

# VM3018A Double Column Machining Center

## Technical Information

Version No. :TRJG-2021-A1



### 1. The main structure of the machine tool:

The main components of this machine tool are composed of base, worktable, beam, spindle head and other parts. The operator must understand the components of the machine tool before using it and know the correct operating position to use it safely and correctly.

#### 1.1 Base structure

The base is the foundation of the entire machine tool. To ensure that each component supported on it has better accuracy and stability, the base is required to have sufficient rigidity. The base of this machine tool is a high-grade casting that is integrally cast. Through reasonable design of reinforcement ribs and precision casting in the process, the base has long-lasting rigidity and can withstand heavy pressure, which lays the foundation for high precision and high stability of the machine.

### 1.2 Worktable structure

High-grade castings with solid structure, can withstand 10,000kg workpieces. There are 8\* 22 mm wide T-slots designed on the table to facilitate clamping of the workpiece (please refer to "Table Dimension Drawing" in the appendix).

### 1.3 Crossbeam structure

The crossbeam is the supporting part of the slide saddle and the spindle head, which must not only bear the cutting force in all directions, but also have a high torsion and bending rigidity. To this target, the beam adopts an integrally cast gantry structure, and the box-shaped cavity is provided with high longitudinal, horizontal, and diagonal reinforcing ribs, so that the beam has a high torsional and flexural rigidity and seismic resistance; The larger area of the joint surface with machine base ensure its rigidity and stability.

### 1.4 Spindle head structure

The spindle head is a box-shaped casting, which is compact in design and has high rigidity and cutting force. The spindle adopts SETCO spindle unit with high speed and large output power. The spindle motor directly drives the spindle through the BF/GTP gearbox.

## 2. Purpose and scope of machine tool

This series of double column machining center is a modern processing machine with automatic tool changer and CNC three-axis linkage control system. It can be clamped at one time and automatically complete various processes such as milling, drilling, boring, reaming and tapping of parts. It is suitable for the processing of various planes, holes and complex-shaped surfaces in medium batch production, especially for large and medium-sized box parts with many holes, it is more convenient, saves fixing and clamping time, shortens the production cycle, and improves the processing accuracy. It is an ideal equipment for mechanical processing and technical transformation in the defense industry, automobile manufacturing, tractors, light industry, textile machinery, mold industry and machine tool industry.

## 3. Main features of machine tool

- 1) The spindle is driven by a digital servo motor, and the motor directly drives the

spindle through the BF/GTP gear box. Reduced transmission links, improved transmission efficiency, and reduced energy loss;

- 2) The main spindle and gear box are forcedly cooled by two oil cooler to ensure excellent rotation accuracy and cooling effect;
- 3) The X axis is driven by a servo motor through a synchronous belt, and then directly driven by the high rigidity ball screw, the Y and Z axes are directly driven by the servo motor and the high rigidity ball screw. The supporting form of the screw adopts the structure that one end is fixed and the other end is stretched, so that the ball screw of the machine tool has a pre-stretching function, which can improve the stability of the transmission rigidity and positioning accuracy, repeated positioning accuracy of the machine tool and improve the thermal stability of the machine tool as well.
- 4) X, Y, Z support guide ways are high-precision heavy-load roller linear guide rails, which have low friction, good rigidity, high positioning accuracy and fast response speed;
- 5) The ATC whole system is imported from Taiwan with reliable performance and short tool change time;
- 6) The machine tool is equipped with a safety guard which is designed according to ergonomics for comfortable operation .
- 7) The main frame of the whole machine adopts high-quality cast iron and undergoes three aging treatments (two times heat aging and one time vibration aging), the structure is stable to keep the excellent accuracy.
- 8) The counterweight of the spindle adopts liquid nitrogen balance device, with simple structure and stable movement to ensure the best accuracy;
- 9) Equipped with two coil chip conveyors and a chain type chip conveyor, which is safe and environmentally friendly when removing chips in efficient.

#### **4. Working environment of machine tool**

- 1) Power supply: 380V±10%, three-phase AC, 50Hz±1%.
- 2) Air source pressure: 0.6MPa~0.8MPa.
- 3) Environment temperature: 5°C~40°C. The environment temperature around the machine

should be 0°C to 40°C (32°F to 104°F) .In order to ensure the machine Long-term stable and reliable processing

accuracy, it is recommended to use the machine tool in an environment of  $20\pm 2^{\circ}\text{C}$ , under other temperature environments or the temperature changes greatly, the accuracy will be reduced.

- 4) Relative humidity:  $\leq 85\%$ .
- 5) Altitude  $\leq 1000\text{m}$ .
- 6) Environment: Do not place in an environment with excessive dust, acid gas, corrosive gas or salt.
- 7) Avoid direct sunlight or radiation.
- 8) Avoid abnormal vibration
- 9) The machine must be grounded separately.

## 5. Technical Parameter and Equipment for VM3018A

Item	Unit	VM3018A		
Standard controller		FANUC 0i MF		
Travel	X axis travel (work-table)	mm	3200	
	Y axis travel (saddle)	mm	2000	
	Z axis travel (spindle head)	mm	1000	
	Distance from spindle nose to table	mm	200-1200	
	Distance between columns	mm	1820	
Work table	Table size(length×width)	mm	3200×1600	
	Max. table load	kg	10000	
	T slot size (width×distance×quantity)	mm	22×180×8	
Spindle	Spindle taper		BT50	
	Max. spindle speed	rpm	6000 (direct driven)	
	Spindle motor power (continual working/Max)	kW	22 / 54	
	Spindle torque (continual working/Max)	N.m	689/1692	
X/Y/Z	Rapid traverse (X axis)	mm/min	20000	
	Rapid traverse (Y axis)	mm/min	20000	
	Rapid traverse (Z axis)	mm/min	12000	
	Cutting feed rate on X/Y/Z	mm/min	1-10000	
Accuracy	VDI/DGQ3441	Full travel positioning accuracy	mm	P0.025
		Repeatability accuracy	mm	Ps0.020
Air pressure	MPa	0.6-0.8		
Supply voltage & frequency		3/PE, AC380V, 50Hz		
Power requirement	kVA	60		
Machine size(mm) (length)	mm	8927		
Machine size(mm) (width)	mm	5535		
Machine size(mm) (height)	mm	4650		
Machine weight	kg	26000		

## 6.Configuration

- 1.High and low power separated electric cabinet
- 2.transformer
3. rigid tapping
- 4.full enclosure guard(without roof)
- 5.spindle air sealing
- 6.machining air blowing device
- 7.working area light
8. 3color indication light
- 9.spindle chiller
- 10.portable MPG

- 11.coolant system
- 12.Grease lubrication system
- 13.pneumatic unit
- 14.air gun flushing function
- 15.water gun flushing function
- 16.tool kit
- 17.automatic power off
- 18.chain type chip conveyer
- 19.coil type chip conveyer
- 20.adjustable level bolts and foundation blocks
- 21.operation manual
- 22.safety door interlock
- 23.Tool release pedal switch
- 24.swivel type operation box
- 25.customization panel
- 26.BT50 6000RPM direct driven spindle with BF gear box,45degree pull stud
27. FANUC OI MF absolute 1 controller with 15"SCREEN  
high quality mold machining package(AICC2,smooth tolerance control, jerk control,  
machining quality level adjustment function)  
pre-read 400 block, data servo ,picture function
- 28.Z axis travel change to 1000mm (including column integrated raiser 200mm)
- 29.Air condition for electric cabinet
- 30.Enclosed iron package for delivery by flat rack
- 31.Simple CE
- 32.ATC preparation

#### 7. Machine main parts spec. and brand

No.	Name	Spec.	Quan.	Memo.
1	Controller	FANUC Oi MF	1 set	FANUC (Japan)
2	Angular contact bearing	Japan NSK precise bearing	20sets	NSK (Japan)
3	X axis ball screw	Dia.80mm, pitch 20mm	1set	THK (Japan)
4	Y axis ball screw	Dia50mm, pitch12mm	1set	THK (Japan)
5	Z axis ball screw	Dia.50mm, pitch10mm	1set	THK (Japan)
6	X,Y,Z linear guide way	55 spec.roller type	3 pairs	THK (Japan)

7	Spindle unit	Direct driven BT50-6000RPM	1set	SETCO (USA)
8	Heat exchanger	MEA-25N-01M5-1237C	1pc	HAOSCH (Germany)
9	Oil chiller		2pc	HAOSCH (Germany)
10	Spindle gear box		1 set	BF (Italy) /GTP(Taiwan)
11	Drag chain	68.125.250 series	2sets	IGUS (Germany)
12	Lubrication system	P-207F including accessories	1set	LUBE(Japan)
13	Pneumatic system	AW30-03D-A and accessories	1set	SMC(Japan)
14	Organ shield		2sets	NAJEC (Japan)
15	Relay	MY2N-D2-J 24VDC	5 件	OMRON (Japan)
16	AC contactor	LC1D09M7C	4pcs	SCHNEIDER (France)
17	Breaker	3P-10A	1pc	SCHNEIDER (France)
18	Breaker	3P-32A	1pc	SCHNEIDER (France)
19	Breaker	DPNK10A2P	2pcs	SCHNEIDER (France)
20	Breaker	C65N1P/6A	2pcs	SCHNEIDER (France)
21	Thermal overload relay	LRD-10C	1pc	SCHNEIDER (France)
22	Thermal overload relay	LRD-06C	1pc	SCHNEIDER (France)
23	Thermal overload relay	LRD-07C	2pcs	SCHNEIDER (France)

## 8. FANUC Oi MF main specifications

### Basic specifications list

Item	Specification
<b>Standard configuration of system software and hardware</b>	
Controller	Type1,15" color LCD, Separable type MDI, 1 path, 2 slot
Interface (Hardware)	ATA Flashcard socket/USB socket (beside LCD Display) ; One RS232/RJ45/USB socket( board Back of LCD Display. One RJ45 socket
Maximum look-ahead blocks	400
High-speed & high-quality machining package	<ul style="list-style-type: none"> <li>● AI contour control II</li> <li>● Smooth tolerance control</li> <li>● Jerk control</li> <li>● Machining quality level adjustment function</li> </ul>
Fast Ethernet Board (hardware)	
Fast Ethernet board (software)	
Ethernet function (software)	
FANUC PICTURE executor (software)	
Custom software	6MB
Dual display function of CNC screen	
Machining condition selecting function	
Pitch error compensation of interpolation type	
<b>Controlled axis</b>	
Max. total number of control axes(axis/spindle)	7 (7/2)
Machine groups	1
Controlled path	1 path
Max. simultaneously controlled axes	Max. 4 axes
Axis control by PMC	Not available on Cs axes
Cs contouring control	
Max. simultaneously controlled axes (in each path)	Max. 4 axes
Tandem control	
Torque control	



Control axis detach	
Increment system	IS-A, IS-B
Increment system C	0.0001mm、0.0001deg、0.00001inch
High precision program command	Included in Increment system A to E
Flexible feed gear	Optional DMR
HRV3 control	HRV3+
Inch/metric conversion	
interlock	
Machine lock	
Emergency stop	
Overtravel	
Stored stroke check1	
Stored limit external setting	
Stored stroke check 2,3	
Stored limit check before move	
Mirror image	
Follow-up	
Servo off/Mechanical handle	
Position switch	
<b>Operation</b>	
Automatic operation	
MDI operation	
DNC operation	Included in RS232C interface.
DNC operation with memory card	CF card and PCMCIA Card Attachment isrequired
Schedule function	
Program number search	
Sequence number search	
Sequence number comparison and stop	
Program restart	
Manual intervention and return	
Wrong operation prevention	
Retraction for Rigid tapping	
Buffer register	
Dry run	
Single block	
Manual continuous feed (JOG)	
Manual reference position return	
Reference position setting without DOG	
Reference point setting with mechanical stopper	
Reference position shift	

Manual handle feed 2/3-units	1
Manual handle feed rate	×1, ×10, ×100
Handle interruption	
Incremental feed	
Jog and handle simultaneous mode	
<b>Interpolation functions</b>	
Nano interpolation	
Positioning	G00 (Linear interpolation type positioning is possible)
Single direction positioning	G60
Exact stop mode	G61
Tapping mode	G63
Cutting mode	G64
Exact stop	G09
Li near interpolation	
Circular interpolation	
Dwell (Second designation)	
Cylindrical interpolation	
Helical interpolation	Circular interpolation plus max. 2 axes linear interpolation
Thread cutting, synchronous cutting	Spindle serial output is required.
Multi threading	For M system, included in Thread cutting, synchronous cutting
Continuous threading	For M system, included in Thread cutting, synchronous cutting
Skip	G31
High-speed skip	
Torque limit skip	
Reference position return	G28
Reference position return check	G27
2nd reference position return	
3rd/4th reference position return	
Normal direction control	
Index table indexing	
General purpose retract	
<b>Feed function</b>	
Rapid traverse rate (Increment system B)	Max. 999.999m/min (1μm)
Rapid traverse rate (Increment system C)	Max. 99.9999m/min (0.1μm) Included in Increment system C
Rapid traverse override	F0, 25, 50, 100%
Feed per minute	
Feed per revolution	
Without position coder feed per revolution	Included in constant surface speed control.
Without position coder constant surface speed control	Included in constant surface speed control.
Tangential speed constant control	

Cutting feedrate clamp	
Automatic acceleration/deceleration	Rapid traverse: linear Cutting feed: exponential, linear
Rapid traverse bell-shaped acceleration/deceleration	
Linear acceleration/deceleration after cutting feed interpolation	
Bell-shaped acceleration/deceleration after cutting feed interpolation	
Smart overlap	
Linear acceleration/deceleration before cutting feed	Included in AI contour control I or II
Feedrate override	0-100%
One-digit F code feed	
Inverse time feed	
Jog override	0-150%
Override cancel	
External deceleration	
Automatic corner deceleration	Included in AI contour control I or II
Feedrate control with acceleration in circular interpolation	
Bell-type acceleration/deceleration before look ahead interpolation	Included in AI contour control I or II
Rigid tapping bell-shaped acceleration/deceleration	Rigid tapping is required.
Rapid traverse block overlap	
<b>Program input</b>	
Tape code	EIA/ISO
Label skip	
Parity check	Horizontal and vertical parity
Control in/out	
Optional block skip	9
Max. programmable dimension	±9 digit (R,I,J and K is ±12digit )
Program file name	32 characters
Sequence number	N8 digit
Absolute/incremental programming	Combined use in the same block
Decimal point programming / pocket calculator type decimal point programming	
Input unit 10 time multiply	
Diameter/Radius programming	
Plane selection	G17、 G18、 G19
Rotary axis designation	
Rotary axis roll-over	
Polar coordinate command	
Coordinate system setting	

Automatic coordinate system setting	
Workpiece coordinate system	G52 - G59
Workpiece coordinate system preset	
Addition of workpiece coordinate system	48 pairs
Direct input of workpiece origin offset value measured	
Manual absolute on and off	
Optional chamfering corner R	
Programmable data input	G10
Sub program call	10 folds nested
Custom macro	
Addition of custom macro common variables	#100 - #199, #500 - #999
Custom macro common variables between each path	Only for more than 2 path control. Included in Custom macro
Interruption type custom macro	
Canned cycle for drilling	
Circular interpolation by R programming	R,I,J,K 12digit
Automatic corner override	
Scaling	
Coordinate system rotation	
Programmable mirror image	
G code preventing buffering	
Tape format for FS10/11	
Small-hole peck drilling cycle	
Pattern data input	
Interruption type custom macro	
<b>Auxiliary/Spindle speed function</b>	
Auxiliary function	M8 digit
2nd auxiliary function	B8 digit
Auxiliary function lock	
High-speed M/S/T/B interface	
Multiple command of auxiliary function	5
Spindle speed function	S5 digit , binary output
Spindle serial output	S5 digit , serial output
Spindle analog output	S5 digit , analog output, up to 1 spindle
Constant surface speed control	
Spindle override	0 - 120%
Spindle orientation	1 spindle Spindle serial output is required
Spindle output switching function	1 spindle Spindle serial output is required.
Spindle synchronous control(Single)	Spindle serial output is required. Analog spindle is not available.
Rigid tapping	

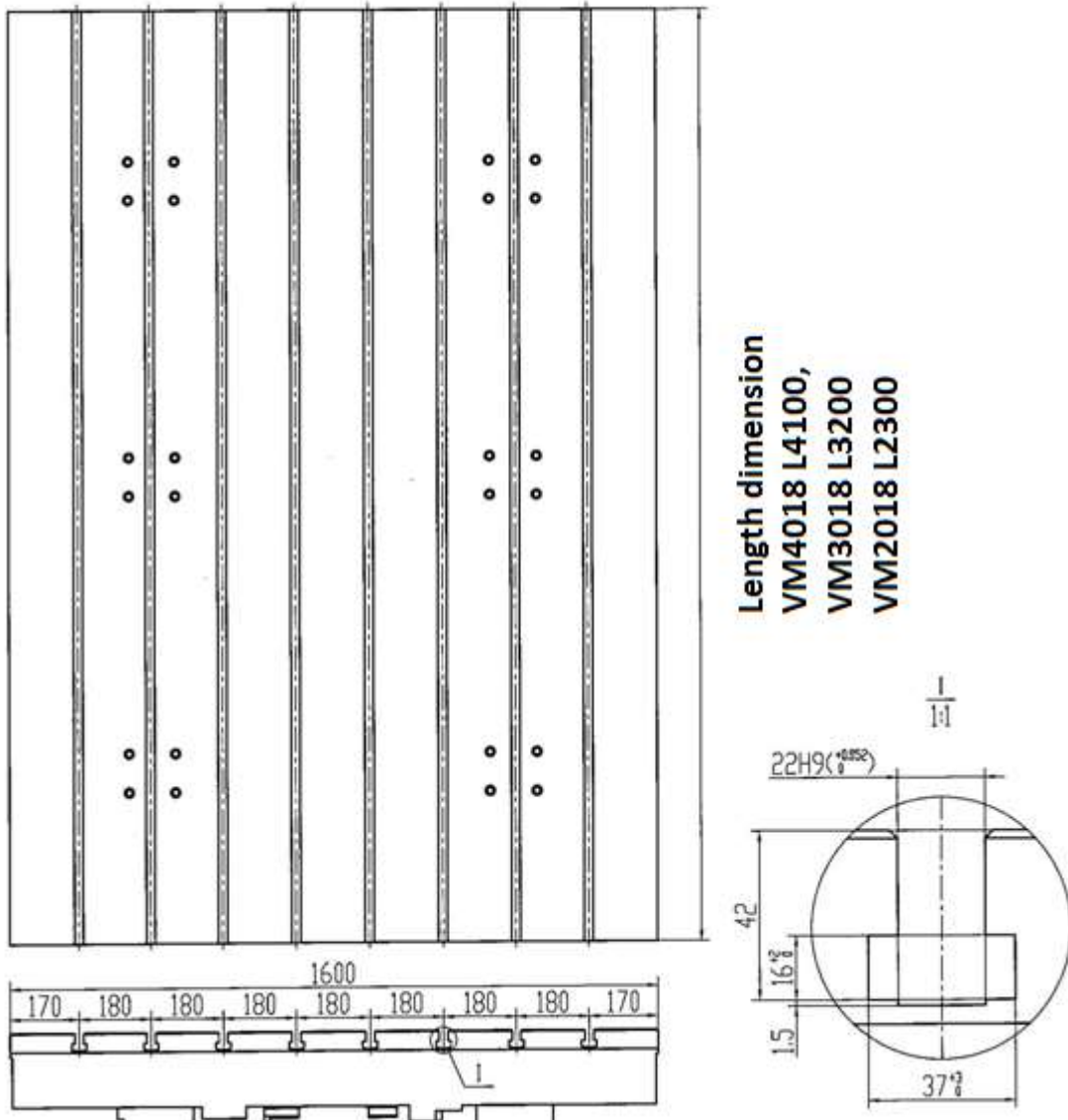
FSSB high-speed rigid tapping	Analog spindle is not available
<b>Tool function/Tool compensation</b>	
Tool function	T8 digit
Tool offset pairs	400-pairs
Tool offset memory C	Distinction between geometry and wear, or between cutter and tool length compensation
Tool length offset	
Tool offset	
Tool radius · Tool nose radius compensation	
Tool length measurement	
Automatic tool length measurement	
Tool life management	
Extended tool life management	
<b>Accuracy compensation function</b>	
Backlash compensation	
Backlash compensation for each rapid traverse and cutting feed	
Smooth backlash compensation	
Smart backlash compensation	
<b>Editing operation</b>	
Part program storage size	512Kbyte
Number of registerable programs	400 个
Part program editing	
Extended part program editing	
Password function	
Playback	
Background editing	
Multi part program editing	Including background editing only available on 15" and 10.4" display unit
Memory card program edit & operation	Max. 63 programs. The tool on PC is required to convert and store files to memory card
High speed program management	
<b>Setting and display</b>	
Status display	
Clock function	
Current position display	
Program comment display	Program name 31 characters
Parameter setting and display	
Parameter check sum function	
Alarm display	
Alarm history display	
Operator message history display	
Operation history display	
Run hour and parts count display	

Actual cutting feedrate display	
Di splay of spindle speed and T code at all screens	
Directory display of floppy cassette	
Operating monitor screen	
Current position display	
Servo setting screen	
Spindle setting screen	
Display servo wave form	
Maintenance information screen	
Trouble Shooting function	
Software operator's panel	
Software operator's panel general purpose switch	Software operator's panel is required.
Extended software operator's panel general purpose switch	Included in software operator's panel general purpose switch
Multi-language display	25 types
Dynamic display language switching	
Data protection key	4 types
Screen eraser function	Manual or Automatic
Parameter set supporting screen	
Help function	
Self-diagnosis function	
Periodic maintenance screen	
Display of hardware and software configuration	
Servo information screen	
Spindle information screen	Included in spindle serial output
Graphic function	
CNC screen display	CNC Application Development Kit is necessary
Power consumption monitoring	
Main menu screen	
<b>Data input/output</b>	
RS232C interface	Ch.1; Ch.2
External tool offset	
External machine zero point shift	
External message	
External data input	Including External tool offset, External machine zero point shift, and External message
External key input	
External workpiece number search	9999
External program number search	1~9999
Memory card input/output	
USB memory input/output	
Screen hard copy	
Power Mate CNC manager	

External I/O device control	
Automatic data backup	
<b>Interface function</b>	
Embedded Ethernet	
Enhanced Embedded Ethernet function	Included in Embedded Ethernet
<b>Others</b>	
Status output signal	NC ready, servo ready, automatic operation, automatic operation start lamp, feed hold, reset, NC alarm, distribution end, rewinding, inch input, cutting, inposition, thread cutting, tapping, etc.
PMC system	PMC ladder function : 24,000 、 Ladder Dividing Management Function 、 I/O Link i DI/DO points: DI/DO 2048/2048 points 、 1st level execution cycle of ladder : 4ms/8ms 、 PMC multi-language message display function 、 Multi-language display of signal comment 、 Extended PMC ladder instruction function、 PMC Function Block function
Control power	DC24V±10%
Ambient temperature of NC unit	During operation: 0°C~58°C During storage: -20°C~60°C
Ambient humidity	Long term : 10 to 75% (with no dew condensation) Short term (within one month) : 10 to 95% (with no dew condensation)
Vibration resistance	Base on IEC68-2-6 standard

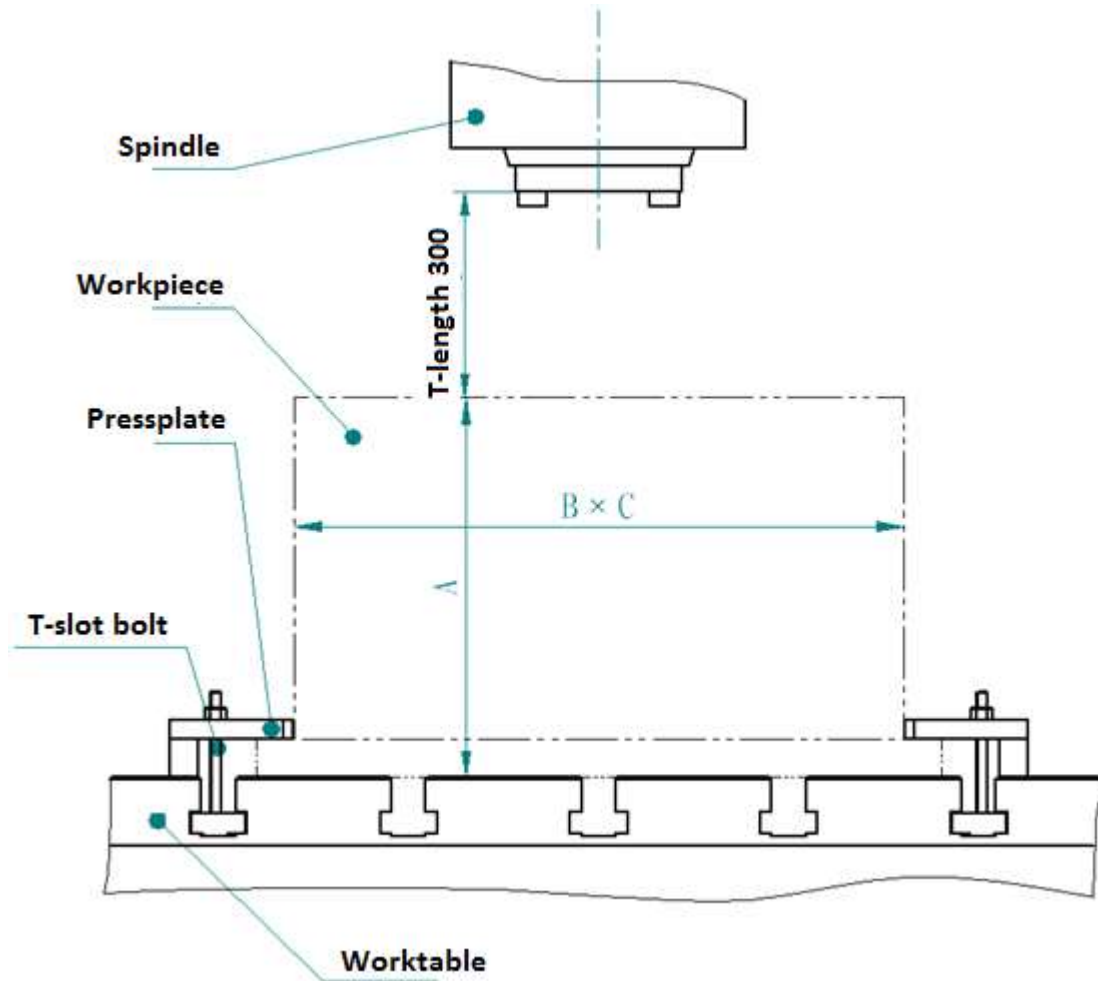
9. Appendix

1. Worktable size





2. Machining scope



Modle	Max. processing height A (mm)	Max. processing size B×C (mm)
VM3018A	700	3200×2000

### 3. Spindle power torque drawing

(if the technical parameters are modified for upgrading without prior notice ,Sky Master reserves the right of interpretation)

