

V22

Vertical Machining Center



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*The specifications, figures, and overviews of products, peripheral devices and accessories in this catalogue may be changed without prior notice to incorporate improvements resulting from ongoing R&D programs.

*The all products in this catalogue include the optional specifications and equipment.

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M356Ep 1704/1 (V-T-D)



Going far beyond the concept of direct die/mold machining



Stability of small diameter tools



- KEY TECHNOLOGY**
- Low vibration spindle with no deflection
 - Super G1.5 control

Pursuit of superb machined surface quality



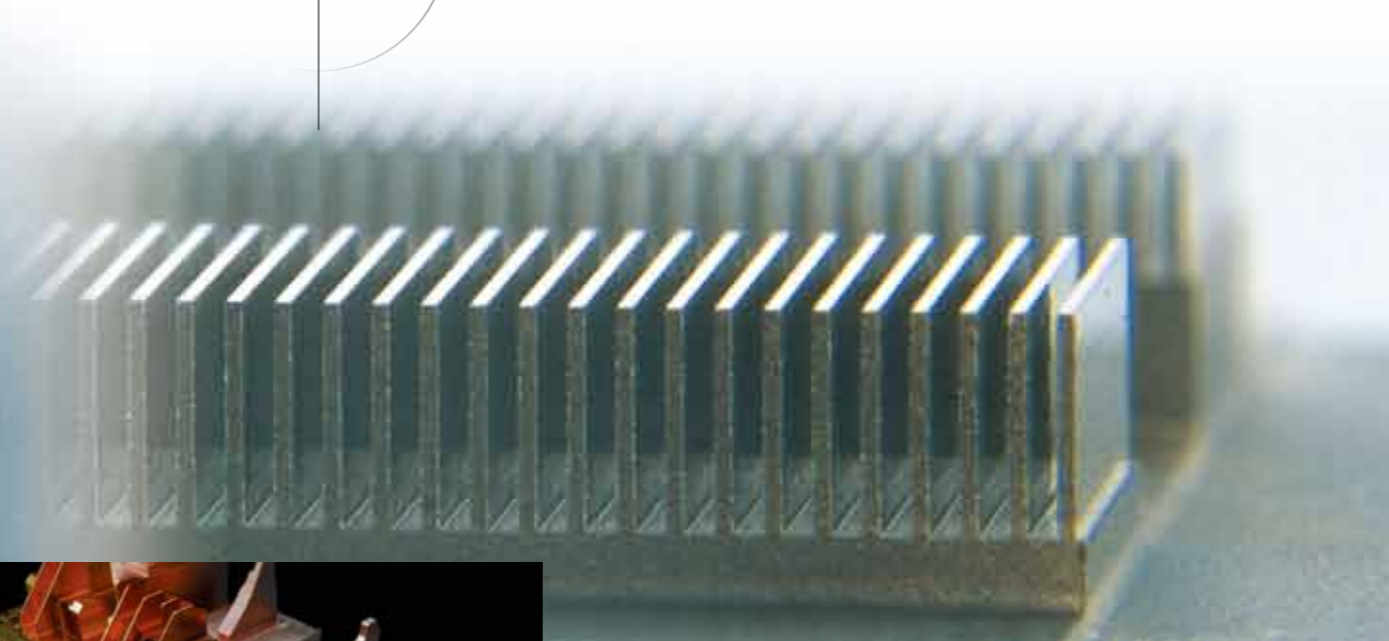
- KEY TECHNOLOGY**
- Low-vibration spindle with no deflection
 - Slideways with outstanding vibration absorption
 - Super G1.5 control
 - 50-nm scale feedback

Precise control of the tool tip position



- KEY TECHNOLOGY**
- Hybrid automatic tool length measuring device
 - Spindle core cooling
 - Thermal Guard

Going far beyond the concept of electrode machining



Stability of small diameter tools

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- Low vibration spindle with no deflection
 - Super G1.5 control



Pursuit of superb machined surface quality

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Support for automation

- KEY TECHNOLOGY**
- Auto-loader specification
 - 60 tools magazine



* The above model includes optional specifications and optional equipment.

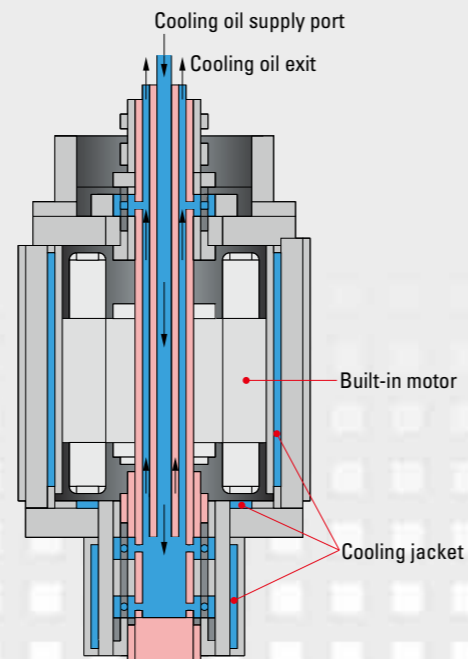
Wide spindle speed range

400 - 40000 min⁻¹ spindle

- Speed range——400 ~ 40000 min⁻¹
- Motor drive——8.4 kW
- Interface——HSK-E32
- Bearing diameter—40 mm (inner)
- Cooling——Spindle core
- Lubrication——Under race

● Machining performance

- Material: Pre-harden steel
NAK80; hardness: 40 HRC
- 6 mm diameter end mill (tungsten carbide)
S = 4000 min⁻¹
F = 800 mm/min
Ad = 3 mm, Rd = 6 mm
- 6 mm diameter drill (high-speed steel)
S = 800 min⁻¹
F = 80 mm/min, Depth of through holes = 25 mm



Spindle core cooling and Under race lubrication

Makino's spindle core cooling system circulates temperature controlled cooling oil, which is through the center of the rotating spindle to cool it directly from the inside.

Moreover, with under race lubrication, coolant flowing through the spindle core is circulated also through the holes in the inner bearing races to lubricate the bearings.

The adoption of this unique cooling system results in greater reliability, enhanced accuracy and faster machining speed.

Continuous machining at high speeds is possible without being concerned about limitations on the spindle's operating speed.

Professional 6

Control unit that maximizes machine performance

Avoids Spindle Crash



No More Scratch



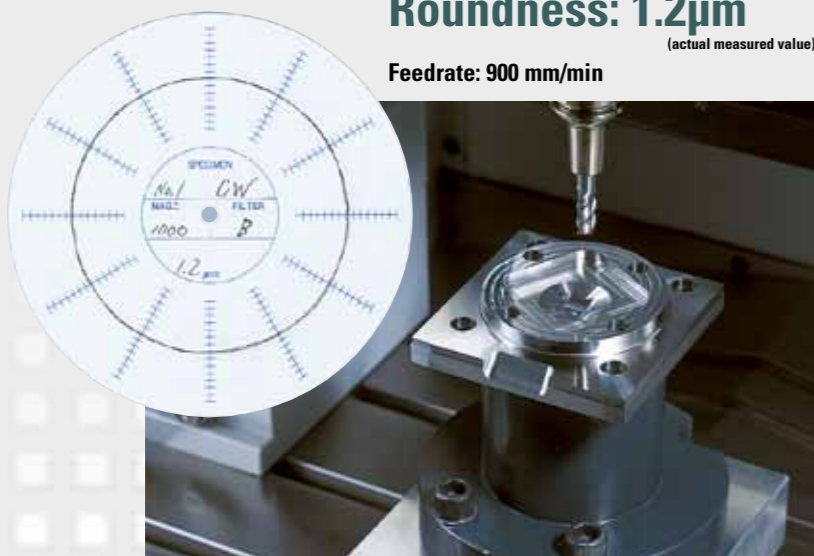
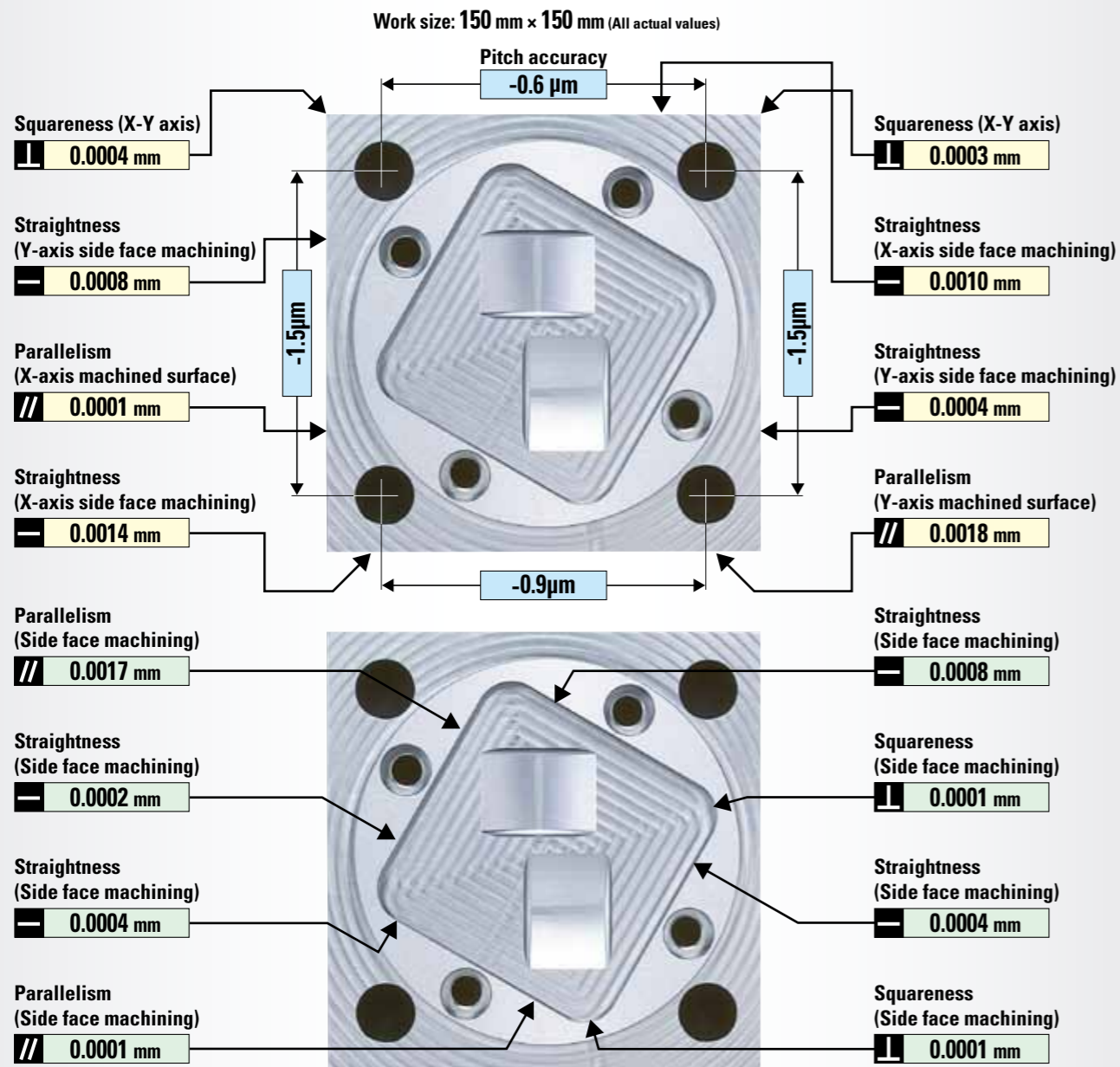
Intuitive Operation



- ◎ It is quick at intuitive operation and easy measurement environment is realized.
- ◎ Easy operation by dialog screen that is cord-free.



All machined accuracies are within 2µm



● Feed control

The combination of a high performance scale feedback system with 0.05 µm (50 nm) resolution and Makino's Super G1.5 control is remarkably effective for machining fine and intricate geometries. Even in continuous machining of tiny blocks of NC data, error-free shape accuracy is obtained at actual machining speeds close to the command value.



Machine construction

Along with the X, Y-axes, the Z-axis is also designed without any overhang to ensure superb accuracy over the entire range of travel. All axes adopt slideways with outstanding vibration absorption to provide machined surfaces of superior quality.

Axis travels (X × Y × Z) — 320 × 280 × 300 mm
Table working area — 450 × 350 mm



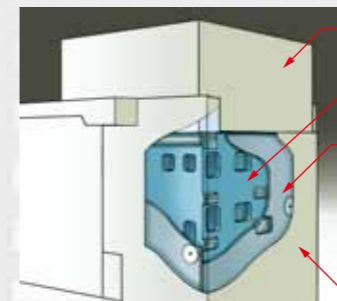
Measures against ambient temperature changes

Makino Thermal Stabilizer

This is a general name for functions that suppress machine attitude changes caused by the ambient temperature. The Thermal Guard is a standard feature on the V22.

Thermal Guard®

The Thermal Guard covers the entire machine to keep out ambient air and thereby minimize machine attitude changes due to the effects of the ambient temperature.



Thermal Guard

Column

Insulation

The column and bed are covered with insulation to suppress attitude changes caused by the effects of the shop environment temperature.

Cover

● Space-saving design

The machine body has a compact footprint of only 2 × 2.2 meters for a substantial reduction of floor space. In addition, the V22's optimal design secures ample rigidity while still reducing the machine weight, enabling the V22 to be installed on a factory's second floor.

● Energy savings


- ECO mode functions
- ECO mode of air consumption volume

Hybrid automatic tool length measuring device (optional specification)

In case of continuously finish machining with different cutters in tool magazine, tiny level differences can occur at the seams of machined surfaces due to the use of different tools.

Polishing workpieces to correct such tiny differences can be an enormous time-consuming task.

The hybrid automatic tool length measuring device precisely measures and controls the position of the tool tip to achieve superior finished surfaces with minimal level differences. (patented)



← Tool tip position: Low-pressure contact probe

↓ Spindle nose position: Non-contact sensor

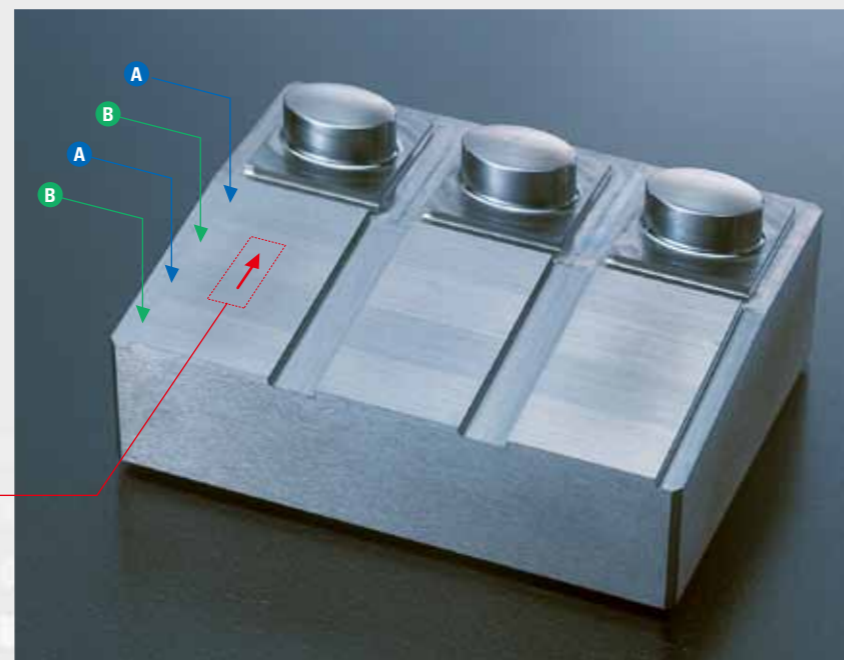
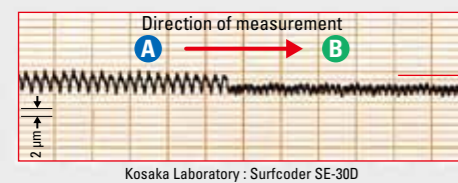
Measuring tool tip position of tool Photo: V33i

Measuring the position of the spindle nose that is revolving at a speed of machining operation.

<Major specifications>
Measuring method: Stylus + Sensor (during rotation) Measurable tool diameter: Min. diameter 0.03 mm Repeatability: 1 μm or less

Machined surface level differences of less than 2 μm even when tools or spindle speeds are changed

- A** R2 Ball End Mill
20000 min⁻¹,
800 mm/min,
Pick 0.06 mm
- B** R1 Ball End Mill
40000 min⁻¹,
1600 mm/min,
Pick 0.03 mm



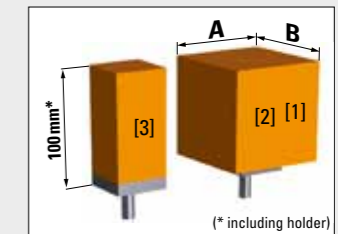
Various automatic work changers are available to meet diverse machining requirements.

V22 <automatic work changer>

Separately installed automatic work changers that hold either 30, 40, or 60 tools are available as options with the V22.



	Workpiece storage capacity	Max. workpiece size (A × B)	Max. payload
[1] WPS30-22S	30	100 × 100 mm (including holder)	7 kg (including holder)
[2] WPS40-22S	40	140 × 75 mm (including holder)	
[3] WPS60-22S	60	55 × 55 mm (including holder)	



V22 automatic work changer connection example

system3R WorkPal

Workpiece storage capacity : 16
Max. workpiece size : 180 × 180 × 135 mm
(including holder)

Machine side
Magnum Chuck 3R-680.10-1



V22 specifications for installing

Robot shutter (optional specification)

The opening for changing workpieces has dimensions of 450 × 900 mm, allowing a large-size hand to be used for loading / unloading workpieces. Shutter specifications can accommodate either a robot or an automatic work changer.



* The oil pan is an optional specification.

Operating ease

Ease of operation is not comprised even by the space constraints of a small machine.

Because the ceiling opens together with the operator's door, no coolant or chips fall on the operator during setup work. In addition, light from the shop's illumination can enter the machining chamber through the ceiling opening to provide better visibility where the operator is working.

The door window is made of scratch-resistant tempered glass on the inside and tough polycarbonate on the outside to avoid perforation. This strong construction ensures ample safety even in the event a tool breaks while machining.

The tool magazine is located on the left side of the machine.



(optional specification: 30 tools magazine)

Chip removal



Slanted troughs are provided on both sides of the table for complete and efficient chip removal.

The chip bucket is located at the front of the machine and can be emptied even while machining.

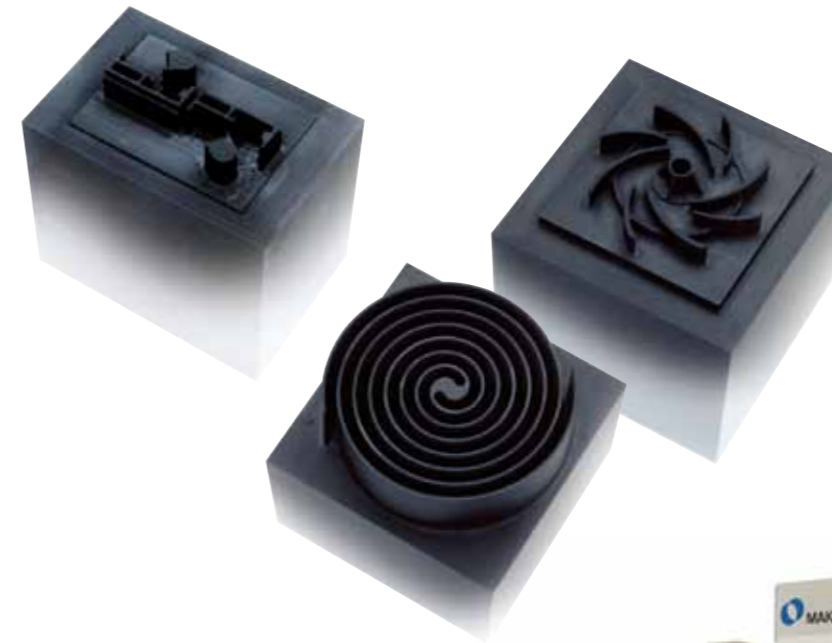


The door opening is wider on the right side of the table center so that work can be done more easily with the right hand inside the machining chamber.

A foot recess is thoughtfully provided at the bottom of the machine for improved approachability.

The height of the table surface is 900 mm from the floor to allow a comfortable work posture.

The control panel swings 180° for enhanced operating ease.



For small and complicated graphite electrode

V22 GRAPHITE

Travels (X × Y × Z)	320×280×300 mm
Maximum workpiece size	450×475×200 mm
Maximum payload	100 kg
Spindle speed range	400~40000 min ⁻¹
Rapid traverse	20000 mm/min
Cutting feedrate	1~10000 mm/min



WPS60-22S and 60 tools magazine specifications



Machine specifications (standard)

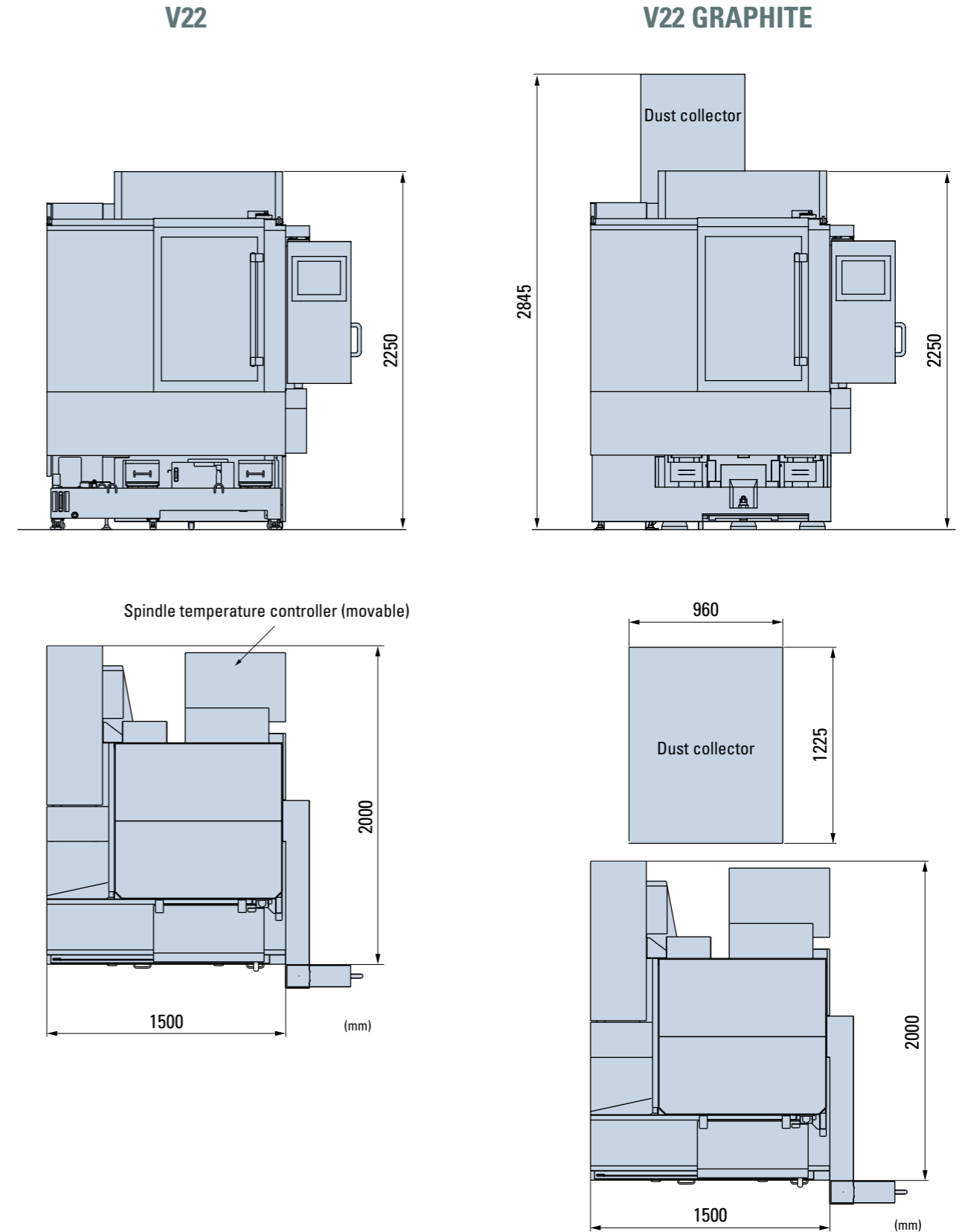
■ Travels	V22	V22-5XB
X × Y × Z axis	320 × 280 × 300 mm	320 × 280 × 300 mm
B, C axis	—	120° (-15° to +105°), 360°
Distance from table surface to spindle end	150 - 450 mm	200 - 500 mm
■ Table		
Size (W × D)	450 × 350 mm	—
Maximum workpiece size (W × D × H)	450 × 475 × 200 mm (with limitation)	90 dia. × 100 mm (including holder)
Maximum payload	100 kg	7 kg (including holder weight)
Surface configuration	T-slot, 14H8 × 4	—
■ Spindle		
Speed range	400 - 40000 min ⁻¹	400 - 40000 min ⁻¹
Motor drive (cont.)	8.4 kW	8.4 kW
Torque (cont.)	2 N·m	2 N·m
Interface	HSK-E32	HSK-E32
Bearing diameter (inner)	40 mm	40 mm
Cooling / Lubrication	Spindle core, Jacket / Under race	Spindle core, Jacket / Under race
■ Feedrates		
Rapid traverse (X, Y, Z axis)	20000 mm/min	20000 mm/min
Rapid traverse (B, C axis)	—	4000, 8000 °/min
Cutting feed (X, Y, Z axis)	10000 mm/min	10000 mm/min
Cutting feed (B, C axis)	—	4000, 8000 °/min
■ Automatic tool changer		
Tool storage capacity	15	15
Maximum tool diameter	32 mm	32 mm
Maximum tool length	120 mm	120 mm
Maximum tool weight	0.5 kg	0.5 kg
■ Machine size		
Width × Depth × Height	1500 × 2000 × 2250 mm	1500 × 2000 × 2250 mm
Weight	4200 kg	4300 kg

■ Travels	V22 GRAPHITE	V22-5XB GRAPHITE
X × Y × Z axis	320 × 280 × 300 mm	320 × 280 × 300 mm
B, C axis	—	120° (-15° to +105°), 360°
Distance from table surface to spindle end	150 - 450 mm	200 - 500 mm
■ Table		
Size (W × D)	450 × 350 mm	—
Maximum workpiece size (W × D × H)	450 × 475 × 200 mm (with limitation)	90 dia. × 100 mm (including holder)
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Speed range	400 - 40000 min ⁻¹	400 - 40000 min ⁻¹
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Torque (cont.)	2 N·m	2 N·m
Interface	HSK-E32	HSK-E32
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Cooling / Lubrication	Spindle core, Jacket / Under race	Spindle core, Jacket / Under race
■ Feedrates		
Rapid traverse (X, Y, Z axis)	20000 mm/min	20000 mm/min
Rapid traverse (B, C axis)	—	4000, 8000 °/min
Cutting feed (X, Y, Z axis)	10000 mm/min	10000 mm/min
Cutting feed (B, C axis)	—	4000, 8000 °/min
■ Automatic tool changer		
Tool storage capacity	15	15
Maximum tool diameter	32 mm	32 mm
Maximum tool length	120 mm	120 mm
Maximum tool weight	0.5 kg	0.5 kg
■ Machine size		
Width × Depth × Height	1500 × 2000 × 2250 mm	1500 × 2000 × 2250 mm
Weight	4440 kg	4540 kg

	V22	V22-5XB	V22 GRAPHITE	V22-5XB GRAPHITE		V22	V22-5XB	V22 GRAPHITE	V22-5XB GRAPHITE
40000 min ⁻¹ spindle	○	○	○	○	Tool storage capacity: 30, 60 tools	●	●	●	●
HSK-E32	○	○	○	○	Automatic work changer (workpiece storage capacity: 30, 40, 60 tools)	●	● (60-tool)	●	● (60-tool)
Spindle temperature controller	○	○	○	○	Automatic work changer shutter	●	●	●	●
15 tools magazine	○	○	○	○	Robot shutter (not selectable with automatic work changer)	●	●	●	●
0.05 μm Scale feedback	○	○	○	○	Loader interface	★	★	★	★
Rotary encoder (B, C axis)	—	○	—	○	i Setup	★	★	★	★
Table chuck specification (selects from System3R or EROWA)	●	○	●	○	Machining chamber air blow	—	—	★	★
Tool magazine door lock	○	○	○	○	MQL unit	★	★	★	★
Operator door lock (operating mode)	○	○	○	○	Mist collector	★	★	—	—
ATC door lock	○	○	○	○	Coolant temperature controller	★	★	—	—
Thermal Guard (including bed and column insulation specification)	○	○	○	○	Oil skimmer	★	★	—	—
Nozzle coolant supply device	○	○	—	—	Workpiece washing gun	★	★	—	—
Dust collector	—	—	○	○	Hybrid automatic tool length measuring device	★	★	★	★
Chip bucket	○	○	○	○	Automatic tool length measuring device (Low contact-pressure)	★	★	★	★
Slideway lubrication unit	○	○	○	○	Automatic non-contact tool measuring device	★	★	★	★
Portable manual pulse generator with the handle enable button	○	○	○	○	Automatic workpiece measuring device	★	★	★	★
Lighting unit (machining chamber internal)	○	○	○	○	Ring gauge for automatic workpiece measuring device	★	★	★	★
Rigid tap	○	○	○	○	I/O interface for measurement	★	★	★	★
Professional 6	○	○	○	○	Air dryer	★	★	★	★
GI control	○	○	○	○	Portable manual pulse generator with tool position display and the handle enable button	★	★	★	★
Super GI.5 control	★	○	★	○	Additional lighting unit (machining chamber internal)	★	—	★	—
High-speed smooth TCP	—	○	—	○	Signal light 3-layer	★	★	★	★
Tilted working plane indexing command	—	○	—	○	Special customer-specified machine colors	●	●	●	●
Tool center point control	—	○	—	○	User memory capacity expansion A 20GB + 20GB	●	●	●	●
3-dimensional cutter compensation	—	○	—	○	MPmax Network type connection specification*	★	★	★	★
Automatic power-off	○	○	○	○	Fast Ethernet interface	★	★	★	★
ECO mode functions	○	○	○	○					
Automatic fire extinguisher Interface	○	○	○	○					
Collision Safeguard	○	○	○	○					

* Requires Fast Ethernet interface.

Front View / Floor Plan



Note: The space for the movable parts and maintenance in addition to the space for the machine main body are required. For the details, please refer to the specification.