**Advanced features of the MAZATROL SmoothG CNC**

- Touch screen operation— Operates similar to your smart phone / tablet
- PC with Windows® embedded OS
- Fastest CNC in the world— Latest hardware and software for unprecedented speed and precision
- Easy conversational programming of multiple surface machinings
- Smooth graphical user interface and support functions for unsurpassed ease of operation
- Fine tuning functions— Easily configure machine parameters for different workpiece materials and application requirements
- MTConnect® ready— Convenient networking

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**High Productivity in a Small Floor Space**

- 2 turret / 2 spindle machine construction for reduced cycle time
- High efficiency integral spindle / motors in both left and right headstocks perform powerful turning and high accuracy C-axis indexing in 0.0001° increments
- In addition to the standard 12 position drum turret, a 24 indexing-step 12 position drum turret and 16 position drum turret are optionally available
- High accuracy milling thanks to the rotary tool spindle on both turrets and long Y-axis stroke (MY, MSY)
- A variety of automation equipment such as bar feeders, workpiece unloader and robot are optionally available

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**High Production Multi-tasking**

**Series range**

<table>
<thead>
<tr>
<th>Models</th>
<th>Main spindle Max. spindle speed</th>
<th>Output (30 min. rating)</th>
<th>Chuck size</th>
<th>Second spindle Max. spindle speed</th>
<th>Output (30 min. rating)</th>
<th>Chuck size</th>
</tr>
</thead>
</table>
| 100MSY | 11,000 rpm | 65 mm (1/4") | 6" | 11,000 rpm | 65 mm (1/4") | 6"
| 150MSY | 15,000 rpm | 80 mm (1/2") | 8" | 15,000 rpm | 80 mm (1/2") | 8"
| 200MSY | 22,000 rpm | 100 mm (3/4") | 10" | 22,000 rpm | 100 mm (3/4") | 10"
| 200MS | 22,000 rpm | 100 mm (3/4") | 10" | 22,000 rpm | 100 mm (3/4") | 10"
| 250MSY | 30,000 rpm | 125 mm (1") | 12" | 30,000 rpm | 125 mm (1") | 12"
| 250MS | 30,000 rpm | 125 mm (1") | 12" | 30,000 rpm | 125 mm (1") | 12"

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**Intelligent Machine**

Innovative support for operators

**ergonomics**

Ease of operation

**eco-friendly**

Designed with environmental considerations
2 turret / 2 spindle machine design for reduced cycle times

The HQR series can perform high-efficiency cutting such as simultaneous 1st and 2nd operations and balanced cutting by utilizing the upper and lower turrets. By synchronized machining of both turrets, balance cutting that minimizes workpiece displacement can be performed. Additionally, simultaneous turning reduces cycle time.
**Higher Productivity**

**High efficiency integral spindle / motors in both headstocks**

Thanks to its design, vibration is minimized during high-speed operation to ensure exceptional surface finishes and maximum tool life. Since no transmission with belts, pulleys or gears is used, the higher efficiency of the integral spindle / motor delivers more power to the tool tip to be used for cutting. The spindle C1-axis and C2-axis* can be indexed by 0.0001° increments and can also perform contouring.

**Conventional belt drive**

![Conventional belt drive](image)

Vibration increases with faster speed

**HQR integral spindle / motor**

![HQR integral spindle / motor](image)

Minimum vibration produced by integral spindle / motor

**Example results of roundness and surface roughness**

![Example results of roundness and surface roughness](image)

Mazak integral spindle / motor

Belt drive motor

**Spindle specifications**

<table>
<thead>
<tr>
<th>Machines</th>
<th>HQR 100MSY</th>
<th>HQR 150MSY</th>
<th>HQR 200MS, 200MSY</th>
<th>HQR 250MS, 250MSY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle</td>
<td>Main spindle</td>
<td>Second spindle</td>
<td>Main spindle</td>
<td>Second spindle</td>
</tr>
<tr>
<td>Chuck size</td>
<td>6&quot;</td>
<td>10&quot;</td>
<td>6&quot;</td>
<td>10&quot;</td>
</tr>
<tr>
<td>Max. speed</td>
<td>5000 rpm</td>
<td>6000 rpm</td>
<td>5000 rpm</td>
<td>6000 rpm</td>
</tr>
<tr>
<td>Spindle acceleration</td>
<td>Main spindle: 3.99 s</td>
<td>Second spindle: 3.8 s</td>
<td>Main spindle: 2.7 s</td>
<td>Second spindle: 3.4 s</td>
</tr>
<tr>
<td>Max. torque</td>
<td>347 N·m (258 ft·lbs)</td>
<td>416 N·m (310 ft·lbs)</td>
<td>467 N·m (344 ft·lbs)</td>
<td>467 N·m (344 ft·lbs)</td>
</tr>
</tbody>
</table>

**Torque Diagrams**

- **6000 rpm 11 kW (15HP)**
  - HQR-100MSY Main spindle / second spindle
  - HQR-150MSY Second spindle

- **5000 rpm 15 kW (20HP)**
  - HQR-200MS, 200MSY Main spindle / second spindle
  - HQR-250MS, 250MY, 250MSY Main spindle

- **4000 rpm 26 kW (35HP)**
  - HQR-250MS, 250MY, 250MSY Main spindle

- **5000 rpm 22 kW (30HP)**
  - HQR-250MS, 250MSY Second spindle
Higher Productivity

High-performance non-lift turret

12 position drum turret

Both the upper and lower 12 position drum turrets can mount either turning or milling tools on each of the 12 positions for convenient setup. A 24 indexing-step 12 position drum turret is optionally available for the HQR 200, 250 series.

16 position drum turret (200MS, 200MSY, 250MS, 250MSY) (OPTION)

Both the upper and lower 16 position drum turrets can mount either turning or milling tools on each of the 16 positions for convenient setup.

Upper turret

Lower turret

Rotary tool spindle

The 6000 rpm, AC 5.5 kW (7.5 HP) milling spindle provides performance comparable to a small machining center from powerful face milling to high speed drilling.

<table>
<thead>
<tr>
<th>Output (kW)</th>
<th>Speed (rpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0.5</td>
<td>1500</td>
</tr>
<tr>
<td>1.0</td>
<td>2250</td>
</tr>
<tr>
<td>2.2</td>
<td>6000</td>
</tr>
</tbody>
</table>

VDI turret for convenient tool setup

The 12 position drum turret and 16 position drum turret* use VDI tool holders for ease of tool setup. Tools can be easily mounted on the turret by turning one bolt for fast tool setup changes.

*200 and 250 series only
Higher Productivity

Upper / lower turret Y-axis (MY, MSY)

The Y-axis stroke (upper turret: 100 mm (4"), lower turret: 70 mm (2.75")) makes it possible to perform a wide variety of machining.

Sample workpieces

Workpiece: Pulley
Material: Aluminum
Cutting time: 5 min

Workpiece: Shaft
Material: Carbon steel
Cutting time: 2.5 min

Workpiece: Piston housing
Material: Carbon steel
Cutting time: 3.9 min

Workpiece: Sleeve
Material: Carbon steel
Cutting time: 4.5 min

Workpiece: Shaft
Material: Carbon steel
Cutting time: 4 min

Tailstock (MY, MSY)

The HQR-200MY and 250MY are equipped with a tailstock. Servo motor controlled tailstock movement and thrust allow automation of shaft workpiece machining.

Example: face driver on main spindle for the complete machining of a shaft workpiece

Higher Accuracy

Continuous machining accuracy

The INTELLIGENT THERMAL SHIELD is an automatic compensation for room temperature changes, which realizes enhanced continuous machining accuracy. MAZAK has performed extensive testing in a variety of environments in a temperature controlled room and has used the results to develop a control system that automatically compensates for temperature changes in the machining area. Changes in the room temperature and compensation data are shown visually.

HQR-150MSY test results

Material: Brass JIS C3604
Spindle speed: 3000 rpm
Machining conditions: Feedrate 0.03 mm/rev, D.O.C. 0.02 mm
Tool: Diamond tool (DA2200), Nose R 0.4 mm

The inspection is conducted according to ISO-230 on a recommended foundation with room temperature controlled to 22°C (+1°C to -3°C) after machine has reached operation temperature.

Results: 0.26 μm (0.0000102") (Main spindle) Results: 0.30 μm (0.0000118") (Second spindle)
Factory Automation

A wide variety of optional equipment is available for the HQR series

Bar feeder and workpiece unloader

Effective operation from bar material to finished workpiece. The unloader hand is designed to prevent any marring of the finished workpiece surface.

Workpiece unloader

The work unloader removes the workpiece from the chuck and transfers it outside of the machine without damaging the machined surfaces. (workpiece unloader not available for the HQR-200MY and 250MY)

Unmanned operation system ROBOT LOADER 100

By utilizing the work loader robot and conveyor, chuck work can be automated and unmanned operation can be performed over extended periods of time to realize high productivity.

Automation for chuck workpieces

- Easy setup by MAZATROL
- Minimum floor space requirements
- Large pallet storage
- Safe operation

Loading material

Unloading finished workpiece

Transferring workpiece to pallet

Standard hand

Double hands with 3-jaws for chuck workpieces (D3)

Max. workpiece weight

16 kg (22 lbs) × 2

Max. diameter

ø20 mm ~ ø150 mm

Workpiece length

20 mm ~ 100 mm

(0.79” ~ 3.94”)

HQR-200MSY
Yamazaki Mazak has developed a variety of functions for the improvement of productivity, high accuracy machining and operator support. A variety of unique technologies has been developed that incorporates the expertise of experienced machine operators that realizes unsurpassed productivity and higher accuracy machining.

**Advanced Intelligent\(^\star\) Functions**

A variety of Intelligent\(^\star\) Functions provides incomparable operator support for exceptional ease of operation and optimum machine efficiency.

**Machine Interference Prevention**

**INTELLIGENT SAFETY SHIELD**

When an operator manually moves the machine axes for setup, tool measurement or changing inserts, the CNC shows a synchronized 3D model on the display for checking machine interference. If any machine interference occurs, the machine motion automatically stops. This function for use during automatic operation is optionally available.

**Variable Acceleration Control Function**

**VARIABLE ACCELERATION CONTROL**

Variable acceleration control is a new function which permits the faster acceleration capability of linear axes to be used whenever possible. The slower acceleration of the rotary axes is not used for all program commands, resulting in faster machining cycle times.

**Seamless Corner Control**

**SMOOTH CORNER CONTROL**

Improved finished surfaces and reduced cycle times by optimized acceleration / deceleration when machining corners.

**Verbal Message System**

**MAZAK VOICE ADVISER**

Verbal support for machine setup and safe conditions confirmation.

**Comprehensive Maintenance Monitor**

**INTELLIGENT MAINTENANCE SUPPORT**

Useful information for improved preventative maintenance to prevent unexpected machine downtime.
**Ergonomics**

Ergonomic design for convenient operation and maintenance

**Large window**
The large front door window allows workpiece machining to be easily monitored by the operator.

**Adjustable CNC touch panel**
Operation touch panel can be tilted to the optimum position for any operator’s height to ensure ease of operation.

**Turret access**
The turrets feature excellent accessibility for convenient tool setup.

**Maintenance area**
Items requiring frequent access for machine maintenance are arranged in one central location.

**Color coded cables**
Cables have a standard color coding for easy identification and convenient maintenance.

**Environmentally Friendly**

The environment and our impact on natural surroundings have always been important concerns of Yamazaki Mazak. This is shown by the fact that all factories in Japan where Mazak machine tools are produced are ISO 14001 certified, an international standard confirming that the operation of our production facilities does not adversely affect air, water or land.

The roller guides utilized by all linear axes are lubricated by a grease lubrication system instead of oil. With this system, tramp oil in the coolant is considerably reduced, resulting in a longer coolant service life. Additionally, the work light, CNC display and the optional chip conveyor are automatically shut off after a predetermined period for lower power consumption when the machine is in the stand-by state.
The seventh generation MAZATROL CNC system - the core of Smooth Technology

**MAZATROL SMOOTH G**

From setup to machining - designed for unsurpassed ease of operation

- **19" touch panel**
  - Touch panel operation
    - similar to your smart phone or tablet
- **USB port**
  - Interface for peripheral equipment
    - USB-1.0 + 2.0
- **SD card slot**
  - Transfer program and tool data
- **Operation switches**
  - Large switches
    - color changes from orange to green when turned on
- **Dials**
  - For frequently-used axes selection and feedrate changes

New interface with touch operation ensures convenient data processing - programming, confirmation, editing, and tool data registration

### Process home screens

Five different home process screens — each home screen displays the appropriate data in an easy-to-understand manner. Icons can be touched in each process display for additional screen displays.

### Pop-up windows

Values and items can easily be input / selected on pop-up windows.
Ease of Programming

Programming screen links tool path, workpiece shape and programming to reduce programming time

**QUICK MAZATROL**
MAZATROL program, unit list and 3D workpiece shape are linked to each other. After defining a machining unit in a MAZATROL program, the 3D shape is immediately displayed to easily and quickly check for any programming error.

**3D ASSIST**
Workpiece and coordinates data can be imported from 3D CAD data to a MAZATROL program. No coordinate value inputs are required. Can reduce input errors and time for program checking.

**QUICK EIA**
Program, process list and 3D tool path display are linked to each other. Visible search on touch screen can reduce the time for program checking.
3D machine model

A 3D machine model is available to perform program interference checks with other CAD/CAM simulation software.
### Machine Specifications

#### HQR-200MS, 200MSY, 250MS, 250MSY 850U

<table>
<thead>
<tr>
<th> </th>
<th>850U</th>
<th>1300U</th>
<th>700U</th>
<th>850U</th>
<th>1300U</th>
<th>700U</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong> (upper / lower turret)</td>
<td>① Depends on chuck specifications</td>
<td>① Depends on chuck specifications</td>
<td>① Depends on chuck specifications</td>
<td>① Depends on chuck specifications</td>
<td>① Depends on chuck specifications</td>
<td>① Depends on chuck specifications</td>
</tr>
<tr>
<td><strong>Max. turning</strong></td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
</tr>
<tr>
<td><strong>Max. machining diameter</strong></td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
</tr>
<tr>
<td><strong>Diameter between tool ports (bit spindle)</strong></td>
<td>ø60 mm (2.375&quot;)</td>
<td>ø60 mm (2.375&quot;)</td>
<td>ø60 mm (2.375&quot;)</td>
<td>ø60 mm (2.375&quot;)</td>
<td>ø60 mm (2.375&quot;)</td>
<td>ø60 mm (2.375&quot;)</td>
</tr>
<tr>
<td><strong>Bar work capacity</strong></td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
<td>ø475 mm / ø400 mm (ø18.7 / ø15.8)</td>
</tr>
</tbody>
</table>

#### Machine Dimensions

**HQR-200MY, 250MY 700U**

- **Dimensions**:
  - **Width**: 2424 mm (95.7")
  - **Height**: 2989 mm (117.68")
  - **Depth**: 3510 mm (138.19")

**HQR-200MS, 200MSY, 250MS, 250MSY 1300U**

- **Dimensions**:
  - **Width**: 2424 mm (95.7")
  - **Height**: 3510 mm (138.19")
  - **Depth**: 3510 mm (138.19")
Automatic opening / closing front door

The automatic opening / closing front door operates in 3 speed steps. If an operator inadvertently places a hand in the opening, operation will automatically stop when the door contacts his hand.

Tool eye

The tool eye can be programmed for automatic tool measurement and compensation as well as inspection for tool breakage. In addition, since tool setup is done by simply bringing the tool tip into contact with the tool eye, tool setup time is considerably reduced.

Auto parts catcher

Auto parts catcher automatically moves workpieces to outside of the machine. By using a bar feeder and work conveyor, automatic operation can be performed.

Area separator (1300U)

Thanks to the area separator, workpiece loading / unloading can be performed even during machining on the other side.

Optional Equipment

Standard and Optional Equipment

<table>
<thead>
<tr>
<th>Machine</th>
<th>100MSY</th>
<th>150MSY</th>
<th>200MSY</th>
<th>200MSU</th>
<th>200MY</th>
<th>250MSY</th>
<th>250MSU</th>
<th>250MY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute position detection</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Double front door switch</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Foundation kit</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Chuck</td>
<td>Through-hole chuck (B-206)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td></td>
<td>Through-hole chuck (B-606)</td>
<td>○</td>
<td>○</td>
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<td>○</td>
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<tr>
<td></td>
<td>Through-hole chuck (B-706)</td>
<td>○</td>
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<td>○</td>
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<tr>
<td></td>
<td>Through-hole chuck (BB-210)</td>
<td>○</td>
<td>○</td>
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<td>○</td>
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<td></td>
<td>Collet chuck (SA-50)</td>
<td>○</td>
<td>○</td>
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<td>○</td>
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<tr>
<td></td>
<td>Collet chuck (SA-500, CB65-ND-A)</td>
<td>○</td>
<td>○</td>
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<tr>
<td></td>
<td>Collet chuck (CB65-ND-A)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td></td>
<td>Second spindle through-hole chuck (B-206)</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
<td>○</td>
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<td></td>
<td>Second spindle through-hole chuck (BB-210)</td>
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<tr>
<td></td>
<td>Second spindle through-hole chuck (B-706)</td>
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<tr>
<td></td>
<td>Second spindle through-hole chuck (BB-710)</td>
<td>○</td>
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<tr>
<td>Safety equipment</td>
<td>Front door interlock</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
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<td>Hydraulic pressure interlock</td>
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<td></td>
<td>Overload detection</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>Factory automation</td>
<td>Automatic chuck jaw open / close confirmation</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td></td>
<td>Chuck open / close confirmation</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td></td>
<td>Coolant temperature control system</td>
<td>○</td>
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<td>○</td>
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<tr>
<td></td>
<td>Machining and buzzer</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td></td>
<td>Spindle orient</td>
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<td>○</td>
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<tr>
<td></td>
<td>Second spindle C-axis contouring (0/067&quot;)</td>
<td>○</td>
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<td>○</td>
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<tr>
<td></td>
<td>Cylinder-type automatic part (0/067&quot;)</td>
<td>○</td>
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<td>○</td>
<td>○</td>
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<tr>
<td></td>
<td>Tool eye (Basis / second spindle)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td></td>
<td>Workpiece measurement (upper / lower)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>High / low chuck pressure (main / second spindle)</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Main spindle chuck jaw air blast</td>
<td>○</td>
<td>○</td>
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<td>○</td>
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<td>○</td>
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<tr>
<td></td>
<td>Second spindle chuck jaw air blast</td>
<td>○</td>
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</table>

*: Standard        : Option        : N/A

*Not on second spindle side

The above specifications are for American market. Standard and optional equipment vary by market.

Adjustment tools

One set of manuals

Standard tooling package

For above specifications are for American model. Standard and optional equipment vary by market.
Specifications are subject to change without notice.
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The accuracy data and other data presented in this catalogue were obtained under specific conditions. They may not be duplicated under different conditions (room temperature, workpiece materials, tool material, cutting conditions, etc.)

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