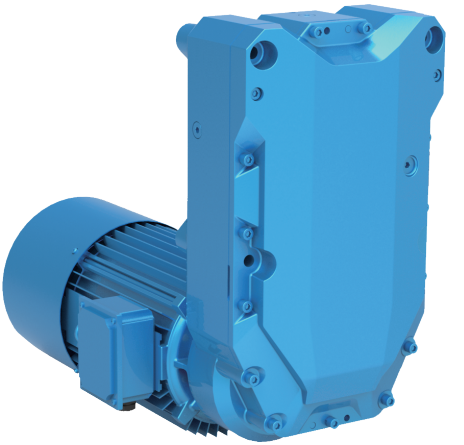
BONENG



# FC Hoisting and Lifting Gearmotor Instruction

07/2021

# Contents

## Important notes

During installation, please pay attention to the safety notes and warning in this book!

Suggestions and useful information


Harmful situations:

Possible result: damage transmission device and the environment

- If you conform to the regulations in this manual, there won't be any fault, at the same time, it can satisfy the requirements of quality defect claim. So before the transmission device starts working, please read this instruction.
- This instruction book contains important installation and maintenance notes, please keep this instruction book in a place near the device for reference;

# 1 Safety information

Safety information mainly involve the applications of gearmotor.When running gearmotor,please note the relevant notes.

- This instruction is an integral part of the gearmotor supplied.
- All persons involved in the installation, operation,maintance and repair of the gearmotor must have read the instructions and comply with them.
- This series gearmotor designed according to FEM standard, safe to use after delivery. It’s forbidden to change the gear units and protective piece.
- No overload running, Reduce the using time in special environment(high temperature ,high elevation).Strongly advice quip the overload limited which will guarantee the safe running.
- Conforming to the instruction strictly is a necessity for realizing non–fault running and performing any quality assurance requirement.
- Under the premise of conforming to instruction, please pay attention to:
  →National (Local) regulations for relevant safety and accident preventions;
  →Special regulations and requirements of relevant devices;
  →Warning and safety mark on device.
- The following situations will cause human injury and property loss:
  →Incorrect running;
  →Wrong installation or operation;
  →Dismatle the protect cover or housing against the instructions.
- Any damage or stop caused by disregarding this instruction book will not be responsible by the company.
- To seek for technical advance, we reserve the rights to modify the instructions. With continuous improvements, we will further improve its performance and safety performances on the foundation of keeping the basic characteristics.

# 2 Technical descriptions

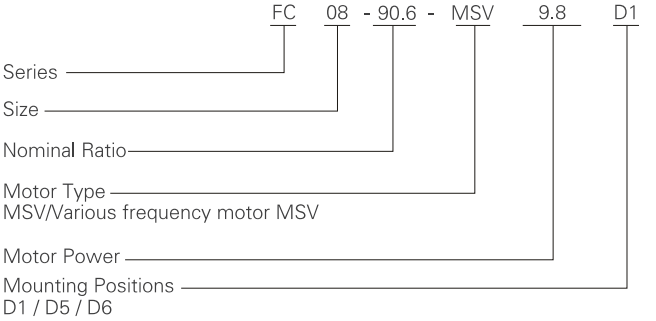
## 2.1 the nameplate

| ⊕ BONENG | | | | | ⊕ |
|---|---|---|---|---|---|
| Type | | | ① | | |
| n2 | | | ② | | RPM |
| P1 | ③ | kW | T2 | ④ | N • m |
| n1 | ⑤ | RPM | i | ⑥ | |
| Oil | ⑦ | | Wt. | ⑧ | kg |
| NO. | ⑨ | | Date | ⑩ | |
| ⊕ | | | | | ⊕ |

① Product type
② Output speed (only for directly connected motor)
③ Rated input power kW (it means motor power for directly connected motor)
④ Rated output torque N • m
⑤ Rated input speed RPM(it means motor speed for directly connected motor)
⑥ Nominal ratio
⑦ Lubrication oil viscosity
⑧ Weight
⑨ Product number
⑩ Production date

◆ Data on nameplate are very important, please read them carefully and keep them clean. When services are needed, please provide the product number, used time and fault details.

## 2.2 Type Designation




◆ Type designation is for your reference, special type, please consult us:

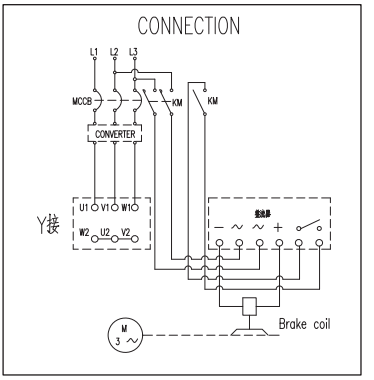
# 3 Brake

## 3.1 Coverview

This type of motor configure eletromagretic discbrake, brake torque is 2.5 times of rated torque,AC power of variable fre–quency motor MSV is same to motor power. Configure 6 pole half wave excitation retifier, motor with high speed brake.

## 3.2 Connection scheme

3.2 .1 MSV connection scheme for frequency motor



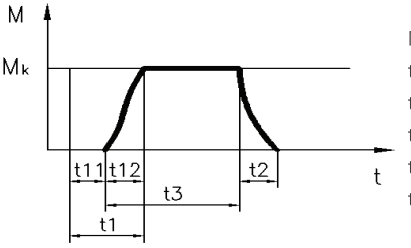

Rectifien type: 6 pole half wave excitation rectifier

Max input voltage: 400VAC

Max output current(60° C): 1.5A

⚠ Notice: When switch on the brake in high speed, do turn the switch of DC side to the side of motor power supply side. Make sure power supply and cut at same time.

## 3.3 Brake reaction time




Mk: Nominal torque of braking
t11: Latency time
t12: Torque rise time
t1: pull–in time
t2: Release time
t3: Sliding time

| Brake type | | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|
| Nomiral brake torque | | 4 | 8 | 16 | 32 | 60 | 80 | 150 | 260 |
| Fast reaction | Pull–in time | 28 | 31 | 47 | 53 | 42 | 57 | 78 | 165 |
| | Release time | 23 | 29 | 38 | 58 | 105 | 110 | 135 | 170 |

## 3.4 Brake air gap and max friction tenaon

| Brake type | 06 | 08 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|
| Rated torque | 4 | 8 | 16 | 32 | 60 | 80 | 150 | 260 |
| Nominal air gap | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 |
| Max working air gap | 0.4 | 0.4 | 0.4 | 0.6 | 0.6 | 0.6 | 0.8 | 0.8 |
| maxpenmission friction | 1.5 | 1.5 | 1.5 | 2.0 | 2.5 | 2.5 | 3.0 | 4.0 |

⚠ Notice: 1) Air gap adjustment

Turn solenoid aften loosening the bolt and turn off the powen, use plug scale adjust the data according to the table, make sure all the data is same, then tighten the bolt.

To make sure the torque, air gap should be adjusted before friction get to maximum, brake noise is related to air gap, it should be adjusted before friction get to maximum, if low noise is requested.

If air gap over maximum, may cause it can´t be released and torque decrease, even cause accident. So periodial inspection is necessary, make sure turn off power before adjustment.

2) Charging the friction plate on brake if abrasion is over the allowed ralue.

### 3.5 Notice:

⚠ → Brake of uariable frequency motor can´t be work with high speed, unless the frequency is unden 30Hz.

# 4 Motor

## 4.1 Infiuence of ambient

Nominal working temperature–15℃ ~ +40℃, ambient & altitude factor:

| Temperature / Altitude | –15℃~40℃ | 45℃ | 50℃ | 55℃ | 60℃ |
|---|---|---|---|---|---|
| 1000m | 1.0 | 0.96 | 0.92 | 0.87 | 0.82 |
| 1500m | 0.97 | 0.93 | 0.89 | 0.84 | 0.79 |
| 2000m | 0.94 | 0.9 | 0.86 | 0.82 | 0.77 |
| 2500m | 0.9 | 0.86 | 0.83 | 0.78 | 0.74 |
| 3000m | 0.86 | 0.82 | 0.79 | 0.75 | 0.7 |
| 3500m | 0.82 | 0.79 | 0.75 | 0.71 | 0.67 |
| 4000m | 0.77 | 0.74 | 0.71 | 0.67 | 0.6 |

## 4.2 Operational instruction of motor

Example :

| Power KW | Speed r/min | work type | Load consistency | Rated frequency Hz | constant torque Hz frequency range | Rated short work time |
|---|---|---|---|---|---|---|
| 3. 2 | 2925 | S3 | 60% | 100 | 25～100 | 30 |

Rated short work time

Rated short work time is motor’ s continuous work time till motor hits the maximum temperature. Motor should be stopped then and should not started until motor got 2K temperature difference from cooling media.

⚠ Note:

Motor starts/stop at low speed and runs/rest at least for 1 min.
Start/stop frequency and rated short work time mustn’ t exceed value suggested in order not to damage motor or cause accident.

## 4.3 Heat protection

VF motor has 3 thermal resistors PTC 150. Make sure heat protection is well connected before motor runs.

# 5 Gearmotor

## 5.1 Installation and dismantlement

### 5.1.1 Notes before installation

- Confirm the gearmotor in good condition (no damage during transporting or storing.
- Confirm site environment conforms to the name plate data.
- Standard working ambient temperature of gearmotor is –20℃–+40℃，no oil, no acid, no harmful gas, no steam and radioactive substance etc.
- When gearmotor is stored over 1 year, the lubrication life on bearings will be short.


- Installing outdoor should avoid direct sunshine. In case of concentrated heat to influence smooth running of gearunit;
- Special gearmotor: allocated according to ambient condition;
- During planning period, you should reserve enough space to maintain or repair.
- Altitude doesn’t excess 1000m;
- Overall vibration of driven machinery should be less than 5.9mm/s2.

## 5.1.2 mounting of gearmotor

- Gearmotor should be mounted only on leveled, vibration– absorbing, rigid and anti–torque support structure. Best consideration be taken that each units' position should be varied, even under maximum load;
- Drum flange features auxiliary fillets between involute splines and housing to bear load;
- External involute splines is designed to deliver torque only, not to bear any load; Drum weight and force on wire is borne by auxiliary fillets at output shafts;
- Splines on output shafts should be cleaned and coated with lubricant before connected with drum;
- Bolts are normally at grade 8.8. In case of high temperature or vibration impact, anti–loose connection should be adopted. See fastening torque of various bolts as below,

| Bolt size(mm) | Pre–tightening torque(N・m) | Bolt size （mm） | Pre–tightening torque（N・m） |
|---|---|---|---|
| M6 | 15 | M16 | 295 |
| M8 | 36 | M20 | 580 |
| M10 | 72 | M24 | 1000 |
| M12 | 123 | M30 | 2000 |

⚠ ◆ Full ventilation should be assured to avoid fire accident when cleanser consists of solvent.

## 5.1.3 Dismantle gearmotor

- Cut power, stop geared motor to cool;
- Make sure gearmotor and wire are not under load;
- Prepare tools such as inner hexagon spanner, hammer, etamine, sharp–nose plier, pullers, etc.;
- Output shaft shouldn't be contorted axially or radially, as such may damage splines and bearings;

## 5.2 Mounting position

### 5.2.1 General description of mounting position

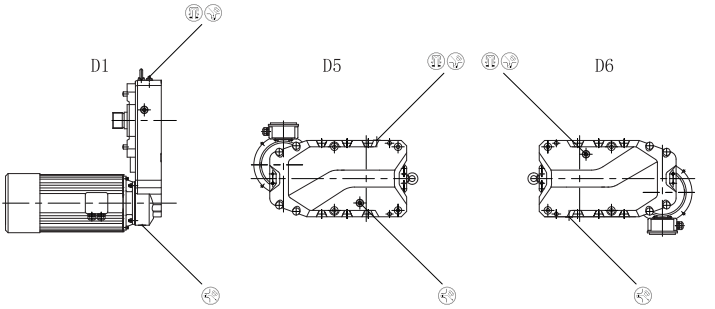
◆ The mounting position details and type selection, please refer BONENG selection manual.

### 5.2.2 Mounting position illustrations

◆ The symbol of mounting position and its meaning:

| symbol | | Meaning | |
|---|---|---|---|
|  |  | Breather | Oil inlet |
|  | | Oil glass | |
|  | | Oil drain plug | |

◆ Mounting position



## 5.3 Lubrication

### 5.3.1 the lubricating oil

- ◆ Gearmotor reducers contain lubricating oil.
- ◆ When replace lubricating oil, please clean all residue of oil and metal to
- ◆ make sure gearmotor clean absolutely.

lubricating oil level and lubricant brand:

| Size | Viscosity class | Oil level (L) |
|---|---|---|
| FC06 | VG680 | 1.4 |
| FC07 | VG680 | 4 |
| FC08 | VG680 | 5 |
| FC09 | VG680 | 9 |

- ◆ When environment temperature is lower than –10° , gear reducers should contain synthetic oil.
- ◆ Using synthetic oil can increase the service life of gear reducers.
- ◆ When temperature beyond the limit, please consult Boneng Technology.

## 5.3.2 Check the device

- While checking gearbox, turn off all power.
- All operators should be professional and keep safe.
- All FC gear reducers contain the brake device, operators should make sure the wire connecting is right.

- Make sure gearbox are in halted state.
- Make sure gearbox are at low temperature to protect operators from being scalded.
- Check the shaft seal are good.
- Check all parts on gear reducers are good.

- Check oil level.
- For the gearmotor equipped with backstop device, inspect whether wiring of motor is correct.
- Inspect whether shaft sealing is effective.
- Check whether the rotating components contact with other components.
- Each feeding holes are all plugged before to delivery. According to different mounting position, change corresponding plug for breather which isdelivered as a spare of geared motor.

## 5.3.3 Start

- Check whether the running direction under free status is correct (supervise whether there is abnormal grinding noise when the shaft is running).
- During running inspection, you should ensure no output component on shaft, open relevant supervision and protection device at the same time.
- If there is abnormal running phenomenon (for example, temperature rise, noise, vibration, etc), you should turn off the motor and check out the reason.
- Contact with BONENG when necessary.

# 6 Checks and maintenance

## 6.1 Check and maintenance regularly

◆ Users should make regular maintenance to gearmotor.Check the status of lubrication oil regularly, clean ventilation cap, fan, cooling coil and the surface of gearmotor, keep the gearmotor clean, ensure normal running of gearmotor.

◆ Equipment maintenance cycle and maintenance:

| | |
|---|---|
| Gear reducers used reach 6 month or 3,000 hours | Check the oil level and lubricant state |
| Gear reducers should keep to FEM,<br>Once every three years | replace mineral lubricating oil<br>(environment temperatur e range:–10° –40) |
| Gear reducers should keep to FEM,<br>Fifth every three years | replace mineral lubricating oil<br>(environment temperature range:–20° –50° ) |

## 6.2 Notes for checks and maintenance:

◆ Cut off power source, prevent electric shock, wait for cooling of gearmotor.

◆ Inspection of oil level: Please refer the oil glass level and fill the oil to the middle level of oil glass .

◆ Oil inspection: remove oil drain plug, take some samples, npsect oil viscosity index; if the oil is not clean, change it.

◆ Oil changing:

→It is forbidden to mix different lubricants.

→After cooling, oil viscosity will increase, it is harder to drain off oil. change before cooling.

→Put an oil picking plate under oil plug, tear down oil plugventilation cap,install oil plug after removing oil.

→Inject new oil of the same brand, oil quantiy should be the same with installation direction (see nameplate); if the brand number is different, consult after–sales department.

→Inspect oil level at oil glass,install vent cap.

# 7 Fault treatment

| Fault | Reason | Measure |
|---|---|---|
| Noise change of gearmotor | Fastening is loose | Tighten bolts/nuts to prescribed torque<br>Replace damaged bolts/nuts |
| | Damage to gearmotor | Con tact customer service<br>→Check all teeth and replace any damaged parts |
| | Excessive bearing play | Contact customer service<br>→Adjust bearing play |
| | Bearing defective | Contact customer service<br>→Replace defective bearings |
| Operating temperature too high | Oil level in gearmotor housing too high or too low | Check oil level and,if necessary, adjust |
| | Oil too old | Contact customer service<br>Check date of last oil change if necessary, change |
| | Oil badly contaminated | Contact customer service<br>→Change oil |
| Increased vibration amplitudesat the bearing points | Bearing defective | Contact customer service<br>→Check and , if necessary, replace bearings |
| | Gear defective | Contact customer service<br>→Check gears and, if necessary replace |
| Oil leakage from gearmotor | Inadequate sealing of housing covers or joints | Check and, if necessary,replace seals, seal joints |
| | Radial shaft sealing rings defective | Contact customer service<br>→Replace radial shaft sealing rings |
| Water in the oil | Oil foams in sump | Check state of oil by the test–tube method for watercontamination.Have oil analysed by laboratory |
| | Gearmotor expose to cold airfrom machine–room ventilator | Protect gearmotor with suitable heat insulation.Close air outlet or alter its direction by structural measures |

⚠ Note: For the faults can’t be removed by customers, please contact with after–sales department of the company.

# 8 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 compant, 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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