

Instruction Manual

MONARCH GX

**3 Phase Squirrel Cage
Induction Motors**



MONARCH GX (ME) Installation and Maintenance Manual

Cast Iron TEFC Squirrel Cage Induction Motors

1. HANDLING AND STORAGE

Motors should preferably be stored in their normal orientation. They should be stored in a clean, dry location away from vibration. Motors with shaft clamps should be stored with the clamps in place.

If motors have been exposed to moisture during long periods of storage then the insulation resistance of the windings to the frame (earth) should be checked with the aid of a megger (max. d.c. voltage 500V) prior to installation. Note do not megger Thermistors.

If any motor damage is to be claimed as “warranty”, TECO Australia must be consulted prior to any work being carried out on motor.

2. INSTALLATION AND OPERATION

Motors should be installed to the requirements of AS3000:2007 SAA Wiring Rules or in line with local regulations.

The installation of the equipment shall be carried out in a manner that does not reduce the protection afforded by the equipment design.

When installing the motor the following points should be carefully checked:

- rated voltage and frequency
- ambient temperature should not exceed 40°C, unless confirmed with TECO sales office
- altitude does not exceed 1000 meters above sea level
- correct connection of motor (see below)
- any shaft seals are correctly seated to ensure IP protection

The use of the motor should conform to the specified degree of protection in accordance with AS60034.5-2009.

Care must be taken to ensure that the cooling air can flow is unhindered. The space between the air intake and the nearest wall should be approximately equal to the shaft height of the motor. Foundations must be designed in such a way that vibration is avoided when the motor and the driven machine are running coupled.

Care should be taken to ensure that any condensate drain holes/plugs are located at the lowest point of motor casing. Any shaft clamps to prevent damage to the bearings in transit, must be removed before motor is put into operation. Before mounting the transmission parts, the motor shaft should be cleaned with a solvent.

Secure the motor to a level surface. Unevenness leads to mechanical deformation of the motor. The motor should be used only with coupling systems which are elastic with respect to centre offset, angular displacement, longitudinal shift and torsional strain. Rigid coupling systems are not permissible (unless previously agreed).

If direct coupling is employed check centre offset and angular offset with test arm and dial gauge. The following deviations should not be exceeded:

- Centre offset (radial measurement) 0.03 mm in 2 pole motors. 0.05 mm in motors with more than 2 poles. (the dial shows twice the value of the deviation).
- Angular offset (axial measurement) 0.10 mm.

Check alignment at normal operating temperature.

With applications involving belt transmission, unnecessary axial forces on the bearings can be avoided by positioning the shafts parallel to each other and keeping the pulleys perfectly aligned. The belt tension should be just sufficiently stretched to prevent slipping in service. If the pulleys are too small the motor shaft is subject to a high bending force which can result in shaft failure.

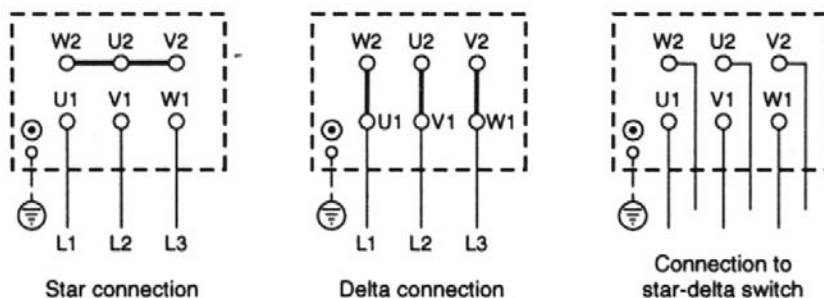
The connections for standard MONARCH three phase motors is –

- Star connected 415 Volt up to and including 3kW
- Delta connected 415 Volt 4kW and larger

This connection is indicated on the connection diagram inside terminal box lid.

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For special voltages and the like, different connections will be noted on the motor nameplate beside the voltage.

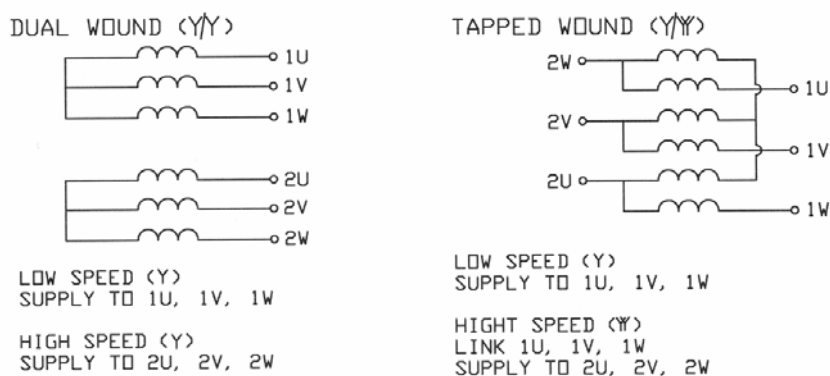
If the phases L1, L2 & L3 are connected in sequence with the motor terminals U1, V1 and W1, the direction of rotation is clockwise if motor viewed from the drive end. Procedure for reversing the direction of rotation: Interchange any two incoming main leads.

All Motors – apart from a few exceptions are suitable for operation in both directions. In the case of motors intended for only one direction (with uni-directional fan), the direction of rotation is indicated by an arrow.

Two speed motor connection diagrams –

Dual Wound motors are: 4 / 6 pole, 6 / 8 pole speeds

Tapped Wound Motors are: 2 / 4 pole, 4 / 8 pole speeds



3. CLEANING, LUBRICATION AND MAINTENANCE

Periodical checking of the magnetic starter (where used) is recommended, in order to prevent serious problems developing such as oxidation and poor electrical contact.

The intake and outlet openings as well as the channels between the cooling fins must be kept clean and protected against clogging to prevent motor overheating.

For motors up to frame size D180, these are generally not fitted with grease nipples. This means that greasing can only be carried out during general overhauls when the motor is disassembled.

Motors in frame size D180 and larger have greasing facilities and are factory lubricated for the initial start up period prior to commissioning.

- 1) D180-315L Lubrication should be performed as follows prior to use:
 - a) Clean the grease nipples with clean cloth
 - b) Whilst motor is running, introduce new grease until all the old grease is purged from the grease relief vents located at the bottom of the endshield
- 2) D355-400 Lubrication should be performed as follows prior to use (motor off):
 - c) Motor D355 and larger Non Drive end requires fan cover to be removed
 - d) Remove the grease relief screwed plug underside of the bearing cap before pumping new grease
 - e) Run motor for short period (5 minutes) with fan cover on and plug out to allow excess grease to escape
 - f) Switch off motor, remove fan cover and refit screw grease relief screwed plug

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Grease Type: SKF **LGHP 2** is a premium quality grease, mineral oil based using Polyurea (di-urea) thickener. It has excellent lubrication properties for a wide temperature range from -40 °C (-40 °F) up to 150 °C (302 °F).

This grease replaces the SKF high temperature grease LGHQ 3

- Compatibility with common Polyurea greases
- Compatibility with lithium complex thickened greases

LUBRICATION INTERVALS

Bearing No.		Poles	Re-lubrication interval			
			Standard condition	Severe condition	Grease quantity (grams)	
					Initial	Replenishment
6211		2	180 days	60 days	27 g	18 g
6212		2	180 days	60 days	35 g	23 g
6309		2	2 years	1 year	38 g	25 g
6311	NU311	2	180 days	60 days	60 g	40 g
6312	NU312	2	180 days	60 days	75 g	50 g
6313	NU313	2	90 days	30 days	98 g	65 g
6314	NU314	2	90 days	30 days	120 g	80 g
6315	NU315	2	90 days	30 days	135 g	90 g
6316	NU316	2	90 days	30 days	150 g	100 g
6317	NU317	2	60 days	20 days	160 g	110 g
6318	NU318	2	60 days	20 days	180 g	120 g
6319	NU319	2	60 days	20 days	180 g	120 g
6211		4 - 8	2 years	1 year	27 g	18 g
6212		4 - 8	210 days	70 days	35 g	23 g
6311	NU311	4 - 8	2 years	1 year	60 g	40 g
6312	NU312	4 - 8	210 days	70 days	75 g	50 g
6313	NU313	4 - 8	210 days	70 days	98 g	65 g
6314	NU314	4 - 8	210 days	70 days	113 g	75 g
6315	NU315	4 - 8	210 days	70 days	135 g	90 g
6316	NU316	4 - 8	210 days	70 days	165 g	110 g
6317	NU317	4 - 8	90 days	30 days	195 g	130 g
6318	NU318	4 - 8	90 days	30 days	225 g	150 g
6319	NU319	5 - 8	90 days	30 days	225 g	150 g
6320	NU320	4 - 8	90 days	30 days	225 g	170 g
6322	NU322	4 - 8	90 days	30 days	315 g	210 g
6324	NU324	4 - 8	90 days	30 days	390 g	260 g

For other bearing sizes please refer to TECO

Motors with shielded bearings, suffix "ZZ" (i.e. 6206ZZ) are greased for life and do not have regreasing facilities.

Definitions

Standard conditions: 8 hour operation per day with rated or light loading in a clean low-vibration environment.

Severe conditions: 24 hour operation per day with rated/light loading or in a dirty/dusty environment or where the motor is subject to vibration/light shock loading.

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4. PROTECTION / AUXILIARY DEVICES

Thermistors

Are fitted to frame sizes D160 and larger and are generally terminated in the main terminal box unless otherwise specified. Thermistors are positive temperature coefficient type, one fitted per phase (1000 ohm each @ tripping temperature = 3000Ω total) with a trip temperature to suit motor insulation class. Connect thermistor leads to a thermistors control relay from a reputable supplier.

Anti-condensation Heaters

If the motor is provided with Anti-condensation Heaters (if specified / ordered, check for nameplate), the incoming supply to the heaters is shown on the heater nameplate. The heater circuit should be de-energised when the motor is running.

5. FAULT FINDING & RECOGNITION

Kind of Fault	Symptom	Cause	Remedy
Fail to Start without Load	Motionless And soundless	Power-off	Consult power company
		Switch-off	Switch-on
		No fuse	Install fuse
		Broken wires	Check wires and repair
		Broken lead	Check leads and repair
		Faulty winding	Check winding and repair
	Fuse blowing – (Circuit Breaker trips off, slow start with electromagnetic noise)	Short circuit	Check circuit
		Incorrect wiring	Check wiring
		Poor contact in circuit switches	Check and repair
		Broken wiring	Check and repair
		Poor contact of starting switch	Check and repair
		Incorrect connection of starting switch	Check and repair
Overload after start	Fuse blowing – Fail to restart due to circuit breaker tripping	Insufficient capacity of fuse or breaker	Replace fuse or breaker
		Overload	Lighten load
		High load at low voltage	Check circuit capacity and reduce load
Overload after Start	Overheating of Motor	Overload or Intermittent Overload	Lighten Load
		Under-voltage	Check circuit capacity and power source
		Over-voltage	Check power source
		Fuse blowing (Single phase rotating)	Install the specified fuse
		Poor contact of circuit switches	Check and repair
		Poor contact of starting switch	Check and repair
		Unbalanced three phase voltage	Check circuit or consult power company
	Speed falls sharply	Voltage drop	Check circuit and power source
		Sudden overload	Check machine
		Single phase rotating	Check circuit and repair
Overload after Start	Switch Overheat	Insufficient capacity of switch	Replace switch
		High load	Lighten load
	Bearing Overheat	Misalignment between motor and load	Re-align
		High bearing noise	Replace damaged bearing

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Kind of Fault	Symptom	Cause	Remedy
Noise	Electro-magnetic noise induced by electricity	Occurrence from first operation	Check noise not normal
		Sudden sharp noise and smoking	Short circuit of windings. Repair.
	Bearing noise	Not enough grease	Add grease
		Deterioration of grease	Clean bearing and re-grease
		Excessive noise	Replace the damaged bearing
	Mechanical noise caused by machinery	Loose belt sheaf	Adjust key and lock the screw
		Loose coupling	Adjust the position of couplings and tighten
		Loose screw	Tighten screw
		Fan rubbing	Adjust fan position
	Mechanical noise caused by machinery	Rubbing as a result of ingress of foreign matter	Clean motor interior and ventilation ducts
		Wind noise	Noise induced by air flowing through ventilation ducts
		Induced by conveyance machine	Repair machine
	Vibration	Electro-magnetic vibration	Short circuit of windings
Open circuit of rotor			Repair
Vibration		Unbalanced rotor	Repair
		Unbalanced fan	Repair
Mechanical vibration		Broken fan blade	Replace fan
		Un-symmetrical centres between belt sheaf	Align central points
		Central points of couplings do not lie on the same level	Adjust the central points of couplings on the same level
		Improper mounting installation	Lock the mounting screw
Motor mounting bed is not strong	Reinforce mounting bed		