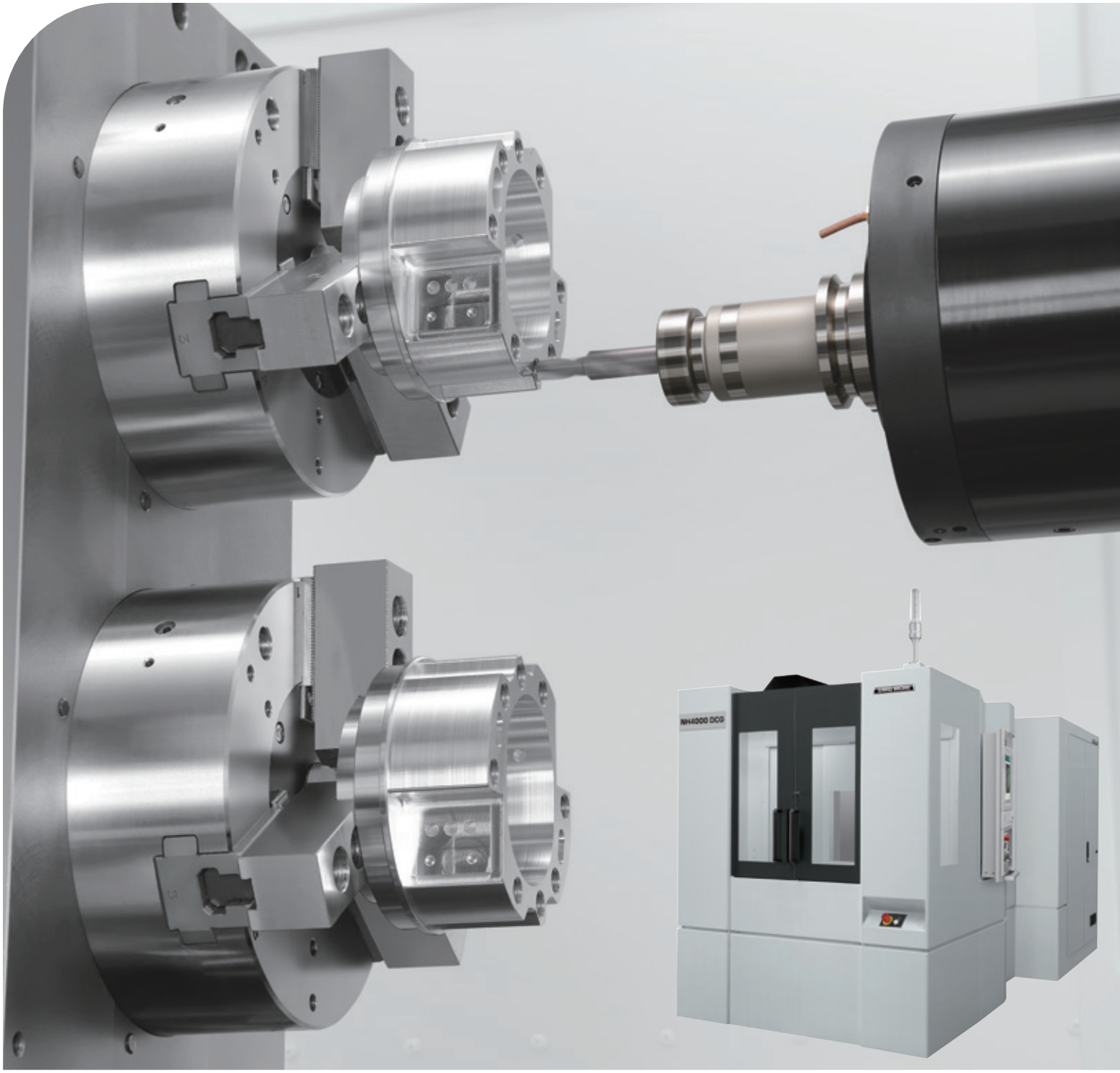
www.dmgmori.com

DMG MORI

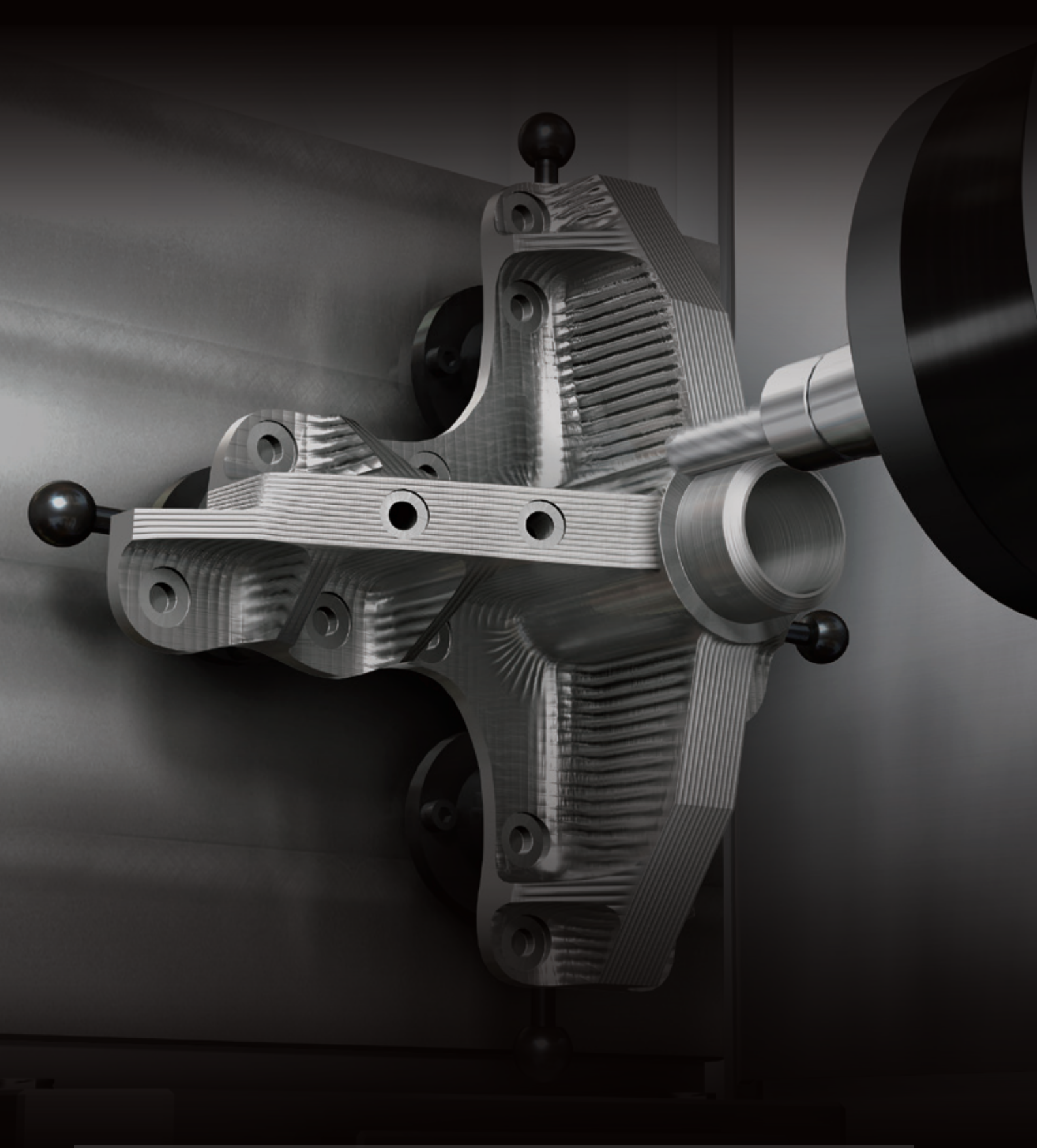
High-Precision Horizontal Machining Center

NH4000 DCG



Presenting the ideal machining center.

The NH4000 DCG is a high-precision horizontal machining center equipped with a 400 mm (15.7 in.) square pallet. It employs the DCG (Driven at the Center of Gravity) technology for vibration control and the Box-in-Box construction for excellent balance, and can achieve backlash-free rotary drive by using the optional direct drive motor. It is a high-performance machine incorporating all the features demanded of a horizontal machining center, including high speed, high precision, chip disposal and ease of maintenance, while achieving both a space saving design and a large work envelope.



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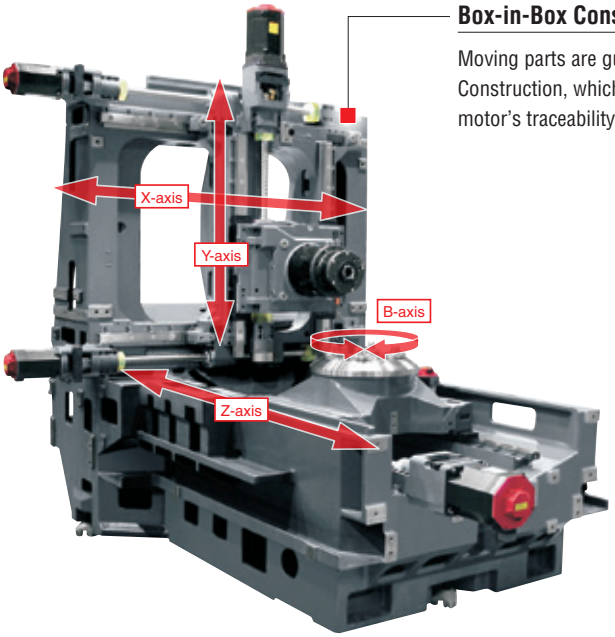
MAPPS: Mori Advanced Programming Production System
● Figures in inches were converted from metric measurements.

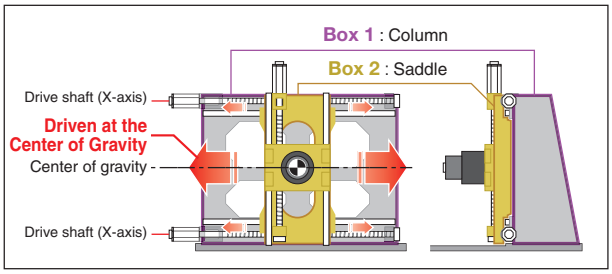
Principal mechanisms

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.



Rapid traverse rate <X, Y and Z axes>

50 m/min (1,968.5 ipm)

Cutting feedrate <X, Y and Z axes>

50 m/min (1,968.5 ipm)

Max. acceleration

Standard specifications

X-axis 0.6 G {6.0 m/s^2 (19.7 ft/s^2)}
Y-axis 0.9 G {8.3 m/s^2 (27.2 ft/s^2)}
Z-axis 0.6 G {6.3 m/s^2 (20.7 ft/s^2)}

High-acceleration specifications OP

X-axis 1.1 G {10.8 m/s^2 (35.4 ft/s^2)}
Y-axis 1.2 G {11.7 m/s^2 (38.4 ft/s^2)}
Z-axis 1.1 G {10.4 m/s^2 (34.1 ft/s^2)}

Driven at the Center of Gravity

DCG Driven at the Center of Gravity

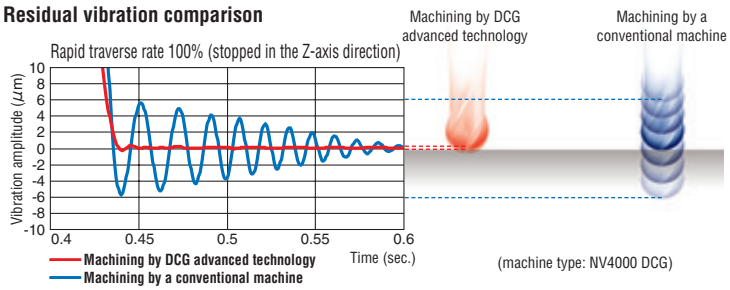
Original technology

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

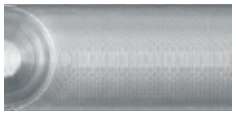
For positioning, machines with DCG virtually eliminate vibration, while machines without DCG continue to vibrate for a long time. DCG controls the rotational vibration which appears at every acceleration start point, and which is proportional to the distance between the drive point and the center of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

Residual vibration comparison



(machine type: NV4000 DCG)

Machining by DCG advanced technology



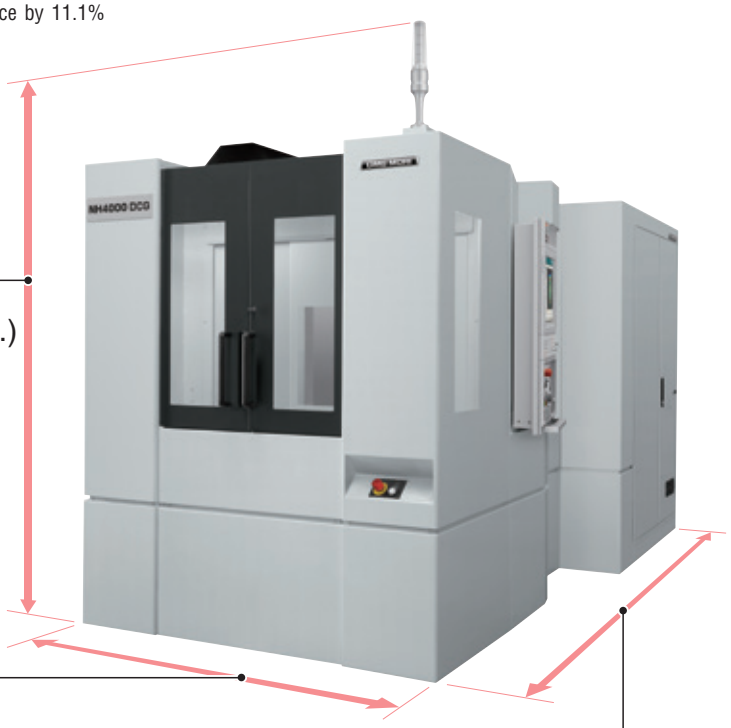
Machining by a conventional machine

Features of DCG

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

Space-saving design

Offering both space-saving design and a large work envelope, reducing the required floor space by 11.1% compared to existing machines.



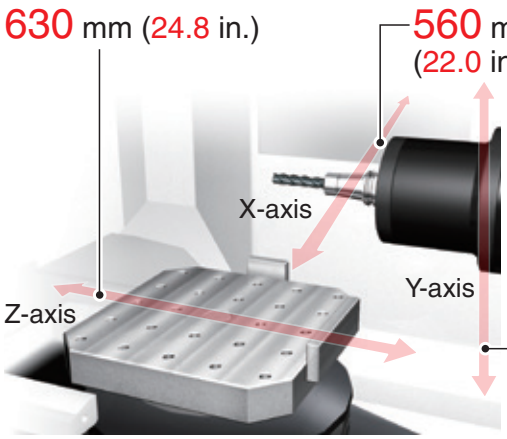
Machine height

2,711 mm (106.7 in.)

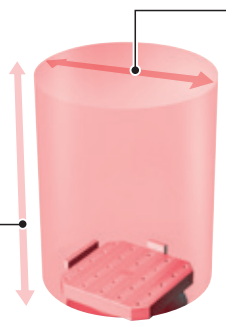
Machine width×Machine depth

2,397×4,004 mm
(94.4×157.6 in.)

Travel <X, Y and Z axes>



Working area



Max. workpiece swing diameter

630 mm (24.8 in.)

560 mm (22.0 in.) OP
<3-station turn-type APC>

Max. workpiece height

900 mm (35.4 in.)

800 mm (31.4 in.) OP
<3-station turn-type APC>

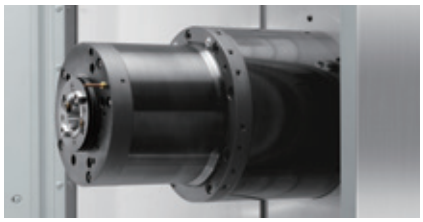
Pallet loading capacity

2-station turn-type APC: 400 kg (880 lb.)

3-station turn-type APC: 300 kg (660 lb.) OP

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.

Max. spindle speed

NH4000 DCG

14,000 min^{-1}

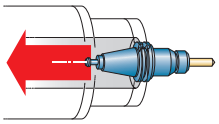
14,000 min^{-1} <high output> OP

20,000 min^{-1} <high speed> OP

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.



12,000 N
(2,697.6 lbf)

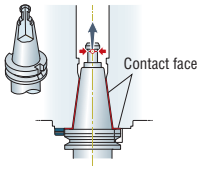
Machine type	Spindle acceleration time	Spindle deceleration time
NH4000 DCG	1.43 sec. (0→14,000 min^{-1})	1.35 sec. (14,000 min^{-1}→0)
NH4000 DCG <high output> OP	2.01 sec. (0→14,000 min^{-1})	1.73 sec. (14,000 min^{-1}→0)
NH4000 DCG <high speed> OP	2.64 sec. (0→20,000 min^{-1})	2.42 sec. (20,000 min^{-1}→0)

● Please use a two-face contact tool when cutting at 15,000 min^{-1} or higher.

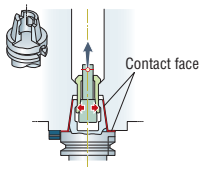
Two-face contact specification OP

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



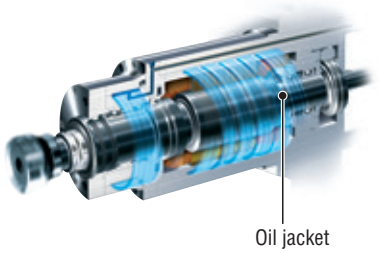
HSK specifications



● 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

400 mm (15.7 in.)

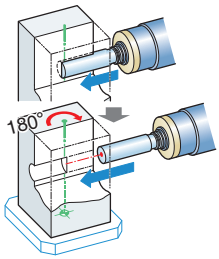
Pallet working surface

400×400 mm
(15.7×15.7 in.)

Boring

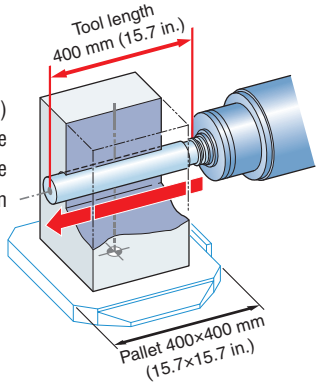
Previous model

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



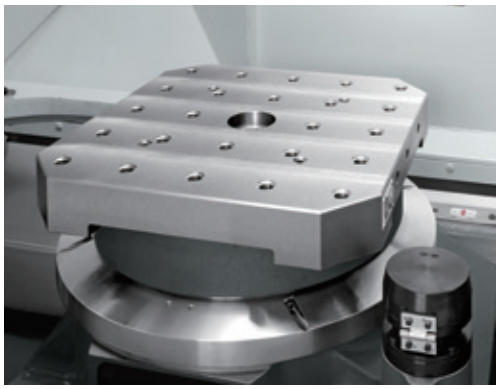
NH4000 DCG

Boring up to 400 mm (15.7 in.) can be done without turning the B-axis, reducing cutting time and achieving high-precision machining.



● Depending on condition, machining may not always be possible.

Table



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 type	1° indexing table	Full 4th axis rotary table OP DDM
Minimum pallet indexing angle	1°	0.001°
Pallet indexing time (90°) <including clamping and unclamping time>	1.54 sec.	0.72 sec.

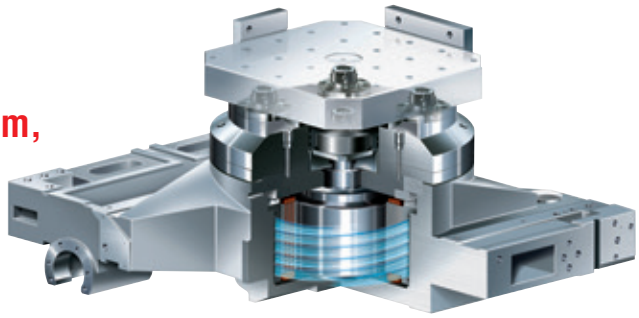
Direct Drive Motor OP

DDM Direct Drive Motor

Original technology

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.



Features of DDM

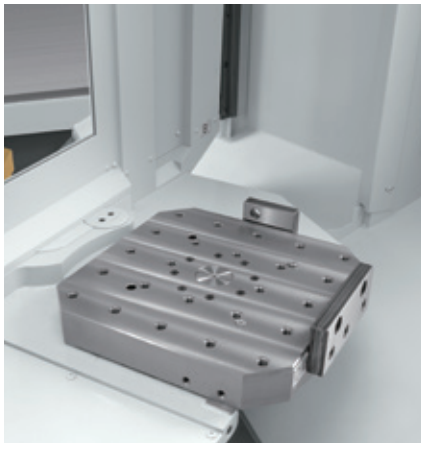
- High-speed rotation
- High-precision indexing
- Less maintenance
- Longer product life

B-axis Max. rotational speed

Previous model (worm gear system) 22 min^{-1} ▶ **NH4000 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*

6 sec.

* Excluding clamping and unclamping time.
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. Please contact our sales representative for details.

Principal mechanisms

ATC

The tool clamp mechanism has been simplified, improving ATC reliability.

Tool changing time

Cut-to-cut (chip-to-chip)

40 tools	60 tools OP	120 tools OP	180 tools OP	240 tools OP
8.7 sec. (max.)	11.4 sec. (max.)	19.7 sec. (max.)	15.8 sec. (max.)	15.8 sec. (max.)
2.8 sec. (min.)	2.8 sec. (min.)	2.8 sec. (min.)	2.8 sec. (min.)	2.8 sec. (min.)

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.

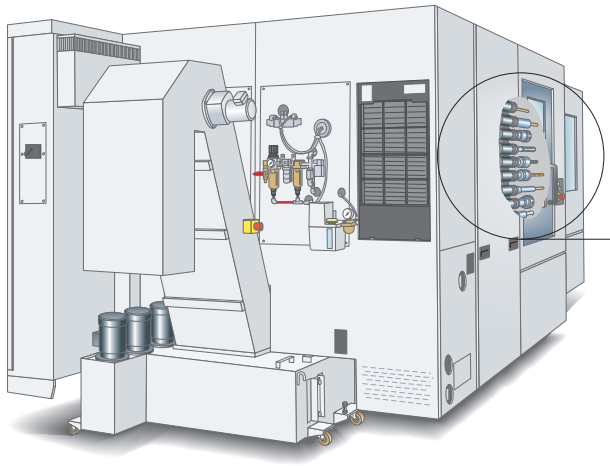
Cut-to-cut (chip-to-chip)

2.8 sec. <MAS>

Tool-to-tool

0.9 sec.

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.

Tool storage capacity

Chain-type magazine (attached to the machine)

40 tools 60 tools OP

Chain-type magazine (separate type)

120 tools OP

Rack-type magazine (separate type) OP

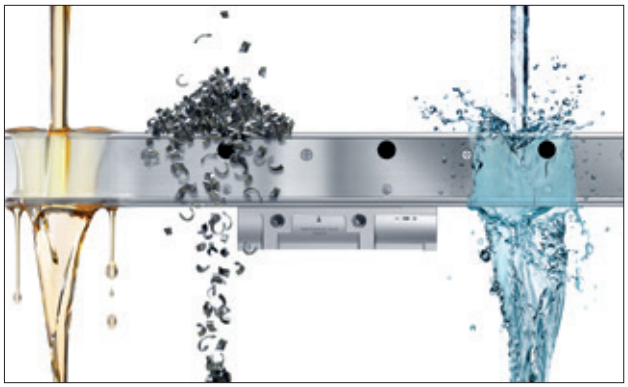
180 tools OP
240 tools OP
300 tools OP
360 tools OP Consultation is required

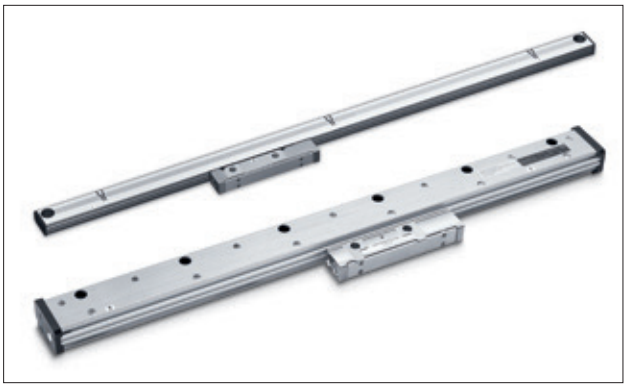
● Magazines incorporate a pot transfer mechanism and the tool capacity includes one tool at the spindle side.

Max. tool length	Max. tool mass	Max. tool diameter
400 mm (15.7 in.)	8 kg (17.6 lb.)	70 mm (2.7 in.) <with adjacent tools> 140 mm (5.5 in.) <without adjacent tools>

High-precision equipment

Full closed loop control (Scale feedback) OP





- 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
- 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

Coolant chiller (separate type) <option> OP

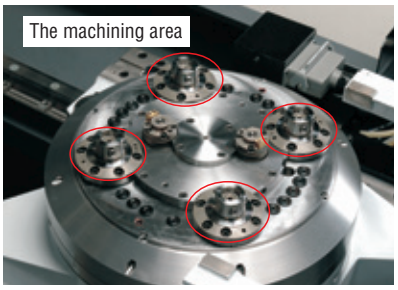
Increased coolant temperature causes thermal displacement in the fixtures and workpiece, affecting the machining accuracy of the workpiece. Use this unit to prevent the cutting coolant from heating up. When using oil-based coolant, the coolant temperature can become extremely high even with the standard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

When using oil-based coolant or a high-pressure coolant system, please be sure to consult our sales representative.

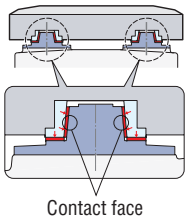
- We cannot guarantee that this unit will completely control the coolant temperature. It is designed to help prevent oil temperature increases.

Pallet clamp system

The dual contact taper cone pallet stabilizes the pallet with its powerful clamping force, and improves the repeatability.

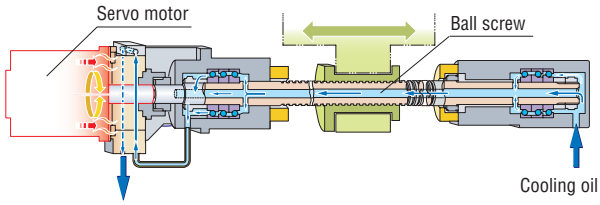


- Auto-coupler specifications pictured



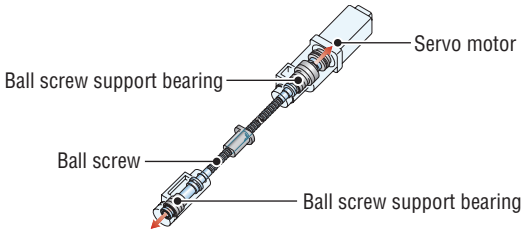
Ball screw center cooling

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.



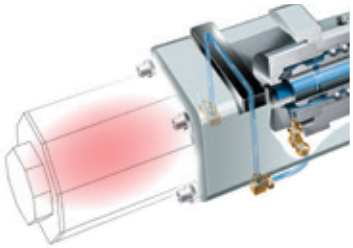
High-rigidity double-anchor support

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



Servo motor thermal insulation

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

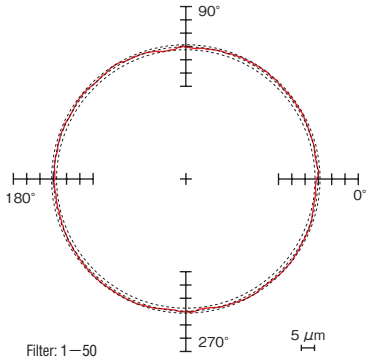


High-accuracy data

Circularity

NH4000 DCG

1.80 μm
(actual result)



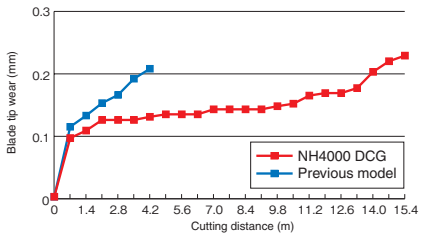
Material <JIS>	A5052* <outer diameter: 100 mm (3.9 in.)>
Tool	ϕ 16 mm (ϕ 0.6 in.) end mill <4 flutes>
Spindle speed	8,000 min^{-1}
Cutting feedrate	2,000 mm/min (78.7 ipm)

A5052: Aluminum

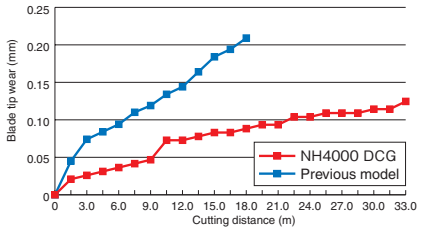
Comparison of tool wear

Minimizing tool tip vibration prevents wear and extends tool life.

ϕ 8 mm (ϕ 0.31 in.) Drill Flank wear



ϕ 16 mm (ϕ 0.6 in.) End mill Flank wear

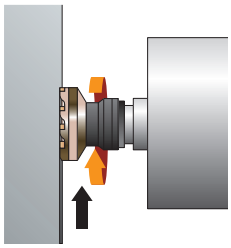


* 5052 (ANSI), NS4 (BS), AlMg2.5 (DIN), 5A02 (GB)

● 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

Cutting test

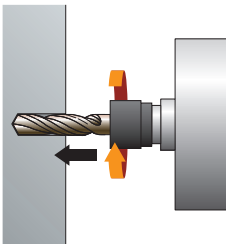
ϕ 80 mm (ϕ 3.1 in.) Face mill <7 flutes>



Material <JIS>: A5052*1

Material removal rate	1,024 mL/min (62.5 in^3./min)
Width of cut	64 mm (2.5 in.)
Depth of cut	1.0 mm (0.04 in.)
Spindle speed	12,000 min^{-1}
Feedrate	16,000 mm/min (629.9 ipm)

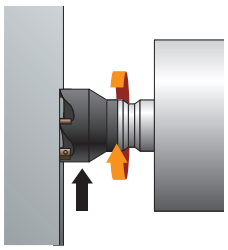
ϕ 35 mm (ϕ 1.4 in.) Drill



Material <JIS>: S50C*2

Material removal rate	44 mL/min (2.7 in^3./min)
Spindle speed	227 min^{-1}
Feedrate	45 mm/min (1.8 ipm)

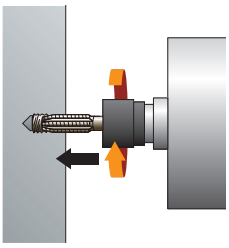
ϕ 80 mm (ϕ 3.1 in.) Face mill <7 flutes>



Material <JIS>: S50C*2

Material removal rate	269 mL/min (16.4 in^3./min)
Width of cut	64 mm (2.5 in.)
Depth of cut	2.0 mm (0.08 in.)
Spindle speed	1,000 min^{-1}
Feedrate	2,100 mm/min (82.7 ipm)

Tap



Material <JIS>: S50C*2

Tool	M30×P3.5
Spindle speed	106 min^{-1}
Feedrate	371 mm/min (14.6 ipm)

*1 5052 (ANSI), NS4 (BS), AlMg2.5 (DIN), 5A02 (GB)
*2 1049 (ANSI), C50, C50E, C50R (BS, DIN), 50 (GB)

● 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.
A5052: Aluminum S50C: Carbon steel JIS: Japanese Industrial Standard

Productivity

The NH4000 DCG has realized even higher productivity by increasing the speed of each structure.

Data for comparison

NH4000 DCG

Max. spindle speed
14,000 min^{-1}

Rapid traverse rate
<X, Y and Z axes>
50 m/min
(1,968.5 ipm)

Tool changing time
Cut-to-cut
<chip-to-chip>
2.8 sec. <MAS>

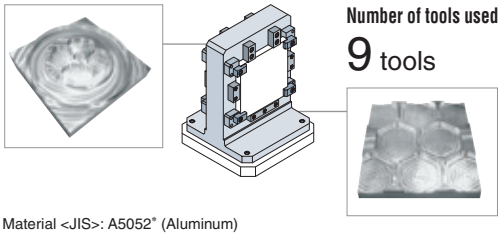
Previous model (1988 year—)

Max. spindle speed
7,000 min^{-1}

Rapid traverse rate
<X, Y and Z axes>
20 m/min
(787.4 ipm)

Tool changing time
Cut-to-cut
<chip-to-chip>
4.6 sec. <MAS>

Workpiece

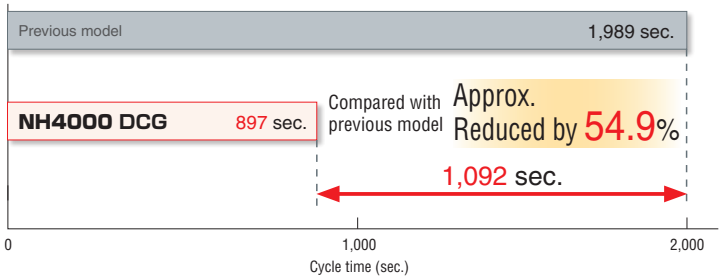


Number of tools used
9 tools

Material <JIS>: A5052* (Aluminum)
- When machining 2 kinds of workpieces at the same time.

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

Cycle time comparison



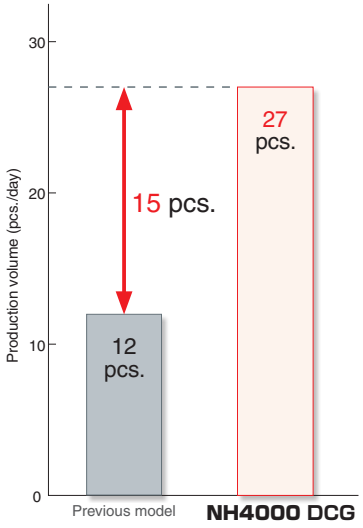
JIS: Japanese Industrial Standard

Comparison of production volume and sales

5 USD/EUR per work

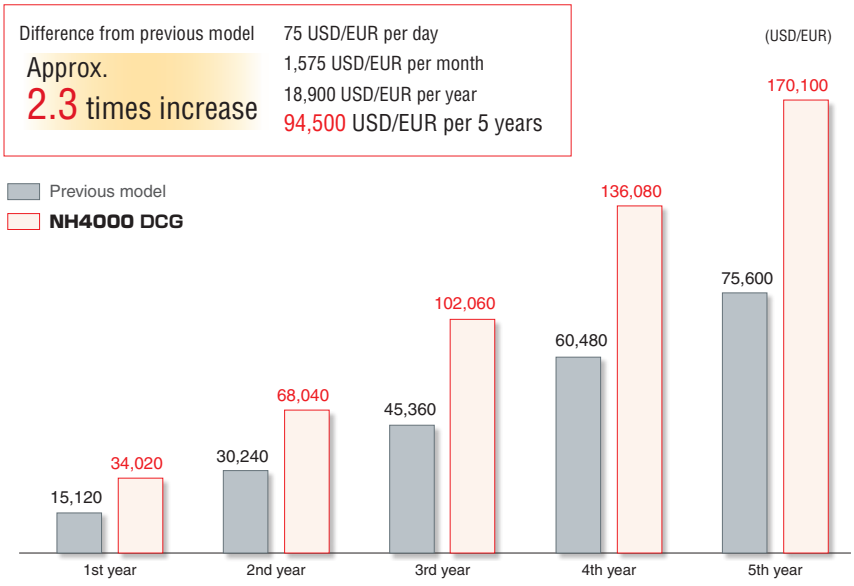
- Running time (one day):
  8 hours×85%=3,600 sec.×8×0.85=24,480 sec.
- Production volume (pcs./day):
  24,480 sec.÷Cycle time (sec.)
- Number of days operating in 1 year:
  21 days×12 months=252 days

5-year sales simulation



Difference from previous model
Approx.
2.3 times increase

75 USD/EUR per day
1,575 USD/EUR per month
18,900 USD/EUR per year
94,500 USD/EUR per 5 years

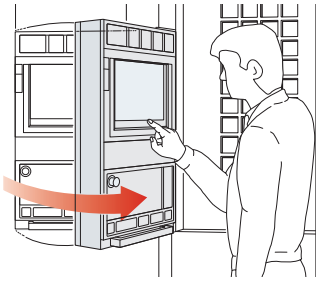


Improved workability

For the NH4000 DCG, we have installed features throughout the machine to improve the operability based on the complete operator-centered concept.

Swivel-type operation panel

The operation panel which can swivel from 0° to 90° improves operability and visibility.



Swivel range 90°

Setup station

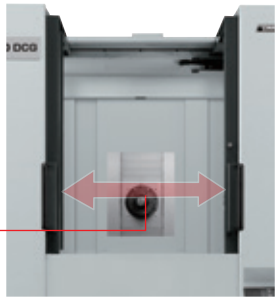
With excellent access to the table and a wide door opening, setup operations such as fixture adjustment can be done smoothly.

Distance from pallet

385 mm (15.2 in.)

Door opening

760 mm (29.9 in.)*

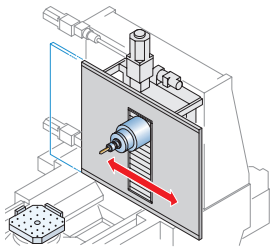


* For the automatic door specification, the door opening is 718 mm (28.3 in.).

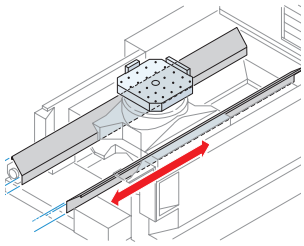
Single cover

A highly reliable design that prevents chip clogging.

X-axis

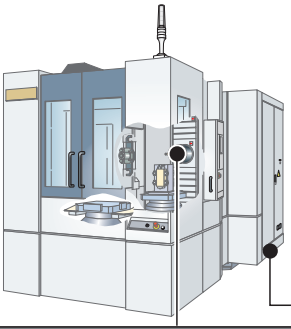


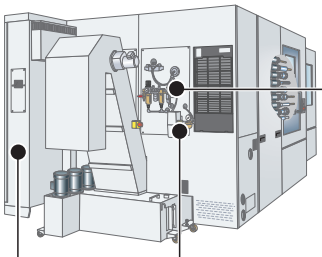
Z-axis



Maintenance

For the NH4000 DCG, the maintenance is improved by placing the oil chiller, hydraulic unit, and pneumatic instruments all in one place and offering better accessibility for operators.





Centralized layout of devices

Controls are on the side panel to facilitate maintenance.

Replacement of spindle unit

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

Slimmer electrical cabinet

A slim electrical cabinet closes the proximity between you and the insides of the machine during maintenance.

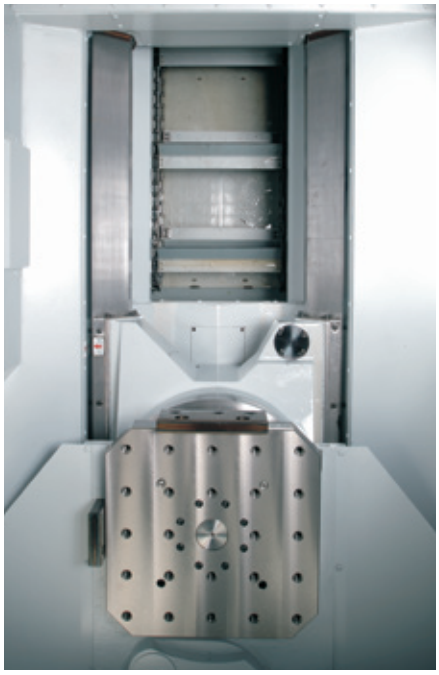
300 mm (11.8 in.) <including doors>

A closer lubrication tank

Peripheral equipment

Chip conveyor

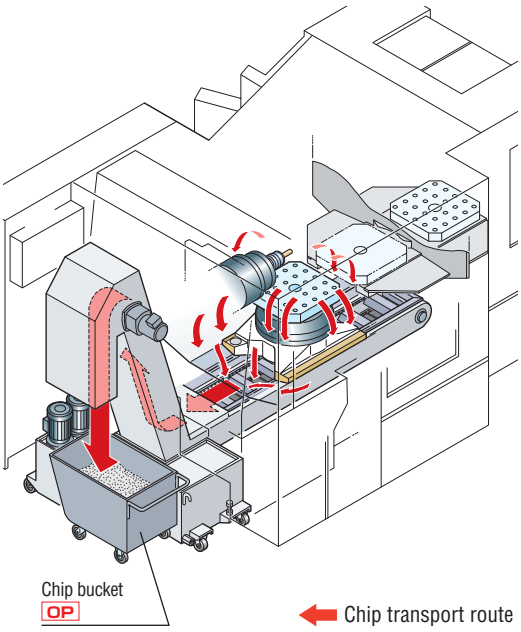
The center conveyor discharges chips directly outside the machine, offering both outstanding chip disposal and space savings.



Scraper type+ drum filter type

Hinge type+ drum filter type OP

Scraper type+drum filter type

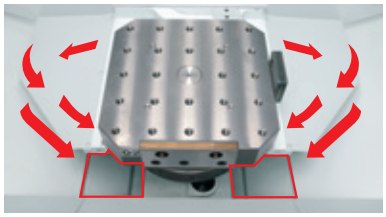


Specifications	Workpiece material and chip size ○: Suitable ×: Not suitable						
	Steel			Cast iron	Aluminum/non-ferrous metal		
	Long	Short	Powdery	Short	Long	Short	Powdery
Scraper type+drum filter type	×	○	○	○	×	○	○
Hinge type+drum filter type OP	○	○	○	○	○	○	○

- Chip size guidelines
  Short: chips 50 mm (2.0 in.) or less in length, bundles of chips ϕ 40 mm (ϕ 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.



Chip disposal groove

Shower coolant

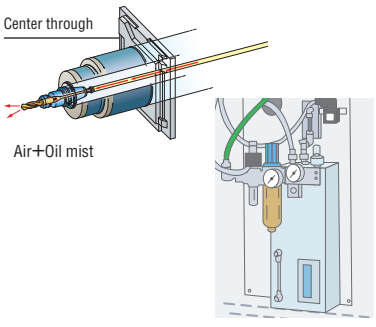
As well as preventing chips from scattering during machining, this allows them to fall smoothly into the center conveyor.

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

Semi dry unit

OP Consultation is required

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.



Misting device

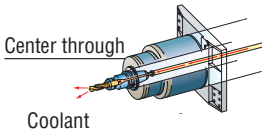
Peripheral equipment

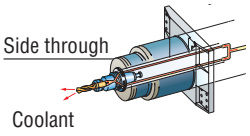
Through-spindle coolant system OP

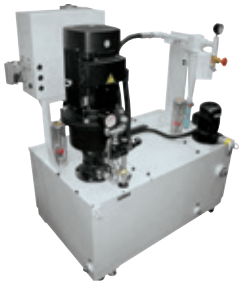
The through-spindle coolant system effectively eliminates chips, cooling the machine point and lengthening the lives of your tools.

	Unit on coolant tank	Separate type
Discharge pressure	1.5 MPa (217.5 psi)	1.5/3.5/7.0 MPa (217.5/507.5/1,015 psi)
Installation space <width×depth>	—	820×1,120 mm (32.3×44.1 in.) <High-pressure coolant system>
Water-soluble coolant	○	○
Coolant filtration accuracy	40 μm	20 μm

⚠ 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.



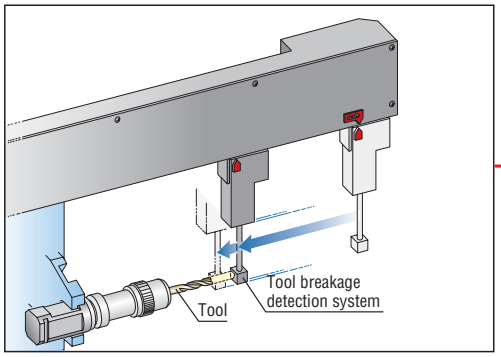




High-pressure coolant system (separate type)

Tool breakage detection system (magazine) OP

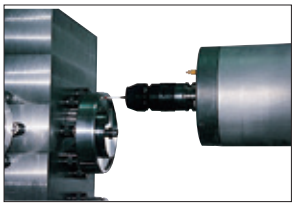
The tool breakage detection unit at the waiting pot position will detect any tool breakage in the magazine. The tool length is not measured inside the machine, so it has no effect on the operating rate.



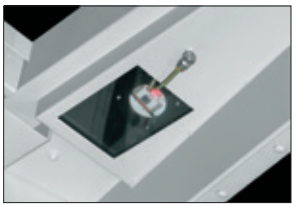
Automatic measurement OP

In-machine measuring system (spindle)

Touch sensor (optical signal transmission type)



Sensor

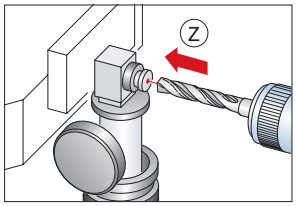


Receiver

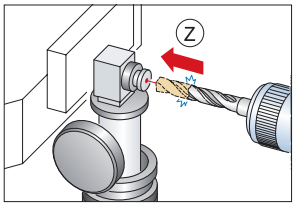
Automatic	■ Centering ■ Measurement
Manual	The workpiece setter function can be added
Workpiece zero point setting and centering are possible	

In-machine measuring system (table)

Touch sensor



Tool length measurement



Tool breakage detection

Automatic	■ Tool length measurement ■ Tool breakage detection
Manual	The tool setter function can be added
Tool length offset is possible	

Automatic measurement+Manual measurement functions OP

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

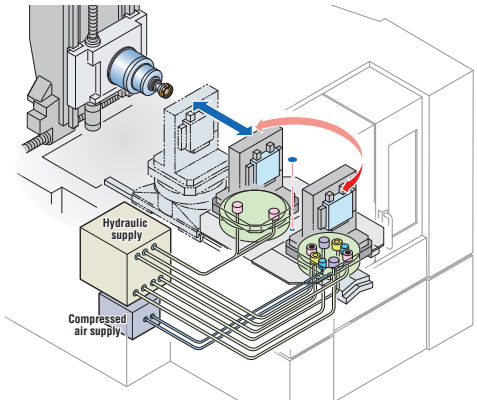
Fixture interface

Fixture interface

OP

Auto-coupler fixture interface

Easily transfer the pallets between the setup station and the work area and avoid external hoses and couplers.

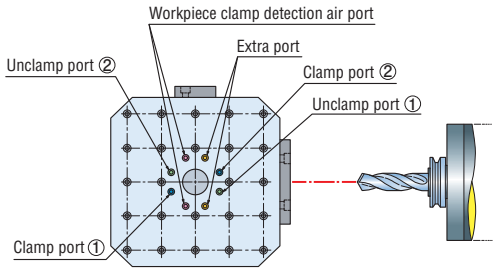


Compressed air is supplied to the setup station. Hydraulic fluid is supplied to both the setup station and the machining table.

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

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 washing coolant system
  - ☐ Fixture air blow system

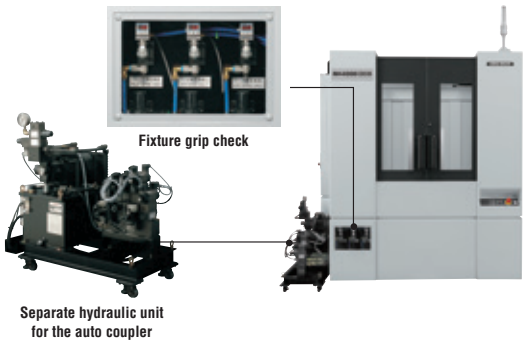


Auto-coupler

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

*Includes two extra ports.

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



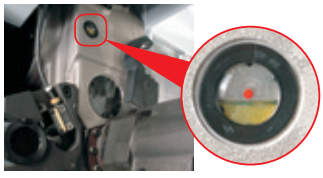
Reduction in environmental burden

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

Energy-saving settings screen

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.

Transfer systems OP

The versatile systems resolve production issues.

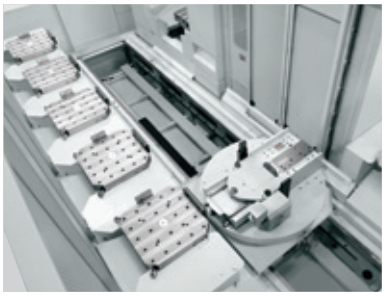
CPP system (Carrier Pallet Pool System)

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 available as an option.



● System example

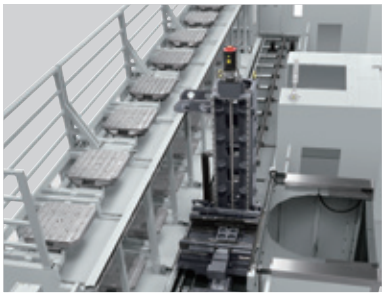
● When the number of machines or workpiece setup stations is two or more, the MCC-LPS Ⅲ is required.
● For models and systems, please consult with our sales representative.

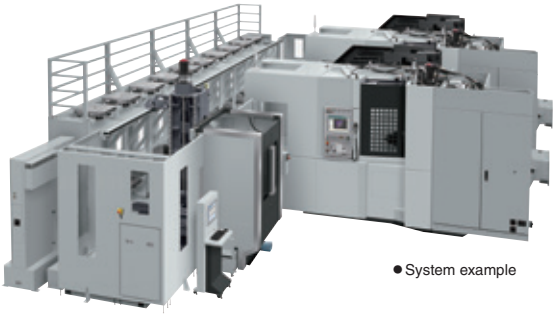
LPP system (Linear Pallet Pool System)

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)





● System example

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.

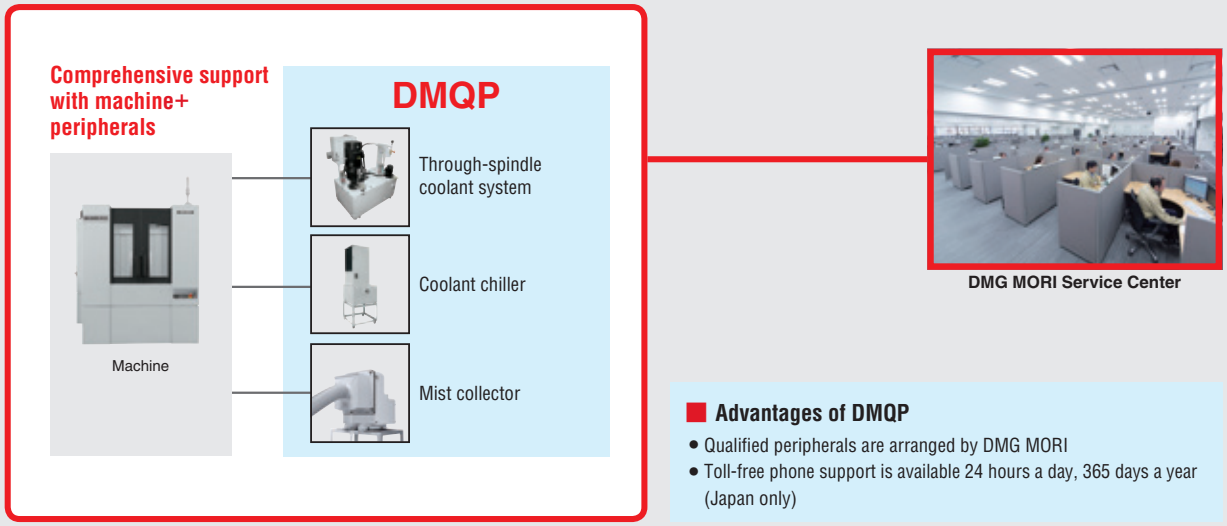
DMQP (DMG MORI Qualified Products) OP

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 (NH4000 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**

● For more details on DMQP items, please contact our sales representative.

CPP: Carrier Pallet Pool LPP: Linear Pallet Pool

MAPPS Ⅳ

High-Performance Operation System
for Machining Centers

● 19-inch operation panel

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 MORI-NET Global Edition Advance OP**

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.

* The reduction rate differs depending on the program.

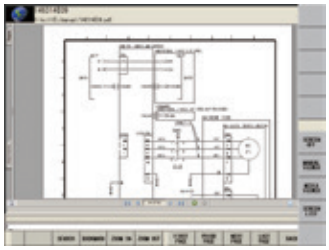
Main specifications

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

Improved ease of maintenance

Alarm help function

When an alarm occurs, MAPPS identifies the cause of the trouble and provides solutions.

Improved productivity

APC schedule operation function OP

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.

Improved work efficiency

Fixed-point in-machine camera OP Consultation is required

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

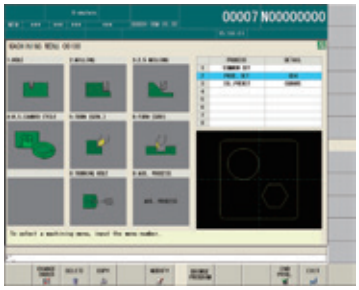
- Inside machine (to check machining)
- Tool magazine (to check cutting tools)
- Chip bucket (to check chip accumulation)

MAPPS: Mori Advanced Programming Production System

Conversational automatic programming

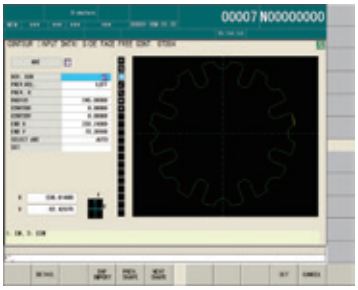
This function allows users to create programs simply by following the guidance on the screen.
Much of the programming process has been simplified due to the minimal key entry required for even the most complex shapes.

Machining menu

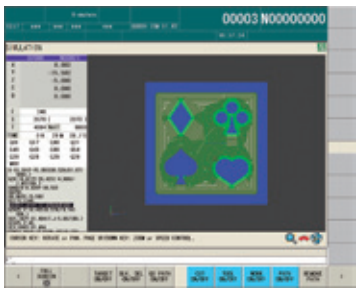


List display function

Contour input

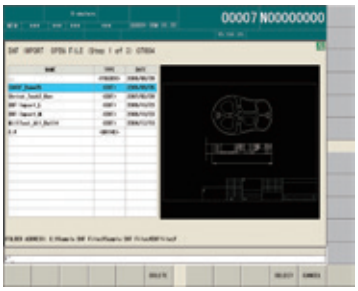


Islands, open pockets OP



MORI-POST advanced mode OP

DXF import function OP



Application System

MORI Automatic Programming System for Machining Center

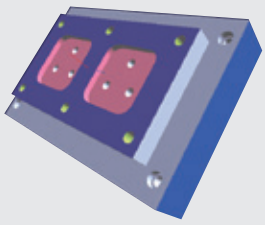
MORI-APM OP

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.

MORI-NETWORK

Network Application Systems
MORI-NET, MORI-SERVER, MORI-MONITOR, DMG MORI MESSENGER

For shorter total production time for all our customers

DMG MORI's software Line-up

This network system application achieves fast information sharing and increased production efficiency.

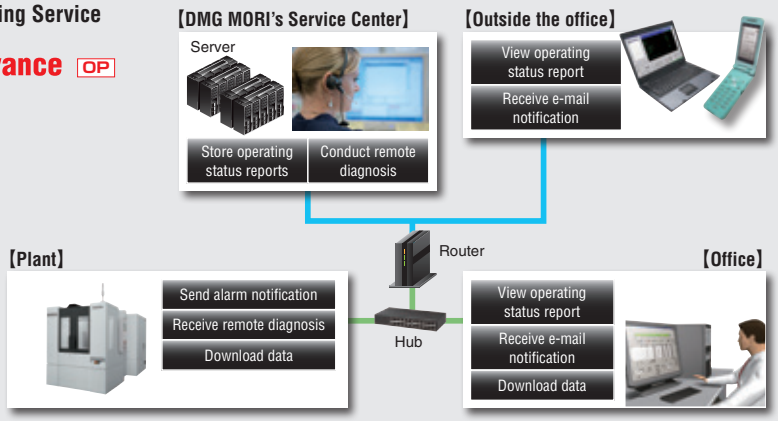
【Internet】
【LAN】

Remote Maintenance/Machine Operation Monitoring Service

MORI-NET Global Edition Advance OP

■ Features

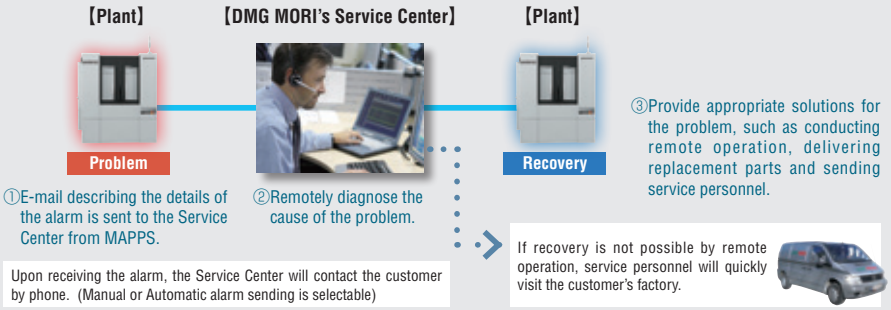
- Remote maintenance service by DMG MORI Service Center
- Internet-based, high speed (max. 1 Gbps), large capacity network
- No server installation is required — reduction in initial cost
- Download various data from the server located at DMG MORI



■ 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.

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

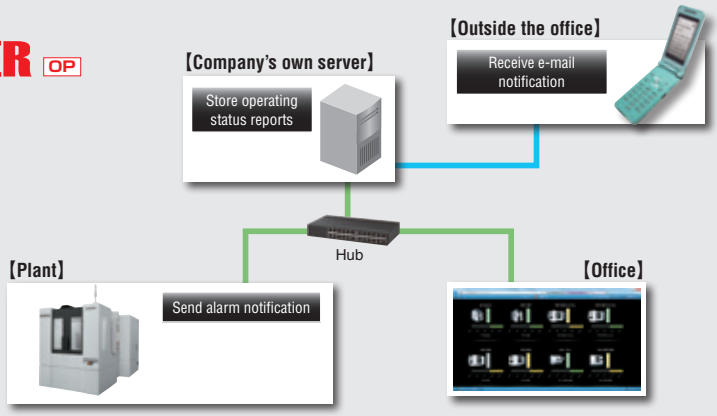


Machine Operation Monitoring System

DMG MORI MESSENGER OP

■ 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 [Standard features]

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 OP

This is an application which allows you to remotely operate and view the MAPPS screens from your office computer.

ACT Advanced Communication Technology

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.

【Internet】
【LAN】

Industrial Network for Peripheral Equipment Control

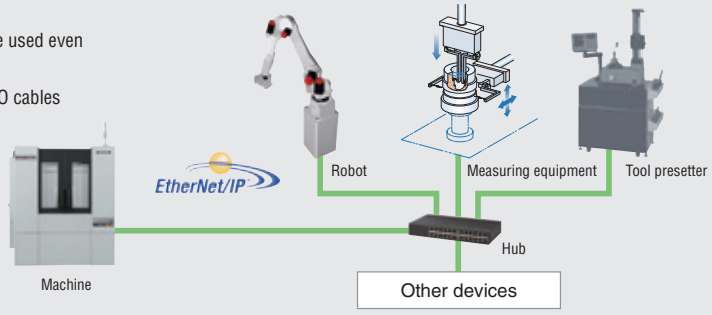
MAPPS EtherNet/IP I/F OP

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

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



Communication Interface for Monitoring Machine Operation

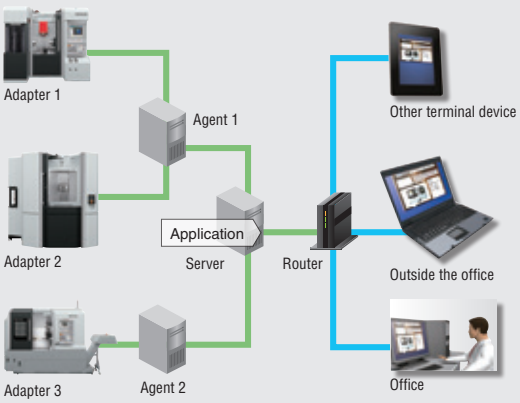
MAPPS MTConnect I/F

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

■ System examples



■ Application examples

Your machines are displayed all at once, allowing you to quickly call up the machine you wish to check.

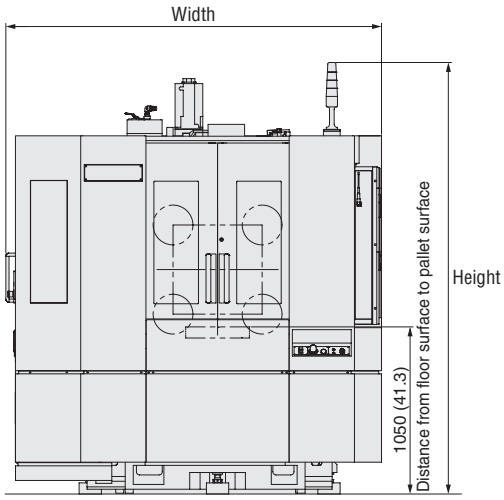
Operating status can be checked in real time.

You can check the operating history on the Gantt chart screen.

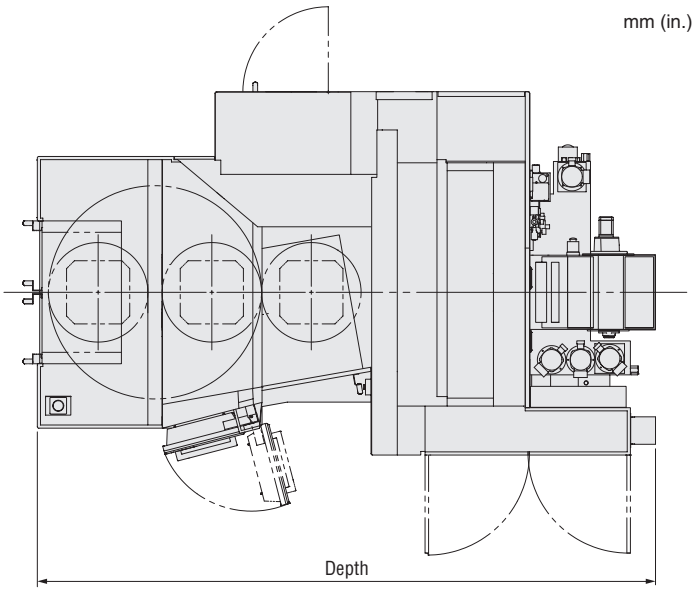
- A server and application must be prepared by the customer.
- For introduction of MTConnect, separate consultation is required.

General view

mm (in.)



Front view



Plan view

Standard

mm (in.)

Width	Depth		Height
	Scraper type + drum filter	Hinge type + drum filter OP	
2,397 (94.4)	4,004 (157.6)	4,271 (168.1)	2,711 (106.7)

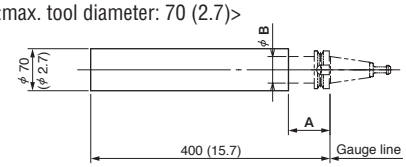
Q55540A01
Q55542A01
Q55544A02
Q55546A02

Tool restrictions

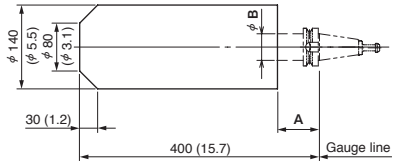
40-tool specifications (chain-type)/60-, 120-tool specifications (chain-type) OP

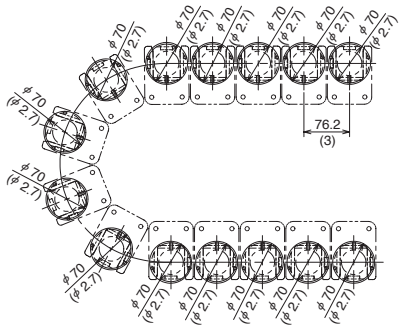
mm (in.)

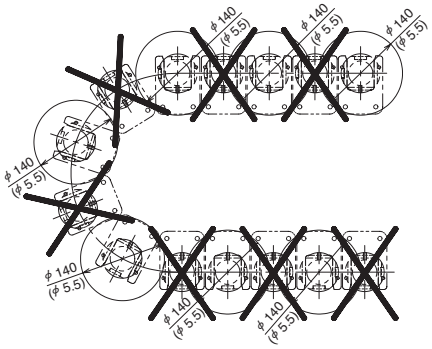
With adjacent tools <max. tool diameter: 70 (2.7)>



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







Tool restriction					
Type of tool shank		BT40	CAT40	DIN40	HSK-A63
Max. tool length	mm (in.)	400 (15.7)			
Max. tool diameter	mm (in.)	With adjacent tools: 70 (2.7) <40, 60, 120 tools> Without adjacent tools: 140 (5.5) <40, 60, 120 tools>			
Tool limitation **A**	mm (in.)	32 (1.3)	34.925 (1.375)	35 (1.4)	42 (1.7)
Tool limitation **B**	mm (in.)	63 (2.5)	44.45(1.75)	50 (2.0)	53 (2.1)
Max. tool mass	kg (lb.)	8 (17.6)			
Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	7.84 (5.7)			

Q81069B04

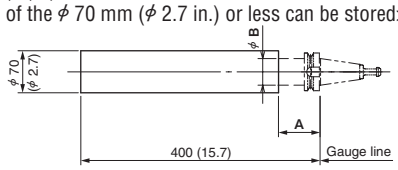
● Do not use the pots marked with "x", because they cause interference.

Tool restrictions

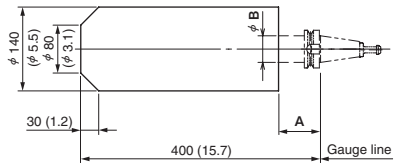
180-tool specifications (rack-type) OP

mm (in.)

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



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



Tool restriction					
Type of tool shank		BT40	CAT40	DIN40	HSK-A63
Max. tool length	mm (in.)	400 (15.7)			
Max. tool diameter	mm (in.)	With adjacent tools: 70 (2.7) Without adjacent tools: 140 (5.5)			
Tool limitation **A**	mm (in.)	32 (1.3)	34.925 (1.375)	35 (1.4)	42 (1.7)
Tool limitation **B**	mm (in.)	63 (2.5)	44.45(1.75)	50 (2.0)	53 (2.1)
Max. tool mass	kg (lb.)	8 (17.6)			
Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	7.84 (5.7)			

- If you attach a tool with a diameter larger than ϕ 70 mm (ϕ 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.

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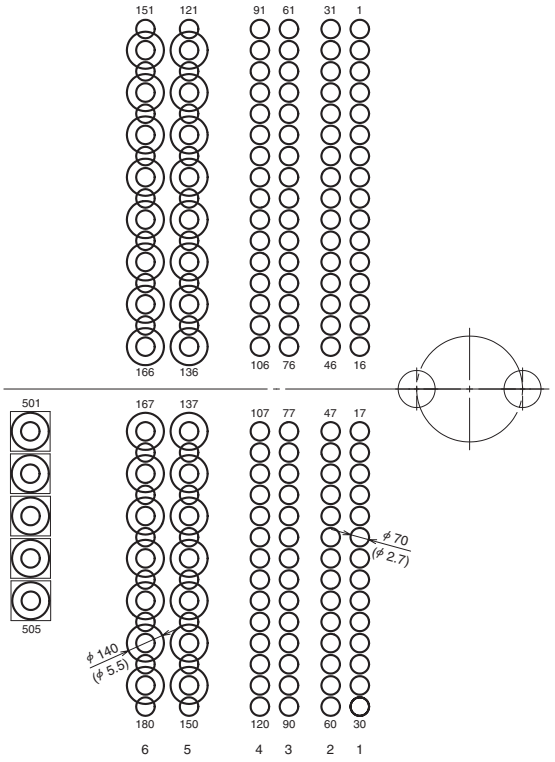
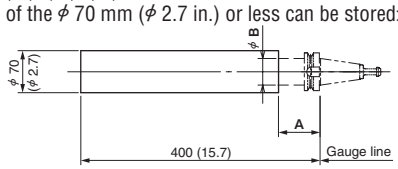


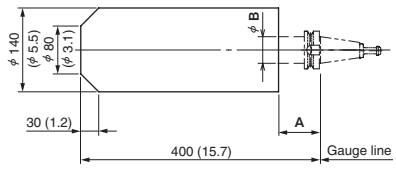
240-tool specifications (rack-type) OP

mm (in.)

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>



Tool restriction					
Type of tool shank		BT40	CAT40	DIN40	HSK-A63
Max. tool length	mm (in.)	400 (15.7)			
Max. tool diameter	mm (in.)	With adjacent tools: 70 (2.7) Without adjacent tools: 140 (5.5)			
Tool limitation **A**	mm (in.)	32 (1.3)	34.925 (1.375)	35 (1.4)	42 (1.7)
Tool limitation **B**	mm (in.)	63 (2.5)	44.45(1.75)	50 (2.0)	53 (2.1)
Max. tool mass	kg (lb.)	8 (17.6)			
Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	7.84 (5.7)			

- 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.

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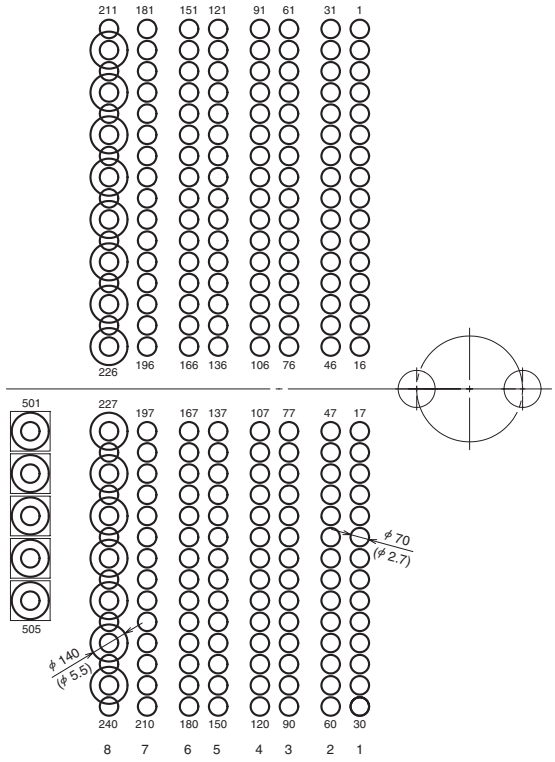
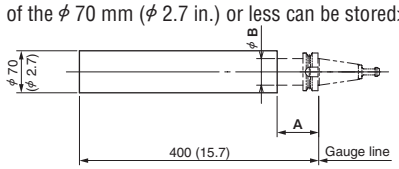


Tool restrictions

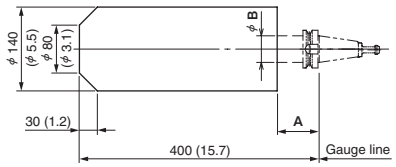
300-tool specifications (rack-type) OP

mm (in.)

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>



Tool restriction					
Type of tool shank		BT40	CAT40	DIN40	HSK-A63
Max. tool length	mm (in.)	400 (15.7)			
Max. tool diameter	mm (in.)	With adjacent tools: 70 (2.7) Without adjacent tools: 140 (5.5)			
Tool limitation **A**	mm (in.)	32 (1.3)	34.925 (1.375)	35 (1.4)	42 (1.7)
Tool limitation **B**	mm (in.)	63 (2.5)	44.45(1.75)	50 (2.0)	53 (2.1)
Max. tool mass	kg (lb.)	8 (17.6)			
Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	7.84 (5.7)			

- 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.

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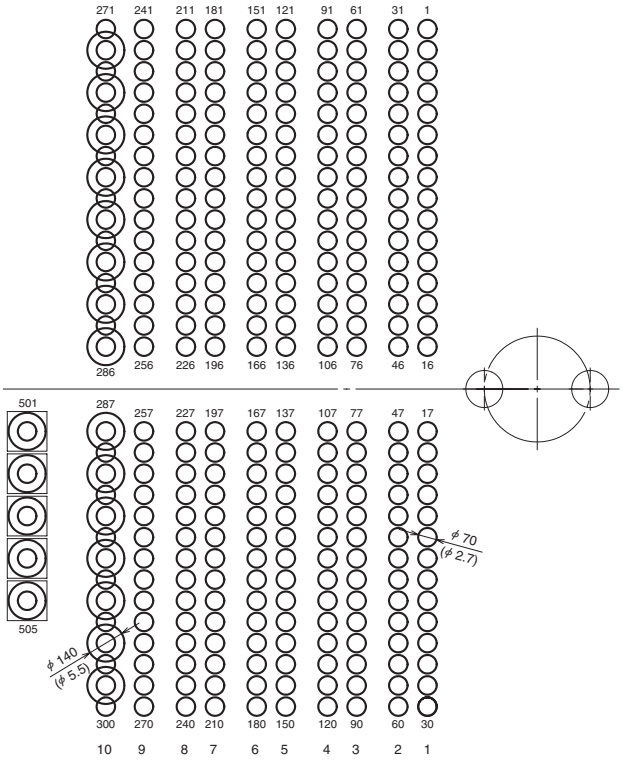
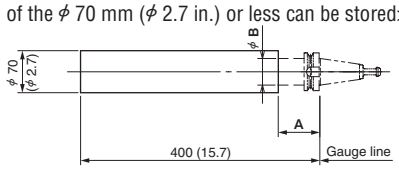


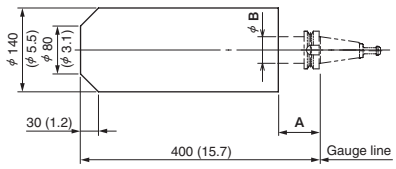
360-tool specifications (rack-type) OP Consultation is required

mm (in.)

Column 1–11
<the tool of the ϕ 70 mm (ϕ 2.7 in.) or less can be stored>



Column 12
<the tool of the ϕ 140 mm (ϕ 5.5 in.) or less can be stored>



Tool restriction					
Type of tool shank		BT40	CAT40	DIN40	HSK-A63
Max. tool length	mm (in.)	400 (15.7)			
Max. tool diameter	mm (in.)	With adjacent tools: 70 (2.7) Without adjacent tools: 140 (5.5)			
Tool limitation **A**	mm (in.)	32 (1.3)	34.925 (1.375)	35 (1.4)	42 (1.7)
Tool limitation **B**	mm (in.)	63 (2.5)	44.45(1.75)	50 (2.0)	53 (2.1)
Max. tool mass	kg (lb.)	8 (17.6)			
Max. tool mass moment <from spindle gauge line>	N·m (ft·lbf)	7.84 (5.7)			

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

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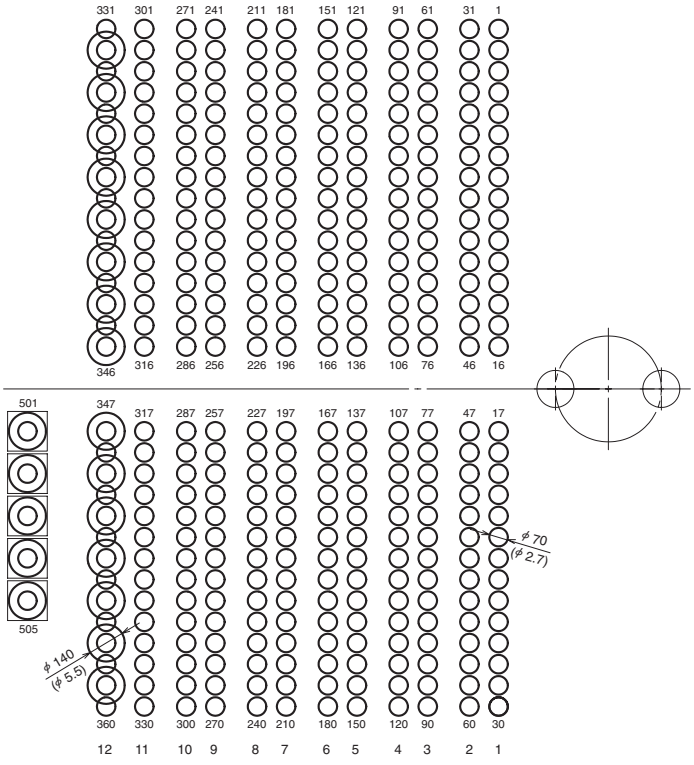
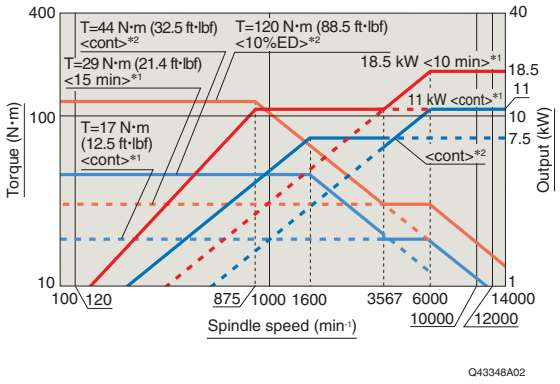


Spindle speed torque/output diagrams

NH4000 DCG

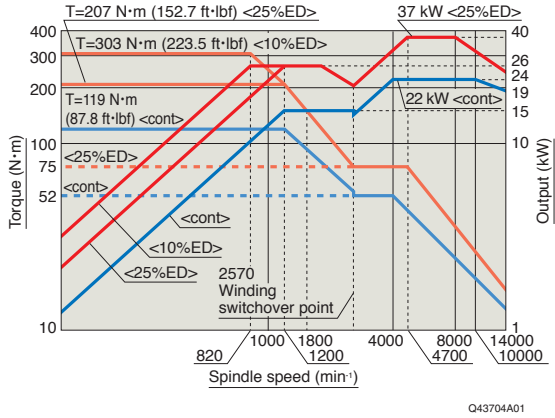
【 Standard 】

- Max. spindle speed: 14,000 min^{-1}
- Spindle drive motor: 18.5/11 kW (24.7/15 HP)
  <10 min/cont>
- Max. spindle torque: 120 N•m (88.5 ft•lbf) <10%ED>



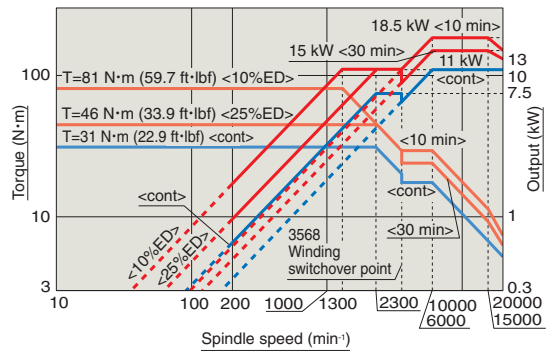
【 High output OP 】

- Max. spindle speed: 14,000 min^{-1}
- Spindle drive motor: 37/22 kW (50/30 HP)
  <25%ED/cont>
- Max. spindle torque: 303 N•m (223.5 ft•lbf) <10%ED>



【 High speed OP 】

- Max. spindle speed: 20,000 min^{-1}
- Spindle drive motor: 18.5/15/11 kW (24.7/20/15 HP)
  <10 min/30 min/cont>
- Max. spindle torque: 81 N•m (59.7 ft•lbf) <10%ED>



*1 High-speed winding side *2 Low-speed winding side ● Please use a two-face contact tool when cutting at 15,000 min^{-1} or higher.

Standard & optional features

● : Standard features ○ : Options ☆ : Consultation is required

Spindle

Type of tool shank	BT40	●
	CAT40	○
	DIN40	○
	HSK-A63	○
Type of retention knob	DMG MORI 90° type	●
	45° (MAS-I)	○
	60° (MAS-II)	○
	DIN	○
	Special (center)	○
BT40	Two-face contact	○
CAT40	Two-face contact	○
HSK-A63	Two-face contact	○
14,000 min^{-1}: 18.5/11 kW (24.7/15 HP) <10 min/cont> {standard}		●
14,000 min^{-1}: 37/22 kW (50/30 HP) <25%ED/cont> {high output}		○
20,000 min^{-1}: 18.5/15/11 kW (24.7/20/15 HP) <10 min/30 min/cont> {high speed}		○

● Please use a two-face contact tool when cutting at 15,000 min^{-1} or higher.
● When the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together.

Table

Minimum table indexing angle	1° indexing	●
	0.001° (full 4th axis rotary table)	○
Sub table	Solid	☆
	T-slot	☆

Pallet/APC

2-station turn-type APC		●
Pallet	Tap (metric, inch)	●
	T-slot	○
Changing to T-slot pallets	2 pallets	○
Automatic indexing setup station		○
3-station turn-type APC	T-slot	○
	Tap	○
Auto-coupler spec. (with pallets)	(Hydraulic 2 circuits+workpiece seating detection 2 circuits) for 2-station APC	○
	(Hydraulic 1 circuit+workpiece seating detection 1 circuit) for 2-station APC	○
Additional tapped pallet for auto-coupler spec.	Hydraulic 2 circuits+ workpiece seating detection 2 circuits	○
	Hydraulic 1 circuit+ workpiece seating detection 1 circuit	○
One additional pallet	Tap	○
	T-slot	○

Fixture/Steady rest

4-sided tooling block	○

Magazine

Tool storage capacity	40 tools (chain-type)	●
	60 tools (chain-type)	○
	120 tools (chain-type)	○
	180 tools (rack-type)	○
	240 tools (rack-type)	○
	300 tools (rack-type)	○
	360 tools (rack-type)	☆

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

Coolant

Coolant system		●
Shower coolant (used at the same time as spindle coolant)		●
Coolant flow switch for through-spindle coolant system		○
Coolant float switch	Lower limit detection	●
	Upper limit detection	☆
Coolant gun for machining side		☆
Coolant gun for setup station side	2-station turn-type APC	○
	3-station turn-type APC	○
Shower coolant (high pressure specifications)		○
Through-spindle coolant/air (switching specifications) <through-spindle coolant system is necessary required separating>		○
Through-spindle coolant system (unit on coolant tank)*1 center through	1.5 MPa (217.5 psi)	○*
Oil shot system		○
Oil-hole drill coolant system		○
Oil mist system		○
Through-spindle coolant system (separate type)*1	Interface	○
Through-spindle coolant system*1 (center through)	Interface <7.0 MPa (1,015 psi), KNOLL>	○
	Interface <7.0 MPa (1,015 psi), Chip braster>	○
Through-spindle coolant system (unit on coolant tank)*1 side through	1.5 MPa (217.5 psi)	○*
Through-spindle coolant system*1 (side through)	Interface <7.0 MPa (1,015 psi), KNOLL>	○
	Interface <7.0 MPa (1,015 psi), Chip braster>	○

*1 When using oil-based coolant, please consult our sales representative.

*DMQP (DMG MORI Qualified Products)
● DMQP: Please see Page 17 for details.
● The information in this catalog is valid as of June 2018.
● Specifications, accessories, safety device and function are available upon request.
● Some options are not available in particular regions. For details, please consult our sales representative.

Coolant

Coolant chiller (separate type)	Optional when using water-soluble coolant	○*
	Essential when using oil-based coolant <for details, please consult with our sales representative>	○*
Coolant chiller (through-spindle coolant system)		○*
Mist collector HVS-150	Including stand (cannot be used in Europe)	○*
	Interface <duct ϕ 150 mm (ϕ 5.9 in.)+electric parts only>	○
Mist collector AFS-1100*2	Including stand	○*
	Interface <duct ϕ 150 mm (ϕ 5.9 in.)+electric parts only>	○
Mist collector interface (duct only)	ϕ 150 mm (ϕ 5.9 in.)	○
Oil skimmer		○
Semi dry unit		☆

*2 Not compatible with oil-based coolant. If using oil-based coolant, select the HVS-150.

Chip disposal

Chip conveyor (single construction)	Rear discharge, scraper type+drum filter type	●
	Rear discharge, hinge type+drum filter type	○
Air blow	Tool tip <when the tool tip air blow is regularly used, air supply of more than 300 L/min (79.2 gpm) is separately required>	●
Chip bucket	254 L (67.1 gal.)	○*

Measurement

In-machine measuring system (table)	Touch sensor	(M)	○
		(R)	○
	Touch sensor+tool setter function (tool length+diameter)	(M)	○
	Touch sensor+tool setter function (tool length+diameter)	(R)	○
In-machine measuring system (spindle)	Touch sensor (optical signal transmission type)	(R)	○
	Touch sensor (optical signal transmission type)+ workpiece setter function	(R)	○
Tool breakage detection system (magazine)			○

● The specifications vary depending on the manufacturers.
(R): Made by RENISHAW (M): Made by Magnescale

Improved accuracy

Full closed loop control (Scale feedback)	X-, Y-, Z-axis	○
Oil chiller		●
High acceleration specifications		○

Automation

Auto power off		●
Automatic door	Setup station	○
EtherNet/IP interface		○
Robot interface (EtherNet/IP) <EtherNet/IP interface is necessary required separating>		○

Pallet pools

CPP (Carrier Pallet Pool) <for details, please consult with our sales representative>	Vertical (5, 7, 9, 11 pallets)	○*
	Horizontal (6, 8, 10, 12 pallets)	○*
LPP (Linear Pallet Pool)		○*

Other

・Full cover ・Door interlock system (incl. mechanical lock): front door/setup station door ・Door interlock system: electrical cabinet door ・Low air pressure detecting switch ・Low hydraulic pressure detecting switch		●
・Built-in worklight ・Leveling block ・Hand tools ・Signal lamp 3 colors (LED type: red, yellow, green)		●
Dry anchor		○
Earth leakage breaker		○
Danger sensing device interface <recommended when oil-based coolant is used or during unmanned operation>		☆
Rotary window <only for 2-station turn-type APC specifications>		○
Additional residual pressure relief valve		☆
Refrigerating type air dryer		○*
Tool wagon		○*
Tool cabinet		○*
Basic tooling kit		○*
Weekly timer		○
Total counter		○
Workpiece counter		○
External M-code	5	○
	10	○
Manual pulse generator (separate type)		○
Electrical cabinet chiller		○*
Storage box for manual		☆
Multi dry filter		○

■ Through-spindle coolant system (separate type) <high-pressure coolant system is attached>

Discharge pressure MPa (psi)	Side through	Center through <special retention knobs are required>
1.5 (217.5)	○*	○*
3.5 (507.5)	○*	○*
7.0 (1,015)	○*	○*

⚠ 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.

Numerical control unit specifications F31iB, F31iB5

●: Standard ○: Option —: Not applicable

Controlled axis

Controlled axis	X (X2), Y, Z, B	●
Simultaneously controlled axes	F31iB: 4 axes F31iB5: 5 axes	●
Least input increment	0.001 mm (0.0001 in.)	●
Max. command value	±999,999.999 mm (99,999.9999 in.)	●
Stroke limit check before movement		●
Software damper	Abnormal load detection function	●
Load monitor function C	Soft key type	●
Programming resolution multiplied by 1/10	0.0001 mm (0.00001 in.)	○

Operation

Sequence number comparison and stop	○
Program restart	○
Tool retract and recover	○
Manual handle interruption	○

Interpolation functions

Nano interpolation		●
Single direction positioning		●
Helical interpolation	Optional 2 axes and other 1 axis	●
External high-speed skip (installation of high-speed skip terminal)		○
Polar coordinate interpolation	G12.1, G13.1	○
Cylindrical interpolation	G7.1	○
Involute interpolation	G2.2/G3.2	○
Spiral/conical interpolation		○
Smooth interpolation		○
Threading, synchronous cutting/Feed per revolution		○
3rd, 4th reference position return		○
Tool spindle Cs control (consultation is required if orbit machining or hale machining needs to be performed)	Includes Cs contour control and Normal direction control	○
NURBS interpolation		○

Feed functions

Rapid traverse override	F0/1/10/25/100%	●
Tangential speed constant control		●
Feedrate override	0—200% (10% increments)	●
Override cancel		●
AI contour control I*1		●
AI contour control II*2		○
One-digit F code feed	F1 to F9	○
Small-hole peck drilling cycle (the arbor with the overload torque detection function must be attached)		○

*1 Look-ahead blocks are up to 30 blocks.
*2 1,000 look-ahead blocks+high-speed processing.

Program input

Program number	4 digits	●
	8 digits	○
Absolute/incremental programming	G90/G91	●
Decimal point programming	Decimal point programming or electronic calculator type decimal point programming can be set using parameters	●
Diameter/radius programming		●
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	G80—G89	●
FS15 format		●
Additional workpiece coordinate systems	48 sets	○
	300 sets	○
Addition of optional block skip	Soft key type (2—9)	○
Polar coordinate command		○
Optional chamfering/corner R		○
Additional custom macro common variables	600 variables (#100 to #199, #500 to #999)	○
Interruption type custom macro		○
Automatic corner override		○
Scaling		○
Coordinate system rotation		○
3-D coordinate conversion		○
Programmable mirror image		○
Graphic copy	G72.1/G72.2	○
Islands, open pockets <MAPPS>		○
High-speed canned cycle <MAPPS>		○
DXF import function <MAPPS>		○
MORI-POST advanced mode <MAPPS>		○
Text engraving function <MAPPS>		○

Miscellaneous function/Spindle speed function

Spindle speed override	50—150% (10% increments)	●
Spindle orientation		●
Synchronous tapping		●
Multiple M cords in single block (Multi M code function) <incl. M code group check>		○

Tool function/Tool offset function

Tool function (T function)	8-digit T code	●
Number of tool offsets	64 sets (diameter+length=1 set, number of offsets indicates that diameter and length are displayed separately)	●
Tool offset data memory C	D/H code, geometry/wear	●
Tool length compensation	G43, G44, G49	●
Cutter radius offset	G40—G42	●
Tool length measurement		●
3-D tool compensation		○
Additional number of tool offsets (the number of selectable tool offsets depends on the tool storage capacity)	99 sets	○
	200 sets	○
	400 sets	○
	499 sets	○
	999 sets	○
Tool position offset	G45—G48	○
Tool life management		○
Additional number of tools to be controlled by the tool life management function	1,024 sets	○
MAPPS Tool management system*1		○
MAPPS Tool management system*1+ Tool IC (MAPPS software only)*2		○
MAPPS Tool management system*1+ Tool ID (MAPPS software only)*2		○

Tool IC: made by BIG DAISHOWA Tool ID: made by BALLUFF
*1 Includes common variable 600 for custom macro.
*2 Separate consultation is required if hardware and software are customized.

Editing

Expanded program editing	A limitation in the copy buffer (10 KB)	●
Background editing		●
Playback		○
Machining time stamp		○
Undo/Redo function <MAPPS>		●
Line number display <MAPPS>		●

Operation and display

Status display		●
Clock function		●
Current position display		●
Program comment display	191 characters (4-digit O code), 187 characters (8-digit O code)	●
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		●
Self-diagnosis	Includes alarm display, I/O signal diagnosis and ladder diagram	●
Operation panel: display section	19-inch TFT color LCD	●
Multi-counter display <MAPPS>		○

Data input/output

I/O interface	USB	●
Ethernet	10/100/1000BASE-T (access to user memory area by Ethernet function with MORI-SERVER Software)	●
Memory card for MAPPS	CF card (4 GB/2 GB/512 MB)+ ATA adaptor	○
6 GB Program storage area (for MAPPS-DNC operation function, for data backup) <MAPPS>	Files up to 10 MB in size can be edited	●
DNC operation using external memory (front USB port)		○

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Registerable programs <in total>

Part program storage length <in total>	Registerable programs <in total>			
	Without expansion <programs>	Expansion 1 <programs>	Expansion 2 <programs>	
128 KB <320 m (1,050 ft)>	63			●
128 KB <320 m (1,050 ft)>	63	250	—	○
256 KB <640 m (2,100 ft)>		500	—	○
512 KB <1,280 m (4,200 ft)>		1,000	—	○
1 MB <2,560 m (8,400 ft)>		1,000	2,000	○
2 MB <5,120 m (16,800 ft)>		1,000	4,000	○
4 MB <10,240 m (33,600 ft)>		1,000	4,000	○
8 MB <20,480 m (67,200 ft)>		1,000	4,000	○

■ Items suitable for each numerical control unit

		F31iB	F31iB5
Simultaneously controlled axes	4 axes	●	●
	5 axes	—	●
Interpolation functions	Nano smoothing	○	●
Feed functions	AI contour control II	○	●
Program input	Tilted working plane command	○	●
	Cutting point command	—	●
Tool function/Tool offset function	Tool center point control	○	●
	3-D cutter compensation	○	●
	SVC function	—	●
	Workpiece position error compensation	○	●
	Rotary table dynamic fixture offset	○	●
Data input/output	Fast data server	○	●
	Memory card for data server*	○	●
	Fast data server+Memory card for data server*	○	●

* CF card 1 GB+ATA adaptor

● The information in this catalog is valid as of June 2018.

Machine specifications

Item				NH4000 DCG
Travel	X-axis travel <longitudinal movement of saddle>		mm (in.)	560 (22.0)
	Y-axis travel <vertical movement of spindle head>		mm (in.)	560 (22.0)
	Z-axis travel <cross movement of pallet>		mm (in.)	630 (24.8)
	Distance from pallet surface to spindle center		mm (in.)	80—640 (3.1—25.2) [60—620 (2.4—24.4) <T-slot pallet>]
	Distance from pallet center to spindle gauge plane		mm (in.)	100—730 (3.9—28.7)
Pallet	Distance from floor surface to pallet surface		mm (in.)	1,050 (41.3) [1,070 (42.1) <T-slot pallet>]
	Pallet working surface		mm (in.)	400×400 (15.7×15.7)
	Pallet loading capacity		kg (lb.)	400 (880) [300 (660) <3-station turn-type APC specifications>]
	Max. workpiece swing diameter		mm (in.)	630 (24.8) [560 (22.0) <3-station turn-type APC specifications>]
	Max. workpiece height		mm (in.)	Tap pallet: 900 (35.4) [800 (31.4) <3-station turn-type APC specifications>] [T-slot pallet: 880 (34.6) {780 (30.7) <3-station turn-type APC specifications>}]
	Pallet surface configuration			M16 (1/2-13 UNC) Tap: 24 Holes. Pitch 80 mm (3 1/8 in.)
	Minimum pallet indexing angle			1° [0.001° <full 4th axis rotary table>]
	Pallet indexing time <including clamping and unclamping time>		s	1.54 [0.72 <full 4th axis rotary table>] (90°)
Spindle	Max. spindle speed		min^{-1}	14,000 [14,000 <high output>] [20,000]
	Number of spindle speed ranges			1
	Type of spindle taper hole			No. 40
	Spindle bearing inner diameter		mm (in.)	70 (2.8) [65 (2.6) <high output>]
Feedrate	Rapid traverse rate		mm/min (ipm)	X, Y, Z: 50,000 (1,968.5)
	Cutting feedrate		mm/min (ipm)	X, Y, Z: 0—50,000 (0—1,968.5)
	Max. rotational speed		min^{-1}	B: 44.4 [100 <full 4th axis rotary table>]
	Jog feedrate		mm/min (ipm)	0—5,000 (0—197.0) <20 steps>
ATC	Type of tool shank			BT40 [DIN40] [CAT40] [HSK-A63] <when the two-face contact specification is selected, a two-face contact tool and other tools cannot be used together>
	Type of retention knob			DMG MORI 90° type [45° (MAS-Ⅰ)] [60°(MAS-Ⅱ)] [DIN] [Special (center through)]
	Tool storage capacity <including one tool at the spindle side>			Chain-type: 40 [60] [120] Rack-type: [180] [240] [300] [360 <Consultation is required>]
	Max. tool diameter <with adjacent tools>		mm (in.)	70 (2.7)
	Max. tool diameter <without adjacent tools>		mm (in.)	140 (5.5)
	Max. tool length		mm (in.)	400 (15.7)
	Max. tool mass		kg (lb.)	8 (17.6)
	Max. tool mass moment <from spindle gauge line>		N·m (ft·lbf)	7.84 (5.7) <a tool with a mass moment greater than the maximum tool mass moment may cause problems during ATC operations even if it satisfies other conditions>
	Method of tool selection			Chain-type: fixed address, shorter route access [Rack-type: fixed address]
	Tool changing time	Tool-to-tool	s	0.9
		Cut-to-cut (chip-to-chip) <MAS>	s	2.8
	● The time differences are caused by the different conditions (travel distances, etc.) for each standard.	Cut-to-cut (chip-to-chip) ISO 10791-9 JIS B6336-9	s	40 tools Max.: 8.7 Min.: 2.8 [60 tools] Max.: 11.4 Min.: 2.8 [120 tools] Max.: 19.7 Min.: 2.8 [180 tools] Max.: 15.8 Min.: 2.8 [240 tools] Max.: 15.8 Min.: 2.8
APC	Number of pallets			2 [3 (3-station turn-type APC specifications)]
	Method of pallet change			Turn-type
	Pallet changing time* <excluding clamping and unclamping time>		s	6
Motor	Spindle drive motor	14,000 min^{-1}	kW (HP)	18.5/11 (24.7/15) <10 min/cont> {high-speed winding side}
		14,000 min^{-1} <high output>	kW (HP)	[37/22 (50/30) <25%ED/cont>]
		20,000 min^{-1}	kW (HP)	[18.5/15/11 (24.7/20/15) <10 min/30 min/cont>]
	Feed motor	X/Y/Z-axes	kW (HP)	1.6×2/4/4 (2.1×2/5.3/5.3)
		B-axis	kW (HP)	1.2 (1.6) [5.3/3.5 (7.1/4.7) <max./cont> {full 4th axis rotary table}]
	Coolant pump motor		kW (HP)	1.1 (1.5) <spindle+ceiling>/1.1 (1.5) <chip removable>
Power sources <standard>	Electrical power supply <cont>		I94105B01 kVA	32.8
	Compressed air supply		MPa (psi), L/min (gpm)	0.5 (72.5), 420 (110.9) {when the tool tip air blow is regularly used, air supply of 300 L/min (79.2 gpm) is required} <ANR>
Tank capacity	Coolant tank capacity		L (gal.)	500 (132)
Machine size	Machine height <from floor>		mm (in.)	2,711 (106.7)
	Floor space <width×depth>		mm (in.)	2,397×4,004 (94.4×157.6)
	Mass of machine		kg (lb.)	9,600 (21,120)
Noise data	A-weighted, time-average radiated sound pressure level		dB	61—75 (Measurement uncertainty is 4 dB)

[ ] Option ISO: 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. For details, please consult our sales representative.

- Max. spindle speed: depending on restrictions imposed by the workpiece clamping device, fixture and tool used, it may not be possible to rotate at the maximum spindle speed.
- Please use a two-face contact tool when cutting at 15,000 min^{-1} or higher.
- ANR: ANR refers to a standard atmospheric state; i. e., temperature at 20 °C (68 °F), absolute pressure at 101.3 kPa (14.7 psi) and relative humidity at 65%.
- Power sources, machine size: the actual values may differ from those specified in the catalogue, depending on the optional features and peripheral equipment.
- Compressed air supply: please be sure to supply clean compressed air <air pressure: 0.7 MPa (101.5 psi), pressure dew point: 10 ℃ (50 °F) or below>.
- A criterion capacity to select a compressor is 90 L/min (23.8 gpm) per 0.75 kW (1 HP). However, this figure may differ depending on the type of compressors and options attached. For details, please check the compressor specifications.
- Noise data: the measurement was performed at the front of the machine with a maximum spindle speed of 14,000 min^{-1}. For details, please consult our sales representative.
- The information in this catalog is valid as of June 2018.

<Precautions for Machine Relocation>

EXPORTATION:
All contracts are subject to export permit by the Government of Japan.
Customer shall comply with the laws and regulations of the exporting country governing the exportation or re-exportation of the Equipment, including but not limited to the Export Administration Regulations.
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.
If the Equipment is so-disabled, it can only be re-enabled by contacting DMG MORI or its distributor representative. DMG MORI and its distributor representative may refuse to re-enable the Equipment if it determines that doing so would be an unauthorized export of technology or otherwise violates applicable export restrictions.
DMG MORI and its distributor representative shall have no obligation to re-enable such Equipment.
DMG MORI and its distributor representative shall have no liability (including for lost profits or business interruption or under the limited service warranty included herein) as a result of the Equipment being disabled.

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

+ The information in this catalog is valid as of July 2018. Designs and specifications are subject to changes without notice.

+ The machines shown in the catalog may differ from the actual machines. The location and the size of the nameplates may also differ from the actual machines, or the nameplates may not be attached to some machines.

+ DMG MORI is not responsible for differences between the information in the catalog and the actual machine.

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