PRADO
AUTOMAÇÃO INDUSTRIAL

Guia Prático de Instalação Motor Spindle ATC 7,5KW (10CV)

https://pradoautomacaoindustrial.com.br

email: vendas@pradoindustrial.com.br

(11) 5666-6461 / (11) 94242-8989 - WhatsApp

JGL-7,5K-18000RPM Automatic Tool Change Electric Spindle Instruction

Thank you for purchasing our products. In order to better understand and use the automatic tool change electric spindle, correctly install and maintain this product, please read the instruction carefully before installation and use. After mastering the function of the automatic tool change electric spindle, then install and debug it.

1. The preparation before installation

1.1 The operation temperature for this product is -10C°— 40C°.

1.2 Before installation, first turn the motorized spindle shaft head by hand, it sh flexible, no blocking phenomenon.

1.3 Use500VMegohmmetertocheckthe insulationresistanceofstator,theresistancecannot be lower than 50MΩ.

1.4 Use1μm dialtestindicatortocheckthefrontpartIOSboringholeofelectricspindle, which cannot be more than 0.003mm.

1.5 Loadthespindlethatmeetstherequirementsabove into the base. The spindle frame and mounting holes are sliding fit. Spindle should be installed at the front and back bearing between the stator clamping, clamping force should not be too large. Spindle into the frame should not be loose. It is strictly forbidden to clamp the front and rear bearing parts to prevent deformation of bearing chamber and early damage caused by stuck bearing.

2. Usage

2.1 The gas must be supplied to the front seal before starting up and entering cooling liquid. The gas should be compressed in air compressor, the it will be filtered via oil-water separator. Otherwise, the front ball bearing will be broken because of entering the liquid.

2.2 When installing the tool of IOS knife handle, the dirt needs to be cleaned in the ER boring hole and spring collect to avoid the accuracy. Special tools should be used when clamping and removing tools. Do not use too much force when clamping and disassembling. When installing the cutting tool, the dirt needs to be cleaned in the boring hole and handles to avoid the accuracy.

2.3 Connect the inlet and outlet water pipe connection of the electric spindle correctly according to the motorized spindle mark, check whether the connection is leaking and unobstructed. The spindle cooling system should be connected to the main switch of the machine. During starting and stopping the machine, the cooling system is continuous working. The cooling water volume is 2.5L/KW.min, the flow is 3-6L/min. The cooling liquid needs to use individual water tank, which add the ant-rusting agent. Coolant is required to be replaced on a monthly basis. Coolant is prohibited to mix with cutting fluid, also avoid the dust to enter the coolant tube, causing the spindle to become hot. JGL series spindles need to have cooling system, the temperature of finishing machine is 25±1C°. The effect of oil cooling on spindle is poor. It is better to use water cooling.

2.4 The frequency converter should be matched with the voltage, power and frequency of the spindle. Set the reference frequency of the frequency converter first. Set the reference frequency of the frequency converter according to the highest frequency of the spindle. Set the highest frequency of the frequency converter, the turning frequency and the

corresponding voltage according to the nameplate data of the spindle. The current of the inverter is set according to the rated current of the spindle. The carrier frequency is set according to the power of the spindle. Less than 10 kw spindle set 8kHz, if the spindle is larger than 10kw, set 5kHz. Speed up and speed down set at about 10s. In case the starting current exceeds the rated current and the protection should be extended the time of rise and deceleration. Too short deceleration time will easily cause the front screw to loosen.

2.5 Connect the frequency converter with the three-phase power cord of the spindle in phase sequence. The yellow and green wires are ground wires, and the other two thin wires are thermistors. The inverter is then connected to an external power supply. Turn on the power and the frequency converter inching, observe whether the direction of rotation of the spindle is consistent with the direction indicated by the spindle, if the direction of rotation is not consistent, immediately shut down, then replace the inverter and the spindle to connect the two three-phase power supply. Spindle is strictly prohibited in the wrong direction of rotation. Connection between motorized spindle and frequency converter shall not exceed 25m. When the power cord of the water-cooled spindle is connected with the plug, please note that the power cord should be waterproof, and it should be sealed with thermoplastic pipe between the power cord and the connector, and fixed after bending into a u-shape at the bottom of the connector to prevent condensed water or oil from entering the connector and causing power short circuit.

2.6 If using vector frequency converter, according to the stator phase resistance and slip data provided by spindle manufacturer, first set the frequency converter according to the 2.4, and then set the stator phase resistance and slip. Vector frequency converter can control the motorized spindle according to the vector. If constant power motorized spindle is used, the setting below the rated point is constant torque, the setting above the rated point is constant power, and the setting above the highest voltage is approximate constant power. The setting of frequency converter should be set according to the frequency voltage curve of spindle. If required to stop, the encoder on the spindle needs to be modulated into square waves by oscillograph before the vector converter can be used. Vector converter is best to use “KEBI” converter. If the servo system is used, the encoder on the spindle does not need to be modulated.

2.7 The spindle is not allowed to run over the speed limit due to grease lubricated precise angular contact ball bearings. Excessive speed may cause the precise angular contact ball bearings to burn out.

2.8 The thermistor control system of motorized spindle shall be installed on the CNC machine tool. When the stator temperature of motorized spindle rises to 110°C, the thermistor control system will cut off the power supply of motorized spindle to prevent the stator from burning out.

2.9 Connect the sensor (attached after the connection diagram). When the spindle hangs the tool handle, the indicator light connected with the sensor will be on, and the spindle can work normally.

2.10 The automatic tool change spindle of small machining center generally adopts cylinder. The air source is clean air through the oil and water separation device. Connect the cylinder with the mark on the back cover of the spindle to connect the air intake, cylinder return, tool changing and dust removal. The pressure of these three gas sources is

controlled at 0.6~0.7MPa. Then connect the ventilation seal, and control the pressure of the air source at 0.2~0.3MPa. 4 solenoid valves shall be installed in the air path control system of CNC machine tools to control air intake of cylinder, air cylinder return, tool change and dust removal and air seal respectively. The sequence of control is to change the tool after the process of parts processing. Stop the tool until the motorized spindle stops, and then remove the tool handle from the disc spring under the cylinder inlet pressure controlled by the cylinder inlet valve. At this time, the proximity switch stops working, and the indicator of the gas path control system is red. After the tool handle is removed, the tool change and dust removal valve controls the tool change and dust removal. After the new tool handle enters the taper hole, the dust removal and air blowing will stop. At the same time, the air intake of the cylinder also stops, and the air intake valve of the cylinder must be connected to the atmosphere to exhaust; Finally, the cylinder return valve controls the cylinder return to complete the process of installing the new tool handle. At this time, the proximity switch works, and the green light of the gas control system indicates that the new tool handle has been hung. Proximity switch and motorized spindle switch to implement linkage, only when the green light indicating the proximity switch, motorized spindle can work. The air seal is controlled by the fourth solenoid valve, which requires the machine to be ventilated from start to stop. To ensure that the bearing from cooling fluid, chip dust pollution.

2.11 In order to extend the service life of the spindle, the new or replacement bearing should be divided into 4~8 grades in the range of rotation speed, respectively running for 1 hour (all of 4 hours), and then rise to the highest rotation speed, to avoid direct high-speed operation and shorten the service life of shaft bearing. After the rest, turn on the motorized spindle to run for half an hour, and then start to work.

2.12 If the spindle is out of service for a long time, use compressed air to blow dry the residual coolant in the cooling pipe.

2.13 When the motorized spindle works normally, listening firstly, then touching, watching finally. Listen to whether the spindle abnormal sound, abnormal sound should be shut down in time to check. Touch electric spindle heating, vibration is stable, if heating, vibration intensification timely shutdown check. Watch the surface quality of the processed parts is stable, such as unstable timely shutdown inspection.

2.14 High speed ISO30 tool handles are finely balanced.

3. The common problems when the electric spindle at runtime

3.1 The constant torque main is caused by the low frequency torque reduction of motorized spindle, then shaft cannot be used at low speed, and generally the torque does not decrease in the frequency range of 50%~100%. If you must use it at low speed, you can use it according to the U/F curve provided by our company.

3.2 Generally in the range of 75% frequency is the electric spindle of the vibration point, cause the motor spindle noise and vibration increase, should avoid in this frequency processing.

3.3 The spindle is working normally, it often encounters heating phenomenon. When the surface temperature of the motorized spindle and the ambient temperature exceed 15°C, it can be considered as heating. Shutdown for checking, first check whether the coolant temperature in the cooling tank exceeds the ambient temperature with a thermometer. If

so, replace the coolant below the ambient temperature in time. Also can increase the volume of cooling water tank to reduce temperature rise. If there is no problem with the above cooling water tank, check whether the cooling water channel of the spindle is blocked, whether the coolant fluid is clean, the coolant fluid is not clean easy to block the cooling water channel, should be replaced immediately, and add dust protection device to the outside of the cooling water tank.

4. Transportation, maintenance

4.1 Electric spindles are precision products. The packaging of spindles should be fixed with foam plastic, and the shell should be carton or wooden box fixed. In the process of transportation should be handled with care, no bumping, especially shaft extension end.

4.2 When abnormal sound or vibration is found during the operation of the spindle, stop the machine immediately to check the ball bearing, and replace it if necessary. When abnormal odor or sudden stop occurs during operation, the power supply should be cut off immediately and the stator should be measured ground resistance and three-phase resistance with a shaking table, insulation resistance loss is stator burned out, should return to the factory to replace the stator.

4.3 The motor spindle should be regularly replaced with grease. Should be replaced by professional maintenance personnel or back to the factory by our company.

4.4 When the spindle is out of service for a long time, compressed air shall be used to clean the residual coolant in the cooling pipe, and the spindle is rust-proof. The spindle cannot be used until it is stored or stopped for 6 months, otherwise it will affect the life of the motorized spindle.

4.5 When the damaged spindle needs to be repaired, it should be repaired by our company. Our company will serve you wholeheartedly.

5. The service life of the electric spindle

5.1 **The service life of the spindle is one year. Life and guarantee period of bearing: import is 2000 h.**

6. No free warranty statement for the electric spindle

If the motorized spindle is damaged due to the user's failure to operate according to the operation instruction, the company shall not assume the obligation of free warranty and carry out the maintenance at a charge.

6.1 The use voltage of the motorized spindle does not accord with the nameplate, causing the stator to burn out.

6.2 The spindle is used in the case of phase deficiency, which causes the stator to burn out.

6.3 Do not use gas seal to process fine powder material, causing bearing damage.

6.4 The air of gas seal do not separate the oil and water, causing bearing damage.

6.5 The spindle is damaged due to the failure of the user.

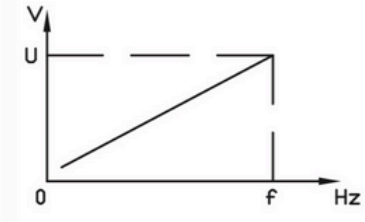
6.6 The user disassembles the motorized spindle privately, causes the motorized spindle damage.

6.7 The user did not change the coolant regularly, which caused the spindle to block the cooling channel and cause the spindle to burn out.

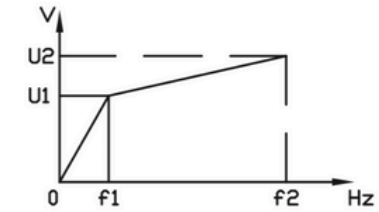
6.8 The spindle is damaged due to the excessive water temperature of the coolant.
6.9 Users increase the cutting parameters without permission, causing damage to the spindle.

7. Frequency-Voltage curve

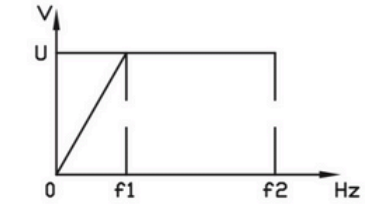
7.1 The constant torque curve



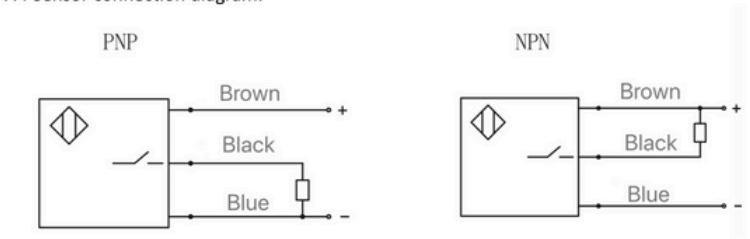
7.2 The constant torque with turning point curve



7.3 The constant power curve



7.4 Sensor connection diagram:



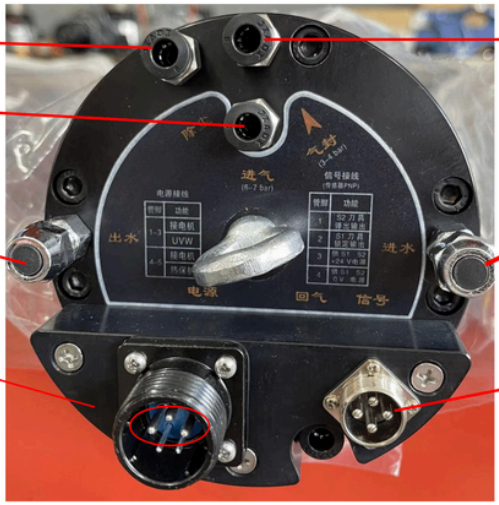
8. Common problems and solving methods

Problems	Reasons	Methods
The motorized spindle does not work after starting up	1. No output or wrong setting of frequency converter.	Check frequency converter output voltage and setting
	2. No plugged in.	Check the plug and connection
	3. Bad plug connection	
	4. The stator wire is damaged	Replace wire
Turn on and run for a few seconds and then stop	1. Water damage insulation of wire package	Dry wire package
	2. High temperature causes damage to insulation of wire package	Replace wire
	3. Phase failure causes overcurrent protection	Check motor wiring
	4. Too short startup time	Extended acceleration time
Power on for a few seconds, machine smoke or shell hair Very hot	1. No output voltage and frequency of frequency converter is inconsistent with the voltage and frequency of motorized spindle nameplate	Check frequency setting of frequency converter
	2. Wrong setting of frequency converter	Reset frequency converter
	3. Cooling water problems	Check waterway is clear
The nut loosens when started	1. Spin the wrong	Change rotation according to nameplate
High noise and vibration	1. Severe bearing wear	Change ball bearing
	2. The precision damage of parts affects the dynamic balance	Check dynamic balance
	3. Spindle runout	Change spindle
The nut loosens when the machine stops	The downtime is too short	Extended deceleration time

Entrada de ar (Dedusting) proteção contra poeira (6- 7 bar)

Entrada de ar para abertura e fechamento da garra (6- 7 bar)

Saída de água



Selo de ar

Entrada de água

CONECTOR DE POTÊNCIA	
Número do pino:	Descrição:
1	FASE U
2	FASE V
3	FASE W

CONECTOR DE COMANDO	
Número do pino:	Descrição:
1	Sensor S2 (garra aberta)
2	Sensor S1 (presença de ferramenta)
3	Alimentação 24V (V+)
4	Alimentação 0V (V-)

Obs:Os sensores são PNP