

# ROTOTECH

## Rototech



### SOUTH AUSTRALIA

HEAD OFFICE

(Accounts / Payments)

34-36 Kinkaid Avenue

NORTH PLYMPTON SA 5037

Ph: (08) 8295 5566

Fax: (08) 8295 5533

### VICTORIA

23 James Street

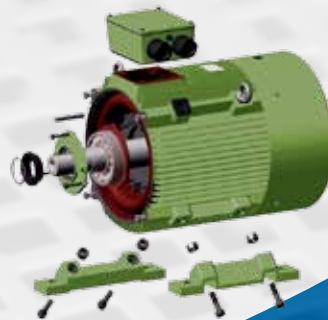
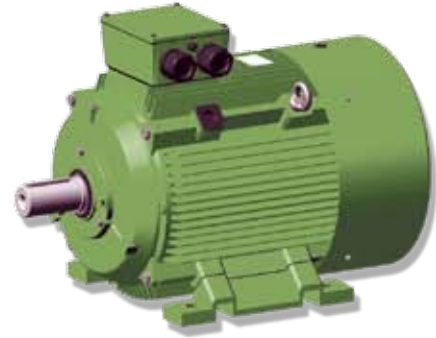
CLAYTON SOUTH VIC 3169

Ph: (03) 9544 2324

Fax: (03) 9543 4328

Web: [www.rototech.com.au](http://www.rototech.com.au)

Email: [mail@rototech.com.au](mailto:mail@rototech.com.au)



- MEPS APPROVED
- HIGH EFFICIENCY
- LOW MAINTENANCE
- ROBUST , RELIABLE

Quality System



Quality  
Endorsed  
Company  
ISO 9001:2008  
QEC LIC 7861  
Standard Australia

Rototech Pty Ltd  
ABN: 58 051 365 882

# ELECTRIC MOTOR TEFC OPERATION & MAINTENANCE

# Contents

- 02 Safety & Lifting
- 03 Inspection & Storage
- 03 Installation Checks
- 05 Alignment
- 06 Mountings
- 06 Terminations
- 09 Starting & Operation
- 11 Maintenance & Lubrication
- 13 Trouble Shooting
- 14 Maintenance Log Book



# HEALTH & SAFETY AT WORK!

Rototech is a Quality Endorsed Company accredited to the highest International Quality Standards ISO 9001-2008. This manual gives guidance for installation and maintenance procedures for the induction motors. It should be carefully read in conjunction with local codes & the following standards prior to installation and commissioning.

AS1359                      Rotating Electrical Machines. General Requirements.  
 AS1359.101              Rating and Performance.  
 AS4024                      Safeguarding of Machinery.  
 AS3000                      Electrical Installation (known as SAA Wiring Rules).

Further information can be obtained at: [www.rototech.com.au](http://www.rototech.com.au)



## LIFTING

Use all lifting facilities provided . Single lift point 100 - 112 . Dual lift point 132 frame & above  
 Maximum hand lift is 20Kg below shoulder

Vertical lifting - Prevent uncontrolled rotation of the motor

### MAX WEIGHTS ( Unpacked)

Frame Size	63	71	80	90	100	112	132	160	180	200	225
Approx Weights (KG)	5.0	6.5	12	23	28	41	95	120	220	300	400
Frame Size	250	280	315	355	400	450	500	560	630	710	800
Approx Weights (KG)	500	680	1400	2000	2300	3300	4000	6100	8900	14000	17800





Installation, operation and maintenance should be performed by personnel qualified for the task. Familiarisation with all Local Safety Standards, IEC Standards and local practices is required. Please follow the following instructions for personal safety and for proper motor operation:

## INSPECTION AND STORAGE



TICK WHEN COMPLETED

- |                          |    |   |
|--------------------------|----|---|
| <input type="checkbox"/> | 01 | Ensure correct motor is received.                   |
| <input type="checkbox"/> | 02 | Check for transit damage.                           |
| <input type="checkbox"/> | 03 | Report damages to Rototech giving complete details. |

### STORAGE

- |                          |    |  |
|--------------------------|----|--|
| <input type="checkbox"/> | 04 | Ensure motors are stored in a dry location with an ambient temperature range -20°C to +45°C        |
| <input type="checkbox"/> | 05 | Energise anti-condensation heaters if fitted.  |
| <input type="checkbox"/> | 06 | Ensure all plugs originally provided are in place (e.g. Cable entry hole plugs, drain plugs , etc) |
| <input type="checkbox"/> | 07 | Every 24 months rotate shaft.  |

## INSTALLATION CHECKS

Refer to Section in manual as indicated

A

C

M

T

- |                          |    |   |
|--------------------------|----|---|
| <input type="checkbox"/> | 08 | Electric motors must be protected with correctly sized thermal overload device's with phase loss / imbalance protection. Rototech motors 160 frame and above are fitted with PTC thermistors, a suitable thermistor relay is recommended. |
| <input type="checkbox"/> | 09 | Fan cover not damaged or touching fan. Minimum 80 mm gap between fan cover and nearest barrier.   |



# INSTALLATION CHECKS Cont

<input type="checkbox"/>	10	Foot not broken or cracked.	
<input type="checkbox"/>	11	Shaft not damaged or bent.	
<input type="checkbox"/>	12	Check all the name plate details	
<input type="checkbox"/>	13	Check free running by hand.	
<input type="checkbox"/>	14	Check grease condition if motor is idle for more than 24 months.	
<input type="checkbox"/>	15	Add appropriate Lubrication to oil seals: if required.	
<input type="checkbox"/>	16	Check mounting alignment / plane. Add shims if necessary.	(A)
<input type="checkbox"/>	17	Verify belt tension where applicable.	(A)
<input type="checkbox"/>	18	Check for any misalignment in motor & drive shaft.	(A)
<input type="checkbox"/>	19	Ensure clean and level mounting surfaces to feet, flange & shaft.	
<input type="checkbox"/>	20	While mounting use appropriate fasteners & tightening torques.	(T)
<input type="checkbox"/>	21	Check all the gaskets, sealants & guards are correctly fitted.	
<input type="checkbox"/>	22	Ensure Correct drain hole position. Refer to mount Positions / Drain Holes	(M)
<input type="checkbox"/>	23	Ensure both power supply system and motor is grounded.	
<input type="checkbox"/>	24	Check insulation resistance of all windings with 500V dc megger. If < 10 mega $\Omega$ , dry out motor . Do not following exceed 125 degree C	
<input type="checkbox"/>	25	Ensure the equipment is fused and isolated correctly.	
<input type="checkbox"/>	26	Ensure all the covers are fitted and sealed, interior of terminal box is clean & free of cable residues and foreign objects.	
<input type="checkbox"/>	27	Seal unused cable entries.	
<input type="checkbox"/>	28	Check connection diagram and ensure correct terminal arrangement.	(C)
<input type="checkbox"/>	29	Ensure all the connections are tight and clean	(T)



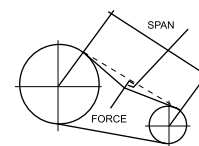
# INSTALLATION CHECKS Cont

- 30 Ensure air clearance on terminals between phases & phase to earth. C
- 31 Check rotation, uncoupled.
- 32 Ensure rating of fuse or circuit breaker is correct.
- 33 Ensure space heater (if provided) is off while motor is operating.
- 34 Altitude in excess of 1000 metres , contact Rototech.
- 35 Ambient temperature higher than 40°C , contact Rototech.
- 36 If operated from a Speed Controller , contact Rototech.
- 37 If motor marked with “Ex” symbol for hazardous area refer to appropriate standards and installation manuals.
- 38 Installation must only be carried out by qualified trade personnel in accordance with local standards.

## A

## ALIGNMENT : BELT DRIVES

- 39 When fitting belt drives, the belt manufacturers recommendations for installation and tensioning must be strictly adhered to.  
Ensure that Pulleys / Couplings are NOT forced or ‘hammered’ onto motor shaft as bearing damage may occur .  
Heating Pulleys / Couplings prior to assembly is recommended .  
After fitting and connecting check for vibration and out of balance.



DO NOT OVER TENSION V-BELTS



1. Shafts are parallel and in alignment, but pulleys are not aligned.



2. Correct Installation. Both shafts and pulleys are parallel and in alignment.

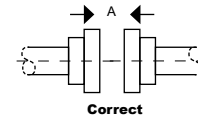


**A**

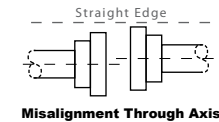
**ALIGNMENT : DIRECT COUPLING**

40

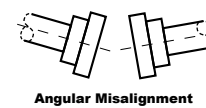
Care must be taken in checking alignment of driving and driven shafts.



Dimension "A" should be the same when measured at any location on coupling face using a thickness gauge.



Ensure that Pulleys / Couplings are NOT forced or 'hammered' onto motor shaft as bearing damage may occur . Heating Pulleys / Couplings prior to assembly is recommended

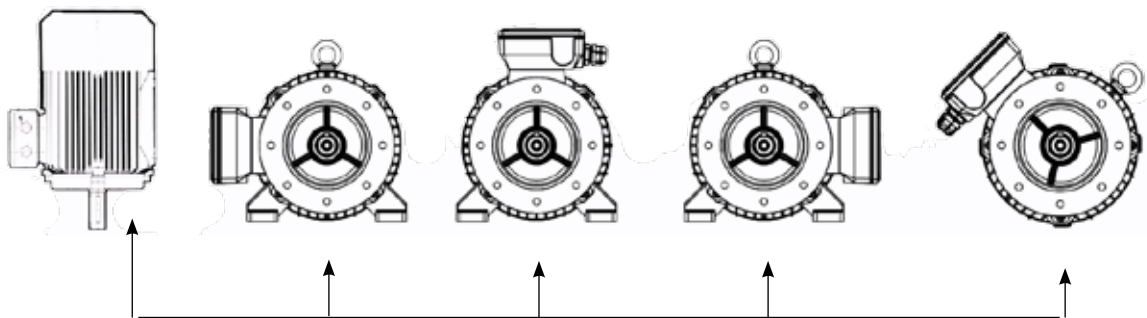


After fitting and connecting check for vibration and out of balance.

**M**

**MOUNTING POSITIONS / BREATHER PLUG**

41



Drain hole plugs at lowest points

Rototech Hu 63-280 frame motors have bolt on mounting feet, relocating the feet allows the terminal box to be left side, right side, or top mount.

When changing feet position ensure:

- Location keys are fitted correctly and fasteners are tightened to recommended torque (see chart). **T**
- Unused mounting holes on frames 63-112 are sealed with screws or sealant to prevent water/dust ingress ; Frame size 132-280 are sealed with rubber grommets to prevent threads damage
- Drain hole plugs/holes are located at the lowest point to allow condensation to drain, IP66 motors generally have the drain hole sealed.





C

CONNECTION & TERMINATIONS

42 Typical connection diagrams for standard motors. All motors are provided with suitable earthing studs.

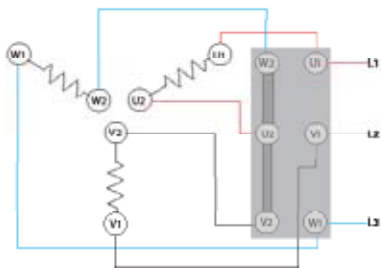


Fig 1 : Star Connection

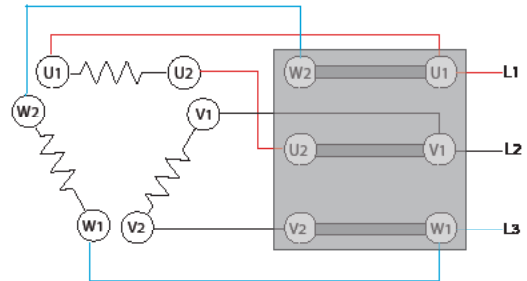


Fig 2 : Delta Connection

Y Star Connection

Hu Series 0.09 kW to 2.2 kW are fitted with Star Y connected bridging bars for operation at 380V to 415V 50Hz / 440V to 480V 60Hz. Motors can be reconnected in Delta Δ (Fig-2) for use with 240V 1Φ input inverter with 220/240V 3Φ

Δ Delta Connections

Hu Series 3kW & above are fitted with Delta Δ connected bridging bars for operation at 380V to 415V 50Hz / 440V to 480V 60Hz. Motors can be reconnected in Star Y (Fig-1) for use on 690V 50Hz supply.

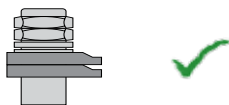
For Multi Speed & 1000V Connections Contact Rototech

43 CABLE TERMINATIONS

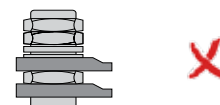
When connecting the supply cable to the motor terminal studs, the position of cable lugs, connectors and washers should be arranged such that the terminal stud is not used as a conductor. Tight terminals must be maintained. It is advisable to tighten nuts or bolts to the recommended torques. T (see table below).

44 The correct creepage and clearances between phases and phase and earth should be maintained: 600V & below 13mm / 600V to 1300V 23mm.

Contact Rototech For High Voltage Clearances



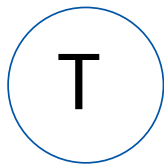
Correct terminal connection.



Incorrect terminal connection.







## RECOMMENDED TIGHTENING TORQUE

 45

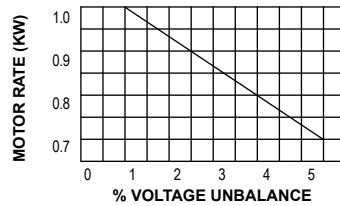
Fixing Size (mm)	TORQUE (Nm + / - 10 %)		
	TERMINAL POST ( All motor sizes)	CAST BODY (132 Frame & above) General Fixings	ALLOY BODY (63-112 Frame ) General Fixings
4	2.5	3.5	2.5
5	5.0	7.0	5.0
6	8.0	10.0	8.0
8	15.0	18.0	17.0
10	25.0	37.0	25.0
12	27.0	65.0	
16	30.9	80.0	



# OPERATION

46 NO LOAD OPERATION

Run motor with load uncoupled. Ensure rated voltage is applied to motor terminals and balanced in all three phases. The maximum allowable imbalance is 1%. Should voltage imbalance be greater than 1%, derate motor output or reduce motor load as per graph below.



47 Check that three phase currents at No Load are balanced.  
 Note: The No Load currents will be more if the voltage is higher. They will be less if the voltage is less. The increase & decrease will not be in linear proportion with voltage.

48 No abnormal noise.

49 Check direction of rotation. Changing any 2 phases will change direction of rotation

50 Check vibration.

# STARTING AND OPERATION ON LOAD

51 Rototech Squirrel Cage Motors are generally suitable for DOL, Star/Delta , Auto Transformer starting and AC Speed Controllers.

52 Maximum DOL starts per hour at maximum load inertia, equally spaced, includes one cold start at 40°C ambient

Pole	FRAME SIZE						
	63-112	132-160	180-200	225-250	280	315M	400-800
2	12	10	8	5	3	3	2
4	21	19	15	10	6	4	3
6 & 8	27	24	19	12	8	6	4



## STARTING AND OPERATION ON LOAD Cont

<input type="checkbox"/> 52 Cont	More starts can generally be achieved by using an AC drive
<input type="checkbox"/> 53	Ensure rated voltage at the motor terminal during start up and check starting time within designed limit. For normal application, the time required will not be more than 5 sec. At DOL. For high inertia load the starting time is longer but special design is required to cater for this. For star/delta & reduced voltage starter the time will be longer than DOL start.
<input type="checkbox"/> 54	Ensure Full Load Currents are balanced in all phases (maximum imbalance 8% corresponding to 1% imbalance of voltage) and the value is within Nameplate Data. In case of pulsating load we recommend the maximum current to be within Nameplate value.
<input type="checkbox"/> 55	No abnormal noise or vibration (If change in vibration level is observed, check alignment again with motor at normal running temperature).
<input type="checkbox"/> 56	Check maximum air inlet temperature 40°C maximum.
<input type="checkbox"/> 57	Check motor temperature after approximately 2 hours of full load operation, maximum 80°C measured at bearing housing including ambient i.e. measured 45°C @ 20°C ambient and predicted summer ambient +20°C = 65°C OK.



## PREVENTIVE MAINTENANCE & LUBRICATION

- 58 Motor should be kept clean and free from oil, dust and moisture.
- 59 Care should be taken to see that ventilation passages are not blocked.
- 60 The insulation resistance of stator should be checked regularly between respective terminals and the frame.
- 61 Always fit shaft clamp during transportation 200 frames and above
- 62 Rototech Electric Motors Frame size up to 180 do not require greasing. Grease replenishment (Shell Alvania RL3 recommended, or equivalent) should be carried out at predetermined intervals. Motor greasing interval and volume is shown on table below

### Never Mix Grease

#### Grease Valve Motors

Frame Size	Poles	Bearing				Regreasing Interval (Hrs)	Regreasing Volume (Grams)
		D.E	Size (mm)	N.D.E	Size (mm)		
200	2	6312	60x130x31	6312	60x130x31	3500	350
	4					6700	
	6					8700	
	8					10600	
225	2	6313	65x140x33	6313	65x140x33	3100	400
	4					6300	
	6					8600	
	8					10300	
250	2	6314	70x150x35	6314	70x150x35	2700	450
	4					5700	
	6					8000	
	8					9500	
280	2	6317	85x180x41	6314	70x150x35	2500	800
	4					5500	
	6					7500	
	8					9500	



62

## Grease Valve Motors ( cont)

(cont)

Frame Size	Poles	Bearing				Regreasing Interval (Hrs)	Regreasing Volume (Grams)
		D.E	Size (mm)	N.D.E	Size (mm)		
315	2	6217	85x180x41	6217	85x180x41	2500	600
	4	NU319	95x200x45	6319	95x200x45	5900	950 (DE) 900( NDE)
	6					7900	
	8					9900	
355	2	6319	95x200x45	6319	95x200x45	2500	
	4	NU322	110x240x50	6322	110x240x50	5700	950 (DE) 900( NDE)
	6					7700	
	8					9500	

Bearing manufacturers recommend re-lubrication intervals based on a maximum bearing outer ring temperature of 70 degrees C.

The re-lubrication interval should be reduced by half for every 15 degrees C that the bearing outer ring temperature exceeds 70 degrees C.

Where grease may be contaminated or the grease serves as a seal against moisture then the relubrication interval should be further reduced.

**Note:**

Rewinding motors may reduce motor efficiency and increase running costs. Contact Rototech for additional information.

Abuse of electrical equipment can be hazardous. Every effort should be made to eliminate these hazards and this guide should assist in minimising these risks.

Qualified engineering advice should be sought to determine the correct selection, sizing, safety and installation of electrical equipment.

Rototech makes no warranty as to the completeness or accuracy of any material contained in this guide and shall not be liable for any errors or omissions. Rototech cannot accept responsibility for the way in which this Installation & Safety Guide it is interpreted, or any consequence as a result.



## Basic Problems and Trouble Shooting

Problems	Possible Cause	Possible Solution
<ul style="list-style-type: none"> <li>• Fail to start with noise or vibration</li> </ul>	<ul style="list-style-type: none"> <li>• No supply voltage in 1 or more phases</li> </ul>	<ul style="list-style-type: none"> <li>• Check if there is an open circuit on main supply to motor . Reconnect , check each phase and try again</li> </ul>
<ul style="list-style-type: none"> <li>• Rotates with noises and overheated</li> </ul>	<ul style="list-style-type: none"> <li>• Winding short circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Repair winding</li> </ul>
<ul style="list-style-type: none"> <li>• Speed is low after starting or appears to ‘ labour’ under load</li> </ul>	<ul style="list-style-type: none"> <li>• Beginning and end terminals of phase windings are incorrectly connected</li> <li>• Connected in Star not Delta</li> <li>• Supply voltage is too low</li> </ul>	<ul style="list-style-type: none"> <li>• Correct beginning and end terminals phase windings connection</li> <li>• Check main voltage</li> <li>• Check line voltage during starting &amp; operating</li> </ul>
<ul style="list-style-type: none"> <li>• Insulation resistance reduces</li> </ul>	<ul style="list-style-type: none"> <li>• Winding is dirty or damp</li> </ul>	<ul style="list-style-type: none"> <li>• Clean motor and dry winding</li> </ul>
<ul style="list-style-type: none"> <li>• Temperature rise of winding is too high</li> </ul>	<ul style="list-style-type: none"> <li>• Motor over loaded</li> <li>• Air vent is blocked</li> <li>• Incorrectly connected</li> <li>• Incorrect line voltage</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce load</li> <li>• Check air flow</li> <li>• Check if connected correctly</li> <li>• Check line voltage</li> </ul>
<ul style="list-style-type: none"> <li>• Bearing overheating</li> </ul>	<ul style="list-style-type: none"> <li>• Motor is not alligned with driven machine</li> <li>• Grease quantity in bearing is either too much or too little</li> <li>• Bearing is damaged</li> </ul>	<ul style="list-style-type: none"> <li>• Check alligment</li> <li>• Check grease quality</li> <li>• Replace bearing . Ensure that bearing clamp is fitted to shaft when transported even for a short distance</li> </ul>
<ul style="list-style-type: none"> <li>• Bearing sounds noisy</li> </ul>	<ul style="list-style-type: none"> <li>• Bearing is damaged</li> <li>• Bearing is dirty or with insufficient grease</li> </ul>	<ul style="list-style-type: none"> <li>• Replace bearing</li> <li>• Refresh grease</li> </ul>







## Note



Looking for a complete solution ?

AC Drives

Electric Motors

Soft Starters

Geared Motors

**ROTOTECH**

Energy Saving  
Solutions

Motor Protection

Encoders

Services /Support

solutions for your business

