Operation and Maintenance Manual for

YVF_2(BPY)Series Variable Frequency Speed-adjustable AC Motor

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1. General

YVF2 series frequency variable speed- adjustableAC motor, sharing merit features of similar products on domestic and overseas market, is designed with computer aided design program. When designer designing , the influence of variable- frequency power source is fully considered, so the drive can achieve compatible use with various frequency conversion devices to constitute AC frequency convertible and speed adjustable system. Its rate classification, frame no, and mounting size are all same with Y2 series three-phase asynchronous motor. The components are in line with IEC international standard, have the character universality and interchangeability. The motor has cage-form rotor, and high operation reliability, at the same time, they are easily maintainable. It carries a cooling blower with independent electric supply, which keep the the motor surface in cool condition and the temperature in the allowed range when the motor running in long-term.

The open-loop system combined with YVF2 motor and general type of frequency converter, adopts V/f control method, under standard frequency and low speed, it can run at constant torque within the scope of 1:10 and achieve high starting torque with a small start-up current.When the system works at a frequency higher than standard frequency, it can raise the frequency with unchanged voltage, and run at a constant torque within the scope of 1:2. In the mean while, YVF2 work together with optical-electricity encoder and vector control frequency converter as a close-loop system, and adjust speed under constant torque in the scope of 1:100 and with constant frequency in the scope of ab 1:2. The system has advantages like quick response and dynamic property.According to the usage, the speed-adjust and frequency-adjust system combined with YVF2 and various of frequency-converter with various of control methods, are widely applied in industry branches like metallurgy, light industry, spinning, chemical industry, machine tool, draught fan, water pump and so on.

2. Installation

2.1 Receiving and storage

Please check the package if it’s become damp before opening of the box. After opening, clean the dust and rust-proof coating carefully; check if there is deformation and damage caused by loading and unloading and the transportation; Inspect carefully,if all motor parts are assembled in good condition and no fastening members, like screws, nuts have become loosened during the transportation; Inspect, if the rotor in good condition and the data on the rating label is in accordance with the requirements; Inspect, if the insulation resistance is in the allowed scope, if it’s too low, then it needs be dried.

If the motor won’t be put in running at once, please store the motor in a dry and dust-free warehouse. After long time storage, the bearings should be lubricated again before the motor is put in use.

2.2 Installation

Please install the motor in ventilated circumstance, and keep space between the motor and other equipments. The place of installation should be easy to access, monitor and clean.

Installation foundation should be stable and solid, the installation surface should be even. Unevenness of the installation surface and the unstable running of the motor may lead to the damage of the bearings.

2.3 Connect to Machinery

The motor can be connected to machine using couplings and belts.

2.3.1 When the couplings are used, please align the shaft center line of the motor with the shaft center line of machine, the offset will lead to strong vibration, and so much as damage of the equipment.

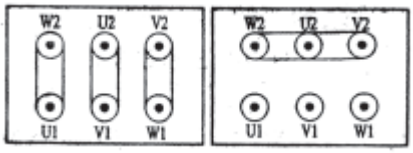
2.3.2When the belts are used, the the shaft center line of the motor should be parallel to the shaft center line of machine, the belts center line should be in the vertical position to the shaft center lines. The minimum diameter of the pulley depends on the allowed radial tension on motor shaft extend end.Please contact supplier for the the limit about the redial tension.

2.3.3 Before the couplings and belts are installed, the balance should be calibrated with half key.

2.3.4 when the couplings and belts are installed, support devices should be used to prevent the shaft extend surface and bearings from damage.

2.4 Wiring:

The wiring should comply with the wiring map. The wiring map for normal motor coil as following:



▲ Connection Y Connection

If there are no special instruction, Y connection should be applied to motor with power ≦ 3kW, and ▲Connection applied to motor with power above 4 kw.

If the power phase sequence A, B, C of the frequency converter separately correspond to binding post U1,V1, W1, the motor will rotor clockwise, seeing from the main shaft extension end. If the phase sequence changed, the rotary direction will also changed.

The motor is equipped with axial-flow fan, which equipped with an individual terminal box. The motor of the fan should be connected to appropriate power supply, please note, that the motor of the fan should connected to power frequency source. When the fan impeller rotates in the right direction, the cooling air should come in from the blower and blow to the motor.

3. Preparation before Start-up

3.1 For new installed motor or a motor has stopped more than 3 months, the insulation resistance should be checked, normally the value should be ≧1MΩ, otherwise the resistance should be dried.

3.2 Check, if the the screw is fastened,if Bearing is lack of grease, if all the wiring are in accordance with requirements, and if the grounding of the shell is reliable. To avoid the electric-magnetic mutual disturbance between motor and frequency converter, the motor should not share grounding with the frequency converter. The should separately grounded.

3.3Check, if the motor and mechanical load are properly installed, and the unit rotate flexibly. Is there any blocking, jump and strange noise.

3.4Check the wiring of frequency converter according to the instruction, and conduct inspection before connection of power. When all the steps conducted, and then set and adjust the parameters of the frequency converter before it is connected with motor. After confirmation the

conformity of the frequency converter with the motor, then they can be connected.

The above mentioned inspection should conducted step by step, the motor should not be started before all the problem solved.

4. Start-up

4.1 When the power is switched “On”, if the motor haven’t start up, please check the frequency at first: if output , time for acceleration and slow down are properly set, V/f mode is corrected chosen; and the value of electric thermal protection is correct. If the motor don’t rotate, then check wiring and loading condition.

4.2 After start-up, please pay attention to the motor , drive device, machine and the data on the converter panel, if there are some strange phenomenon, please stop the equipment, debug and then restart.

5. Maintenance during the running

5.1 The temperature of the running motor should not exceed the allowed limit(when the ambient temperature ≤40℃, B class should not exceed 80K, F class should not exceed 105K). The temperature of shaft should not exceed 95℃, During the motor running, the temperature of the different parts of motor should be monitored.

5.2 Monitor of load current of the motor . The most defects will lead to increasing of the stator current and overheat of motor. The load current should not exceed the 1.05 times of the rated current on the rating label. The electric thermal protection function of the frequency converter can also be used prevent the motor from overcurrent.

5.3 Please pay attention to the smell of scorching and noise. When it’s overheated, Winding will emit smell of scorching. In most situation, if there is such defect, especially machinery defect, the machine will vibrate and become noisy. So if the scorching are smelled and and strange vibration is seen or scretching , buzz and other strange sound are heard, the machine should be stopped and checked.

When the speed of motor is adjusted by the frequency converter, the motor has bigger noise and vibrationthan that is powered by power grid, because of the ultraharmonics. With the variation of the frequency, foundamental harmonics and ultraharmonics variate in wide scope. The motor will possibly have resonance with all parts and machine, when the speed is adjusted to the the point of system resonance frequency, the system will possibly create voilent vibration and noise. At this time, the resonance could be avoided by increasing of the stiffness of the system,or frequency hopping function of frequency converter.

5.4 The daily maintenance includes inspection of heat of the bearings, oil leaking phenomenon. The motor with frame size small than 160mm is equipped with oil-retaining bearings, for which oil are not to be refilled. For the motor with frame size up 180mm, the oil or grease should periodically checked and applied. No.3 lithium-based grease is optimal for the bearings. Principally the type of the oil or grease should not often changed. And the volume of lubrication oil or grease should not exceed the 70% of the volume of the bearings housing.

5.5 The inside of the motor should be clean, and water drop, foreign grease and contamination and other things should be kept outside of the motor. The inlet and outlet of air should be unblocked.

6.Malfunction and Trouble shooting

At first, we should find out the defect position. The system can normally devided into 3 phases when the defect is analyzed.

(1) The front part of the converter, power and input signal

(2) Frequency converter itself

(3) The rear part of the converter, motor, mechanical load

The defects happen on the 1.and 2 phase should be disposed according to the instruction of converter, and for the 3 phase, the following are the malfunction and trouble shooting.

Fault	Possible Reason	Solution
1. The motor can not start	a.One of the phases of stator winding is open	Check stator winding, find out the open circuit, and repair
	b.Any short-circuit among windings and phases	Check the resistance of stator windings and find out the short-circuit and repair.
	c.Wiring defect of stator	Correct the wiring according to the rating plate or wiring map
	d.The defect on mechanical load or drive device	Disconnect motor and mechanical load, if the motor can start-up,the mechanical load should be checked, and eliminate the defects.
	e.Improper parameter of converter	Check the parameter of converter, and adjust
2. After start-up, the rotary speed lower than rated speed	a.Incorrect output voltage and frequency of the converter	Reset according to the requirements.
	b.Over load of the motor	Check the drive device work effectively.
3. Motor has strange noise and dramatic vibration	a.Mechanical friction(include the friction between stator and rotor)	Check the clearance between rotary part and static part, find out the reason, andsolve the problem
	b.Single phase running	Switch off, and switch on the power, if the motor can’t be start up, then one phase could be broken, check the power source and motor, and repair.
	c.Poor grease or damage of the bearings	Clean the bearings, and refill the oil or grease, or change the bearings.
	d.Wrong wiring of the motor	Find the out the position and correct.
	e.The rotor balance is disturbed after repairing	Recalibration
	f.Bend or distortion of Shaft extension	Straightening and change the shaft if necessary
	g.Loosen of couplers	Find out the position and fasten the screw or bolt
	h.The mounting surface is	Check the foundation and correct

	uneven or has defect	
	i.Carrier frequency of the converter incorrect	Change the carrier frequency
4. Motor overheated	a.Overload of the motor	Check the value on converter panel, or measure the rotor current using electric-magnetic amperemeter, if the motor is overloaded , should reduce the load.
	b.Single Phase running	Check wiring of converter and motor rotor, and repair.
	c.Wrong connection of motor	If such misusing of △ connection and Y connection methodare found, must be corrected at once.
	d.Interturn or interphase short circuit orshort circuit of grounding,	Find out the short circuit and grounding and correct
	e.Squirrel cage rotor	Change the rotor
	f.Friction between stator and rotor	Check the assembly of the bearings, and the assembly of stator and rotor, and repair.
	h.Poor ventilation	Check fan and fan blade, if damaged, should repair If the air duct blocked, should remove the barrier, clear the duct, and other stuffs, keep the air duct free of blocks.Check the power source and the connection.
	i.Incorrect V/f parameter of the converter lead to overexciting of the low loaded motor, current exceed the rated value	Adjust the V/f parameter.
	j.When stopping the motor using DC brake function of converter, the brake current too high	Adjust the DC brake current, the normal value should be in the scope of 100%-150% of the rated current, considering the brake frequency.
5. Over heat of the bearings	a.Bearings damage	Change the bearings
	b.Inappropriate volume of the grease on bearings, too much, too less or impurity	Correct or change the grease.
	c.Assembly between bearings and shaft, or bearings and end cover inappropriate	Adjust if too loose or too tight
	d.The position between both endplates of motor and bearing	Align the endplates and bearingcover, fasten the bolt

	cover unparallel	
	e.Inappropriate assembly of pulley(too loose or too tight), orassembly problem of coupler	Adjust the assembly
	f.For motor of protection class IP54, inappropriate assembly of oil seal on shaft end	Adjust the assembly
6.Measurable current on shell	a. Poor earthing	Check the contact of grounding bolt or grounding wire with the motor shell
	b.Winding moist, insulting resistance too lower	Dry the winding
	c.Insulation damage, stator coil touch the iron core winding	Repair
	d.wiring board contaminate	Clean the wiring board
	e. Resistance of outlet broken	Wrap the outlet with resistance

7. Usage and maintenance of accessories

7.1 The attached optical-electric encoder or tachogenerator should not be dismounted at will and should be protect from impact. When the motor are moved, these should not be force bearing point. The usage and assembly should follow the instruction.

7.2 When the motor with brake are driven by frequency converter, please pay attention to the following:

7.2.1. The attached electric is normally power-off brake, after the power switched on, the brake will be off. At this time, check the shaft extension, it should can rotary without blocking. The clearance between the friction surfaces has been adjusted before delivery, should not be changed at will. The brake surface should be kept clean and free from contamination from grease and other foreign things, so that the brake can work reliably after the power-off. If the brake is electric brake, the brake should be checked before the power on .

7.2.2 The brake is powered by ac or dc, please refer to the nameplate.

7.2.3 When the motor is rotary in high speed, it should not be stopped with electric-magnetic brake, first the speed should be reduced using the converter, then stop with electric brake.

7.24. If the the motor is stopped using brake when frequency converter outputting voltage, the stall may happen, the motor current will increased dramatically. Please firstly cut off the circuit of converter and the brake.