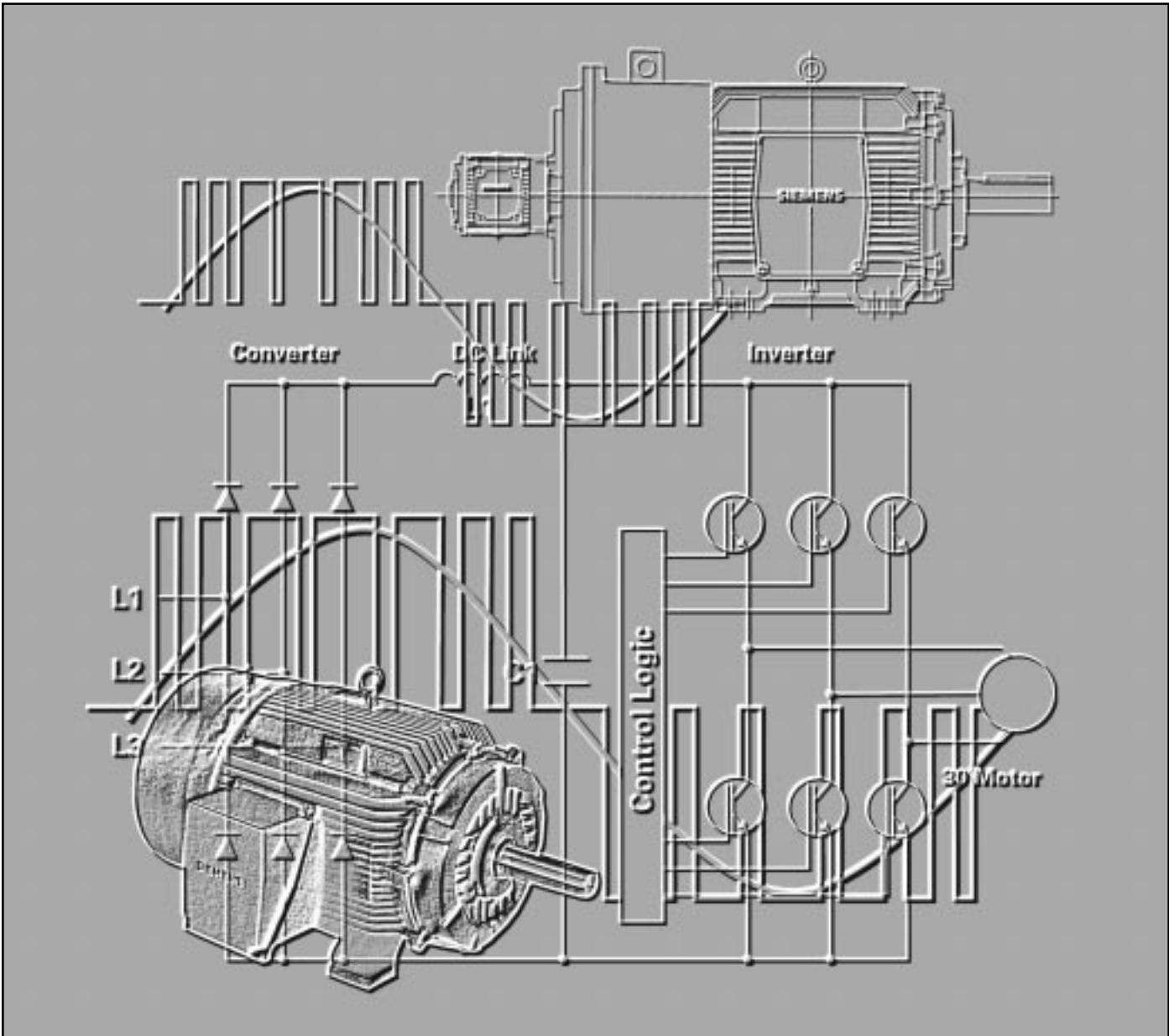


## RGZESDI

# Inverter Duty AC Induction Motors

Installation • Operation • Maintenance Instructions

Frames: 143T through S449SS/LS



## **SIGNAL WORDS**

The signal words " Danger," Warning" and " Caution" used in this manual indicate the degrees of hazard that may be encountered by the user. These words are defined as:

**Danger** - Indicates death or serious injury will result if proper precautions are not taken.

**Warning** - Indicates death or serious injury or property damage can result if proper precautions are not taken.

**Caution** - Indicates some injury or property damage may result if proper precautions are not taken.

## **QUALIFIED PERSON**

For the purposes of this manual and product labels a qualified person is one who is familiar with the installation, construction, operation or maintenance of the equipment and the hazards involved. In addition this person has the following qualifications:

- (a) Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- (b) Is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
- (c) is trained in rendering first aid.

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**IMPORTANT**

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens sales office. The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

## INSTALLATION & OPERATION

### INTRODUCTION

THIS EQUIPMENT CONTAINS HAZARDOUS VOLTAGES, ROTATING PARTS AND HOT SURFACES. SEVERE PERSONAL INJURY OR PROPERTY DAMAGE CAN RESULT IF SAFETY INSTRUCTIONS ARE NOT FOLLOWED. ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT AFTER BECOMING THOROUGHLY FAMILIAR WITH ALL WARNINGS, SAFETY NOTICES, AND MAINTENANCE PROCEDURES CONTAINED HEREIN. THE SUCCESSFUL AND SAFE OPERATION OF THIS EQUIPMENT IS DEPENDENT UPON PROPER HANDLING, INSTALLATION, OPERATION AND MAINTENANCE.

### STORAGE

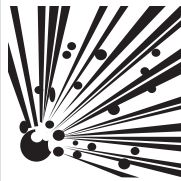

Motors must be stored in a clean, dry, well ventilated location free from vibration and rapid or wide temperature variations. If the unit is to be stored longer than three months, consult the factory. Ball bearing motors are shipped from the factory properly lubricated and ready to operate. When in storage, the motor shaft must be turned several rotations every month and the bearing re-lubricated every year. On non-explosion-proof TEFC motors, a removable plug in the bottom of the frame or housing permits removal of accumulated mois-

### INSPECTION

Care is taken at the factory to assure that the motor arrives at its destination in first class condition. If there is evidence of rough handling or damage in shipping, file a claim at once with the carrier and notify your Siemens Sales Office.

Examine the outside of the motor carefully for damage, with particular attention to conduit box, fans, and

covers. Inspect and tighten all hardware and accessories, which may have become loosened during shipping and handling. Turn the shaft by hand to be sure that it rotates freely. If the motor has been mishandled sufficiently to break external parts, the end shield should also be removed to check for internal damage unless the motor is explosion proof. See warning below on explosion proof motors.

		<h3>WARNING</h3>
	<p><b>Explosion.</b> Can cause death, serious injury or property damage.</p> <p>When repairing and reassembling a motor that has an underwriter's label, it is imperative that the unit be re-inspected and:</p> <ol style="list-style-type: none"> <li>1 All original fits and tolerances are maintained.</li> <li>2 All plugs and hardware be securely fastened.</li> <li>3 Any parts replacements, including hardware, be accurate duplicates of the Originals.</li> </ol> <p>Repair work on explosion proof-motors can only be performed by the original manufacturer or U.L. certified shops. Violations of any of the above items will invalidate the significance of the U.L. Label.</p>	

ture. Drain regularly if storage atmosphere results in formation of condensation.

### INSTALLATION

Qualified service or maintenance personnel must handle installation. The motor foundation must rigidly support all four feet in the same plane. Place shims under the motor feet, as required; so they will not be pulled out of plane when mounting bolts are tightened. All wiring to the motor and control must be in accordance with the National Electrical Code and all local regulations. Before load is connected,

momentarily energize motor to check that the direction of rotation is proper. For direct connected loads, accurate alignment is 0.004 inch/ft. (Radius to dial Indicator = one foot)

Any change in shims requires re-checking alignment. When alignment is within limits, dowel two feet of each unit. When installing V-belt sheave, spur or helical pinion or chain drives, be certain that they are within NEMA limitations. Refer to NEMA motor and general standards, MG1-14.07 and 14.41.

**OPERATION**

Repeated trial starts can over heat the motor and result in motor burnout (particularly for across the line starting). If repeated trial starts are made, allow sufficient time between trials to permit heat to dissipate from windings and rotor to prevent overheating. Starting currents are several times running currents and heating varies as the square of the current.

After installation is completed, but before motor is put into regular service, make an initial start as follows:

1. Check motor connections and VFD connections against wiring diagrams.
2. Check voltage, phase, and all loaded drive parameters against motor nameplate. If an auxiliary blower is supplied, check to see that it is wired and operating properly. The blower should be wired to a separate 60 hz power source.
3. If possible, remove external load and turn shaft by hand to ensure free rotation. This may have been done during installation procedure; if so, and conditions have not changed since, this check may not be necessary.

**VFD OPERATION**

Special consideration must be paid to ensure that the motor is operated within recommended guidelines for torque and speed for the type and size of RGZESDI motors selected. Under no circumstances should the motor be operated at frequencies beyond the safe mechanical limits shown below in this document.

RGZESDI Constant Torque motors provide full rated torque within their listed speed range, without exceeding their Class F temperature rating



<b>Maximum Safe Mechanical Speed Limits Direct Connected Loads</b> (does not imply constant horsepower capability)			
<b>Motor Frame</b>	<b>3600 rpm</b>	<b>1800 rpm</b>	<b>1200 rpm</b>
143-184	7200	5400	2700
213-256	5400	4200	2700
284-286	5400	3600	2700
324-326	4500	3600	2700
364-365	4500	2700	2700
404-445	3600	2700	1800
447-449	3600	2250	1800



- a. If load is disconnected, run motor at no load long enough to be certain that no unusual conditions develop. Listen and feel for excessive noise, vibration, clicking, or pounding. If present, stop motor immediately. Investigate the cause and correct before putting motor in service.
  - b. If load is not disconnected, interrupt the starting cycle after motor has decelerated to a slow speed. Carefully observe for unusual conditions as motor coasts to a stop.
4. When checks are satisfactory, operate at minimum load and look for unusual conditions. Increase load slowly to a maximum. Check unit for satisfactory



operation. Electric motors operating under normal conditions become quite warm. Although some places may feel too hot to touch, the unit may be within operational limits. Use a thermocouple to measure winding temperature when there is any concern.

The total temperature, not the temperature rise, is the measure of safe operation. Investigate the operating conditions if the total temperature measured by a thermocouple placed on the winding exceeds:

- 275°F (135°C) for class "F" insulation
- 302° F(150°C) for class "H" insulation

	 <b>CAUTION</b>
	<p><b>Electrical Overload.</b> May cause property damage.</p> <p>To avoid the danger, guard against overloading. Overloading causes overheating and overheating means shortened insulation life. A motor subjected to a 10°C temperature rise above the maximum limit for the insulation may cause the insulation life to be reduced by 50%. To avoid overloading, be sure motor current does not exceed nameplate current when nameplate voltage is applied.</p>

	 <b>CAUTION</b>
	<p><b>Electrical Overload.</b> May cause property damage.</p> <p>To avoid damage to the motor, caution must be observed when applying standard motors for continuous low speed, constant torque operation. A standard motor's self-cooling capacity depends upon self-ventilation schemes that are greatly reduced at decreased operating speeds.</p>

	 <b>CAUTION</b>
	<p><b>Electrical Overload.</b> May cause property damage.</p> <p>To avoid damage to the motor, it is the responsibility of the startup personnel during commissioning of the VFD/ motor combination to properly tune the drive to the motor for the specific application. Application of motors which are not per the guidelines of this document may void the warranty, if they are not specifically approved by Siemens.</p>

on PWM (pulse width modulated) inverter power. Speed ranges are based on use with vector type IGBT inverters, set at a minimum 3 kHz switching frequency, and are

designed for operation at 150% of rated torque for one minute, up to the base speed of the motor (overload capacity declines as the motor reaches maximum speed).

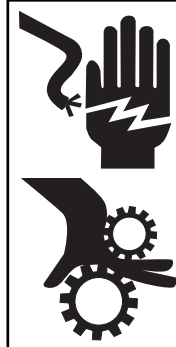
# ACCESSORIES

## Thermostats

All RGZESDI motors are equipped with Class F normally closed thermostats for detection of overload conditions. The thermostat is a device that is intended to be used in the alarm or protective circuit of an RGZESDI motor. It is in direct contact with the stator coil and is useful in guarding against loss of normal ventilation air, high ambient temperature, and prolonged operation of self-ventilated motors at very low speeds.

## Blowers (if Equipped)

Blower motors, where supplied, must be in operation to supply cooling air before loading totally enclosed blower cooled (TEBC) motors. Blower should be checked for correct rotation. Air movement should be from non-drive end toward drive end of the motor. The nameplate voltage and fre-



## WARNING

**Hazardous Voltages and Entanglement.**  
Can cause death, serious injury, or property damage.

To avoid the danger, the control circuit should be designed to prevent the automatic starting of the motor when the thermostat resets. Always de-energize all power sources and ground the equipment before maintenance. Only qualified personnel should perform maintenance.

quency should agree with the power supply. Motors will operate successfully on line voltage within +/- 10% of the nameplate value or frequency within +/- 5%. The combined variation shall not exceed +/- 10%.

Wiring of Blower motor should meet the National Electric Code and local building codes.

## Encoders (if Equipped)

Follow encoder instructions supplied with the RGZESDI motor for encoder operation and wiring.

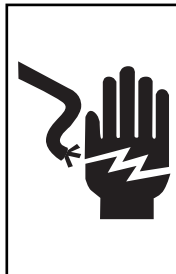
# MAINTENANCE

## MAINTENANCE

Failure to properly maintain the equipment can result in severe personal injury and product failure. The instructions contained herein should be carefully reviewed, understood and followed. The following maintenance procedures should be performed regularly:

1. Bearing Lubrication
2. Insulation resistance check
3. Cleaning

This checklist does not represent an exhaustive survey of maintenance steps necessary to ensure safe operations of the equipment.



## DANGER

**Hazardous Voltages.**  
Will cause death or serious injury.

To avoid the danger, always de-energize all power sources and ground the equipment before maintenance. Only qualified personnel should perform maintenance.

Particular applications may require further procedures. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Sales Offices.

The use of unauthorized parts in the repair of the equipment, tampering by unqualified personnel, or removal or alterations of guards or conduit covers will result in dangerous conditions which can cause severe personal injury or equipment damage. Follow all safety instructions contained herein.

## BEARING LUBRICATION

Bearing life is assured by maintaining proper alignment, proper belt or chain tension, and good lubrication at all times.

Prior to shipment, motor bearings are lubricated with the proper amount and grade to provide six months of satisfactory service under normal operating conditions.

For best results, grease should be compounded from a polyurea base and a good grade of petroleum oil. It should be of No. 2 consistency and stabilized against oxidation. Operating temperature range should be from -15°F to +300°F for class F and H. Most leading oil companies have special bearing grease that is satisfactory.

Re-lubricate bearings every six months (more often if conditions require) as follows:

1. Stop the motor. Lock out the switch.
2. Thoroughly clean off pipe plugs and remove from housings.



## CLEANING

The motor exterior must be kept free of oil, dust, dirt, water, and chemicals. For fan cooled motors, it is particularly important to keep the air intake openings free of foreign material. Do not block air outlet or inlet.

On non-explosion proof TEFC motors, a removable plug in the bottom of the motor bearing housing permits removal of accumulated moisture. Drain regularly.

## SERVICE

For immediate action on your motor problems, call your certified service center or contact your nearest Siemens District Office.

	 <b>CAUTION</b>
	<p><b>Entanglement.</b> May cause injury or property damage.</p> <p>To avoid the danger, do not lubricate motor while in operation, since excess grease will be forced through the bearings and into the motor before it will force its way out of the drain plug. Excess grease accumulation on windings reduces the insulation life.</p>

3. Remove hardened grease from drains with stiff wire or rod.
4. Add grease to inlet until small amount of new grease is forced out of the drain.
5. Remove excess grease from ports, replace inlet plugs, and run motor 1/2 hour before replacing drain plugs.
6. Put motor back in operation.



over 500 volts is the most convenient and safest method. Standards of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) recommend that the insulation resistance of stator windings at 75°C, measure at 500 volts DC, after one Minute should not be less than:

$$\frac{\text{Rated Voltage of Machine} + 1000}{1000} = \text{resistance in Megohms}$$

## INSULATION RESISTANCE

Check insulation resistance periodically. Any approved method of measuring insulation resistance may be used, provided the voltage across the insulation is at a safe value for the type and condition of the insulation. A hand-cranked megger of not

This formula is satisfactory for most checks. For more information, see IEEE Standard No.43, "Recommended Practice for Insulation Resistance Testing of AC Rotating Machinery"

	 <b>WARNING</b>
	<p><b>Entanglement.</b> Can cause death, serious injury, or property damage.</p> <p>To avoid the danger, do not attempt to clean motor while it is operating. Contact with rotating parts can cause severe personal injury or property damage. Stop the motor and lock out switch before cleaning.</p>

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