SERIES *TEBY* FLAMEPROOF THREE-PHASE INDUCTION MOTORS(FRAME 80~355)

INSTRUCTIONS

WUXI TECO ELECTRIC & MACHINERY CO., LTD

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1. GENERAL DESCRIPTIONS

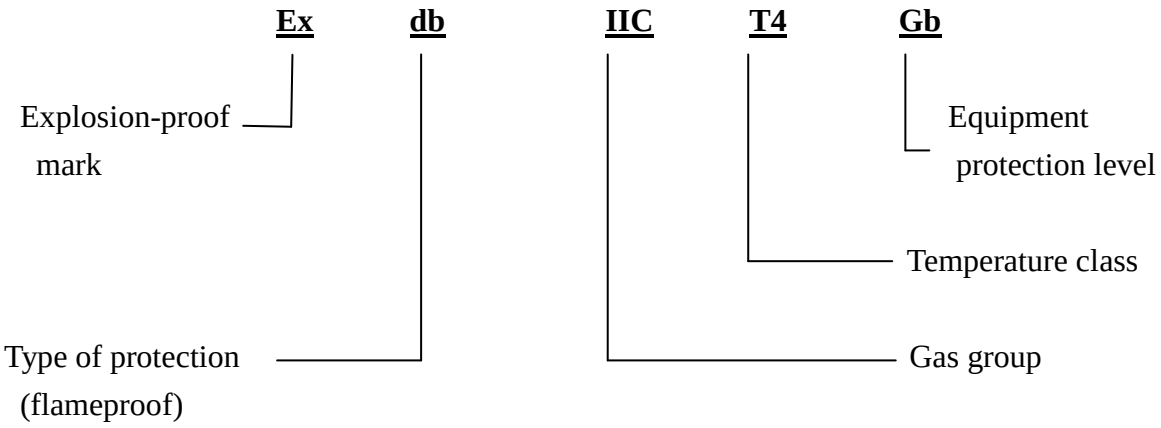
1.1 Summarize

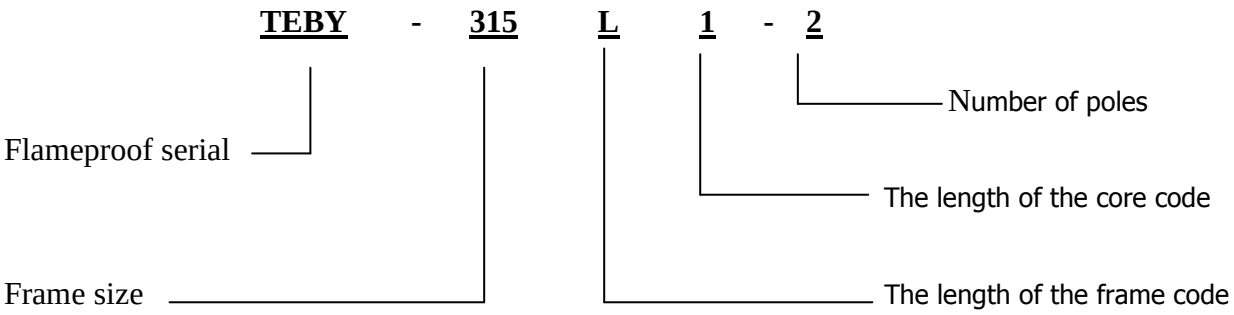
Series *TEBY* flameproof three-phase induction motors (hereinafter referred to as motors) according to Q/320217ACV08—2015《Series *TEBY* flameproof three-phase induction motors (frame 80 ~ 355) technical requirements》. And meet the IE3 efficiency of IEC60034-30-1:2014. This series motors are a new generation of high efficiency flameproof three-phase induction motors.

Explosion-proof requirements of this series motors according to IEC60079-0:2011《Explosive atmospheres --Part 0: Equipment--General requirements》and IEC60079-1:2014《Explosive atmospheres -- Part 1: Equipment protection by flameproof enclosures "d"》.

1.2 Service condition

- Explosion-proof mark:Exdb IIB T4 Gb,Exdb ⅡC T4 Gb(or Ex db ⅡC(H2) Gb）
- Temperature class: T1~T4
- Hazardous area:Zone 1 or Zone 2
- Explanation of mark ang type





- Rated voltage:

200V,220V,230V,240V,380V,400V,415V,440V,460V,480V,525V,575V,660V,690V,1140V,220/380V, 230/400V,380/660V,400/690V,660/1140

- Frequency:50Hz,60 Hz
- Duty:S1-conditions
- Motor shell protection class:

If explosion—proof grade is Exdb Ⅱ BT4 Gb,Protection Grade is IP54 or IP55.

If explosion—Proof Grade is Exdb Ⅱ CT4 Gb（or Exdb Ⅱ (H2) Gb）,Protection Grade is IP54,IP55,IP56,IP65 or IP66。

● The cooling mode of the motor :IC411.

2. ACCEPTING, INSPECTION, STORAGE, TRANSPORTATION

2.1 Inspection upon receipt

Check the following points upon receipt：

● Are the nameplate ratings identical with what you ordered？

● Are dimensions and color in compliance with your specifications？

● Are the nameplate ratings for heater, thermal protector, temperature detector, etc. identical with what you ordered？

● Is there any damage？

● Are all accessories and accompanying instruction manuals in good order？

● Please ensure that the arrowhead indicator really indicates direction of revolution.

● If there are any specific requirements, please ensure they are in conformity with your specification.

2.2 Storage

When motors are not in operation, the following precautionary measures should be undertaken to assure best performance.

2.2.1 Place

(a) High and dry, well-ventilated without direct sun, dust or corrosive gas.

(b) Not located near to a boiler or freezer.

(c) Entirely free from vibration and easy for movements.

(d) Motors should be put on pallets to prevent moisture.

2.2.2 Well protection

Motors should be well shielded from dust, but under well-ventilated circumstances.

2.2.3 Moisture prevention

Since moisture can be very detrimental to electrical components, the motor temperature should be maintained about 3℃ above the dew point temperature by providing either external or internal heat. If the motor is equipped with space heaters, they should be energized at the voltage shown by the space heater nameplate attached to the motor. Incandescent light bulbs can be placed within the motor to provide heat. However, if used, they must not be allowed to come in contact with any parts of the motor because of the concentrated hot spot that could result.

2.2.4 Insulation resistance test

Even during storage, the insulation resistance should be kept above the specified values.

(a) For measurement of insulation resistance and acceptable standard values, please refer to measures stated in 4.1.2 "Measurement of insulation resistance".

(b) Insulation resistance test should be performed once every three months.

2.2.5 Long period storage

If the motor is not in operation for a long period (one week and above) after installation or has been in operation but stopped for a period of time, the following precautions must be taken.

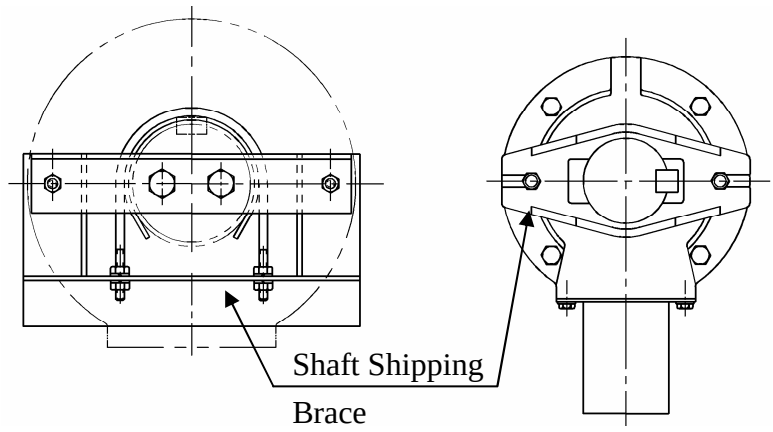
(a) Protect the motor as measures stated in 2.2.3.

(b) Insulation resistance test should be performed as stated in 2.2.4.

(c) Operation test should be performed once every three months.

2.2.6 Bearing protection

(a) If the motor has been provided with a shaft shipping brace to prevent shaft movement during transit, it must be removed before operating the motor.
It is very important that this brace be reinstalled exactly as it was originally, before the motor is moved from storage or any time when the motor is being transported. This prevents axial rotor movement that might damage the bearings.



(b) Motors equipped with sleeve bearings are shipped from the factory with the bearing oil reservoirs drained. In storage, the oil reservoirs should be properly filled to the center of the oil level gauge with a good grade of rust inhibiting oil. To keep the bearing journals well oiled and to prevent rusting, the motor shaft should be rotated several revolutions about every month ensuring the shaft does not come to rest in its original position. While the shaft is rotating, it should be pushed to both extremes of the endplay.

(c) 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.

2.2.7 Prevent rusting

ATTENTION！

Cares should be taken to keep parts such as fitting surface, key, shaft extension and axial central hole from any collision with foreign matters. Grease should also be generously applied to prevent rusting.

2.3 Transportation

ATTENTION！

To keep the rotating parts of motors from moving, thus preventing damage and scratching during transportation, they should be held securely with a locking device. Remove all transit clamps before operating the motor. It is very important that this device be reinstalled exactly as it was originally, before the motor is moved from storage or any time when the motor is being transported.

The vertical mounting type motors should be transported in the vertical position.

Do not use the hoisting hook/eyebolts to lift more that the motor itself. They are designed to support the motor only.

Make sure the hoisting hook is correctly attached to the eyebolt(s) or lug(s) of the motor and that the eyebolt(s)/lug(s) are fully screwed in before hoisting. Also note such parts as fan cover, ventilation box, bracket, slip-ring, etc. may have their own hoisting lugs which can only carry their own weight. Nothing extra should be attached while hoisting.Do not twist the steel wires and make sure the eyebolts have been firmly screwed and the sling angle is correct.

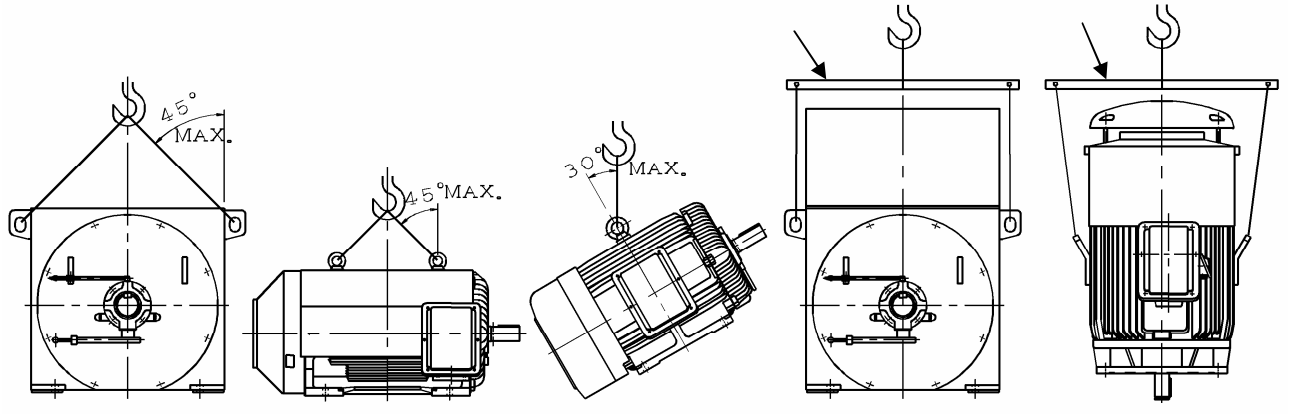


Fig. 1

3. INSTALLATION

3.1 Site and environment for motor installation

3.1.1 Standard environment and site conditions for the installation of motors are usually set as follows

(a) Ambient temperature：-20 ~ +50 ℃

(b) Humidity：Relative humidity below 95%RH .

(c) Elevation：below 1000 meters.

(d) Foundations should be strong and free of vibration.

If there are any special environmental conditions, please inform us upon ordering.

3.1.2 Ventilation and space

(a) Installation area should be well-ventilated.

(b) The installation space should be large enough to facilitate heat dissipation and maintenance.

3.2 STRUCTURAL CHARACTERISTICS

3.2.1 The motor terminal box is located in the top of the motor ,according to voltage, box is provided with 6 box terminals and a grounding terminal the horn outlet or thread outlet, such as the selection of thread outlet users specify when ordering.

3.2.2 The main inlet is provided with a sealing ring (for Figure 2)and a metal washer(for Figure 3) The outer diameter of the cable is limited by the diameter of the metal washer。The sealing ring provided with a plurality of concentric circles，Use the outer diameter of the cable to select the inner diameter of the sealing ring (for Table A),In order to ensure that the junction box bucket tightly ,so that the sealing ring and the cable ,as well as between the sealing ring and the junction box gap, otherwise it can not play the role of explosion—proof.

Fig2

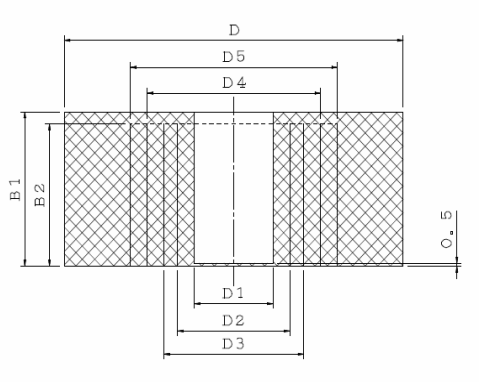


Fig 3

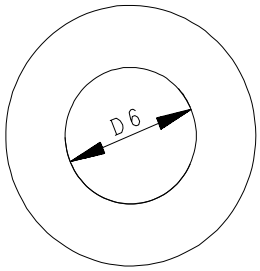


Table A UNIT：mm

Frame size	D1	D2	D3	D4	D5	D6
H80-132	Φ14	Φ20	Φ25			Φ22
H160-180	Φ14	Φ20	Φ26	Φ31	Φ35	Φ28
H200-225	Φ20	Φ26	Φ32	Φ38	Φ42	Φ37
H250-280	Φ25	Φ31	Φ36	Φ45	Φ50	Φ40
H315-355	Φ40	Φ46	Φ51	Φ57	Φ64	Φ58

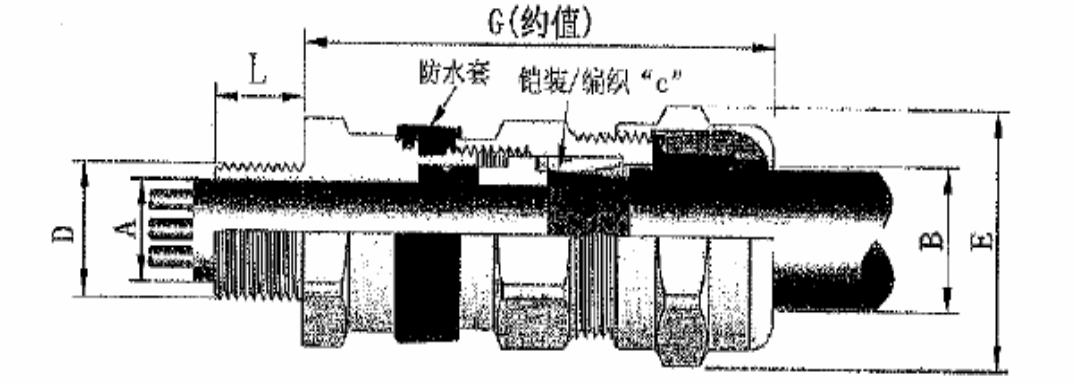
3.2.3 The auxiliary inlet port is provided with WX series flameproof cable joint（Stuffing box or introduction device,for Figure 4）,Cable must be used in customer incoming cable,The gap between the cable connector and the cable, and the connector and the junction box is free,otherwise can not

play the role of explosion—proof. Among,The outer diameter of the multi-core cable shall be within the range of A value of the inner cable of Table B.

Table B Unit：mm

Specificat--ion model	Inlet thread size	Thread length	Inner cable A	Outer cable B
WX-01S	M20x1.5	15	3.2-7.8	5.5-11.8
WX-01	M20x1.5	15	7.6-11.8	9.6-15.8
WX-02	M20x1.5	15	11.1-14.2	12.6-20.4
WX-03	M25x1.5	15	13.2-20.1	17.0-25.8
WX-04	M32x1.5	15	19.2-26.4	22.2-32.8
WX-05	M40x1.5	15	25.2-32.4	28.2-40.8
WX-06	M50x1.5	15	31.6-44.3	36.2-51.0
WX-07	M63x1.5	15	42.6-56.2	46.2-65.2
WX-08	M75x1.5	15	54.6-68.1	57.2-78.0

Fig4



3.2.4 Motor using F class insulation,motor stator winding temperature rise（Resistance method）according to 80K examination.When the altitude and ambient air temperature are not in accordance with the provisions of article fifth,motor temperature rise limit should be amended according to the provisions of GB755.

3.2.5 Each component of the flameproof enclosure is subjected to hydrostatic test.Frame、end cover、shaft、bearing cover、junction box、terminal、terminal bolts、the sealing ring is flameproof parts.The connecting bolt of the explosion proof part is provided with a spring washer to prevent self loosening.

3.2.6 The outer shell of the motor is provided with a grounding bolt and a grounding sign plate.

3.3 Electrical connections

All interconnecting wiring for controls and grounding should be in strict accordance with local requirements such as the USA National Electrical Code and UK IEE wiring regulations.

Wiring of motor and control, overload protection and grounding should follow the instructions of connection diagrams attached.

3.3.1 Power

The rated conditions of operation for the motor are as shown on the nameplate. Within the limits, given below, of voltage and frequency variation from the nameplate values, the motor will continue to operate but with performance characteristics that may differ from those at the rated conditions：

+/- 10% of rated voltage

+/- 5% of rated frequency

+/- 10% combined voltage and frequency variation so long as frequency variation is no more than +/- 5% of rated

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.

3.3.2 Main lead box

The main lead box furnished with the motor has been sized to provide adequate space for the make-up of the connections between the motor lead cables and the incoming power cables.

The bolted joints between the motor lead and the power cables must be made and insulated in a workman-like manner following the best trade practices.

3.3.3 Grounding

Either fabricated motors or fan cooled cast frame motors are all provided with grounding pads or bolts.

The motor must be grounded by a proper connection to the electrical system ground.

3.3.4 Rotation direction

The rotation direction of the motor will be as shown by either a nameplate on the motor or the outline drawing. The required phase rotation of the incoming power for this motor rotation may also be stated. If either is unknown, the correct sequence can be determined in the following manner：
While the motor is uncoupled from the load, start the motor and observe the direction of rotation. Allow the motor to achieve full speed before disconnecting it from the power source. Refer to the operation section of these instructions for information concerning initial start-up. If resulting rotation is incorrect, it can be reversed by interchanging any two (2) incoming cables.

3.3.5 Auxiliary devices

Auxiliary devices such as resistance temperature detectors, thermocouples, thermo guards, etc., will generally terminate on terminal blocks located in the auxiliary terminal box on the motor. Other devices may terminate in their own enclosures elsewhere on the motor. Such information can be obtained by referring to the outline drawing. Information regarding terminal designation and the connection of auxiliary devices can be obtained from auxiliary drawings or attached nameplates.

If the motor is provided with internal space heaters, the incoming voltage supplied to them must be exactly as shown by either a nameplate on the motor or the outline drawing for proper heater

operation.

Caution must be exercised anytime contact is made with the incoming space heater circuit as space heater voltage is often automatically applied when the motor is shutdown.

4. OPERATION

4.1 Examination before start

4.1.1 Wiring check

When motors are installed in good manner, ensure the wiring is according to the diagram. Also, the following points should be noted：

(a) Make sure all wiring is correct.

(b) Ensure the sizes of cable wires are appropriate and all connections are well made for the currents they will carry.

(c) Ensure all connections are properly insulated for the voltage and temperature they will experience.

(d) Ensure the capacity of fuse, switches, magnetic switches and thermo relays etc. are appropriate and the contactors are in good condition.

(e) Make sure that frame and terminal box are grounded.

(f) Make sure that the starting method is correct.

(g) Make sure switches and starters are set at their right positions.

(h) Motor heaters must be switched off when the motor is running.**4.1.2 Measurement of insulation resistance**

During and immediately after measuring, the terminals must not be touched as they may carry residual dangerous voltages. Furthermore, if power cables are connected, make sure that the power supplies are clearly disconnected and there are no moving parts.

(a) For rated voltage below 1000V, measured with a 500VDC megger.
For rated voltage above 1000V, measured with a 1000VDC megger.

(b) In accordance with IEEE 43, clause 9.3, the following formula should be applied：

$$R \geq \frac{\text{Rated voltage (v)}}{1000} + 1 \quad (M\Omega)$$

(c) On a new winding, where the contaminant causing low insulation resistance is generally moisture, drying the winding through the proper application of heat will normally increase the insulation resistance to an acceptable level. The following are several accepted methods for applying heat to a winding：

(1) If the motor is equipped with space heaters, they can be energized to heat the winding.

(2) Direct current (as from a welder) can be passed through the winding. The total current should not exceed approximately 20% of rated full load current. If the motor has only three leads, two must be connected together to form one circuit through the winding. In this case, one phase will carry the full applied current and each of the others, one-half each. If the motor has six leads (3 mains and 3 neutrals), the three phased should be connected into one

series circuit.

Ensure there is adequate guarding so live parts cannot be touched.

(3) Heated air can be either blown directly into the motor or into a temporary enclosure surrounding the motor. The source of heated air should preferably be electrical as opposed to fueled (such as kerosene) where a malfunction of the fuel burner could result in carbon entering the motor.

ATTENTION！

Caution must be exercised, when heating the motor with any source of heat other than self contained space heaters, to raise the winding temperature at a gradual rate to allow any entrapped moisture to vaporize and escape without rupturing the insulation. The entire heating cycle should extend over 15-20 hours.

Insulation resistance measurements can be made while the winding is being heated. However, they must be corrected to 40℃ for evaluation since the actual insulation resistance will decrease with increasing temperature. As an approximation for a new winding, the insulation resistance will approximately halve for each 10℃ increase in insulation temperature above the dew point temperature.

(d) Should the resistance fail to attain the specified value even after drying, careful examination should be undertaken to eliminate all other possible causes, if any.

4.1.3 Power source

(a) Ensure the capacity of the power source is sufficient.

(b) Ensure the supply voltage and frequency ratings are identical to those on the nameplate.

(c) Voltage variation should be confined to within ±10% of the rated value and the phase to phase voltages should be balanced.

4.1.4 Remove all locks

ATTENTION！

Make sure all locks which fasten the movable parts of the motors during transportation are dismantled and the shaft can rotate freely.

4.1.5 Clean before starting

ATTENTION！

Ensure there are no foreign matters or tools inside the motors before starting motors.

4.1.6 Transmission system check

Make sure the transmission system, including belts, screws, bolts, nuts and set pins are in good condition.

The keys fitted to the shaft extensions are held by plastic tape only to prevent them falling out during transportation or handling. The shaft key shall be removed to avoid flying out, when the motor is operated prior to the couplings etc. being fitted to the shaft extension.

4.1.7 Test run

Make sure the items above are examined. Test the motor running with or without load. Record and check according to "Maintenance" at 15 minutes intervals during the first three hours of operation. Then regular examinations should take place at longer intervals. If all goes well the motor can be classified as "in good order".

4.2 Staring operation

4.2.1 Starting load

Initially run the motor unloaded prior to coupling to other machines. Unless otherwise specified, a motor usually starts with light load which is then gradually increased proportional to the square of speed and at last reach 100% load at full load speed.

4.2.2 Starting

Too frequent starts can harm the motors. The following restrictions should be observed：

(a) Motor can be restarted should the initial start fail. Two starts are generally permissible when the motor is cold.

(b) Motor can be started only once when it is at normal running temperature.

(c) Should additional starts be necessary beyond the conditions stated above, the following restrictions should be noted：

(1) Let the motor cool down for 60 minutes before restarting, fully loaded.
(2) Let the motor cool down for 30 minutes before restarting, unloaded.
(3) Two inching starts can be regarded as one normal start.

(d)

ATTENTION！
If the motor rotor fails to start turning within one or two seconds, shut off the power supply immediately.
Investigate thoroughly and take corrective action before attempting a restart.

Possible reasons for not starting are：

(1) Too low a voltage at the motor terminals.

(2) The load is too much for the rotor to accelerate.

(3) The load is frozen up mechanically.

(4) All electrical connections have not been made.

(5) Single phase power has been applied.

(6) Any combination of the above.

4.2.3 Rotating direction

(a) Most TECO motors are bi-directional. However, when some special types, such as high speed 2P, certain large capacity motors, those with a non-reverse ratchet etc. should rotate in one direction, please ensure the rotation is in conformity with the directional arrow-mark shown on the attached nameplate.

(b) To reverse a bi-directional motor, cut the power and wait until the motor stops. Then interchange any two of the three phases.

4.2.4 Power source, Voltage, Current

(a) Ensure the voltage and frequency of the power source are identical to the ratings shown on the nameplate.

(b) Voltage variation should be confined to within ±10% of the rating and the three phase voltages should be in full balanced.

(c) Ensure the motor phase currents, when without load, are within ±5% of the average values.

4.2.5 Frequency

Frequency variation should be confined to within ±5% of the rating. The aggregate variation of voltage and frequency should be confined to within ±10% of the absolute value of the ratings.

4.2.6 Starting time and unusual noises

ATTENTION！

Starting time is longer for the motors with large inertia. However, if starting time is longer than usual or if there is difficulty in starting, or there is abnormal noise, do not run the motor and refer to TECO.

4.2.7 Bearing temperature rise

Following the initial start-up, the bearing temperatures should be closely monitored. The rate of rise in bearing temperature is more indicative of impending trouble than is the actual temperature.

ATTENTION！

If the rate of rise in temperature is excessive or if the motor exhibits excessive vibration or noise, it should be shut down immediately and a thorough investigation made as to the cause before it is operated again.

If the bearing temperature rise and motor operation appear to be normal, operation should continue until the bearing temperatures stabilize.
Recommended limits on bearing temperature are as follows：
Anti-Friction Bearings. • By permanently installed detector 95℃ 100℃

4.2.8 Noise and Vibration

ATTENTION！

Any abnormal noise or vibration should be immediately investigated and corrected. Increased vibration can be indicative of a change in balance due to mechanical failure of a rotor part, a stator winding problem or a change in motor alignment.

5. MAINTENANCE

5.1 Major points in regular inspection and maintenance

For safety, maintenance and repairs must only be carried out by properly trained personnel.

Some testing, such as insulation resistance, usually requires the motor to be stopped and isolated from power supplie(s).

Routine inspection and maintenance are usually performed by looking, listening, smelling and simple meters.

High temperature may arise under operating conditions on the motor surfaces, so that touching should be prevented or avoided.
Keep away from moving and live parts.
Unless deemed necessary, do not remove guards whilst assessing the motor.

Timely replacement of worn parts can assure longevity and prevent breakdown.
Routine inspection and regular inspection and maintenance are important in preventing breakdown and lengthening service life.
Owing to the varied time and circumstances, motors are used, it is difficult to set the items and periods for regular inspection and maintenance. However, as a guide it is recommended to be performed periodically according to factory maintenance program. Generally, the inspection scope determined by the following factors
(a) Ambient temperature.
(b) Starting and stopping frequency.
(c) Troublesome parts usually affecting motor functions.
(d) Easily abraded parts.
(e) The important position of motor in the operational system of a factory should be duly recognized. Therefore, its health and wellbeing should be fully protected, especially when it is operating is sever Conditions.

5.2 Motor winding

(a) Measurement of insulation resistance and standards to determine quality of insulation resistance, please refer to measures stated in 4.1.2 "Measurement of insulation resistance".

(b) Inspection of coil-ends：

(1) Grease and dust accumulated on coils may cause insulation deterioration and poor cooling effect.

(2) Moisture must not accumulate. Keep coils warm when motor is not in use if moisture can be seen.

(3) Discoloring. This is mainly caused by overheat.

(c) Ensure no untoward change of wedges from original position.

5.3 Clean the interior of the motor

(a) After a motor is in operation for some time, accumulation of dust, carbon powder and grease etc., on the inside is unavoidable, and may cause damage. Regular cleaning and examination is necessary to assure top performance.

(b) Points to note during cleaning：

(1) If using compressed air or a blower：

a) Compressed air should be free of moisture.

b) Maintain air pressure at 4 kg/cm^2, since high pressure can cause damage to coils.

(2) Vacuum

Vacuum cleaning can be used, both before and after other methods of cleaning, to remove loose dirt and debris. It is a very effective way to remove loose surface contamination from the winding without scattering. Vacuum cleaning tools should be non-metallic to avoid any damage to the winding insulation.

(3) Wiping

Surface contamination on the winding can be removed by wiping using a soft, lint-free wiping material. If the contamination is oily, the wiping material can be moistened (not dripping wet)

with a safety type petroleum solvent.

In hazardous locations, a solvent such as inhibited methyl chloroform may be used, but must be used sparingly and immediately removed. While this solvent is non-flammable under ordinary conditions, it is toxic and proper health and safety precautions should be followed while using it.

ATTENTION！

Solvents of any type should never be used on windings provided with abrasion protection. Abrasion protection is a gray, rubber-like coating applied to the winding end-turns.

Adequate ventilation must always be provided in any area where solvents are being used to avoid the danger of fire, explosion or health hazards. In confined areas (such as pits) each operator should be provided with an air line respirator, a hose mask or a self-contained breathing apparatus. Operators should wear goggles, aprons and suitable gloves. Solvents and their vapors should never be exposed to open flames or sparks and should always be stored in approved safety containers.

(4) Keep core ducts completely clean. The difference in temperature rise could be around 10℃ before and after cleaning.

5.4 Clean the exterior of the motor

(a) On open ventilated motors, screens and louvers over the inlet air openings should not be allowed to accumulate any build-up of dirt, lint, etc. that could restrict free air movement.

ATTENTION！

Screens and louvers should never be cleaned or disturbed while the motor is in operation because any dislodged dirt or debris can be drawn directly into the motor.

(b) If the motor is equipped with air filters, they should be replaced (disposable type) or cleaned and reconditioned (permanent type) at a frequency that is dictated by conditions. It is better to replace or recondition filters too often than not often enough.

(c) Totally enclosed air-to-air cooled and totally enclosed fan cooled motors require special cleaning considerations. The external fan must be cleaned thoroughly since any dirt build-up not removed can lead to unbalance and vibration. All of the tubes of the air-to-air heat exchanger should be cleaned using a suitable tube brush having synthetic fiber bristles (not wire of any type).

5.5 Maintenance of anti-friction bearing

5.5.1 Frequency of relubrication

The life of grease varies greatly as a result of types of model, revolution speed, temperature, operational conditions etc. It is, therefore, impossible to be precise about replenishment intervals. However, for normal direct coupling transmission, the periods shown as Table 1 may be used as a guide.

Remarks：

(a) The periods shown in Table 1 should be halved where bearings are used for belt drive and/or in dirty, or high ambient temperature or high humidity environments.

(b) Please refer to the lubrication nameplate, if attached to the motor.

(c) For bearing numbers outside the range of Table 1, please contact TECO.

(d) If the periods referred to Table 1 for drive-end bearing and opposite drive-end bearing are different, for the convenience of maintenance operation, please take the shorter one the required grease replenishment period of these bearings.

Remarks：

(a) The periods shown in Table 1 should be halved where bearings are used for belt drive and/or in dirty, or high ambient temperature or high humidity environments.

(b) Please refer to the lubrication nameplate, if attached to the motor.

(c) For bearing numbers outside the range of Table 1, please contact TECO.

(d) If the periods referred to Table 1 for drive-end bearing and opposite drive-end bearing are different, for the convenience of maintenance operation, please take the shorter one the required grease replenishment period of these bearings.

TABLE 1

Bearing number		600 RPM	720 RPM	750 RPM	900 RPM	1000 RPM	1200 RPM	1500 RPM	1800 RPM	3000 RPM	3600 RPM
62XX 63XX 72XX 73XX	6210										
	12									2000Hrs	
	13										
	14									1000Hrs	
	15										
	16	3000Hrs								720 Hrs	
	17							2000Hrs			
	18										
	20										
	22							1500Hrs			

Bearing number		600 RPM	720 RPM	750 RPM	900 RPM	1000 RPM	1200 RPM	1500 RPM	1800 RPM
NU2XX NU3XX	NU214								
	15							2000Hrs	
	16								
	17	3000Hrs							
	18							1500Hrs	
	20								
	22							1000Hrs	

TABLE 1

Bearing number		600 RPM	720 RPM	750 RPM	900 RPM	1000 RPM	1200 RPM	1500 RPM	1800 RPM	3000 RPM	3600 RPM
62XX 63XX 72XX 73XX	6210										
	12									2000Hrs	
	13										
	14									1000Hrs	
	15										
	16	3000Hrs								720 Hrs	
	17							2000Hrs			
	18										
	20										
	22							1500Hrs			

TABLE 1

Bearing number		600 RPM	720 RPM	750 RPM	900 RPM	1000 RPM	1200 RPM	1500 RPM	1800 RPM	3000 RPM	3600 RPM
62XX	6210										

63XX 72XX 73XX	12			2000Hrs
	13			
	14			1000Hrs
	15			
	16	3000Hrs		720 Hrs
	17		2000Hrs	
	18			
	20			
	22		1500Hrs	

Bearing number		600 RPM	720 RPM	750 RPM	900 RPM	1000 RPM	1200 RPM	1500 RPM	1800 RPM
NU2XX NU3XX	NU214								
	15							2000Hrs	
	16								
	17	3000Hrs							
	18							1500Hrs	
	20								
	22							1000Hrs	

5.5.2 Kinds of grease

Generally, ESSO BEACON 325(or ESSO POLYREX EM to substitute) grease is standard for TECO 2 pole motors except some special models for which special grease will be shown on the lubrication nameplate. Please use identical grease or its equivalents when maintaining.

ATTENTION !

Do not mix different kinds of grease.
Mixing grease with different type of thickeners may destroy its composition and physical properties. Even if the thickeners are of the same type, possible differences in the additive may cause detrimental effects.

5.5.3 Grease quantity

The amount of grease per replenishment depends on the type, size and construction of the bearings. The maximum amount of one replenishment for each bearing is shown in Table 2.

TABLE 2

Bearing No.		Amount of replenishment
62XX	6210	30g
	6212	40
NU2XX	6213	50
	6214	50
	6215	60
	6216	60
	6217	80
	6218	80
	6220	100
	6222	120

Bearing No.		Amount of replenishment
63XX	6310	40g
	6312	60
NU3XX	6313	80
	6314	80
	6315	100
	6316	100
	6317	120
	6318	120
	6320	160
	6322	220

* Fill new grease until it overflows and the old grease is entirely replaced.**5.5.4 Re-greasing**

If relubrication is to be performed when the motor is running, stay clear of rotating parts.

It is advisable to re-grease when the motor is running to allow the new grease to be evenly distributed inside the bearing.

Before re-greasing, the inlet fitting should be thoroughly cleaned to prevent any accumulated dirt from being carried into the bearing with the new grease. The outlet of grease drainage should be opened to allow the proper venting of old grease.

Use a grease gun to pump grease through grease nipple into bearings. After re-greasing, operate the motor for 10-30 minutes to allow any excess grease to vent out.

5.5.5 Cleaning and installation of bearings

(a) Apply the proper amount of grease to disassembled parts of the bearing after they have been thoroughly cleaned with high quality cleaning oil. Then protect them from contamination before and during assembly.

(b) Bearing installation

ATTENTION！

Before installing the bearings, make sure that the shaft mounted parts inside the bearings are in place before installation.

Since the bearing is a high precision component, it is important to avoid ingression of dust and foreign matter, and hammering during cleaning and installation. Use extreme care and ensure clean conditions during installation and assembly.

ATTENTION！

The best way for bearing installation is heat shrinking. Knocking and hammering during installation should be avoided absolutely.

The bearing should be heated in a bath of clean oil at temperature of approx. 80℃. After warming, slide the bearings in place quickly and nimbly so that it has not shrunk before being fully in position. Grease the bearing after the temperature returns to normal, and then reassemble the motor.

6.FAULT FINDING AND RECOGNITION

Kinds of Breakdown	Symptoms	Possible causes	Remedies
Fail to start without load	Motionless and soundless	Power-off	Consult power company
		Switch-off	Switch-on
		No fuse	Install fuse
		Broken wiring	Check wiring and repair
		Broken lead	Check wiring and repair
		Broken windings	Check windings and repair
	Fuse blowing. (Automatic switch trips off, slow start with electromagnetic noise)	Short circuit of circuit switches	Check circuit switches and replace
		Incorrect wiring	Check wiring according to nameplate
		Poor contact at terminals	Lock tightly
		Windings grounded	Factory repair
		Broken windings	Factory repair
		Poor contact of circuit switches	Check and repair
		Broken wiring	Check and repair
		Poor contact of starting switches	Check and repair
		Short circuit of starting switches	Check and repair
		Incorrect connections of starting switches	Connect according to nameplate

Loading after start	Fuse blowing. Fail to restart due to trip-off of automatic switch	Insufficient capacity of fuse	Replace fuse if wiring permits
		Overload	Lighten load
		High load at low voltage	Check circuit capacity and reduce load
	Overheating motor	Overload or intermittent overload	Lighten load
		Under-voltage	Check circuit capacity and power source
		Over-voltage	Check power source
		Ventilation duct clogged	Remove the foreign matter in the duct
		Ambient temperature exceeds 40°C	Correct insulation class to B or F, or lower ambient temperature.
		Friction between rotor and stator	Factory repair
		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 circuit or consult power company

Kinds of Breakdown	Symptoms	Possible causes	Remedies
Loading after start	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	Misalignment between motor and machine shafts	Re-align
		Over speed of bearing outer-ring	Adjust bracket
		High bearing noise	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 factory
	Bearing noise	Noise of low shishi or Thru-Thru	May be normal
		Kala-Kala as result of poor lubrication	Grease
		Kulo-Kulo as a result of deteriorated grease	Clean bearing and grease
		Sa-Sa or larger noise	Replace the damaged bearing
	Mechanical noise caused by machinery	*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 ingression of foreign matters	Clean motor interior and ventilation ducts
		Wind noise	Noise induced by air flowing through ventilation ducts
		Induced by conveyance machine	Repair machine
Vibration	Electromagnetic vibration	Short circuit of windings	Factory repair
		Open circuit of rotor	Factory repair
	Mechanical vibration	Unbalanced rotor	Factory repair
		Unbalanced fan	Factory repair
		Broken fan blade	Replace fan

		Central points of couplings do not lie on the same level	Adjust the central points of couplings to the same level
		Improper mounting installation	Lock the mounting screws
		Motor mounting bed is not strong enough	Reinforce mounting bed
		Mounting bed vibration caused by near machines	Eliminate the vibration source near motor
Remarks: (1) Circuit switches: These include knife switches, electromagnetic switches, fuse and other connection switch etc. (2) Starting switches: These include Delta-Star starters, compensate starters, reactance starters, resistor starters, starting controllers etc.			

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