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— GLOBAL NETWORK —

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Available machines or machines shown may vary depending on optional equipment or periodic design changes.

The export of products defined as restricted commodities (or technologies) under Japan's "Foreign Exchange and Foreign Trade Act" requires an export license issued by the Japanese Government. Furthermore, similar licenses may be required for re-transfer, re-sale or re-export of such products, therefore please do not fail to contact JTEKT in advance.

In order to observe laws and regulations and prevent inappropriate export, re-sale and relocation, JTEKT has equipped all of our NC machine tools with devices that detect relocation. If this device is activated, the machine will cease operation and will not restart until it has been checked by JTEKT. JTEKT may refuse to restart the machine should it be deemed that such an action would amount to the inappropriate export of a commodity or technology, or violate export regulations. In such a case, JTEKT will not be liable for any damages arising from the refusal to restart machine operation and do not bear any liability to perform services pertaining to product warranty. Please contact your JTEKT representative for details. Always read manuals carefully before using any machinery to ensure safe and proper use.

FH SERIES

FH1250SX-5Axis

5-Axis Horizontal Spindle Machining Centers





Supporting environmental age



Energy-related industry, aerospace industry, construction machine and transport machine

Top-level performance in machining large-size parts of every industry

Top-level performance in three features of "Large" , "Fast" , and "Strong" . Moreover, this machine enables the 5 axis simultaneous machining of complex-shaped workpieces and multi-face machining in one set-up. This equates to reduced set-up time and shorter workpiece machining lead time. FH1250SX-5Axis is large-type 5 axis control horizontal machining center which can realize high-quality, increased production efficiency and high cost-performance.

■ Workpiece range, the largest in the class

Maximum workpiece swing, maximum workpiece height and maximum stroke are realized to be the largest in the class.

■ Rapid feed rate, the fastest in the class

More than double speed performance is realized compared with large-size machine tools such as horizontal boring and milling machine and 5-face machining center.

■ Cutting ability, the strongest in the class

From aluminum to titanium - featuring a highly versatile, 5 axis special-purpose spindle not fussy about the material it machines.



FH1250SX-5Axis

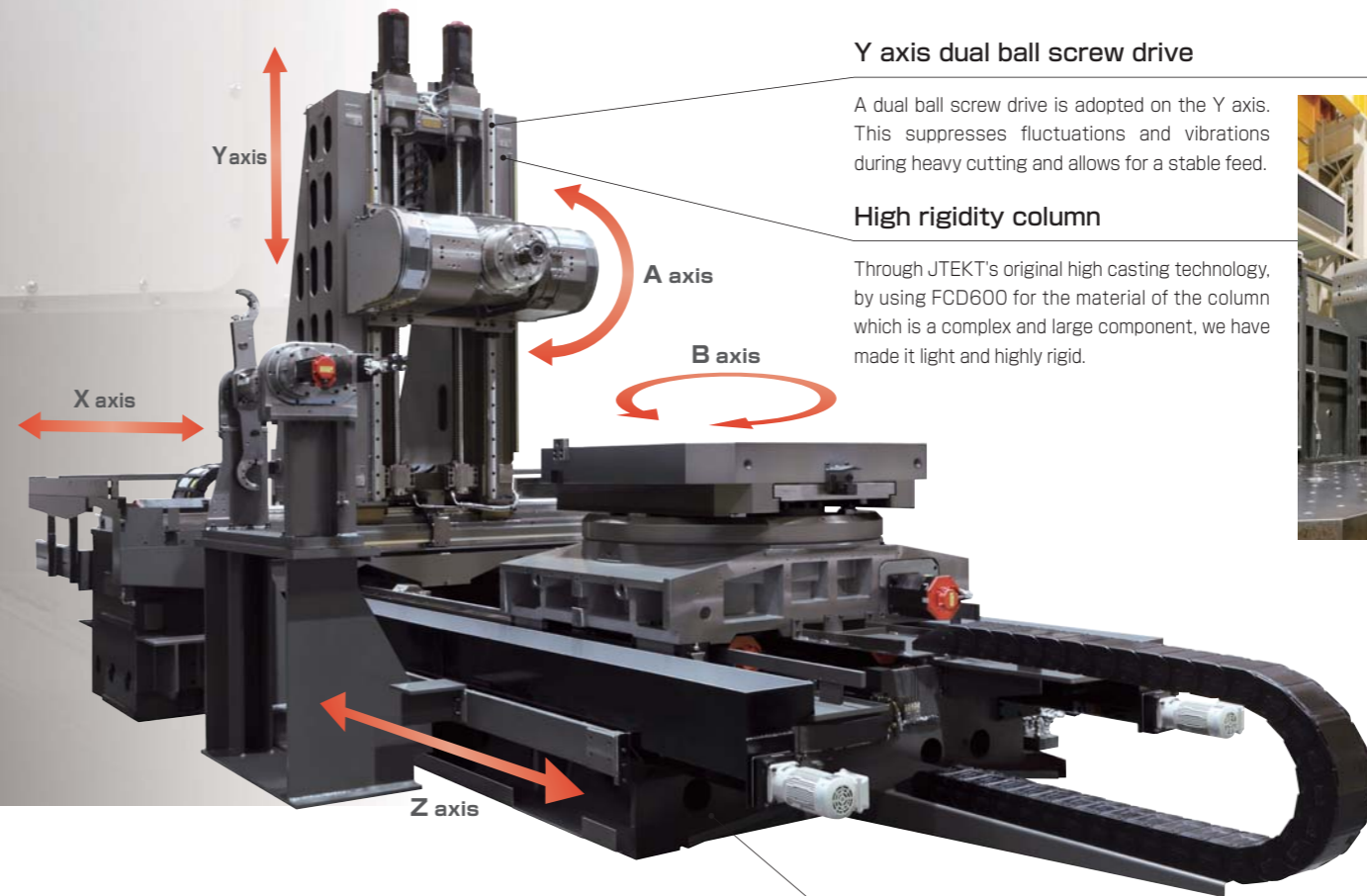
maximum & fastest



A rigid **Platform** incomparable to any others assures stable production over a long period.

JTEKT's basic approach towards machine design is to minimize displacement caused by external forces that may impact on cutting accuracy. The rigid bed of the FH Series provides the answer towards withstanding large cutting resistance as well as inertial forces of feed acceleration and deceleration. -The immobile bed is placed as a solid stationary matter and moving bodies such as the column is light-weight but at the same time rigid-simple, yet requiring high level analysis techniques and material technology.

An unmatched sturdy platform, utilizing the 5 axis function to the fullest.



Y axis dual ball screw drive

A dual ball screw drive is adopted on the Y axis. This suppresses fluctuations and vibrations during heavy cutting and allows for a stable feed.

High rigidity column

Through JTEKT's original high casting technology, by using FCD600 for the material of the column which is a complex and large component, we have made it light and highly rigid.



Tilt spindle (A axis unit)

By adopting a tilt spindle, large workpieces can be loaded on the pallet. A turning axis (A axis) on the spindle prevents workpiece weight from swaying right to left, keeping the machining accuracy of large workpieces stable.



Spindle

Equipped with a newly developed, low heat-generating spindle with a spindle rotation of 10,000 min⁻¹ and maximum torque of 263 N·m. It can machine a wide range of difficult-to-cut materials from aluminum to titanium and so on.



High-class cast steel high rigidity bed

The bed which supports movable bodies uses FEM analysis technology, securing sufficient rigidity and significantly enhancing the movable level. This has made stable axis feed possible.

Triple trough

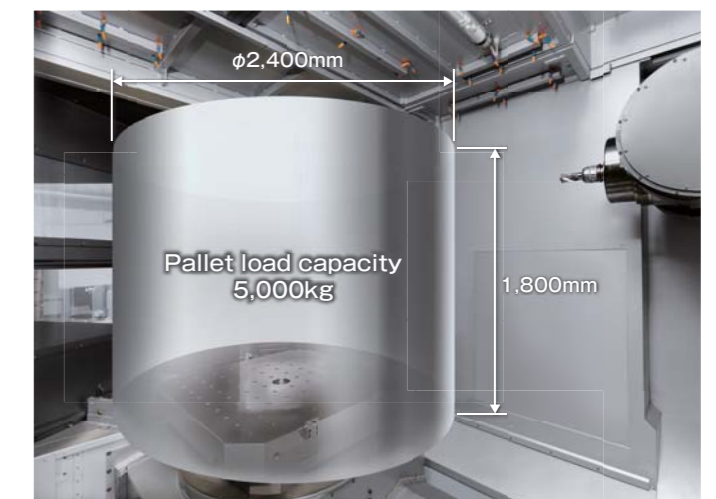
3 screw conveyors have been installed on the bed to process cutting chips smoothly.



High rigidity cylindrical roller slide

While maintaining rigidity, by adopting a cylindrical roller slide which can endure high speed, high acceleration axial movement, orientation change upon rapid acceleration, rapid stopping is slight, becoming possible to locate smoothly and contributing to production improvement.

Workpiece maximum dimensions and mass



The max. workpiece dimensions may be limited depending on tooling and the A-axis angle.

Simultaneous 5 Axes Milling of Aluminum Aircraft Part



1,100mm × 250mm × 25mm

[Workpiece material] A5052 (Aluminum)

Machining conditions

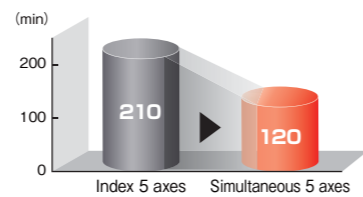
- Rough milling**
[Tool to use] φ32 R2 radius cutter
[Spindle rotation speed] 10,000min⁻¹
[Feedrate] 5,000mm/min
- Semi Finish & Finish milling**
[Tool to use] φ10 R2 radius end mill
[Spindle rotation speed] 10,000min⁻¹
[Feedrate] 2,000mm/min
- Finish milling**
[Tool to use] φball nose end mill
[Spindle rotation speed] 10,000min⁻¹
[Feedrate] 3,000mm/min

Machining performance

Surface roughness

0.86~1.5μmRa

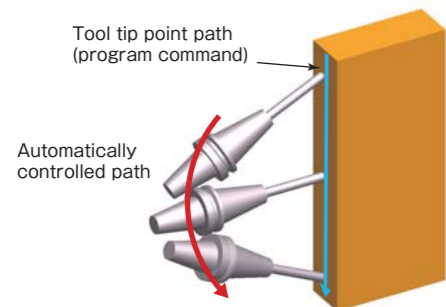
Cutting time (min)



5 axis machining support function

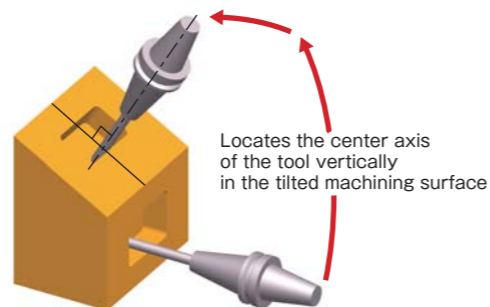
Tool tip point control

In machining where the tool orientation changes, the path and speed of the tool tip is automatically controlled using program commands.



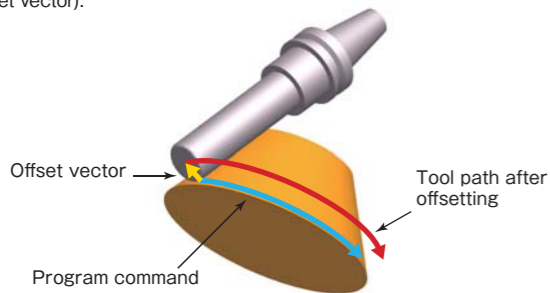
Tilted surface machining command

When machining holes and pockets in tilted surfaces it is possible to automatically convert the program created in XY coordinates to a tilted surface.



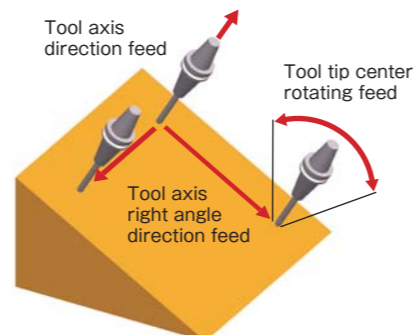
3D tool diameter offset

When machining using the side of the tool, it is possible to offset the tool diameter in a vertical direction against the center axis of the tool (offset vector).



3D manual feed

Tools can be moved in various directions using manual feed.



OP Supporter II

JTEKT's machining centers feature an automation function which makes the automation of the machine possible and supports the operator's work.

The 4 supporting features of the OP Supporter II

Program control support

- Required information can be obtained without opening multiple pages ... Program check & edit
- Command to machine can be executed with using cycles of eight drilling patterns...NC program edit
- The state of tools can be displayed by using NC program list (so as to check the state of tools before machining) ...List of use tool
- The configuration of sub programs can be displayed by using NC program list (so that time to edit can be reduced) ...NC program configuration diagram

Tool control support

- Simple program ... Tool number conversion function
- Direct tool setting capability ... Tool correction function
- Detailed control ... Tool life control function
- Limiting arm speed according to tool weight ... ATC control function
- Feedrate and rotation speed can be set in each tool...Machining condition setting function
- Faulty tool indexing ... Automatic magazine indexing function
- Storing the removed tool data and reusing it...Stored tool data storing function
- Setting the max. rotation speed in each tool and checking S-command...Limit rotation speed setting function
- Compensation value can be set till 3 sets in each tool...Second/third compensation function

Pallet control support

- Automatic cutting program call ... Program call function
- Omission of unnecessary cutting operations ... Multi-workpiece installation skip function
- Correction between pallets ... Pallet correction function

Maintenance control support

- Equipment fault recording ... Fault history display function
- Periodic inspection item reminder ... Periodic inspection instruction function
- Maintenance work of ATC unit is made easy...Unit maintenance function
- How to process at the time of trouble occurrence is described with photo and illustration...Trouble shooting instruction function

Attached functions: Item marked with [○] is attached. Item with [NO MARK] can be attached as option.

Classification	Function name	Accessories	Remarks
① Operation state	Current position display	○	
	Modal information display	○	
	Program check & edit	○	
② Program control	NC program edit	○	
	List of using tool	○	
	NC program structure	○	
③ Help	M code	○	
	Operation manual	○	
	Maintenance manual	○	
④ Tool management	Tool number conversion function	○	
	Tool offset function	○	
	Tool life managing function	○	
	ATC speed override function	○	
	AC function (condition control)	○	
	compensation value update function	○	●
	Machining condition setting function	○	●
	Automatic index function of tool requiring replacement	○	
	Data update function at tool clamp/unclamp	○	
	Storing tool data storage function	○	●
	Tool ID function	○	●
	Limit rotation speed setting function	○	
	second/third compensation function	○	
Display function	Trouble tool list display	○	
	Spare tool list display	○	
	Tool position display	○	
	Image list display	○	
	Using tool list display	○	
⑤ Pallet	APC control	○	※
	Pallet compensation	○	※
	Multi-parts mounting	○	※
⑥ Auxiliary	Function ON/OFF switch	○	
	Lamp display	○	
	Measurement result display	○	●
⑦ Maintenance	Alarm history	○	
	Periodic inspection display	○	
	Load monitor	○	
	Periodic measurement display	○	
	Unit maintenance	○	
	Operation history display	○	
	Parameter setting	○	
Trouble shooting instruction	○		
⑧ Function for DNC	Diagnostic data	○	
		○	
⑨ Report	Accumulated hours	○	
	Machining result	○	
	Operation result	○	



Program control

List of use tool



The status and type of tool is indicated with photos, descriptions and colors and can all be viewed at a glance.

- Setting the compensation value till 3 sets in each tool
- ATC speed controlled in line with tool mass
- Spindle rotation restriction control when the touch sensor function is in use

Maintenance control

Periodical inspection instruction

The details of periodical inspections and measurement items are shown using diagrams and photos.



1. The function marked with ● in the field of remarks requires addition such as option and device other than software. Please contact us separately for the details.
2. The function marked with ※ in the field of remarks can not be equipped to the machine connecting to FMS.

Machine specifications

Item		Unit	FH1250SX-5Axis	
			Standard specifications	Special specifications
Table & Pallet	Table dimensions (pallet dimensions)	mm	□1250 (Pallet)	1,250×1,600
	Rotary table indexing angle	°	0.001° (NC)	
	Pallet height (from floor)	mm	1,500	
	Max load on pallet	kg	5,000	
	Table indexing time (90° indexing)	sec	5.6	
	Pallet change time	sec	85	
Stroke	X-axis	mm	2,200	
	Y-axis	mm	1,600	
	Z-axis	mm	1,850	
	A-axis	°	-100~+45	
	B-axis	°	360	
	Distance from spindle endface to table center (with spindle at 0°)	mm	-150~1,700	
	Distance from spindle center to pallet upper face (with spindle at 0°)	mm	100~1,700	
	Distance from spindle endface to pallet upper face (with spindle at -90°)	mm	-250~1,350	
	Distance from spindle center to table center (with spindle at -90°)	mm	200~2,050	
	Max. workpiece swing × Max. workpiece height	mm	φ2,400×1,800 ※1	
Feeds	Rapid feed rate (X, Y, Z)	m/min	32, 32, 42	
	Rapid feed rate (A)	min ⁻¹	30	
	Cutting feed rate (X, Y and Z)	m/min	0.001~30	
	Ball screw diameter (X, Y, Z)	mm	φ63 (X), φ50 (Y, Z)	
Spindle	Spindle speed	min ⁻¹	50~10,000	
	Spindle diameter (front side bearing inner diameter)	mm	φ110	
	Spindle nose shape		BT No.50	
	Spindle motor short time/continuous	kW	30/25	
ATC	Tool holding capacity	tool	60	121, 180, 240, 330 ※2
	Tool selection		Absolute address	
	Tool (dia. × length)	mm	φ120×800 ※1	
	Tool mass	kg	35	
	Tool change time (Tool-to-Tool)	sec	8.4 (15kg), 10.3 (15~35kg)	
	Tool change time (Chip-to-Chip)	sec	10.3 (15kg), 12.2 (15~35kg)	
	Tools Holder Pull stud		MAS BT50 MAS P50T-1	
Dimensions & Weight	Floor space (width × depth)	mm	6,320×10,000 ※3	
	Machine height	mm	4,520	
	Machine weight	kg	49,500	
Various Capacities	Working oil	L	63	
	Slide lubricant	L	5.5	
	Table	L	4	
	Spindle coolant	L	70 (35×2)	
	Power supply capacity	kVA	64	
	Control voltage	V	DC24	
	Air source capacity	NL/min	900	
	Air source pressure	MPa	0.4~0.5	
Capability & Performance	Positioning accuracy ※4	mm	± 0.003	± 0.002
	Repeatability ※4	mm	± 0.0015	± 0.001
	Table indexing accuracy ※4	sec	± 7	± 3.5 (with NC encoder)
	Table indexing repeatability ※4	sec	± 3.5	± 2 (with NC encoder)

※1 For detail shape, refer to the tooling data. ※2 The matrix magazine is used for 180-tools or more ※3 For details, refer to the layout plan. ※4 According to our inspection method

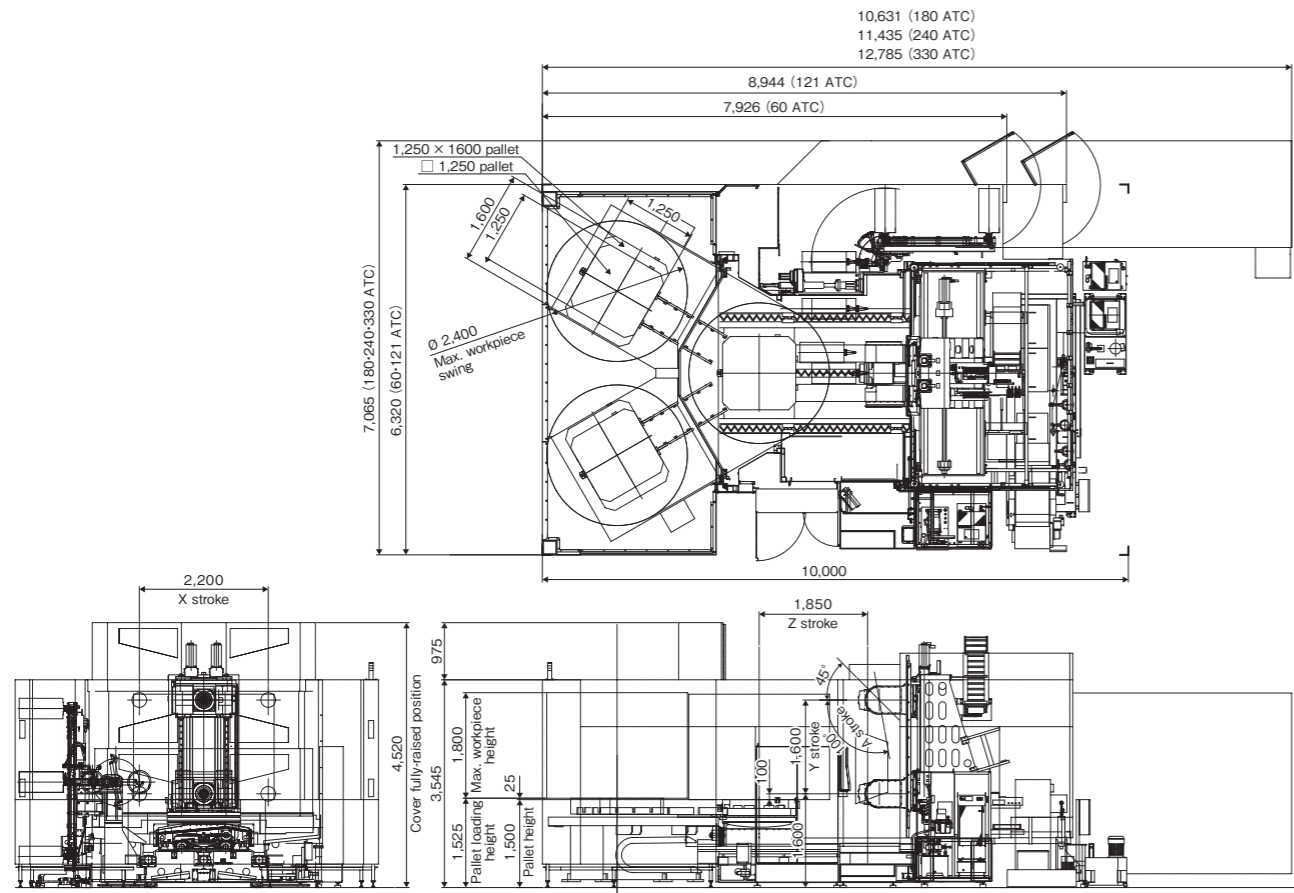
CNC unit FANUC 31i-A5 ●: Standard / □: Optional

Division	Name	FH1250SX-5Axis
Axis control	Min. input increment (0.0001mm)	●
	Machine lock	●
	Absolute position detection Inch/metric switch	● □
Operation	Dry run	●
	Single block	●
	Manual handle feed 1 unit	●
	Program restart	□
	Manual handle interrupt	□
Interpolation function	Nano interpolation	●
	Positioning (G00)	●
	Exact stop mode (G61)	●
	Tapping mode (G63)	●
	Cutting mode (G64)	●
	Exact stop (G09)	●
	Linear interpolation (G01)	●
	Arc interpolation (G02, G03)	●
	Dwell (G04)	●
	Helical interpolation	●
	Reference point return (G28, G29)	●
	Second reference point return (G30)	●
	Third and fourth reference point return (G30)	●
Feed function	AI contour controlI (pre-read 30 blocks) F1-digit feed	● □
	AI contour controlII (pre-read 200 blocks)	□
Program entry	Local coordinate system (G52)	●
	Machine coordinate system (G53)	●
	Workpiece coordinate system (G54 to G59)	●
	Additional workpiece coordinate systems (48 sets)	□
	Additional workpiece coordinate systems (300 sets)	□
	Custom macro	●
	Additional custom macro common variables (#100 to #199, #500 to #999)	●
	Fixed drilling cycle (G73, G74, G76, G80 to G89, G98 and G99)	●
	Additional optional block skip (9 pieces)	□
	Automatic corner override	□
Spindle function	Rigid tap	●
Tool function Tool correction function	Tool corrections (99)	●
	Tool corrections (200)	□
	Tool corrections (400)	□
	Tool corrections (499)	□
	Tool corrections (999)	□
	Tool corrections (2,000)	□
	Tool position offset	●
	Tool diameter and cutter radius compensation	●
	Tool length compensation (G43, G44 and G49)	●
	Program storage capacity (128K bytes)	●
Editing operation	Program storage capacity (256K bytes)	□
	Program storage capacity (512K bytes)	□
	Program storage capacity (1M byte)	□
	Program storage capacity (2M bytes)	□
	Program storage capacity (4M bytes)	□
	Program storage capacity (8M bytes)	□
	Number of registered programs (250)	●
	Number of registered programs (500) ※Storage capacity 256K bytes compulsory	□
	Number of registered programs (1,000) ※Storage capacity 512K bytes compulsory	□
	Number of registered programs (2,000) ※Storage capacity 1M bytes compulsory	□
Number of registered programs (4,000) ※Storage capacity 2M bytes compulsory	□	
Simultaneous multi-program editing (incl. background editing)	●	
Data entry/display	Touch panel control	●
Communication function	Built-in Ethernet	●
Others	12.1" color LCD	●
5 axis machining support function	Fast data server function	□
	Tilted surface machining command	●
	3D coordinates conversion	□
	3D tool diameter offset	●
	3D manual feed	●
	Tool orientation control	□
	Cutting point command	□
Tool tip point control	●	

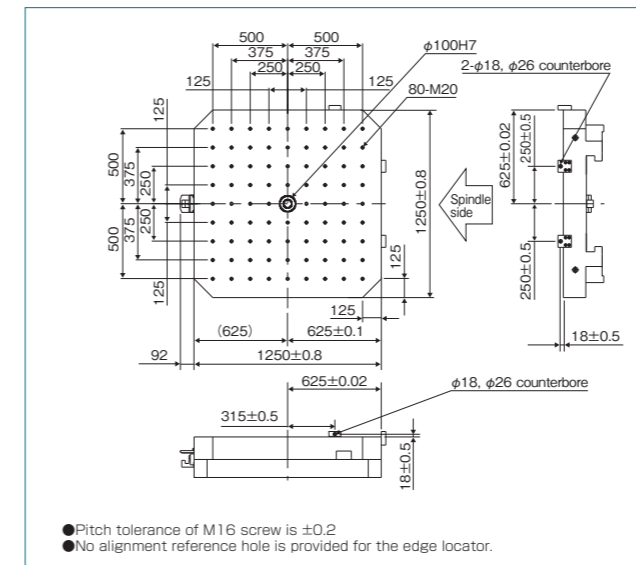
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FH1250SX-5Axis

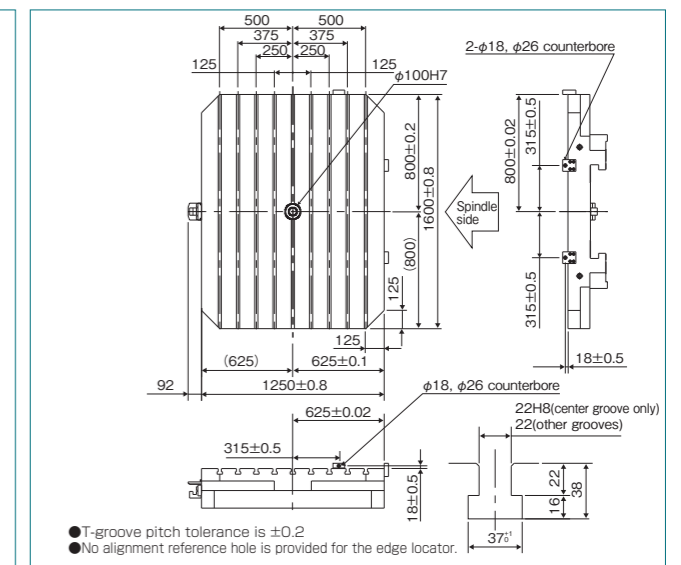
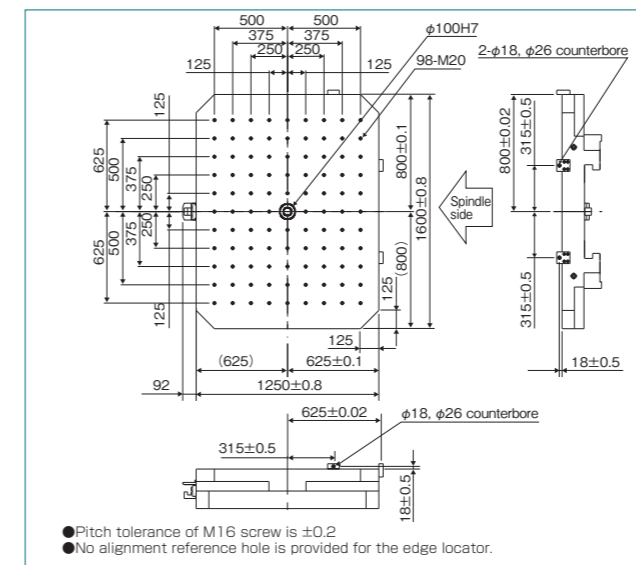
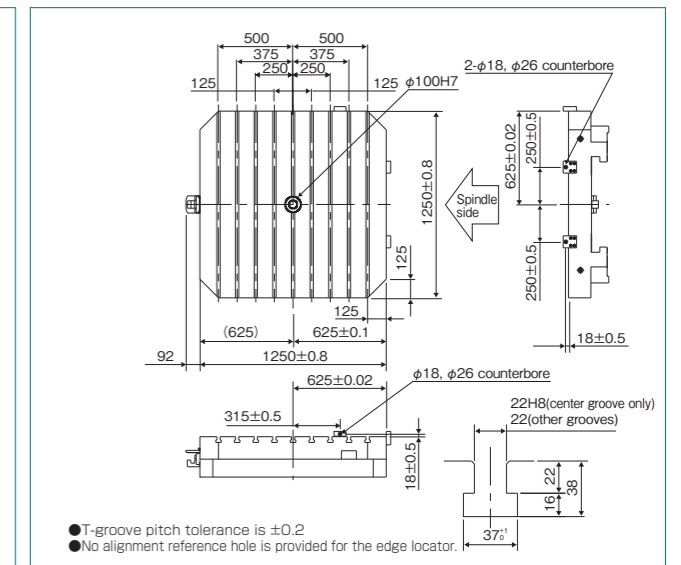
Layout plan



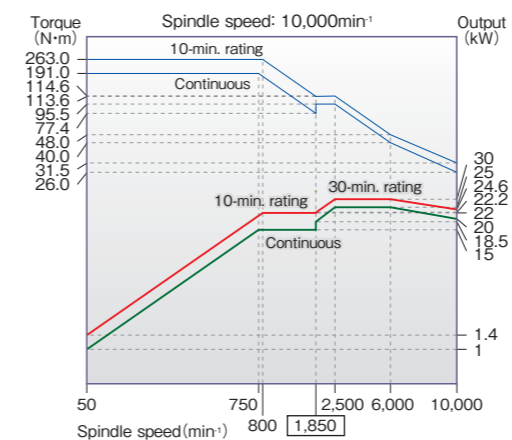
Threaded hole pallet



T-groove pallet

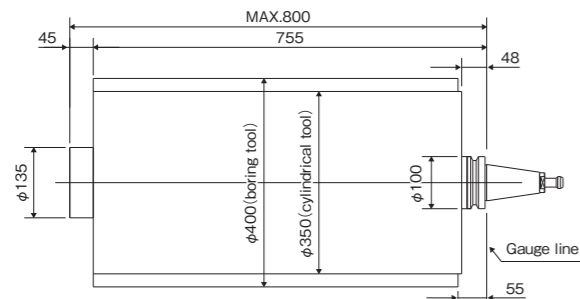


Output and torque diagram



Limitations in tool holder shape (JIS-CAT-DIN BT No.50)

The tool holder is subject to limitations in the shape during ATC (automatic tool change). If the maximum tool diameter exceeds φ100, the 48mm range from the gauge line must be φ100 in the outside diameter. The 55mm range from the gauge line must be within φ350 in the outside diameter. The total mass must be within 35kg and the length from the gauge line must be within 800mm.



Item	Max. spec
Tool length	800mm
Tool diameter	With 60 tools magazine: φ120mm (with no limitations caused by adjacent tools) With 121 tools magazine: φ130mm (with no limitations caused by adjacent tools) With 180, 240 and 330 tools magazines: φ110mm (with no limitations caused by adjacent tools)
Tool weight	35kg; The moment at the spindle nose must be within 29N·m.
Tool imbalance	30 × 10 ⁻⁵ N·m or less (tools not exceeding 6,000min ⁻¹)

Tools with diameters exceeding those described above are subject to limitations in the diameter of adjacent tools in the magazine, key good position of the tool holder and so on. Refer to the tool charts for limitations of spindle rotation speed according to the tool shape.