strong electromagnetic interference emission.

Note: In the case of converter fed machines, high frequency harmonic currents in the motor supply leads can give rise to electromagnetic interference emission, the magnitude of which depends upon the converter design (type, interference suppression measures, and manufacturer). That is why the use of shielded supply cables is recommended. In order to avoid exceeding the limit values specified in EN 50081 with a converter / motor drive system, the EMC data provided by the converter manufacturer should always be followed. If they recommend the use of shielded supply cables, the shielding is most effective if it is connected over a large area right up to the motor terminal box (with a metal cable gland). In the case of motors with built in detectors (e.g. PTC thermistors), interference voltages can occur in the detector cables due to converter related reasons.

Electromagnetic interference immunity:

The requirements of immunity to interference to EN 50082 are in principle, satisfied by the motors. In the case of motors with built in detectors (e.g. PTC thermistors), the operator himself must provide immunity to interference by selecting a suitable detector signaling cables with shielding (similar to the main motor leads).

Noise while operations with VFD supply:

Motors when used in VFD supply may exhibit higher noise level due to harmonics in the supply. Suitable measures should be employed to reduce this – if required.

5. Maintenance



Caution

(Environmental Protection)

The disposal of waste generated during operation & maintenance of the motor should be done as per the applicable local environmental legislations.



Caution

(Environmental Protection)

Waste Copper windings during repair and maintenance - to be collected as segregated waste and sent to registered recyclers approved by the respective State Pollution Control Board.

Safety Precautions



Warning

Before starting any work on the motor or other equipment, particularly before opening covers over live or moving parts, the motor must be properly isolated from the power supply. Besides the main circuits, any additional or auxiliary circuits that may be present must also be isolated.

The “5 Safety rules” to be followed are:

- Isolate the equipment
- Take effective measures to prevent reconnection
- Verify equipment is dead
- Ensure proper earthing connections
- Cover or fence off adjacent live parts

The precautions listed above should remain in force until all maintenance work is finished and the motor has been fully assembled.

Certain parts of the motor may reach temperatures above 50°C.

When cleaning the motor with compressed air, ensure that suitable exhaustion measures are used and you use personal protective gear (goggles, face mask/filter or similar)!

If chemical cleaning agents are used, observe the instructions and any warnings.

Chemical agents must be compatible with the motor’s components/parts, especially when it involves plastics.

5.1 General

Periodic overhauling of the motor is recommended to ensure long trouble free service.

Before starting the maintenance work, make sure that the supply is disconnected. These motors are provided closely pitched ribs for effective cooling of the motor. These ribs should be cleaned at regular intervals either by oil free compressed air, or by scraping, depending on the level of contamination.

The inside of the motor should be cleaned using dry compressed air during normal overhauling of the motor. Special care should be taken while cleaning the windings to remove loose dust, moisture etc.

5.2 Dismantling

5.2.1 Pressing on and pulling off drive elements

Use the tapped hole provided in the end of the shaft for fitting drive components such as couplings, gearwheels, belt pulleys etc. and, if possible, heat the components as necessary. Use a suitable puller tool for removing the components. Do not strike the components, e.g. with a hammer or similar tool, when fitting or removing them and do not exert more than the maximum value of radial or axial force – according to the catalog – transmitted to the motor bearings through the shaft extension.

5.2.2 Fans

Plastic fan

Thermo plastic fans have two cast-on tabs that snap into the ring groove on the shaft to prevent axial movement. Before the fan is pulled off the shaft, the two tabs must be disengaged (lifted up) and held temporarily in that position, e.g. by inserting packing.

Thermoplastic fans have two openings for the insertion of the puller arms so that the pulling force can directly act on the fan hub. On delivery, a film of plastic may cover these openings and later on they should be punched.

A suitable device (puller) should be used for pulling the fan off and pressing it back on. Hammer blows must be avoided to protect the fan and bearings.

Cast Iron fan

Cast iron fans are axial locked with separate circlip. Cast iron fans are best removed by engaging the puller arms on the outer rim of the fan. In case of larger fans, the puller holes provided on the hub can be used.

5.2.3 Removal of Bearings

For removing bearings use proper pullers. Re-usable bearings, which are non-separable (e.g. Deep groove ball bearing), should be withdrawn by attaching puller arms to the inner ring of the bearing. If it is a must to apply puller arms on the outer ring of the bearing, the bearing should be rotated during withdrawal to avoid damage to the bearing.



Caution (Environmental Protection)

Waste grease & greased cloth - to be collected as hazardous waste and sent to hazardous waste disposal facility for incineration.

Removal of bearings or inner rings which are not to be used is facilitated by heating them with gas or welding torch.

5.3 Re-assembly

The motor must be assembled in a dust free, dry and clean location.

As the motor conforms to the type of protection IP55, all machined mating surfaces are provided with a thin even coat of bearing grease. Provide a fresh coat of this grease at the time of re-assembly.

Unmatched surfaces are provided with rubber gaskets. At the time of re-assembly, ensure that the gaskets are in good condition. Place the gaskets carefully to achieve the correct sealing. Replace the gaskets with the new ones if the same are damaged.

All fasteners that are used on the exterior of the motor are provided with a coat of bearing grease to prevent ingress of water and dust through tapped holes. Ensure that the same is provided at the time of re-assembly.

Do not interchange location (DE & NDE) of bearing covers, as the spigot dimensions may be different.

A bearing must be replaced if it is damaged. Damage to bearing is often difficult to recognize; in doubtful cases, replace the bearing. Bearings, which have been removed, should be reused only if they show no trace of damage and provided they are thoroughly cleaned beforehand.

Clean bearings using proper cleaning agent like White spirit. It is advisable to wear gloves.



Caution

The cleaned bearing must be free of foreign bodies (fibres from cleaning rags, hair from brushes, etc.)



Caution (Environmental Protection)

The bearing to be discarded must be thoroughly cleaned from grease and should be intentionally damaged (using weld marks or cutters etc) to avoid reuse.

The removed grease is a hazardous waste and is harmful to environment causing soil pollution and water pollution. It should only be incinerated at an authorized agency and not disposed by any other means.

It is recommended that the new rolling contact bearings be installed as follows:

Heat the deep groove ball bearing in oil or air to a temperature of approximately 80°C and slip them over the shaft. Heavy blows may damage the bearing and must be avoided.

When replacing the bearings, it is also advisable to replace any sealing elements that are subject to wear (e.g. oil seal, felt etc.).



Caution (Environmental Protection)

Waste insulation material is a hazardous waste and it should only be incinerated at an authorized agency and not disposed by any other means.

Replace any other damaged parts. For Spare parts contact the nearest SIEMENS sales office.

5.5 Joint sealing

When reassembling machines with degree of protection IP56 (see rating plate), the joint between the motor frame and the

endshields are sealed with rubber 'O' rings. It should be ensured that these are not damaged.

6. Spare Parts

When ordering spare parts, please indicate the correct Motor Type, Serial Number (as shown on the rating plate) and also the correct part description. This will ensure speedy and correct delivery of spare parts. Please refer to the exploded view of the motor (Fig.1).



Caution (Environmental Protection)

Disposal of the product at the end of its life: When it is decided that the product cannot be repaired and is to be disposed off, care should be taken to adhere to Local / Statutory environmental requirements. It should be noted that the product contains grease, copper windings, insulation materials that are not biodegradable and are hazardous to the environment.

NOTE:

In addition to the above information, it is recommended that the user refer to IS: 900 – "Code of practice for installation and maintenance of Induction Motors".

Applicable Standards

The motors comply with the following standards:

IS: 12615: Specification for three phase induction motors

IS: 900: Code of practice for installation and maintenance of induction motors.

IS: 4691: Degree of protection provided by enclosure for rotating electrical machinery

IS: 7816: Guide for testing insulation resistance of rotating machines.

IS: 9628: Specification for Three phase induction motors with type of protection 'n'.

IS: 6381: Specification for construction and testing of apparatus with type of protection 'e'.

IS: 12065: Permissible limits of noise level for rotating electrical machines.

IS: 12075: Mechanical vibration of rotating electrical machines with shaft heights 56mm and higher – Measurement, Evaluation and Limits of Vibration severity.

IS/IEC: 60034-1: Rotating electrical machines – Part 1: Rating and Performance.

IS/IEC: 60034-5: Degree of protection for rotating electrical machines.

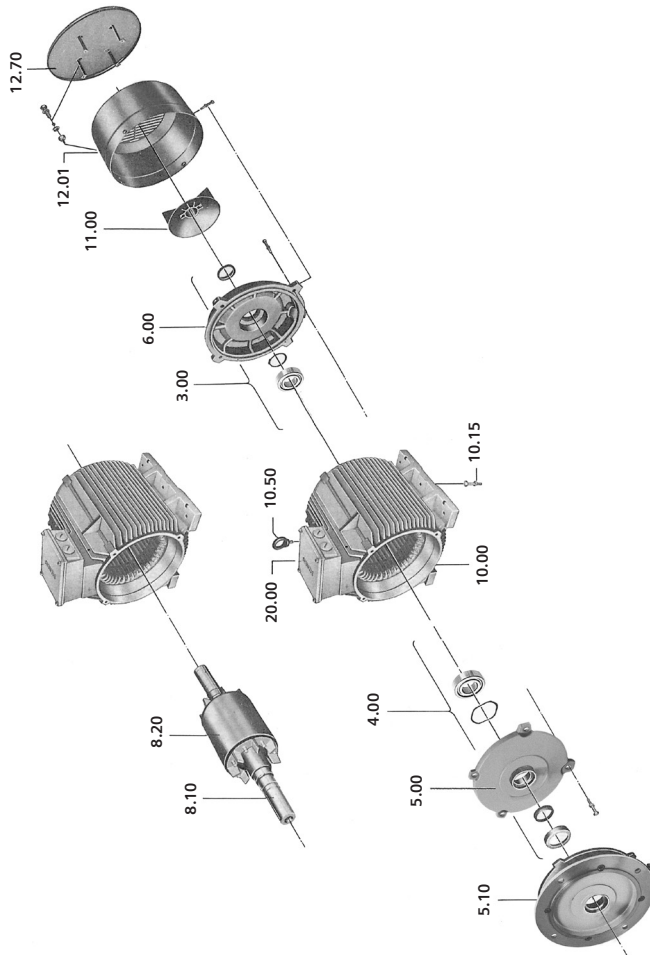
EN: 60204: Safety of machinery –Electrical equipment of machines.

7. Motor Troubleshooting Chart

Sr. No.	Trouble	Cause	Remedy
1	Hot bearings	Excessive belt pull	Decrease belt tension.
		Pulley too far away	Move pulley closer to bearing.
		Pulley dia. too small	Use larger pulley.
		Misalignment	Correct by realignment of drive.
		Broken ball or rough races	Replace bearings.
		Excess lubricant	Reduce quantity of grease (Bearing should be filled only half).
		Overloaded bearings	Check alignment, side thrust & end thrust.
2	Motor connected but does not start	Bearing running dry	Regrease the bearing.
		No supply voltage/ One phase open/ Voltage too low	Check voltage on each phase.
		Motor may be overloaded	Reduce load or start at no load.
		Control gear defective	Examine each step of the control gear for bad contacts or open circuit.
		Starting torque too high	If with autotransformer starting, change to higher tap.
		Rotor defective	Look for broken rings.
		Short circuit to earth	Check with Megger.
3	Motor runs & then stops down	Fault in starter or star/delta switch	Check contacts & connections.
		Power failure	Check for loose connections to line, fuses & control gear.
		Over load	Examine overload trips & see that they are set at approx. 150% of full load current.

Sr. No.	Trouble	Cause	Remedy
4	Motor starts sluggishly, speed falls when load is put on	Rating not proper	Get correct type of motor.
		Voltage too low at motor terminals because of line drop	- do -
		Starting load torque too high	Check load characteristics with motor speed torque.
		Broken rotor bars	Look for cracks near the ring & if required get new rotor.
5	Motor starts with difficulty on star connection or not at all	Load too high	Reduce load or use larger motor.
		Supply voltage low	Check supply lines to motor.
		Contacts burnt in star/delta starter	Overhaul or replace starter.
6	Stator heats up quickly & takes large no load current	Stator wrongly connected	Check connection.
		Phase short	Rewind
		Multiple earth	Rewind
7	Motor overheats while running on load	Overload	Reduce load.
		One phase open	Check connections.
		Shorted stator coil	Repair & check wattmeter reading.
		Faulty connection	Correct the connections.
		Motor operated on load cycle not in accordance with the name plate	Run the motor on duty for which it is specified.
		High or low voltage	Check voltmeter reading.
		Foreign material in air gap	Dismantle & remove obstruction.
8	Motor vibrates after connections are made	Motor misaligned	Realign.
		Weak foundation	Provide strong base.
		Coupling out of balance	Balance coupling.
		Driven equipment unbalanced.	Re-balance.
		Balancing weights shifted.	Re-balance the rotor.
		Defective bearings	Replace bearings.
		Bearings not in line	Line up properly.
		Excessive end play	Adjust bearings or add washers. Use shims for alignment. Use vibration pads to dampen external vibrations.
9	Scraping noise	Fan touching fan cover	Remove interference.
		Loose on bed plates	Tighten mounting bolts.
10	Magnetic noise	Airgap not uniform	Check & correct bearings.
		Loose bearings	Correct or replace bearings.
11	Shaft end breaks or stator rotor rubbing	Excessive radial loads due to pulley drives	Check for suitability.
12	Heavy vibrations	Load unbalance	Re-balance.
13	Current unbalance	Unbalanced supply voltage	Check voltage.

Exploded view for Frame Size upto 132



- | | | | |
|------|---|-------|---|
| 3.00 | Rolling contact bearing assembly (fixed bearing) | 10.00 | Stator housing with integral feet and wound core packet |
| 4.00 | Rolling contact bearing assembly (floating bearing) | 10.15 | Earthing clamp |
| 5.00 | Endshield drive end | 10.50 | Lifting eyebolt |
| 5.10 | Flange endshield | 11.00 | External fan |
| 6.00 | Endshield, non-drive end | 12.01 | Fan Cowling |
| 8.10 | Shaft | 20.00 | Terminal box |
| 8.20 | Cage rotor | 12.70 | Canopy |

Note: The graphic displayed here is solely for the purpose of explanation. The actual product may be different in appearance.

Fig. 1

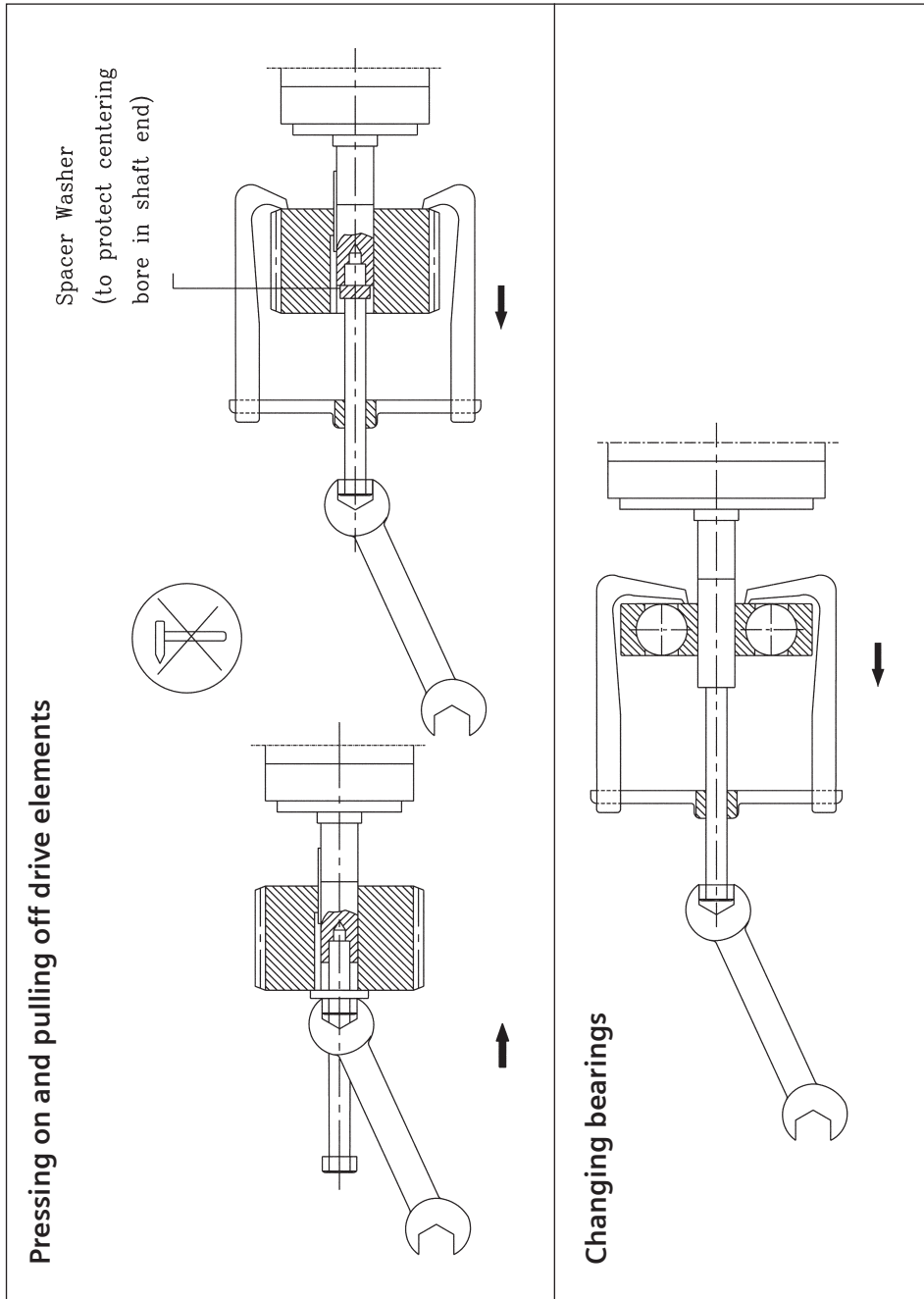
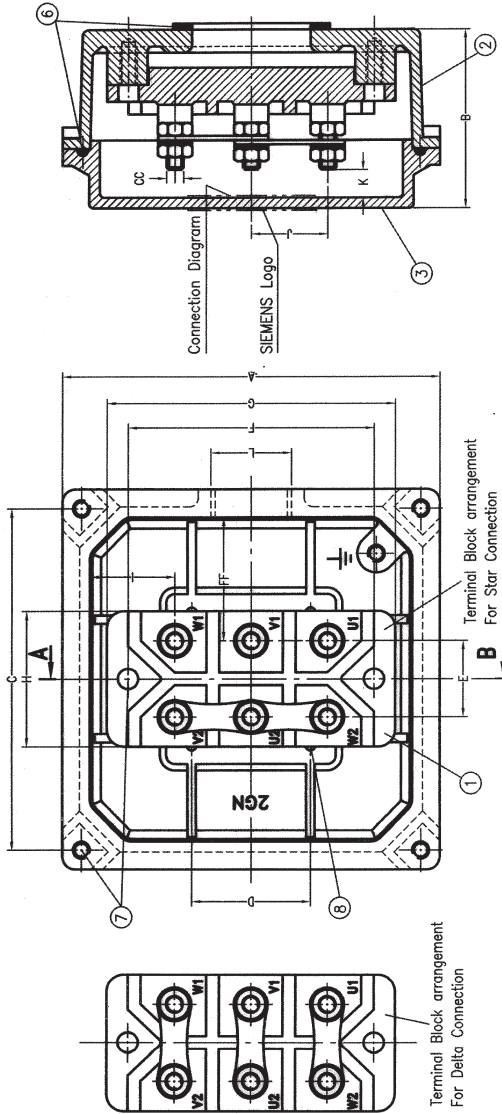


Fig. 2

**Terminal box for frame sizes 63, 71, 80, 90S and 90L
Type: 1 x B0 096**

Section A-B



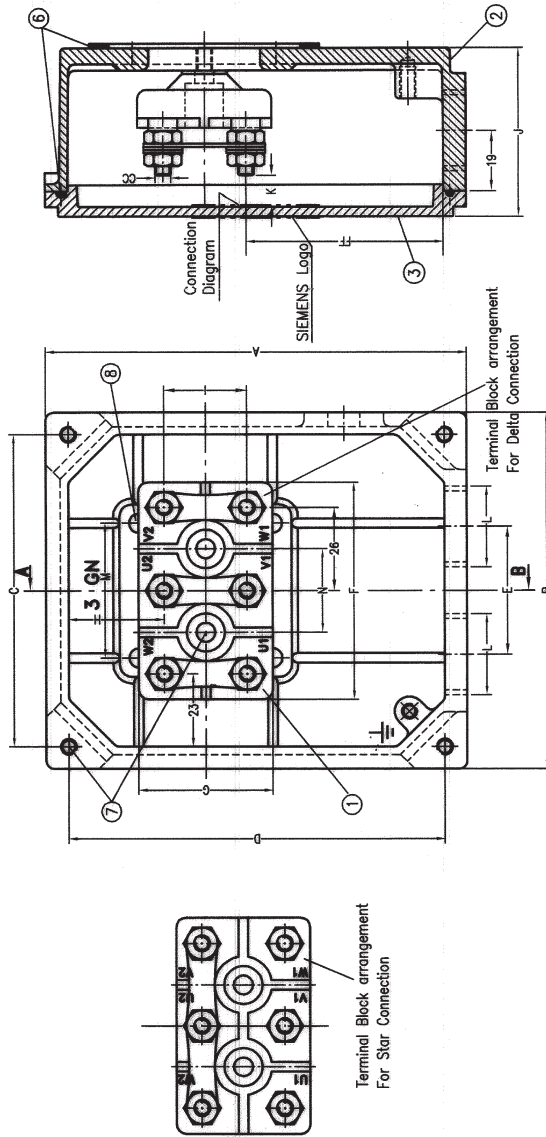
Terminal Box	A	B	C	D	E	F	G	H	I	J	K	L	CC	FF
1XB0 096	89	42	80	28	18	58	68	32	20	18	6.5	④	M4	29

- ① Terminal Block
- ② Terminal Box Base of aluminium alloy
- ③ Terminal Box Cover of aluminium alloy
- ④ 1 no. B.S.Conduit Entry 19 (0.75") as per IS:1653
- ⑤ Max. permissible size of conductor cross-section(mm²):6.0
- ⑥ Rubber Gasket
- ⑦ Cheese head Screw M4x10
- ⑧ Cheese head Screw M4x12

Fig. 3

**Terminal box for frame sizes 100L, 112M, 132S and 132M
Type: 1 x B0 132**

Section A-B



Terminal Box	A	B	C	D	E	F	G	H	I	J	K	L	M	N	CC	FF
100L 132	132	112	96	118	40	66	42	30	26	53	9.5	④	42	26	M5	62

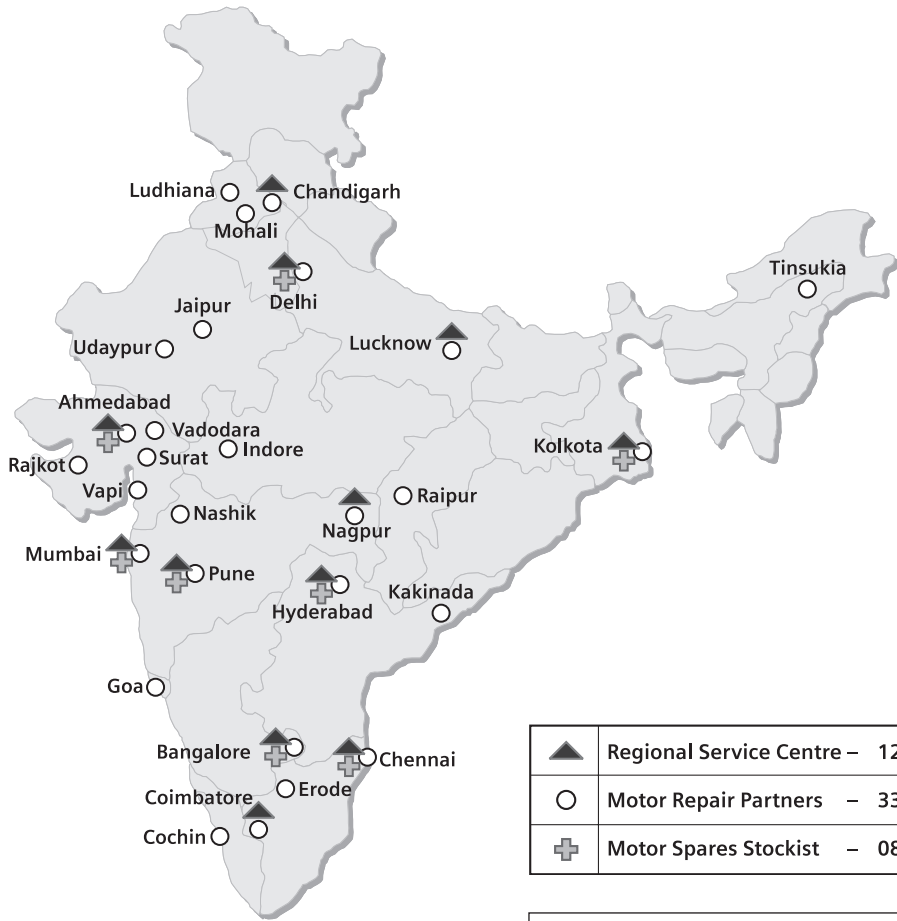
- ① Terminal Block
- ② Terminal Box Base of aluminium alloy
- ③ Terminal Box Cover of aluminium alloy
- ④ 2 nos. B.S.Conduit entry 25.4 (1") as per IS:1653
- ⑤ Max. permissible size of conductor cross-section(mm²);16
- ⑥ Rubber Gasket
- ⑦ Cheese head Screw M5x12
- ⑧ Cheese head Screw M5x15

View without terminal box cover

All dimensions in mm.

Fig. 4

Motor Service Network in India



▲	Regional Service Centre – 12x
○	Motor Repair Partners – 33x
+	Motor Spares Stockist – 08x

Customer Care Desk

Toll Free Number: 1800 20 90987
Toll Free From BSNL/MTNL: 1800 22 0987

Phone : 022 2760 0150
Fax : 022 2762 3722
Email : ics.india@siemens.com

East - +91 - 9830256240
West - +91 - 9820507909
North - +91 - 9810205655

Siemens Expert House

Region	Office	Name	Mobile no.
East	Kolkotta	Kishor Yadao	9830912630
WR-1	Mumbai	Mr Kunwar Pratap Singh	9833041401
WR-1	Ahemdabad	Mr Haresh Shah	9825300909
WR-2	Pune	Mr Sandeep Pataskar	9822976541
WR-2	Nagpur	Mr Sandeep Pataskar	9822976541
North	Delhi	Abhishek Pandey	9910991211
North	Lucknow	Abhishek Pandey	9910991211
North	Chandigarh	Abhishek Pandey	9910991211
North	Jaipur	Abhishek Pandey	9910991211
South-1	Chennai	Praveen Pai	9840323334
South-1	Coimbatore	Praveen Pai	9840323334
South-2	Bangalore	Prakash Hegde	9632506222
South-2	Hyderabad	Prakash Hegde	9632506222

For Service Support:

Siemens Customer Care Desk
Toll Free From BSNL/MTNL: 1800 22 0987
Phone: 022 2760 0150
Fax: 022 2762 3722
Email: ics.india@siemens.com

For Spares contact nearest stockist or send enquiries to:

"Pragati" Quotation Center
Email: quoteccr.india@siemens.com

Disposal

Siemens Products are environment friendly, which predominantly consist of recyclable materials.

For disposal we recommend disassembling and separation into following materials:

METALS: Segregate into Ferrous & Non Ferrous types for recycling through authorised dealer.

PLASTICS: Segregate as per material type for recycling through authorised dealer.

Because of the long lifetime of Siemens products the disposal guidelines may be replaced by other national regulations when taking the product out of service.

The local customer care service is available at any time to answer disposal-related questions

Siemens Ltd.
Industry Sector
I DT LD P LV Motors
R&D Technology Centre
6th Floor, Kalwa Works
Thane Belapur Road, Thane - 400 601
Fax: +91 22 33265504
E-mail: motors.in@siemens.com

Customer care Toll free no. 1800 220 987.
Email: ics.india@siemens.com

Order No.: 104808383

Siemens Ltd.
MOT-02-120-050

Product development is a continuous process. Consequently the data indicated in this booklet is subject to change without prior notice.