

# SERVO MOTOR FOR WIND POWER PITCH SYSTEM

风电变桨系统专用伺服电机

**FinePower**

翡叶动力科技有限公司  
FinePower Technology Co.,Ltd.

# ADVANTAGES IN THE APPLICATION OF WIND POWER PITCH SYSTEM

## 在风电变桨系统应用中的优势

高质量的全进口关键零部件(包括制动器、编码器、轴承),确保产品性能稳定、质量可靠;

High -quality all -imported key components (including brakes, encoders, bearings) ,to ensure stable product performance and reliable quality;

高过载能力,高动态响应速度,高控制精度, 保证变桨系统工作在最佳状态;

High overload capacity, high dynamic response speed, high control accuracy, ensure that the paddle system works in the best state;

体积小,重量轻,节省轮毂安装空间,方便检修和更换;

Compacted design, saving wheel installation space, convenient maintenance and replacement;

专用定制化的设计和制造,可灵活适用并满足客户的各种需求;

The dedicated customized design and manufacturing can be flexibly applied and meet the various needs of customers;

所有产品均符合并通过了CE认证;

All products with CE certification;

高等级的防腐涂层设计,可保证电机在含腐蚀性的盐雾和细砂的空气中长期稳定安全运行,产品完全符合风力发电对变桨电机的工作环境要求;

The design of high -level anticorrosive coating can ensure that the motor runs in the medium and long -term stable and safe operation of the motor in the corrosive salt fog and fine sand, and the product fully meets the working environment of wind power pitch system;

高效节能,发热少,采用自冷却散热方式,无需散热风扇,降低变桨电机的维护成本;

High -efficiency energy saving, self -cooling without the forced ventilation and reduce the maintenance cost of pitch motor;

比较于交流感应异步电机和直流电机,交流永磁同步伺服电机具有明显优势;

Compared with AC asynchronous motors and DC motors, AC permanent magnet synchronous servo motors have obvious advantages;

插头式连接设计,大大减少现场安装时间;

The plug - connection design greatly reduces the on-site installation time;

内容 Content	交流感应异步电机 AC asynchronous motor	直流电机 DC motor	交流永磁同步伺服电机 AC magnet synchronous motor
位置控制精度 Position control accuracy	较低 low	较低 low	最高 High
调速范围 Position control accuracy	最小, 低于10Hz后特性变差 The minimum, after 10Hz, the characteristics become worse	较宽, 但低速时转矩脉动大 Big wider, but turning the torque at low speed is large	较宽, 低速性能佳 Wider, better low -speed performance
功率密度 Power density	较小 Smaller	较小 Smaller	最高, 是其它两种电机的两倍左右 The highest, which is about twice that of the other two motors
功率密度 Cooling fan	有 Yes	有 Yes	无 No
换向碳刷 Commutating carbon brush	无 Yes	有 Yes	无 No
防护等级 protection class	一般 average	一般 average	最好, 电机整体防护等级IP65 IP65

# WINDMILL INDUSTRY APPLICATION

## 风力发电行业应用

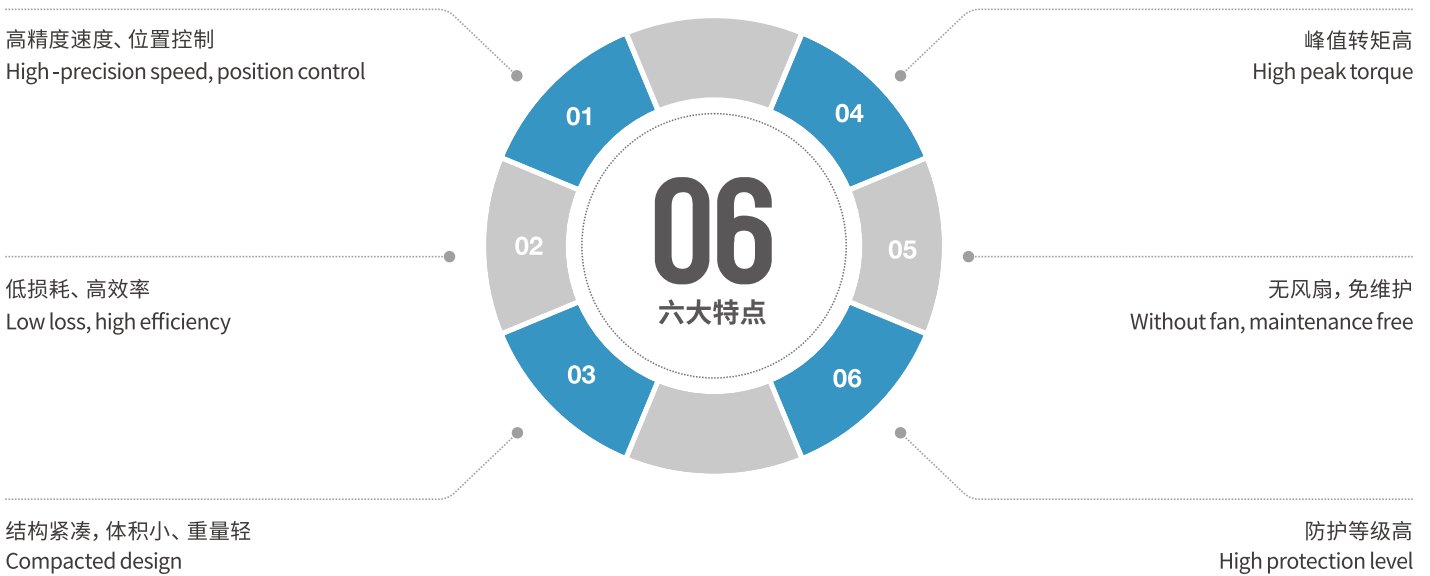
作为最早的国内高压同步变桨方案的电机供应商之一,翡叶动力将风电行业作为我们在新能源领域的一个重要市场目标。根据变桨电机的严苛应用要求,我们进行了定制化的产品设计,目前已经实现在风电变桨应用方面的大批量稳定配套,与国内外多家知名企业建立战略合作关系。

从最早的陆上1.5MW机型到如今海上15MW以及更大机型,翡叶动力不断优化创新,获得了风电行业的认可,连续多年稳居同步变桨电机销售榜首位置,在风电变桨交流永磁同步伺服电机应用领域处于国内领先地位。

Since FinePower as high quality motor suppliers of high-voltage synchronous pitch solutions,the wind power industry is one of an important market target for us in the field of new energy. According to the strict application requirements of pitch motors,we have carried out customized product design,and have achieved large-scale and stable matching in wind power pitch applications,and have established strategic cooperative relations with many well-known enterprises domestically and abroad.

From onshore 1.5MW model at the beginning to the current offshore 15MW and larger models,FinePower has been continuously optimized and innovated,and has been recognized by the wind power industry.The application field of permanent magnet synchronous servo motor is in a leading position in China.

### ◎ 变桨系统专用伺服电机的特点 / Features of the special servo motor for paddle system



5FSNA7



5FSNA8



5FSNA9

# SERVO MOTOR FOR WIND POWER PITCH SYSTEM

## 风电变桨系统专用伺服电机

翡叶动力根据风电变桨系统对电机的特殊应用需求,定制研发了变桨系统专用三相交流永磁同步伺服电机产品,该产品依据风电功率等级、桨叶规格和不同的安装尺寸要求,分为3个产品系列:5FSNA7系列、5FSNA8系列和5FSNA9系列,产品具体覆盖范围如下:

According to the special application requirements of the wind power pitch system for the motor, FinePower has customized and developed the three-phase AC permanent magnet synchronous servo motor product for the pitch system. For 3 product series: 5FSNA7 series、5FSNA8 series and 5FSNA9 series the specific coverage of the products is as follows:

功率等级/Power	桨叶规格/Blade specification
2MW	93m、99m、105m、111m、116m
3.6MW	116m、122m、136m

### 环境条件 / Environment conditions

内容 Working environment	工作温度 Working temperature	存储温度 Storage temperature	相对湿度 Relative humidity	海拔高度 Latitude	防护等级 Protection class	防腐等级 Corrosion class
户外露天自然环境 outdoor environment	-40°C~+50°C	-40°C~+60°C	≤90%	适应高海拔应用	IP65	C2防腐 (内陆型风场) C2 Anti-corrosion (onshore) C4防腐 (近海型风场) C4 Anti-corrosion (offshore) C5防腐 (深海型风场) C5 anti-corrosion (offshore)

### 基本配置 / Basic configuration

冷却方式 cooling	位置反馈 Position feedback	温度反馈 thermostat	制动器 brake	接线方式 connection	绝缘等级 Insulation grade
自冷却 outdoor environment	旋转变压器 (进口) resolver (imported)	PT100 KTY83 KTY84 上述3种反馈器件可根据驱动器要求选择使用 The above three feedback devices can be selected according to the requirements of the driver	永磁/励磁 制动器 (进口) Magnet/Excitation brake (imported)	航空插头 (德国进口) Plug (imported from Germany)	F级绝缘 Class F

### 旋转变压器参数 / Resolver performance

极数/poles	精度/accuracy	非线性/Nonlinear
2	± 10分	± 1分

### 制动器参数 / Brake performance

制动力矩 (Nm) Brake torque (Nm)	吸合时间 (ms) Pull-in time (ms)	释放时间 (ms) Release time (ms)	电源电压DC (V) Power voltage DC (V)	功率 (W) power (W)
100~500	≥60	≥100	24/104/205	42~124

◎ 技术性能 / Technical performance

技术指标 Specification	单位 units	5FSNA75-[nnn]XabXe0.00-0	5FSNA76-[nnn]XabXe0.00-0	5FSNA77-[nnn]XabXe0.00-0
额定转速 Rated speed	min <sup>-1</sup>	2200	2000	2000
最高转速 Maxium speed	min <sup>-1</sup>	3000	3000	3000
额定转矩 Rated torque	Nm	32	42	51
额定功率 Rated power	Kw	7.4	8.8	10.7
额定电流 Rated current	A	14.5	22.1	28.3
静态转矩 Stall torque	Nm	40	60	72
静态电流 Stall current	A	18.2	31.6	40.0
峰值转矩 Peak torque	Nm	120	160	195
峰值电流 Peak current	A	63.0	94.0	121.0
转矩常数 Torque constant	Nm/A	2.2	1.9	1.8
电势常数 Voltage constant	V/1000min <sup>-1</sup>	135	128	125
绕组电阻(线) Resistance ( line)	Ω	0.40	0.14	0.11
绕组电感(线) Inductance(line)	mH	4.30	2.20	1.24
无制动器转动惯量 Inertia without brake	Kgcm <sup>2</sup>	130	184	236.0
带制动器转动惯量 Inertia with brake	Kgcm <sup>2</sup>	136	256	286.0
无制动器重量 Weight without brake	Kg	34.0	46.0	58.0
带制动器重量 Weight with brake	Kg	37.0	52.0	64.0
制动力矩 Holding torque of the brake	Nm	143	143	143

◎ 技术性能 / Technical performance

技术指标 Specification	单位 units	5FSNA84-[nnn]XabXe0.00-0	5FSNA85-[nnn]XabXe0.00-0	5FSNA86-[nnn]XabXe0.00-0
额定转速 Rated speed	min <sup>-1</sup>	2200	2000	2000
最高转速 Maxium speed	min <sup>-1</sup>	3000	2600	2600
额定转矩 Rated torque	Nm	51.5	72	85
额定功率 Rated power	Kw	11.9	15.1	17.8
额定电流 Rated current	A	23.5	29.5	35
静态转矩 Stall torque	Nm	69	94	115
静态电流 Stall current	A	31.4	39.2	47.9
峰值转矩 Peak torque	Nm	202	280	345
峰值电流 Peak current	A	106	133	164
转矩常数 Torque constant	Nm/A	2.2	2.4	2.4
电势常数 Voltage constant	V/1000min <sup>-1</sup>	135	150	150
绕组电阻(线) Resistance ( line)	Ω	0.15	0.15	0.11
绕组电感(线) Inductance(line)	mH	4.8	4.4	3.5
无制动器转动惯量 Inertia without brake	Kgcm <sup>2</sup>	107	142	182
带制动器转动惯量 Inertia with brake	Kgcm <sup>2</sup>	149	190	230
无制动器重量 Weight without brake	Kg	48.5	65.9	83.5
带制动器重量 Weight with brake	Kg	55.5	72.5	90.5
制动力矩 Holding torque of the brake	Nm	143	143	143

◎ 技术性能 / Technical performance

技术指标 Specification	单位 units	5FSNA93-[nnn]XabXe0.00-0	5FSNA94-[nnn]XabXe0.00-0	5FSNA95-[nnn]XabXe0.00-0
额定转速 Rated speed	min <sup>-1</sup>	2000	2000	2000
最高转速 Maxium speed	min <sup>-1</sup>	2500	2700	2400
额定转矩 Rated torque	Nm	86	114.6	148
额定功率 Rated power	Kw	18	24	31
额定电流 Rated current	A	40	53.3	68.8
静态转矩 Stall torque	Nm	135	180	240
静态电流 Stall current	A	62.8	83.7	111.6
峰值转矩 Peak torque	Nm	370	500	700
峰值电流 Peak current	A	205	278	388
转矩常数 Torque constant	Nm/A	2.2	2.2	2.2
电势常数 Voltage constant	V/1000min <sup>-1</sup>	154	146	161
绕组电阻(线) Resistance ( line)	Ω	0.11	0.07	0.05
绕组电感(线) Inductance(line)	mH	5.3	3.6	1.7
无制动器转动惯量 Inertia without brake	Kgcm <sup>2</sup>	243	373	503
带制动器转动惯量 Inertia with brake	Kgcm <sup>2</sup>	5.3	423	553
无制动器重量 Weight without brake	Kg	87	106.5	135
带制动器重量 Weight with brake	Kg	122	142	170
制动力矩 Holding torque of the brake	Nm	370	370	370

卓越动力铸就非凡科技

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