High-Precision Horizontal Machining Center

NH5000 DCG
Achieving highest-level speed in the world

The NH5000 DCG, a high-precision horizontal machining center in the NH Series, is equipped with a 500 mm (19.7 in.) square pallet and employs DMG MORI’s original technologies of DCG (Driven at the Center of Gravity) as standard and DDM (Direct Drive Motor) as an option. We have prepared No. 40 and No. 50 taper spindles for the model. A machine with a No. 40 taper spindle offers both space saving design and a large work envelope, while a machine with a No. 50 taper spindle focuses on high cutting ability. The two varieties of spindles will solve a wide range of production problems with parts machining, and realize unprecedented high productivity.
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MAPPS: Mori Advanced Programming Production System

*Figures in inches were converted from metric measurements.*
Principal mechanisms

Basic structure

Box-in-Box Construction
Moving parts are guided and driven with perfect balance at their center of gravity by the “Box-in-Box” Construction, which supports the saddle at both ends. At the same time, we have improved the servo motor’s traceability, allowing higher speed and greater acceleration than ever before.

Driven at the Center of Gravity

Our DCG (Driven at the Center of Gravity) technology controls vibration, which is one of the main enemies of high speed and high precision, by driving structural parts at their center of gravity.

Vibration Controlled

For positioning, machines with DCG virtually eliminate vibration, while machines without DCG continue to vibrate for a long time. DCG controls the rotational vibration which appears at every acceleration start point, and which is proportional to the distance between the drive point and the center of gravity. This prevents deterioration of the quality of the machined surface.

Features of DCG

- Improved surface quality
- Improved roundness
- Outstanding acceleration
- Longer tool life

Machining by DCG advanced technology

Machining by a conventional machine

Residual vibration comparison

<table>
<thead>
<tr>
<th>Rapid traverse rate &lt;X, Y and Z axes&gt;</th>
<th>Feedrate &lt;X, Y and Z axes&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 m/min (1,968.5 ipm)</td>
<td>50 m/min (1,968.5 ipm)</td>
</tr>
</tbody>
</table>

Max. acceleration

<table>
<thead>
<tr>
<th>X-axis</th>
<th>Y-axis</th>
<th>Z-axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 G  {9.8 m/s² (32.2 ft/s²)}</td>
<td>1.1 G  {10.8 m/s² (35.4 ft/s²)}</td>
<td>0.7 G  {6.9 m/s² (22.6 ft/s²)}</td>
</tr>
</tbody>
</table>

With AI contour control
Space-saving design

Offering both space-saving design and a large work envelope, reducing the required floor space by 10% (in the case of the NH5000 DCG/40) compared to existing machines.

Machine height

- **NH5000 DCG/40**: 3,138 mm (123.5 in.)
- **NH5000 DCG/50**: 3,440 mm (135.4 in.)

Machine width × machine depth

- **NH5000 DCG/40**: 2,725×4,610 mm (107.3×181.5 in.)
- **NH5000 DCG/50**: 3,437×4,799 mm (135.3×188.9 in.)

Travel <X, Y and Z axes>

- X-axis: 850 mm (33.5 in.)
- Y-axis: 730 mm (28.7 in.)
- Z-axis: 730 mm (28.7 in.)

Working area

- Max. workpiece swing diameter: 800 mm (31.4 in.)
- Max. workpiece height: 1,000 mm (39.3 in.)
- Pallet loading capacity:
  - 2-station turn-type APC: 500 kg (1,100 lb.)
  - 3-station turn-type APC: 400 kg (880 lb.)

Option

- NH5000 DCG/40: 3,138 mm (123.5 in.)
- NH5000 DCG/50: 3,440 mm (135.4 in.)

Option

- NH5000 DCG/40: 2,725×4,610 mm (107.3×181.5 in.)
- NH5000 DCG/50: 3,437×4,799 mm (135.3×188.9 in.)

Option
Principal mechanisms

**Spindle**

For the spindle drive, we use the high-efficiency DDS (Direct Drive Spindle) motor which extracts full power over a wide range, from high-speed machining to heavy-duty cutting. This machine handles all types of materials from steel to aluminum and other non-ferrous metals.

**Equipped with a No. 40 taper spindle**

- Max. spindle speed
  - NH5000 DCG/40
    - 14,000 min⁻¹
    - 20,000 min⁻¹<sup>OP</sup>
  - NH5000 DCG/40 <high speed> OP</sup>
    - 14,000 min⁻¹
    - 20,000 min⁻¹<sup>OP</sup>

- Tool clamp power
  - Improved tool clamping force

  Using the newly developed collet, clamping power on the tool has been increased. The ability to control vibration during spindle rotation ensures high-precision machining.

<table>
<thead>
<tr>
<th>Machine type</th>
<th>Spindle acceleration time</th>
<th>Spindle deceleration time</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH5000 DCG/40</td>
<td>1.72 sec. (0→14,000 min⁻¹)</td>
<td>1.49 sec. (14,000 min⁻¹→0)</td>
</tr>
<tr>
<td>NH5000 DCG/40 &lt;high speed&gt; OP&lt;/sup&gt;</td>
<td>2.55 sec. (0→20,000 min⁻¹)</td>
<td>2.35 sec. (20,000 min⁻¹→0)</td>
</tr>
<tr>
<td>NH5000 DCG/50</td>
<td>1.91 sec. (0→8,000 min⁻¹)</td>
<td>1.80 sec. (8,000 min⁻¹→0)</td>
</tr>
</tbody>
</table>

- Please use a two-face contact tool when using a No. 40 taper spindle at 15,000 min⁻¹ or higher, or a No. 50 taper spindle at 10,000 min⁻¹ or higher.

**Two-face contact specification**

Tool rigidity has been improved by contact of both the spindle taper and the tool flange. This extends the useful life of a tool, raises cutting power and improves the machining precision.

**BT specifications**

**HSK specifications**

- All DMG MORI spindles are made in-house to better meet our customer needs. For details, please consult with our sales representative.
- When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

**Spindle cooling**

Stator coil in DDS motor: the coolant supplied by the oil chiller minimizes heat diffusion by circulating through an oil jacket, which is placed around the stator coil.

**Tool, Boring**

The maximum tool length is the same as the pallet size. Deep hole boring up to the maximum tool length can be done without turning the table around, reducing cutting time and achieving high-precision machining.

- Max. tool length
  - 500 mm (19.6 in.)

- Pallet working surface
  - 500×500 mm (19.6×19.6 in.)

**Boring**

Previous model

Concentric drilling can be done on both sides by flipping the table.

<table>
<thead>
<tr>
<th>NH5000 DCG</th>
<th>Boring up to 500 mm (19.6 in.) can be done without turning the B-axis, reducing cutting time and achieving high-precision machining.</th>
</tr>
</thead>
</table>

- Depending on condition, machining may not always be possible.
A one-degree indexing table is standard, and a full indexing table equipped with DDM is available as an option. These have significant advantages for machining of workpieces that require high speed and high positioning accuracy.

### Selection of tables

<table>
<thead>
<tr>
<th>Table type</th>
<th>1° indexing table</th>
<th>Full 4th axis rotary table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum pallet indexing angle</td>
<td>1°</td>
<td>0.001°</td>
</tr>
<tr>
<td>Pallet indexing time (90°)</td>
<td>1.57 sec.</td>
<td>1.12 sec.</td>
</tr>
</tbody>
</table>

- High-speed rotation
- High-precision indexing
- Less maintenance
- Longer product life

### Features of DDM

- APC
  - 2-station turn-type APC
  - NH5000 DCG (DDM)
  - 22 min⁻¹ previous model
  - 100 min⁻¹ NH5000 DCG (DDM)
  - Approximately 4.5 times faster

### Direct Drive Motor

The world’s fastest rotary axis drive system, which achieves zero backlash.

Until now, gears have been used to transmit the drive power to the rotary axes, but this drive system had a negative effect on drive speed and precision. By transmitting the drive power to the rotary axes directly without using gears, DDM offers outstanding transmission efficiency and high-speed feed. DDM also achieves zero backlash.

### B-axis Max. rotational speed

- Previous model
  - 22 min⁻¹ (worm gear system)
- NH5000 DCG (DDM)
  - 100 min⁻¹
  - Approximately 4.5 times faster

### APC

- It uses a front 2-station turn-type APC. This APC offers high-speed pallet change that reduces non-cutting time.

### Pallet changing time*

- 2-station turn-type APC
  - 7 sec.
  - 13 sec. <Pallet loading capacity 700 kg (1,540 lb.>>
Principal mechanisms

ATC

By using a double arm, which offers high-speed tool change, non-cutting time is dramatically reduced.

<table>
<thead>
<tr>
<th>Tool changing time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut-to-cut (chip-to-chip)</td>
</tr>
<tr>
<td>Machine type</td>
</tr>
<tr>
<td>NH5000 DCG/40 (40 tools)</td>
</tr>
<tr>
<td>NH5000 DCG/50 (54 tools)</td>
</tr>
</tbody>
</table>

ISO 10791-9  JIS B6336-9
ISO: International Organization for Standardization  JIS: Japanese Industrial Standard
● The time differences are caused by the different conditions (travel distances, etc.) for each standard.

Magazine

We prepared two types of magazine: a chain type and a rack type. Customers can choose either a chain type or rack type to suit their production needs.

<table>
<thead>
<tr>
<th>Tool storage capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain-type magazine (attached to the machine)</td>
</tr>
<tr>
<td>NH5000 DCG/40</td>
</tr>
<tr>
<td>40 tools</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool storage capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain-type magazine (separate type)</td>
</tr>
<tr>
<td>NH5000 DCG/40</td>
</tr>
<tr>
<td>120 tools [OP]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tool storage capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rack-type magazine (separate type)</td>
</tr>
<tr>
<td>NH5000 DCG/40</td>
</tr>
<tr>
<td>180 tools [OP]</td>
</tr>
<tr>
<td>NH5000 DCG/50</td>
</tr>
<tr>
<td>100 tools [OP]</td>
</tr>
</tbody>
</table>

● Magazines incorporate a pot transfer mechanism and the tool capacity includes one tool at the spindle side.

<table>
<thead>
<tr>
<th>Machine type</th>
<th>Max. tool length</th>
<th>Max. tool mass</th>
<th>Max. tool diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH5000 DCG/40</td>
<td>500 mm (19.6 in.)</td>
<td>12 kg (26.4 lb.)</td>
<td>70 mm (2.7 in.) [with adjacent tools]</td>
</tr>
<tr>
<td>NH5000 DCG/50</td>
<td>300 mm (11.8 in.)</td>
<td>140 mm (5.5 in.)</td>
<td>110 mm (4.3 in.) [with adjacent tools]</td>
</tr>
</tbody>
</table>

● The maximum tool diameter is limited to 255 mm (10.0 in.) or less when using a No. 50 taper spindle at 10,000 min⁻¹ or higher.
High precision equipment

**Full closed loop control (Scale feedback)**

- Superior precision with full closed loop control (Scale feedback)
- Magnetic measuring system with a high resolution of 0.01 μm
- Resistance to oil and condensation due to a magnetic detection principle

**Coolant chiller (separate type) <option>**

Increased coolant temperature causes thermal displacement in the fixtures and workpiece, affecting the machining accuracy of the workpiece. Use this unit to prevent the cutting coolant from heating up. When using oil-based coolant, the coolant temperature can become extremely high even with the standard coolant pump, so please be sure to select this unit.

**Pallet clamp system**

- Impact resistance of 450 m/s² (17,716.5 in./s²)
- Vibration resistance of 250 m/s² (9,842.5 in./s²)
- High-accuracy machining is ensured by a scale with the same thermal expansion rate as the cast iron machine structure

**Servo motor thermal insulation**

By circulating coolant inside the flange, heat from the motor is prevented from being transmitted to the cast iron body.

**High-rigidity double-anchor support**

As well as ball screw core cooling, it uses a double-anchor support for highly rigid feed.

**Ball screw center cooling**

In order to control thermal displacement and to keep high-accuracy positioning, the ball screw core cooling system in which cooling oil circulates through the support bearings is used.
High-accuracy data

### Cutting test

**Face mill**

<table>
<thead>
<tr>
<th>Material &lt;JIS&gt;</th>
<th>A5052&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Tool</th>
<th>1.97 μm</th>
<th>Spindle speed</th>
<th>Feedrate</th>
<th>Material removal rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH5000 DCG/40</td>
<td>1049 (ANSI)</td>
<td>4-flute</td>
<td>1,536 mL/min</td>
<td>14 r/min</td>
<td>1,500 mm/min</td>
<td>691 mL/min (22.5 in.)/min</td>
</tr>
<tr>
<td>NH5000 DCG/50</td>
<td>5052 (ANSI)</td>
<td>4-flute</td>
<td>1,920 mL/min</td>
<td>14 r/min</td>
<td>3,000 mm/min</td>
<td>42.2 mL/min</td>
</tr>
</tbody>
</table>

**X, Y, Z-axes thermal displacement**

- Max. spindle speed: 14,000 min<sup>-1</sup>

### Tool

<table>
<thead>
<tr>
<th>Material &lt;JIS&gt;</th>
<th>S50C&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Tool</th>
<th>Spindle speed</th>
<th>Depth of cut</th>
<th>Width of cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH5000 DCG/40</td>
<td>1049 (ANSI)</td>
<td>2-flute</td>
<td>101 mL/min</td>
<td>8 mm (0.31 in.)</td>
<td>25 mm (1.0 in.)</td>
</tr>
<tr>
<td>NH5000 DCG/50</td>
<td>5052 (ANSI)</td>
<td>2-flute</td>
<td>178 mL/min</td>
<td>14 mm (0.6 in.)</td>
<td>25 mm (1.0 in.)</td>
</tr>
</tbody>
</table>

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<sup>1</sup> The cutting test results indicated in this catalog are provided as examples. The results indicated in this catalog may not be obtained due to differences in cutting conditions and environmental conditions during measurement. JIS: Japanese Industrial Standard

<sup>2</sup> A5052: Aluminum, S50C: Carbon steel, JIS: Japanese Industrial Standard
The NH5000 DCG has realized even higher productivity by increasing the speed of each structure.

### Data for comparison

**NH5000 DCG/40**

<table>
<thead>
<tr>
<th>Compared with previous model</th>
<th>NH5000 DCG/40: 897 sec.</th>
<th>Reduced by 54.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle time (sec.)</td>
<td>1,092 sec.</td>
<td>1,989 sec.</td>
</tr>
</tbody>
</table>

**Cycle time comparison**

<table>
<thead>
<tr>
<th>Max. spindle speed</th>
<th>14,000 min⁻¹</th>
<th>7,000 min⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid traverse rate</td>
<td>50 m/min (1,968.5 ipm)</td>
<td>20 m/min (787.4 ipm)</td>
</tr>
<tr>
<td>Tool changing time</td>
<td>Cut-to-cut &lt;chip-to-chip&gt; 3.3 sec. &lt;MAS&gt;</td>
<td>Cut-to-cut &lt;chip-to-chip&gt; 4.6 sec. &lt;MAS&gt;</td>
</tr>
</tbody>
</table>

**Number of tools used**

- **9 tools**

**Material (JIS): A5052** (Aluminum)

*When machining 2 kinds of workpieces at the same time.*

- 5052 (ANSI), NS4 (BS), AlMg2.5 (DIN), 5A02 (GB)

**Previous model** (1988 year)

<table>
<thead>
<tr>
<th>Max. spindle speed</th>
<th>7,000 min⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid traverse rate</td>
<td>20 m/min (787.4 ipm)</td>
</tr>
<tr>
<td>Tool changing time</td>
<td>Cut-to-cut &lt;chip-to-chip&gt; 4.6 sec. &lt;MAS&gt;</td>
</tr>
</tbody>
</table>

**Workpiece**

- **Approx. 2.3 times increase**

**Comparison of production volume and sales**

- **5 USD/EUR per work**

| Running time (one day): 8 hours×85%=3,600 sec.×8×0.85=24,480 sec. |
| Production volume (pcs./day): 24,480 sec.÷Cycle time (sec.) |
| Number of days operating in 1 year: 21 days×12 months=252 days |

**5-year sales simulation**

<table>
<thead>
<tr>
<th>Difference from previous model</th>
<th>75 USD/EUR per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. 2.3 times increase</td>
<td>1,575 USD/EUR per month</td>
</tr>
<tr>
<td>94,500 USD/EUR per 5 years</td>
<td>18,900 USD/EUR per year</td>
</tr>
</tbody>
</table>

**Graph showing production volume**

- **NH5000 DCG/40**
  - 12 pcs. (1st year), 15 pcs. (2nd year), 34,020 pcs. (3rd year), 60,480 pcs. (4th year), 75,600 pcs. (5th year)

- **Previous model**
  - 27 pcs. (1st year), 30,240 pcs. (2nd year), 45,360 pcs. (3rd year), 60,480 pcs. (4th year), 102,060 pcs. (5th year)
Improved workability

For the NH5000 DCG, we have installed features throughout the machine to improve operability based on the complete operator-centered concept.

**Setup station**

With excellent access to the table and a wide door opening, setup operations such as fixture adjustment can be done smoothly.

- **Distance from pallet**
  - 190 mm (7.5 in.)

- **Height of pallet top surface**
  - 1,200 mm (47.2 in.)

- **Door opening**
  - 860 mm (33.9 in.)*

*For the automatic door specification, the door opening is 845 mm (33.3 in.).

**Maintenance**

For the NH5000 DCG, maintenance is improved by placing the oil chiller, hydraulic unit, and pneumatic instruments all in one place and offering better accessibility to operators.

**Centralized layout of devices**

**Replacement of spindle unit**

By changing the spindle unit to a cartridge, which even includes the rear bearings, we have dramatically reduced replacement time.
Peripheral equipment

**Chip conveyor**
The center conveyor discharges chips directly outside the machine, offering both outstanding chip disposal and space savings.

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Workpiece material and chip size</th>
<th>○: Suitable</th>
<th>×: Not suitable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steel</td>
<td>Cast iron</td>
<td>Aluminum/non-ferrous metal</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Short</td>
<td>Powdery</td>
</tr>
<tr>
<td>Scaper type+drum filter type</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hinge type+drum filter type</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

- Chip size guidelines:
  - Short: chips 50 mm (2.0 in.) or less in length, bundles of chips ≤ 40 mm (≤ 1.6 in.) or less
  - Long: bigger than the above

- The options table shows the general options when using coolant. Changes may be necessary if you are not using coolant, or depending on the amount of coolant, compatibility with machines, or the specifications required.

- Please select a chip conveyor to suit the shape of your chips. When using special or difficult-to-cut material (chip hardness HRC45 or higher), please consult with our sales representative.

- Chip conveyors are available in various types for handling chips of different shape and material. For details, please consult with our sales representative.

**Chip disposal groove (setup station)**
A chip disposal groove is also included on the setup station.

**Shower coolant**
As well as preventing chips from scattering during machining, this allows them to fall smoothly into the center conveyor.

- When using shower coolant, it is used at the same time as spindle coolant.

**Semi dry unit**
Supplies air and oil mist to the cutting tip. An environmentally friendly device which reduces oil consumption. We recommend using this unit together with a mist collector.

- Consultation is required
Peripheral equipment

Through-spindle coolant system

The through-spindle coolant system effectively eliminates chips, cooling the machine point and lengthening the lives of your tools.

| Tool breakage detection system (magazine) |

The tool breakage detection unit at the waiting pot position will detect any tool breakage in the magazine. The tool length is not measured inside the machine, so it has no effect on the operating rate.

Automatic measurement

In-machine measuring system (spindle)

Automatic measurement + Manual measurement functions

Manual measurement applications can be added to the automatic measurement function.
Fixture interface

Auto-coupler fixture interface
Easily transfer the pallets between the setup station and the work area and avoid external hoses and couplers.

Compressed air is supplied to the setup station. Hydraulic fluid is supplied to both the setup station and the machining table.

- Hydraulic fluid is supplied to the machining table through two ports that diverge from one circuit.

Auto-coupler
High pressure can be used with the anti-rising mechanism.

- Setup station: 8 ports
- Machining table: 2 ports

- Includes two extra ports.
- Hydraulic fluid is supplied to the machining table through two ports that diverge from one circuit.

Check list (for hydraulic/pneumatic fixtures)

- Pressure source
  - Hydraulic
  - Pneumatic
- Supplied pressure _____ MPa
- No. of circuits
  - Hydraulic: _____
  - Pneumatic: _____
- For workpiece holding detection: _____

Others
- Clamp check system
- Fixture chip wash
- Fixture air blow system

Custom fixture interfaces are available for connecting any fixture, either part time or full time

Eco-friendly design

Reduced consumption of lubricating oil

- Oil-bath ATC
An oil-bath design has been integrated into the ATC unit design. Compared with conventional oil drip designs, the amount of lubricating oil used has been radically reduced.

Power-saving function

- Automatic sleep function
If the keyboard is not touched after a certain amount of time and NC operation is not being performed, power is cut off to the servo motor, the spindle, the coolant pump and the chip conveyor, thereby saving energy.

- Automatic machine light function
If the operation panel is not touched for a certain amount of time, the interior light automatically turns off. This saves energy and lengthens the life of the machine lights.

Energy-saving settings screen

Option
Peripheral equipment

Transfer systems

The versatile systems resolve production issues.

CPP system (Carrier Pallet Pool System)

With its simple construction provided in predefined packages, this system is easy to introduce. For the system configuration, the customer can select from 8 packages to provide the optimum specifications for their needs.

Controller
- Handy controller (Standard features)
- MCC-LPS III is installed in the specialized cell controller and MCC-TMS can be installed in the controller and your PC.
- When the number of machines or workpiece setup stations is two or more, the MCC-LPS III is required.
- For models and systems, please consult with our sales representative.

LPP system (Linear Pallet Pool System)

This system can be equipped with multi-level pallet racks, providing a high level of automation. The system construction can also be customized however you wish, achieving the optimum productivity and operation rate.

Controller
- MCC-LPS III (Standard features)

Applications

Linear Pallet Pool Control System

MCC-LPS III
- Easy operation / management of the pallet transfer system.
- Machining programs can be managed and automatically downloaded.
- Able to flexibly change production priority in response to urgent requests.

The Tool Management System

MCC-TMS
- Improves the system operating rate through highly efficient, centralized tool management.
- Compatible with ID tags.
- Compatible with tool presetter interface.
- MCC-LPS III is installed in the specialized cell controller and MCC-TMS can be installed in the controller and your PC.
Selected peripherals with superior quality, performance and maintainability.

The DMQP program is designed to certify peripherals that meet DMG MORI standards in quality, performance and maintainability. DMQP provides customers with even greater peace of mind.

Comprehensive support with machine + peripherals

DMG MORI provides comprehensive support, from proposal to delivery and maintenance, for high-quality peripherals that offer superior performance and maintainability.

Examples of qualified products (NH5000 DCG)

- **Through-spindle coolant system**
  Coolant is supplied to the tool tip through the center of the tool and spindle.

- **Coolant chiller**
  It cools down coolant to offer better cutting performance and minimize thermal displacement in the workpiece.

- **Mist collector**
  It removes mist, smoke, etc. generated inside the machine.

- **Chip bucket**
  Chips discharged from the chip conveyor are collected into this bucket.

- **Electrical cabinet chiller**
  This prevents temperature rise and dew condensation inside the electrical cabinet.

- **Refrigerating type air dryer**
  This unit removes moisture contained in the compressed air supplied by the compressor, preventing moisture-related problems in the pneumatic equipment.

- **CPP**
  This is a workpiece transfer system with the packaged system configuration that can be easily introduced at your factory.

- **LPP**
  This is a workpiece transfer system that can be freely customized for high-level automation.

- **Tool wagon**

- **Tool cabinet**

- **Basic tooling kit**

- **Advantages of DMQP**
  - Qualified peripherals are arranged by DMG MORI
  - Toll-free phone support is available 24 hours a day, 365 days a year (Japan only)

**For more details on DMQP items, please contact our sales representative.
MAPPS IV
High-Performance Operation System
for Machining Centers

High-performance operation system that pursues ease of use, and combines the best hardware in the industry with the advanced application/network systems.

▶ Outstanding operability thanks to upgraded hardware
▶ Cutting-edge functions for easier setup and maintenance
▶ Various types of monitoring, including internal monitoring, are possible on the screen (option)
▶ In the event of trouble, DMG MORI’s remote maintenance service solves it smoothly

Outstanding operability

Vertical soft-keys
Vertical soft-keys are arranged on the left and right sides of the screen. The vertical soft-keys can be used as option buttons or shortcut keys to which you can assign your desired screens and functions, allowing you to quickly display the screen you want.

Keyboard
A PC-type keyboard is used as standard, making key input easy. A keyboard with a conventional key layout is also available as an option.

Advanced hardware

Reduction of drawing time
Shorter drawing time was achieved thanks to increased CPU performance.

MAPPS III 68 sec.
MAPPS IV 45 sec.

Approx. Reduced by 33%

* The reduction rate differs depending on the program.

Main specifications

Main memory 2 GB
User area 6 GB

Interface
- USB 2.0 3 ports
  (Screen side: 2, Bottom of operation panel: 1)
- LAN 1 port (1000BASE-T)
- RS-232-C port

Soft-keys
Left/right 12 keys Bottom 12 keys

Improved ease of setup

File display and Memo function
Data necessary for setups such as operating instructions, drawing data and text data can be viewed on MAPPS. Text data is editable.

Viewable file types
- PDF
- TXT (Editable)
- Any file that can be displayed with Internet Explorer is available

Fixed-point in-machine camera
Images taken by cameras installed inside/outside the machine can be viewed on the programming screen. This function is useful for maintenance.

Examples of camera locations
- Inside machine (to check machining)
- Tool magazine (to check cutting tools)
- Chip bucket (to check chip accumulation)

Consultation is required

Improved work efficiency

APC schedule operation function
Operation schedule of the APC can be controlled through MAPPS. The ability to set various schedules supports unmanned continuous operation. This function can also handle changes to machining schedules flexibly.

 MAPPS: Mori Advanced Programming Production System
**Conversational automatic programming**

This function allows users to create programs simply by following the guidance on the screen. Much of the programming process has been simplified due to the minimal key entry required for even the most complex shapes.

**Application System**

**MORI Automatic Programming System for Machining Center**

**MORI-APM**

MORI-APM are application systems which let you create machining programs easily on your PC.

1. **Simple programming**
   - **(Conversational automatic programming)**
     - Easy operation by simply inputting product shapes according to the screen guidance.

2. **Reduce programming time**
   - **(Supporting complicated programming)**
     - Simply enter the machining shape using conversational automatic programming and the machine automatically selects the necessary tools and cutting conditions.

3. **Save costs**
   - **(Compatibility with the MAPPS conversational function)**
     - Prepared conversational programs can be converted into NC programs with MAPPS. Cutting conditions can also be changed on MAPPS.

*The photo shown may differ from actual machine.*

*Information about the screen is current as of June 2018.*
This is an application which allows you to remotely operate and view the MAPPS screens from your office computer. This enables high-speed transfer of programming data between your office computer and machine, reducing the lead time of pre-machining processes.

### DMG MORI’s software Line-up

#### Remote Maintenance/Machine Operation Monitoring Service

**MORI-NET Global Edition Advance**

- **Features**
  - Remote maintenance service by DMG MORI Service Center
  - Internet-based, high speed (max. 1 Gbps), large capacity network
  - No server installation is required — reduction in initial cost
  - Download various data from the server located at DMG MORI

- **Remote alarm support**
  - When an alarm goes off, an alarm notification will be sent to the DMG MORI Service Center simply by pressing the “Send e-mail” button on MAPPS.
  - DMG MORI service personnel will remotely diagnose the cause of the problem, and quickly provide solutions for machine recovery.

- **Features**
  - This service may not be available in some areas. Please contact our sales representative for details.

#### Machine Operation Monitoring System

**DMG MORI MESSENGER**

- **Features**
  - Intra-corporate network system
  - Up to 30 machines can be connected with one server
  - The operating status of your machines can be centrally managed in real time

#### Application for Data Transmission

**MORI-SERVER**

This enables high-speed transfer of programming data between your office computer and machine, reducing the lead time of pre-machining processes.

#### MAPPS Screen Remote Control and Browsing Application

**MORI-MONITOR**

This is an application which allows you to remotely operate and view the MAPPS screens from your office computer.
Advanced Communication Technology (ACT) connects machine tool and peripheral devices

DMG MORI’s new proposal, ACT, is designed to strengthen connections between machine tools and peripheral equipment by standardizing communication and software of the entire system. With ACT, standardization of interfaces of peripherals, simplified wiring, and labor saving can be achieved.

Industrial Network for Peripheral Equipment Control

MAPPS EtherNet/IP I/F

This industrial network using the standard Ethernet (TCP/IP) offers high speed and reliable connection. Simple Plug and Play connections, which are made available just by connecting to the hub through MAPPS, enable you to build a system easily. The use of standard cables also helps to reduce costs.

- **Features**
  - Connections between a machine and peripheral equipment become easy because standard LAN cables are used
  - Thanks to increased versatility, your peripheral equipment can be used even when the machine tools are replaced by new ones
  - Reliability is significantly increased by reducing the number of I/O cables

- **Features**
  - Easy system construction
  - Connection with existing devices
  - Inexpensive devices

Communication Interface for Monitoring Machine Operation

MAPPS MTConnect I/F

MTConnect, which was introduced by the Association for Manufacturing Technology (AMT) in 2008, is a new XML (Extensible Markup Language) based communication protocol that offers an open interface. This interface allows you to build a system to monitor the operating status of your machines.

- **Features**
  - Open communication interface allows you to access to your company’s system
  - This makes it possible for you to build a system to monitor the operating status of your machines via the Internet

- **Application examples**
  - Your machines are displayed all at once, allowing you to quickly call up the machine you wish to check.
  - Operating status can be checked in real time.
  - You can check the operating history on the Gantt chart screen.

- A server and application must be prepared by the customer.
- For introduction of MTConnect, separate consultation is required.
Tool restrictions

**NH5000 DCG/40**

**40-tool specifications (chain-type)/60-, 120-tool specifications (chain-type)**

With adjacent tools <max. tool diameter: 70 (2.7)>  
Without adjacent tools <max. tool diameter: 140 (5.5)>

\[ \text{Do not use the pots marked with "×", because they cause interference.} \]

<table>
<thead>
<tr>
<th>Tool restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of tool shank</td>
</tr>
<tr>
<td>Max. tool length mm (in.)</td>
</tr>
<tr>
<td>Max. tool diameter mm (in.)</td>
</tr>
<tr>
<td>Tool limitation A mm (in.)</td>
</tr>
<tr>
<td>Tool limitation B mm (in.)</td>
</tr>
<tr>
<td>Max. tool mass kg (lb.)</td>
</tr>
<tr>
<td>Max. tool mass moment N·m (ft·lbf)</td>
</tr>
</tbody>
</table>

**180-tool specifications (rack-type)**

Column 1, 2, 3, 4  
<the tool of the # 70 mm (#2.7 in.) or less can be stored>

Column 5, 6  
<the tool of the # 140 mm (#5.5 in.) or less can be stored>

\[ \text{If you attach a tool with a diameter larger than # 70 mm (#2.7 in.) in the 5th or 6th column in the rack, you may not be able to attach tools to the adjacent tool pots.} \]

**Option**

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP 23</td>
</tr>
<tr>
<td>NH5000 DCG</td>
</tr>
</tbody>
</table>
Tool restrictions

240-tool specifications (rack-type)

Column 1, 2, 3, 4, 5, 6, 7
<the tool of the Φ 70 mm (Φ 2.7 in.) or less can be stored>

Column 8
<the tool of the Φ 140 mm (Φ 5.5 in.) or less can be stored>

<table>
<thead>
<tr>
<th>Tool restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of tool shank</td>
</tr>
<tr>
<td>Max. tool length (mm/in.)</td>
</tr>
<tr>
<td>Max. tool diameter (mm/in.)</td>
</tr>
<tr>
<td>Tool limitation A (mm/in.)</td>
</tr>
<tr>
<td>Tool limitation B (mm/in.)</td>
</tr>
<tr>
<td>Max. tool mass (kg/lb.)</td>
</tr>
<tr>
<td>Max. tool mass moment (N·m/ft·lbf)</td>
</tr>
</tbody>
</table>

- If you attach a tool with a diameter larger than Φ 70 mm (Φ 2.7 in.) in the 8th column in the rack, you may not be able to attach tools to the adjacent tool pots.

300-tool specifications (rack-type)

Column 1–9
<the tool of the Φ 70 mm (Φ 2.7 in.) or less can be stored>

Column 10
<the tool of the Φ 140 mm (Φ 5.5 in.) or less can be stored>

<table>
<thead>
<tr>
<th>Tool restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of tool shank</td>
</tr>
<tr>
<td>Max. tool length (mm/in.)</td>
</tr>
<tr>
<td>Max. tool diameter (mm/in.)</td>
</tr>
<tr>
<td>Tool limitation A (mm/in.)</td>
</tr>
<tr>
<td>Tool limitation B (mm/in.)</td>
</tr>
<tr>
<td>Max. tool mass (kg/lb.)</td>
</tr>
<tr>
<td>Max. tool mass moment (N·m/ft·lbf)</td>
</tr>
</tbody>
</table>

- If you attach a tool with a diameter larger than Φ 70 mm (Φ 2.7 in.) in the 10th column in the rack, you may not be able to attach tools to the adjacent tool pots.
### NH5000 DCG/40

**360-tool specifications (rack-type)**

<table>
<thead>
<tr>
<th>Tool restrictions</th>
<th>Type of tool shank</th>
<th>BT40</th>
<th>CAT40</th>
<th>DIN40</th>
<th>HSK-A63</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. tool length</td>
<td>mm (in.)</td>
<td>500</td>
<td>19.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter</td>
<td>mm (in.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With adjacent tools:</td>
<td>70 (2.7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without adjacent tools:</td>
<td>140 (5.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool limitation A</td>
<td>mm (in.)</td>
<td>32 (1.3)</td>
<td>34.025 (1.347)</td>
<td>35 (1.4)</td>
<td>42 (1.7)</td>
</tr>
<tr>
<td>Tool limitation B</td>
<td>mm (in.)</td>
<td>63 (2.5)</td>
<td>44.45 (1.75)</td>
<td>50 (2.0)</td>
<td>53 (2.1)</td>
</tr>
<tr>
<td>Max. tool mass</td>
<td>kg (lb.)</td>
<td>12 (28.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool mass moment</td>
<td>N m (ft lbf)</td>
<td>7.84 (5.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- If you attach a tool with a diameter larger than $\#70$ mm (2.7 in.) in the 12th column in the rack, you may not be able to attach tools to the adjacent tool pots.

### NH5000 DCG/50

**54-tool specifications (chain-type)**

With adjacent tools: *max. tool diameter: 110 (4.3)*

Without adjacent tools: *max. tool diameter: 220 (8.6)*

Without adjacent tools: *max. tool diameter: 300 (11.8)*

- Do not use the pots marked with "x", because they cause interference.

---

**Type of tool shank**
- BT40
- CAT50
- DIN40
- HSK-A63
- HSK-A100

**Max. tool length**
- 500 (19.6)

**Max. tool diameter**
- With adjacent tools: 70 (2.7)
- Without adjacent tools: 140 (5.5)
- With adjacent tools: 110 (4.3)
- Without adjacent tools: 220 (8.6), 300 (11.8)

**Tool limitation A**
- With adjacent tools: 38 (1.5)
- Without adjacent tools: 38 (1.5), 38 (1.5), 45 (1.8)

**Tool limitation B**
- With adjacent tools: 100 (3.9)
- Without adjacent tools: 69.85 (2.75), 69.85 (2.75), 85 (3.3)

**Max. tool mass**
- 30 (66)

**Max. tool mass moment**
- 29.4 (21.6)
Tool restrictions

NH5000 DCG/50

100-tool specifications (rack-type) [G5]

Column 1, 2
<the tool of the $\Phi$ 110 mm ($\Phi$ 4.3 in.) or less can be stored>

Column 3, 4, 5
<the tool of the $\Phi$ 150 mm ($\Phi$ 5.9 in.) or less can be stored>

Column 6
<the tool of the $\Phi$ 300 mm ($\Phi$ 11.8 in.) or less can be stored>

140-tool specifications (rack-type) [G5]

Column 1, 2, 3, 4
<the tool of the $\Phi$ 110 mm ($\Phi$ 4.3 in.) or less can be stored>

Column 5, 6, 7
<the tool of the $\Phi$ 150 mm ($\Phi$ 5.9 in.) or less can be stored>

Column 8
<the tool of the $\Phi$ 300 mm ($\Phi$ 11.8 in.) or less can be stored>

Tool restrictions

<table>
<thead>
<tr>
<th>Type of tool shank</th>
<th>BT50</th>
<th>CAT50</th>
<th>DIN50</th>
<th>HSK-A100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. tool length mm (in.)</td>
<td>500 (19.6)</td>
<td>350 (13.8)</td>
<td>380 (15)</td>
<td>450 (17.7)</td>
</tr>
<tr>
<td>Max. tool diameter mm (in.)</td>
<td>300 (11.8)</td>
<td>69.85 (2.75)</td>
<td>69.85 (2.75)</td>
<td>85 (3.3)</td>
</tr>
<tr>
<td>Tool limitation A mm (in.)</td>
<td>38 (1.5)</td>
<td>38 (1.5)</td>
<td>38 (1.5)</td>
<td>45 (1.8)</td>
</tr>
<tr>
<td>Tool limitation B mm (in.)</td>
<td>100 (3.9)</td>
<td>69.85 (2.75)</td>
<td>69.85 (2.75)</td>
<td>85 (3.3)</td>
</tr>
<tr>
<td>Max. tool mass kg (lb.)</td>
<td>30 (66)</td>
<td>30 (66)</td>
<td>30 (66)</td>
<td>30 (66)</td>
</tr>
<tr>
<td>Max. tool mass moment N·m (ft·lbf)</td>
<td>29.4 (21.6)</td>
<td>29.4 (21.6)</td>
<td>29.4 (21.6)</td>
<td>29.4 (21.6)</td>
</tr>
</tbody>
</table>

Column 3, 4, 5
<the tool of the $\Phi$ 150 mm ($\Phi$ 5.9 in.) or less can be stored>

Column 6
<the tool of the $\Phi$ 300 mm ($\Phi$ 11.8 in.) or less can be stored>

If you attach a tool with a diameter larger than $\Phi$ 110 mm ($\Phi$ 4.3 in.) in the 3rd, 4th, 5th or 6th column in the rack, you may not be able to attach tools to the adjacent tool pots.

If you attach a tool with a diameter larger than $\Phi$ 110 mm ($\Phi$ 4.3 in.) in the 5th, 6th, 7th or 8th column in the rack, you may not be able to attach tools to the adjacent tool pots.
180-tool specifications (rack-type)

Column 1, 2, 3, 4, 5, 6
<the tool of the #110 mm (#4.3 in.) or less can be stored>

Column 7, 8
<the tool of the #150 mm (#5.9 in.) or less can be stored>

Column 9, 10
<the tool of the #300 mm (#11.8 in.) or less can be stored>

240-tool specifications (rack-type)

Column 1–16
<the tool of the #110 mm (#4.3 in.) or less can be stored>

Column 2
<six tool of the #150 mm (#5.9 in.) or less can be stored>

Column 1
<eight tool of the #200 mm (#7.8 in.) or less can be stored>

Column 15, 16
<nine tool of the #300 mm (#11.8 in.) or less can be stored>

Tool restrictions

<table>
<thead>
<tr>
<th>Type of tool shank</th>
<th>BT50</th>
<th>CAT50</th>
<th>DIN50</th>
<th>HSK-A100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. tool length   (mm)</td>
<td>500 (19.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter (mm)</td>
<td>300 (11.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool limitation A (mm)</td>
<td>38 (1.5)</td>
<td>38 (1.5)</td>
<td>38 (1.5)</td>
<td>45 (1.8)</td>
</tr>
<tr>
<td>Tool limitation B (mm)</td>
<td>100 (3.9)</td>
<td>69.85 (2.75)</td>
<td>69.85 (2.75)</td>
<td>85 (3.3)</td>
</tr>
<tr>
<td>Max. tool mass (kg)</td>
<td>30 (66)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool mass moment (N·m) from spindle gauge line</td>
<td>29.4 (21.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- If you attach a tool with a diameter larger than #110 mm (#4.3 in.) in the 7th, 8th, 9th or 10th column in the rack, you may not be able to attach tools to the adjacent tool pots.

- If you attach a tool with a diameter larger than #110 mm (#4.3 in.) in the 1st, 2nd, 15th or 16th column in the rack, you may not be able to attach tools to the adjacent tool pots.
**NH5000 DCG/40**

**[Standard]**
- Max. spindle speed: 14,000 min\(^{-1}\)
- Spindle drive motor: 37/22 kW (50/30 HP) (high-speed winding side)
- Max. spindle torque: 303 N\(\cdot\)m (223.5 ft\(\cdot\)lbf) <10%ED>

**[High speed]**
- Max. spindle speed: 20,000 min\(^{-1}\)
- Spindle drive motor: 18.5/15/11 kW (24.7/20/15 HP) (high-speed winding side)
- Max. spindle torque: 81 N\(\cdot\)m (59.7 ft\(\cdot\)lbf) <10%ED>

**NH5000 DCG/50**

**[Standard]**
- Max. spindle speed: 8,000 min\(^{-1}\)
- Spindle drive motor: 30/22 kW (40/30 HP) <30 min/cont> (high-speed winding side)
- Max. spindle torque: 302 N\(\cdot\)m (222.7 ft\(\cdot\)lbf) <15%ED>

**[High speed]**
- Max. spindle speed: 15,000 min\(^{-1}\)
- Spindle drive motor: 30/22 kW (40/30 HP) <30 min/cont> (high-speed winding side)
- Max. spindle torque: 302 N\(\cdot\)m (222.7 ft\(\cdot\)lbf) <15%ED>

**[High torque]**
- Max. spindle speed: 8,000 min\(^{-1}\)
- Spindle drive motor: 30/25 kW (40/33.3 HP) <30 min/cont> (high-speed winding side)
- Max. spindle torque: 600 N\(\cdot\)m (442.5 ft\(\cdot\)lbf) <15%ED>

---

*Please use a two-face contact tool when using a No. 40 taper spindle at 15,000 min\(^{-1}\) or higher, or a No. 50 taper spindle at 10,000 min\(^{-1}\) or higher.*
Specifications

Standard & optional features

Coolant

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH8000 DCQ/DCI</td>
<td>NH8000 DCQ/DCI</td>
</tr>
<tr>
<td>Oil-base drill coolant system</td>
<td>Oil-base drill coolant system</td>
</tr>
<tr>
<td>Oil mist system</td>
<td>Oil mist system</td>
</tr>
<tr>
<td>Through-spindle coolant system (separate type)</td>
<td>Through-spindle coolant system (separate type)</td>
</tr>
<tr>
<td>Through-spindle coolant system*</td>
<td>Through-spindle coolant system*</td>
</tr>
<tr>
<td>Through-spindle coolant system*</td>
<td>Through-spindle coolant system*</td>
</tr>
<tr>
<td>Coolant chiller (separate type)</td>
<td>Coolant chiller (separate type)</td>
</tr>
<tr>
<td>Coolant chiller (through-spindle coolant system)</td>
<td>Coolant chiller (through-spindle coolant system)</td>
</tr>
</tbody>
</table>

Chip disposal

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chip conveyor (single construction)</td>
<td>Chip conveyor (single construction)</td>
</tr>
<tr>
<td>Chip hopper</td>
<td>Chip hopper</td>
</tr>
<tr>
<td>Air blow</td>
<td>Air blow</td>
</tr>
</tbody>
</table>

Measurement

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch sensor</td>
<td>Touch sensor</td>
</tr>
<tr>
<td>Touch sensor+tool setter function</td>
<td>Touch sensor+tool setter function</td>
</tr>
<tr>
<td>Touch sensor+tool setter function</td>
<td>Touch sensor+tool setter function</td>
</tr>
<tr>
<td>Tool breakage detection system (spindle)</td>
<td>Tool breakage detection system (spindle)</td>
</tr>
</tbody>
</table>

Improved accuracy

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full closed loop control (scale feedback)</td>
<td>Full closed loop control (scale feedback)</td>
</tr>
<tr>
<td>Oil chiller</td>
<td>Oil chiller</td>
</tr>
</tbody>
</table>

Automation

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto power off</td>
<td>Auto power off</td>
</tr>
<tr>
<td>Ethernet/IP interface</td>
<td>Ethernet/IP interface</td>
</tr>
<tr>
<td>Touch interface</td>
<td>Touch interface</td>
</tr>
<tr>
<td>Touch interface</td>
<td>Touch interface</td>
</tr>
</tbody>
</table>

Pallet pools

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPP (Carrier Pallet Pool)</td>
<td>SPP (Carrier Pallet Pool)</td>
</tr>
<tr>
<td>Vertical (6, 7, 9, 11 pallets)</td>
<td>Vertical (6, 7, 9, 11 pallets)</td>
</tr>
<tr>
<td>LPP (Linear Pallet Pool)</td>
<td>LPP (Linear Pallet Pool)</td>
</tr>
</tbody>
</table>

Other

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door interlock system</td>
<td>Door interlock system</td>
</tr>
<tr>
<td>Door interlock system</td>
<td>Door interlock system</td>
</tr>
<tr>
<td>Door interlock system</td>
<td>Door interlock system</td>
</tr>
<tr>
<td>- Low air pressure detecting switch</td>
<td>- Low air pressure detecting switch</td>
</tr>
<tr>
<td>- Low hydraulic pressure detecting switch</td>
<td>- Low hydraulic pressure detecting switch</td>
</tr>
<tr>
<td>Tool breakage detection system</td>
<td>Tool breakage detection system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N8000 DCQ/DCI</th>
<th>N8000 DCQ/DCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal M-code</td>
<td>Internal M-code</td>
</tr>
<tr>
<td>Manual power generator</td>
<td>Manual power generator</td>
</tr>
<tr>
<td>Oil chiller</td>
<td>Oil chiller</td>
</tr>
<tr>
<td>Storage box for manual</td>
<td>Storage box for manual</td>
</tr>
<tr>
<td>Multi dry filter</td>
<td>Multi dry filter</td>
</tr>
</tbody>
</table>

Through-spindle coolant system (separate type) | Through-spindle coolant system (separate type) |

<table>
<thead>
<tr>
<th>Discharge pressure</th>
<th>Side through</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPa (psi)</td>
<td>MPa (psi)</td>
</tr>
<tr>
<td>1.5 (217.5)</td>
<td>1.5 (217.5)</td>
</tr>
<tr>
<td>3.5 (507)</td>
<td>3.5 (507)</td>
</tr>
<tr>
<td>7.0 (1,015)</td>
<td>7.0 (1,015)</td>
</tr>
</tbody>
</table>

Flammable coolant such as oil-based coolant has a high risk of ignition, and will cause fire or machine breakage if ignited. If you have to use a flammable coolant for any reason, please be sure to consult our sales representative.
**Specifications**

**Numerical control unit specifications F31iB, F31iB5**

- **Controlled axis**
  - X (X2), Y, Z, B
  - Simultaneously controlled axes: F31iB: 4 axes, F31iB5: 5 axes
  - Load input increment: 0.001 mm (0.0001 in.)
  - Max. command value: +99999.9999 mm (+99999.9999 in.)
  - Stroke limit check before movement
  - Software damper
  - Load monitor function C: Soft key type
  - Programming resolution multiplied by 1/1000: 0.0001 mm (0.00001 in.)

- **Operation**
  - Sequence number comparison and stop
  - Program restart
  - Tool retract and recovery
  - Manual handle interruption
  - Manual tool selection without tool (the arbor with the overload torque detection function must be attached)

- **Interpolation functions**
  - Linear interpolation
  - Helical interpolation
  - External high-speed interpolation (installation of high-speed spindle terminal)
  - Cylindrical interpolation
  - Involute interpolation
  - Spiral interpolation
  - Smooth interpolation
  - Threading, synchronous cutting/Feed per revolution
  - 3rd, 4th reference position return
  - Tool spindle Cs control (confirmation of tool position is required if tool spindle machining or tool changing needs to be performed)

- **Feed functions**
  - Rapid traverse override: 100/10/15/100%
  - Tangential speed constant control
  - Feedrate override: 0~200% (10% increments)
  - Override cancel
  - AI contour control II
  - AI contour control III
  - One-digit F code feed: F1 to F9
  - Small-hole peak drilling cycle

- **Miscellaneous function/Spindle speed function**
  - Spindle speed override: 50~200% (10% increments)
  - Spindle orientation
  - Synchronous tapping

- **Registerable programs <in total>**

<table>
<thead>
<tr>
<th>Part program storage length &lt;in total&gt;</th>
<th>Registerable programs &lt;in total&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without expansion &lt;programs&gt;</td>
<td>Expansion 1 &lt;programs&gt;</td>
</tr>
<tr>
<td>128 KB &lt;320 m (1,950 ft)&gt;</td>
<td>63</td>
</tr>
<tr>
<td>256 KB &lt;640 m (2,190 ft)&gt;</td>
<td>1,000</td>
</tr>
<tr>
<td>512 KB &lt;1,280 m (4,200 ft)&gt;</td>
<td>2,000</td>
</tr>
<tr>
<td>1 MB &lt;3,560 m (8,400 ft)&gt;</td>
<td></td>
</tr>
<tr>
<td>2 MB &lt;8,120 m (16,800 ft)&gt;</td>
<td></td>
</tr>
<tr>
<td>4 MB &lt;16,240 m (33,600 ft)&gt;</td>
<td></td>
</tr>
<tr>
<td>8 MB &lt;28,480 m (57,200 ft)&gt;</td>
<td></td>
</tr>
</tbody>
</table>

- **Program input**
  - Program number: 4 digits
  - Absolute/Incremental programming: G90/G91
  - Decimal point programming: Decimal point programming or electronic calculator type decimal point programming can be set using parameters
  - Plane selection: G17, G18, G19
  - Programmable data input: G10
  - Sub-program call: Up to 10 nestings
  - Custom macro
  - Custom macro common variables: #100 to #149, #500 to #549
  - Hole machining canned cycle: G85, G69
  - FTS format
  - Additional workplace coordinate systems: 48 sets
  - Additional of optional block skip: Soft key type (2~9)

- **Tool function/Tool offset function**
  - Tool function (T function)
  - Tool offset (G function)
  - Tool offset data memory C
  - Tool length compensation: G43, G44, G49
  - Cutter radius offset
  - Tool length measurement
  - 3-D tool compensation
  - Additional number of tool offsets: 99 sets (500 sets if the number of selectable tool offsets depends on the tool storage capacity)

- **Editing**
  - Expanded program editing
  - Background editing
  - Playback
  - Machining time stamp
  - Undone/Redo function
  - Line number display

- **Status display**
  - Status display
  - Clock function
  - Current position display
  - Program comment display
  - Parameter setting display
  - Alarm display
  - Alarm history display
  - Operator’s message history display
  - Operation history display
  - Running time/Parts count display
  - Actual cutting feedrate display

- **Data input/output**
  - IO interface: USB
  - Ethernet: 10/100/1000BASE-T
  - Memory card for MAPPS: CF card (4 GB/2 GB/12 MB) + ADA adapter
  - 6 GB Program storage area (for MAPPS-ONC operation function, for data backup): <MAPPS>
  - ONC operation using external memory (front USB port): Files up to 10 MB in size can be edited

- **Expansion 1 <programs>**
  - MAPPS Tool management system
  - MAPPS Tool management system + Tool IC (MAPPS software only)
  - MAPPS Tool management system + Tool ID (MAPPS software only)
  - Tool IC: made by BNG DAIKIHOKA
  - Tool ID: made by BALLUFF

- **Expansion 2 <programs>**
  - 999 sets
  - 250 sets
  - 100 sets
  - 50 sets
  - 20 sets
  - 10 sets
  - 5 sets
  - 1 set

- **Map tools**
  - Tool function (T function) 8-digit T code
  - Tool life management
  - Tool position offset: G64~G68
  - Tool life management function
  - Additional number of tools to be controlled by the tool life management function

- **Items suitable for each numerical control unit**
  - Simultaneously controlled axes: F31iB: 4 axes, F31iB5: 5 axes
  - Intermachine functions: Nano smoothing
  - Feed functions: AI contour control II
  - Tool program input: Tilted working plane command
  - Tool function/Tool offset function: Tool center point control
  - Tool offset data memory C
  - Tool length compensation: G43, G44, G49
  - Cutter radius offset
  - Tool length measurement
  - 3-D tool compensation
  - Additional number of tool offsets: 99 sets

**The information in this catalog is valid as of June 2018.**
# Machine specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>NH5000 DCG/40</th>
<th>NH8000 DCG/60</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis travel</td>
<td>mm (in.)</td>
<td>730 (28.7)</td>
</tr>
<tr>
<td>Y-axis travel</td>
<td>mm (in.)</td>
<td>730 (28.7)</td>
</tr>
<tr>
<td>Z-axis travel</td>
<td>mm (in.)</td>
<td>580 (23.0)</td>
</tr>
<tr>
<td>Distance from pallet surface to spindle center</td>
<td>mm (in.)</td>
<td>100-380 (3.9-15.0)</td>
</tr>
<tr>
<td>Distance from pallet center to spindle gauge plane</td>
<td>mm (in.)</td>
<td>100-950 (3.9-37.4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pallet</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallet working surface</td>
<td>mm</td>
<td>500×500 (19.7×19.7)</td>
</tr>
<tr>
<td>Pallet loading capacity</td>
<td>kg (lbf)</td>
<td>2-station turn-type APC: 500 (1,100) / 700 (1,540)</td>
</tr>
<tr>
<td>Max. workspace swing diameter</td>
<td>mm (in.)</td>
<td>800 (31.5) / 900 (35.4) / 8-station turn-type APC</td>
</tr>
<tr>
<td>Max. workspace height</td>
<td>mm (in.)</td>
<td>1,400 (55.1) / 900 (35.4) / 8-station turn-type APC</td>
</tr>
<tr>
<td>Minimum pallet indexing angle</td>
<td>°</td>
<td>(1°: [0.001°] at 4th axis rotary table)</td>
</tr>
<tr>
<td>Pallet indexing time</td>
<td>(including clamping and disengaging time)</td>
<td>1.07 (1.12 at 4th axis rotary table) (90°)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spindle</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. spindle speed</td>
<td>min⁻¹</td>
<td>14,000 [20,000]</td>
</tr>
<tr>
<td>Number of spindle speed ranges</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Type of spindle taper hole</td>
<td>No. 40 (H6K-46)</td>
<td>No. 50 (H6K-A100)</td>
</tr>
<tr>
<td>Spindle bearing inner diameter</td>
<td>mm (in.)</td>
<td>65 (2.6)</td>
</tr>
<tr>
<td>Spindle drive motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool mass moment (from spindle gauge line)</td>
<td>N·m (ft-lbf)</td>
<td>8.5 (1.9)</td>
</tr>
<tr>
<td>Feedrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedingrate</td>
<td>mm/min (ipm)</td>
<td>X, Y: 50,000 (1,968.5)</td>
</tr>
<tr>
<td>Max. tool mass</td>
<td>kg (lb.)</td>
<td>12 (26.4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ATC</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ATC toolchanger</td>
<td>Chain-type: Fixed address, shorter route access (Face-type: Fixed address)</td>
<td></td>
</tr>
<tr>
<td>tool-changing time</td>
<td>s</td>
<td>0.9</td>
</tr>
<tr>
<td>Tool-to-tool (chip-to-chip)</td>
<td>s</td>
<td>3.3</td>
</tr>
<tr>
<td>Tool changing</td>
<td>Chain-type: BT40 [CAT40] [DIAM40] [HSK-A63]</td>
<td></td>
</tr>
<tr>
<td>Type of tool selection</td>
<td>Chain-type: BT50 [CAT50] [DIN63] [HSK-A100]</td>
<td></td>
</tr>
<tr>
<td>Number of tool magazine</td>
<td>60 tools</td>
<td></td>
</tr>
<tr>
<td>ATC toolchanger</td>
<td>Rack-type: [180] [240] [300] [60] (1°: [60] (2°: [120])</td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter with adjacent tools</td>
<td>mm (in.)</td>
<td>140 (5.5)</td>
</tr>
<tr>
<td>Max. tool length</td>
<td>mm (in.)</td>
<td>100 (3.9)</td>
</tr>
<tr>
<td>Max. tool mass</td>
<td>kg (lb.)</td>
<td>100 (220)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spindle drive motor</td>
<td>kW (HP)</td>
<td>37/22 (50/30)</td>
</tr>
<tr>
<td>Feed motor</td>
<td>kW (HP)</td>
<td>1.8 (2.4)</td>
</tr>
<tr>
<td>Power sources &lt;standard&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical power supply</td>
<td>kW</td>
<td>12.1 (26.3)</td>
</tr>
<tr>
<td>Coolant system</td>
<td>kW</td>
<td>2.2 (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>APC</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of pallets</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Pallet changing time</td>
<td>s</td>
<td>2 (3)</td>
</tr>
<tr>
<td>Pallet changing time (including clamping and disengaging time)</td>
<td>s</td>
<td>2 (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Machine size</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine height</td>
<td>mm (in.)</td>
<td>3,138 (123.5)</td>
</tr>
<tr>
<td>Floor space</td>
<td>mm (in.)</td>
<td>2,725.4 × 810 (107.3 × 32.0)</td>
</tr>
<tr>
<td>Mass of machine</td>
<td>kg (lb.)</td>
<td>12,900 (28,380)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Noise data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A-weighted, time-averaged sound pressure level</td>
<td>dB</td>
<td>54 — 79 (measurement uncertainty is 4 dB)</td>
</tr>
</tbody>
</table>

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* Option ISD: International Organization for Standardization JIS: Japanese Industrial Standard

- When equipped with the auto-coupler, time taken to shut off/supply hydraulic pressure to the fixture is not included. The pallet changing time of the 3-station APC differs from that of the standard specification.
- Noise data: the measurement was performed at the front of the machine with a No. 40 spindle taper and a maximum spindle speed of 14,000 min⁻¹. For details, please consult our sales representative.
<Precautions for Machine Relocation>

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All contracts are subject to export permit by the Government of Japan. The Equipment is subject to export restrictions imposed by Japan and other exporting countries and the Customer will not export or permit the export of the Equipment anywhere outside the exporting country without proper government authorization.

To prevent the illegal diversion of the Equipment to individuals or nations that threaten international security, it may include a "Relocation Machine Security Function" that automatically disables the Equipment if it is moved following installation.

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+ If you have any questions regarding the content, please consult our sales representative.

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