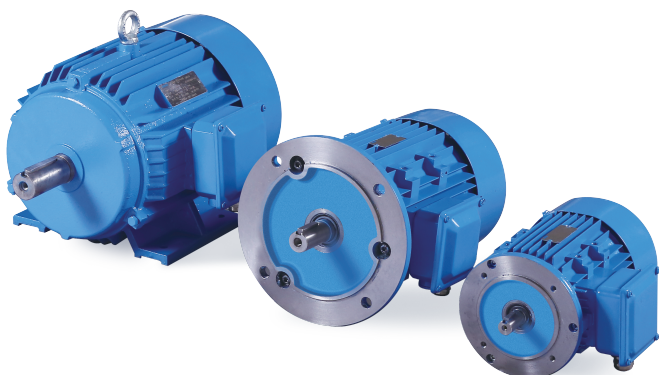


# ***BONENG***



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## **Three-phase Asynchronous Motor Instruction**

09/2021



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## Overview

### 1. Instruction

This instruction book is a document provided with motor. It introduces starting, storage and installation requirements of motor and the notes, requirements, methods and notes for application and maintenance of motor. Maintainers should carefully read this instruction manual. Read nameplate, label, alarm signs on motor. Operators should pass relevant trainings before going to work.



Note:

To ensure safe and correct installation, operation and maintenance of device, please conform to relevant clauses in this instruction manual. Staffs responsible for installation or maintenance should pay attention to relevant instructions, the neglect of instruction will make quality assurance lose effect.

### 2. Applicable scope of products

This instruction book is appropriate for standard series and the derived series motors of Boneng (except anti-explosion motors).

Frame size central height: 56-280. (For the motors of special application sites or with special design, refer to other special instructions).

## Common requirements

### 1. Starting

#### 1.1 Reception inspection

After reception, check whether the motor has external damage, inspect all the nameplate data, especially the connection method of voltage and windings(Y or ).

Spin running shaft with hand, check empty running situation of motor. If the motor is installed with locking device, open it.

For brake motor, connect power source, check whether the brake can be released, for brake with handle, pull the handle, check manual release performance.

#### 1.2 Insulation performance inspection

Before first use of motor, windings may be affected with damp, measure the insulation resistance; for double winding various speed motor, measure insulation resistance of the two groups of windings.



Note: After measurements, winding should discharge electricity immediately, avoiding electric shock.

Winding should be remade when immersed in seawater.



### 1.3 Direct start, Y/ $\Delta$ start and various frequency start

Wiring box of standard single speed motor usually has 6 wiring bolts and at least 1 grounding bolt.

Before the motor is connected with power, it should be reliably grounded according to regulations, zero connecting can't replace grounding.

Connection method of voltage and winding are marked on nameplate.

Direct start

Winding can apply Y or  $\Delta$  connection method, for example, 660VY, 380V  $\Delta$  express 660V, Y connection method and 380V,  $\Delta$  connection method.

Y/ $\Delta$  start

- Power source voltage should be equal to rated voltage of wiring motor.
- Tear down all the wiring pieces on wiring plate, install wiring according to Y/ $\Delta$  starting, connect it to six wiring columns of motor, it can trip from Y connection of initial period of starting to connection with completed starting.
- The power source connection of double speed motor and other special motors should be done according to the wiring diagram in wiring box.

Various frequency start

- Make correct wiring to frequency changer according to instruction manual of frequency changer, make inspection before charging. After inspection, first not connect motor, set and adjust parameters of frequency changer. After confirming that there is no problem for frequency changer running, connect motor.
- After giving out "connection" order, if the motor doesn't rotate, please first check the frequency changer, whether output frequency has been set; If the motor doesn't run, please check wiring and loading situation of motor.
- Before the motor (cooling method to IC416) starts, start fan and ensure it runs well, pay attention to motor, transmission device, production machinery and displayed data of frequency changer panel. If there is any abnormal situation, stop the machine immediately, check out the fault and remove the fault, then restart.

### 1.4 Wiring column and rotation direction

Observing rotation shaft from motor driving terminals, the rotation is in clockwise direction.

Switching any two phases of power cable can change running direction of motors.

## 2. Instructions

### 2.1 Running environment

Motor is used for industrial production.

Normal ambient temperature is between  $-15^{\circ}\text{C}$  and  $40^{\circ}\text{C}$ , the altitude is not higher than 1000m.

### 2.2 Safety factors

The motor should be installed and wired by specialists who are familiar with relevant safety requirements.

During installation, there should be safety device to prevent accidents, the position should conform to regulations.

## 2.3 Conform to rules

The motor can't be used for acceleration and overloading running. Motors with special design considerations should be indicated.

# 3. Management

## 3.1 Storage

All the motors should be stored indoor, the environment should be dry, with no vibration and dust.

Motor surface (shaft extension end and flange) with no protective layer should take anti-rust measures.

It is suggested to check motor regularly, turn running shaft with hand, prevent lubrication grease loss or other problems.

If it is installed with anti-condensation heater, better apply.

## 3.2 Transportation

The motor needs to install the lock device in transportation.

# 4. Electrical connection

## 4.1 Overview:

The wiring box at the top of motor can be rotated, select outlet direction according to requirements. You can also select wiring box installation method of side outlet wire.

The inlet port with no cable should be sealed.

Except the wiring of main winding and grounding end, the wiring box has thermistor, heating zone, thermoswitch or PT100 resistive element and wiring parts of brake in wiring box.

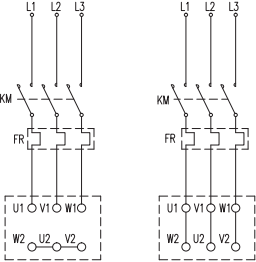
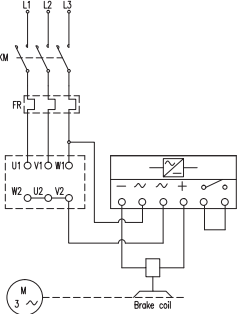
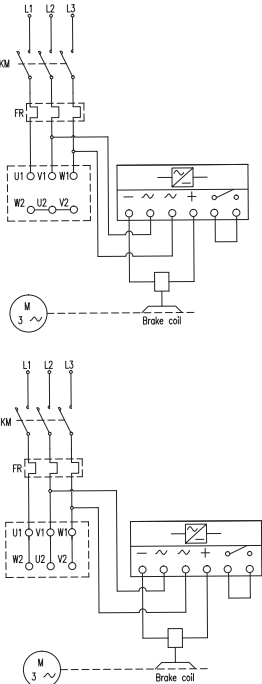
For motors with magnetic brake, when customers provide power source by themselves, ensure motor power by switched together with brake power source.

Frequency-changing motor with cooling method IC416 should be installed with axial flow fan. Axial flow fan is equipped with special wiring box. Fan motor should be connected with relevant power source voltage. Fan motor should apply non-reversible frequency power source, the wiring should be on input end of frequency changer. The correct running direction of fan blade should be the same with the running direction arrow on fan cover.

### △ Note:

1. For motors (if used outdoor) with high protection level, wiring box cable and joint should make protections. If motor wiring box has water inside, the responsibility will be borne by customers.
2. When motor stops running, the wiring box may be with electricity, don't touch wiring column.

## 4.2 Wiring diagram (standard configuration)

Type	Wiring diagram	Applicable scope
MH MP YZ		Applicable to all voltage range.
		Brake with external AC voltage 220~240V.
MH+Brake MP+Brake YZ+Brake		Brake with external AC voltage 380~420V.

Type	Wiring diagram	Applicable scope
		<p>Brake with external AC voltage 220~240V.</p>
<p>MH+Brake MP+Brake YZ+Brake</p>		<p>Brake with external AC voltage 380~420V.</p>



Note:

- The above listed fans are three-phase fan, fan voltage frequency is the same with motor.
- The brake wiring applies slow speed wiring control method. More rapid braking, see illustration below.
- The wiring diagram above is standard configuration, any other special requirement should be referred to us.
- The brake frequency should not exceed the corresponding operation system of electric motor and the on and off frequency allowed by the load rate

Type	Wiring diagram	Applicable scope
MH+Brake MP+Brake YZ+Brake		Brake with external AC voltage 220~240V.

## 5. Maintenance

### 5.1 Overview

Check motor regularly.

Keep motor clean, air flow.

Check sealing ring of shaft extension, change in time when necessary.

Check installation and connection situation, mounting bolts.

Check bearing running situation by listening to abnormal noise, temperature detection, etc.

If there is abnormal situations, stop the machine immediately, check out the reason, remove the problem in time.

### 5.2 Bearing lubrication

Standard motor is fitted with seal type bearing and free maintenance.

### 5.3 Maintenance of brake

Adjustment of brake air gap

After long-term application of abrasion face of brake, it will be damaged, increasing air gap between electromagnetic iron and armature and the spring working length, thus reducing spring pressure and brake torque, at the same time, as the increasing of air gap, current rises when armature pulls in, when the situation is serious, armature will not be pulled in. So you should often check air gap, adjust it or change abrasion piece.

Air gap adjustment procedure is as follows: (reference Fig. 1)

Take wind cover down(7).

Remove the dust cover(5).

Adjust the air gap.

Adjust the range listed in table below.

Central height of frame size	71	80	90	100	112	132	160	180	200	225	250	280
Normal working air gap (mm)	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.6	0.6
Maximum working air gap (mm)	0.5	0.5	0.5	0.75	0.75	0.75	1	1	1	1.2	1.2	1.2

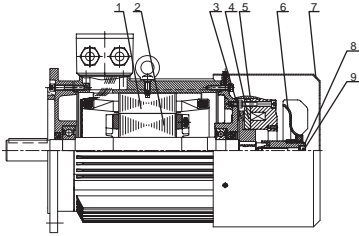
Change friction disc

Friction disc is easy to be damaged, when friction of the disc exceeds the following value, change a new one

Central height of frame size	71	80	90	100	112	132	160	180	200	225	250	280
Maximum friction quantity (mm)	1.5	1.5	1.5	2.5	2.5	3.5	3.0	4.0	4.5	4.5	5.0	5.0

The procedure of changing friction disc:

- Take down wind cover(7).
- Take down fan(6).
- Screw down bolt(9).
- Remove the connecting shaft(8).
- Remove the dust cover(5).
- Tear down lead wire of brake coil.
- Tear down brake disc, change friction disc.



- 1-Stator
- 2-Rotor
- 3-Brake
- 4-Armature
- 5-Dust cover
- 6-Fan
- 7-Wind cover
- 8-The connecting shaft
- 9-Socket head bolts

Fig. 1 Electromagnetic brake motor

## 5.4 Maintenance characteristics of various frequency motor

### Maintenance during normal running

Adjust the speed of motor with frequency changer. As there is higher harmonic influence in frequency - changer output wave, motor noise and vibration are larger than the situation during mains supply, there is normal. When the change of running frequency, fundamental component, higher harmonic component change in a large scope, the resonance with each part of motor and mechanical loading are increasing, when adjusting to the point the same with system resonance frequency, mechanical system will has large vibration and noise. When there is such kind of phenomenon, you can apply the method of increasing system rigidity to avoid resonance, or you can make the output frequency equal to resonance point jump upward or downward by frequency jumping function of frequency changer, avoid resonance frequency, realize smooth running.

### Application and maintenance of accessories

- ◎ Photoelectric encoder or speed - measuring machine brought with motor should not be torn down, avoid collision. When the motor is moved, this part should not be used as stressed part. Installation and application should strictly conform to regulations of encoder or speed - measurement machine.
- ◎ When motor with brake applies frequency - changer driving, pay attention to the following points:

Electro magnetic brake of motor is power - off type brake and released after power - on. the clearance of brake pads has been well adjusted before delivery and no changes should be made arbitrarily. Oil grease substance and other impurities should be prevented from entering into brake pads to ensure the reliability of brake in case of power - off.

Brake power source should not be connected on output side of frequency changer, it should be connected in input side of frequency changer.

As brake work is proportional to quadratic running speed, so high speed brake should not apply electromagnetic brake directly. Reduce motor speed under frequency speed with the regeneration brake function of frequency changer, then make electromagnetic brake.

If brake moves when frequency changer is outputting power, the current will be cut off. Brake should be done after main return circuit of frequency changer is cut off.



## 6.Common fault and maintenance method of motor

Fault	Possible reasons of fault	Treatment
(1)Can't start	One phase of stator windings is open -circuited	Check stator winding, check the shortcut part, repair
	Phase or interturn of stator windings is short - circuited	Measure whether stator winding resistance and no -load current of each phase are balanced, checkout the position, with insulation
	Stator wiring error	Check out stator winding wire according to the regulated connection method on nameplate and the wiring diagram, correct wrong connection
	Loading or transmission machinery have faults	Separate motor from loading, if the motor can start normally, check the machinery being pulled, remove faults.
	Frequency - changer parameter setting is not appropriate	Check frequency changer parameters, adjust (frequency changer motor)
	Brake doesn ' t work	Check brake and the machine (brake motor)
(2)After frequency changer motor starts, speed is lower than rated speed	Output frequency and output voltage setting of frequency changer are not appropriate	Reset according to application requirements
	Loading is too heavy	Check whether loading transmission device is normal
( 3 ) Motor has abnormal noise or the vibration is too large	Mechanical friction (including stator and rotor phase friction)	Check the distance between transmission part and the static part, check out phase friction reason, correct
	Phase - lack running	Cut off electricity, switch on, if it can ' t start, maybe one phase cuts electricity, check the power source or motor to repair
	Bearing lacks oil or is damaged	Clean bearing, add new oil, or change new bearing
	Motor wiring is wrong	Check out the reason, correct
	Balancing of rotor after repair is damaged	Re - correct balancing
	Shaft extension bends,transforms	Correct, change running shaft when necessary
	Coupling connections loose	Check out the loosing part, screw down bolts
	Installation foundation is not balanced or has defects	Check foundation fixing situation, correct defects
( 4 ) Motor temperature rise is too high	Overload	Measure stator current of electromagnetic current table or check the current display value on frequency changer panel (frequency - changer motor), if it is overloaded, reduce loading.
	Phase - lacking running	Check motor stator wiring or frequency changer wiring (frequency changer motor), and repair
	Motor wiring is wrong	- connection wiring of motor is connected incorrectly in Y or vice versa, cut off power source to change connection
	Stator winding grounding or interturn or phase - to - phase short circuit	Check out short circuit and grounding part, repair

Fault	Possible reasons of fault	Treatment
( 4 ) Motor temperature rise is too high	Stator, rotor frictions	Check whether bearing assembly loose, whether stator and rotor assembly are bad, repair
	Ventilation is not good	Check whether fan and blade are damaged, whether wind path is blocked. If fan or blade is damaged, repair or change. If the wind path blocks, remove the articles that obstructs ventilation, clean wind path dirt, dust and impurities, make air flow smoothly
	V,F parameter settings of frequency changer are not appropriate, there will be over excitation when motor is under low speed and light loading running, the current is larger than rated value	Adjust parameter setting of V/f (frequency changer motor)
	When braking the motor with DC brake function of frequency changer, brake current is too large	Adjust DC brake current setting, according to brake frequency, set it to be 100% - 150% of rated current.
	Brake action is slow	Check brake air gap and DC excitation voltage (brake motor)
( 5 ) Bearing is overheat	The bearing is damaged	Change bearing
	Bearing has too much or too less lubrication grease, or with impurities	Adjust or change lubrication grease
	The mating of bearing with shaft, bearing or end cover is too loose or too tight	Repair to appropriate allocation
	Side end cover or bearing cover of motor are not assembled well (not paralleled)	Make side end cover or bearing cover seam horizontal, rotate bolts
	Shaft extension oil sealing is not installed well	Adjust to appropriate installation status
( 6 ) Motor cover has electricity	Grounding is not good	Check grounding bolt, whether grounding wire has tight connection with machine cover
	Winding damps, insulation resistance is too low	Winding drying treatment
	Insulation is damaged, stator coil collides with iron core	Repair
	Wiring plate has dirt	Clean wiring plate
	Outlet insulation is damaged	Pack the damaged parts with insulation materials

Fault	Possible reasons of fault	Treatment
(7) Motor can't start with loading	Rotor winding has interturn shortcircuit	Check resistance and current of each phase
	Overload	Check motor loading current
(8) Three-phase current is not balanced	Interturn shortcircuit	Repair winding
	Wiring is wrong	Correct wiring
	Three-phase power source and voltage are not balanced	Improve electricity supply quality
(9) Fuse cuts	The two phase has shortcircuit	Repair winding
	Loading is too large	Reduce loading
	Voltage is too low	Rise voltage
(10) Insulation resistance is too low or be broken down	Insulation aging or damaged	Repair insulation
	Not clean	Blow the inner part with dry compressed air
	Winding or wiring plate damps	Tear down to dry or reuse after treatment
	Motor is overheat	Tear down inspection, prevent continuous heating
(11) Brake motor brake loses effect	Friction disc is seriously abraded	Adjust air gap
	Spring loses effect	Change spring
	Action is slow	Adjust air gap, check excitation voltage
	Rectifier is damaged	Adjust rectifier
	Brake wire path has fault	Remove brake wire fault correctly



Note:

1. Customers want to obtain detailed data, please contact with us.
2. We have the right to modify the maintenance manual without notice.

## 7.After-sale service

For the various kinds of transmission devices, if there is any quality problem, don't tear down components, you should illustrate the situation, then contact with after-sales department of the company, confirm about the problems, then apply ideal method to deal with them.

Type: \_\_\_\_\_

Production date: \_\_\_\_\_

Number: \_\_\_\_\_

Time being used: \_\_\_\_\_

Site or main machine name: \_\_\_\_\_

Manufacturer of main machine: \_\_\_\_\_

Quality problem description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

User company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Postcode: \_\_\_\_\_ Contact: \_\_\_\_\_

After-sales service telephone of Boneng: \_\_\_\_\_

Fax: \_\_\_\_\_

NOTE: \_\_\_\_\_

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# Three-phase Asynchronous Motor Instruction

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