

Vertical Machining Center

# VC Series



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# VC Series



### High rigidity structure

- Wide span column with the best force flow route ensures the machine rigidity.
- Through finite element analysis (FEA), the static, mold and optimization analyses of structure were processed for ensuring high dynamic rigidity and stability.

### Various spindles are available

- For ensuring the motor's performance, direct-drive spindle with 12,000 rpm is equipped as standard (15,000 rpm is optional).

### Tongtai self-made built-in spindle (optional)

- Maximum spindle speed 20,000rpm, which allows the machine to expand the range of machining applications.
- Oil-air lubricated bearings and the floating sleeve on rear-end bearing are able to reduce thermal generation and avoid thermal expansion that affects machining accuracy and bearing life.

### Main Specifications

|            |   |
|------------|---|
| Spindle    | 12,000 rpm Direct-drive spindle (standard)<br>15,000 rpm Direct-drive spindle (optional)<br>20,000 rpm Built-in spindle (optional)<br>Rapid traverse 24 m/min         |
| Three axes | X/Y/Z axis travel<br>VC-608 850/610/530 mm<br>VC-610 1,050/610/530 mm<br>VC-711 1,100/710/710 mm<br><input type="checkbox"/> 45 mm high rigidity roller guideways     |
| ATC        | X/Y axis Ø40 mm<br>Z axis Ø45 mm (VC-608/610) / Ø50 mm (VC-711)<br>High precision ballscrews with the pitch 10 mm on Z axis<br>Tool capacity 24 pc (optional : 30 pc) |



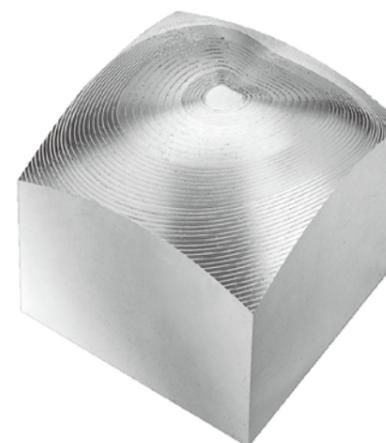
CONTENT

- 03 High accuracy
- 04 Machining examples
- 05 Basic structure
- 07 Operation
- 08 High resolution control
- 09 Spindle output and torque chart · Machine dimensions
- 10 Specification · Standard/Optional accessories

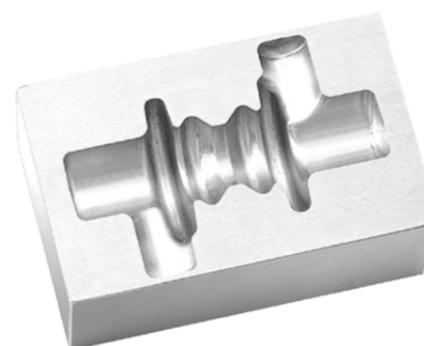
# High accuracy



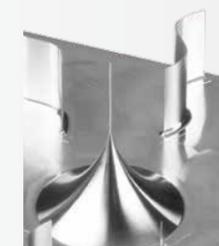
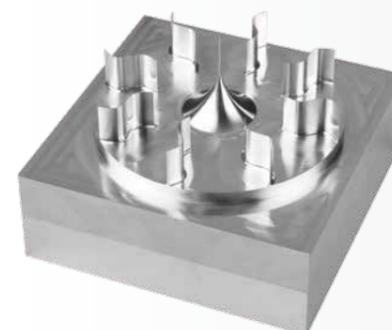
# Machining examples



| Car lamp mold    |                 |
|------------------|-----------------|
| Materials        | NAK80 (HRC 40°) |
| Size             | 120×120×80 mm   |
| Tools            | R 0.2 mm        |
| Spindle speed    | 20,000 rpm      |
| Cutting feedrate | 1,000 mm/min    |
| Machining time   | 9.8 hr          |



| Crankshaft mold  |                 |
|------------------|-----------------|
| Materials        | SKD11 (HRC 60°) |
| Size             | 80×50×30 mm     |
| Tools            | R1.5 mm         |
| Spindle speed    | 13,000 rpm      |
| Cutting feedrate | 2,200 mm/min    |
| Machining time   | 70 min          |



| Thin wall machining |               |
|---------------------|---------------|
| Materials           | A6061         |
| Size                | 100×100×70 mm |
| Tools               | R1.0 mm       |
| Spindle speed       | 10,000 rpm    |
| Cutting feedrate    | 1,000 mm/min  |

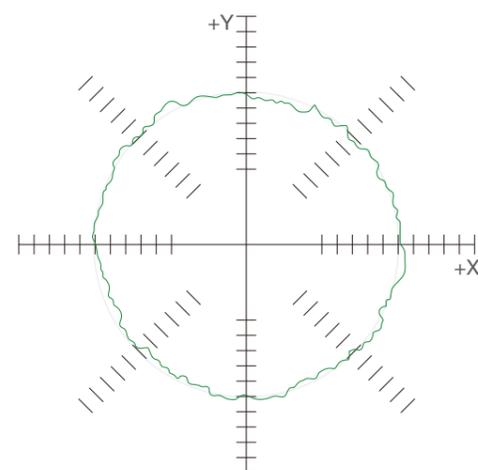
## Three axes accuracy

Test standard : VDI3441

|        | Positioning accuracy | Repeatability accuracy |
|--------|----------------------|------------------------|
| X axis | 4.59                 | 3.79                   |
| Y axis | 3.42                 | 2.64                   |
| Z axis | 4.78                 | 3.76                   |

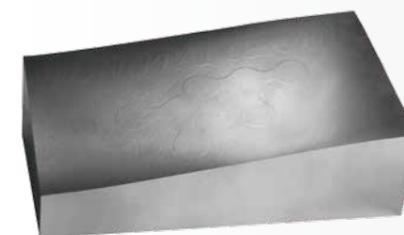
Unit : μm

## X-Y Ball-bar test



F : 1,000 mm/min  
R : 150 mm  
**Circularity : 3.2 μm**

Scale: 2 μm/div.



| Micromachining   |              |
|------------------|--------------|
| Materials        | A6061        |
| Size             | 150×80×70    |
| Tools            | R1.0 mm      |
| Spindle speed    | 14,000 rpm   |
| Cutting feedrate | 1,000 mm/min |

# Basic structure

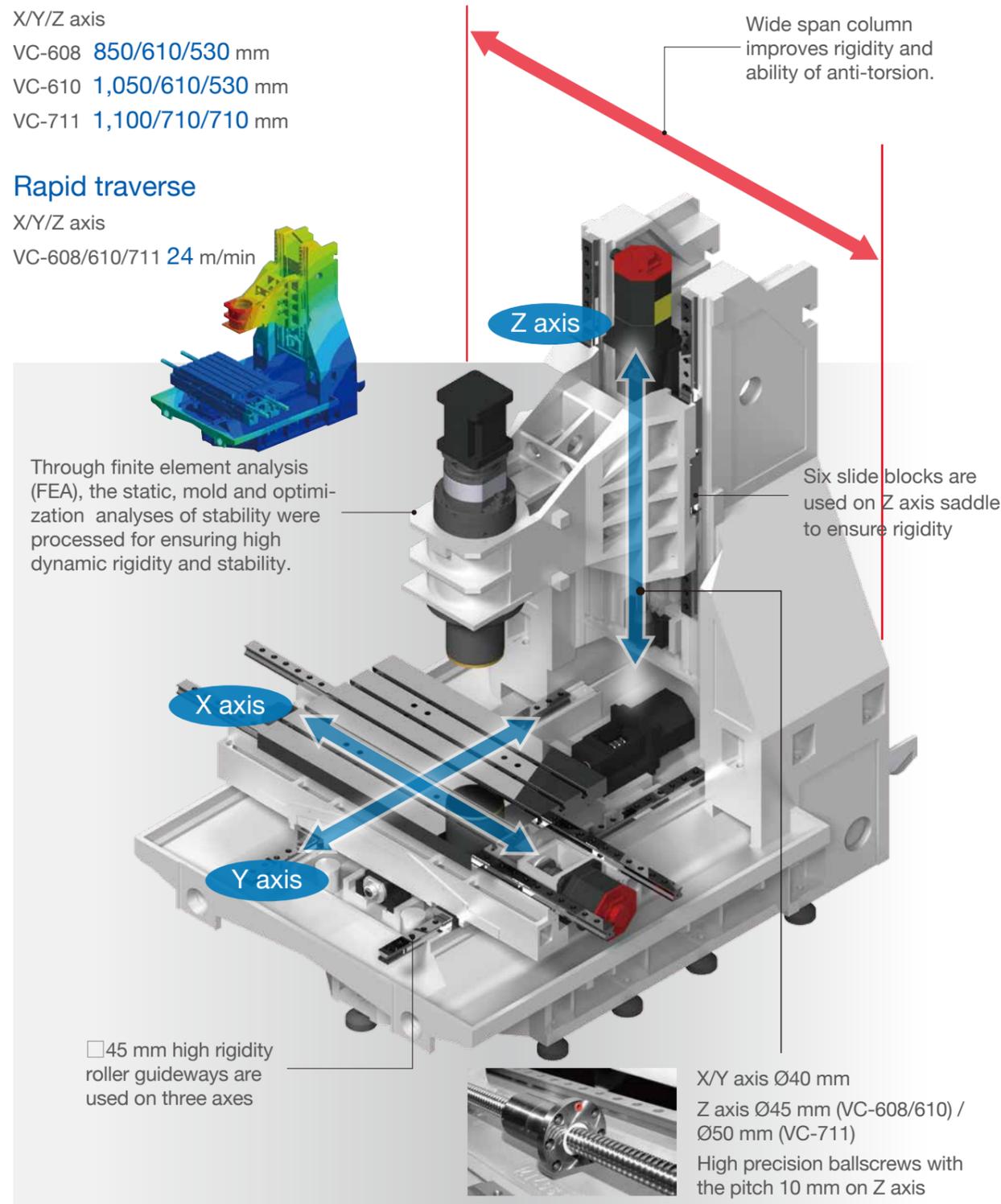
## High rigidity structure

### Travel

X/Y/Z axis  
 VC-608 850/610/530 mm  
 VC-610 1,050/610/530 mm  
 VC-711 1,100/710/710 mm

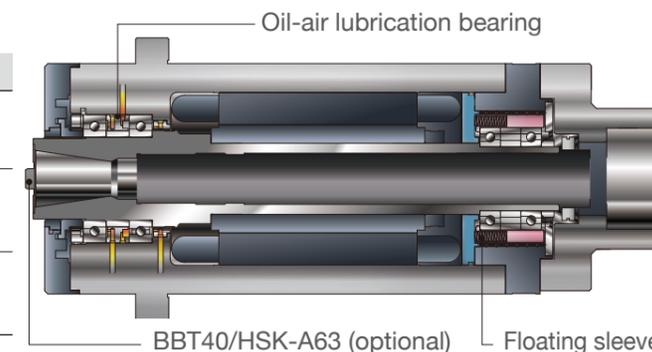
### Rapid traverse

X/Y/Z axis  
 VC-608/610/711 24 m/min



## Spindle

| Specification                             | Max. speed | Horsepower   | Torque      |
|---|------------|--------------|-------------|
| 12,000rpm direct-drive spindle (standard) | 12,000 rpm | 11/7.5 kW    | 70/48 Nm    |
| 15,000rpm direct-drive spindle (optional) | 15,000 rpm | 15/11/7.5 kW | 95/70/48 Nm |
| Built-in spindle (optional)               | 20,000 rpm | 40/30 kW     | 38/29 Nm    |



- The spindle of VC series is equipped with oil-air lubricated bearings and oil-cooling cartridge, it constrains the thermal generation and reduces the thermal expansion in the spindle.
- Floating sleeve on rear-end bearing is used in 20,000 rpm built-in spindle, that is avoids the preload variation of bearing induced by thermal expansion that affects bearing life.
- BBT dual-contact tool holder is equipped to enhance the stability and machining quality.

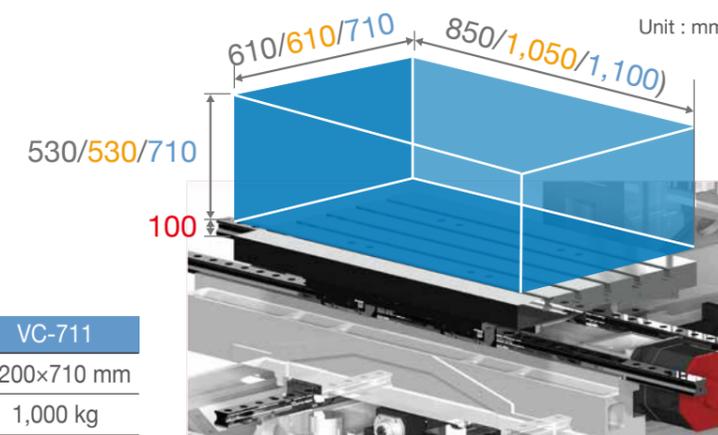
## ATC

The cam-type tool changer has higher accuracy and lower noise. In addition, the stable tool clamping can ensure spindle accuracy and expand bearing life.

Tool capacity 24 tools  
 30 tools (optional)



## Working area

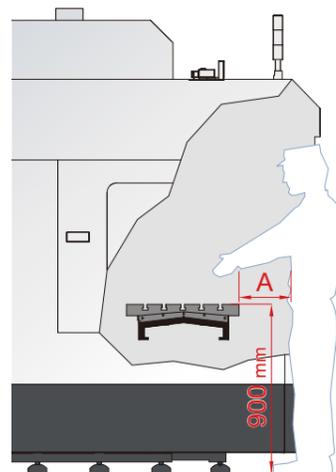


| Specifications | VC-608     | VC-610       | VC-711       |
|----------------|------------|--------------|--------------|
| Table size     | 950×600 mm | 1,100×650 mm | 1,200×710 mm |
| Max. load      | 500 kg     |              | 1,000 kg     |

# Operation

## Accessibility

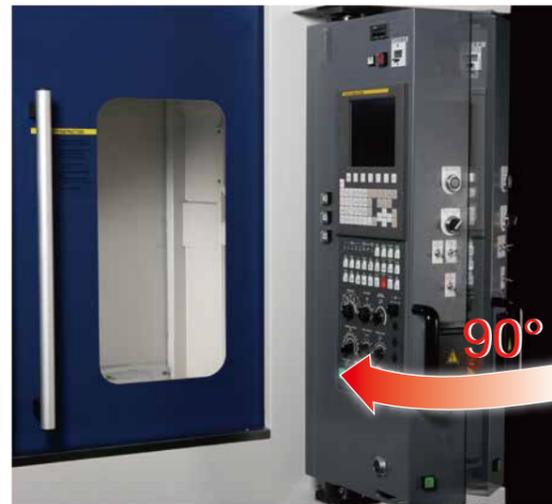
Suitable table height and reasonable distance between table and operator provide an excellent machining experience during operation.



| Distance A |        |
|------------|--------|
| VC-608     | 245 mm |
| VC-610     | 270 mm |
| VC-711     | 300 mm |

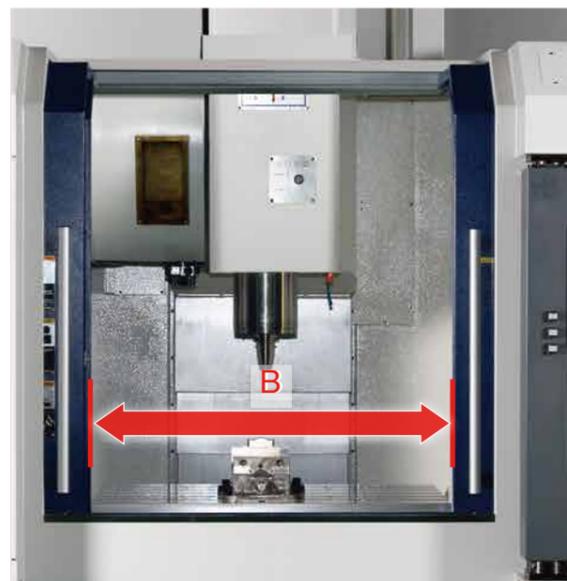
## Swivel-type operation panel

The operation panel is able to swivel from 0 to 90 degrees, which improves visibility during operation.



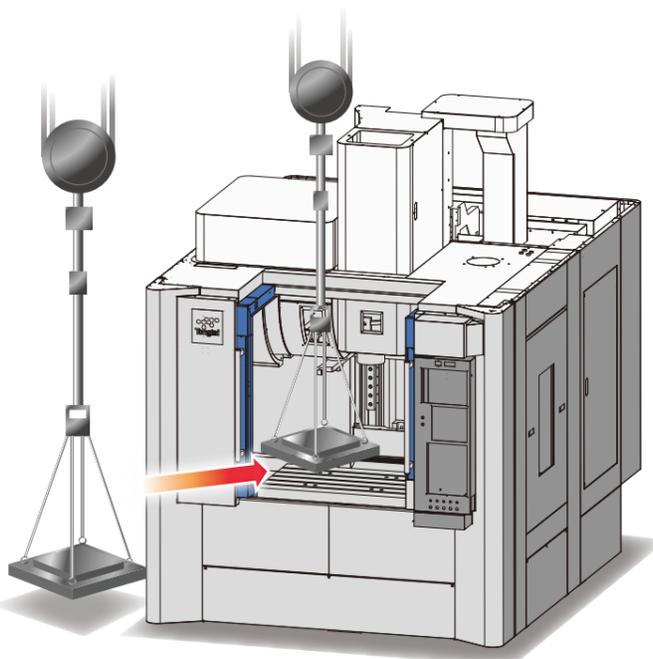
## Door opening width

The wide door opening makes machine operation and loading/unloading more convenient.



| Distance B |          |
|------------|----------|
| VC-608     | 950 mm   |
| VC-610     | 1,100 mm |
| VC-711     | 1,200 mm |

Spacious working zone facilitates operation of overhead travelling crane.



# High resolution control

Equipped with Mitsubishi M720-VS series controller, which supports high speed and high accuracy control, combined with high rigidity and high stability machine structure, MDV-608/611 shows outstanding performance in high speed contouring.

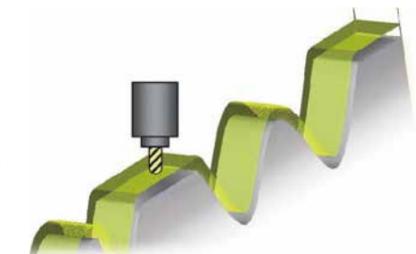
- Supports high-class, high speed, and high accuracy control
- Super Smooth Surface controlling function



## High-speed & High accuracy control mode I/II

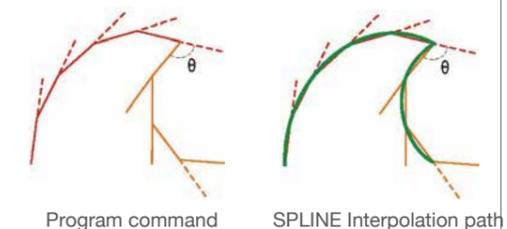
Utilizing our block look ahead from the commanded paths, unnecessary deceleration is reduced even when fine steps exist; thereby, realizing smooth surfaces. Machining time can be shorter than conventional system.

High speed & high accuracy control model I : G05.1Q1  
High speed & high accuracy control model II : G05P10000



## SPLINE Interpolation

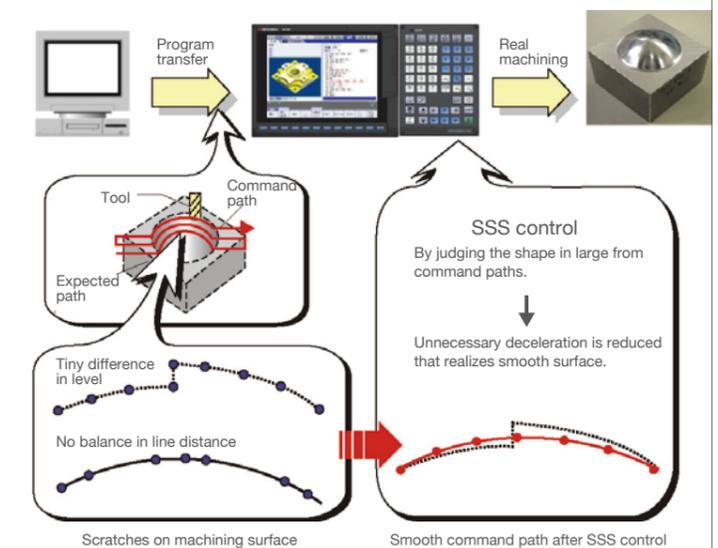
This function can be commanded in high speed and high accuracy mode II to automatically generate a spline curve that passes through a sequence of points commanded by the fine segment machining program, and interpolates the path along this curve. This allows highly accuracy machining at a high speed.



## SSS Control

SSS control (Super Smooth Surface) ensures high machining stability and quality with virtual no effects resulting from cutting shape or speed; that is suitable for high precision mold machining.

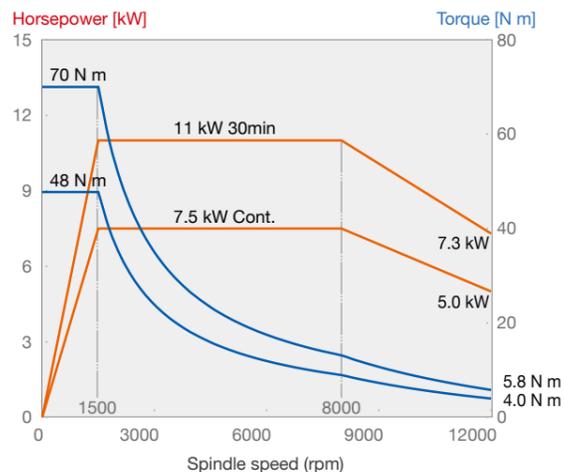
Optimum speed control is always performed even with the program with error, resulting smooth surface in short time.



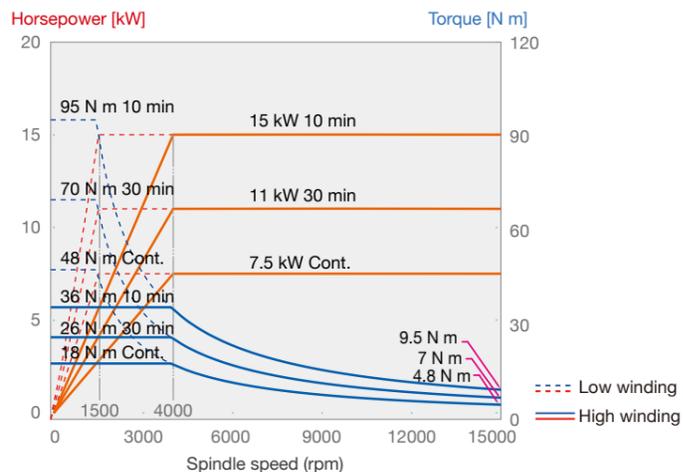
# Spindle output and torque chart · Machine dimensions

# Specification · Standard/Optional accessories

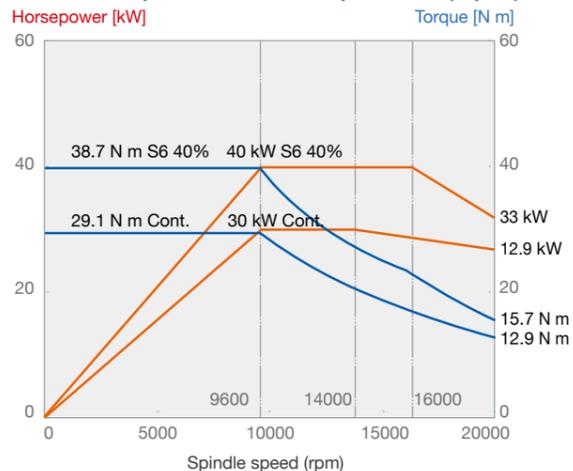
12,000 rpm Direct-drive spindle (std.)



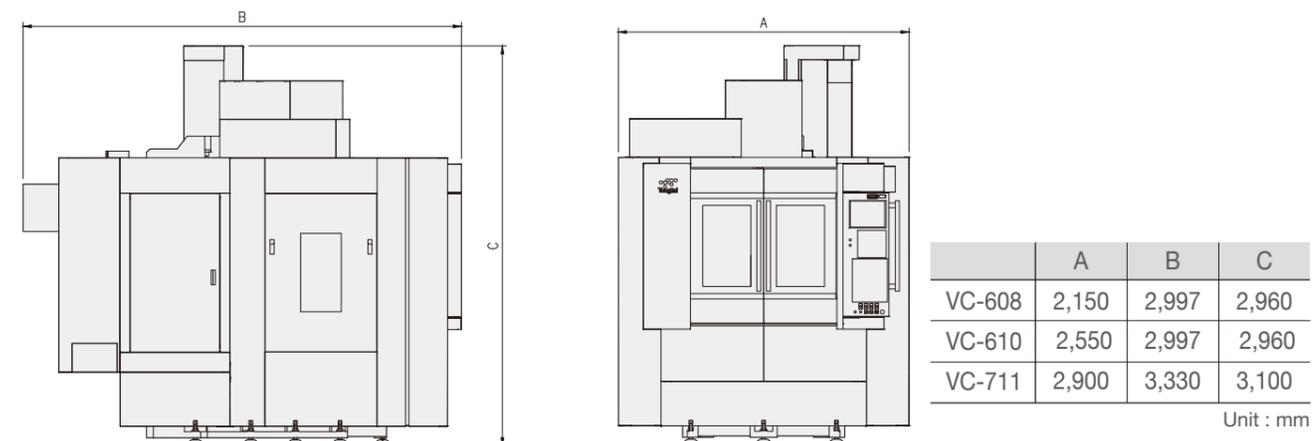
15,000 rpm Direct-drive spindle (opt.)



20,000 rpm Built-in spindle (opt.)



## Machine dimensions



## Specification

| Item         | Specification                          | Unit   | VC-608                         | VC-610            | VC-711            |
|--------------|--|--------|--------------------------------|-------------------|-------------------|
| Table        | Table size (L×W)                       | mm     | 950×600                        | 1,100×650         | 1,200×710         |
|              | Max.loading capacity                   | kg     | 500                            |                   | 1000              |
|              | Table height from floor                | mm     | 900                            |                   | 900               |
|              | T-slot (size×No.)                      | mm     | 18×5                           |                   | 18×5              |
| Spindle      | Spindle taper                          |        | 7/24 Taper No.40               |                   |                   |
|              | Spindle speed                          | rpm    | 12,000 (15,000) (20,000)       |                   |                   |
| Travel       | X/Y/Z axis travel                      | mm     | 850/610/530                    | 1,050/610/530     | 1,100/710/710     |
|              | Spindle nose to table                  | mm     | 100~630                        | 100~630           | 100~810           |
| Feed         | X/Y/Z axis rapid traverse              | m/min  | 24/24/24                       |                   |                   |
|              | Cutting feedrate                       | mm/min | 1~10,000                       |                   |                   |
| ATC          | Tool shank                             |        | BBT-40/HSK-A63                 |                   |                   |
|              | Tool capacity                          | pc     | 24 (30)                        |                   |                   |
|              | Max. tool diameter                     | mm     | Ø89                            |                   |                   |
|              | Max. tool diameter (w/o adjacent tool) | mm     | Ø125                           |                   |                   |
|              | Max. tool length                       | mm     | 300                            |                   |                   |
|              | Max. tool weight                       | kg     | 7                              |                   |                   |
| Motor        | Spindle motor                          | kW     | 11/7.5 (15/11/7.5) (40/30)     |                   |                   |
|              | X/Y/Z servo motor                      | kW     | 2/2/3 [2.7/2.7/4]              |                   |                   |
| Machine size | Width×Depth×Height                     | mm     | 2,150×2,997×2,960              | 2,550×2,997×2,960 | 2,900×3,330×3,100 |
|              | Weight                                 | kg     | 7,000                          | 8,000             | 9,000             |
| Controller   |  |        | Mitsubishi M70VA [Fanuc Oi-MF] |                   |                   |

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## Standard/Optional accessories

|                                   |   | Standard           | Optional |  |
|-----------------------------------|---|--------------------|----------|--|
| Tool shank                        | BBT-40  | ●                  |          |  |
|                                   | HSK-A63                                       |                    | ○        |  |
| Coolant through spindle pump      | 20 bar  |                    | ○        |  |
|                                   | 35 bar  |                    | ○        |  |
|                                   | 70 bar  |                    | ○        |  |
| Cooling system                    | Spindle cooling system                        | ●                  |          |  |
|                                   | Hydraulic temperature control system          |                    | ○        |  |
|                                   | Coolant temperature control system            |                    | ○        |  |
|                                   | Air conditioner for electrical cabinet        |                    | ○        |  |
| Chip conveyor                     | Two chip augers                               | ●                  |          |  |
|                                   | Scraper type conveyor                         |                    | ○        |  |
|                                   | Magnetic scraper type conveyor                |                    | ○        |  |
|                                   | Hinge type conveyor                           |                    | ○        |  |
|                                   | Bed flushing pump.                            |                    | ○        |  |
| Lubrication system                | General lubricant system                      | ●                  |          |  |
|                                   | LHL integrated lubrication system             |                    | ○        |  |
| Positioning accuracy control      | Three axes linear scale 5µm resolution        |                    | ○        |  |
|                                   | Three axes linear scale 3µm resolution        |                    | ○        |  |
|                                   | Three axes magnetic scale with 5µm resolution |                    | ○        |  |
| Tool measuring system             | Tongtai made touch type broken tool detector  |                    | ○        |  |
|                                   | Marposs Mida Laser 75P Tool breakage detector |                    | ○        |  |
| 4 <sup>th</sup> axis rotary table |   |                    | ○        |  |
| Automatic door                    |   |                    | ○        |  |
| Others                            | Renishaw OMP60/RMP60                          |                    | ○        |  |
|                                   | Machining air blow                            |                    | ○        |  |
|                                   | Minimum quantity lubrication (MQL)            |                    | ○        |  |
|                                   | Air gun                                       |                    | ○        |  |
|                                   | Coolant gun                                   |                    | ○        |  |
|                                   | Oil skimmer                                   |                    | ○        |  |
|                                   | Oil mist collector                            |                    | ○        |  |
|                                   | Controller                                    | Mitsubishi M720-VS | ●        |  |
|                                   | Mitsubishi M730-VW                            |                    | ○        |  |
|                                   | FANUC Oi-MD                                   |                    | ○        |  |
| FANUC 31i-MB                      |   | ○                  |          |  |
| SIEMENS 828D                      |   | ○                  |          |  |