

Installation & Maintenance for Electric Motor



Customer Safety Instructions & Installation Check List

Caution:

All installation must be carried out by appropriately trained personnel. For full installation and maintenance instructions refer these instructions or consult us, if in doubt.

Lifting:

1. Use all lifting facilities provided & both lifting points if fitted or single lifting point if fitted. Do not use any other part of the motor for lifting.
Note: Maximum handlift is 20kg below shoulder, but above ground level.
2. Vertical lifting & Prevent uncontrolled rotation of the motor.
3. Do not lift other equipment with motor lifting points only.

Maximum Weights: (Unpacked) Aluminium Frame

Frame size IEC	63	71	80	90	100	112	132
NEMA			56	145		184	215
Weights in KG	5	6	9	14.5	19	27	46
Frame size IEC	160	180	200	250	315	355	
			225	280			
Weights in KG	250	500	1000	1500	2000	3000	

Inspection on Receipt:

1. Make sure the right motor is received.
2. Check for transit damage.
3. Please report damages to us giving complete nameplate details.

Storage:

1. Ensure motors are stored in a place with an ambient range of -20°C to +45°C.
2. Store motors under cover and not in open.
3. Ensure that the stored motor does not receive any harmful vibration.
4. Ensure no water drips on motor and no water accumulates under the motor.
5. Energise heaters if fitted.
6. Ensure all plugs originally provided are in place (e.g. Cable entry hole plugs, drain plugs & fan cover greasing hole plug for TEFC motors.)

Periodic Requirements	Every 1 Week	Rotate shaft
	Every 3 Months	Check insulation resistance. If less than 10 M.Ohm, dry out.

All data is subject to confirmation by BROOK-MTL

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BROOK-MTL, 63 Allens Road, East Tamaki, Auckland, New Zealand

Tel +64 9 271 6063 - Fax +64 9 271 6020 - www.brookmtl.co.nz - info@brookmtl.co.nz

Associate company: **Rotating Machinery Supplies**, 6 Devon Road, Hamilton rotatingmachinery@clear.net.nz

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Pre-Installation Checks:

Ensure TICK WHEN CHECKED

1. Fan cover not damaged or touching fan. ☐
2. Foot not broken or cracked. ☐
3. Shaft not damaged. ☐
4. All fastenings are tight. ☐
5. Check all the name plate details. ☐
6. Check free running by hand. ☐
7. Check grease condition if motor is idle for more than 6 months. If bad replenish with fresh grease ☐
8. Add lubricating oil in the oil seal (if provided). ☐

Installation – Mechanical:

1. Level mounting surface. Clean mounting foot/flange & shaft of the motor. ☐
2. Check mounting plane. Add shims if necessary (maximum change of indicator reading $\pm 0.075\text{mm}$ with mounting bolts loose & tight while checking mounting surface w.r.t. motor foot/flange). ☐
3. Check for any misalignment in motor & drive shaft. (approx. TIR $\pm 0.050\text{m}$) ☐
4. While mounting use appropriate fasteners & tightening torques. ☐
5. Check all the gaskets, seals & guards are correctly fitted. ☐
6. Verify belt tension. ☐

Installation – Electrical:

1. Remember to ensure proper earthing. ☐
2. Check insulation resistance of all windings with 500V dc megger. If $< 10 < \text{Mohm}$, dry out following proper procedure. ☐
3. Ensure the equipment is fused and isolated correctly. ☐
4. Ensure all the covers are fitted and interior of terminal box is clean & free of cable residues. ☐
5. Seal unused cable entries. ☐

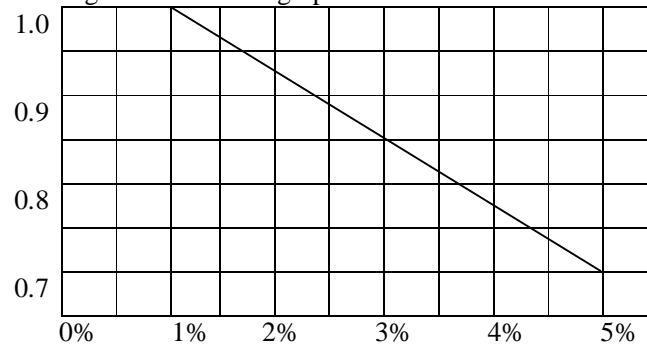
Connections:

1. Check connection diagram and ensure correct terminal arrangement. ☐
2. Ensure all the connections are tight and clean. ☐
3. Ensure air clearance between live & live to earth $> 10 \text{ mm}$. ☐
4. Check driven equipment is free. ☐
5. Check rotation, uncoupled. ☐
6. Ensure rating of fuse, setting of protecting devices are correct. Recommended protections: ☐
- Overload, Single Phasing, Under Voltage, Earth Fault. ☐
7. Ensure space heater (if provided) is off while starting the motor. ☐

Operation:

Free Running Before Coupling to Load:

1. Ensure supply voltage as per name plate & balanced in all three phases. (Maximum, deviation from average is 1%) For more unbalance, reduce the output by derating factor from the graph.



2. Check three phase currents at No Load (free shaft).
3. No abnormal noise.
4. Bearing not heating up abnormally.
5. Check direction of rotation. If specific.
6. The vibration. (Vibration level on the mounting structure immediately below the motor should be within 30% of horizontal vibration level at the bearing housing).

Running on Load:

1. Ensure rated voltage at the motor terminal during start up and check starting time within designed limit. (Any 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 this. For star/delta & reduced voltage starter the time will be longer than that in DOL).
2. Ensure Full Load Currents are balance in all phases (Maximum unbalance 8% corresponding to 1% unbalance of voltage) and the value is within name plate data. In case of pulsating load we recommend the maximum current to be within name plate value.
3. No abnormal vibration. (If change in vibration level is observed, check alignment again preferably in hot condition.)
4. No abnormal noise.
5. Check maximum. Air inlet temperature = Ambient temperature mentioned on name plate.
6. No abnormal heating up.
Total permissible temperature including ambient for Class B rated motors are approximately as follows:
By Thermometer : At Eyebolt : 90°C
 At Bearing Cover : 80°C
 On Slipping Surface : 90°C
Check the temperature after 4-5 hours of operation, when it is stabilised.
7. Ensure all connections are tight.

Problems:

Noisy
Vibrating
Tripping
Overheating
Not starting

Refer to us with machine number.

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Maintenance:

Ensure that the motor is correctly isolated before working on any faulty machine.

Spare Parts:

While ordering spare parts, always quote machine number and reference number which will be found on the name plate. Please use only genuine spares.

Hazardous Areas:

If motor is marked with Ex symbol, special conditions apply. Refer appropriate installation manual and relevant standards. All operations are to be carried out by appropriately trained personnel.

Operating & Maintenance Tips:

This Motor has been designed, manufactured and tested to a high standard of excellence. The motor conforms to relevant standards as mentioned on the name plate.

The motor is sound in design and robust in construction and will give satisfactory service with correct installation and normal routine maintenance.

Site:

- Check for proper ventilation. TEFC motors should be provided with at least 20 gap between fan cover and nearest barrier.
- Install DP motors at a clean dry place.
- Check for ambient conditions, if special treatment on motor is provided for adverse ambient.
- Ensure passages in between ribs in TEFC motors are properly cleaned.

Foundation:

The foundation of the motor should be preferably of concrete, or structural steel, and must be sufficiently rigid to minimize vibrations and to maintain alignment between the motor and the load.

Pinions, Pulleys and Couplings:

- Use flexible couplings.
- Use dynamically balanced (with half key) pulley/couplings/pinions. (Motor rotors are balanced with half key.)
- For belt drive, mount belt nearest to motor bearings. Belts should not be too tight.
- Use pulley diameter and coupling/pulley bore as follows:

Pulley Dimensions (mm):

TOLERANCE ON BORE DIA-OF
PULLEY & COUPLING (H-7)

Frame IEC	Nema	Min Dia	Max Face Width	Nominal	Tolerance
63		75	30	18 to 30	+0.0
71		75	40		+0.021
80		75	50	30 to 50	+0.0
90	145	75	63		+0.025
100		75	80	50 to 80	+0.0
112	184	100	100		0.030
132	215	120	125	80 to 120	+0.0
160	256	150	177		0.035
180	286	180	203		
200	326	187	280		
225	365	197	330		
250	405	228	380		
280		375	380		
315		400	380		
355		500	400		

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Starting:

Squirrel Cage motors are suitable for DOL, Star/Delta or Auto Transformer Starting.

Slipring motors should be started by stator/rotor starter with suitable external resistance in rotor circuit which should be cut off gradually when motor picks up speed.

- In case of star/delta starter, put to Δ when the motor picks up fully in Star position.
- While operating on load & the motor is hot, the motor is suitable for 2 starts in one hour, unless it is designed for higher number of starts.
- In case of Slipring Starters, ensure the current and voltage of the starter are the same as specified on the motor name plate (RV & RA).

Preventive Maintenance:

The bearings marked ZZ or 2RS are sealed for life and require no lubrication.

For greased bearings:

1. Check relubrication interval on name plate. The regreasing interval should be shortened for high ambient temperature, presence of corrosive vapours or extreme level of contaminations.
2. For replenishing fresh grease in the bearing:
 - Quantity of grease to be filled in bearing (in gms.) 6 Bearing bore dia.
 - Fill 1/3rd of bearing cover cavities with grease.

Recommended grease is lithium based grade 2. MIXING OF DIFFERENT GREASE SHOULD BE AVOIDED.

While removing the bearings from the shaft, use properly designed draw-off tackle or puller to hold the bearing preferably at inner race.

Bearing should be re-fitted on shaft after heating up to approximately 90°C and by slipping on to the shaft.

Foot Fixing

Al				Fe		
Type	Bolt dia	Nm	Lbf.ft	Bolt dia	Nm	Lbf.ft
63	M5	6-7	4-5	-	-	-
71	M5	6-7	4-5	-	-	-
80	M8 taptite	24-25	18-19	-	-	-
90	M8 taptite	24-25	18-19	-	-	-
100	M8 corflex	32-35	24-26	M10	52	38
112	M8 corflex	32-35	24-26	M10	52	38
132	M8 corflex	32-35	24-26	M12	90	66
160	M10	68-72	50-53	M16	220	162
180	M10	68-72	50-53	M16	220	162

Endshield Fixing

Al				Fe		
Type	Bolt dia	Nm	Lbf.ft	Bolt dia	Nm	Lbf.ft
63	M4	1-5	1.1	-	-	-
71	M4	1-5	1.1	-	-	-
80	M5	5	3.7	M5	5	3.7
90	M5	5	3.7	M5	5	3.7
100	M6 taptite	8-10	6.7	M6	6	4
112	M6 taptite	8-10	6.7	M6	6	4
132	M6 taptite	8-10	5.7	M8	16	12
160	M8 taptite	29	21	M8	16	12
180	M10 taptite	52	38	M10	31	22

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