

Performance and Structural Description of the VFX820A+1 Vertical Machining Center



Manufacturer: Raysure Era Intelligent Technology

(Shandong) Co., Ltd.

Number: 1 unit

The brand image of the VFX series is enhanced by its meticulously crafted exterior design and high-quality fully enclosed protective panels. Featuring refined craftsmanship, a user-friendly environment, safe and comfortable operation, seamless human-machine interaction, and a vibrant corporate color scheme, the series has also obtained ISO 14001 international environmental certification.

This model features a sleek back-mounted module design that addresses cable management and space optimization challenges, reducing footprint size and lowering land costs.

1. Basic structural components of machine tools:

The base, columns, spindle head, saddle, and worktable form the foundation for maintaining precision in CNC machine tools. The fundamental components of the Ruishi Ji Yuan Precision Machinery VFX series vertical machining centers are manufactured using advanced Mihanna cast iron technology, ensuring material stability and long-term deformation resistance.

The bed features a sealed, integrated housing structure with a grid-patterned reinforcement system, providing exceptional rigidity and sustained precision performance.

The machine tool's core components feature an integrated mechanical box structure, designed using finite element analysis software ANSYS and NASTRAN to ensure optimal rigidity, stability, and material durability.

The column features a special reinforced structural design with a "A" -shaped configuration.

II. Machine Tool Guides:

The X and Y axes utilize THK heavy-duty finished linear guides, while the Z-axis slide rail employs a roller linear guide with a width of 45 mm, significantly enhancing the rigidity required for cutting operations. Each set of linear guides comes with an original factory inspection certificate, eliminating the need to segment standard 5-meter linear guides for use. Imported large-diameter lead screws are employed to improve axial movement rigidity. The extensive guide span, combined with a high-torque spindle head and a highly rigid housing design, surpasses that of conventional equipment, ensuring optimal stability during saddle and spindle head movement.

3、 Three-axis stroke

X-axis stroke: 820 mm

Y-axis travel: 520 mm

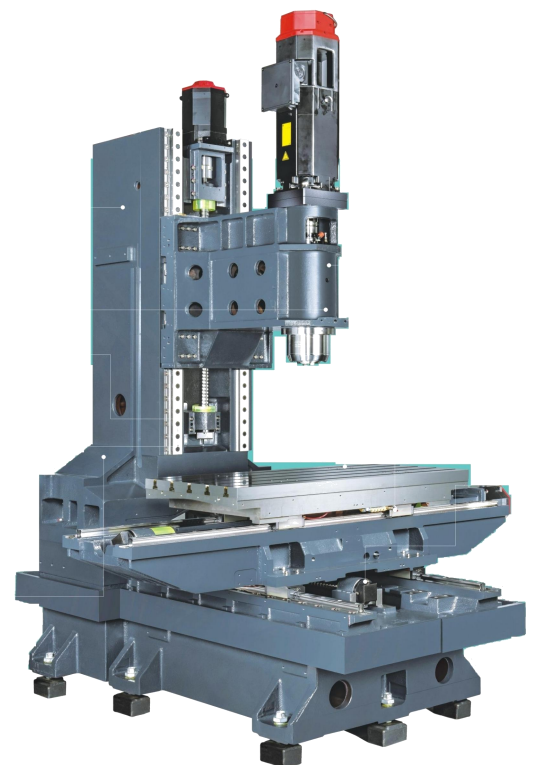
X-axis stroke: 635 mm

Lubrication method for X/Y/Z-axis guides: uses Japan's SHOWA system for timed, quantitative, and centralized automatic lubrication.

IV. Ball screws for the X, Y, and Z axes:

The VFX series three-axis ball screws all utilize ball screws manufactured by PMI.

Ball screw manufacturer: PMI Company, Grade C3



The lead screw and motor are connected directly.

The lead screw employs a centralized, timed, and quantitative automatic lubrication system.

The screw rod has bearings fixed at both ends, manufactured by FAG/NSK in precision grade.

V. X, Y, and Z-axis servo motors

All three-axis VFX servo motors are digital AC servo motors manufactured by Japan's FANUC.

	X axle	Y axle	Z axle
power	3.0KW	3.0KW	3.0KW

VI. Spindle System:

The main drive system of the VFX series vertical machining center features a patented design, offering excellent high-speed performance and superior precision retention. The spindle is equipped with a high-speed internal circulation cooling system that ensures stable operation at elevated speeds. Patent No.62889 effectively addresses the impact forces on the spindle during automatic tool changes by enabling successful load/unload operations onto the spindle housing, thereby significantly enhancing precision retention and extending machine tool service life. The spindle end structure employs a patented labyrinth design with a nose-end labyrinth air-blowing mechanism that effectively prevents dust ingress during ferrous metal cutting, ensuring extended bearing life.

The box-type spindle head features internal reinforcement ribs combined with high-precision tapered bearings optimized for heavy-cutting applications, ensuring maximum rigidity and precision, with dynamic balance vibration controlled at ± 0.002 mm.

Main shaft bearing accuracy: Grade P4

Spindle Structure: The spindle features a tool holder air-blowing cleaning function during automatic tool change, ensuring the cleanliness of the spindle taper hole.

All automatic tool change systems installed in the machine tools have undergone over one million tool change cycles to ensure continuous durability and stability.

The spindle motor employs 11/15/18.5 kW servo motors, delivering full power and high torque output even at low speeds with minimal power loss.

VII. Workbench:

Workbench dimensions: 950 mm × 520 mm Maximum load capacity: 800 kg

8. Protection and Chip Removal of Machine Tools:

The VFX machine tool features a comprehensive protection system that maintains a clean and tidy working surface in compliance with environmental standards. The chip discharge unit and water tank employ a front-side discharge design to expel metal debris outside the machine. The X, Y, and Z-axis screw guides are equipped with stainless steel telescopic protective covers, ensuring precise alignment between the guides and screws.

IX. Gas Source & Pneumatic Components:

1. The machine tool uses pneumatic tools for tool release and cleaning, requiring a gas pressure system pressure greater than 6 kPa. If the system pressure falls below the set value, the machine tool will automatically enter a safety protection mode and trigger an alarm. If the pressure fluctuation exceeds the threshold, the machine tool will automatically shut down.

2. The entire machine employs SMC pneumatic components, ensuring stable performance during operation.

X. Machine Tool Operating Environment:

Power supply: Voltage 380 V $\pm 10\%$, Frequency 50 Hz $\pm 1\%$.

Temperature: 5–40°C Humidity: ≤80% Pressure source: 6–8 bar

Area: 2730 × 2185 × 2800 mm

XI. Machine Tool Configuration List

Item Number	name of a part	Supply Brand
1	controller	FANUC 0I-MF Plus (1 pack)
2	Main spindle motor	FANUC series
3	X, Y, and Z-axis motors	FANUC Controller – Three-axis, 3 kW
4	main shaft bearing	NSK (Sweden)/FAG
5	X、 Y、 Z axle bearing	NSK/FAG
6	Three-axis ball screw	PMI/THK Company – Level C3
7	X, Y, and Z Linear Guides	Japan THK
8	Tool Library	Okada
9	Blade Switching Mechanism	Okada
10	Main shaft cutting cylinder	Okada
11	Debris Removal Machine	Rui Shi Ji Yuan (OEM)
12	Electrovalve (hydraulic)	SMC
13	Working Lighting Lamp	Japanese Machinery Engineer
14	Signal Cables	Hangzhou Junbang (Taiwan Yabang)
15	Electrical Box Heat Exchanger	Rui Shi Ji Yuan (OEM)
16	Lubrication Unit and Hydraulic Distributor	SHOWA (Japan Seiwa)
17	transformer	Rui Shi Ji Yuan (OEM)
18	hand wheel	Japan East Survey

12. Standard Specifications: Model VFX-820A+1 #40

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Main material of the customer's products: ☒ Aluminum, copper alloy ☐ Steel

☐ Cast iron Note: Medical device

Processing Type: ☐ General Mold ☐ High-Precision Mold ☒ Part Processing

☐ Heavy Cutting

Number: 1 unit

1. Itinerary	X-axis stroke: 820 mm Y-axis stroke: 520 mm Z-axis travel: 635 mm
2. Spindle	Main spindle speed: 50–12000 rpm (direct type) Main spindle hole taper: 7/24 taper, No.40 The distance from the nose end of the spindle to the worktable ranges from 140 to 775 mm. (Increased by 200 mm for easier installation of the turntable; final height: 340–975 mm) The distance from the spindle center to the column rail surface is 583 mm. Distance from the center of the workbench to the column rail surface: 323–843 mm
3. Feed	The X and Y axes move rapidly at 36 m/min Z-axis rapid displacement: 30 m/min
4. Workbench	Workbench area: 520 mm × 950 mm Workbench load capacity: 800 kg T-shaped groove dimensions: 18 × 5 × 100 mm The distance from the workbench surface to the ground is 950 mm.
6. CNC System	FANUC 0IMF Plus (1 pack)
7. Tool Chamber	Tool magazine capacity: 24 tools Tool magazine capacity: 24 tools Maximum tool diameter: 80 mm Maximum tool diameter: 80 mm Maximum tool diameter (without adjacent tools): 150 mm

	Maximum tool length: 300 mm Maximum tool length: 300 mm Maximum tool weight: 8 kg Maximum tool weight: 8 kg Blade change time (blade-to-blade): 2.2 seconds Blade change time (blade-to-blade): 2.2 seconds
8. Drive Motor	Main spindle motor: 11/15/18.5 kW X-axis AC servo motor, β series, 3.0 kW Y-axis: AC servo motor, β series, 3.0 kW X-axis AC servo motor, β series, 3.0 kW
9. Disk Diameter	$\Phi 210\text{mm}$
10. Central diameter	$\Phi 67\text{mm}$
11. Central Height	160mm
12. Rotation Stroke	$360^{\circ}/0.001^{\circ}$
13. Segmentation Accuracy	30"
14. Repetition Accuracy	15"
15. Shield	Full Shield
16. Colors	Pattern Standard Color
17. Machine Tools	Mechanical footprint and height: 2330 × 2185 × 3143 mm Mechanical weight: 5200 kg

II. Standard Attachments

NO.	Specification	quantity
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	Specification	
1 .	Electrical Box Heat Exchanger	1
2 .	Three-axis screw pre-tensioning	1
3 .	Sandwich knife device	1
4 .	Automatic oiling and lubrication system	1
5 .	Full-coverage chip-resistant sheet metal shield	1
6 .	Dust-proof device for electrical cabinets	1
7 .	Air curtain chip prevention device at the nose	1
8.	end of the spindle	1
9.	Three-color warning light	1
10.	Rigid tooth cutting	1
11.	Cuttings flushing device	7
12.	Foundation bolts and washers	1
	Tool Box	

Select Configuration:

1. Chain plate-type chip disposer
2. Hydraulic Station (NACHI brand) + Four-axis control circuit solenoid valve
3. External handwheel (with emergency stop button)
4. High-pressure outlet interface at the 50 bar pressure point; fully enclosed metal housing; water tank filtration assembly.
5. Water gun + Air gun
6. Oil-Water Separator
7. Chassis burr
8. In-machine tool-setting instrument TS-27R
9. Sensing probe (Renesso OMP60)
10. Main spindle oil cooler
11. Panel Attachment
12. There are 72 pull pins on the central outlet.
13. Tool holders: Strong C32 holders – 6 pieces; Threaded tool holders – 3 pieces
14. Card reader (including card and USB drive) – 3 sets

III. Technical Documents

- 1) Machine Tool Operation Manual (Youjia) QR Code
- 2) Electrical Circuit Diagram (Youjia) QR Code

2) Electrical Circuit Diagram (Youjia) QR Code

3) Machine Tool Precision Inspection Form QR Code

3) Machine Tool Precision Inspection Form QR Code

4) One copy of the FANUC System Manual CD-ROM (from FANUC Corporation)

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5) Machine Tool Parameters CD with QR Code

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