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## T-5A Tapping & Drilling Machining Center

### EQUIPMENT DETAILS



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## T-7C Tapping & Drilling Machining Center

### EQUIPMENT DETAILS



## 1. General introduction of the machine tool

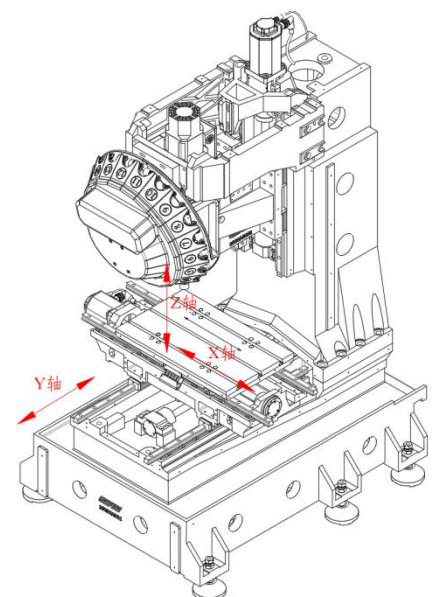
The T-5A/7C drilling and tapping machining center is developed based on the internationally popular, advanced, and flexible machine tool design concept. It is mainly used for drilling, tapping, and tapping processes such as non-ferrous metals, 3C industry, and aluminum substrates. It can realize boring, milling, and mobile The speed is fast, the spindle speed is high, and the efficiency of drilling and tapping speed is more than 20% higher than that of ordinary machining centers. It is an ideal processing equipment for customers in 3C and communication industries.

This machine tool fully and fully embodies the rich experience of Jirfine Intelligent Equipment Co., Ltd. in metal cutting of drilling and tapping machining centers. This machine tool adapts to the development trend of precision and high efficiency in the processing industry, and the processed products have high efficiency and high precision. , such as electronic communications, textile accessories, auto parts, hydraulic parts, etc., to adapt to the most challenging machining requirements of various industries. It has the characteristics of high precision, high speed, high flexibility and environmental protection. Its performance index and precision index fully comply with the national standard. After modular design, the products can be serialized and customized according to market demand. Its good performance-price ratio is the best choice for domestic and foreign customers.

The design of the machine tool conforms to the ISO international standard, and the measurement units of all parts and various instruments adopt the International System of Units (SI) standard.

## 2. The overall layout of the machine tool

High-speed drilling and tapping machining center with C-type machine structure designed by absorbing foreign advanced technology . The main structure is composed of five castings: base, saddle, worktable, column and spindle box. The table moves left and right on the saddle line rail, and the headstock moves up and down on the column line rail. The



workbench is rectangular, suitable for processing discs, sleeves, and plate parts, and a rotary table that rotates along the horizontal axis can be installed on the workbench. , used to process spiral parts.

The design of the direct connection between the spindle and the motor eliminates the problems of belt or gear transmission noise, backlash, and vibration. The motor shaft outputs the rotational speed directly to obtain high-quality tapping results. The whole machine has high rigidity, good stability, high dynamic characteristics, and high positioning accuracy of the machine tool.

The three motion coordinate axes of the machine tool are:

Move the table left and right (X coordinate axis)

Saddle moves back and forth (Y axis)

Headstock moves up and down (Z coordinate axis)

### 3. The main technical parameters of the machine tool

Name	Project	Unit	T-5A/C Specification	T-7C Specification
Workbench	Size (length X width)	mm	650×400	850×400
	T-slot (size x qty x spacing)	mm	14 x 3 x 125	14 x 3 x 125
	Weight capacity	Kg	250	350
Travel	X axis	mm	500	700
	Y axis	mm	400	400
	Z axis	mm	300(350 for T-5C)	350
Fast Speed	X /Y/Z axis	m/min	48/48/48	48/48/48
Feed Rate	X/Y /Z axis	mm/min	1~10000	1~10000
Spindle	Spindle taper hole/speed		BT30/20000rpm direct drive	BT30/ 20000 rpm direct drive
	Nose end to table distance	mm	155-455	150 - 500
	Spindle center to Z-axis shield	mm	415	411

Precision ( GB/T 20957.4-20 07 )	Positioning precision ( X/Y/Z )	mm	0.005 /0.005 /0.005	0.007 /0.005/0.005
	Repeat positioning precision ( X/Y/Z )	mm	0.003 /0.003 /0.003	0.004/0.003/0.003
Tool magazine	Magazine capacity		21T	21T
	Maximum Tool Outer Diameter	mm	100 (adjacent empty tool 140)	100 (adjacent empty tool 140)
	Tool length	mm	250	250
	Tool weight	kg	3	3
Other	Total capacity of machine power supply	KVA	15	15
	Barometric pressure	bar	≥ 6	≥ 6
	Machine Tool Dimensions ( L * W * H )	mm	1750*2400*2400	1890*2573*2442
	Machine color		Catalog standard color	Catalog standard color
	Shield		Full shield	full shield

#### 4. Standard accessories

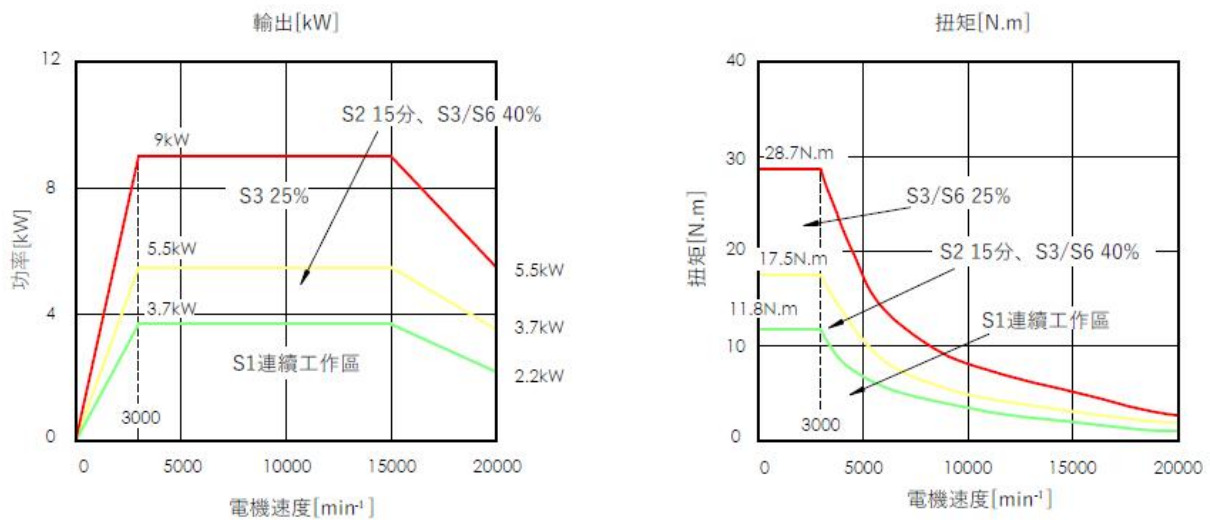
No.	Specifications	Quantity
1	Spindle Blowing System	1 set
2	Tool Cooling System	1 set
3	Full Face Shield	1 set
4	Automatic Lubrication System	1 set
5	Working Lamp	1 set
6	Adjust Pads And Bolts	6pcs
7	Dust Bin	1 set
8	Water Tank	1 set
9	Toolbox	1 set

## 5. System configuration

This model has FANUC CNC system configuration, the specific configuration is as follows

No.	Project	Manufacturer	T-5A Specification
1	System	Japan FANUC	OI-MF
2	Spindle motor	Japan FANUC	aiI2/20000
3	Three axis motor	Japan FANUC	αiS8*2+αiS12B

Spindle Motor Characteristic Curve FANUC (aiI2/20000)



## 6. Main components

No.	Project	Manufacturer	T-5A/C Specification	T-7C Specification
1	Spindle	China Haozhi/Jirfine	BT30	BT30
2	Three-Axis Ball Screw	Japan THK/ Taiwan PMI	X/Y/Z: 28 mm Pitch: 16mm	X/Y/Z: 28 mm Pitch: 16mm
3	Three-Axis Linear Guide	Germany Rexroth / Taiwan PMI	X/Y : 30(25 for T-5C) Z : 30	X/Y : Size 25 Z : 30
4	Ball Screw Bearings	Germany FAG / Japan NACHI	XYZ axis: 20TAC47B contact angle 60° Z axis: 25TAC62B contact angle 60°(for T-5A)	XYZ axis: 20TAB04U Contact angle 60°
5	Coupling	China Ruidi/China xudonghua	Axis X/Y : $\varnothing 16$ - $\varnothing 19$ Z : $\varnothing 20$ - $\varnothing 24$ (T-5A)	Axis diameter X/Y : $\varnothing 18$ - $\varnothing 19$

			Axis diameter X/Y : $\varnothing$ 18- $\varnothing$ 19 Z : $\varnothing$ 18- $\varnothing$ 24(T-5C)	Z : $\varnothing$ 18- $\varnothing$ 24
6	Main Air Circuit Solenoid Valve	Japan SMC/Japan CKD	SMC: VX, SY series / CKD: 3G, 4G series	SMC: VX, SY series / CKD: 3G, 4G series
7	Cutting Cooling Motor	China Ruijia	480W	480W
8	Ac Contactor	French Schneider	LC1-D series	Schneider: LC1-D series
9	Breaker	French Schneider	GV2-ME series	Schneider:GV2- ME series
10	Relay	Omron	MY2N series	MY2N series
11	Tool Magazine	Beiju , Taiwan, China	BT30-21T	BT30-21T
12	Air Filter	Japanese SMC	AW, AMF series	AW, AMF series

Above accessories are out of stock, the manufacturer guarantees to use brand specifications of the same price and grade. Jirfine Intelligent Equipment Co., Ltd.

## 7. The main structural characteristics of the machine tool

### 7.1. Machine tool spindle

The main drive adopts the AC servo motor of the main shaft as the power source, which is directly transmitted to the main shaft through a flexible coupling, without the noise and vibration problems of the belt main shaft. The spindle adopts domestic well-known brands with high precision and high performance. The tension force acts on the pull stud of the tool handle through the four-petal claw broach mechanism, so that the tool and the taper hole of the main shaft are closely matched to realize the tool grip; the 12,000rpm main spindle is equipped with a circulating oil cooling system to reduce the occurrence of high-speed rotation of the main shaft. The phenomenon of temperature rise can ensure the uniform temperature of the spindle, ensure the life and precision of the spindle and ensure the stability of the movement of the headstock. The 24000 rpm spindle of T-5A(T-7 20000 rpm) is equipped with high-precision ceramic ball bearings to improve the rigidity and operation stability of the spindle.

### 7.2. Feed transmission of each axis

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X-axis drive—The servo motor drives the ball screw through the precision coupling to drive the table to move left and right on the saddle to realize the X-axis feed movement.

Y-axis drive—The servo motor drives the ball screw through the precision coupling to drive the saddle to move back and forth on the base to realize the Y-axis feed movement.

Z-axis drive—The servo motor drives the ball screw through the precision coupling to drive the spindle box to move up and down on the column to realize the Z-axis feed movement.

### **7.3. Basic parts**

The base, table, column, saddle and spindle box of the machine tool are all made of high-quality inoculated iron castings, and have been subjected to multiple aging treatments. The overall structure design of the machine tool adopts FEM finite element analysis and optimization technology in order to obtain higher rigidity. The large castings of this machine tool adopt a firm and closed box-shaped structure, the reinforcing ribs are arranged reasonably, and multi-point support is adopted; the inside of the base of the fixing part is designed with "M"-shaped ribs, the column adopts a "herringbone"-shaped structure design, and the internal ribs The bar adopts a cross-shaped "well" structure design, which has sufficient bending and torsional strength and high rigidity of the basic parts, and can meet the requirements of heavy-duty cutting.

### **7.4. Machine tool guide rail**

X-axis guide rail pair—two linear guide rails and four sliders are adopted, with small friction coefficient, high sensitivity of worktable, small high-speed vibration, no crawling at low speed, high positioning accuracy, excellent servo drive performance; at the same time, large load-carrying capacity and anti-vibration performance of cutting Well, it can improve the performance characteristics of the machine tool, improve the accuracy and accuracy stability of the machine tool and the service life of the machine tool.

Y-axis guide rail pair - using two linear guide rails and four sliders, with sufficient bending rigidity and torsional rigidity.

Z-axis guide pair—two heavy-duty linear guide rails and four sliders are used to ensure

smooth cutting during processing.

### 7.5. Lubrication system

Both the ball screw pair and the three-axis linear guideway adopt an automatic lubrication system with a lubrication system that automatically controls the oil output. After the lubricating oil is divided, the screw and guide rail pair are lubricated regularly and quantitatively.

The oil circuit of the machine tool is laid with high-pressure resistant nylon pipe, which prolongs the service life of the oil pipe and is not easy to burst, so that the machine tool can get more stable oil circuit protection.

### 7.6. Cooling system and chip removal system of the machine tool

The chip cooling system of the machine tool adopts an external cooling method, and its coolant is an emulsified non-corrosive liquid, and is equipped with a sufficient number of nozzles, and the flow rate can be adjusted.

The chip removal system of the machine tool is that the chips are rushed into the rear of the machine tool through the chip removal groove, and the chips are discharged into the chip collection box .

### 7.7. Machine tool protection device

The bed guide rails ( XYZ axis) of the machine tool adopt anti-rust metal telescopic protective cover .

The sheet metal of the overall cover adopts a fully enclosed protective design to prevent iron filings and coolant from splashing, reduce the impact of oil mist on the environment of the customer's processing workshop during processing, and enable the operator to work in a safe and comfortable environment.

### 7.8. Perfect protection measures

NO.	Function
1	Machine tool spindle over-temperature and pressure-loss protection
2	Spindle Drive Fault Protection
3	Spindle system overload protection
4	Spindle automatic tool unloading and spindle start interlock protection

5	Soft limit protection
6	Overtravel limit protection
7	Feed drive failure protection
8	Feed system overload protection

## 8. Machine tool electrical control system

### 8.1. Description of CNC system

The machine tool adopts FANUC CNC system, equipped with a thin HMI operation panel and a 10.4 " color LCD display; the operation panel has user-defined keys, a USB interface for data transmission, and a network transmission interface for communication .

Basic functions of CNC system:

NO.	Features	Specification
<b>Axis control</b>		
1	Number of control axes	3 axes (up to 5 axes)
2	Number of linkage axes	3 axes (maximum 4 axes)
3	Minimum instruction increment	0.001mm (0.0001inch)
4	Minimum input increment	0.001mm (0.0001inch)
5	Mirror image	Axis reverse movement
6	Stored pitch error compensation	Per-axis pitch error offset compensation
7	Encoder	Absolute position encoder
<b>Spindle function</b>		
1	M code function	
2	Spindle positioning	
3	Spindle speed function	
4	Spindle override control	
<b>Tool function</b>		
1	Tool radius compensation C	G40, G41, G42,
2	Number of tool offsets	400
3	Tool Length Compensation	G43, G44, G49
4	Tool compensation memory C	Geometry/wear and length/radius
5	Tool offset	G45-G48

<b>Programming &amp; Editing Functions</b>		
User variable, configurable		
1	Absolute/Incremental Programming	G90, G91
2	Automatic coordinate system setting	
3	Background editing	
4	Fixed cycle	G73, G74, G76, G80-G89, G99
5	Radius becomes circular interpolation	
6	I/O interface	Network transmission interface USB
7	Imperial/Metric Conversion	G20/G21
8	local machine coordinate system	G52/G53
9	Maximum command value	
10	The number of programs that can be	400EA
11	Select program skip	
12	Choose to stop	M01
13	Part program storage	
14	Block number	
15	Program number search	
16	Program protection	
17	Program stop	M00/M02/M30
18	Rigid tapping	G84, G74
19	Subroutine	Up to 10 levels of nesting
20	Tape code	ISO/EIA code automatic recognition
2 1	Threading	
2 2	Work coordinate system	G54-G59
<b>Operation method</b>		
1	MEM automatic	Including program running, program interruption, dry run, single block, DNC
2	JOG (manual) adjustment	Include REF way
3	Handwheel operation	(×1,×10,×100)
4	MDI manual data entry	
<b>Operation and display</b>		
1	NC and PLC diagnostic functions, screen	

2	Self-diagnosis function display	
3	Current location display	
4	Graphic display	
5	Program display	
6	Program error display,	
7	Operation error display	
8	Actual cutting speed display	
9	Chinese and English menu display	
10	Alarm information display	
11	Multiple sets of M code instruction sets	

## 8.2. Electric cabinet part

The control cabinet and operation box adopt a fully enclosed structure, and the safety protection level meets the IP54 standard.

## 9. Machine tool operating environment and testing requirements

### 9.1 Machine tool working environment

The working environment of the machine tool is directly related to the performance and normal operation of the machine tool. If the temperature is too high, the control mechanism in the numerical control system will fail or malfunction; if the temperature is too low, the working conditions of the lubrication system and hydraulic system will deteriorate and the machine tool Faulty or damaged machine parts. Therefore we recommend that the machine be used under the following conditions:

- The machine tool should be placed indoors and in a dry environment. The machine tool foundation is manufactured according to the requirements of the machine tool foundation.
- Power supply voltage: 3-phase AC 415V  $\pm 10\%$ , power frequency: 50Hz  $\pm 2\%$ . Ambient air temperature: within the range of -5°C to 40°C;
- Humidity: relative humidity not exceeding 75% , and changes in humidity do not cause condensation.
- The dust concentration in the air shall not exceed 10mg/m<sup>3</sup> , and shall not contain acid , salt and corrosive gas.

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- Atmospheric pressure 86 ~ 106kpa .
  - Machine tools should be installed away from vibration and heat sources . The power in the workshop where the machine tool is installed should be below 0.5G (G is the acceleration of gravity).

## 9.2 Precision Inspection Conditions

In order to meet the machine tool accuracy, please check according to the following requirements.

During the accuracy inspection of machine, the ambient temperature shall be kept within  $20\pm 2^{\circ}\text{C}$ :

Machine tools and tools shall be placed in the inspection environment for a long enough time (preferably overnight) to ensure a thermal stable state prior to inspection. Air flow and external radiation, such as sunlight, external heat sources, should be avoided.

The rate of ambient temperature change during the test in  $^{\circ}\text{C}/\text{h}$  before 12h and during the inspection shall be within the range of the above requirements.

When any specific target position approaches continuously in the detection, if the deviation becomes an orderly sequence, the thermal state is not stable, and these trends should be minimized by heating operation.

## 10. Manufacturing Standards

GB 9061-2006 <General Technical Conditions for Metal Cutting Machine Tool>

GB 15760-2004 <General Technical Conditions for Safety Protection of Metal Cutting Machine Tool>

GB/T 17421.1-1998 Machine Tool Inspection Rules-Part 1: Geometric accuracy of machine tools under no load or finishing conditions

GB/T 17421.2-2016 machine inspection rules-Part 2: determination of positioning accuracy and repeated positioning accuracy of CNC axis

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JB/T 8771.2-1998 machining Center Inspection Conditions- -Part 2 Geometric accuracy test of vertical machining centers

JB/T 8771.4-1998 Processing Center Inspection Conditions- -Part 4 Test of positioning accuracy and repeated positioning accuracy of linear and rotary axes

## 11. Installation

### 11.1 Preparation Before the Machine Installation

Foundation preparation:

- According to the foundation drawings provided by the manufacturer, find a professional design institute to design the actual situation of the user soil.
- According to the professional foundation construction drawing production of the foundation, the foundation must be solid, rigid, smooth concrete foundation, and meet the requirements of the manufacturer's foundation drawings.
- The foundation is laid, and the machine tool can be installed only after the concrete is fully solidified.(Cement curing time is about 10~15 days)

Infor Power Supply:

- AC380V±10%, 50HZ±1%, users should provide power cord from plant power supply to machine power cabinet and electrical cabinet to separate ground wire, which should be ground separately.

Compressed air access preparation (air gun, trachea)

- Compressed air: 6bar, 280 L/min (ANR) The User provides 12 air pipes from the air source to the machine tool.

- Tool and hanger preparation:

Box lifting tools, lifting equipment and lifting ropes

Other:

- Grouting tools, foot rod bushings, etc

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## Quality Guarantee

### A) Quality assurance items

The guarantee period with FOC within one year (not including nonexpendable & transport and travel fees)

1. During the guarantee period, Jirfine shall supply free maintenance or replacement for the damaged part (just for nonexpendable part) induced by non-human damage;
2. If any quality problems occurs within the guarantee period, and Jirfine must provide on-site service, the transport and travel expense shall be borne by customer;
3. If any big quality problems occurs out of the guarantee period, Jirfine will provide a maintain service, the transport and travel expense shall be borne by customer, also charge for a favorable price;
4. Jirfine will provide a lifetime favorable price to the buyer with the materials and spare parts used in system operation, equipment maintenance;

### B) The main quality warranty maintenance certificate

If there is any dispute please refer to our guarantee letter, so:

- ① please keep the guarantee letter, if you lost it, please connect with us in a month.
- ② If the guarantee letter has been altered or it has no our stamp, it is useless.

### C) The following conditions need to be paid reasonably even in the assurance period:

- ① Natural reasons
- ② Operating mistakes
- ③ Voltage is not fit for our operation instruction

- ④ Repack it without our guides
- ⑤ Damaged for lending machine to others
- ⑥ Damaged for authorized machine modification