



FEELER® FAIR FRIEND GROUP
FAIR FRIEND ENTERPRISE CO., LTD.

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HV *SERIES*

Vertical Machining Center

FAIR FRIEND • ENGINEERING • EXCELLENCE • LEADERSHIP • EXPERTISE • RELIABILITY



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ISO 9001
ISO 14001



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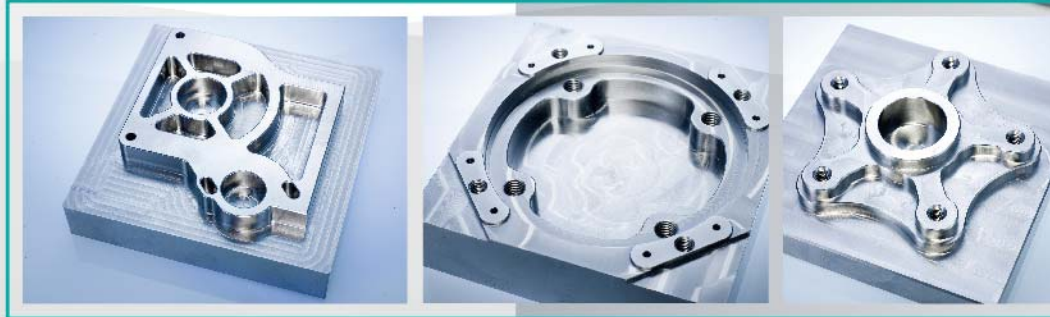
HV ***SERIES***

Vertical Machining Center

FEELER HV SERIES

HV-40A

Same Level of Machining Performance and Accuracy as Japanese and European Machines. Surpassing the Competitive Models Made in Taiwan and Korea.



Creating a New Level of Parts Machining and Precision Mold Machining.

For years, FEELER has dedicated itself to the pursuit of higher efficiency and higher performance vertical machining centers to help customers stay competitive. FEELER'S HV Series was designed to integrate many innovative features into the existing models.

The HV Series features outstanding machine structure, accuracy and machining efficiency, greatly surpassing existing models. It's an excellent model especially ideal for today's high speed parts machining.



HV Series Machine Structure

- ▶ The column structure is reinforced by cross ribs to upgrade torsional torque resistant capability.
- ▶ Increased saddle height increases bending resistant capability. Saddle deformation is reduced by 60%.
- ▶ Circularity accuracy on X, Z-axis increased by 38%.
- ▶ Movement accuracy on X-axis upgraded by 50%.

No Counter Weight on Z-axis

- ▶ No counter weight design avoids vibration of chain. This outstanding design also avoids oscillation caused by counter weight that may affect movement stability on Z-axis. Another benefit is greatly reduced vibration when performing peck-drilling operation.
- ▶ Extra powerful drive combined with brake.



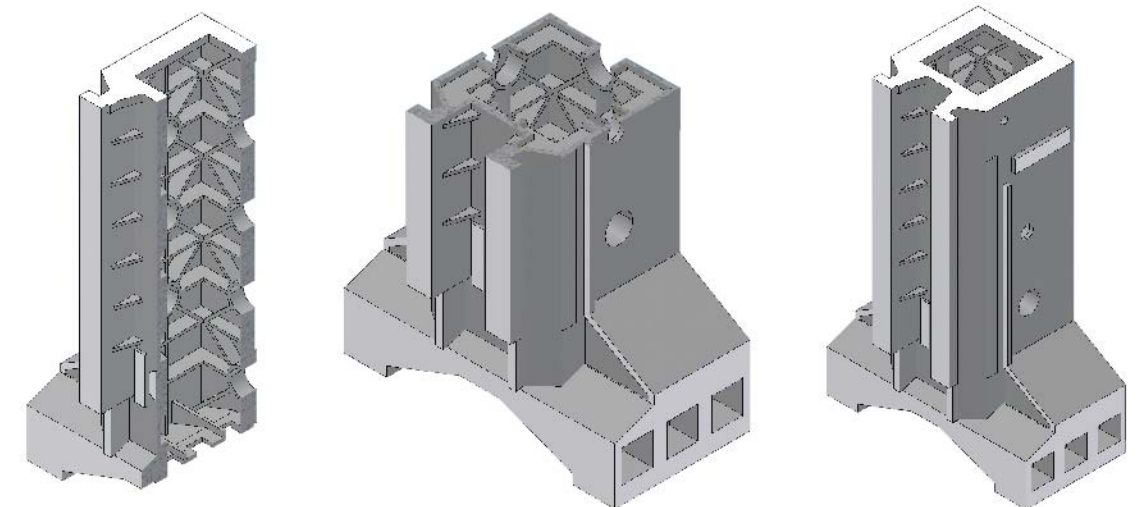
30%
RIGIDITY INCREASED



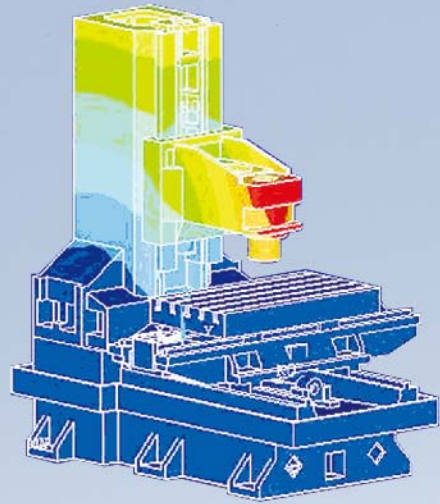
HV-40

Honeycomb-shape Ribs Layout

The interior of column is reinforced by cross ribs. This not only upgrades structural torsional torque resistant capability, but also effectively upgrades resonance frequency of low frequency structure. As a result, you get optimal stability.

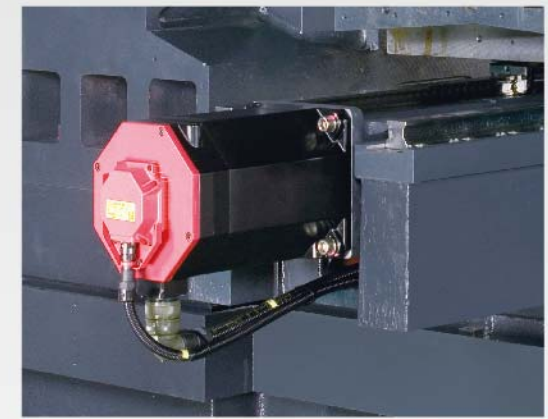


Finite Element Analyzed Throughout



Finite element analyzed throughout increases rigidity by 30%.

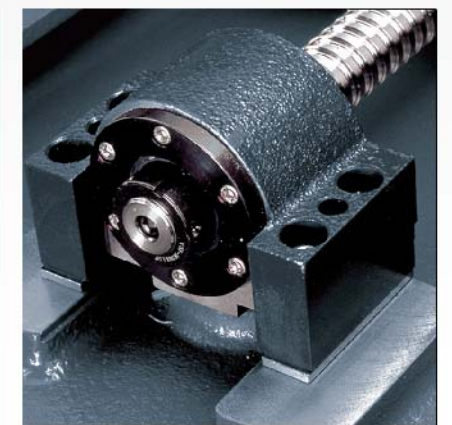
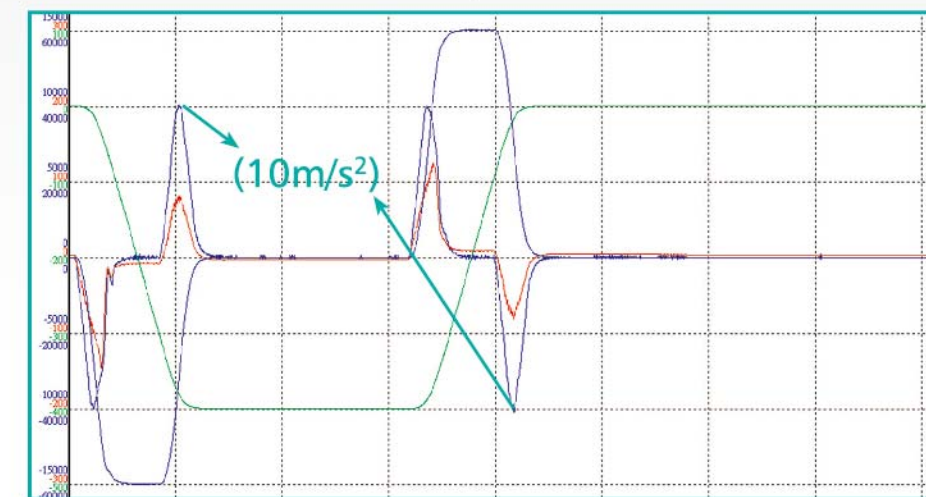
1G Acceleration (X-axis)
(10m/s²)



3 Axis Rapid Traverse Upgraded to

60/60/30 m/min

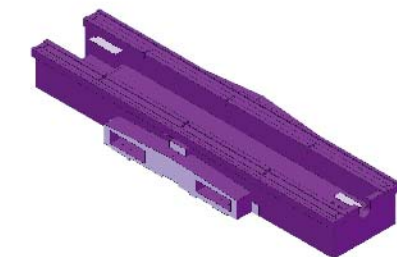
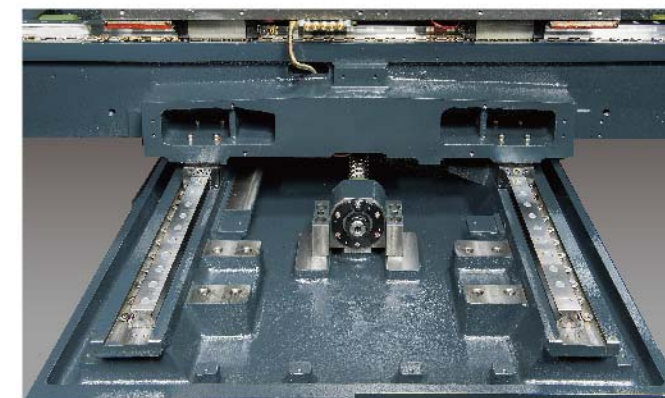
Max. acceleration on 3 axis up to 1.02G (10m/s²).
X-axis acceleration increased by 155%.



Ballscrews in all 3-axis are pre-tensioned to increase accuracy.

Increased Saddle Height

The HV Series vertical machining center has higher saddle than that of conventional models. This special resistant capability, movement straightness and structural rigidity. In addition, it also facilitates workpiece loading and unload on meets humanengineering theorem.



By using structural analysis technology to increase saddle height, the I value is increased and rigidity is increased by 30% than the other.

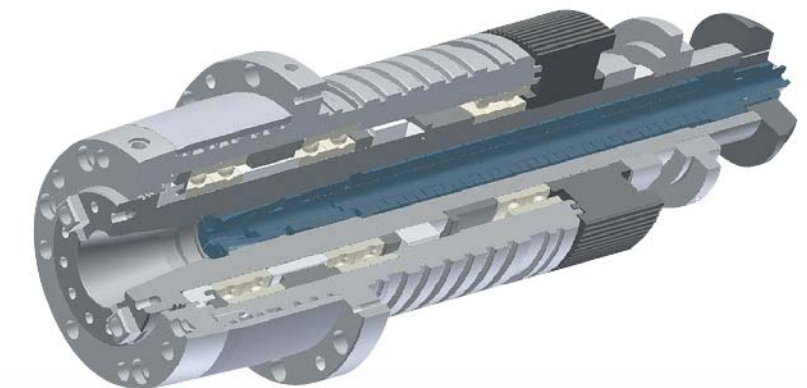
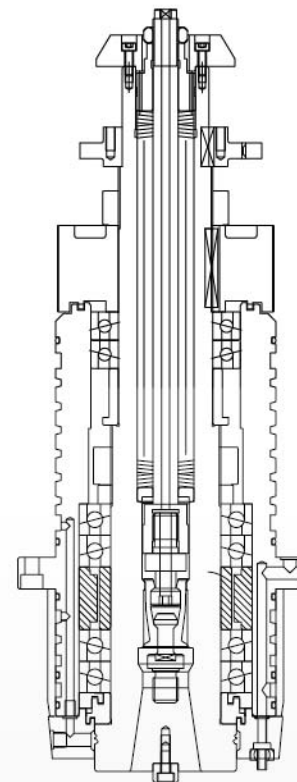
Rigid Spindle Fully Exhibits Exceptional Machining Efficiency

101B578

Rigorous Spindle Vibration Control is
Unmatched by Competitors

2 μ m Spindle Side

1 μ m Spindle Front



Utilizing a high-rigidity spindle greatly increases the metal removal rate. FEELER's performance-proven spindle design also improves the machining accuracy and extends operational life!



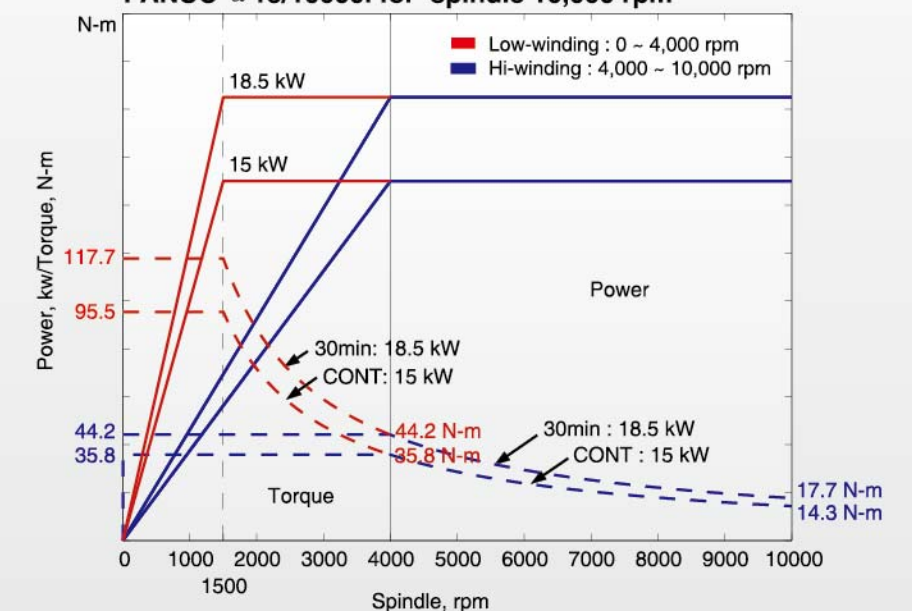
Direct Drive



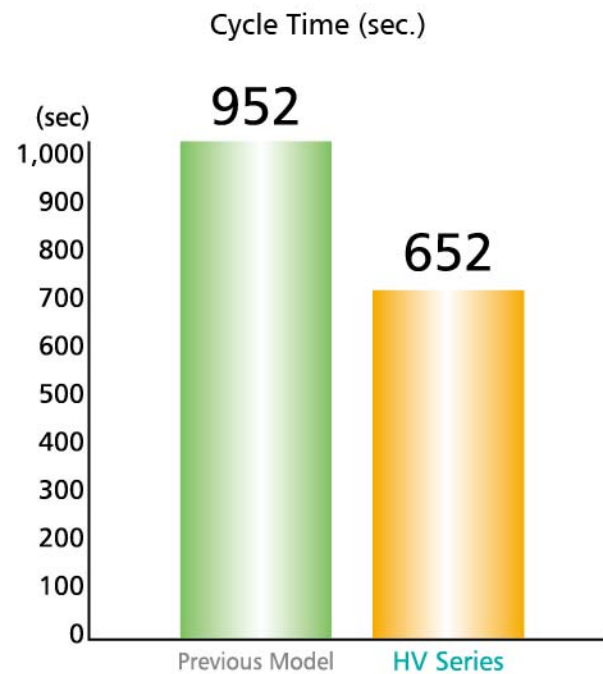
Belt Drive

Spindle Speed / Torque Diagram

FANUC α 15/10000i for spindle 10,000 rpm



Total Machining Efficiency Upgraded by Max. 31.5%



Rigorous Quality Control and Inspection System

8 μm
Positioning Accuracy

4 μm
Repeatability

Cutting Efficiency Comparison

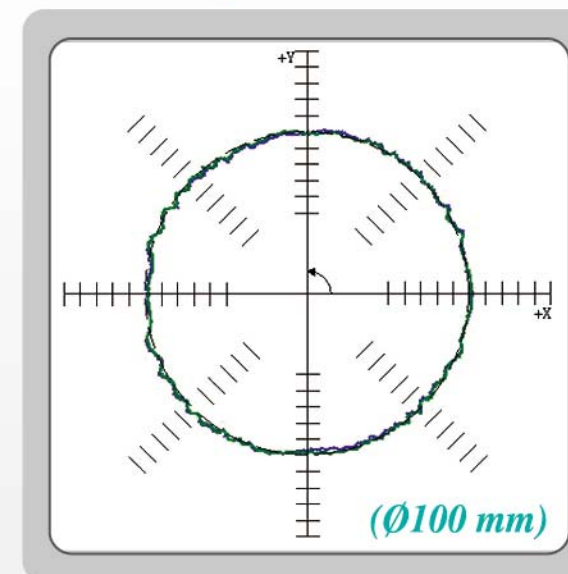
Cutting Method	End Milling on 3 Cavities Mold. Material: S45C			Parts Machining by 10 Tools. Material: S45C	
Model	Machining Time (sec)	Difference (Efficiency)	Roughness Ra (μm)	Machining Time (sec)	Difference (Efficiency)
Previous Model	952	---	0.67	143.26	---
HV-40A	652	31.5%	0.52	114.96	19.8%

Cutting Capacity Example

Workpiece Material: Medium Carbon Steel (S45C)

Machining Types		
Drilling	Tapping	Face Milling
Tool Diam. (mm) x Feed (mm/rev)	Tool Diam. (mm) x Pitch (mm/rev)	Width (mm) x Depth (mm) x Feed (mm/min)
$\varnothing 40 \times 0.1$	M24 x 3.0	308 c.c. 80 x 3.5 x 1100

Circularity Accuracy
2.7 μm



Static Accuracy

	Measured Plane	Permissible (mm / 300mm)	Measured (mm / 300mm)
Perpendicularity	X - Y	0.012	0.005
	Y - Z	0.012	0.004
	Z - X	0.012	0.005
	Measured Plane	Permissible (mm / Full Stroke)	Measured (mm / Full Stroke)
Positioning Accuracy	X	0.01	0.005
	Y	0.01	0.003
	Z	0.01	0.006
	Measured Plane	Permissible (mm)	Measured (mm)
Repeatability	X	0.006	0.003
	Y	0.006	0.002
	Z	0.006	0.004
	Measured Plane	Permissible (mm)	Measured (mm)
Circularity	X - Y	0.015	0.008
	X - Z	0.015	0.006



Chips Removing System

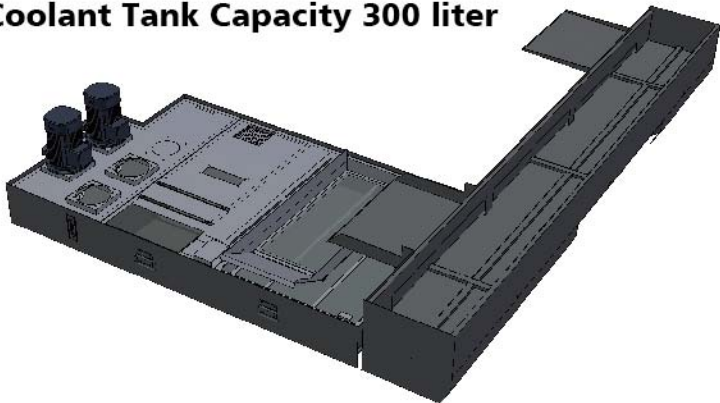
High efficiency and fast chips removing system assures precision and high speed machining.



Multiple Layers Of Filtration Greatly Extends Coolant Service Life.

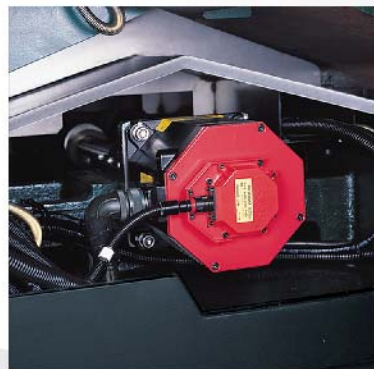
Integrated sheet metal fabrication, with large chip disposal openings, contributes to convenient chip cleaning.

Coolant Tank Capacity 300 liter



Chamfered bed facilitates chips removing.

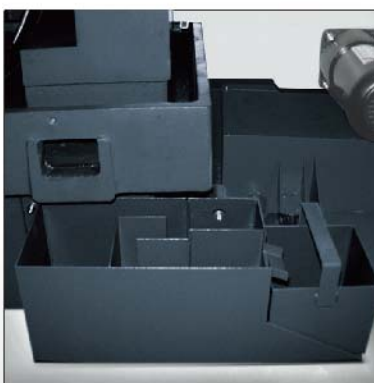




Rear installation of the Y-axis servomotor provides a convenient maintenance space.



Oversized side-window openings for convenient maintenance of the X-axis servomotor, linear guideways and ballscrews.



Oil/coolant separation device is attached to the base. No separate leveling adjustment is required.



HV32APC Hydraulic Fixturing Interface



HV-50A



HV-32A apc



FANUC OI-MD
10.4" LCD + Manual guide I
AICC II (200 blocks)

Crystal Scanning Type Control Panel

The self-illuminated crystal scanning control panel allows easy identification for operator in poor environments. The keys are water-proof, bumping-resistant and oil-proof and are interchangeable.

Ergonomically Designed Control Box

The control box design meets human engineering theorem. It can be swiveled $0^{\circ} \sim 75^{\circ}$ for added convenience of operation. The control box is equipped with a M.P.G. handwheel for increasing convenience of set up.



Transparent side window on headstock cover enables convenient inspection and maintenance.



Heat exchanger is included as a standard accessory.



The EC cabinet adopts rigorous dust-free design to ensure lifetime dependability of the electric components.



Rubber seals are mounted at the EC cabinet door for optimal enclosure.



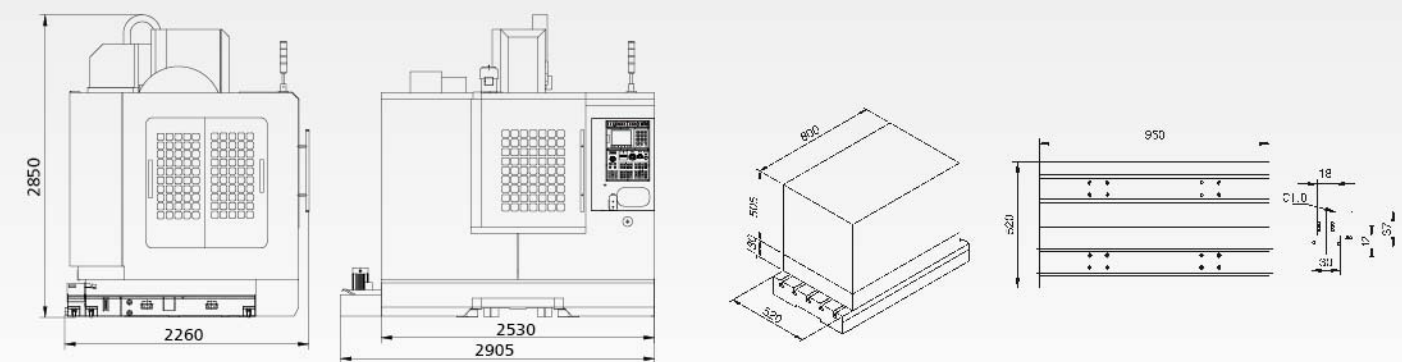
Water-proof fittings are mounted at the openings for wires to avoid invasion of oil mist.

**Dust-Proof
Electrical
Cabinet And
Modern
Appearance
Rear Design**

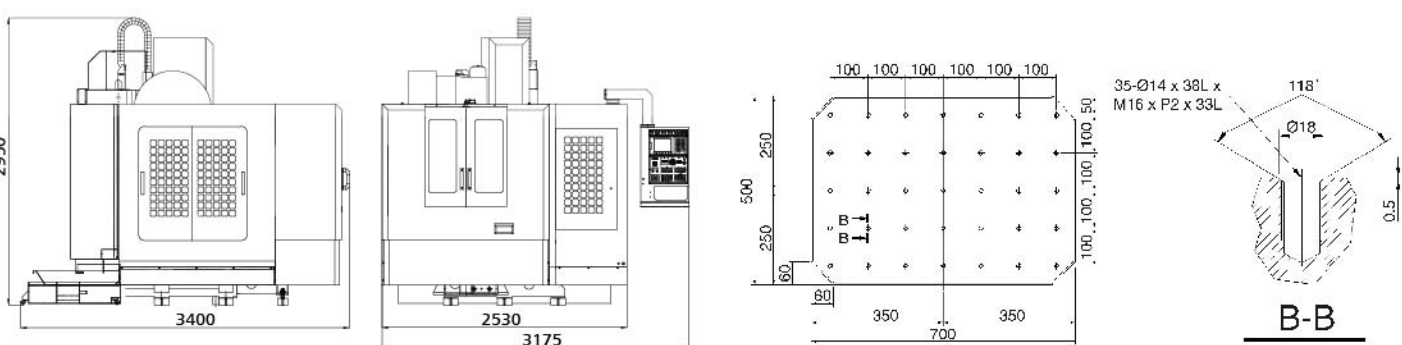


Machine Dimensions, Table Dimensions, and Working Capacity

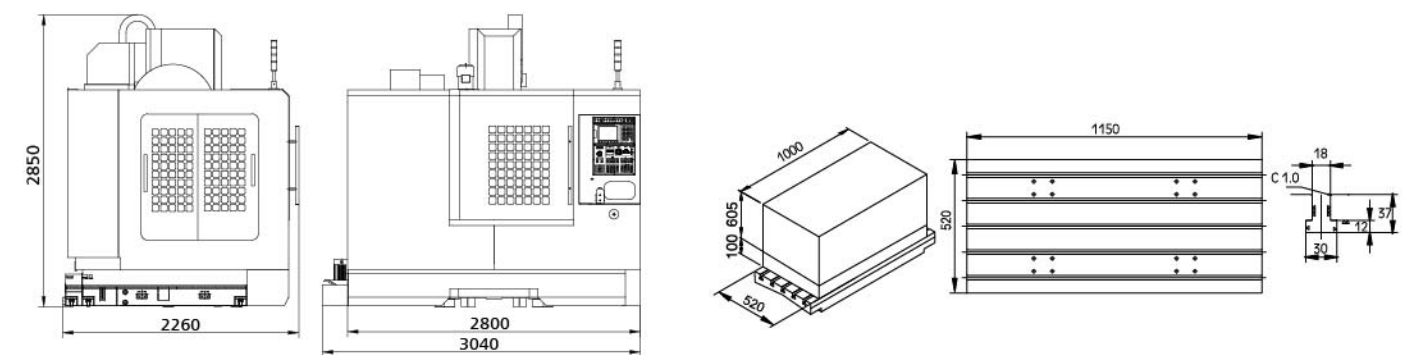
HV-32A



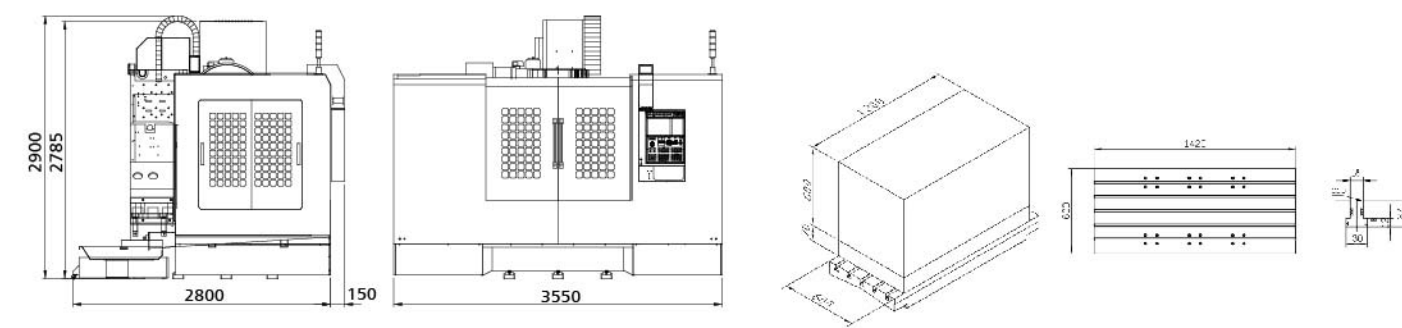
HV-32Aapc



HV-40A



HV-50A



Machine Specifications

MODEL	HV-32A	HV-32Aapc	HV-40A	HV-50A
Travel				
X axis travel	800 mm	800 mm	1000 mm	1,300 mm
Y axis travel	520 mm	520 mm	520 mm	610 mm
Z axis travel	505 mm	505 mm	505 mm	600 mm
Spindle nose to table surface	130-635 mm	148-653 mm	100-605 mm	70-670 mm
Spindle center to column surface	560 mm	560 mm	560 mm	660 mm
Table surface to floor	940 mm	1025 mm	970 mm	1025 mm
Table center to column surface	300-820 mm	300-820 mm	300-820 mm	355-965 mm
Table				
Table dimension	950×520 mm	700×500 mm	1150×520 mm	1420×600 mm
Max .loading weight	800 kg	200 kg	800 kg	1000 kg
T slot(W*NO*P)	18×5×100	35-M16XP2.0	18×5×100	18x5x100
Spindle				
Spindle speed	10000 rpm	50-10000 rpm	10000 rpm	10000 rpm
Spindle taper	7/24 taper No. 40	7/24 No.40	7/24 taper No. 40	7/24 taper NO.40
Spindle motor	7.5/11 kw	15/18.5 kw	7.5/11 kw	15/18.5 kw(a15)
Feedrate				
Rapid traverse X axis	60 m/min	60 m/min	60 m/min	48 m/min
Rapid traverse Y axis	60 m/min	60 m/min	60 m/min	48 m/min
Rapid traverse Z axis	30 m/min	30 m/min	30 m/min	24 m/min
Automatic tool changer				
Tool changer	ARM	ARM	ARM	ARM
No of tools	24	24	24	24
Pool stud	P-40T(45°)	P-40T(45°)	P-40T(45°)	P-40T(45°)
Max .tool weight	8 kg	8 kg	8 kg	8 kg
Max tool length	300 mm	300 mm	300 mm	300 mm
Max dim of tool	80 mm	80 mm	80 mm	ø80 mm
Max dim of tool (no adjacent tool)	150 mm	150 mm	150 mm	ø150 mm
Tool changing time(tool to tool)	1.7 sec	1.7 sec	1.7 sec	1.9 sec/60 HZ
Others				
Floor space (L×W)	2905 X 2260 mm	3400 X 3175 mm	3040 X 2260mm	3550 X 2750 mm
Machine weight (NW)	6850 kg	7500 kg	7150 kg	7,300 kg
Max height of machine	2850 mm	2950 mm	2850 mm	2900 mm
Water tank Capacity	300 liter	270 liter	300 liter	310 liter
Power capacity	25 KVA	25 KVA	25 KVA	25 KVA

* Specifications are subject to change without prior notice.

Standard Accessories

- * Heat exchanger
- * 3-axis pre-tensioned ballscrew
- * Automatic lubrication system
- * Fully enclosed splash guard
- * Dust-proof electrical cabinet
- * Spindle air sealing
- * Spindle coolant nozzle
- * Spindle oil cooler
- * 3-color signal light
- * Rigid tapping
- * Leveling bolts and blocks
- * 2-sided chip screws on Y Axis
- * Rear flushing + coolant gun
- * Fanuc Oi-MD 10.4" LCD
- * Manual guide i
- * AICC II

Optional Accessories

- * 3-axis linear scales
- * Coolant through spindle
- * Tool measuring system
- * Workpiece measurement
- * Chip conveyor
- * 12,000 rpm DDS spindle
- * 15,000 rpm DDS spindle
- * X / Y / Z axis roller type linear guide
- * 30 / 40 / 50 ATC
- * Air gun
- * Top roof
- * 4th axis rotary table.