HTB05 变频调速异步电动机用户手册

HTB05 AC Drilling Motor

User Manual

YJ05.000.000SC

HONGTIAN

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在您使用该电动机之前，请您先仔细阅读这本用户手册，它会告诉您如何正确安装、操作、维护，使其更好的为您服务。

请您妥善保管这本用户手册，以便今后使用。

Before operation, we would like you to read this manual carefully which providing information to you to encourage proper installation, operation, maintenance and repair.

Keep this manual for using in the future!

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安全警示 **Safety Warnings**

* 本说明书适用于 HTB05 系列变频调速异步电动机，使用该产品前必须仔细阅读以下内容。
* 严禁带电拆卸电机零部件。
* 检修后组装，如果紧固用螺钉及螺栓损坏需更换时，不得低于原配螺钉及螺栓的性能等级。
* 带防护要求的零部件有锈蚀或损坏需要更换时，必须向原制造单位联系，选用符合要求的零部件，严禁使用者擅自配制更换。

- This manual is applicable for HTB05 VF Induction Motor. Must read it before operate the product.
- Be sure all power is off before dismantling parts.
- Assemble it after inspection, if tightening bolt or screw damaged, replace with new one not less than the former.
- If need to replace the part with protective requirement caused by damage or rust, it strongly recommended to contact its manufacturer for change or purchase.

1. 环境要求和工作条件 Service Conditions

电动机应在下列条件下运行。

a 海拔高度不超过 1200m 。

b 环境温度：-40℃～+55℃。

c 环境空气最大相对湿度：月平均最低温度不高于 25℃时，月平均最高相对湿度为 90%。

d 钻机设备受雨、雪、风沙的侵袭。

e 钻机设备正常运行时产生的冲击和振动。

f 符合钻井作业 HSE 要求。

g 含有ⅡA、ⅡB 级、T1～T3 组爆炸性气体或蒸汽与空气形成的爆炸性混合物的 2 区场所。

当电动机需要在超过上述某项条件运行时，由用户与制造厂商协商作出特殊处理。

Motor should operate under the following service conditions:

a. Exposure to a maximum altitude of 1200m.
b. Exposure to an ambient temperature in the range of -40℃～+55℃
c. Max. relative humidity of ambient air: when average monthly min. temperature less than 25℃, average monthly max. RH as 90%.
d. Subject to rain, snow or sand.
e. Subject to the shock or vibration caused by equipment normal running.
f. Conform to drilling HSE requirements.
g. Applied in the area of ⅡA&ⅡB ,T1~T3 explosive gas atmospheres zone 2.

When the service conditions exceed the above, the manufacturer should be consulted to manufacturer and make a proper solution.

2. 基本数据 Basic data

2.1 电机主要参数 Main Parameters

结构形式 Construction： 三相异步鼠笼式电动机 three-phase squirrel-cage induction motor

额定功率 Rated power： 1200kW

额定电压 Rated voltage： 575V

额定电流 Rated current： 1449 A

额定转速 Rated speed： 1000r/min

额定转矩 Rated torque： 11459N·m

额定频率 Rated frequency： 50.5 Hz

功率因数 Power factor： 0.88

效率 Efficiency： 94.5%

恒功最高转速 Max. speed at constant power： 1500r/min

恒功最高频率 Max. Freq. at constant power： 76Hz

恒转矩转速范围 Speed range at constant torque： 0～1000r/min

恒功转速范围 Speed range at constant power： 1000 r/min～1500r/min

绝缘等级 Insulation class： H

防护等级 Protection degree IP44（主机 main motor） IP55（接线盒 terminal box）

级数 Number of poles： 6

相数 Phase： 3

定子绕组接法 Stator winding wiring method： Y

工作制 Duty： S1

冷却方式 Cooling means： 强迫通风（自带风机）forced cooling (self-own blower)

2.2 温升限值 Temperature-rise limit

电机部件 Motor part	绝缘等级 Insulation class	测量方法 Measurement	允许温升 Allowable temperature rise
定子绕组 Stator winding	H	电阻法 Resistance measurement	180K
转子 Rotor		点温度计法 By thermometer of point	温升以不损害任何绕组或其他部件为限 Without damage to any winding or other parts
轴承 Bearing		温度计法 By thermometer	55K

2.3 轴承型号及润滑脂牌号 Model of Bearing and Lubricating Grease

非传动端（前端）Non-drive end： NJ320ECM/C3+HJ320EC（SKF 或 FAG）

传动端（后端）Drive end:： NU330ECM/C3 （SKF 或 FAG）

润滑脂牌号 Lubricating grease： Arcanol L135V（FAG）

2.4 质量 Weight

总质量 Total weight 3370kg(HTB05), 3360kg(HTB05A)

转子装配 Rotor assembly 893kg

定子装配 Stator assembly 855kg (HTB05), 1847kg(HTB05A)

2.5 HTB05、HTB05A 变频调速异步电动机外形图分别见附图 1、附图 2。

Outline views of HTB05 and HTB05A motor refer to the attached drawing 1 and 2.

2.6 螺栓紧固力矩 Bolt tightening Torque

螺纹直径 Thread diameter	M6	M10	M12	M16	M20
紧固力矩(N·m) Tightening torque	7±1	37±5	62±7	155±15	300±20
螺纹直径 Thread diameter	M24				
紧固力矩(N·m) Tightening torque	700±36				

2.7 结构参数 Construction parameters

电机定子铁心槽数 Number of stator core slots 72

电机转子铁心槽数 Number of rotor core slots 62

电机气隙长度 Air-gap 1.8mm

定子绕组节距 Stator winding pitch 10

并联支路 Parallel branches 6

3. 结构介绍 Construction Introduction

3.1 HTB05 与 HTB05A 电机的差异 Difference between HTB05 and HTB05A

除风机和接线盒在电机上的装配位置与风机型号不同外，两种电机是完全相同的。HTB05 电机从传动端视之为顶置风机、左置接线盒，其风机型号为 BL13-11B-R；HTB05A 电机从传动端视之为顶置风机、右置接线盒，其风机型号为 BL13-11B-L；

Other than the assembly position of blower and terminal box and blower model, these two motors are identical. When viewing from the drive end of HTB05 motor, the blower (model BL13-11B-R) is at the top and terminal box at the left; and when viewing from the drive end of HTB05A motor, the blower (model BL13- 11B-L) is at the top and terminal box at the right.

3.2 概述 General

本电动机为卧式、单轴伸、双轴承支撑结构的三相鼠笼式变频调速异步电动机。轴伸为 1:9.6 锥度，并带有液压卸联轴节的油槽。电动机采用了高品质的进口轴承和长效润滑脂，总体具有长达三年的免维护　周期。电动机为防护式强迫通风，自带风机，冷却空气从非传动端进入，由传动端排出。

在电机接线盒侧安装有除湿电加热器，当外部环境温度低于允许使用温度，或温度过低电机内部凝结霜露，或停机时可接通电源，对电机升温保温，避免电机受潮，影响设备安全。

电机定子绕组间隙安装有 PT100 铂热电阻传感器，引线连接在电机接线盒内接线端子上，与辅助控制电路连接。PLC 在电动机运行中检测定子绕组温度，过热时给予保护。

The motor is horizontal type and has a construction of single shaft extension and double bearings support. The shaft extension is taped to 1:9.6 with oil trough for removing coupling. The high quality imported bearing and everlasting lubricating grease are used and have life expectancy of 3 years without any maintenance. Also, the motor is cooled by the self-blower which forces air past from non-drive end to drive end.

There is a electric heater installed near the terminal box; when ambient temperature lower than allowable, motor inside condensation or at stop, the heater should be energized for preventing from moisture and keeping equipment safe.

PT100 platinum RTDs are supplied in the stator winding slots, whose leads are connected on terminal blocks and with auxiliary control circuits. PLC shall monitor stator winding temperature and protect against overheat.

3.3 定子 Stator

定子绕组为成型双层叠绕组。定子绕组端部用涤玻绳绑扎，并在引出线一侧，集电环用支撑固定在定子压圈上，集电环引线头与软编织铜线联接后绝缘处理，三相引线头在机座出线窗口引出后固定。定子整体真空压力浸漆处理。

Stator winding is form-wound double layer type. The stator winding end is tightened up by polyester rope and at the side of leads. Collector ring leads have been insulated after connected with flexible copper wire, and the three-phase leads are fastened at frame entry. The whole stator is varnished for VPI.

3.3.1 定子铁心 Stator Core

定子铁心由 50W470 优质冷轧硅钢片冲制的整圆片叠制而成。通过拉杆和两端的压圈压紧并焊接，然后热套到定子机座上。

The stator core is laminated by 50W470 high quality cold rolled silicon steel plates, which are compressed and welded with the pull rods and pressing rings, and then apply shrink fit on stator

frame.

3.3.2 电枢线圈 Armature coil

电枢线圈由聚酰亚胺-氟 46 复合薄膜绕包线绕制而成， 采用聚酰亚胺薄膜作为对地主绝缘，外包绝缘采用无碱玻璃丝带。

Each coil is wound by 46 compound film lapped wire of polyimide-fluorin, and mainly insulated by PI film, exterior by alkalifree glass tape.

3.4 接线盒及引出线 Terminal box and leads

电动机接线盒置于电机侧面，三相引出线标志为 U、V、W。

Terminal box is installed at the side of motor, and its leads are identified as U, V, and W.

3.5 转子 Rotor

转子为铜条鼠笼式结构。导条插入转子铁心槽后，将导条冲紧并固定在槽内。导条与端环采用硬钎焊。转子铁心由 50W470 优质冷轧硅钢片冲制的整圆片叠压而成，铁心与转轴键配合，并通过两端的压圈及锁紧螺母压紧铁心。转子铁心内部有冲制的两圈孔形成轴向通风道。

Copper rotor bars are used to form squirrel cage construction, which have been inserted into core slots and punched tightly. The rotor bars are brazed with end rings.

The rotor core is laminated with 50W470 high-quality cold rolled silicon steel plates, which is compressed by pressing rings and tightening bolts. Holes are punched to be core ventilating holes.

3.6 端盖 End Brackets

前、后端盖为铸造结构。

Front and rear end brackets are of cast construction.

3.7 通风机 Blower

通风机整机外购，整体靠蜗壳出风口联接法兰支撑并安装在电动机主机上。

The blower is purchased from outside which supported by volute housing and installed on the main motor.

4. 安装及使用 Installation and Operation

4.1 新安装或长期停用的电机，在开机前应做如下准备：用 1000V 兆欧表测量电机定子绕组及联线对机壳的冷态绝缘电阻，应不小于 2MΩ,如小于此值时，应先检查接线盒内是否有灰尘及定子绕组绝缘是否有损坏现象，然后分别测量电机定子绕组及联线对机壳的冷态绝缘电阻，如是定子绕组冷态绝缘电阻低，则接通电机内部的电热板进行干燥处理。用手拨动转轴，转子转动应灵活。

For new equipment or long-time shut down, the following preparation should be performed: measure

cold insulation resistance of stator windings and leads by using 1000V megohmmeter, as a minimum of 2MΩ. If less than this value,should check terminal box inside for dust and stator winding insulation for damage; and measure the insulation resistance of stator windings and leads separately, if that of stator windings is lower, energize motor's heater to dry inside. Rotor should move smoothly when turning shaft.

4.2 电机接好线开机前应检查 Check the following items before startup.

4.2.1 通风机的转向是否正确。检查方法：将风机电机通电再断电，看风机电机的风扇叶转向是否和风机转向标识一致。

Check the blower rotary direction before startup in sequence: power on and power off blower motor to observe whether it moves in the same direction with blower.

警告：*不能以是否出风来判断通风机的转向，因为离心式风机不管正转反转都出风，只是风量不同。*

CAUTION: *The rotation cannot be decided by whether it outputs air, in that the centrifugal blower will produce air in clockwise or counterclockwise, only difference in air flow.*

4.2.2 检修开关复位 Reset the lockout switch。

4.3 风机滤尘器 Air Filter

风机滤尘器装在风机的进风口，在风机的转向正确和风机电机转动正常的情况下，开动风机后风压开关应动作，如果风压开关不动作，一般都是风机滤尘器的滤网被空气中的漂浮物堵了，应拆下滤网清理干净再装上。

Air filter is installed at air intake. As long as blower rotation is correct and blower motor moves normally, pressure switch should be activated; if non-activated, it is commonly resulted from filter screen blocked, dismantle and clean it.

4.4 轴承的维护保养 Bearing Maintenance

本电机的轴承安装结构为免维护结构，并且采用了高品质的进口轴承和长效润滑脂，保证从出厂之日起三年免维护。使用满三年后，电机应解体，用汽油清洗轴承及轴承盖并重新润滑。

The bearing is installed to be free-maintenance construction; and the high-quality import bearing and long-term effectively grease have a minimum life of 3 years from the date of leaving factory without any maintenance. After 3 years, motor should be disassembled for bearing clean with gasoline and bearing lubrication.

警告：*不能使用碱性清洗剂清洗轴承。*

CAUTION: *The bearing cannot be used alkaline cleaner.*

电机在运用过程中建议用点温计定时定点测量轴承温升，并作好统计，以便根据轴承温升的发展趋势判断轴承工作状态。如在电机运行 2h 后，在外轴承盖外表面的某一固定点测量轴承温升，每日一次，并作统计。

It is suggested to use themistor thermometer to measure bearing temperature, and record at one-day intervals for decide its operation status.

4.5 紧固 Tightening

检查电机各处螺栓有无松动现象，如有则应对螺栓进行紧固。建议每打一口井检查一次螺栓有无松动现象

Inspect all bolts for looseness; tighten as necessary.

4.6 吹扫 Blow

由于电机的工作环境差，在电机的进风口、出风口、外壳表面和内表面会有灰尘、污垢，不仅影响电机的散热，也容易吸潮，导致金属件腐蚀。所以建议每打一口井吹扫一次电机的内外表面。如用 0.6MPa 左右的压缩空气吹扫电机的外表面，拆下前端盖板或通风机，将高压风管（软管）从窗口伸进电机内部吹扫内表面。

Under a severe service condition, the motor is subject to dust or dirt which will accumulate and interfere with normal ventilation. So that, it is recommended to blow the inside and outside of motor at a interval of drilling a well; blow the outside surface with a compressed air about 0.6MPa; dismantle the front end bracket or blower to blow the inside with high-pressure hose.

5. 故障分析 Fault Analysis

5.1 电机不能起动 Motor Unable to Start

应从如下七个方面分析处理：

a. 通风机转向错误（通风机电机接线错误），风压开关未动作；

   Rotary direction incorrect due to the wrong wiring of blower motor, and lead to air pressure switch not activated;

b. 检修开关未复位；

   Lockout switch not reset

c. 电源接线错误；

   Power supply connection incorrect;

d. 电源未通（至少两相未通）；

   Not energized (at least for two phases);

e. 熔丝熔断（至少两相熔断）；

   Fuse burn-out (at least for two phases);

f. 过流继电器整定值太小；

   Over-current relay setting is too small;

g. 控制设备接线错误。

   The wring for control equipment incorrect;

5.2 电动机接入电源后，熔丝被烧断 Fuse burn-out after motor energized

应从如下六个方面分析处理：

a. 缺一相电源启动，或定子线圈一相反接；

Start with lacking of one phase, or one phase of stator coil connected reversely;

b. 定子绕组接地；

Stator winding grounded ;

c. 定子绕组相间短路；

Stator winding phase short-circuit;

d. 定子绕组接线错误；

Stator winding wiring incorrect;

e. 熔丝截面积过小；

Fuse cross-sectional area is too small;

f. 电源线短路或接地。

Power supply cable short-circuit or grounded;

5.3 电动机通电后，电机不转，嗡嗡响 Motor cannot move after energized but humming

应从如下六个方面分析处理：

a. 定子绕组有断路（一相断线），或电源一相失电；

Stator winding has broken circuit (because of one phase broken off) or one phase of power supply blacks out;

b. 绕组引出线始末端接错或绕组内部接反；

Winding leads connection incorrect or winding connected inversely;

c. 电动机负载过大；

Motor overloaded;

d. 转子卡住，或轴承卡住；

Stator or bearing stuck;

e. 电源回路接点松动，接触电阻大；

Power supply loop contact loose, contact resistance much higher;

f. 电源电压过低。

Supply voltage below level;

g.

5.4 电动机外壳带电 Motor Enclosure Alive

a. 电源线与接地线搞错；

Power supply line and grounding line mixed

b. 电动机绕组受潮，绝缘严重老化；

Motor winding dampened , insulation ages badly

c. 引出线与接线盒接地。

Outgoing cable and connection box grounded

5.5 电动机起动困难，额定负载时，转速低于额定转速较多 Motor is difficult to start, and speed is much lower than the rating at rated load

a. 电源电压过低；

Supply voltage is too low;

b. 鼠笼转子开裂或断裂；

Squirrel-cage stator cracks or broken;

c. 定子局部线圈错接、反接；

Stator partial coils incorrectly connected;

d. 电机过载。

Motor overloaded;

5.6 电动机空载或过负载时，电流表指针不稳、摆动 Ammeter pointer sways when the motor is no-load or overload

主要原因是鼠笼转子开焊或断条。

Mainly due to open-weld or broken happened to rotor bars;

5.7 绝缘电阻低 Low insulation resistance

应从如下三个方面分析处理：

a. 绕组受潮或被水淋湿；

Winding affected with moisture;

b. 绕组绝缘沾满粉尘、油垢；

Winding insulation covered with dust or oil;

c. 绕组绝缘老化。

Winding insulation aged;

5.8 电动机空载电流不平衡，三相相差大 No-load current unbalanced and large difference among three phases

应从如下三个方面分析处理：

a. 绕组首尾端接错；

Winding incorrectly connected;

b. 电源电压不平衡；

Supply voltage unbalanced;

c. 绕组存在匝间短路、线圈反接等故障。

Turn-to-turn short circuit and coil connected inversely in winding;

5.9 电动机空载电流平衡，但数值大 No-load current balanced but too large:

应从如下三个方面分析处理

a. 电源电压过高；

Supply voltage is too high;

b. 电机重新装配后，定子、转子铁心未对齐；

The core of stator and rotor not aligned after motor re-assembled;

c. 气隙不均匀；

Air gap nonuniform;

5.10 电动机运行时响声不正常，有异响 Motor sounds abnormally when running

应从如下六个方面分析处理：

a. 轴承磨损，有故障，润滑脂内有沙粒等异物；

Bearing worn and has fault, or grease exists mixed sand or other foreign materials;

b. 定子、转子铁心松动；

Stator or rotor core looseness;

c. 电压太高或三相电压不平衡；

Voltage is too high or unbalanced;

d. 定子绕组接错或短路；

Stator winding incorrectly connected or short-circuited;

e. 轴承缺少润滑脂；

Bearing lacking of grease;

f. 定子、转子铁心相擦；

Friction between stator core and rotor core;

5.11 电动机振动 Motor Vibration

应从如下十个方面分析处理：

a. 气隙不均匀；

Air gap nonuniform

b. 转子不平衡；

Rotor unbalance;

c. 安装不平稳；

Installation unstable;

d. 笼型转子开裂或断裂；

Rotor cracks or breakdown;

e. 定子绕组故障（短路、开路、接地，连接错误等）；

Stator winding faults (short-circuit, open circuit, ground, or wrong wiring, etc);

f. 铁心变形或松动；

Core deformation or loosening

g. 联轴器或其他传动装置安装未校正，或不符合要求；

Coupling or other driving device has been installed without adjustment or not conform to

requirements

h. 轴头压板紧固螺栓松动；

Tightening bolt loosening

i. 轴承磨损，间隙过大。

Bearing worn and clearance overlarge

5.12 电动机过热或冒烟 Motor overheating or smoking

应从如下十个方面分析处理：

a. 电源电压过高，使铁心磁通密度过饱和，造成电动机温升过高；

Overhigh voltage leads to core flux density supersaturation and temperature-rise much higher

b. 电源电压过低，又带额定负载运行电机温升过高；

When motor is running with rated load and at lower voltage, its temperature-rise is much higher;

c. 定子、转子铁心相摩擦；

Friction between stator core and rotor core;

d. 电动机过载或拖动的阻力过大，或频繁启动使电机发热；

Motor overload or driving force overlarge, or motor overheating because of frequent start;

e. 鼠笼转子断条；

Rotor bar broken;

f. 电动机缺相，两相运行；

Motor lacking of phase;

g. 绕组表面沾满尘垢或异物，影响电机散热；

Winding covered with dust or other foreign materials affects motor heat radiation;

h. 冷却环境温度过高，

Cooling temperature is too high;

i. 通风机风扇故障，风道堵塞，通风不良；

Blower fan failures cause blocked air duct and bad ventilation;

j. 定子绕组匝间短路、相间短路以及绕组接地，绕组内部连接错误；

Turn-to-turn short circuit and coil connected inversely in winding

警告：*如因条件限制，无法处理电机故障时，请与修造厂联系进行检修。*

CAUTION: *If the motor fault cannot be treated because of the limited condition, please contact with manufacturer!*

6. 检修方法 Maintenance

6.1 基本技术要求 General Technical Requirements

6.1.1 电机机座及端盖应清扫干净、检查有无裂纹与缺陷，各螺孔螺纹状态良好，铭牌完好清晰。

Motor frame and end brackets should be clean, free of cracks or defection, and screw thread and

nameplate in good condition.

6.1.2 电机定子线圈、联线、导电环绝缘无破损、烧伤，引出线标记清晰正确。

Ensure that no damage or burn in the insulation of stator coil, wires or collecting ring; and leads should be identified clearly;

6.1.3 测量定子绕组线电阻，换算到 20℃时阻值与标准值相比，误差不超过标准值的±10%。

Measure stator winding resistance and the difference should not be exceed ±10% of standard value at 20℃.

6.1.4 电机绝缘电阻要求 Motor insulation resistance

用兆欧表测量各部分冷态绝缘电阻不低于下表要求：

Measure the cold insulation resistance with megohmmeter and not less than the following values:

部位 Position	冷态绝缘电阻 Cold insulation resistance	工具 Tool
定子绕组对地 stator winding to ground	2MΩ	1000V 兆欧表 1000V megohmmeter
辅助电器系统对地 auxiliary electric system to ground	0.5MΩ	500V 兆欧表 500V megohmmeter

6.1.5 定子绕组对地耐压试验 Withstand-voltage test of stator winding to ground

试验电压为 50Hz、1720V 正弦波交流电，历时 1min，应无击穿闪络现象。

Test voltage should be 50HZ, 1720V sine wave AC power and last for 1 minute, as a result of no flashover.

6.1.6 用脉冲耐压测试仪检查定子绕组匝间绝缘情况，每相施加 3600V 脉冲电压，历时 3 秒，匝间绝缘应无破损.

Measure the turn-to-turn insulation of stator winding by pulse withstand voltage insulation tester: 3600V pulse voltage for each phase and last for 3 minutes, as the result of no damaged.

6.1.7 电机按下表要求空转，轴承应无异常振动和噪声，各部件无异常。

When motor idling at the following speed, it is required without abnormal vibration or noise for bearing, and all parts in good condition:

转速(r/min) RS(r/min)	400	1000	1500
时间(min) TIME(min)	5	30	5

6.2 原始数据及限值 Original data and limit

序号 No.	名 称 Name	原 形 Original shape	限 度 Limit
1	传动端后内封环位轴径(mm) Shaft diameter of drive end internal seal ring (mm)	$\phi 153r6(^{+0.09}_{+0.065})$	
2	传动端后外封环位轴径(mm) Shaft diameter of drive end external seal ring (mm)	$\phi 146s6(^{+0.125}_{+0.1})$	
3	传动端轴承位轴径(mm) Shaft diameter of drive end bearing (mm)	$\varphi 150^{+0.055}_{+0.036}$	
4	传动端轴承径向原始游隙(mm) Radial internal clearance of drive-end bearing (mm)	0.115~0.165	
5	非传动端内封环位轴径（mm） Shaft diameter of non-drive end internal seal ring（mm）	$\phi 105r6(^{+0.076}_{+0.054})$	
6	非传动端轴承位轴径（mm） Shaft diameter of non-drive end bearing（mm）	$\varphi 100^{+0.048}_{+0.031}$	
7	非传动端轴承径向原始游隙(mm) Radial internal clearance of non-drive end bearing (mm)	0.075~0.11	
8	组装后转子轴向移动量(mm) Rotor axial displacement after assembling (mm)	0.13~0.4	0.5
9	传动端轴承内圈安装后的径向跳动量(mm) Inner ring radial run-out value of drive end bearing after assembling (mm)	0～0.03	0.04
10	非传动端轴承内圈安装后的径向跳动量(mm) Inner ring radial run-out value of non-drive end bearing after assembling (mm)	0～0.025	0.035
11	定子绕组线电阻值（Ω） Stator winding phase-to-phase resistance	0.0045	10%

6.3 检修过程及要求 Procedures and Requirements

6.3.1 电机解体，抽出转子，卸下封环和轴承，并对端盖、轴承等零件进行清洗、吹干。轴承须用汽油进行清洗。

Disassemble the motor and pull out its rotor, dismantle end rings and bearing and clean the bearing and end bracket. Meanwhile, it's required to clean the bearing with gasoline.

6.3.2 定转子分别先用压力不大于 0.6MPa 的压缩空气进行吹扫，然后用汽油或中性清洗液擦洗，最后用

清水冲洗，清洗干净后吊入烘箱烘潮，烘潮要逐步升温，加热至 60℃左右须保温 2h，便于电机内水气彻底蒸发，然后加温至 110~120℃左右烘 4h。在烘潮过程中用 1000V 兆欧表每隔 1h 测量一次定子绕组对地绝缘电阻，连续三次测量绝缘电阻值趋于稳定状态，相互间误差不大于 10%，且热态绝缘电阻不小于 0.6MΩ 即可认为烘焙合格。

Blow the stator and rotor with compressed air not more than 0.6Mpa, and clean with gasoline or neutral cleaning solution and then wash off by pure water. So lift them into drying cabinet, till temperature increasing to 60℃ keep for 2 hours, so as to evaporate steam completely; and continuously increase to 110～120℃ and keep drying for 4 hours. During this period, measure winding insulation resistance with 1000V megohmmeter for three times per hour, if the difference of these 3 results is not more than 10% and hot insulation resistance no less than 0.6MΩ, this drying reaches to standard.

6.3.3 定子检修 Stator Maintenance

对清洗干净后的定子进行检查，各部分绝缘应无破损，联线固定可靠、排列整齐、绑扎牢固。

用双臂电桥测量定子绕组线电阻值，标准按 6.2。

对地耐压试验标准按 6.1.5。

匝间耐压试验标准按 6.1.6，应无闪络击穿。

After clean and dry, inspect the stator for insulation damage, and wiring fastness and order.

Measure stator winding resistance with double bridge, and refer to 6.2 for standard.

Withstand voltage test to ground should be performed in accordance with 6.1.5.

Withstand voltage test in turn-to-turn should be performed in accordance with 6.1.6 and without flashover.

6.3.4 转子检修 Rotor Maintenance

转子导条两端、端环、支架通风孔内不得积存油污。

轴、导条、端环、导条与端环焊接不得有裂纹、变形，轴承位不得有拉伤。

平衡块丢失、松动、空转振动大的转子须作动平衡试验，最大不平衡量两端均为 30g。

No dirt is accumulated on rotor bars, end rings or spider, which will interfere with normal ventilation.

Ensure rotor bars and end rings without cracks or deformation.

If the rotor is looseness and exceeds vibration limit at no load, it’s required to perform dynamitic balance test, and the unbalance response at the both ends should be not more than 30g.

6.3.5 轴承清洗干净后须仔细检查，内外圈、滚动体、保持架均不得有伤痕、锈蚀，滚动体滚动灵活，轴承游隙符合标准，否则须更换。

After the bearing is clean up, inspect for damage or flexibility to inner and outer ring, roller and bracket; bearing clearance for meeting requirement; replace as necessary.

6.3.6 电机组装，转子吊入定子内时不得磕碰 When assembling, rotor should be lifted into stator smoothly。

轴承型号和润滑脂牌号须符合本电机标准，轴承加热温度不超过 120℃。

轴承加油量：传动端轴承 NU330ECM/C3 加油量为 1000g，非传动端轴承 NJ320ECM/C3+HJ320 加油量为 290g。轴承空间加满，轴承室空间加 1/2。

The model of bearing and lubricating grease should conform to the standard of this motor. And bearing temperature should not exceed 120℃.

Oil feed requirement of bearing: 1000g for drive-end bearing NU330ECM/C3, 290g for the opposite-drive end bearing NJ320ECM/C3+HJ320. Bearings should be fed fully, but bearing housings be fed to 1/2.

6.3.7 解体检修后重新组装的电机均需按 6.1.7 要求进行空转试验，电机应运转正常，轴承无异音。

The reassemble motor should be performed the idle test as 6.1.7, as a result of normal running and no noise for bearing.

6.3.8 联轴节的安装 Coupling installation

联轴节安装时，首先把联轴节套在轴上，推紧并用深度尺测量与后封环的距离，然后将联轴节加热到 250~260℃，联轴节在轴上以冷态测量值为基准向里推进 3.05~3.3mm。

Fit coupling on shaft and push tightly; and heat coupling to the temperature of 215~250℃ for a further push of 3.05~3.3mm.

6.3.9 电动机大修后须按本手册的 6.1.3~6.1.7 条规定项目进行试验。

After a overhaul, the motor should be carried out tests in accordance with 6.1.3 through 6.1.7.

7. 搬运与存放 Transportation and Storage

7.1 搬运 Transportation

a. 电动机在吊运过程中应按规定位置吊挂，搬运过程中要放置平稳，避免倒置、碰撞。

During this period, lift or hang the motor at specified position, and lay down horizontally. No upend or collision.

b. 在正常运输时，不应因包装不善而受潮，污染与损坏。

Protect the motor against moisture, dirty and damage resulting from improper package.

7.2 存放 Storage

a. 电动机到达后，客户应开箱检查电动机是否有损坏、受潮及生锈等现象。

After the motor arrives at job site, customer should check whether it presents damage, moisture or rust.

b. 电动机存放中，应有必要的防锈措施并作定期检查。轴身或安装底座等其他与用户设备联接安装处应采取防锈和防护措施。

During storage, take necessary measures to prevent rust for storage and make periodic inspection. The position of shaft or mounting base or other devices connecting with user

equipments should be protected against rust.

c. 电动机贮存时应放在干燥、清洁、无酸碱及腐蚀性气体的场地，放置应平稳可靠，勿倒置，电动机上不得放置其他物品。

Store the motor in the location of dry, clean and free of acid, alkali and corrosive. Motor should be placed stably and keep upright.

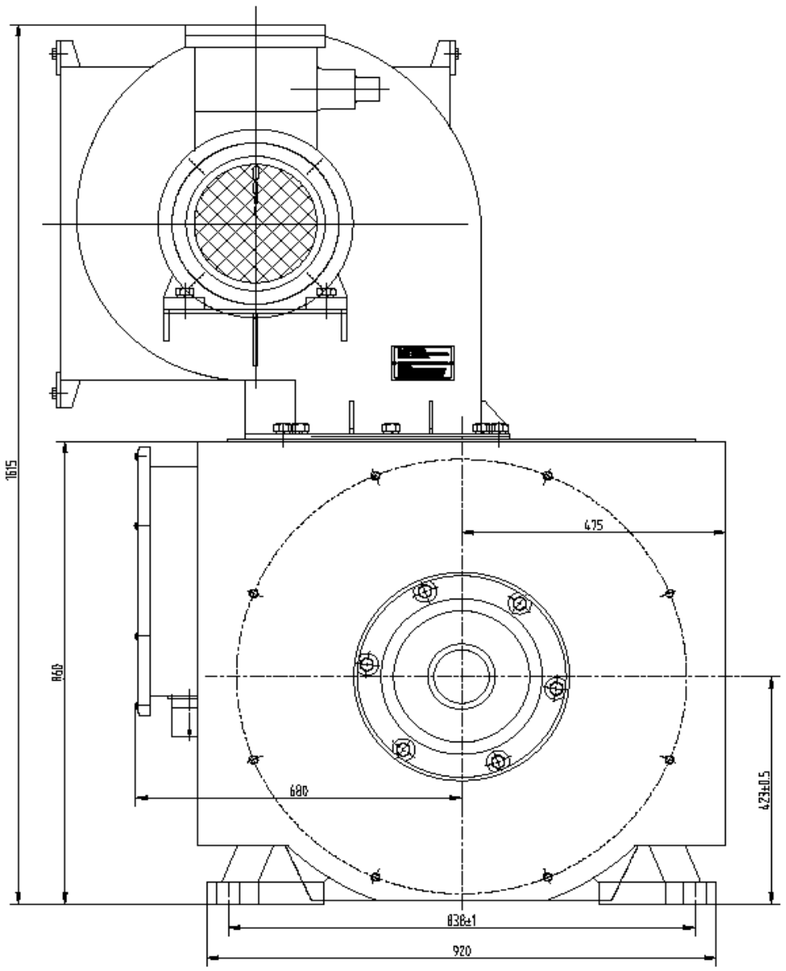
8. 主要外购件目录 Main Purchase Parts List

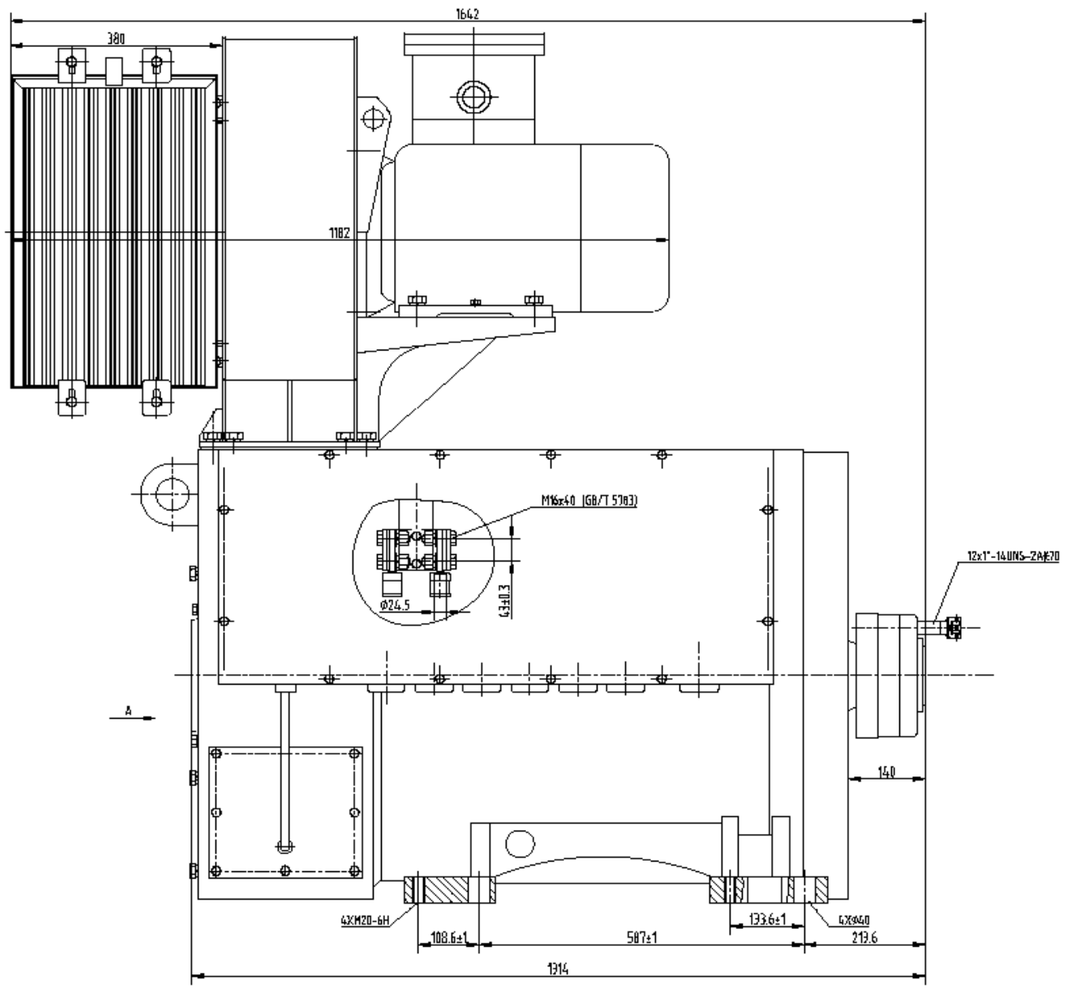
序号 No.	代号 Code	名称 Name	产地 Manufacturer
1	NU330ECM/C3	传动端轴承 Drive end bearing	SKF 或 FAG
2	NJ320ECM/C3 +HJ320EC	非传动端轴承和角圈 Opposite-drive end bearing and angle ring	SKF 或 FAG
3	Arcanol L135V	润滑脂 Grease	FAG of the Schaeffler Group
4	BL13-11B-R（HTB05） BL13-11B-L（HTB05A）	通风机 Blower	无锡锡山特种风机有限公司 Wuxi Xishan Special Blower Co., Ltd.
*5	YB2-160M1-2	通风机辅助电动机 Auxiliary motor of blower	南阳防爆集团有限公司 Nanyang Explosion Protection Group Co., Ltd.
6	XHFY2002A	风压开关 Air pressure switch	佛山基露亚实业有限公司 FoShan ShunDe Glee Ruler Industrial Co.,Ltd.
*7	ZB2BZ102C+ZB2BS54C	急停自锁按钮元件 E-stop self-locked button component	
*8	400W 220V 单相	电热板 Heater	
*9	WH-09-PG42	防爆电缆接头 Ex-proof cable connector	泰州得尔机电制造有限公司 Taizhou De’er Electrical and Mechanical Manufacture Co., Ltd.
*10	WH-06-PG21	防爆电缆接头 Ex-proof cable connector	泰州得尔机电制造有限公司 Taizhou De’er Electrical and Mechanical Manufacture Co., Ltd.
*11	WH-05-PG16	防爆电缆接头 Ex-proof cable	泰州得尔机电制造有限公司 Taizhou De’er Electrical and

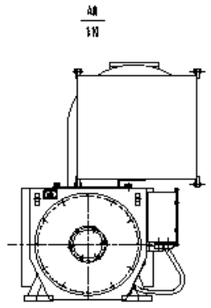
		connector	Mechanical Manufacture Co., Ltd.
*12	ZDU2.5	接线端子 Terminal block	德国魏德米勒集团公司 Weidmuller Interface GmbH & Co.
*13	ZPE2.5	接线端子 Terminal block	德国魏德米勒集团公司 Weidmuller Interface GmbH & Co.
*14	ZDU6	接线端子 Terminal block	德国魏德米勒集团公司 Weidmuller Interface GmbH & Co.
*15	ZPE6	接线端子 Terminal block	德国魏德米勒集团公司 Weidmuller Interface GmbH & Co.
*16	16YT-10J/GZ-10K	防爆 10 芯连接器 Ex. 10-core cable connector	宝鸡友泰电子有限责任公司 Baoji Youtai Electronic Co., Ltd.
*17	PT100	测温铂电阻 Platinum resistance temperature detector	阿泰克斯电子有限责任公司 ATEXIS Co., Ltd., France

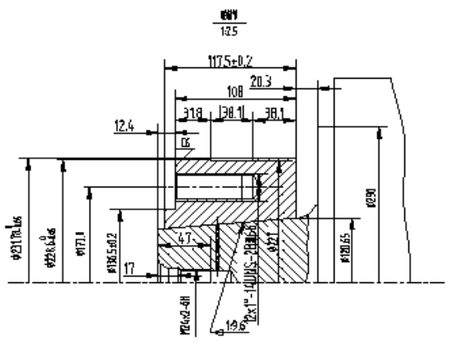
Note: *the parts of the serial number with "*" which means meet with the protective grade and Ex marks, spare component (see 3.1 clause) meet with the requirements in this manual*

附件 **1** **HTB05** 变频调速异步电动机外形图 **Attached drawing 1** **HTB05 Motor Outline Drawing**



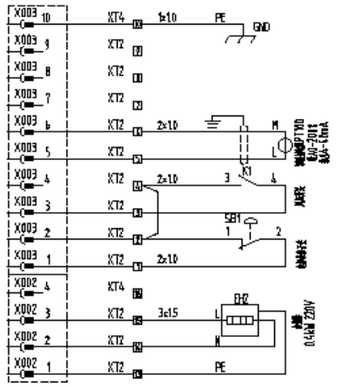


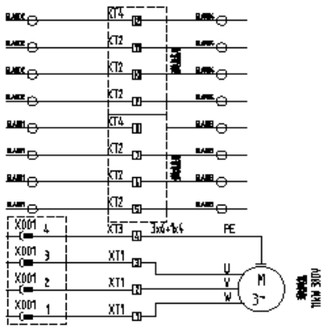




辅助电路接线图

装插件X001—三相双端接头插座6DYT/GT (400V 60A)
装插件X002—三相双端接头插座15YT/GT (400V 15A)
装插件X003—10芯电缆插座16YT-10J/GZ-10K (250V 16A)
接线端子XT1—ZDU6 (600V 45A)
接线端子XT3—ZPE6 (800V)
接线端子XT2—ZDU2.5 (600V 25A)
接线端子XT4—ZPE2.5 (800V)

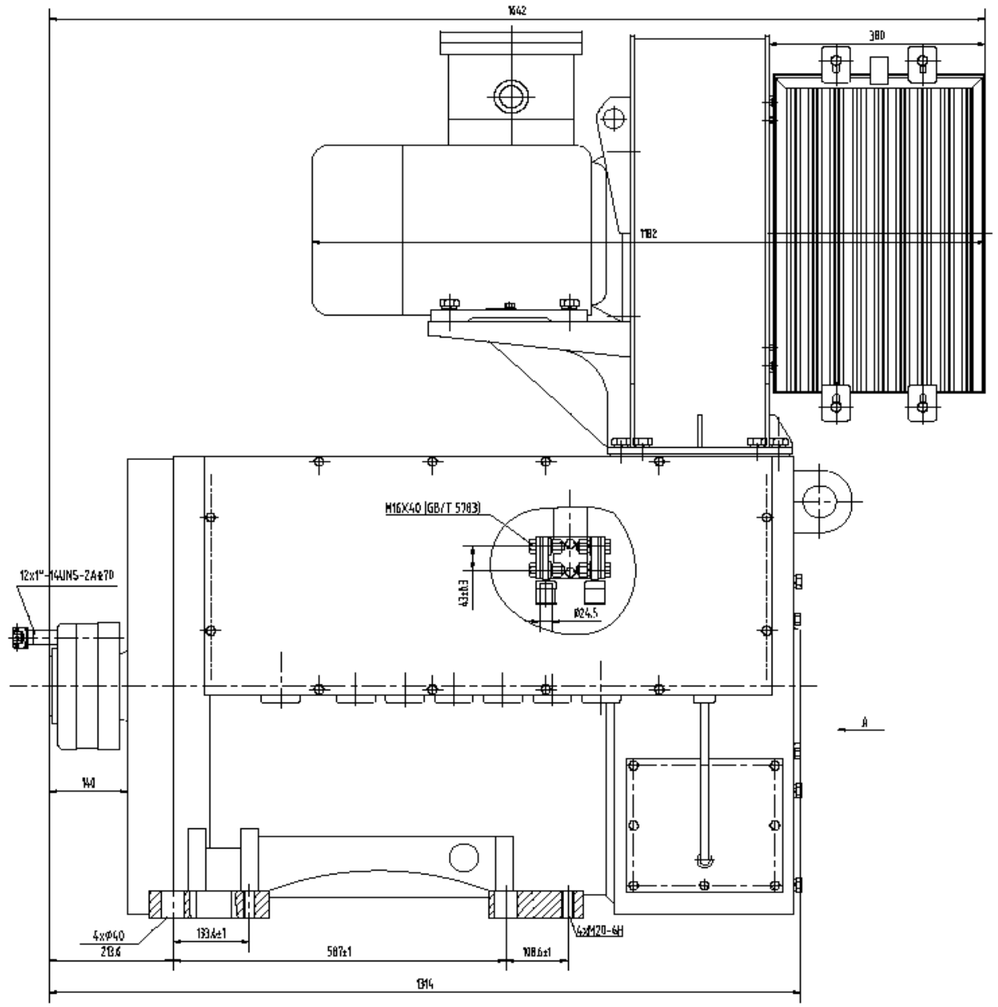


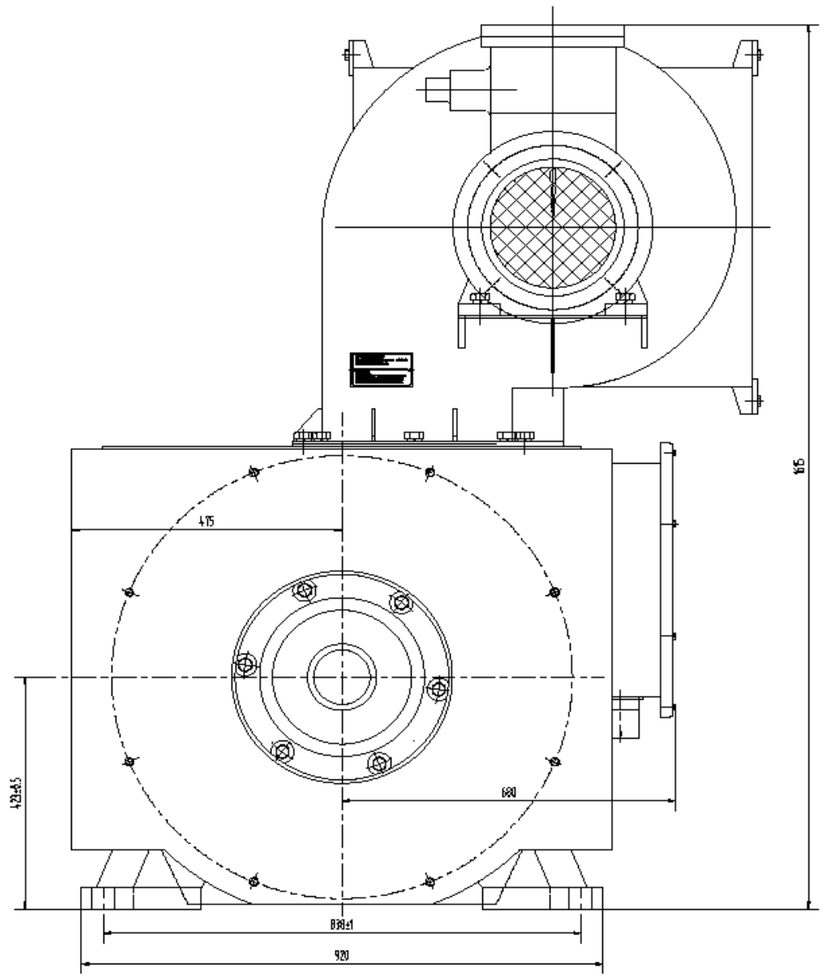


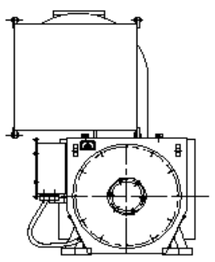
技术参数

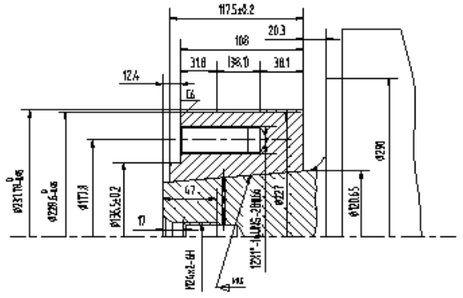
额定功率:1200kW
额定电压:575V
额定电流:1449A
额定转速:1000r/min
额定频率: 50.5Hz
额定转矩:11459N·m
功率因数: 0.88
效率: 94.5%
最高恒功转速:1500r/min
最高恒功频率:76Hz
绝缘等级:H级
工作制:S1
防护等级:IP44
冷却方式:强迫风冷,自带风机
从轴伸端看接线盒在左侧

附图 **2**　**HTB05A** 变频调速异步电动机外形图　　**Attached drawing 2　HTB05　AC Motor Outline Drawing**



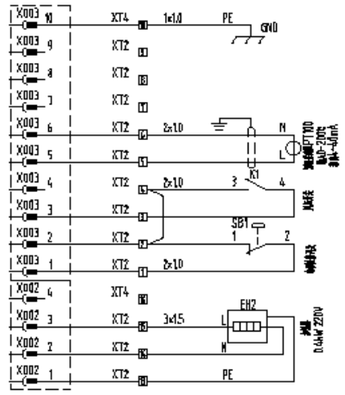


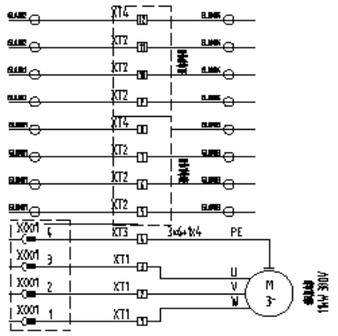




辅助电路接线图

接插件XD01—三相四线插头插座60YT/GT (400V 60A)
接插件XD02—三相四线插头插座15YT/GT (400V 15A)
接插件XD03—10芯电连接器16YT-10J/GZ-10K (250V 16A)
接线端子XT1—ZDU6 (600V 45A)
接线端子XT3—ZPE6 (800V)
接线端子XT2—ZDU2.5 (600V 25A)
接线端子XT4—ZPE2.5 (800V)





技术参数

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额定电压:575V
额定电流:1449A
额定转速:1000r/min
额定频率:50.5Hz
额定转矩:11459N·m
最高转速转矩:1500r/min
最高转速频率:76Hz
绝缘等级:H级
工作制:S1
冷却方式:强迫风冷，自带风机
从轴伸端视接线盒在右侧