Changzhou Changlong Motor Co.,Ltd

Instruction Manual

Preface

1.Thank you for your trust and support to this spindle.

This item spindle is developed accoridng to the market's need and which is of small size,high speed,high power and easy to use.

2. Important Statement

2.1Our company is not responsible for the issues that not operate according to the precaution and instrucion of the manual.

2.2 The spindles have been past the quality examination before release,and only be responsible for electrical and mechnical parts.

2.3 We are not responsible under any circustances for nny damange when using the spindles .

3.Warnings and safety precautions.

3.1 This instruction includes the important directives and precautions,which is very important to the safety operation on the spindles.

Please make sure you have read all insturctions before using the spindle,and please keep the instruction manual in the places near the place so that the operator can take it at any time.

3.2 General safety sign

The circumstances which may cause personal injury.

Active electrical components.

Important information.

3.3 Hazard of the spindle

We can not know the end user's installation of electric spindle.So the installer or customer must take the risk assessment fo each application.

The installer also has the responsibility to ensure that adequate protection is provided.In order to avoid contact with moving parts.

The installer and operator must also be aware of the risks associated with other types of risk, especially with foreign bodies, explosions, flammable substances, toxic substances or high temperature gases.

Risks associated with maintenance operations must also be prevented and must be maintained in the best safety condition, while the spindle should be completely stationary and turned off.

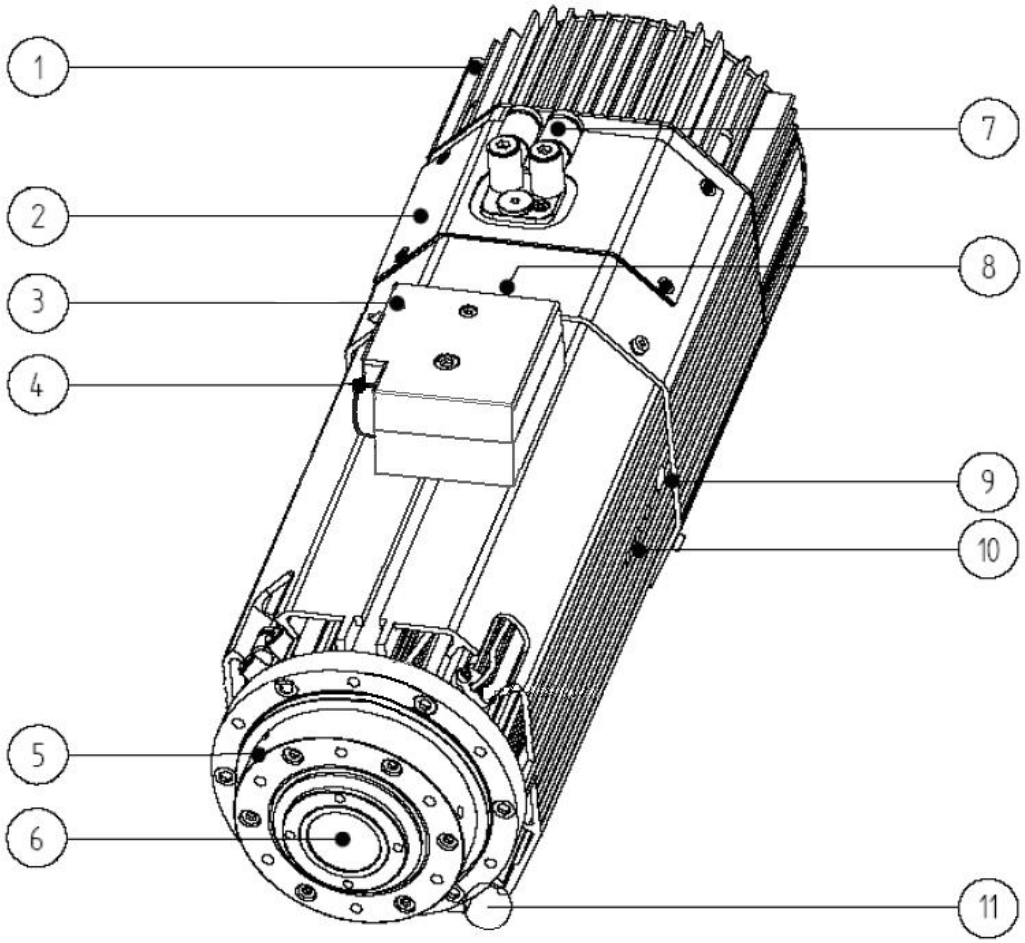
Warings: DON'T
Start the maintenance work before the tool in the spindle is not completely stationary.
Start the maintenance work before the spindle is disconnected from the main power supply.
Try to clean it when the spindle is running.

4. General Information

4.1 The spindle is used as a part of a machine. The machine structure of the fixed electric spindle must be firm and hard enoug to support the weight of the spindle, and can withstand the subsequent processing operations.

The spindle described in this manual is designed to be used for drilling wood, plastic, aluminum and fiber boards.

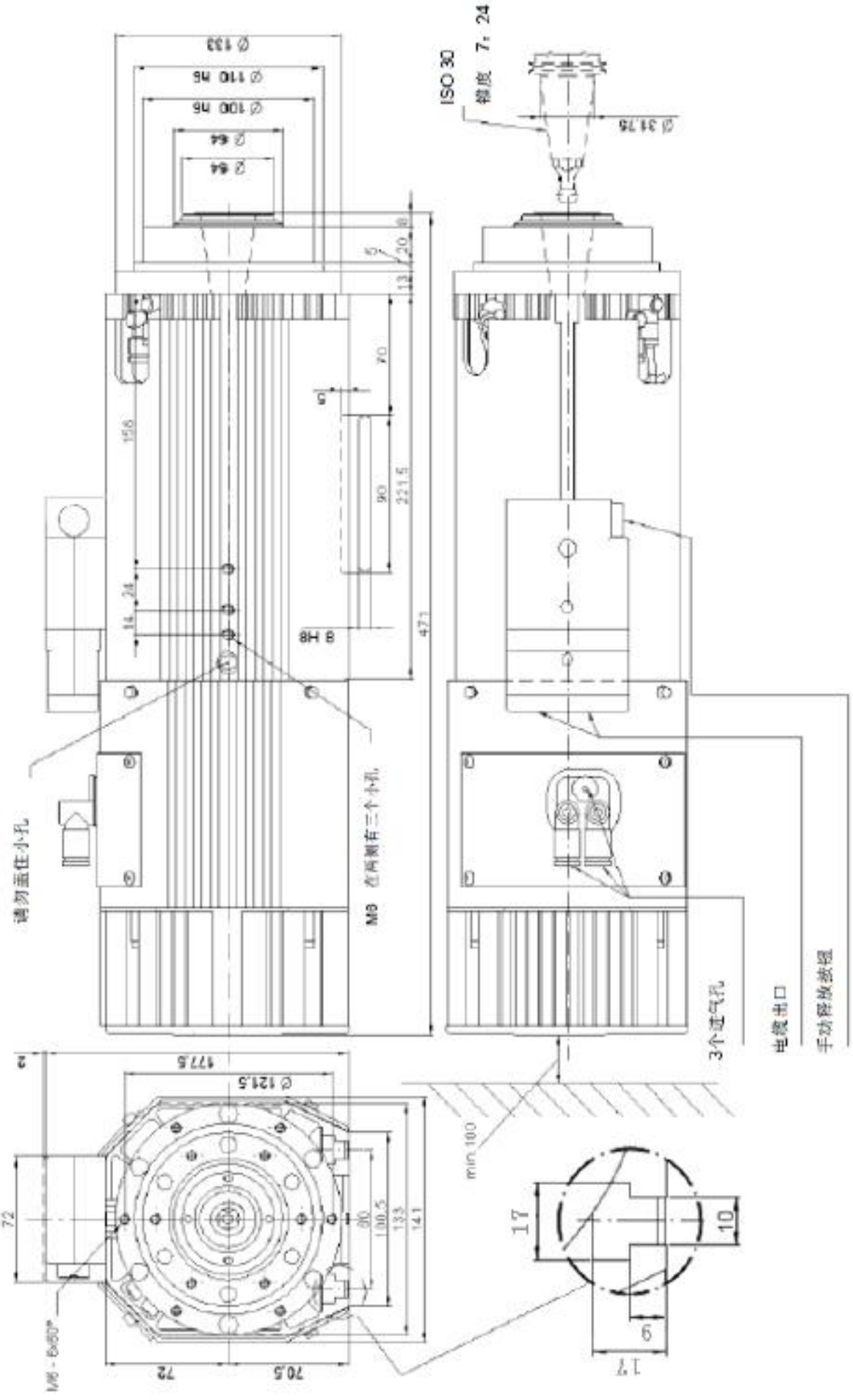
4.2. Main parts of the spindle



1	Cooling fan
2	Transduction room
3	Junction box
4	Deblocking buttom of manual collect nut
5	head of spindle
6	Axis of spindle
7	Air compression connector
8	Electric terminal
9	Exhaust sliencer
10	Screw Protection hole
11	Supporting anchor groove

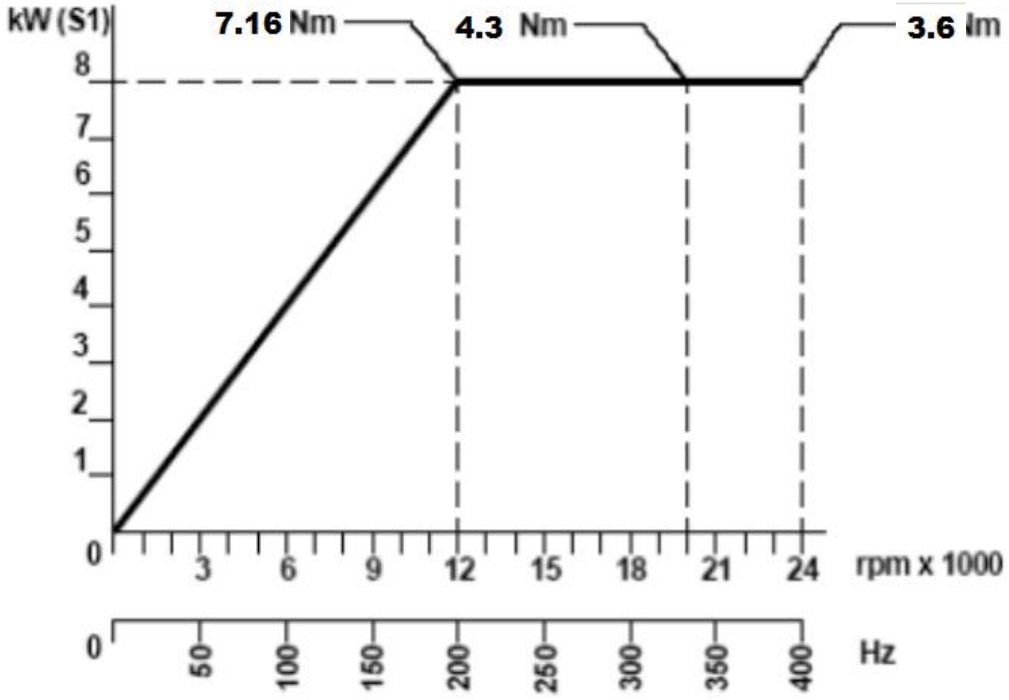
5.Specification

5.1 Drawing



5.2 Performance parameter

Terminal connection type	Star	triangle
Rated voltage	380V±10%	220V±10%
Rated current	22A	38A
Rated speed	12000rpm(400Hz)	
Rated power	9kw	
Type of work system	S1	
Rated torque	7.16Nm	
Rated efficiency μ	0.8	
power factor Φ	0.8	
Electrode number	4	
Insulation grade	H	
Cooling mode	Cooling fan	
Weight	31kg	



GDZ143*133-9

i Check whether the power terminal is properly connected before installing the spindle.

⚠ Bearings have been permanently lubricated and do not require the addition of lubricants

5.3 tool holer locking and releasing device

tool holer is mechanical locked by the spring mechanism, the locked axial force:3500N±10%

The tool holer is released by operating the single acting two stage air cylinder.The pressure of the cylinder is 7bar(100PSI)

i	The locking spring axial force applied to the tool holer to ensure the 2,000,000 tool replacement cycles.

The internal pressurized pneumatic circuit can avoid the dust to enter the electric main shaft.

The pressure of the is 4bar(58PCSI).

⚠	Even if the spindle does not work, it should always provide compressed air to the spindle.

6.Storage and transportation

⚠	The customer has the responsibility to ensure that the use of lifting device, cable, sling, chain can withstand the spindle load.

Storage:

⚠	Do not carry the spindle by the cooling fan.As the fan may be break when lifting ,and may cause the spindle danmage and hurt the operator.

7.Installation

7.1 Initial installation

Before starting the installation, check that the parts of the spindle are not damaged during transportation or handling,

7.2 Prepare the equipment required for the installation .

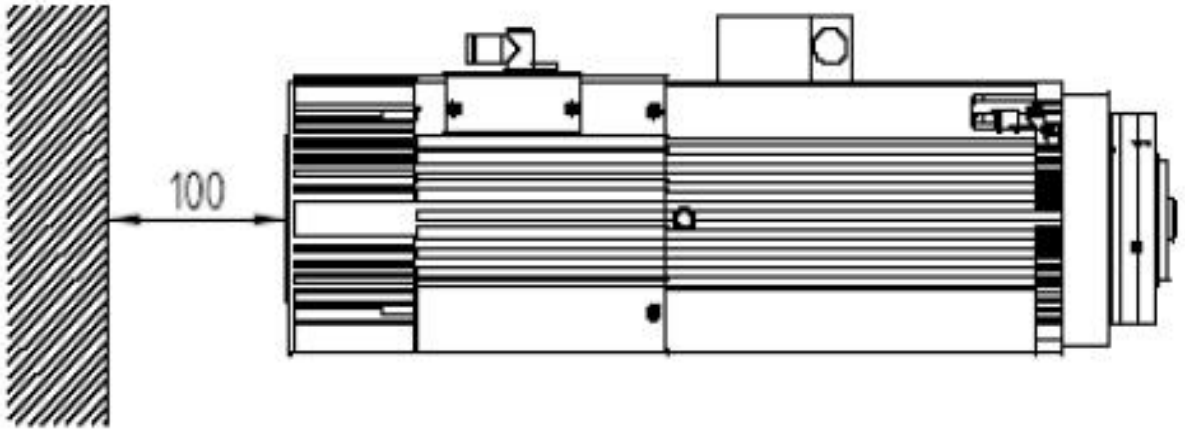
7.3 Mechanical installation

7.3.1 Supporting surface

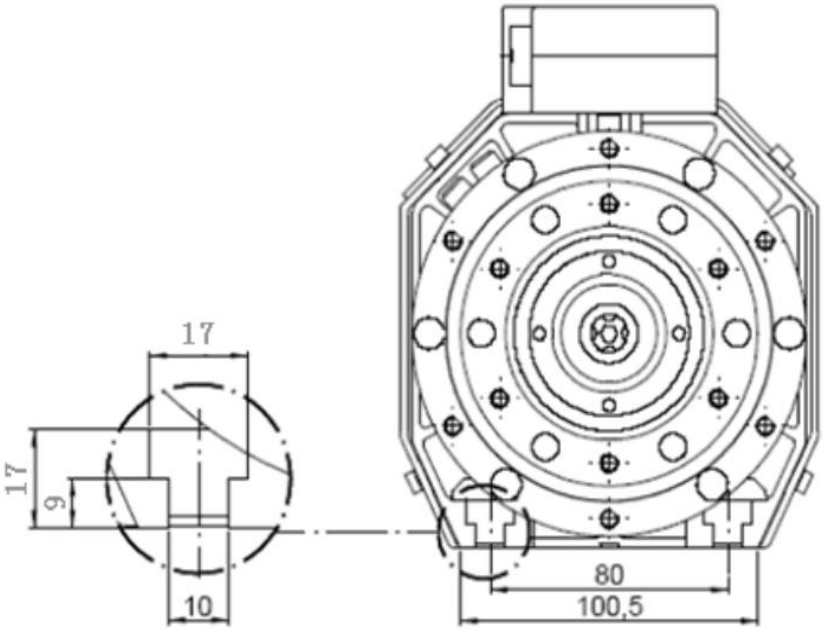
i spindle	The supporting surface of the motorized is fixed, and the flatness is less than 0.02mm	▱ 0,02

7.3.2 Installation

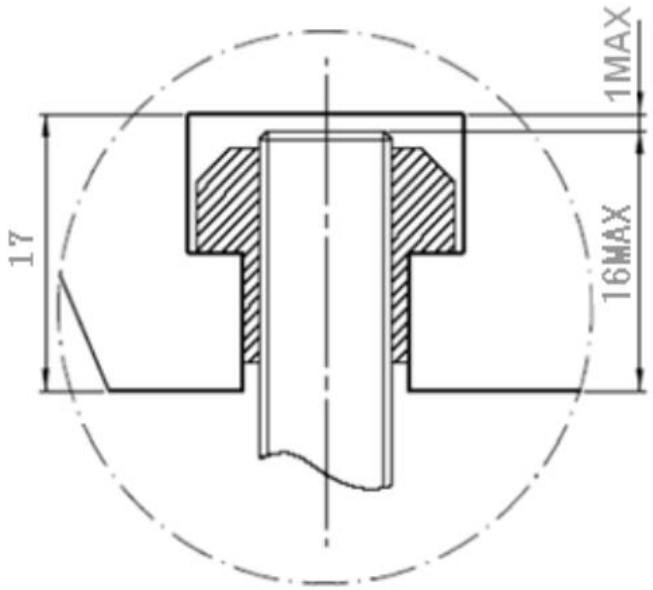
The spindle should be installed at the distance of 100mm from location to make sure enough cooling air for the spindle.



7.3.3 Fix the spindle



2.Screw protection hole

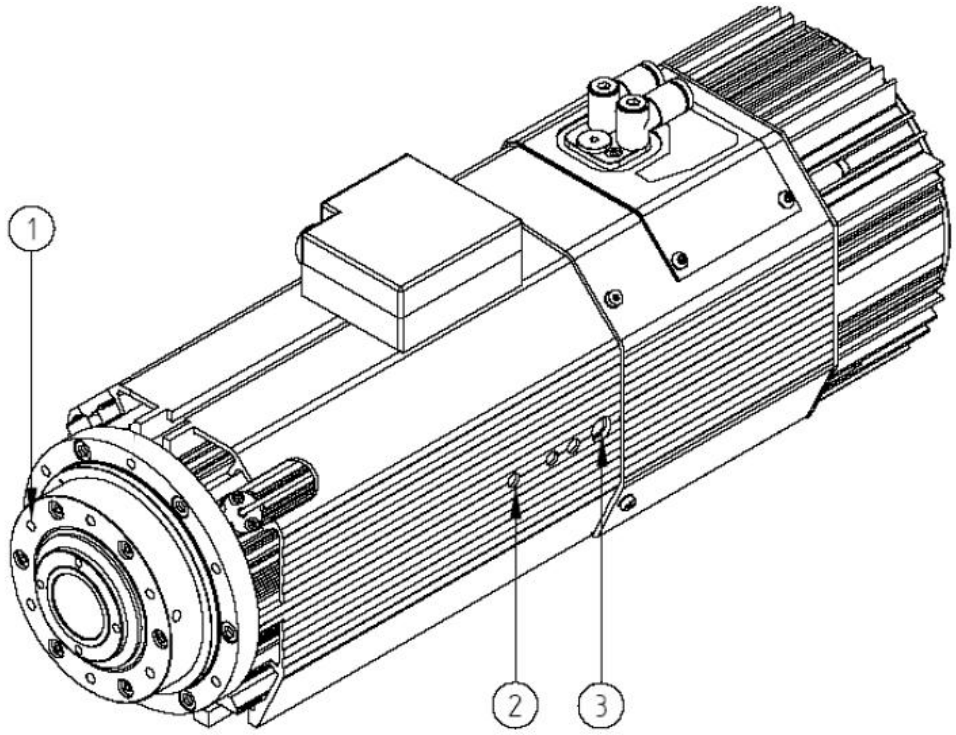


The biggest highlight of the bolt is 16mm.
Set aside at least 1mm of the gap.

Greater prominence will make the motorized spindle deformation, reduce the processing accuracy and processing safety

7.3.4 Thread maintenance hole

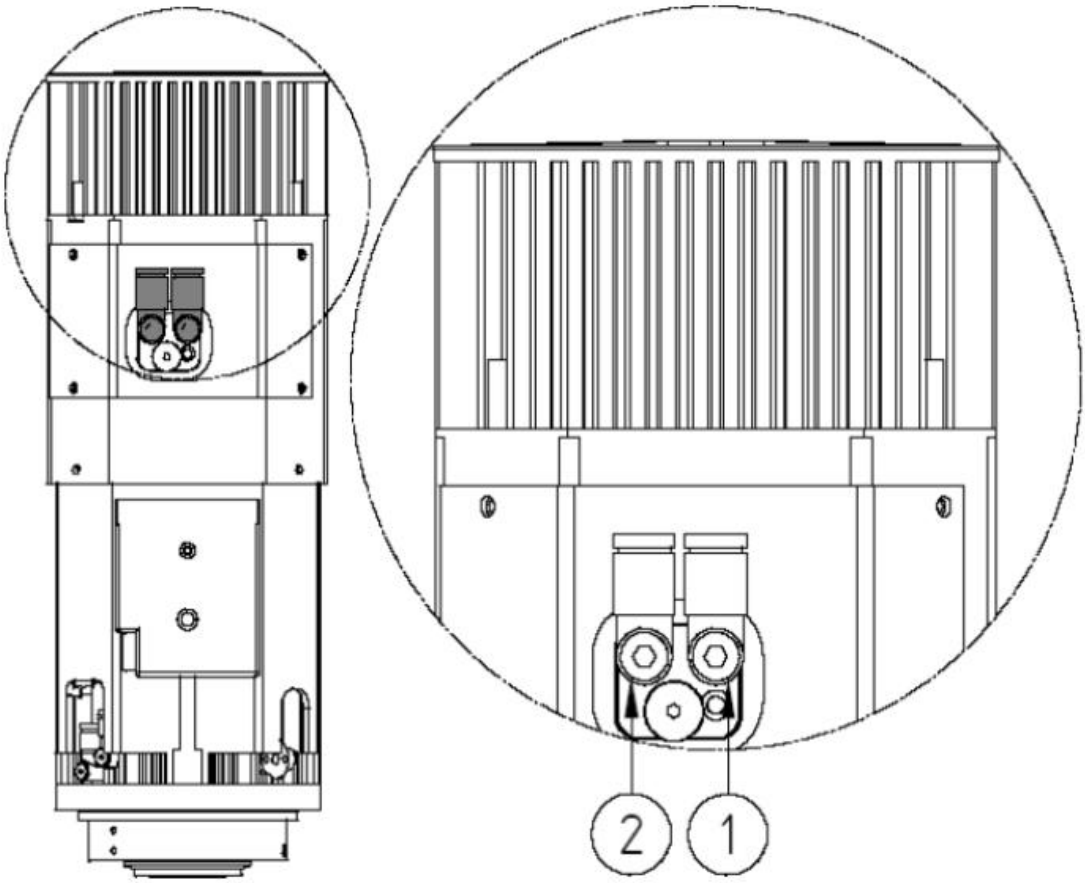
Attention: do not block the silencer exhaust hole (position 3)



1	Front protection hole	6
2	Side protection hole	3 each side
3	Exhaust silencer holes	1 each side

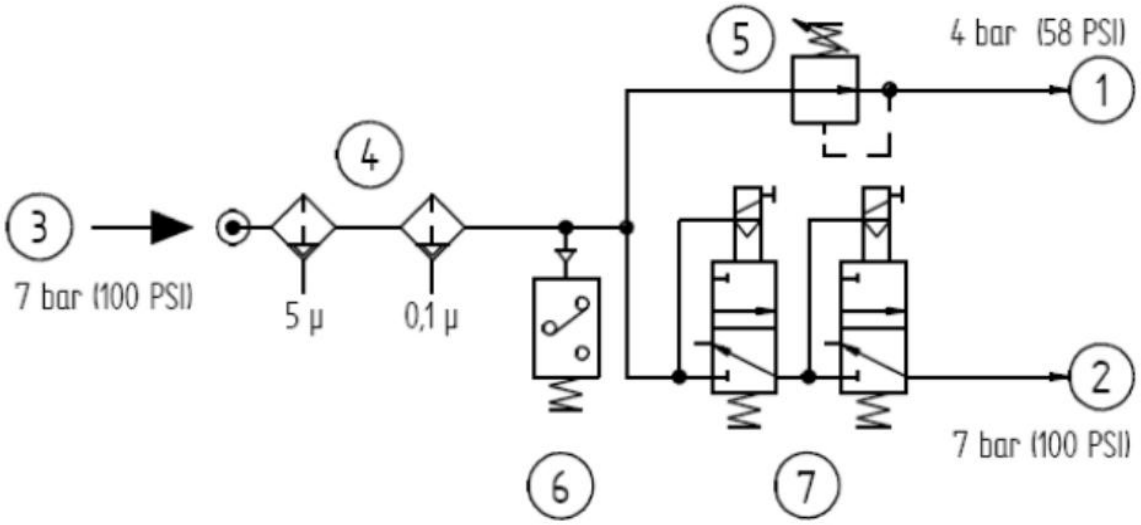
7.4 Compressed air connection

7.4.1 Compressed air joint



Item	Pressure (bar/PSI)	Dia of outer tube(mm)
1.Inlet of pressure supercharge & cone clean	4/58	8
2.Inlet & outlet of air for tool holer release	7/100	8

7.4.2 Function diagram of electric spindle compressed air connection

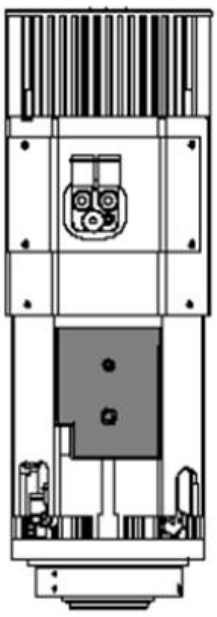


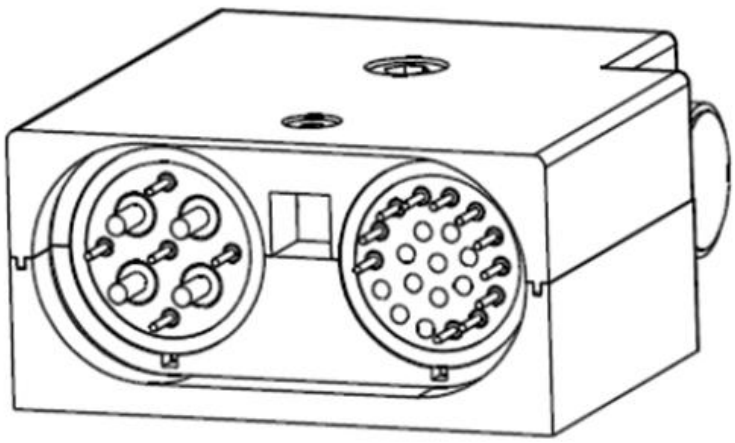
1	Vertebral body cleaning and internal pressurization air inlet.
2	Air inlet of tool holer release.
3	Factory air inlet.
4	Compressed air filter / drying group with automatic condensation water discharge:the first stage is 5 μ，the second is 0.1μ
5	Pressure relief valve.
6	Pressure switch.
7	A pair of three position two way solenoid valve.

The air scource should be dry and filtered.

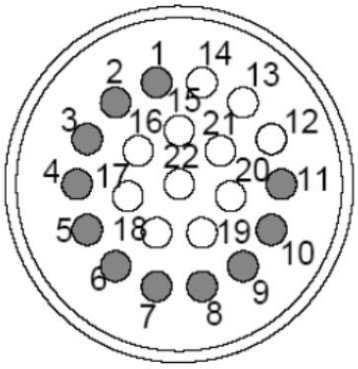
7.5 Electric connection

There are 2 connectors, one is to connect power supply,the other one is to connect the signal.





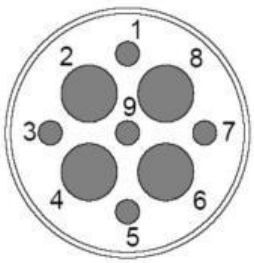
7.5.2 Definition of pin which fixed on signal connector



Pin	Function
1	Sensor S2 （tool pop）output
2	Sensor S1 （tool lock）output
3	Sensor S3 （shaft stop）output
4	Provides + 24V DC power supply to the S1,S2 and S3.
5	Provides + 24V DC power supply to the button light.
6	Provides 0V power supply to the S1,S2 and S3.
7	Provides + 24V DC power supply to the button
8	Button output
9	Temperature Sensor of front bearing
10	Temperature Sensor of front bearing
11	Provides 0V power supply to the button light.

i USE WIRE AWG22

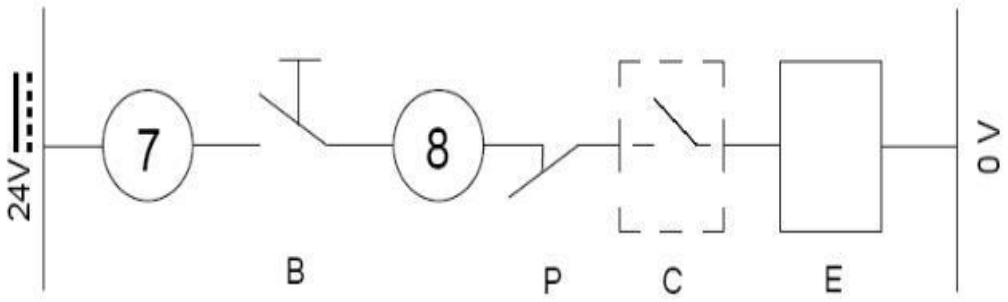
7.5.3 Pin definition of fixed power connector



Pin	Function
1	Thermal switch:NC. Bimetal switch should be connected in series to machine safety stop system.
2	W PE Common Pin 7
3	230V AC 50/60HZ Cooling fan
4	U Motor phase
5	Thermal switch(showed in pin 1)
6	V Motor phase
7	W PE Common Pin 2
8	W Motor phase
9	230V AC 50/60HZ Cooling fan

i Use wire AWG10 to the even pin,use wire AWG18 to the odd pin

7.5.4 Wiring diagram of the spindle which not controlled by CNC tool holer release system.



7--8	Signal connectors pin
B	Tool release button
P	Pressure Switch which avoid cutting tool release when air pressure is inadequate
C	Security check（checking equipment when electric spindle stop ）
E	Tool release solenoid valve

- When the button“B" from the spindle is pressed，the coil of solenoid valve”E"(We didn't provide solenoid valve) will be energized.At the same time,tool holders is released
- Press button "B" to release Tool holders

8.General inspection after installation.

8.1 Check the positioning of the spindle before starting.

- The outer diameter of the tool exchange air hose must be 8mm, and the dry and filtered air must be provided as the 7bar (100psi) at the same time.

> *i* Tool release cylinders are single action.

9.Operation of electric spindle

9.1 Warm-up.

When first time start the electric spindle everyday, please make it warm up slowly no-load, which make the bearing can be gradually play to its operating temperature, and the bearing seat of the expansion to equilibrium.

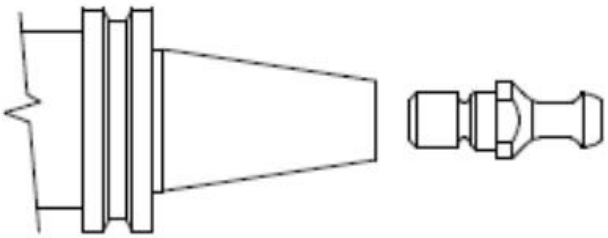
Recommend the following steps to warm up, tool holer in the process should be in place, but not the actual processing (no lc

Run at 50% of maximum rated speed for 2 minutes.

Run at 75% of maximum rated speed for 2 minutes.

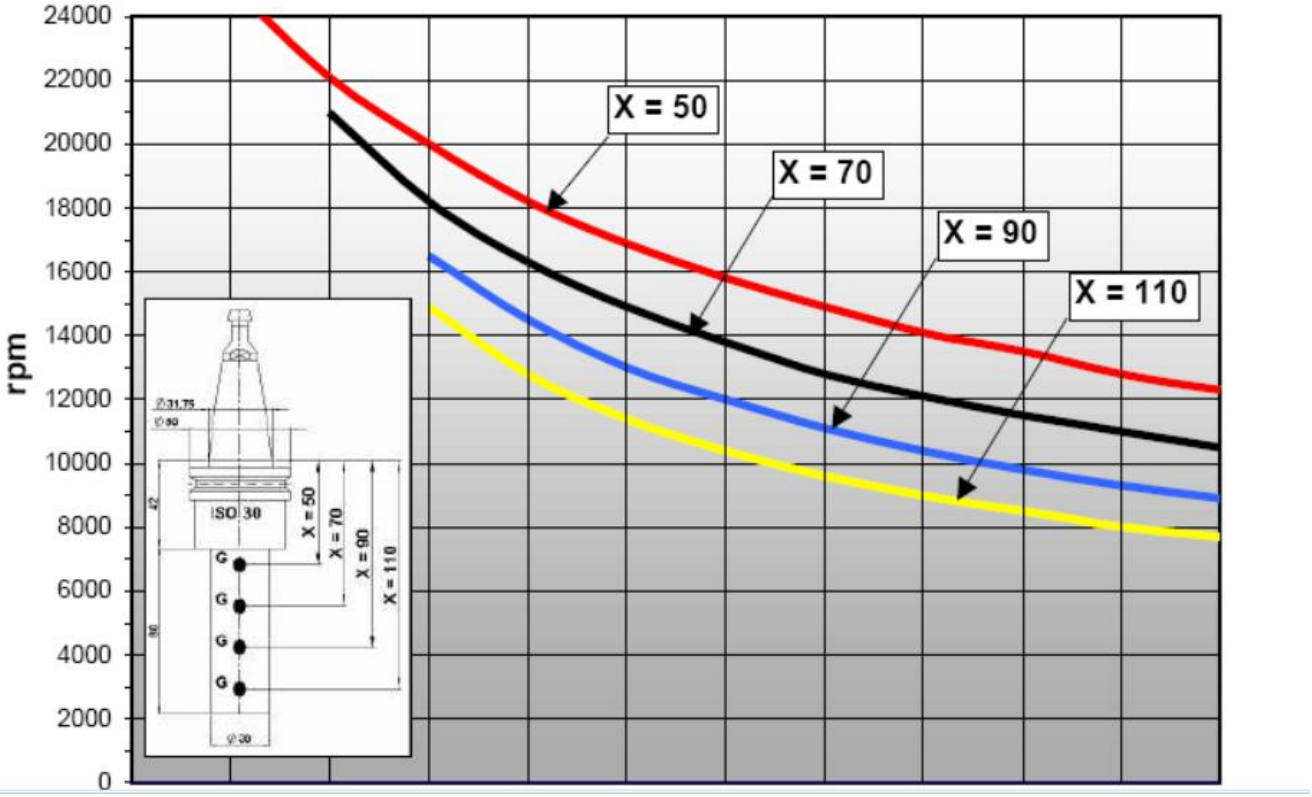
Run at 100% of maximum rated speed for 1 minutes.

9.2 tool holer chosen：ISO30 tool holer



ISO30 Vertebral body rivet
DIN69871

9.3 Speed selection curve



kg

The basic configuration of the spindle is equipped with two sensors:S1 and S2

S1 is checking whether the tool holer correct locked and to supply the safety signal to

allow the spindle rotate correctly.

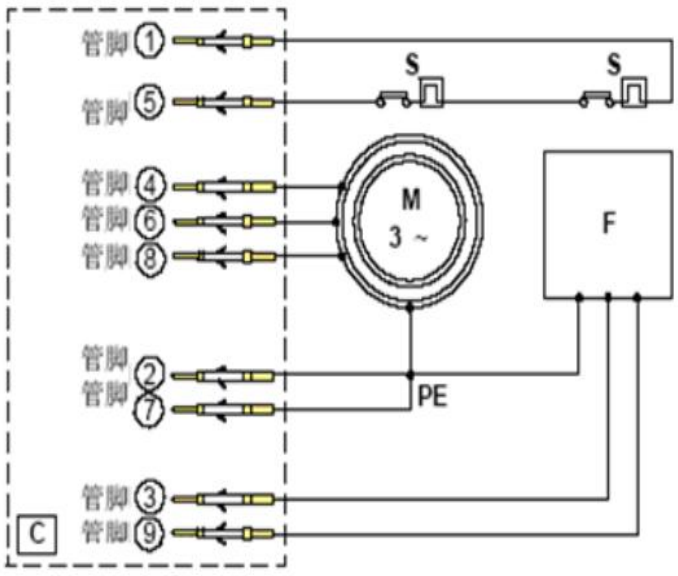
condition	output S1
the tool holer is locked	+24 V
no tool holer	0V
The tool holer has pop-up	0V

This value is very important in the process of changing the tool holer.

The detection of pop-up, allowing the next step of the tool holer exchange circulation begin .

condition	output S2
the tool holer is locked	0V
no tool holer	0V
The tool holer has pop-up	+24 V

9.7 Thermal control switch.



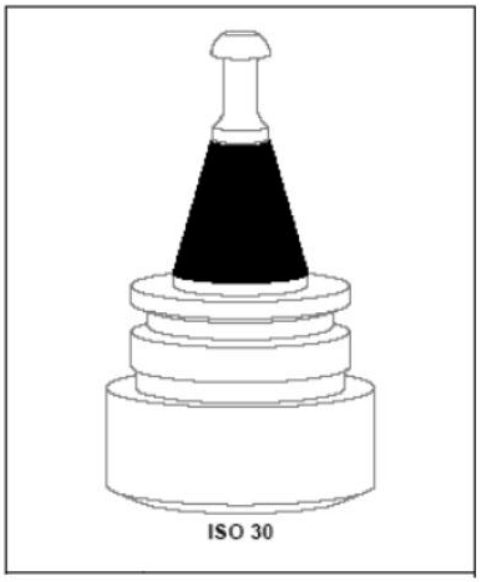
C	**Power connector**
S	**Bimetallic switch**
M	**Spindle motor**
F	**Cooling fan**
PE	**Electrical Protection**

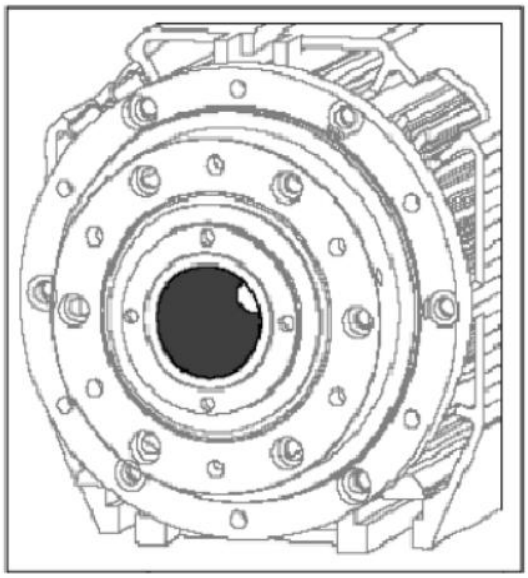
10.Maintainance

10.1

> *i* According to 8 hours per day, 5 working days per week, as well as the usual working environment to calculate the maintenance frequency.

10.1.1 Check the tool holer of vertebral body and the cleanliness of the spindle's cone.

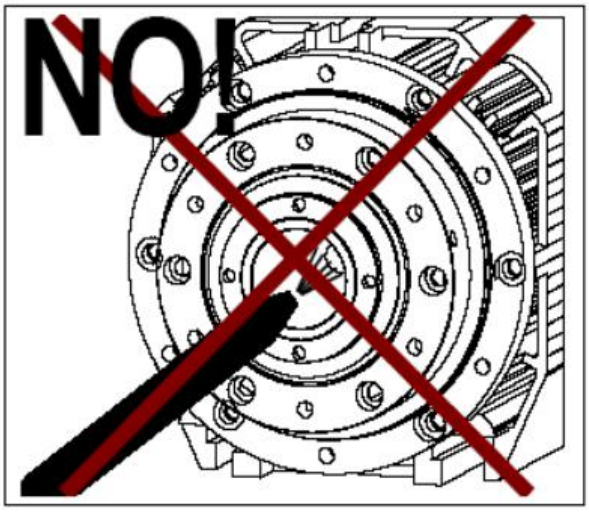




The cone surface of ISO30 toolholder(black part) cone hole(black part)

Use a clean soft cloth to clean these parts at the end of each working day.

> Using compressed air to clean the main cone hole will damage the electric spindle.



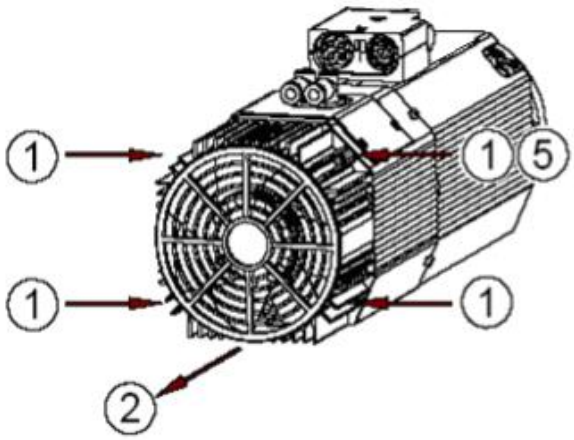
10.1.2 Clean the body of the tool holder

> *i* Dust is not allowed into the vertebral body. Block the hole using a suitable stopper or standby tool holder.

10.1.3 Bearing

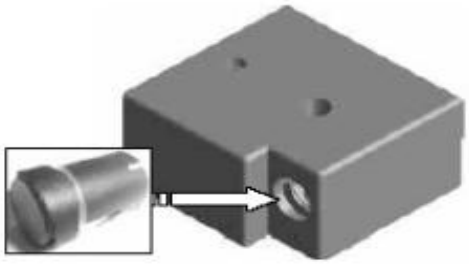
i	Bearings have been permanently lubricated and needn't add the lubrication.

10.2 Exchange the cooling fan



1	Remove 4 fixing screws from the cooling fan.
2	Pull the fan along the direction of the arrow.
3	Disconnect electric connector of the fan.
4	Connect new electric connector for the fan.
5	Connect the new fan to ground wire, insert the hole No. 5 .
6	Install new cooling fan and fix it with 4 screws.

10.2.2 Exchange tool holder button

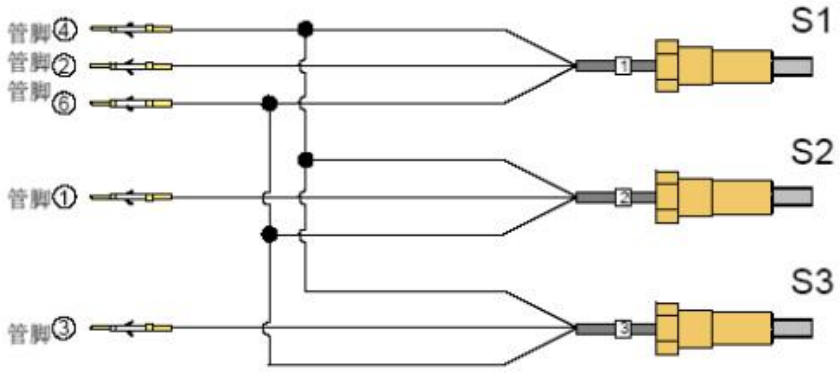


1	Remove two screws from the housing of the junction box.
2	Take off the shell of junction box .
3	Disconnect button cable.
4	Push the old button softly from the junction box,and pull it out from outside
5	Install new buttom.
6	Install new wire cable.
7	Install the housing of the terminal.
8	Install and screw tight the 2 screws for the
9	Check whether the 2 buttons work normally.

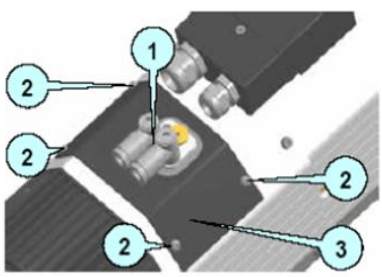
i	Must not exchange the wire cable of the junction box.

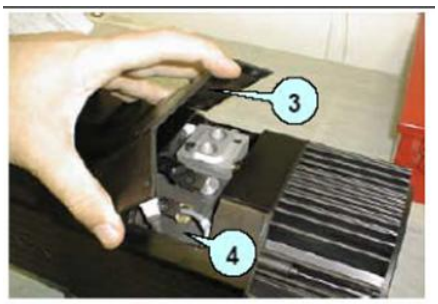
10.2.3 Exchange the sensor S1,S2,S3

10.2.3.1 Sensor wiring



10.2.3.2 Connect the sensor



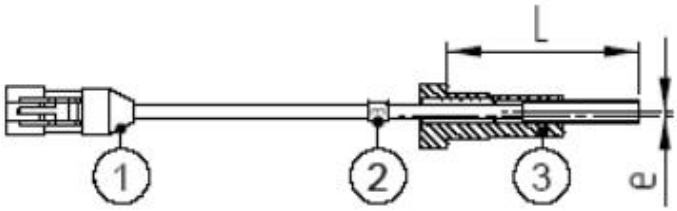


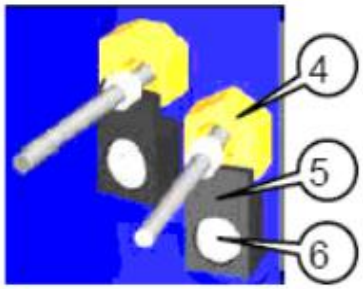
1.1 pair quick mounting joint	3.Housing of the sensor room
2.Screw	4.Sensor room

10.2.3.3 Position of the sensor

10.2.3.4

> ⚠ The sensor consists of a number of cable labels to identify. Be careful not to confuse the sensor.This may damage the moving parts of the spindle.





1	Electric connector	e	Adjusting eccentric wheel
2	Number ring of Cable	4	Sensor
3	Well calibrated base and sensor	5	Fixed support of sensor
L	Calibrated depth	6	Six angle screw

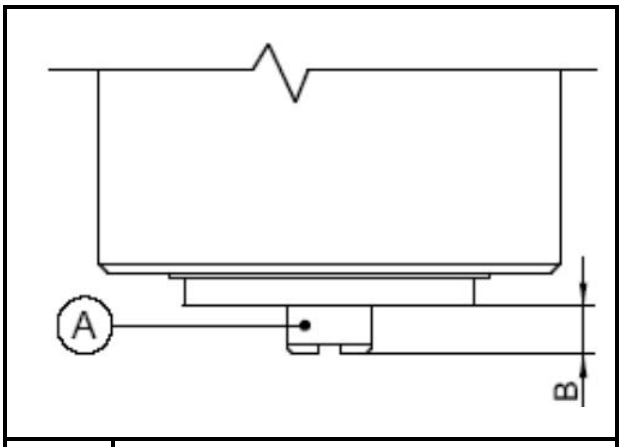
> ⚠ Using all of the available tool holders to test as much as possible, in order to confirm th validity of the new sensor calibration.

10.2.3.5 Adjusting the sensor

Check whether the signal output of the sensor S1 is in accordance with the following table

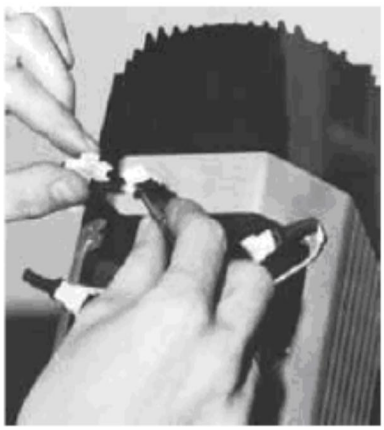
condition	output S1
the tool holer is locked	+24 V
no tool holer	0V
The tool holer has pop-up	0V

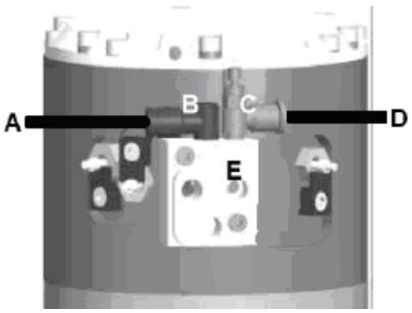
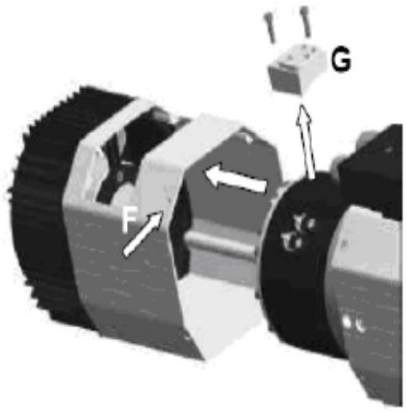
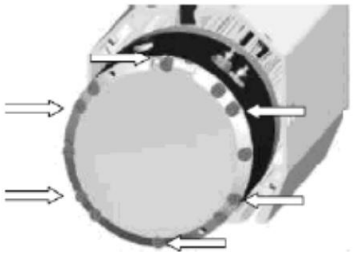
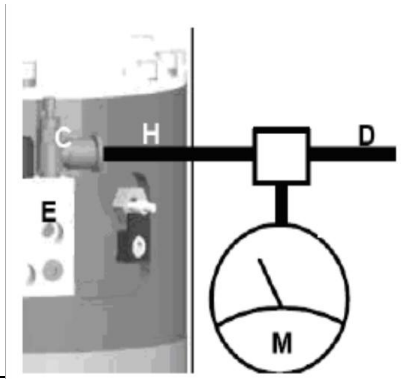
Adjusting step of S2

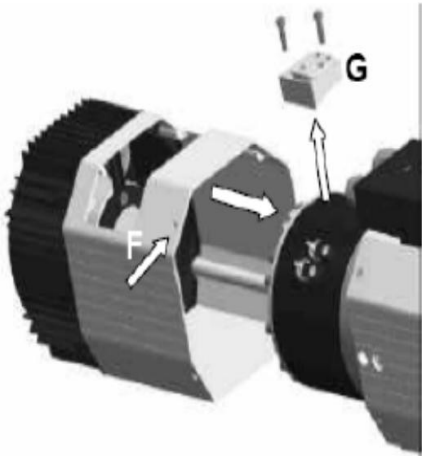


A	Ejector
B	Standard measure

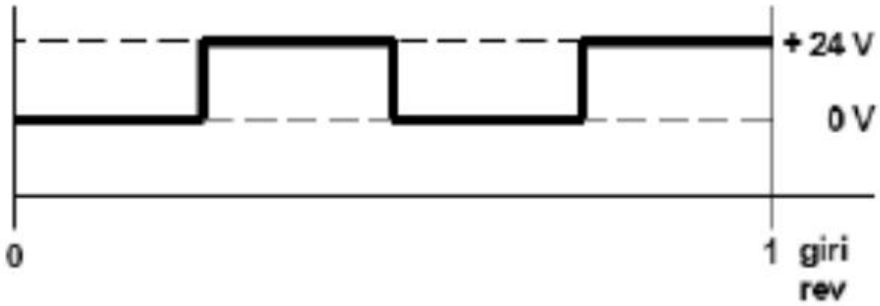
10.2.4 Replace cylinder assembly

1		Open the sensor room in accordance with the 10.2.3.2
2		Disconnect all electrical connectors
3	Important tips	Before you disconnect the hose A and D, use the tape on it to mark them so that they can be identified in the following steps.

<table>
<tr><td>4</td><td> 
</td><td>A</td><td>Optional features of compressed air lines.</td></tr>
<tr><td></td><td></td><td>B</td><td>Quick mounting joint.</td></tr>
<tr><td></td><td></td><td>C</td><td>Quick mounting joint with pressure regulator.</td></tr>
<tr><td></td><td></td><td>D</td><td>Compressed air lines with internal pressurizatio</td></tr>
<tr><td></td><td></td><td>E</td><td>Compressed air inlet for vertebral body cleaning and pressurization.</td></tr>
<tr><td>5</td><td> 
</td><td colspan="2">• As shown in step 3, make a clear mark on the hose A and D.
• Disconnect hose D and B from the connector A and C
• Take off 2 fixing screws from block D.
• Take off the block G.
• Take off 4 screws F.
• Take off the cooling fan along the arrow direction.</td></tr>
<tr><td>6</td><td>  </td><td colspan="2">• Only take off the 6 screws as shown to loosen the cylinder.</td></tr>
<tr><td>7</td><td></td><td colspan="2">Install new cylinder using the 6 screws which take off from Step 6.</td></tr>
<tr><td>8</td><td> 
</td><td colspan="2"></td></tr>
<tr><td></td><td></td><td>C</td><td>Quick mounting joint with pressure regulator.</td></tr>
<tr><td></td><td></td><td>D</td><td>Compressed air lines with internal pressurizatio</td></tr>
<tr><td></td><td></td><td>E</td><td>Compressed air inlet for vertebral body cleaning and pressurization.</td></tr>
<tr><td></td><td></td><td>H</td><td>Connecting hose.</td></tr>
<tr><td></td><td></td><td>M</td><td>Pressure gauge.</td></tr>
<tr><td>9</td><td> 
</td><td colspan="2"></td></tr>
<tr><td></td><td></td><td>C</td><td>Quick mounting joint with pressure regulator.</td></tr>
<tr><td></td><td></td><td>N</td><td>Regulator.</td></tr>
<tr><td></td><td></td><td>P</td><td>Locking nut.</td></tr>
<tr><td></td><td></td><td colspan="2">• As shown in step 8, a pressure gauge M is installed to measure the output pressure of the connector C.</td></tr>
<tr><td></td><td></td><td colspan="2">• Connect a 4bar(58PSI) air source on the E.</td></tr>
<tr><td></td><td></td><td colspan="2">• Rotate the regulator N until the pressure gauge is read as 0.8bar(11.6PSI).</td></tr>
<tr><td></td><td></td><td colspan="2">• Tighten the lock nut P to adjust and fix.</td></tr>
<tr><td></td><td></td><td colspan="2">• Disconnect the pressure gauge and hose D,H from the connector C.</td></tr>
</table>

10		• Must take off the block G before reinstalling the cooling fan. • Take off the 2 fixing screws from the block G. • Take off the block G,be careful not to lose or damage the seal. • Install the fan cover,and fix it with screw F. • Reinstall the block G,pay attention to install the seals correctlu amd tighten the 2 fixing screws. • Reconnect the hose A and D to the quick mounting joint B.(as shown Step 4). • Connect the electric connectors for cooling fan.
11		Operate according to the instructions of 12.2.4. • Take off the sensor form the cyclinder. • Install the sensor to new cyclinder. • Adjusting the sensor. • Colse off the sensor room.
12		• Remove the external compressed air connection from the old cylinder using a 6M six angle wrench and install it on the new cylinder.

11.Optional accessories.
The spindle can be installed "stop"sensor 3.
When the spindle rotate a circle, the sensor will output 2" on" and 2" off" pulses and it will remain on at high speed.



i	Ignore the output of S3 in the process of changing the tool.

12.Trouble shooting

⚠	Please read and comply with the safety signs before operating the spindles.

Problem	Reason	Repair method
The spindle doesn't work	Cannot get through electricity.	*Check the mail power supply.
		*Check all the electrical end.
		*Check whether there's break in all the electrical cable and connection .
	Hasn't install the tool holer	*Please install one tool holer .
	The location of the tool holer is incorr	*Check the tool holer whether is locked.
	The spindle's thermal protection starts	*Wait until the spindle is cooled, the thermal control switch will be set automatically.
	The inverter's overcurrent protection s	*Refer to the manual of inverter or contact the inverter supplier.
	No signal of spindle starts.	*Refer to the manual or contact the machine supplier,digital control and inverter supplier.
	Transducer S1 break or out of order.	*Check the connection of the transduction
		*Check whether the cable of transductor is broken.
		*Adjust the transductor.
		*Exchange the faulted transductor.
The tool holder doesn't pop up	Air pressure is not sufficient.	*Check the air pressure equipment.
		*Check whether there's break or pressure loss in the air compression system.
	Hasn't pop up the trigger signal.	*Refer to the manual or contact the machine supplier,digital control and inverter supplier.
Output of one transducer doesn't meet the demand	The transducer cut off or out of order.	*Check the transducer's connector
		*Check whether there's break in the transducer connection cable
		*Adjust the transductor.
		*Exchange the faulted transductor.
The spindle is too hot.	The cooling fan doesn't work normally.	*Check the cooling fan whether work normally
		*Check whether the cooling fan is damanged.
		*Check whether there's something block the work of the cooling fan.
		*If the cooling fan unit has falt,please exchange one.
	The voltage of the power supply is incorrect.	*Check the demand of the spindle
	The passageway of air is blocked.	*Take off the cooling fan.
		*Check and clean the passageway of air.
		*Reinstall the cooling fan.
	The power comsuption is heavy when processing .	Reduce the demand of power.
	The inverter set incorrect.	*Check the specification of spindle.
Noise from the bearings.	The bearings are worn down or damanged.	*Exchange the bearings.
The spindle vibriates.	The tool holer has be dynamic balanced.	*Choose the tool holer according to demand.
	The nut hasn't be dynamic balanced.	*Choose the nut according to demand.
	There's dirt in the tool holer or the cones.	*Clear the dirt and clean the tool holerand cone.
	The inverter is set incorrectly.	*Refer to the tech data of the spindle and spec.
	The power comsuption is heavy when processing .	*Reduce the cutting deepness and speed.
	The screw is loosen.	*Tighten the fixing screw.
	The bearings are worn down or damanged.	*Exchange the bearings.

Thanks for your reading!