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## V-8B Vertical Machining Center

### EQUIPMENT DETAILS



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## V-11 Vertical Machining Center

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## VH-85 Vertical Machining Center

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## 1. General introduction of machine tools

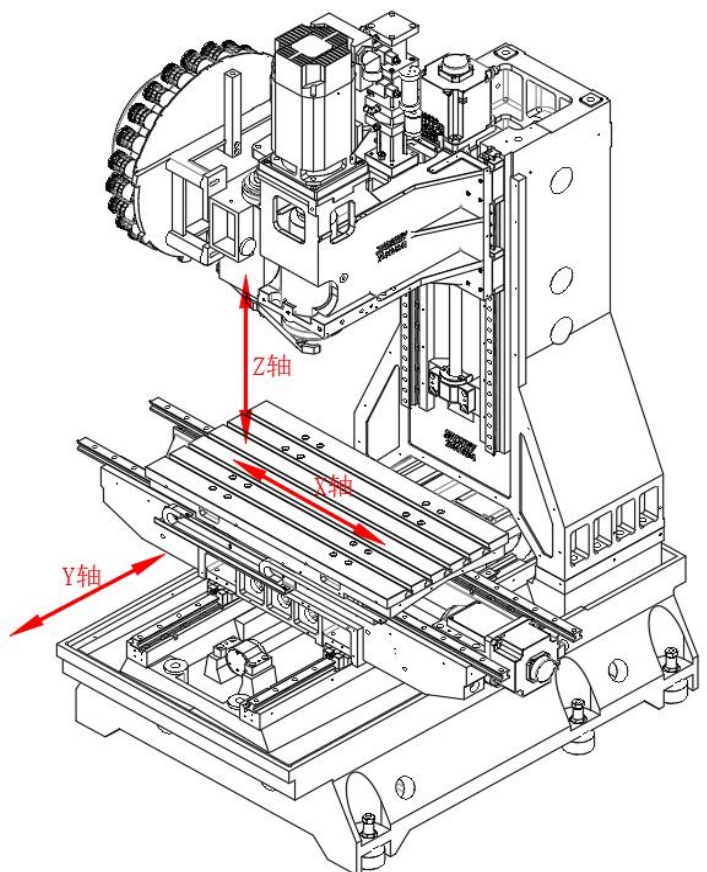
V-8B/11,VH-85 line rail vertical machining center is a kind of processing equipment with excellent performance, wide range of processing technology, high precision and high production efficiency, which is designed and manufactured by our company by adopting modern advanced mechanical, electrical, hydraulic and other new technologies. The machine tool adopts the world's advanced numerical control system Japan Fanuc, which can realize any three-axis linkage.

This product has a wide range of applications and strong processing capabilities; it is mainly suitable for aerospace, shipbuilding, power generation, military industry, heavy machinery, locomotives, machine tools, textile machinery, printing machinery, mold manufacturing and other industries. The machine tool has the functions of drilling, boring, milling, expanding, reaming, tapping, linear interpolation, circular interpolation, helical interpolation, and three-coordinate linkage. Mainly performs CNC machining on various medium and small molds and precision parts. 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

This machine tool is a line rail



vertical 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 saddle moves back and forth on the line rail of the base. The workbench moves left and right on the saddle rail, and the spindle box moves up and down on the column rail. The workbench is rectangular and has no indexing and rotary function. It is suitable for processing discs, sleeves, and plate parts, and one can be installed on the workbench. A rotary table that rotates along a horizontal axis for machining helical parts. The whole machine has high rigidity, good stability, high dynamic and static characteristics, and high positioning accuracy of the machine tool. The three linear motion coordinate axes of the machine tool are:

Workbench moves left and right (X axis)

Saddle moves back and forth (Y axis)

Headstock moves up and down (Z axis)

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

Name	Project	Unit	V-8B Specification	V-11 Specification	VH-85 Specification
Workbench	Size (L X W)	mm	1000×500	1200 ×600	1000 ×520
	T-Slot (Size x QTY x Spacing)	mm	18 x 5 x 80	18 x 5 x 100	18 x 5 x 100
	Weight capacity	Kg	600	800	600
Travel	X axis	mm	820	1100	850
	Y axis	mm	550	600	550
	Z axis	mm	550	600	550
Fast speed	X /Y/Z axis	m/min	48/48/48	36/36/36	36/36/36
Feed rate	X/Y /Z axis	mm/min	1~10000	1~10000	1~10000

Spindle	Spindle taper hole/speed		BT40 12000rpm Direct drive	BT40 12000 rpm Direct drive	BT40 12000 rpm Direct drive
	Nose end to table distance	mm	120-670	130-730	110-660
	Distance from spindle center to Z-axis shield	mm	540	625	560
Precision (GB/T 20957.4-20 07)	Positioning precision (X/Y/Z)	mm	0.008/0.006/ 0.006	0.008/0.006/ 0.006	0.008/0.006/ 0.006
	Repeat positioning precision (X/Y/Z)	mm	0.005/0.004/ 0.004	0.005/0.004/ 0.004	0.005/0.004/ 0.004
Tool magazine	Magazine capacity		24T	30T	24T
	Maximum Tool Outer Diameter	mm	80 (adjacent empty tool 150)	80 (adjacent empty tool 150)	80 (adjacent empty tool 150)
	Tool length	mm	300	300	300
	Tool weight	kg	8	8	8
Other	Total capacity of machine power supply	KVA	20	25	25
	Barometric pressure	bar	≥ 6	≥ 6	≥ 6
	Machine Tool Dimensions (L * W * H)	mm	2400*2700* 2830	2900*2680*30 50	2500*2750 *2790
	Machine color		Catalog standard color	Catalog standard color	Catalog standard color
	Shield		Full shield	Fully shield	Full shield

Technical data are subject to change without prior notice; Jirfine Intelligent Equipment Co., Ltd. reserves the right of final interpretation.

#### 4. Standard accessories

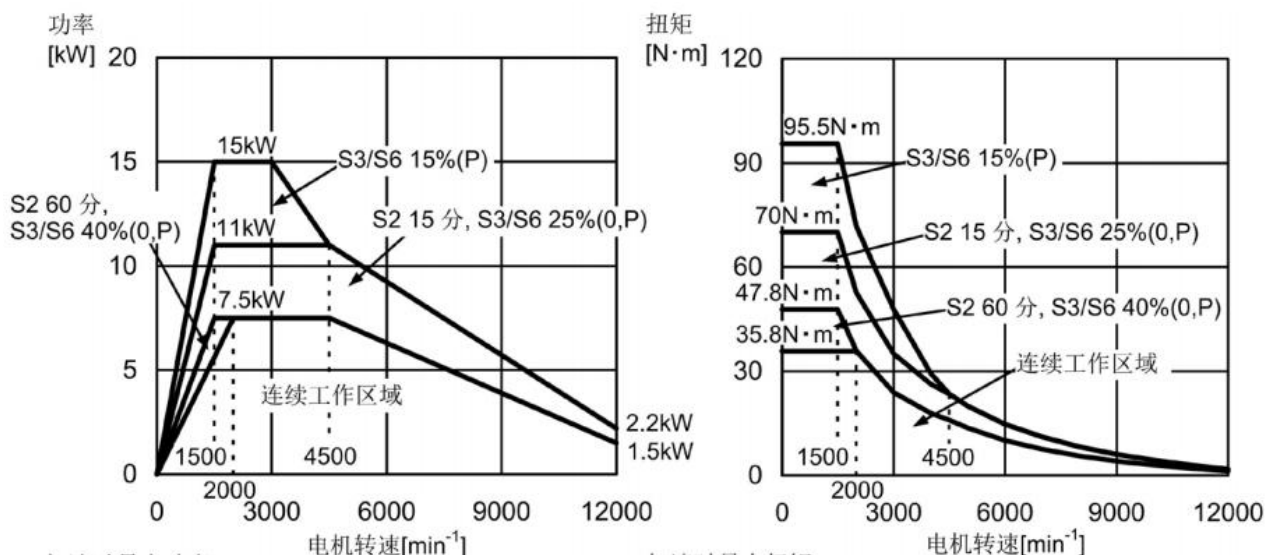
No.	Specification	Quantity
1	Spindle blowing system	1 set
2	Tool Cooling System	1 set
3	Full face shield	1 set
4	Automatic lubrication system	1 set
5	Working lamp	1 set
6	Adjust pads and bolts	6pcs(V-8B); 10pcs(V-11);8pcs(VH-85)
7	Dust bin	1 set
8	Water tank	1 set
9	Toolbox	1 set

### 5. Machine tool CNC system configuration

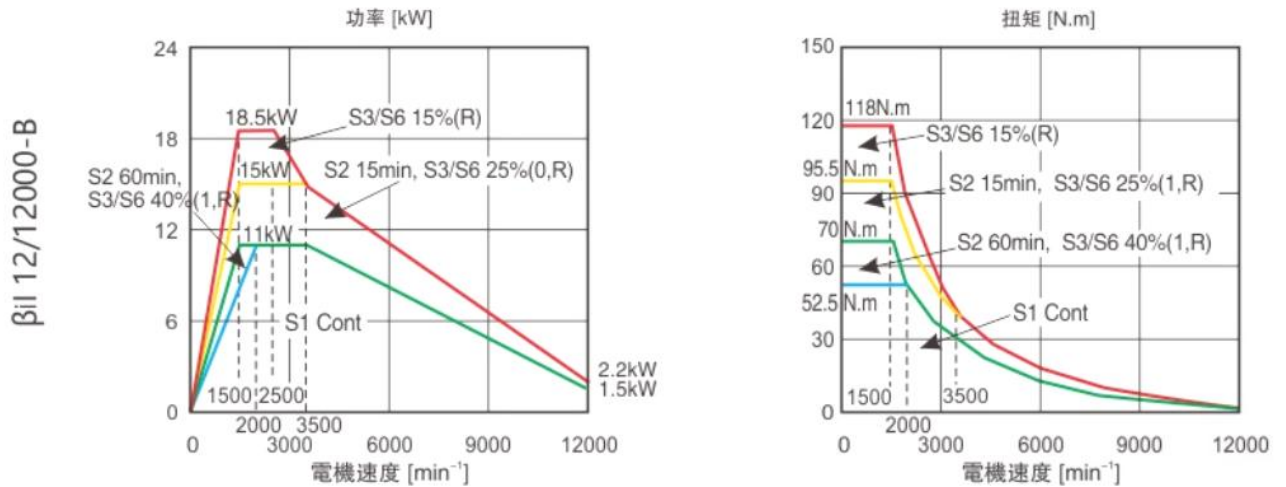
This model has FANUC CNC system configuration, the specific configuration is as follows

NO.	Project	Manufacturer	V-8B Specification	V-11/VH-85 Specification
1	System	Japan FANUC	OI-MF	OI-MF
2	Spindle motor	Japan FANUC	$\beta$ i18	$\beta$ i12
3	Three axis motor	Japan FANUC	$\beta$ iS12*2+ $\beta$ iS22B	$\beta$ iS22*2+ $\beta$ iS22B

### Spindle Motor Characteristic Curve ( $\beta$ i18)



### Spindle Motor Characteristic Curve (βil12)



## 6. Main components of machine tools

NO.	Name	Origin	V-8B Specification	V-11 Specification	VH-85 Specification
1	Spindle	Jirfine, China	Direct drive BT40	Direct drive BT40	Direct drive BT40
2	Three-axis ball screw	Taiwan PMI/Japan THK	X/Y/Z: 36 mm Pitch: 16mm	X/Y/Z:40mm Pitch 12mm	X/Y/Z:36mm Pitch: 12mm
3	Three-axis linear guide	Taiwan PMI / Germany Rexroth / Japan THK	X/Y/Z: 35	X:35 Y/Z: 45	X : 35 Y/Z : 45
4	Ball screw bearings	Japan NTN / Japan NACHI	25TAC62B	30TAC62BSU	25TAC 62B
5	Coupling	China Reddy	Axis diameter X/Y : $\varnothing 20 - \varnothing 24$ Z : $\varnothing 20 - \varnothing 35$	Axis diameter X/Y / Z : $\varnothing 28 - \varnothing 35$	Axis diameter X/Y / Z : $\varnothing 20 - \varnothing 35$
6	Tool system	Taiwan Chensound	W1000	W1000	W1000
7	The electromagnetic valve	Japanese SMC	VX, SY series	VX, SY series	VX, SY series
8	Cutting cooling motor	China Ruijia	480W	480W	480W



9	AC contactor	France Schneider / Japan Mitsubishi	Schneider: LC1-D series / Mitsubishi: MMP-T32LF series	Schneider: LC1-D series / Mitsubishi: MMP-T32LF series	Schneider: LC1-D series / Mitsubishi: MMP-T32LF series
10	Breaker	France Schneider / Japan Mitsubishi	Schneider: GV2-ME series / Mitsubishi: MMP-T32LF series	Schneider: GV2-ME / Mitsubishi: MMP-T32LF	Schneider: GV2-ME series / Mitsubishi: MMP-T32LF series
11	Relay	Japan Omron	MY2N series	MY2N	MY2N series
12	Tool magazine	Jirfine, China	BT40-24T	BT40-30T	BT40-24T
13	Air filter	SMC,Japan	AW、AMF series	AW、AMF series	AW、AMF series

If the above accessories are out of stock, the manufacturer guarantees to use brand specifications of the same price and grade, and Jirfine Intelligent Equipment Co., Ltd. reserves the right of final interpretation.

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

### 7.1. Machine tool spindle

When the direct drive is used, it is directly connected to the spindle through the coupling, and there is no noise and vibration of the belt main shaft; when the belt drive is used, the main drive uses the main shaft AC servo motor as the power source, and the synchronous A toothed belt transmits the power to the spindle.

### 7.2. Feed transmission of each axis

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, and pre-stretch the screw to improve the stiffness of the screw pair.

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, And pre-stretch the screw to improve the stiffness of the screw pair.

Z-axis drive——The servo motor drives the ball screw through the precision coupling to

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drive the spindle box to move up and down on the column to realize the Z-axis feed movement, and pre-stretch the screw to improve the stiffness of the screw pair.

### **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 reasonably arranged, and multi-point support is adopted; the interior of the fixing base adopts the "M" type reinforcing rib design, the column adopts a large "herringbone" 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 - using two heavy-duty linear guide rails with four sliders, small friction coefficient, high workbench sensitivity, small high-speed vibration, no crawling at low speed, high positioning accuracy, excellent servo drive performance; at the same time, large load-bearing capacity, cutting Good anti-vibration performance can improve the performance characteristics of machine tools, improve the accuracy and precision stability of machine tools and the service life of machine tools.

Y-axis guide rail pair - using two heavy-duty linear guide rails and four sliders, it has sufficient bending stiffness and torsional stiffness.

Z-axis guide rail pair - using two heavy-duty linear guide rails and four slide blocks to ensure smooth cutting during processing.

### **7.5. Lubrication system**

Both the ball screw pair and the three-axis linear guideway adopt the automatic lubrication method, and there is 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.

Oil circuit of the machine tool is laid with a high-pressure resistant hose , which prolongs the 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 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.

### 7.7. Machine tool protection device

The bed guideway ( XY axis) of the machine tool is protected by an anti-rust metal telescopic cover ; the column guideway (Z axis) is protected by an armored cover.

The sheet metal of the overall cover adopts a fully enclosed protective design to reduce the impact of oil mist on the environment of the customer's processing workshop during processing.

### 7.8. Perfect protection measures

NO.	Features
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
21	Threading	
22	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	

### 10.2. Electric cabinet part

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

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## 11. Machine tool operating environment and testing requirements

### 11.1 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 380V  $\pm 10\%$ , power frequency: 50Hz  $\pm 2\%$ . Beyond this range, the user needs to purchase a regulated power supply by himself.
- Ambient air temperature: within the range of 8°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.
- 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).

### 11.2 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

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20±2℃:

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℃/ 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.

## **12. 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

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

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## 13. Installation

### 13.1 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 non expendable & transport and travel fees)

1. During the guarantee period, Jirfine shall supply free maintenance or replacement for the damaged part (just for non expendable 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

customer.

- ② The apparatus try not to be used in the following situations:
  - a. Vibration, rocking the occasion.
  - b. Direct sunlight.
  - c. Hot, dusty, damp places.
  - d. To ensure safe, AC supply of the machine should be well grounded.
  - e. Do not use strong solvents (such as: benzene, nitro oil) washing machine.
  - f. Do not inject water and debris into the machine; prevent damage to electrical components and electrical shock.
  - g. Instrument displays the disassembly and debugging can only be measured by the State Department approved the units and the company, other people not allowed to overhaul