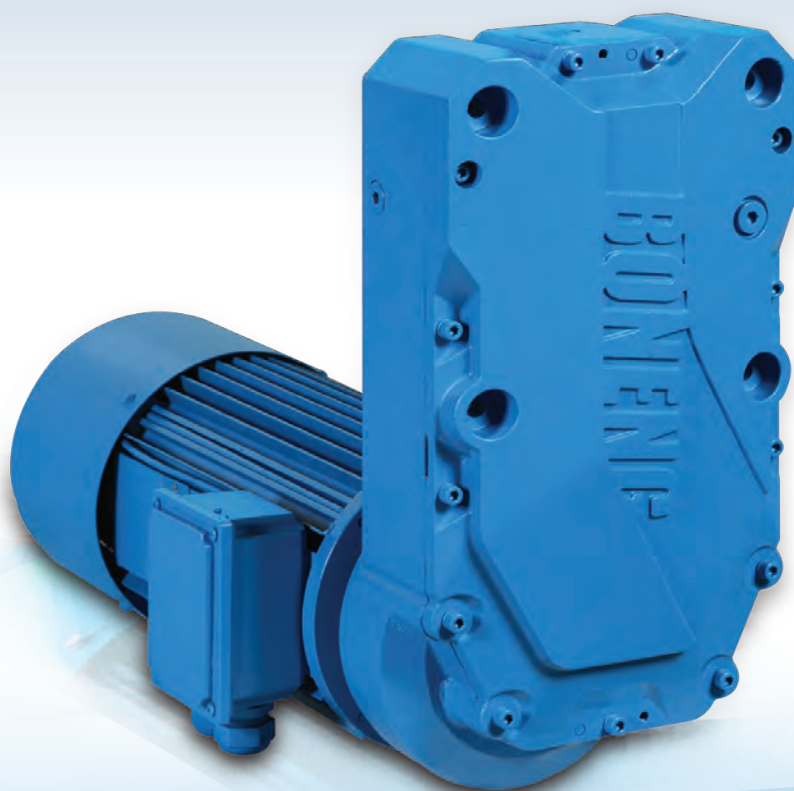


BONENG



博能 FC起重和升降驱动系统 FC HOISTING AND LIFTING DRIVE SYSTEM

使用手册
Instruction



03 / 2014

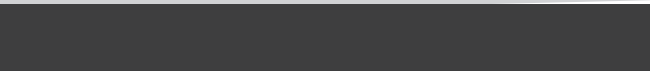
www.motiontech.com.au

Contents 目录

.....	重要提示 01
	Important Notes
.....	安全说明 02
	Safety notes
.....	技术说明 03
	Technical descriptions
	铭牌说明 03
	the nameplate
	型号说明 03
	Type Designation
.....	制动器 03
	Brake
	概述 03
	Coverview
	接线指示图 04
	Connection scheme
	制动器起制动反应时间 05
	Brake reaction time
	制动器气隙及摩擦盘最大允许磨损量 05
	Brake air gap and max friction tenaon
	注意 06
	Notice:
.....	电机 06
	Motor
	运行环境对电机的影响 06
	Infuence of ambient
	电机的运行说明 06
	Operational instruction of motor
	热保护 07
	Heat protection

Contents 目 录

.....	齿轮箱 07
	Gearbox
	安装与拆卸 07
	mounting & dismantle
	安装方位 09
	Mounting position
	维护与保养 10
	Maintenance and service



1 重要提示

◆在安装操作过程中,请注意本说明书中的安全提示和警告提示。

1.Important Notes

◆Please notice the safety and warning instruction during operation.

	有电危险 可能产生的后果：死亡或者严重伤害	Electricity! Consequence: Death or serious Injury
	危险情况 可能产生的后果：轻微伤害	Danger! Consequence: Slight Harm
	有害情况： 可能产生的后果：损坏传动装置和环境	Adverse Condition! Consequence: Damage the transmission device and surrounding
	使用建议和有用的信息	Usage Advice and information



- ◆ 遵守本手册的规定可以让装置无故障运行，同时也满足质量缺陷索赔的要求，因此在使用传动装置进行工作之前，请您先阅读本说明书；
- ◆ 本说明书包含重要的安装维护提示，请将说明书保管在靠近设备的位置，以便安装维护参阅。

- ◆ It must be read before operation. Abides by regulations will make gear units work well and meet the requirement of after-service
- ◆ This Manual contains important maintenance notice, please keep it close to your machine.

2 安全说明

安全说明主要涉及减速机的使用。当使用减速机时，请注意说明书中的相关安全提示！

- ◆ 减速机的安装、操作、维护和修理人员均需认真阅读本手册并遵守其中的规定并随时随地注意：
 - 防止对使用者和第三者的人身伤害危险。
 - 确保减速机的运转安全性。
 - 只允许在停机状态下对减速机进行修理；必须采取措施防止驱动装置被意外接通；在开启位置上挂上表明正在修理减速机的指示标志。
 - 采取措施防止由于错误操作所导致的停机故障和环境污染。
- ◆ 本系列减速机是按照FEM标准设计制造的，交货后即可安全使用。不得擅自进行对运行安全有妨害的改动、加装和改装；也不得对接触防护装置进行改动。
- ◆ 本系列减速机不允许超载工作，特定工作环境下（如高温、高海拔等）还需降额使用；强烈建议配套设备中配置超载限制器，以保证设备安全运行，防止安全事故的发生。
- ◆ 严格遵循说明书中的规定是实现产品无故障运行和履行任何质量保证要求的必要条件。
- ◆ 在遵循说明书规定的前提下还必须注意：
 - 相关安全和事故防范的国家（地区）规定；
 - 相关设备的特别规定和要求；
 - 设备装置上的安全警告和安全标志牌；
 - 所有工作必须在“安全第一”的原则下谨慎进行。
- ◆ 请同样重视该操作手册各个章节中的补充性安全提示。
- ◆ 下列情况会导致人身伤害和财产损失：
 - 使用不当；
 - 安装或操作失误；
 - 违反规定拆除必要的防护罩或机壳。
- ◆ 如果将本系列减速机安装到设备中，设备制造商必须将本说明书中的规定、说明和描述一并归纳入其操作说明书中。
- ◆ 若因违反本说明书的规定而造成减速机的任何损伤或停机，BONENG公司概不负责。

2 Safety notes

Safety Instruction mainly involved in using of gear units. Before operation, please notice the prompts in this manual!

- ◆ All persons involved in the installation, operation, maintenance and repair of the gear unit must read this manual and comply the rules.
 - Prevent the danger to users or the third party
 - Make sure gear units working well
 - All work such as repair must be carried out when it is not in operation. The drive assembly must be secured against being switched on accidentally. A notice should be attached to the ON switch stating clearly that work in progress.
 - Measures shall be taken to prevent downtime and pollution reason by wrong operation
- ◆ This series gear units 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.
- ◆ It's necessary to follow the manual that operation well.
- ◆ Under the premise of the need to comply with the instruction also notice follow:
 - Reference safety and accident prevent rules
 - Relative equipments regulation
 - Safety Warning and signs on the device
 - All the work should be under rules “safety first”
- ◆ Please also notice the supplement safety sticker in this manual.
- ◆ The following condition will result in personal injury and property damage.
 - Misuse
 - Installation or operation errors
 - Disengage the protect guard or housing against the regulations.
- ◆ If the gear units are intend or installation in plant or machinery, the manufacturer of such planter machinery must ensure that the contents of these instructions are incorporated in his own manuals.
- ◆ We accept no responsibility for damage or disruption caused by disregard of these instructions.

3 技术说明

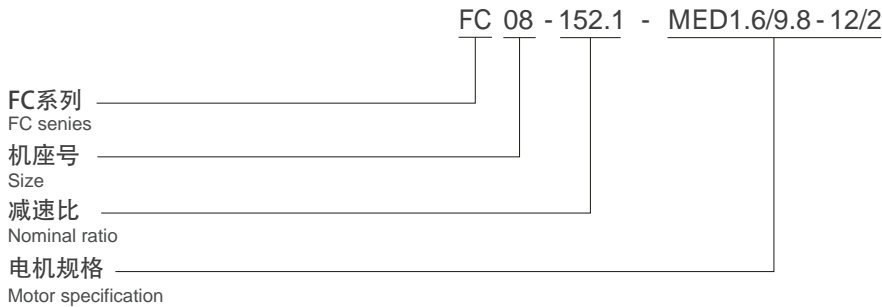
3.1 铭牌说明

BONENG				CE	
Type		①			
P ₁	②	KW	n ₂	③	RPM
⊕ Oil	④			⑤	L ⊕
i	⑥			⑦	kg
NO.	⑧	Date	⑨		

◆ 铭牌上的数据十分重要，请仔细阅读，并保持其整洁，当需要服务时，请提供铭牌上的产品编号、使用时间及故障类型。

3.2 型号说明

◆ 举例：减速器FC08-152.1-MED1.6/9.8-12/2



◆ 型号说明仅供用户参考使用，特殊供货类别另请咨询；

4 制动器

4.1 概述

此型号电机选用电磁失电盘式制动器。制动力矩一般选定在额定转矩的2.5倍以上。双速电机MED外接交流电源一般为电机电源 $1/\sqrt{3}$ ，变频电机MSV外接交流电源一般为电机电源电压，配六极半波过励磁整流器，电机采用较快速制动接线为实现电机的安全、可靠提供了保障。

3 Technical descriptions

3.1 the nameplate

- ① 产品型号
gear unit type
- ② 额定输入功率KW（电机功率）
Nominal input power KW(motor power)
- ③ 输出转速RPM
Output speed
- ④ 润滑油牌号
Quantity of oil in liters
- ⑤ 油量L
Oil Level L
- ⑥ 减速比
Ratio
- ⑦ 重量
Weight
- ⑧ 产品编号
Products NO
- ⑨ 出厂日期
Ex-work date

◆ The data are important on the nameplate, please read carefully and keep it clean. When after service, please supply the product no, running time and failure type.

3.2 Type Designation

Example: reducerFC08-152.1-MED1.6/9.8-12/2

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

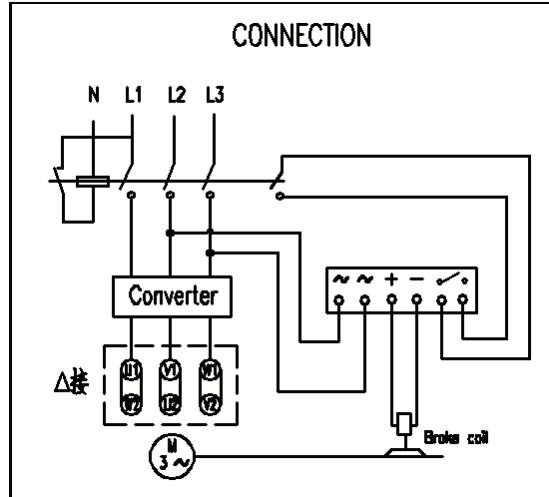
4 Brake

4.1 Coverview

This type of motor configure eletromagretic discbrake, brake torque is 2.5 times of rated torque,ACpower of motor MED is $1/\sqrt{3}$ of motor power,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.

4.2 接线指示图：

4.2.1变频电机MSV接线指示图：



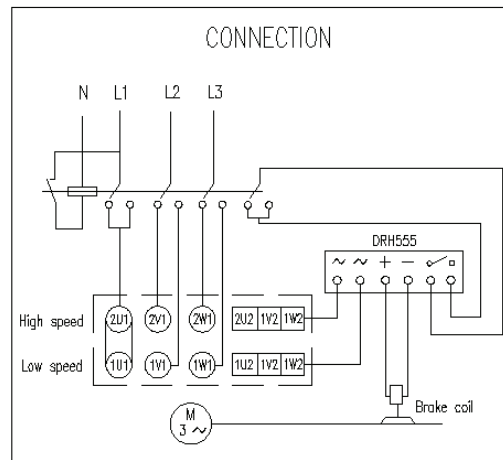
整流器型号：六极半波过励磁整流器
 整流器最高输入电压：400VAC
 整流器最大输出电流（60° C）：1.5A

4.2 Connection scheme

4.2 .1 MSV connection scheme for frequency motor

Rectifier type: 6 pole half wave excitation rectifier
 Max input voltage: 400VAC
 Max output current(60°C): 1.5A

4.2.2双速电机MED接线指示图：



整流器型号：六极半波过励磁整流器
 整流器最高输入电压：555 VAC
 整流器最大输出电流（60° C）：1.5A

4.2.2 MED connection scheme for double speed motor:

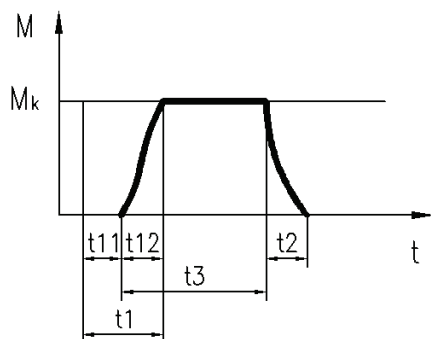
Rectifier type: 6 pole half wave excitation rectifier
 Max input voltage: 555VAC
 Max output current(60°C): 1.5A



注：快速起制动时，必须将整流器的直流侧开关接于电机供电线路控制开关上，实现同时断供电。

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.

4.3 制动器起制动反应时间：



4.3 Brake reaction time

Mk: 额定制动力矩
Nominal torque of braking

t11: 延迟时间
Latency time

t12: 力矩上升时间
Torque rise time

t1: 吸合时间
pull-in time

t2: 放松时间
Release time

t3: 滑动时间
Sliding time

制动器型号 Brake type		06	08	10	12	14	16	18	20
额定制动力矩(N · m) Nomiral brake torque		4	8	16	32	60	80	150	260
快速起制动 Fast reaction	吸合时间t1(ms) Pull-in time	28	31	47	53	42	57	78	165
	放松时间t2(ms) Release time	23	29	38	58	105	110	135	170

4.4 制动器气隙及摩擦盘最大允许磨损量：

4.4 Brake air gap and max friction tenaon

制动器型号 Brake type		06	08	10	12	14	16	18	20
额定制动力矩(N · m) Rated torque		4	8	16	32	60	80	150	260
正常工作气隙(mm) Nominal air gap		0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4
最大工作气隙(mm) Max working air gap		0.4	0.4	0.4	0.6	0.6	0.6	0.8	0.8
摩擦盘最大允许磨损量(mm) max penmission friction		1.5	1.5	1.5	2.0	2.5	2.5	3.0	4.0

! 注：1) 气隙的调节：

在螺栓松开和断电的情况下，转动调节螺管，借助塞尺将气隙调节到表中的正常气隙值，注意保证整个圆周气隙相同。气隙调好后，拧紧螺栓。

为保证足够的制动力矩，气隙应在磨损达到表中最大值前进行调整。另制动器的噪音与气隙的大小密切相关，在要求噪音很低的应用中，也应在磨损达到表中最大值前重调气隙。

气隙超过最大值，可能导致无法释放或制动力矩及保持力矩减小，甚至导致重大事故。所以必须定期检查并重调气隙，注意调整前必须断开机器的总电源

2) 当摩擦片磨损超出最大允许磨损量时，应更换摩擦片或更换制动器。

Notice: 1) Air gap adjustment

Turn solenoid after loosening the bolt and turn off the power, 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 value.

4.5 注意:

- ⚠ → 双速电机制动器不应在高速状态下制动，故电机在制动之前，应调到低速状态运行后制动！
- 变频电机制动器不应在高速状态下制动，故电机在制动之前，应调到30Hz以下状态运行后制动！

4.5 Notice:

- Brake of dounle speed motor can't be worked in high speed, unless the motor works in low speed.
- Brake of uariable frequency motor can't be work with high speed, unless the frequency is unden 30Hz.

5 电机

5.1 运行环境对电机的影响

电机正常运行环境温度在-15℃到+40℃之间，海拔不高于1000m。对于不同环境温度及海拔对应电机的使用系数见下表

5 Motor

5.1 Influence of ambient

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

<div>温度 Temperature</div> <div>海拔 Altitude</div>	-15℃~40℃	45℃	50℃	55℃	60℃
1000	1.0	0.96	0.92	0.87	0.82
m	0.97	0.93	0.89	0.84	0.79
1500	0.94	0.9	0.86	0.82	0.77
m	0.9	0.86	0.83	0.78	0.74
2000	0.86	0.82	0.79	0.75	0.7
m	0.82	0.79	0.75	0.71	0.67
2500	0.77	0.74	0.71	0.67	0.6
m					

5.2 电机的运行说明

- 1) 电机为双速运行，短时频繁起动工作制。具体运行方式举例如下：
- 举例

5.2 Operational instruction of motor

- 1) motor runs at double speed and starts frequently in short period. See examples as below,
- Example

功率KW Power KW	转速r/min Speed r/min	工作制 work type	负载持续率 Load consistency	短时工作定额min Rated short work time
9.8/1.6	2900/460	S3	40%	3.5/30

短时工作定额：在电机温升达到最大值前，电机连续运行所能持续工作的时间，超过此时间，电机应停机冷却直至跟冷却介质温差2K以内，方可再次运行

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.

举例2:

功率KW Power KW	转速r/min Speed r/min	工作制 work type	负载持续率 Load consistency	额定频率Hz Rated frequency Hz	恒转矩变频范围Hz constant torque Hz frequency range	短时工作定额min Rated short work time
3.2	2925	S3	40%	100	25~100	30

短时工作定额：在电机温升达到最大值前，电机连续运行所能持续工作的时间，超过此时间，电机应停机冷却直至跟冷却介质温差2K以内，方可再次运行

Example 2:

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.



注意:

电机应低速起动及停止，在每次起动及停止过程中应保证低速分别运行至少1秒钟。

电机起停频率及短时工作定额不可超过电机提供数值，以免影响电机使用寿命或造成事故！

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.

5.3 热保护:

双速电机带6只热敏电阻 PTC150℃串联，变频电机带3只热敏电阻串联，出两线。电机运行时应确保热保护连接，以免操作过频或操作时间过长导致电机过热而发生事故！

5.3 Heat protection

Double-speed motor has 6 thermal resistors PTC150, while VF motor 3. Make sure heat protection is well connected before motor runs.

6 齿轮箱

6.1 安装与拆卸

6.1.1 安装前的注意事项



◆ 确认减速机完好无损(在运输或储存过程中未损坏)。

◆ 确认现场环境条件与铭牌内容相符。

◆ 减速机正常工作环境温度：-20℃~+50℃。



◆ 减速机应在室内环境使用，不受阳光直射，无油、酸、有害气体、蒸汽、放射性物质等。

◆ 海拔高度应不超过1000m。

◆ 安装设备总体振动应小于5.9m/s。

◆ 在户外安装时应避免阳光的直射，一定要避免热力集中影响减速机的正常性能。

6 Gearbox

6.1 mounting & dismantle

6.1.1 precautions before mounting

◆ Confirm gearbox's physical perfection;

◆ Make sure work site conditions conforms with nameplate;

◆ Ambient temperature: -20 ~ +50

◆ Gearbox works at confined space, concealed from sunshine, corruption gases, steam, radiation material, and so on.

◆ Altitude doesn't excess 1000m;

◆ Overall vibration of driven machinery should be less than 5.9m/s2.

◆ Keep gearbox from strait sunshine as intensive heat may damage gearbox.

6.1.2 减速机的整机安装

- ◆ 减速机只能按规定的安装位置安装在平的、减振的、刚性好的、抗扭的支撑结构上；同时也需充分考虑即使加上最大载荷仍不至于改变装配好后各部件的位置。
- ◆ 卷筒上的卷筒法兰必须设计应用于渐开线花键与箱体之间的配合轴颈，以达到承受负荷的作用。
- ◆ 输出轴外花键部分只设计用于传导减速机的输出扭矩，不能承受任何载荷，卷筒重力及绳索上的力由输出轴配合轴颈部分承受。
- ◆ 减速机输出轴花键与卷筒部件连接时,应先清理干净安装轴上的污物并涂润滑油。
- ◆ 安装螺栓一般情况下采用8.8级，如果有高温或者振动冲击等情况，请在螺纹连接处作好防松措施。各个紧固螺栓的拧紧扭矩见下表：

螺栓大小 (mm) Bolt size	预紧力矩 (N · m) Pre-tightening torque	螺栓大小 (mm) Bolt size	预紧力矩 (N · m) Pre-tightening torque
M6	15	M16	295
M8	36	M20	580
M10	72	M24	1000
M12	123	M30	2000



- ◆ 使用添加有溶剂的清洁剂时，要采取充分的通风措施，有可能要注意溶剂的着火危险性。

6.1.3 减速机的整机拆卸

- ◆ 切断电源，确保减速机停止运转，温度足够冷却。
- ◆ 确保减速器无负载，卷筒上的钢丝绳处于松弛状态。
- ◆ 事先准备好所需的拆卸工具(内六角扳手、木槌、棉纱布、尖嘴钳、拉拔器等)。
- ◆ 在安装和拆卸过程中，输出轴的轴向和径向不得受到扭曲，否则容易损坏联接花键，轴承也可能会因为受力过度而出现故障。

6.1.2 mounting of geared motor

- ◆ Gearbox 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,

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

6.1.3 Dismantle geared motor

- ◆ Cut power, stop geared motor to cool;
- ◆ Make sure geared motor 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;

6.2 安装方位

6.2.1安装方位说明

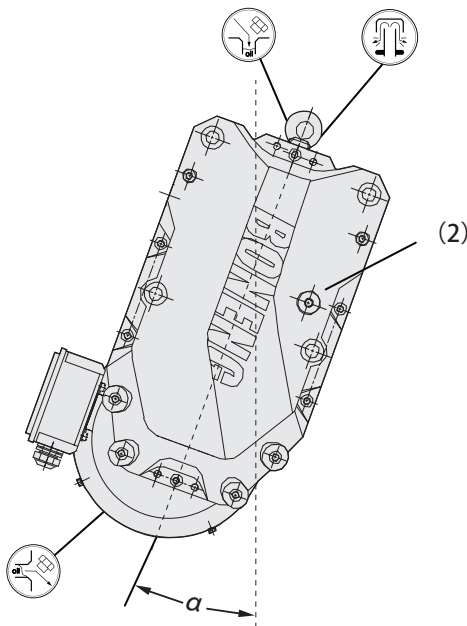
◆为运输方便，通常本系列减速机出厂时所有油孔均使用油塞密封，安装前需根据安装方位将对应油塞替换为通气帽（通气帽，一般作为附件运送）。

6.2.2 安装方位图示

◆减速机的安装方位页面中使用的图形符号及其含义：

图形符号 Graphs			
含义 Meaning	进油孔 feeding hole	放油孔 draining hole	通气帽 breather

◆减速机的安装方位



- ◆ 安装角 α 范围：0° ~90° 。
- ◆ 当安装角 α 接近90° 时，（1）处为进油孔，通气帽。（2）处作为放油孔。
- ◆ 用户可根据实际安装需求选型，必要时请向BONENG公司技术部门咨询。

6.2 Mounting position

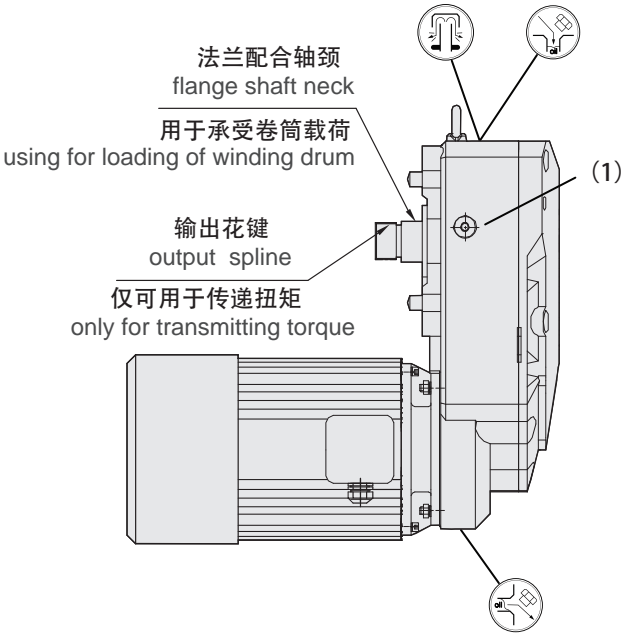
6.2.1 Instruction

◆ Each feeding holes are all plugged before to delivery. According to different mounting position, change corresponding plug for breather which is delivered as a spare of geared motor;

6.2.2 Mounting position illustrations

◆ Graphs in mounting page are as follow:

◆ Mounting position



- ◆ Setting angle α range: 0°-90°
- ◆ When setting angle is close to 90°, (1) fuel feed hole, breather (2) drain oil
- ◆ Customers should according to the fact, please consult when necessary.

6.3 维护与保养

6.3.1 润滑油（脂）的选择

- ◆ 减速器在出厂前已经加满润滑油，正常使用周期内无需更换润滑油。
- ◆ 需更换润滑油时，要将减速机箱体里面的沉积物、金属颗粒和残留的润滑油都冲洗干净，保证减速机壳体的绝对干净。
- ◆ 下表列出了各产品规格使用润滑油牌号及注油量：

产品规格 Size	润滑油粘度值 Viscosity class	注油量(L) Oil level (L)
FC0	VG68	1.4
6	0	4
FC0	VG68	5
7	0	9
FC0	VG68	13
8	0	15
FC0	VG68	



- ◆ 环境温度低于-10℃时必须使用合成油。
- ◆ 为确保产品的使用寿命，实际使用中推荐使用合成油。
- ◆ 使用环境温度超过上述范围时，请咨询 BONENG 公司技术部门。

6.3 Maintenance and service

6.3.1 the lubricating oil

- ◆ Gear reducers contain lubricating oil.
- ◆ When replace lubricating oil, please clean all residue of oil and metal to make sure gearbox clean absolutely.
- ◆ lubricating oil level and lubricant brand:

- ◆ 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.

6.3.2 设备检查



- ◆ 确保检查所有设备时，电源连接已经切断，防止触电！
- ◆ 必须由经过专业培训的人员在接线盒和带电部件上经行操作，并注意专用安全规定。
- ◆ 本系列减速机，电机上均配备了制动器装置，需检查电机接线是否正确，以免发生重大安全事故。



- ◆ 确保设备处于停止运转状态，防止意外！
- ◆ 设备停止运作后，由于保持较高工作温度，注意等待冷却，防止烫伤。
- ◆ 检查轴封是否有效，是否需要更换。
- ◆ 检查旋转的零部件是否与其它零件接触。

6.3.3 周期与维护

◆ 下表列出了设备的维护周期与相应维护项目：

设备使用6个月或者工作时间达到3000小时 Gear reducers used reach 6 month or 3,000 hours	检查油面高度及润滑油状态 Check the oil level and lubricant state
设备严格遵循FEM工作要求，每三年一次 Gear reducers should keep to FEM, Once every three years	更换矿物润滑油（环境温度-10℃~40℃） replace mineral lubricating oil (environment temperature range:-10°-40
设备严格遵循FEM工作要求，每五年一次 Gear reducers should keep to FEM, Fifth every three years	更换合成润滑油（环境温度-20℃~50℃） replace mineral lubricating oil (environment temperature range:-20°-50°

◆ 如果减速器工作在以下不利的环境中，缩短保养时间间隔则变得尤为重要：

- a、高度潮湿；
- b、灰尘，酸性或其他腐蚀性的环境；

6.3.2 Gearbox maintenance

- ◆ 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.

6.3.3 Service cycle and maintenance

◆ Equipment maintenance cycle and maintenance:

◆ When operate in the hostile environment as follow, frequent maintenance is important

- a.High humidity;
- b. High corrosion;
- c. large temperature difference

6.3.4检查与维护的注意事项:

- ◆ 切断电源,防止触电,等待减速机冷却!
- ◆ 油的检查:移去油塞,取油样,检查油的粘度指数;如果油明显浑浊,建议尽快更换。
- ◆ 油的更换:
 - 不同的润滑剂禁止相互混合使用。
 - 冷却后油的粘度会增大,放油困难,换油时减速机应保持温热。
 - 在油塞下面放一个接油盘,拆下油塞通气帽,将油全部排除后装上油塞。
 - 注入同牌号的新油,油量应与相应规格注油量一致(见铭牌或本说明书维护与保养部分相关表格)。

6.3.4 Warning in checking and maintenance:

- ◆ Power off and make sure gear reducers are cool.
- ◆ Lubricant checking: Check lubricant in gearbox, if it is feculent, please replace lubricant.
- ◆ Lubricant replacing:
 - Don't feed different lubricant in a gearbox.
 - When drain lubricant from gearbox, should keep gear reducers in a warm temperature.
 - Screw off the vent cap and drain the lubricant, then screw on the vent cap.
 - When feed a new brand lubricant in gearbox, operator should refer to oil level.

若有任何质量问题, 敬请与我司售后服务联系。

Any questions, please contact with BONENG after service.



Distributors for Australia & New Zealand

MOTION TECHNOLOGIES PTY LTD

24/22-30 Northumberland Road
Caringbah NSW 2229 Australia
Phone: (02) 9524 4782
Fax: (02) 9525 3878

sales@motiontech.com.au
www.motiontech.com.au

© 02/04/19