

**INSTRUCTIONS FOR  
INSTALLATION  
AND  
MAINTENANCE OF  
ELECTRIC MOTOR**



## CUSTOMER SAFETY INSTRUCTIONS & INSTALLATION CHECK LIST

### CAUTION :



All operations must be carried out by appropriately trained personnel. For full installation and maintenance instructions refer this book thoroughly or consult the supplier, 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 20 Kg below shoulder, but above ground level.

2. Vertical lifting - Prevent uncontrolled rotation of the motor.
3. Do not lift other equipments with motor lifting points only.

### MAXIMUM WEIGHTS : (Unpacked)

Weights in KG	 6.5	 8	 19	 25	 36	 50	 115
Frame size IEC	63	71	80	90	100	112	132
NEMA				145		184	215
Weights in KG	 250	 500	 1000	 1500	 2000	 3000	
Frame size IEC	160	180	200 225	250 280	315	355	
Frame size NEMA	256	286	326 365	405			

## INSPECTION ON RECEIPT :



1. Make sure the right motor is received.
2. Check for transit damage.
3. If necessary, please open packing case in presence of an authorised Insurance Agent.
4. Please report damages to us giving complete Nameplate details.

## STORAGE :



1. Ensure motors are stored in a place with an ambient range of  $-20^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$ .
2. Store motors under shade 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 logging 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.

## PRE-INSTALLATION CHECKS :



Ensure TICK WHEN CHECKED

1. Motor not corroded excessively.
2. Fancover not damaged or touching fan.
3. Foot not broken or cracked.
4. Shaft not damaged/bend.
5. All fasteners are tight.
6. Check all the name plate details.
7. Check free running by hand.
8. Check grease condition if motor is idle for more than 6 months. If bad replenish with fresh grease.
9. 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 (Maxm. change of indicator reading - 0.075 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 - 0.050 m)
4. While mounting use appropriate fasteners & tightening torques.
5. Check all the gaskets, sealants & guards are correctly fitted.
6. Verify belt tension.

## INSTALLATION - ELECTRICAL :



1. Ensure power supply system is grounded.
2. Ensure proper earthing.
3. Check insulation resistance of all windings with 500V dc megger. If  $< 10$  Mohm, dry out following proper procedure.
4. Ensure the equipment is fused and isolated correctly.
5. Ensure all the covers are fitted and interior of terminal box is clean & free of cable residues.
6. Seal unused cable entries.

## CONNECTIONS :



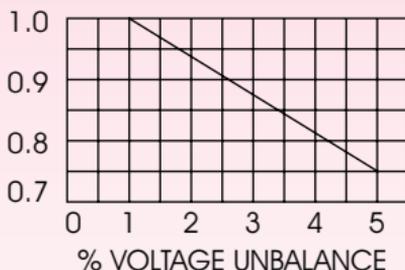
1. Check connection diagram and ensure correct terminal arrangement.
2. Ensure all the connections are tight and clean.
3. Ensure air clearance between live & live to earth  $> 10$  mm.
4. Check driven equipment is free.
5. Check rotation, uncoupled.
6. Ensure rating of fuse, setting of protecting devices 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 nameplate & balanced in all three phases. (Maxm. allowable unbalance i.e. Maxm. 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).

Note : The currents will be more if the voltage is more. They will be less if the voltage is less. The increase & decrease will not be in linear proportion with voltage.

3. No abnormal noise. (Use a screwdriver as a medium to hear.)
4. Bearing not heating up abnormally.
5. Check direction of rotation. If specific.
6. Check 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 startup 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 (Maxm. unbalance 8% corresponding to 1% unbalance of voltage) and the value is within Nameplate Data. In case of pulsating load we recomend the maximum current to be within Nameplate value.
3. No abnormal vibration. (If change in vibration level is observed, check alignment again preferebly in hot condition.)
4. No abnormal noise.
5. Check maxm. air inlet temperature = Ambient temperature mentioned on Nameplate
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
7. Check the temperature after 4-5 hours of operation, when it is stabilised.   
Check no sparking is appearing on the slipping in case of Slipping Motor.

## PROBLEMS :



Noisy

Vibrating

Tripping

Overheating

Not starting

Refer to supplier with Machine no.

## MAINTENANCE :

While carrying out maintenance

1. Ensure that the motor is isolated.
2. Refer to supplier, if in doubt.

## SPARE PARTS :

While ordering Spare Parts, always quote Machine Number and Reference number which will be found on the Nameplate.

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 2" 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. Normally a mixture of four parts of stone and two parts of sand and one part of cement by volume is suitable.

## PINIONS, PULLEYS AND COUPLINGS

- Use flexible coupling.
- 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	MIN	MAX	FACE		
IEC	NEMA	DIA	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		

## **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 'Delta' 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 same as specified on the motor name plate (RV & RA)

## **PREVENTIVE MAINTENANCE :**

Motor should be kept clean and free from oil, dust and moisture. Care should be taken to see that ventilation passages are not blocked. The earthing conductor should be regularly inspected and checked for continuity. The insulation resistance of stator and rotor windings should be checked regularly between respective terminals and the frame.

In case of slipring motors, carbon dust should be blown out regularly from sliprings and brushes. The pressure on brushes and wear out should be checked.

## **BEARINGS :**

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 contamination.
2. For replenishing fresh grease in the bearing :
  - Quantity of grease to be filled in bearing (in gms.) = 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. While pulling out the bearing, rotate the bearing to avoid damages if the bearing is intended to be used again.

Bearing should be re-fitted on shaft after heating upto approximately 90<sup>0</sup>C and by slipping on to the shaft.

## SLIPRING/BRUSHGEAR

Size of brushes on the Slipring motors are as below -

FRAME (IEC) a X t X r (Dimensions in mm)

112            20    X 8    X 20

132            15.8 X 9.5 X 25

160-180      12.5 X 8 X 21            t - Thickness

200-250      16    X 20 X 30            a - Axial width

280-315      20    X 40 X 28            r - Radial width\*

(\* Radial width should not be allowed to wear below 15 mm length).

- If Slipring surface is not smooth, smoothen with fine glass paper (DO NOT USE EMERY CLOTH).
- Brushes should be free in holder, recommended brush pressure is 0.2 KG/SQ.CM. (t X a)
- Ensure that Slipring and Brushes are free from oil and Dust. Blow out carbon dust from Sliprings and brushes periodically.
- Use brush grade M15E of Assam Carbon or BE22 of Electro Carbonium.
- For new brushes proper brading is to be done with sand paper, so that curvatures of brushes and slipring are perfectly matched.

### NOTE :

In case of the Non-standard motors, wherever necessary, special instructions will be provided.