

**BUILT TO LAST!**



**EBI Dry Kiln Duty Motor**

Installation, Operation and Maintenance Manual



## **Introduction**

This manual provides information on how to safely install, operate, maintain, and dispose of your EBI Motor. The information provided in this manual is applicable to the EBI Dry Kiln Duty Motors only. This manual provides information on the various features and functions of these powerful kiln motors, including:

- Installation,
- Operation,
- Maintenance
- Mechanical and electrical specifications.

The EBI squirrel cage induction motor was designed for an extended service life under very difficult environmental conditions imposed by the lumber drying industry. However, should the motor require service, this manual includes different sections that assist the repair technician with maintenance, disassembly/assembly, part replacement, testing, troubleshooting, and warranty information.

Maintenance recommendations include inspection requirements, cleaning methods, bearing lubrication, disassembly support, and testing methods. To maximize the abilities of the EBI motor, a familiarity with this manual will be required. This manual has been prepared for the Installer and Maintenance Personnel. Included is a section on general safety instructions that describe the warning labels and symbols that are used on the motor and throughout the manual.

Read the manual completely before installing, operating, performing maintenance, or disposing of the EBI motor. This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in imperial units and/or the metric equivalent.

Connection drawings within this document convey the typical connectivity of the motor and do not include every possible connection variation.

Because of our commitment to continuous improvement, the manufacturer, EBI Electric reserves the right, without prior notice, to update information, make product changes, or to discontinue any product or service identified in this publication.

EBI Electric shall not be liable for direct, indirect, special, or consequential damages resulting from the use of the information contained within this manual.

## **Important Notice**

The instructions contained in this manual are not intended to cover all details or variations in equipment types, nor may it provide for every possible contingency concerning the installation, operations, or maintenance of this equipment. Should additional information be required, contact the EBI Electric Customer Support Service.

The contents of this manual shall not become a part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of EBI Electric. The warranty contained in the contract between the parties is the sole warranty of EBI Electric and any statements contained herein do not create new warranties or modify the existing warranty.

Any electrical or mechanical modifications to this equipment without prior written consent of EBI Electric may void all warranties or other safety certifications. Unauthorized modifications may also result in a safety hazard or equipment damage.

Misuse of this equipment could result in injury and equipment damage. In no event will EBI Electric be responsible or liable for direct, indirect, special, or consequential damage or injury that may result from the use or misuse of this equipment.

Changes to this manual are made without notice.

## **Contacting EBI Electric Customer Service**

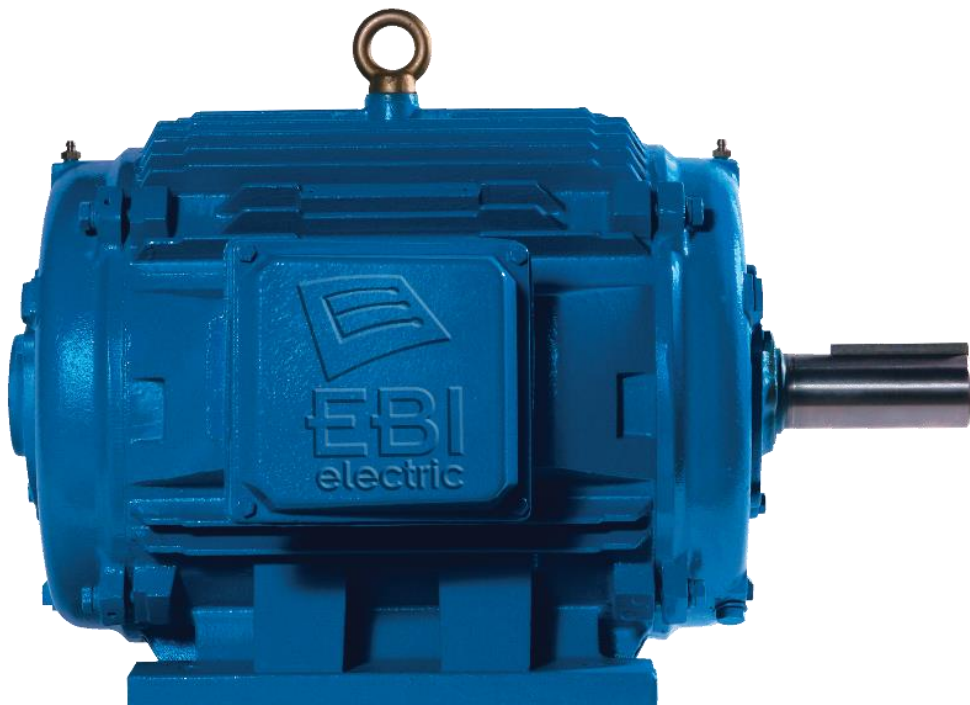
EBI Electric's customer service can be contacted to obtain help in resolving any EBI motor system problem that you may experience or to provide application information.

The EBI customer service is open from 8 a.m. to 5 p.m. (EST), Monday through Friday. The Center's toll free number is 1-888-228-5505 (North America). For after-hours support, follow the directions of the outgoing message when calling.

You may also contact EBI Electric by writing to:

EBI Electric Inc  
2250, 90e Rue  
St-Georges, Quebec  
Canada, G5Y 7J7  
Attn: EBI Kiln Duty Motor

For further information on EBI Electric products and services, please visit our website at [www.ebielectric.com](http://www.ebielectric.com) or send us an e-mail at [info@ebielectric.com](mailto:info@ebielectric.com)



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## General Safety Information

DO NOT attempt to install, operate, maintain, or dispose of the motor until you have read and understood all of the product safety information and directions that are contained in this manual.

### WARNINGS AND CAUTIONS - ELECTRICAL

#### SAFETY

Safety is emphasized throughout this manual. These are safety alert symbols and signal words. They alert the user to potential personal injury hazards. Obey all safety messages to avoid possible injury or death or damage to equipment and other property.

**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

#### IMPORTANT INFORMATION; PLEASE READ CAREFULLY

This manual is not intended to provide operational instructions. Appropriate instructions provided with the motor and precautions attached to the motor should be read carefully prior to installation, operation and/or maintenance of the equipment. Injury to personnel or motor failure may be caused by improper installation, maintenance or operation. The following **WARNING** and **CAUTION** information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your product:

#### **WARNING**

Each item below identifies a hazardous situation which, if not avoided, could result in death or serious injury. Failure to follow the instructions and precautions listed below could result in personal injury or damage to equipment.

- Disconnect power and lock out driven equipment before working on a motor.
- Keep hands and clothing away from moving parts.
- The lifting eyebolt on the motor is not to be used to lift the entire machine. Only the motor attached directly to the support may be safely lifted by the support.
- Install and ground per local and national codes
- Misapplication of a motor in hazardous environments can cause fire or an explosion and result in serious injury. Only the end user, local authority having jurisdiction, and/or insurance underwriter are qualified to identify the appropriate class(es), group(s), division(s), and temperature code(s) that applies(y) in a hazardous environment. EBI electric personnel cannot evaluate or recommend what motors may be suitable for use in hazardous environments.
- Never attempt to measure the temperature rise of a motor by touch. Temperature rise must be measured by thermometer, resistance, imbedded detector or thermocouple.
- Operation of a motor at a voltage, a current or an RPM greater than its nameplate rating may result in fire, damage to equipment or serious injury to personnel.
- For safety, buyer or user should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The user is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.

## CAUTION

Each item below identifies a hazardous situation which, if not avoided, could result in minor or moderate injury. Failure to follow the instructions and precautions listed below could result in personal injury or damage to equipment

- Consult qualified personnel with questions and all electrical repairs must be performed by trained and qualified personnel only.
- Motors and/or driven equipment should not be operated faster than their rated speed.
- For inverter applications, follow the inverter manufacturer's installation guidelines.
- Make sure the motor is properly secured and aligned before operation.

## WARNINGS AND CAUTIONS - MECHANICAL

### IMPORTANT INFORMATION PLEASE READ CAREFULLY

The following **WARNING** and **CAUTION** information is supplied to you for your protection and to provide you with many years of trouble free and safe operation of your product: Read ALL instructions prior to operating reducer. Injury to personnel or reducer failure may be caused by improper installation, maintenance or operation.

## WARNING

Each item below identifies a hazardous situation which, if not avoided, could result in minor or moderate injury. Failure to follow the instructions and precautions listed below could result in personal injury or damage to equipment.

- Check to make certain application does not exceed the allowable load capacities published in the current manual.
- Buyer shall be solely responsible for determining the adequacy of the product for any and all uses to which buyer shall apply the product. The application by buyer shall not be subject to any implied warranty of fitness for a particular purpose.
- For safety, buyer or user should provide protective guards over all shaft extensions and any moving apparatus mounted thereon. The User is responsible for checking all applicable safety codes in his area and providing suitable guards. Failure to do so may result in bodily injury and/or damage to equipment.
- Make certain that the power supply is disconnected before attempting to service or remove any components. Lock out the power supply and tag it to prevent unexpected application of power.

## CAUTION

Each item below identifies a hazardous situation which, if not avoided, could result in minor or moderate injury. Failure to follow the instructions & precautions listed below could result in damage to equipment or personal injury.

- Test run unit to verify operation. If the unit tested is a prototype, that unit must be of current production.
- Mounting bolts should be routinely checked to ensure that the unit is firmly anchored for proper operation.
- Do not operated the motor at an RPM speed over is manufacturer specifications.



## Qualified Personnel

Installation, operation, and maintenance shall be performed by Qualified Personnel ONLY. A Qualified Person is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements and other country safety requirements and regulations).

Qualified Personnel shall:

- Have carefully read the entire manual.
- Be familiar with the safety regulations, accident prevention, and handling of this equipment.
- Be familiar with the construction and function of the motor, the equipment being driven, and the hazards involved.
- Be able to recognize and properly address hazards associated with the application of motor-driven equipment.
- Be trained and authorized to safely energize, de-energize, ground, lock-out/tag-out circuits and equipment, and clear faults in accordance with established safety practices.
- Be trained in the proper care and use of personal protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.





# Receiving, Storing and Handling

## Receiving

Each EBI motor is thoroughly tested at the factory and carefully packaged for standard shipping.

The motor must be checked when received for any damage that may have occurred during the transportation.

All damages must be reported in writing to the transportation company, to the insurance company and to EBI Electric.

Failure to comply with such procedures will void the product warranty.

You must inspect the product:

- Check if nameplate data complies with the purchase order
- Remove the shaft locking device (if any) and rotate the shaft by hand to ensure that it rotates freely
- Check that the motor has not been exposed to excessive dust and moisture during the transportation.

Do not remove the protective grease from the shaft, or the plugs from the cable entries. These protections must remain in place until the installation has been completed.

Use proper lifting techniques when moving the motor.

## Handling



**WARNING:** Lifting lugs on the motor are designed for handling only the motor. They are not to be used to lift the motor plus additional equipment such as pumps, compressors or other driven equipment. In the case of assemblies on a common base, lugs or eyebolts provided on the motor are not to be used to lift the assembly and base. The assembly should be lifted by a sling around the base or by other lifting means provided on the base. In the case of unbalanced loads (such as couplings or other attachments), additional slings or other effective means should be used to prevent tipping.

Eyebolts provided on the frame are designed for lifting the motor only. Do not use these eyebolts for lifting the motor with coupled equipment such as bases, pulleys, pumps, reducers, etc. Never use damaged, bent or cracked eyebolts. Always check the eyebolt condition before lifting the motor. Eyebolts mounted on components, such as on end shields, forced ventilation kits, etc. must be used for lifting these components only. Do not use them for lifting the complete machine set. Before lifting the motor ensure that all eyebolts are tightened properly, and the eyebolt shoulders are in contact with the base to be lifted, as shown in Figures below showing correct an incorrect tightening of the eyebolt.



Correct tightening of the eyebolt



Incorrect tightening of the eyebolt

Ensure that lifting machine has the required lifting capacity for the weight indicated on the motor nameplate. The center-of-gravity may change depending on motor design and accessories. During the lifting procedures, the maximum allowed angle of inclination should never be exceeded as specified below. Individually packaged motors should never be lifted by the shaft or by the packaging. They must be lifted only by means of the eyebolts, when supplied. Use always suitable lifting devices to lift the motor.

Eyebolts on the frame are designed for lifting the motor weight only as indicated on the motor nameplate. Motors supplied on pallets must be lifted by the pallet base with lifting devices fully supporting the motor weight.

The package should never be dropped. Handle it carefully to avoid motor damage.

Handle the motor carefully without sudden impacts to prevent excessive mechanical stresses on the eyebolts resulting in its rupture.

You can find the list of our motors with their respective weight on page 11 of this manual.

#### LIFTING Horizontal motors with one eyebolt

For horizontal motors fitted with only one eyebolt, the maximum allowed angle-of inclination during the lifting process should not exceed 30° in relation to the vertical axis, as shown in the figure below.



Maximum allowed angle-of-inclination for motor with one eyebolt is 30°



**WARNING** During lifting, mounting or maintenance work, all necessary safety considerations shall be in place and special attention must be taken so that nobody will be subject to lifted load.

#### Motor Inspection

If the motor has been exposed to a low temperature, do not remove the coverings until the motor has had sufficient time to attain a temperature that is close to that of the room in which it is to be unpacked. Otherwise, when opened, moisture will condense on the cold parts. This may reduce the electrical resistance of the insulation or cause rust or corrosion of metallic parts. If the motor is to be stored in temperatures below 5° F (-15° C), it should be specified during ordering to allow for the proper shipping precautions and packaging.

- Upon receipt of the equipment, inspect the packaging and equipment for shipping damage.
- Ensure that the rated capacity and the model number specified on the nameplate conform to the order specifications.
- Carefully unpack the motor and check for parts that may have been damaged during shipping, missing parts, or concealed damage.
- Check for scratches, dents, or rattles indicating loose components, presence of oil, or any other irregularities.
- If any discrepancies are discovered, it should be noted with the carrier prior to accepting the shipment, if possible. File a claim with the carrier if necessary and immediately notify EBI Electric.
- DO NOT install the motor if it is damaged or if it is missing any component(s).
- Modification of this equipment is dangerous and is to be performed by factory trained personnel ONLY. When modifications are required, contact EBI Electric.
- Turn the rotor by hand if possible as a preliminary check for bearing damage.
- Inspections may be required after moving the equipment.
- Contact your EBI customer support to report discrepancies or for assistance if required.

## **Storing**

If the motor is not used upon receipt, store it in the original packaging in a clean, dry, and vibration-free environment. Care should be taken to keep the equipment covered when moving from a cold location to a warm location, otherwise condensation may occur. If condensation does occur, allow the motor to dry thoroughly before applying power.

EBI Electric recommends turning the shaft by hand every month when stored for long periods (longer than 3 months) to redistribute the lubricant in the bearings. Grease should be added every 6 months. For long-term storage or when indoor storage is not available, the motor must be covered with plastic or weather-proof tarp. Cover the motor completely. To ward off the formation of condensation, do not wrap the motor tightly. This will allow for adequate ventilation. Precautions must also be taken to protect the motor from flooding or being exposed to harmful chemical vapors.

Ensure that any unpainted sections are covered. Retouch any scratched or flaked painted areas. If condensate plugs or drain plugs are used, ensure that they are functional. Whether indoors or outdoors, the area should be free from vibration. Excessive vibration can cause bearing damage. Any motor which must be stored in an area that is exposed to vibration must have the shaft locked to prevent any movement.

If the motor is stored in a temperature less than 5° F (-15° C), the motor must be allowed to return to the specified operating temperature before installation or operation.

A systematic inspection and maintenance schedule should be established. If the motor is to be stored for 6 months or longer, in addition to the precautions above, the insulation resistance of the windings should be tested. Using a megohmmeter, test the insulation resistance of the windings. A minimum of 5 megohms is recommended between the metal frame to winding leads. A record of the readings, temperature, time, humidity, and length of applied voltage should be recorded to show the winding conditions prior to start up.

## **Bearing Protection**




Motors with anti-friction bearings are properly lubricated with the correct grade of grease at the factory and no further greasing is required in storage. The shaft should be rotated several revolutions about every month to maintain proper distribution of the grease within the bearings. However, re-greasing is required if a significant period of time has elapsed between manufacture and use, or while in storage for extended time (more than 6 months).

Listing of EBI Dry Kiln Duty Motor family with frame, weight and bearing numbers

<b>EBI electric - NEMA Motors Listing</b>							
<b>HP</b>	<b>RPM</b>	<b>FRAME</b>	<b>PART NUMBER</b>	<b>Weight motor + crate</b>	<b>Weight motor only(lbs)</b>	<b>DE BEARING</b>	<b>NDE BEARING</b>
2	1800	145T	RTT21800145TXXXV	65	55	6205 C3	6205 C3
2	1200	184T	RTT21200184TXXXV	105	96	6306 C3	6306 C3
3	1800	182T	RTT31800182TXXXV	100	85	6306 C3	6306 C3
3	1200	213T	RTT31200213TXXXV	165	145	6308 C3	6306 C3
3	1200	215T	RTT31200215TXXXV	185	160	6308 C3	6306 C3
3	900	215T	RTT3900215TXXXV	185	160	6308 C3	6306 C3
4	1800	184T	RTT41800184TXXXV	105	96	6306 C3	6306 C3
5	1800	184T	RTT51800184TXXXV	105	96	6306 C3	6306 C3
5	1200	215T	RTT51200215TXXXV	185	160	6308 C3	6306 C3
5	1200	254T	RTT51200254TXXXV	275	250	6309 C3	6308 C3
5	900	254T	RTT5900254TXXXV	275	250	6309 C3	6308 C3
5.5	1800	213T	RTT5.51800213TXXXV	165	145	6308 C3	6306 C3
7.5	1800	213T	RTT7.51800213TXXXV	165	145	6308 C3	6306 C3
7.5	1200	254T	RTT7.51200254TXXXV	275	250	6309 C3	6308 C3
7.5	900	256T	RTT7.5900256TXXXV	345	300	6309 C3	6308 C3
10	1800	215T	RTT101800215TXXXV	185	160	6308 C3	6306 C3
10	1200	256T	RTT101200256TXXXV	345	300	6309 C3	6308 C3
10	900	284T	RTT10900284TXXXV	385	355	6311 C3	6309 C3
10	900	286T	RTT10900286TXXXV	445	415	6311 C3	6309 C3
15	1200	284T	RTT151200284TXXXV	385	355	6311 C3	6309 C3
15	900	286T	RTT15900286TXXXV	445	415	6311 C3	6309 C3
20	1200	286T	RTT201200286TXXXV	445	415	6311 C3	6309 C3
20	900	324T	RTT20900324TXXXV	515	480	6312 C3	6312 C3
20	900	326T	RTT20900326TXXXV	585	550	6312 C3	6312 C3
25	900	326T	RTT25900326TXXXV	585	550	6312 C3	6312 C3

<b>EBI electric - IEC Motors Listing</b>							
<b>HP</b>	<b>RPM</b>	<b>FRAME</b>	<b>PART NUMBER</b>	<b>Weight motor + crate</b>	<b>Weight motor only(lbs)</b>	<b>DE BEARING</b>	<b>NDE BEARING</b>
2 (1.5)	1800	100L	RTT21800100LXXXV	85	75	6206 C3	6206C3
2 (1.5)	1200	112M	RTT21200112MXXXV	110	95	6306C3	6306C3
3 (2.2)	1800	100L	RTT31800100LXXXV	85	75	6206 C3	6206C3
3 (2.2)	1200	132M	RTT31200132MXXXV	175	160	6308 C3	6306 C3
4 (3)	1800	100L	RTT41800100LXXXV	85	75	6206 C3	6206 C3
4 (3)	1800	112M	RTT41800112MXXXV	110	95	6306C3	6306C3
5 (3.7)	1800	112M	RTT51800112MXXXV	110	95	6306C3	6306C3
5 (3.7)	1200	132M	RTT51200132MXXXV	175	160	6308 C3	6306 C3
5.5 (4)	1800	112M	RTT5.51800112MXXXV	110	95	6306C3	6306C3
5.5 (4)	1800	132M	RTT5.51800132MXXXV	175	160	6308 C3	6306 C3
7.5 (5.5)	1800	132M	RTT7.51800132MXXXV	175	160	6308 C3	6306 C3
7.5 (5.5)	1200	160M	RTT7.51200160MXXXV	275	250	6309 C3	6308 C3
7.5 (5.5)	1200	160L	RTT7.51200160LXXXV	345	300	6309 C3	6308 C3
10 (7.5)	1800	132M	RTT101800132MXXXV	175	160	6308 C3	6306 C3
10 (7.5)	1800	160M	RTT101800160MXXXV	275	250	6309 C3	6308 C3
10 (7.5)	1800	160L	RTT101800160LXXXV	345	300	6309 C3	6308 C3
10 (7.5)	1200	160M	RTT101200160MXXXV	275	250	6309 C3	6308 C3
10 (7.5)	1200	160L	RTT101200160LXXXV	345	300	6309 C3	6308 C3
15 (11)	1800	160M	RTT151800160MXXXV	275	250	6309 C3	6308 C3
15 (11)	900	180L	RTT15900180LXXXV	445	415	6311 C3	6311 C3

## Nameplate Description

FAB. PAR MADE BY				2250, 90e Rue Saint-Georges, Qc G5Y 7J7 Canada Tél.: (418) 228-5505 www.electrobeauce.com		 E300275		 LR60892	
TYP.	H.P.	R.P.M.	FR.	VOLT	ORIENT.	O.P. CODE			
MFG.				F.L.A.			P.H.		
CLASS			S.F.			HZ			
AMB. TEMP.				SER.					
D.E. BRG.				N.D.E. BRG.					

- TYP = EBI motor model
- HP = Motor power rating
- RPM = Motor speed at full load
- FR = Frame size
- VOLT – Motor voltage
- Orient = Orientation
- OP Code = Options
- MFG = Frame manufacturer
- FLA = Full load amperes
- PH = Nb of Phases
- CLASS = Motor classification
- SF = Service factor
- HZ = Frequency
- ENV = TEAO or TEFC
- AMB Temp = Max ambient temperature
- SER = Serial number
- D.E. BRG = Drive End bearing number
- N.D.E BRG = Non Drive end bearing number

## EBI Motor Certifications

Agency listings UL and CSA: EBI Electric motors are UL recognized and CSA certified.



# Frames and Dimensions

## DIMENSIONS

NEMA	MOUNTING										SHAFT				KEY + KEY SEAT		CONDUIT BOX			
	A	B	C	E	2F1	2F2	BA	G	J	L	O	P	N+W	U	D	R	S	ES	AA	AB
143T	6.875	5.250	10.63	2.75	4.00	-	2.25	0.472	1.46	6.9	7.000	6.75	2.25	0.875	3.5	0.771	0.188	1.41	0.75	8.1
145T	6.875	6.420	11.81	2.75	4.00	5.00	2.25	0.472	1.46	6.9	7.000	6.75	2.25	0.875	3.5	0.771	0.188	1.41	0.75	8.1
182T	8.750	6.300	12.60	3.75	4.50	-	2.75	0.620	1.97	10.30	9.000	8.75	2.75	1.125	4.5	0.988	0.250	1.78	1.00	7.32
184T	8.750	7.000	13.68	3.75	4.50	5.60	2.75	0.620	1.97	10.30	9.000	8.75	2.75	1.125	4.5	0.988	0.250	1.78	0.75	7.32
213T	10.500	7.625	15.83	4.25	5.50	-	3.50	0.709	2.36	12.26	10.250	9.75	3.30	1.375	5.25	1.201	0.312	2.41	1.00	6.63
215T	10.500	8.875	17.28	4.25	5.50	7.00	3.50	0.709	2.36	12.26	10.250	9.75	3.30	1.375	5.25	1.201	0.312	2.41	1.00	6.63
254T	12.375	10.500	20.24	5.00	8.25	-	4.25	0.787	2.76	14.84	12.500	12.25	4.00	1.625	6.25	1.416	0.375	2.91	1.50	11.20
260T	12.375	12.500	21.97	5.00	8.25	10.00	4.25	0.787	2.76	14.84	12.500	12.25	4.00	1.625	6.25	1.416	0.375	2.91	1.50	11.20
284T	13.750	12.375	22.99	5.50	9.50	-	4.75	0.866	2.76	16.33	14.000	14.00	4.82	1.875	7.00	1.591	0.500	3.28	1.50	12.00
286T	13.750	13.625	24.49	5.50	9.50	11.00	4.75	0.866	2.76	16.33	14.000	14.00	4.82	1.875	7.00	1.591	0.500	3.28	1.50	12.00
324T	15.500	13.625	25.63	6.25	10.50	-	5.25	0.944	2.76	18.35	15.750	15.00	5.25	2.125	8.00	1.845	0.600	3.91	2.00	13.40
326T	15.500	14.250	27.13	6.25	10.50	12.00	5.25	0.944	2.76	18.35	15.750	15.00	5.25	2.125	8.00	1.845	0.600	3.91	2.00	13.40
364T	18.000	15.200	28.15	7.00	11.25	-	5.88	1.102	2.92	20.57	17.400	17.40	5.88	2.375	9.00	2.021	0.625	4.28	3.00	15.70
365T	18.000	16.200	29.13	7.00	11.25	12.25	5.88	1.102	2.92	20.57	17.400	17.40	5.88	2.375	9.00	2.021	0.625	4.28	3.00	15.70

## AVAILABLE OPTIONS

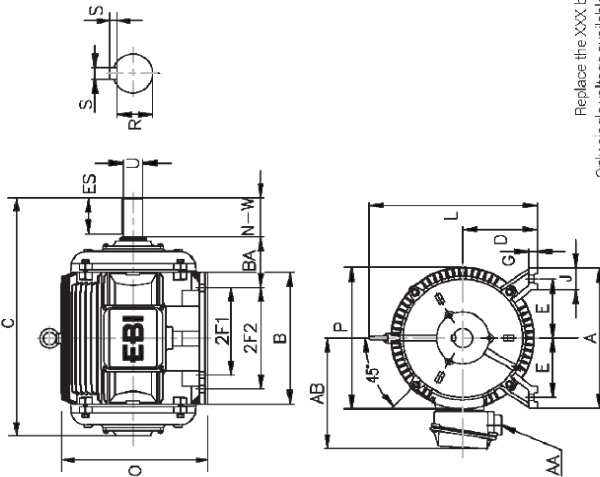
- Extra long leads
- Sealed bearings with superior high temperature grease
- Space heater
- Specially designed shaft
- Thermistors
- Oversized frame

GET YOUR

DRY KILN MOTOR QUOTE

online at  
**ebielectric.com**

## NEMA FRAMES



Replace the XXX by the desired voltage  
Only single voltage available: 230V - 460V - 600V  
Other ratings available upon request

## DIMENSIONS

IEC	MOUNTING										SHAFT				KEY + KEY SEAT		CONDUIT BOX	
	A	B	BT	C	E	F	BA	J	L	N+W	U	D	R	S	ES	AA	AB	
90L	175	140	-	200	70	140	56+1.5	4X10+0.36	252	50+0.037	24+0.004	16+0.05	20+0.002	8+0.036	40	1XMX00		
100L	200	140	-	325	80	160	63+2.0	4X12+0.43	275	60+0.037	28+0.002	100+0.05	24+0.002	8+0.036	46	1XMX00		
112M	226	140	-	340	95	190	70+2.0	4X12+0.46	300	60+0.037	28+0.002	112+0.05	24+0.002	8+0.036	46	1XMX00		
132M/S	262	140	178	400	105	216	80+2.0	6X12+0.46	340	80+0.037	38+0.002	132+0.05	33+0.002	10+0.036	60	1XMX00		
160M/L	314	210	254	570	127	254	108+3.0	6X15+0.46	400	110+0.043	42+0.002	160+0.05	37+0.002	12+0.043	80	1XMX00		
180M/L	348	140	278	625.00	138.5	348	121+3.0	6X15+0.46	465	110+0.043	48+0.002	180+0.05	42+0.002	14+0.043	80	1XMX00		

## AVAILABLE OPTIONS

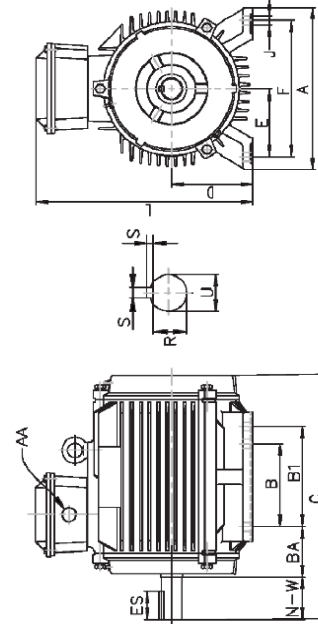
- Extra long leads
- Sealed bearings with superior high temperature grease
- Space heater
- Specially designed shaft
- Thermistors
- Oversized frame

GET YOUR

DRY KILN MOTOR QUOTE

online at  
**ebielectric.com**

## IEC FRAMES



Replace the XXX by the desired voltage  
Only single voltage available: 230V - 460V - 600V  
Other ratings available upon request



## Installation



### Safety Precautions Warning

Installation should conform to the National Electrical Code as well as local codes and practices. All work on the motor must only be performed by qualified personnel, with the motor in a stationary state. Before starting any work on the motor or other equipment, particularly before opening covers over live or moving parts, the motor must be properly isolated from the power supply. The supply should be secured so that it cannot be switched back on again. Check that no voltage is present before commencing any work. Besides the main circuits, any additional or auxiliary circuits that may be present must also be isolated. The “5 Safety rules” to be followed are:

- Isolate the equipment
- Take effective measures to prevent reconnection
- Verify equipment is dead
- Ensure proper earthing connections
- Cover or fence off adjacent live parts

The precautions listed above should remain in force until all maintenance work is finished and the motor has been fully assembled. Certain parts of the motor may reach temperatures above 120°C. Hot surfaces imply wearing protective clothes and gloves. When cleaning the motor with compressed air, ensure that suitable exhaustion measures are used and that you use personal protective gear (goggles, face mask/filter or similar equipment). If chemical cleaning agents are used, observe the instructions and any warnings. Chemical agents must be compatible with the motor's components/parts, especially when it involves plastics. When other devices are coupled to the motor shaft, be sure to install protective devices to prevent future accidents.

## Insulation Resistance Measurement

The insulation resistance of the windings must be measured prior to initial start-up, and after long periods of storage or standstill (approximately 6 months) to evaluate its electrical operating conditions.



**Warning** The insulation resistance must be measured in a safe environment. While the measurement is being taken and immediately afterwards, some of the terminals carry dangerous voltages and must not be touched. To avoid risks of electrical shock, the motor frame must be grounded, and the windings should be discharged against the frame immediately after each measurement

The insulation resistance must be measured with a megohmmeter. The motor must be in cold state and disconnected from the power supply. It is recommended to insulate and test each phase separately. This procedure allows the comparison of the insulation resistance between each phase. During the test of one phase, the other phases must be grounded. The test of all phases simultaneously evaluates the insulation resistance to ground only, but does not evaluate the insulation resistance between the phases. The power supply cables, switches, capacitors and other external devices connected to the motor may considerably influence the insulation resistance measurement. Thus, all external devices must be disconnected and grounded during the insulation resistance measurement. Measure the insulation resistance one minute after the voltage has been applied to the winding. The applied voltage should be 500 Volts DC. The recommended minimum insulation resistance in megohms at 40°C (104°F) is as next table.

A general rule of thumb is 5 megohm or more	
Insulation resistance value	Insulation level
2 Megohm or less	Bad
2-5 Megohm	critical
5-50 Megohm	Good
50-100 Megohm	Very good
100 Megohm or more	Excellent

## Location

It is important that motors be installed in locations that are compatible with motor enclosure and ambient conditions. Improper selection of the motor enclosure and ambient conditions can lead to reduced operating life of the motor.

Unless otherwise specified, the ambient operating temperature range is -15°C to 120°C maximum. Install the motor securely on a firm and flat base. Ensure that the installation is in a well-ventilated location that is easily accessible for cleaning, inspection, and maintenance - this includes being away from walls and other obstructions to permit a free passage of air. Proper ventilation for the motor must be provided. Obstructed airflow can lead to reduction of motor life. Ensure that there are no obstructions to the operation of the motor. Do not install the motor in an area where flammable gases or combustible material may be present, or around any hazardous processes, unless designed for such an application. Totally enclosed motors may be installed where dirt, moisture (not running water), and corrosion are present. Additional application-specific measures may be required. Contact EBI Electric for any required modifications.

## Mounting Sub-Structure

The foundation is the structural element, designed to withstand the stress produced by the installed equipment, ensuring safe and stable performance during operation. The foundation of motors must be rigid and secure to provide adequate support. Foundation must be leveled at least at 4 points and guaranteed to be below .0015 in. (0.04mm) flat and level. There must be no vibration, twisting, misalignment, etc. due to inadequate foundations. The foundation design should consider the adjacent structures to avoid the influences of other installed equipment and no vibration is transferred through the structure. The motor must be securely installed on a rigid foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft load. Failure to provide a proper mounting surface may cause vibration, misalignment and bearing or shaft damage. The mounting bolts must be carefully tightened to prevent changes in alignment and possible damage to the motor or equipment. These values are for medium carbon steel bolts (identified by 3 radial lines 120° on the bolt head-ANSI grade 5). For low carbon steel bolts (ANSI grade 2), use 50% of this torque.

### TIGHTENING TORQUE FOR THE SECURING BOLTS

Bolt Size		Recommended Torque	
Inches	Metric	FT.LB	N-M
1/4	M6	7-11	9-15
5/16	M8	14-21	19-28
3/8	M10	25-37	34-50
1/2	M12	60-90	81-122
5/8	M16	120-180	163-244
3/4	M20	210-320	285-433

## Alignment

Accurate alignment of the motor with the driven equipment is extremely important.

**1. Direct Coupling:** For direct drive, use flexible couplings if possible. Consult the drive or equipment manufacturer for more information. Mechanical vibration and roughness during operation may indicate poor alignment. Use dial indicators to check alignment. The space between coupling hubs should be maintained as recommended by the coupling manufacturer.

**2. End-Play Adjustment:** The axial position of the motor frame with respect to its load is also extremely important. The motor bearings are not designed for excessive external axial thrust loads. Improper adjustment will cause failure.

## Vibration

On new installations, excessive vibration may occur while running. Motors must not be subjected to vibration in excess of 0.5 G's in any application.

Note: A vibration detector will be required to measure the system vibration levels.

Listed below are some of the more common causes of excessive vibration:

- Improper shimming and/or a soft foot.
- Shafts of the motor and load are not properly aligned.
- Unbalanced load.
- Worn bearings on the motor and/or the driven machine.
- A resonant mounting condition - the effect is increased when the motor is coupled to the load.
- Vibration of the driven equipment.
- Improper or cracked foundation.
- Electrical imbalance.
- Rotor imbalance.

## Power Connections

Before the motor is connected for the first time, it is recommended to check the insulation resistances between winding and earth and between phases. After prolonged storage, it is absolutely essential that the insulation resistance is measured. Using a megohmmeter, test the insulation resistance of the motor before energizing. A minimum of 5 megohms is recommended.

Nameplate voltage and frequency should be consistent with the power supply. Wiring of the motor and control, overload protection and grounding should be in accordance with standards, directives, and local codes and regulations. Typically, the frames and metal exteriors of motors should be grounded to limit their potential to ground in the event of accidental connection or contact between live electrical parts and the metal exteriors. All motors must be installed with overload protection systems. Three-phase motors should be fitted with phase fault protection systems. All protection devices, including overcurrent protection, must be set according to the rated machine conditions. These protection devices must protect the machine against short circuit, phase fault, locked rotor condition or overload. The motor protection devices must be set according to the applicable standards. Lock-out/tag-out and disconnect the motor from the power supply before opening the conduit box or performing any maintenance or repair on the motor.

## AC Power

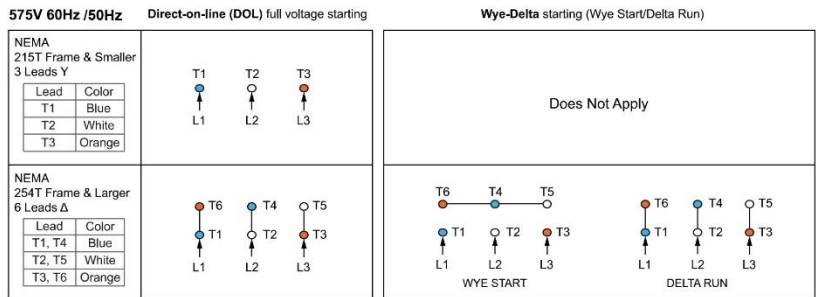
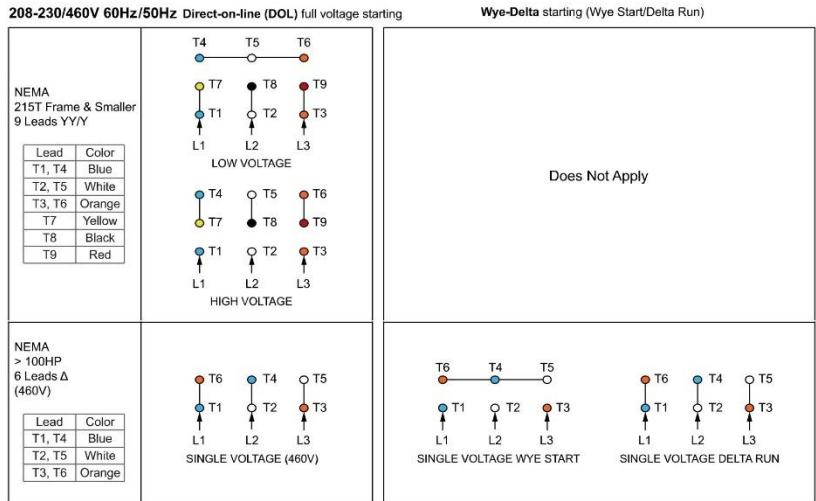
Connect the motor leads as shown on the connection diagram located inside the conduit box or as shown on the diagrams underneath. Be sure the following guidelines are met: the motor will operate satisfactorily on line voltages within 10% of the nameplate value. The frequency must be within 5% of the nameplate value. The combined variation shall not exceed 10%. The motor current shall be not more than the motor current nameplate, observing the allowed service factor. Motor load at different speed shall respect a normal vent motor usage current chart as a 10:1 motor speed derating. Otherwise, warranty claims with respect to damaged windings become void. Operating the motor at voltages and frequencies outside of the above limits can result in both unsatisfactory motor performance and damage to, or failure of, the motor.

Before closing the terminal box, be absolutely sure that:

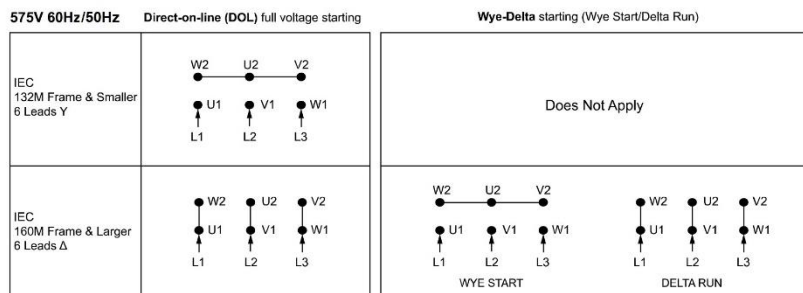
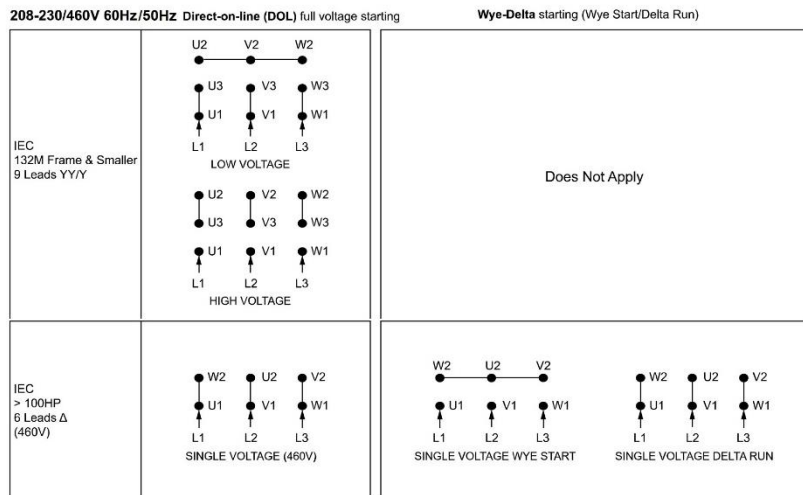
- The connection has been made in accordance with the wiring diagram
- All terminal box connections are tightened
- All minimum values of air paths are maintained (larger than 8 mm up to 500 V, larger than 10 mm up to 750 V)
- The interior of the terminal box is clean and free from foreign bodies
- Unused cable entries are blanked off and the threaded plugs with seals are tightened
- The seal in the terminal box cover is clean and tightly glued and all sealing surfaces are in the correct state to ensure that the relevant degree of protection is maintained. The seals of terminal boxes must be placed correctly in the slots provided to ensure the correct IP class. A leak could lead to penetration of dust or water, creating a risk of flashover to live elements.

# Typical connection diagram for three-phase motors

## NEMA THREE-PHASE WIRING DIAGRAMS



## IEC THREE-PHASE WIRING DIAGRAMS



## First Time Start Up

Before starting up the motor check that all safety regulations are strictly adhered to, that the machine is correctly installed and aligned, that all fixing parts and earthing connections are tightened, that the auxiliary and additional devices are functionally and correctly connected.

Be sure that all power to motor and accessories is off. Be sure the motor shaft is disconnected from the load and will not cause mechanical rotation of the motor shaft.

1. Make sure that the mechanical installation is secure and that all bolts and nuts are tightened, etc.
2. If motor has been in storage or idle for some time, check winding insulation integrity with a Megger.
3. Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity.
4. Ensure the sizes of cable wires are appropriate and all connections are well made for the currents they will carry.
5. Ensure all connections are properly insulated for the voltage and temperature they will experience.
6. Ensure the capacity of fuses, switches, magnetic switches and thermo relays etc. are appropriate and that contactors are in good condition.
7. Be sure all shipping materials and braces (if used) are removed from motor shaft.
8. Ensure that all drain and fill plugs/caps are secured.
9. Manually rotate the motor shaft to ensure that it rotates freely.
10. Remove all unused shaft keys and loose rotating parts to prevent them from becoming projectiles during operation.
11. Momentarily apply power and check the direction of rotation of the motor shaft.
12. If motor rotation is wrong, be sure power is off and change the motor lead connections. Verify rotation direction before you continue.
13. Start the motor and ensure operation is smooth without excessive vibration or noise. If so, run the motor for 15 minutes with no load connected.

## Coupled Start Up

This procedure implies a coupled start up. Also, it implies that the first time start up procedure was successful.



Ensure that all personnel is clear from the motor and from the driven equipment during the following test.

Apply power and verify that the load is not transmitting excessive vibration back to the motor through the coupling or the foundation. Vibration should be at an acceptable level. If the motor is running smoothly and without any abnormal noises, the load of the driven machine is to be applied to the motor. When the motor is started up it is recommended to monitor the current consumption if the motor is loaded with its driven machine so that any possible overloads and asymmetries occurring in the mains can be recognised immediately.

The equipment can now be loaded and operated within specified limits. Do not exceed the nameplate ratings for amperes for steady continuous loads.



## Jogging and Repeated Starts

Repeated starts and/or jogs of induction motors generally reduce the life of the motor winding insulation. A much greater amount of heat is produced by each acceleration or jog than by the same motor under full load. If it is necessary to repeatedly start or jog the motor, it is advisable to check the application with EBI Electric customer service.

## Rated Ambient Temperature

Duty rating and maximum ambient temperature are stated on the motor name plate. Do not exceed these values. If there is any question regarding safe operation, contact EBI Electric customer service.

## Operation

### Operating Conditions

Unless otherwise stated in the purchase order, electric motors are designed and built to be operated at altitudes up to 1000 meters above sea level and in a temperature range from -15°C to 120°C. Any deviation from the normal condition of motor operation must be stated on the motor nameplate. Some components must be changed if the ambient temperature is different from the specified one or if the altitude is over 1000 meter above sea level. Contact EBI Electric to check the required special features.

Motors installed inside enclosures (cubicles) must have an air renewal rate in the order of one cubic meter per second. Totally Enclosed Air Over motors - TEAO are supplied without cooling fans and the manufacturer of the driven machine is responsible for sufficient motor cooling. If no minimum required air speed between motor fins is indicated on the motor nameplate, ensure the air speed indicated in the table below is provided. The values shown in the underneath table are valid for 50Hz or 60 Hz motors.

### Minimum required air speed between motor fins (metres/second)

Frame		Poles			
IEC	NEMA	2	4	6	8
63 to 90	143/5	13	7	5	4
100 to 132	182/4 to 213/5	18	12	8	6
160 to 200	254/6 to 324/6	20	15	10	7
225 to 280	364/5 to 444/5	22	20	15	12
315 to 450	445/7 to 7008/9	25	25	20	15

If the motor is cooled by ambient air, clean the air inlet and outlet openings and cooling fins at regular intervals to ensure a free airflow over the frame surface. The hot air should never be returned to the motor. The cooling air must be at room temperature limited to the temperature range indicated on the motor nameplate

## Variable Speed Operation

Guidelines for application of general purpose, three phase, single speed motors on variable frequency drives meets NEMA® MG1-2006 part 30 and part 31 section 4.4.2. Unless stated otherwise, motor nameplates do NOT include listed speed range.

MAXIMUM RPM RATIO FOR MOTOR WITH DRIVE								
Enclosure	Efficiency	Variable Torque	Constant Torque					
		All Frames	142-215		254-286		324-365	
NEMA Motors		All Poles	2 Poles	4&6 Poles	2 Poles	4&6 Poles	2 Poles	4&6 Poles
TEFC	EPA compliant	10:1	2:1	10:1	2:1	10:1	2:1	2:1
	NEMA Premium	10:1	2:1	20:1	2:1	20:1	2:1	20:1
TEAO	EPA compliant	10:1	2:1	10:1	2:1	10:1	2:1	2:1
	NEMA Premium	10:1	2:1	20:1	2:1	20:1	2:1	20:1

## Bearing Currents

EBI Electric recommends that any motors used with variable frequency drives be equipped with suitable means to protect the motor bearings from shaft currents caused by common mode voltages inherent with operation on a non-sinusoidal power supply. EBI Electric offers several options for motors in non-classified (non-hazardous) locations, including insulated bearings and non-contact shaft grounding rings. Restricted use: DO NOT APPLY THE FOLLOWING MOTORS ON VARIABLE FREQUENCY DRIVES: motors with inherent overload protection.

MAXIMUM CABLE LENGTHS FROM THE MOTOR TO THE DRIVE			
PRODUCT DESCRIPTION	3 kHz CARRIER FREQUENCY (PHASE TO PHASE)*		
	230Vlot	460Volts	575 Volts
56-326 NEMA	600 ft	125 ft	40 ft
100-225 IEC	1000 ft	225 ft	60 ft

## Variable Speed Information

EBI Electric Inverter-Duty motors, unless otherwise stated, are rated for continuous operation in a 100°C ambient and for altitudes up to 3300 feet (1000 meters) above sea level. Special application considerations, such as high or low ambient, intermittent ratings, high altitude, duty cycle rated, extended constant horsepower range, special base speed, voltage or frequency, or any other special requirements, should be reviewed by a factory representative. It is the responsibility of the startup personnel during commissioning of the VFD/motor system to properly tune the drive to the motor for the specific application. The correct voltage boost and volts/hertz settings are application dependent and unique to each motor design. Procedures for these adjustments should be in your VFD user manual.

We are highly recommending the installation of a load reactor with 3 percent impedance or a DV/DT filter between the VFD and the motor to protect it and to extend its work life.

### WARNING

Power factor correction capacitors should never be installed between the drive and the motor.

## Inverter Duty or Inverter Rated

“Inverter Duty” (often called “Inverter Rated”) motors are suitable for use with Variable Frequency Drives as long as operation is within the application guidelines published in this manual.

EBI Electric motor product lines have been enhanced to facilitate reliable operation on today's variable speed drives, including wider constant torque speed range (up to 10:1) and improved insulation systems that withstand voltage spikes common with variable frequency operation.

Inverter Duty (Rated) motors are most often used in 20:1 speed range, variable torque applications. Refer to cable length restrictions (from VFD to motor) in the previous section.

## **Variable Torque Loads**

Applications include fans and blowers. Torque varies as the square of the speed, and horsepower as the cube of the speed. Operation below base speed significantly lightens the load on the motor. While most variable torque applications do not require the motor to operate below half speed, the motor is fully capable of operation to 10 percent of nominal speed. Operation above base speed significantly adds to the load on the motor; therefore, a factory representative must review applications requiring variable torque above base speed. A bypass circuit is often employed in variable torque applications. If this device is intended to be used, selection of a NEMA Design B motor is recommended to withstand the inrush current during across-the-line starting.

## **Motor Grounding**

Frames and accessories of all motors must be grounded in accordance with Local Electric Code and regulations. Proper grounding of inverter-driven motors is essential to protect personnel and livestock from inverter-sourced common mode voltages which may reach hazardous levels on the frame of ungrounded or poorly grounded motors.

## **Low Input Voltage**

If, due to lower utility supply voltage, the input voltage from the VFD of the motor is lower than the motor's rated voltage, de-rating of the motor's base frequency, horsepower, full load RPM, and constant HP RPM is required. The revised values can be calculated by multiplying by the ratio of the voltage change. For example, to operate a 460 volt motor from an inverter fed by 50 or 60 HZ, 400 volt utility power, the multiplier is  $400/460$  or 0.87. The VFD can be reprogrammed to match the new base point values, allowing the motor to provide rated torque at rated current from the new base speed down to its original minimum constant torque speed.

## **Overspeed Capability**

Maximum safe mechanical speed capability is a function of bearing size and type, lubrication, rotor balancing technique and specifications, air gap, enclosure, frame construction and connection to the driven load. In addition, consideration must be given to ambient noise levels, as operation above base speed will increase motor noise and vibration and reduce bearing life. Under no circumstances should bearing hub temperature exceed 120°C.

## **Other Applications Consideration**

For proper selection, the following should be considered:

- Horsepower or torque requirements at various speeds
- Desired speed range of the load and motor

- Acceleration and deceleration rate requirements of the process being controlled
- Starting requirements including the frequency of starting and a description of the load (reflected inertia at the motor, load torque during starting)
- Whether the application is a continuous process or duty cycle of starts, stops and speed changes
- A general description of the type of application including the environment in which the VFD system components must operate (determines motor enclosure and/or explosion proof classification)
- Description of the available electrical power supply and wiring
- Special performance requirements, if any
- Whether the drive will be configured with a by-pass circuit. In case of its deployment, the motor will operate like its fixed speed counterpart and may require a NEMA® B design which limits in-rush current, or selection of a larger motor starter or other protective circuitry
- Mounting and other mechanical considerations

## Efficiency

The efficiency of a motor is the ratio of its useful power output to its total power input and is usually expressed in a percentage. EBI Electric motors are available with standard, high efficient EPACT, efficient ratings. Standard efficiency motors may only be used on applications that are exempt from legislated efficiencies.



## Maintenance



### Safety Precautions Warning

Before starting any work on the motor or other equipment, particularly before opening covers over live or moving parts, the motor must be properly isolated from the power supply. Besides the main circuits, any additional or auxiliary circuits that may be present must also be isolated.

The “5 Safety rules” to be followed are:

- Isolate the equipment
- Take effective measures to prevent reconnection
- Verify equipment is dead
- Ensure proper earthing connections
- Cover or fence off adjacent live parts

The precautions listed above should remain in force until all maintenance work is finished and the motor has been fully assembled. Certain parts of the motor may reach temperatures above 120°C. When cleaning the motor with compressed air, ensure that suitable exhaustion measures are used and you use personal protective gear (goggles, face mask/filter or similar)! If chemical cleaning agents are used, observe the instructions and any warnings. Chemical agents must be compatible with the motor’s components/parts, especially when it involves plastics. The purpose of maintenance is to extend the useful life of the equipment. The non-compliance with one of these previous items can cause unexpected machine failures.

All repairs, disassembly and assembly related services must be carried out only by qualified and well-trained personnel by using proper tools and techniques. Make sure that the machine has stopped, and it is disconnected from the power supply, including the accessory devices (space heater, etc.), before any servicing is undertaken.

EBI Electric does not assume any responsibility or liability for repair services or maintenance operations executed by non-authorized service centres or by nonqualified service personnel. The company shall have no obligation or liability whatsoever to the buyer for any indirect, special, consequential or incidental loss or damage caused or arising from the company’s proven negligence

## **General Inspection**

The inspection intervals depend on the motor type, application and installation conditions. Proceed as follows during inspection:

- Visually inspect the motor and coupling. Check if abnormal noises, vibrations, excessive heating, wear signs, misalignment or damaged parts are noticed. Replace the damaged parts as required.
- Measure the winding insulation resistance
- Clean the motor enclosure. Remove oil spills and dust accumulation from the motor frame surface to ensure a better heat transfer to the surrounding ambient.
- Investigate the current condition of the seals and replace them, if required.
- Drain the condensed water from inside the motor. After draining, reinstall the drain plugs to ensure the degree of protection as indicated on the motor nameplate. The motor must always be positioned so the drain hole is at the lowest position.
- Check the connections of the power supply cables, ensuring the correct clearance distance between live and grounded parts.
- Check if the tightening torque of the bolted connections and mounting bolts meets the tightening torque specified.
- Check the status of the cable passages, the cable gland seals and the seals inside the terminal box and replace them, if required.
- Check the bearing operating conditions.
- Check for the presence of any abnormal noise, vibration or other abnormal operating conditions, like motor temperature rise.
- Record and file all changes performed on the motor.



Do not reuse damaged or worn parts. Damaged or worn parts must be replaced by parts supplied by the manufacturer and must be installed as if they were the original parts.

## Lubrication

Proper lubrication plays a vital role in the motor performance. Only use the grease, amounts and lubrication intervals recommended for the bearings.

The grease disposal should be made in compliance with applicable laws in each country.

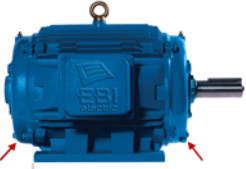


Please contact EBI Electric when motors are to be installed in special environments or used for special applications.

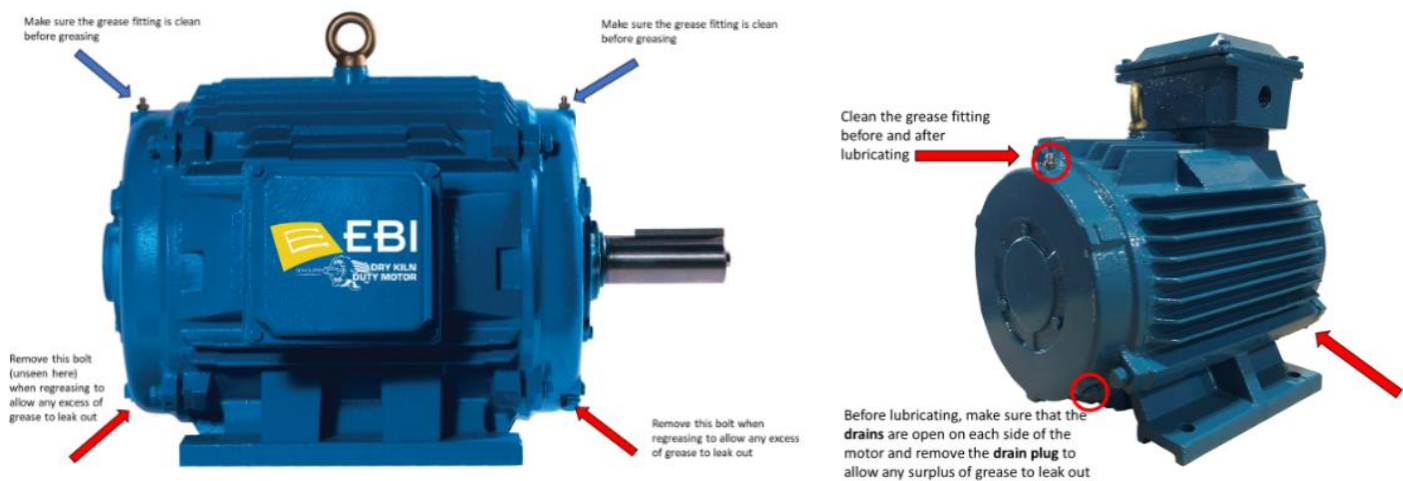
### Grease Lubricated Rolling Bearings



Excess grease causes bearing overheating, resulting in bearing failure


<b>Lubrication Instructions</b>				
<b>THIS MOTOR IS READY TO USE - DO NOT RELUBRICATE AT FIRST USE</b>				
<i>Regreasing interval</i>			<i>This table is for illustrative purposes only. It is always better to do the maintenance more often and use just the right amount of grease than to lengthen the intervals by adding too much grease at a time.</i>	
Kiln Temp.	Hrs Operation			
< 100°C/212°F	2200 HRS			
< 110°C/230°F	1450 HRS			
< 120°C/248°F	720 HRS			
<b>Read the instructions below before proceeding</b>				
1) Check the condition of the bearings				
2) Properly clean the grease fitting before and after				
3) Open the drains and make sure they are clear (Image)				
3) Check the recommended amount according to the following table				
4) Let the motor run while re-greasing for best results				
	<i>Bearings C3</i>		<i>Grease Qty.</i>	
<i>Frame</i>	DE	ODE	DE	ODE
143/5T	6205	6205	4 gr - 0.141 oz	4 gr - 0.141 oz
182/184T	6306	6306	8 gr - 0.282 oz	8 gr - 0.282 oz
213/215T	6308	6306	11 gr - 0.388 oz	8 gr - 0.282 oz
254/256T	6309	6308	13 gr - 0.459 oz	11 gr - 0.388 oz
284/286T	6311	6309	18 gr - 0.635 oz	13 gr - 0.459 oz
324/326T	6312	6312	20 gr - 0.706 oz	20 gr - 0.706 oz
Type:				
ORIENT:	H = HORIZONTAL	V = VERTICAL	H/V : MIXTE	
OP CODE:	SH: STRIP HEATERS --- SG: SEALED BEARINGS			
<i>Use a calcium sulphonate complex grease or compatible (See compatibility chart underneath)</i>				






Here are the types of grease that are compatible with the original grease of EBI Electric kiln motors


- Barium complex
- Calcium Stearate
- Lithium Complex

 For lubrication, use only manual grease gun.

It is not recommended to mix different types of greases. In such a case, clean the bearings and lubrication channels before applying new grease.

## Motor Assembly and Disassembly

 All repair services on motors should always be performed by qualified personnel and in accordance with the applicable laws and regulations in each country. Always use proper tools and devices for motor disassembly and assembly.

 Disassembly and assembly services can be carried out only after the motor has been disconnected from the power supply and is completely stopped. Dangerous voltages may be present at the motor terminals inside the terminal box since capacitors can retain electrical charge for long periods of time even when they are not connected directly to a power source or when space heaters are connected to the motor or when the motor windings are used as space heaters. Dangerous voltages may be present at the motor terminals when they are driven by frequency inverter even when they are completely stopped.

Record the installation conditions such as terminal connection diagram, alignment / leveling conditions before starting the disassembly procedures. These records should be considered for later assembly. Disassemble the motor carefully without causing scratches on machined surfaces or damaging the threads. Assemble the motor on a flat surface ensuring a good support base. Footless motors must be fixed/locked on the base to prevent accidents. Handle the motor carefully to not damage the insulated components such as windings, insulated rolling bearings, power cables etc. Seal elements, such as joint seals and bearing seals should always be replaced when wear or damage is noticed.

## Terminal box

- Proceed as follows to remove the terminal box cover and to disconnect/connect the power supply cables and the cables of the accessory devices.
- Ensure that during the screw removal the terminal box cover does not damage the components installed inside the terminal box.
- If motors are supplied with terminal blocks, ensure the correct tightening torque on the motor terminals as specified in Table underneath.
- Ensure that the cables do not contact sharp edges.
- Ensure that the original IP degree of protection is not changed and is maintained as indicate on the motor nameplate.
- The power supply cables, and the control cables must always be fitted with components (cable glands, conduits) that meet the applicable standards and regulations of each country.
- The seals in the terminal box must be in perfect condition for reuse and must be reinstalled correctly to ensure the specified degree of protection.

Tightening torque for the securing bolts [Nm]

Screw type and seal	M4	M5	M6	M8	M10	M12	M14	M16	M20
Hex bolt/hex socket bolt (rigid joint)	-	3,5 to 5	6 to 9	14 to 20	28 to 40	45 to 70	75 to 110	115 to 170	230 to 330
Combined slotted screw (rigid joint)	1,5 to 3	3 to 5	5 to 10	10 to 18	-	-	-	-	-
Hex bolt/hex socket bolt (flexible joint)	-	3 to 5	4 to 8	8 to 15	18 to 30	25 to 40	30 to 45	35 to 50	-
Combined slotted screw (flexible joint)	-	3 to 5	4 to 8	8 to 15	-	-	-	-	-
Terminal blocks	1 to 1,5	2 to 4 1)	4 to 6,5	6,5 to 9	10 to 18	15,5 to 30	-	30 to 50	-
Grounding terminals	1,5 to 3	3 to 5	5 to 10	10 to 18	28 to 40	45 to 70	-	115 to 170	

# Motor Troubleshooting

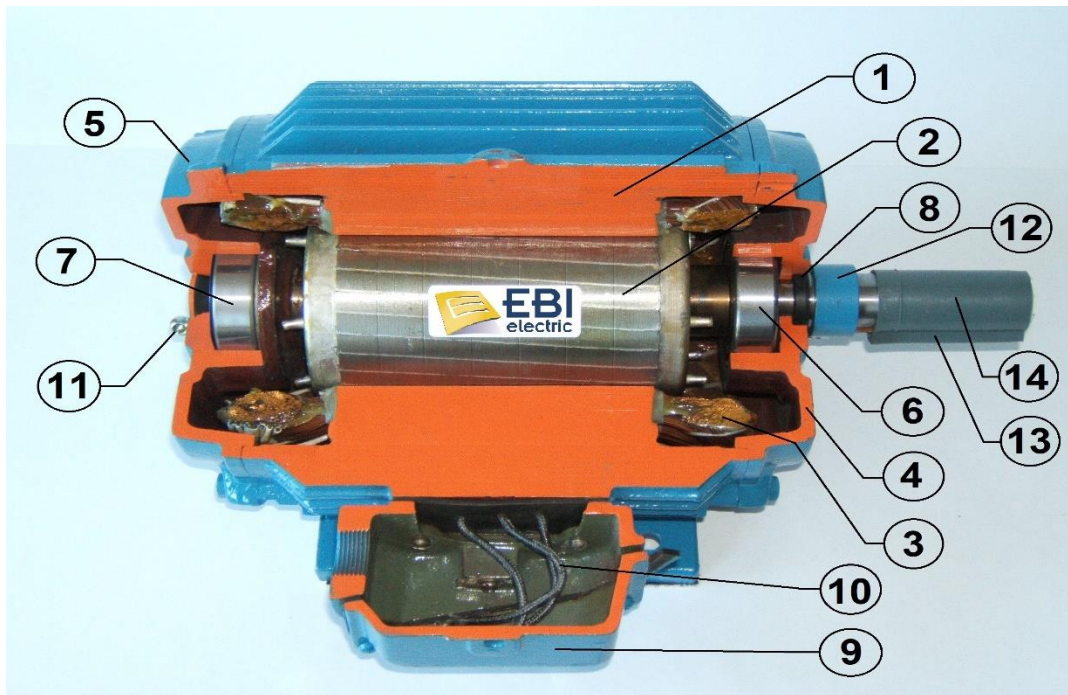
Problems	Symptoms	Possible Causes	Remedies	
Issues after start and loading	Overheating motor	Friction between rotor and stator	Factory repair. Check air gap clearance and bearings.	
		Fuse blown (Single-phase rotating)	Install the specified fuse	
		Poor contact of circuit switches	Check and repair	
		Poor contact of circuit starting switches	Check and repair	
		Unbalanced three-phase voltage	Check voltage at all phases (should be approximately equal) to isolate and correct the problem	
		Open stator winding	Check stator resistance at all three phases for balance	
		Grounded winding	Perform dielectric test and repair as required	
		Rotor rubbing on stator	Check air gap clearance and bearings	
		Improper connections	Inspect all electrical connections for proper termination, clearance, mechanical strength and electrical continuity. Refer to motor lead connection diagram.	
Issues after start and loading	Speed falls sharply	Voltage drop	Check circuit and power source	
		Sudden overload	Check machine	
		Single-phase rotating	Check circuit and repair	
	Switch overheat	Insufficient capacity of switch	Replace switch	
		High load	Lighten load	
	Bearing overheating	Bent or sprung shaft	Straighten or replace shaft	
		Excessive belt tension	Adjust belt tension	
		Slack belt tension	Adjust belt tension	
		Pulleys too far away from shaft shoulder	Move pulley closer to motor bearing	
		Misalignment between motor and machine driven shaft	Re-align	
		Excessive end thrust	Reduce the end thrust from driven machine	
		Excessive grease in bearings	Remove grease till the end cavity is 3/4 filled	
		Insufficient grease in bearing	Add grease until cavity is approximately 3/4 filled	
		Deterioration of grease or lubricant contaminated	Clean bearing cavity and bearing. Remove old grease, wash bearings thoroughly in kerosene and replace with new grease.	
		High bearing noise. Broken ball or rough races.	Replace the damaged bearing	
Noise	Electromagnetic noise induced by electricity	Occurrence from its first operation	May be normal	
		Sudden sharp noise and smoking	Short circuit of windings should be repaired at the factory	
	Bearing noise	Noise of low shishi or Tru-Thru	May be normal	
		Kala-Kala as a result of poor lubrication	Grease	
		Kulo-Kulo as a result of poor lubrication	Clean bearing and grease	
	Growling or whinnying	Damaged bearing	Replace bearing. Clean all grease from cavity and new bearing. Repack with correct grease until cavity is approximately 3/4 filled	
	Mechanical noise caused by machinery	Loose belt sheave	Adjust key and lock the screw	
		Loose coupling or skip	Adjust the position of couplings, lock key and screw	
		Loose screw on fan cover	Lock fan cover screw tightly	
		Fan rubbing	Adjust fan position	
		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	
		Loose bolts	Retighten the bolts	
	Vibration	Electromagnetic vibration	Motor mounting base resonance	Check mounting base design
			Short circuit of winding	Factory repair
Open circuit of rotor			Factory repair	
Mechanical vibration		Motor misalignment	Check and align motor and driven equipment	
		Motor mounting bed is not strong enough	Reinforce mounting base sub-structure	
		Coupling out of balance	Balance coupling	
		Unsymmetric centers between belt sheaves	Align central points	
		Rotor out of balance	Have rotor balance checked and repaired at your EBI electric Service Center	
		Unbalanced fan	Factory repair	
		Broken fan blade	Replace fan	
		Rubbing between rotating parts and stationary parts	Isolate and eliminate cause of rubbing	
		Defective bearings	Replace bearings	
		Bearings not in line	Repair motor	
		Resonance	Tune system or contact your EBI Electric for assistance	
		Poly phase motor running single phase	Check for open circuit	
Improper mounting installation	Lock the mounting screws			

## Spare Parts

Use only genuine EBI Electric parts. When ordering, specify complete motor information including model number and serial number are a minimum requirement. Specify quantity and part description. The recommended spare parts listed in the table below are wear items and are normally the most susceptible to damage. Though the table will offer a reasonable level of security for normal operations, it is provided as a guide only. Stock size will depend primarily on the application. Critical applications where continuous operation is of primary importance will require a larger supply of parts. Each user will have to evaluate the proper requirements in this respect.

Item	Part Name	1 – 4 Motors	5 – 9 Motors	10 – 25 Motors
1	DE Bearings	1	2	2
2	NDE Bearings	1	2	2

## Exploded View of Motor Components



<b>EBI Electric Dry Kiln Duty Motor Typical Components</b>			
Item #	Description	Item #	Description
1	Frame/stator assembly	8	Seal
2	Rotor assembly	9	Wire Connexion Box
3	Winding	10	Lead Wires
4	Cover (drive end)	11	Grease fitting
5	Cover (non drive end)	12	Spacer
6	Bearing (drive end)	13	Key
7	Bearing (non drive end)	14	Shaft protective cap

## Environmental Information

### Packaging

EBI Electric motors are supplied in cardboard, plastic or wooden packaging. These materials can be recycled and must be disposed according to the applicable laws and regulations in each country.

### Product

Electric motors consist mainly of ferrous metals (steel plates and cast iron), nonferrous metals (copper and aluminum) and plastic materials. In general, electric motors have relatively long service life. However, when they must be discarded, EBI Electric recommends dismantling the motor, sort the different materials and send them for recycling. No-recyclable materials should be disposed of at industrial landfills according to the applicable environmental laws and regulations in each country or co-processed in cement kilns or incinerated. The recycling service providers, the disposal in industrial landfills, the waste co-processing or the incineration process must be properly authorized by the state environment agency to carry out these activities.



## Warranty

EBI Electric warrants that the received motors will be free of defects in materials and workmanship. If within the applicable warranty period of two years, the customer discovers any defects in the materials or workmanship of any of the EBI Dry Kiln Duty Motors and promptly notifies EBI Electric Inc. in writing of such defects and returns the defective items or provides evidence of disposal of such items at the option of EBI Electric Inc., EBI Electric Inc. shall repair or ship a replacement for the defective item or at EBI Electric Inc.'s sole option refund to the customer the purchase price for each defective item. This warranty shall not apply to any of the following: (a) Products that have been repaired or altered by anyone other than EBI Electric Inc.; (b) Products having components purchased from anyone other than EBI Electric Inc.; (c) Products that have been damaged by negligence or accident or by other circumstances beyond the reasonable control of EBI Electric Inc.; or (d) Products that have been improperly operated, maintained, serviced, or stored, or that have been subjected to abnormal conditions of operation, maintenance, service, and storage not in conformity with the manufacturer's written instructions concerning operation, maintenance, service, and storage. In no case whatsoever, including justified warranty claims, is the customer entitled to retain payments due. EBI Electric Inc. shall reserve the right to have at its expense, any "defective" motor shipped to a qualified EASA shop for inspection. If upon inspection the motor is found to fit any of conditions a, c or d as noted previously, the customer will be invoiced the full price of the replacement motor supplied including applicable shipping costs and the customer will retain ownership of the defective motor. The customer may, at their expense, request further inspection of the motor by a second qualified EASA shop to confirm or contradict the findings of the first. This warranty does not include reimbursement to the customer for its costs and expenses of transportation, freight, labor, removal, or other expenses that might be incurred in connection with the customer's returning the defective items to EBI Electric Inc. or in connection with EBI Electric Inc.'s sending to the customer any repaired or replaced items. In no event shall EBI Electric Inc.'s employees or representatives be liable to the customer for any indirect, consequential, special, contingent, exemplary, or incidental damages or expenses (including, but not limited to, lost profits, loss of production, down time, or business interruption, whether caused by or related to any defective products or arising from this warranty, breach of contract, negligence, or any other legal theory. In all events, the liability of EBI Electric Inc. whether based in tort, breach of contract, breach of warranty, or otherwise, shall not exceed the price of the defective products in question or with respect to which such breach, default, or negligence is claimed. The customer acknowledges that the remedies provided herein are exclusive and in lieu of all other remedies. This limited warranty is in lieu of all other warranties, express or implied, including but not limited to any warranties of merchantability, fitness for any particular purpose, or non-infringement, all of which are hereby expressly disclaimed. Finally, warranty, prices and specifications are subject to change without notice.

### Warranty Waiver

- 1) All EBI Electric Dry Kiln Motors to be used in high temperature continuous wood dry kiln are not covered with EBI's warranty. Contact our customer service for more details.
- 2) All EBI Electric 900 rpm motors are subjected to specific warranty terms to be agreed with our customers. Contact our customer service technician for more details.



## Resale Waiver

In the event of the resale of any of the goods, in whatever form, resellers/buyers will include the following language in a conspicuous place and in a conspicuous manner in a written agreement covering such sale:

THE MANUFACTURER MAKES NO WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE GOODS SOLD HEREUNDER. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE GOODS PURCHASED HEREUNDER WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. IN NO EVENT WILL THE MANUFACTURER BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES. EVEN IF THE REPAIR OR REPLACEMENT REMEDY SHALL BE DEEMED TO HAVE FAILED OF ITS ESSENTIAL PURPOSE UNDER SECTION 2-719 OF THE UNIFORM COMMERCIAL CODE, THE MANUFACTURER SHALL HAVE NO LIABILITY TO BUYER FOR CONSEQUENTIAL DAMAGES.

Resellers/buyers will include this entire document, including the warnings and cautions above, in a conspicuous place and in a conspicuous manner in writing to instruct users on the safe usage of the product. This information should be read together with all other printed information supplied by EBI Electric.

## Application Information

- 1) **INSULATION SYSTEMS:**
  - **Class H** – Class H insulated motors have a total temperature rating of 180°C and maximum allowable temperature rise of 125°C.
- 2) **MOUNTING:** Most EBI motors are designed for horizontal mounting (shaft parallel with ground)
- 3) **PHASE/POWER SUPPLY:** Most factories, large commercial and industrial users require three phase motors.
- 4) **ROTATION:** Most EBI electric motors are reversible by electrical reconnection or by physical orientation.
- 5) **SPEED/RPM:** 3600, 1800,1200 and 900 are the most common 60 HZ synchronous speeds. 3000, 1500,100 and 750 are the most common 50 HZ synchronous speeds.

## Terminology

- 1) **Ambient Temperature:** Temperature of the medium, such as air, water or earth, into which the heat of the equipment is dissipated.
- 2) **Across The Line Start:** A method of motor starting that applies full line voltage to the motor. The motor is connected directly to the power source.
- 3) **Base Speed:** Nameplate rating where the motor will develop rated HP at rated load and voltage. With AC systems, it is commonly the point where 60 Hz is applied to the induction motor.
- 4) **Breakaway Torque:** The torque required to start a machine from standstill.
- 5) **Breakdown Torque (BDT):** The maximum torque that an AC motor will develop with rated voltage applied at rated frequency while rotating.
- 6) **Cogging:** A condition in which a motor does not rotate smoothly but “steps” or “jerks” from one position to another during shaft revolution. Cogging is most pronounced at low motor speeds and can cause objectionable vibrations in the driven machine.



- 7) **Continuous Duty:** The continuous rating is the maximum constant load that can be carried continuously without exceeding established temperature rise limitations under prescribed conditions of load and within the limitations of established standards.
- 8) **Definite Purpose Motor:** Any motor design, listed and offered in standard ratings with standard operating characteristics and mechanical construction, for use under service conditions other than usual or for use on a particular type of application (NEMA®).
- 9) **Duty Cycle:** The relationship between the operating and resting times or repeatable operation at different loads and/or speeds.
- 10) **Efficiency:** Ratio of power output to power input indicated as a percentage. In motors, it is the effectiveness with which a motor converts electrical power into mechanical power.
- 11) **Frequency:** Number of cycles per second of alternating current 60HZ used primarily in North America, 50HZ normally used overseas.
- 12) **Full Load Torque (FLT):** The torque necessary to produce rated horsepower at full load speed.
- 13) **Inertia:** A measure of a body's resistance to changes in velocity, whether the body is at rest or moving at a constant velocity. The velocity can be either linear or rotational. The moment of inertia (WK<sup>2</sup>) is the product of the weight (W) of an object and the square of the radius of gyration (K<sup>2</sup>). The radius of gyration is a measure of how the mass of the object is distributed about the axis of rotation. WK<sup>2</sup> is usually expressed in units of lb-ft<sup>2</sup>.
- 14) **Inrush Current:** The initial surge of current into the windings. Inrush current can be up to ten times higher than the continuously needed current because there is low initial resistance.
- 15) **Intermittent Duty:** A motor that never reaches equilibrium temperature but is permitted to cool down (to ambient temperature) between operations. For example, a crane, hoist or machine tool motor is often rated for 15, 30 or 60-minute duty.
- 16) **Load Sharing:** An application condition in which two or more similar-sized AC Induction motors are mechanically connected to each other and powered from the same inverter. Optimum load sharing is achieved with higher slip (NEMA Design B or C) motors.
- 17) **Locked Rotor Current (LRA):** Steady state current taken from the line with the rotor at standstill, at rated voltage and frequency. This is the current when starting the motor and load across the line.
- 18) **Locked Rotor Torque (LRT):** The minimum torque that a motor will develop at rest for all angular positions of the rotor, with rated voltage applied at rated frequency.
- 19) **No Load (Conditions):** The state of a machine rotating at normal speed under rated conditions, but when no output is required from it.
- 20) **Part Winding Start (PWS):** A method of reduced voltage starting that applies power to only one set of windings, then to the other set as the motor comes up to speed.
- 21) **Power Factor:** Power factor is the ratio of real power (kW) to total kVA, or the ratio of actual power (W) to apparent power (voltamperes).
- 22) **Reactance:** The opposition to the flow of current made by an induction coil or a capacitor. Performance data expresses stator reactance as X1 and rotor reactance as X2.
- 23) **Resistance:** The opposition to voltage or current in an electrical circuit. Performance data expresses stator resistance as R1 and rotor resistance as R2.
- 24) **Rotor:** The rotating member of a machine with a shaft.
- 25) **Service Factor (SF):** When used on a motor nameplate, a number which indicates how much above the nameplate rating a motor can be loaded intermittently without causing serious degradation (i.e. a motor with 1.15 SF can produce 15% greater torque than one with 1.0 SF, within temperature constraints).
- 26) **Squirrel Cage Induction Motor:** When used on a motor nameplate, a number which indicates how much above the nameplate rating a motor can be loaded without causing serious degradation (i.e. a motor with 1.15 SF can produce 15% greater torque than one with 1.0 SF, within temperature constraints).
- 27) **Shock Load:** The load seen by a clutch, brake or motor in a system that transmits high peak loads. This type of load is present in crushers, separators, grinders, conveyors, winches and cranes.

- 28) **Slip:** The difference between the speed of the rotating magnetic field (synchronous speed) and mechanical rotational speed (rotor speed) of AC induction motors. Usually expressed as a percentage of synchronous speed.
- 29) **Speed Range:** The minimum and maximum speeds at which a motor must operate under constant or variable torque load conditions. A 50:1 speed range for a motor with top speed of 1800 RPM means the motor must operate as low as 36 RPM and still operate within specifications.
- 30) **Starting Torque:** The torque exerted by the motor during the starting period.
- 31) **Stator:** The stationary portion of the magnetic circuit and the associated windings and leads of a rotating machine.
- 32) **Synchronous Speed:** The speed of an AC induction motor's rotating magnetic field. It is determined by the frequency applied to the stator and the number of magnetic poles present in each phase of the stator windings. Mathematically, it is expressed as Sync Speed (RPM) = 120 x Applied Frequency (Hz)/Number of Poles per phase.
- 33) **Torque:** A turning force applied to a shaft, tending to cause rotation. Torque is normally measured in "pound feet" and is equal to the force applied times the radius through which it acts.
- 34) **Torque-to-Inertia Ratio:** The rated motor torque divided by its rotor inertia. Helps determine a motor's ability to accelerate loads and/or respond to commands from a drive to change speed or direction.
- 35) **Voltage Drop:** The reduction in voltage level from the source to the load caused by conductor resistance.

## Formulas & Conversion Factors

- Horsepower (HP) = Torque (lb-ft) x RPM / 5252
- Horsepower (HP) = Torque (lb-in) x RPM / 63025
- Torque (lb-ft) = HP x 5252 / RPM
- Torque (lb-in) = HP x 63025 / RPM
- Efficiency = Power Out / Power In
- Synchronous RPM = 120 x Frequency / # Poles
- Ohms = Volts / Amperes ( $R = E/I$ )
- Amperes = Volts / Ohms ( $I = E/R$ )
- Volts = Amperes x Ohms ( $E = IR$ )
- Static Torque (T) = F x R (lb-ft), F = Force (lb), R = pulley or drum radius (ft)
- Pound-feet (torque) = .7376 x Newton-meters
- Newton-meters (torque) = 1.3558 x lb-ft
- Power (HP) = Torque (lb-ft) x  $2\pi$  x RPM / 33000
- Temperature (Celsius) = 5/9 x (F° - 32)
- Temperature (Fahrenheit) = (9/5 x C°) + 32
- 1 Kilowatt (KW) = 1.341 Horsepower
- 1 Horsepower = 746 watts (.746 KW)
- Brake Torque = (5252 x P / N) x SF, P = HP, N = RPM, SF = 1.4. Use 2.0 to 2.5 SF for cranes and hoists (consult crane manufacturer or end-user).

