www.dmgmori.com

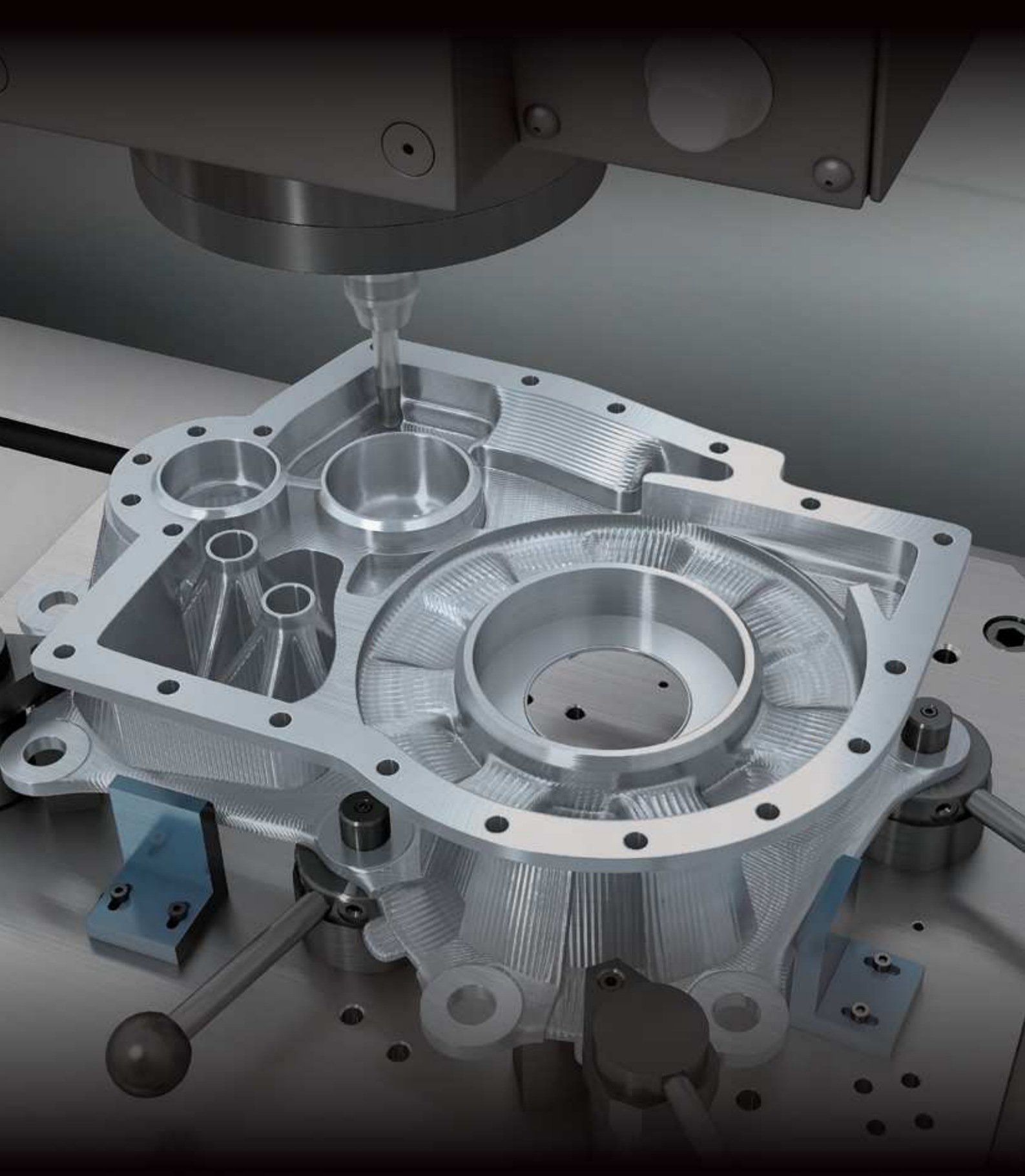
DMG MORI

High-Precision Vertical Machining Center

NV4000 DCG

Presenting the ideal vertical machining center.

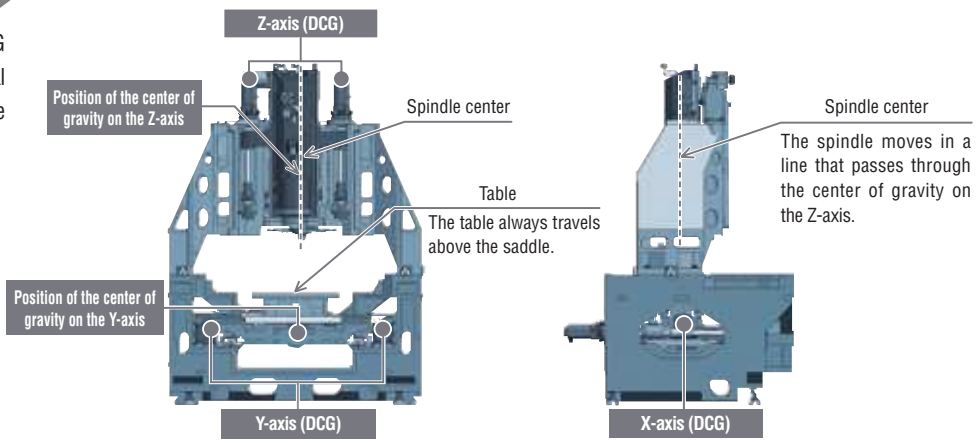
High speed and high-quality—in order to combine these conflicting factors,
DMG MORI took a fresh look at the structure of machine tools.
The best answer we came up with was the DCG (Driven at the Center of Gravity) technology,
which controls machine vibration.
The NV4000 DCG, a high-precision vertical machining center, achieves both high speed and
high quality thanks to the innovative technology.



Principal mechanisms

Basic structure

The NV4000 DCG incorporates the DCG on all axes. Also, DMG MORI's original structure made it possible to eliminate spindle and table overhang.



Driven at the Center of Gravity

DCG® Driven at the Center of Gravity

Original technology

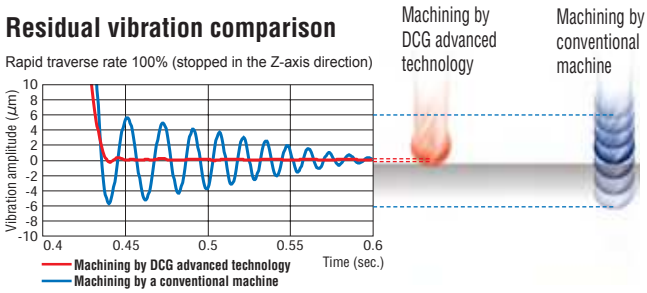
Our DCG technology controls vibration, which is one of the main enemies of high speed and high precision, by driving structural parts at their center of gravity.

Features of DCG

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

Residual vibration comparison

Rapid traverse rate 100% (stopped in the Z-axis direction)



Rapid traverse rate <X, Y and Z axes>

42 m/min (1,653.5 ipm)

Feedrate <X, Y and Z axes>

42 m/min (1,653.5 ipm) {for look-ahead control <theoretical value>}

Max. acceleration

Standard

X and Y axes 0.60 G {5.88 m/s² (19.29 ft/s²)}

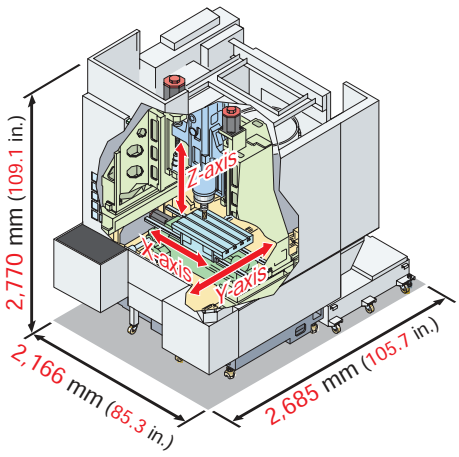
Z-axis 0.56 G {5.49 m/s² (18.01 ft/s²)}

High acceleration OP

X and Y axes 0.80 G {7.84 m/s² (25.72 ft/s²)}

Z-axis 1.10 G {10.78 m/s² (35.36 ft/s²)}

Axis configuration, machine size



Working area

Despite its compact body, the NV4000 DCG ensures a large work envelope suitable for various workpieces.

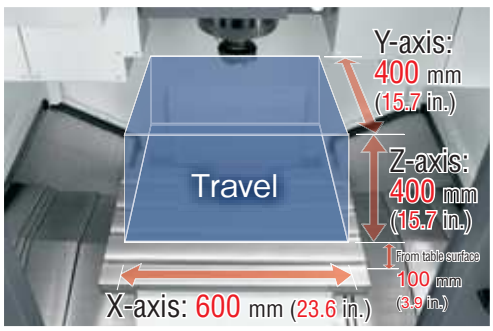


Table working surface

700×450 mm (27.6×17.7 in.)

ATC, Magazine

By using the ATC, which allows high-speed tool change, non-cutting time is dramatically reduced.

Tool changing time

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

20 tools	40 tools OP
5.5 sec. (max.)	10.9 sec. (max.)
3.6 sec. (min.)	3.6 sec. (min.)

- Without ATC shutter
- ISO 10791-9, JIS B6336-9
- The time differences are caused by the different conditions (travel distances, etc.) for each standard.
- Depending on the arrangement of tools in the magazine, the cut-to-cut (chip-to-chip) time may be longer.

Tool-to-tool 1.0 sec.

Tool storage capacity

20 tools
40 tools OP
60 tools OP

- For APC specifications, a dummy tool which is mounted on the spindle during APC operation is included.

We use a space-saving tool magazine that fits in the standard installation space even if options are selected.

ISO: International Organization for Standardization JIS: Japanese Industrial Standard

Spindle

Max. spindle speed

12,000 min^{-1}
20,000 min^{-1} OP
30,000 min^{-1} OP

- Please use a flange tool when cutting at 15,000 min^{-1} or higher.

Spindle acceleration time

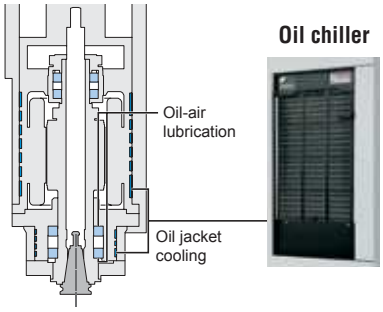
1.30 sec. (0→12,000 min^{-1})
2.43 sec. (0→20,000 min^{-1}) OP

Spindle deceleration time

1.17 sec. (12,000 min^{-1}→0)
2.20 sec. (20,000 min^{-1}→0) OP

Spindle cooling

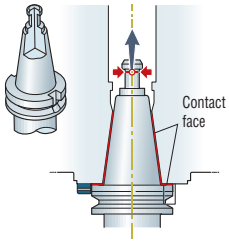
Stator coil in DDS motor: the coolant supplied by the oil chiller minimizes heat diffusion by circulating through an oil jacket, which is placed around the stator coil.



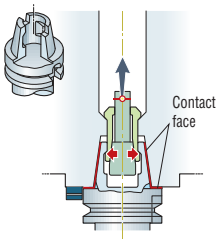
Two-face contact specifications OP

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.

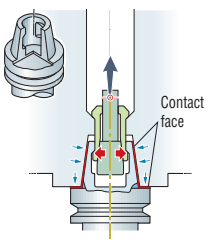
BT40*



HSK-A63



HSK-F63 (30,000 min^{-1} specifications only)



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

High-precision equipment

Direct scale feedback OP

The absolute magnetic linear scale (full closed-loop control) made by Magnescale is effective for high-precision positioning, and is available as an option.

Resolution

0.01 μm

Magnescale

High accuracy absolute scale

- High accuracy, high resolution
- Greater accuracy than optical scale
- Highly resistant to condensation and oil
- Vibration and impact resistant characteristics

Oil chiller (separate type) OP

An energy-saving oil chiller is used that delivers very little temperature fluctuation.

Coolant chiller (separate type) OP

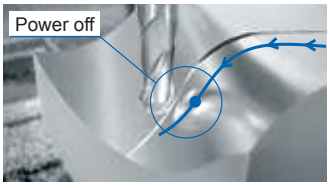
Increased coolant temperature causes thermal displacement in the fixtures and workpiece, affecting the machining accuracy of the workpiece. Use this unit to prevent the cutting coolant from heating up. When using oil-based coolant, the coolant temperature can become extremely high even with the standard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

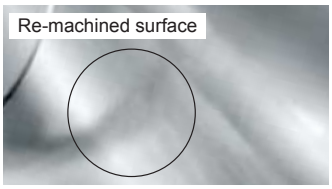
When using oil-based coolant, please be sure to consult with our sales representative.

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

Z-axis drop prevention function ideal for blackouts

Raising the spindle slightly during blackouts prevents any contact between the tool and the workpiece caused by the spindle dropping.

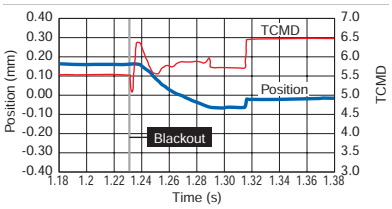




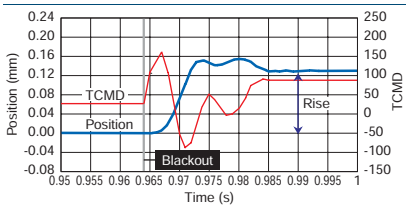
※ The Z-axis drop prevention function is not available in the following situations.

1. When the feed axis servo alarm has gone off.
2. When the power supply module alarm has gone off.
3. When the communication alarm between the CNC and the amp has gone off.

Before blackout countermeasure



After blackout countermeasure (Z-axis raised)



TCMD: Torque command

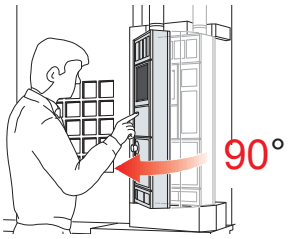
- Depending on how voltage drops (slowly or suddenly), it may not always be possible to detect a blackout.

Improved workability

Since the NV4000 DCG has been designed for ease of use, improvements have been made to the door width and distance from the workpiece, thereby enhancing overall convenience.

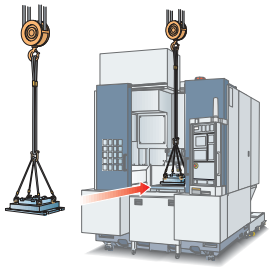
Swivel-type operation panel

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



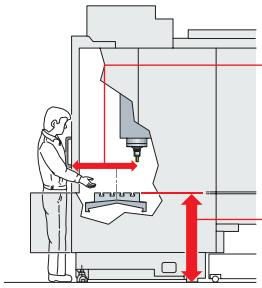
The open/close ceiling

The top panel can be opened and closed, making crane accessibility quick and easy.



Accessibility

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

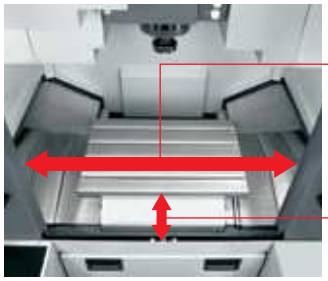


Distance from the front of the machine to the spindle center

640 mm (25.2 in.)

Distance from floor surface to table surface

900 mm (35.4 in.)



Door opening

885 mm (34.8 in.)

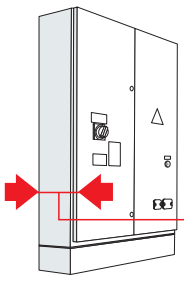
Distance from door to table

215 mm (8.5 in.)

Maintenance

The NV4000 DCG is designed with features for ease of maintenance to increase the machine operating rate.

Slimmer electrical cabinet



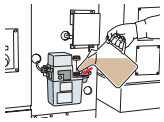
A slim electrical cabinet closes the proximity between you and the insides of the machine during maintenance.

300 mm (11.8 in.)
<including doors>

Transparent magazine

Visibility of the magazine has been improved with the addition of a door with a window.

A closer lubrication tank



Centralized layout of devices

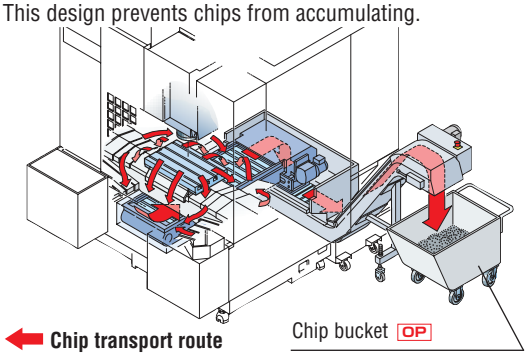
Controls are on the side panel to facilitate maintenance.

● The colors and configurations shown in the photographs or illustrations may differ from those of the actual product.

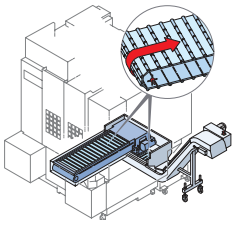
Peripheral equipment

Chip conveyor OP

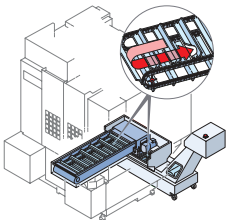
Chips that fall from the Y-axis tilted panel down into the center trough are automatically discharged out of the machine by the chip conveyor. This design prevents chips from accumulating.



Hinge type



Scraper type+drum filter type



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

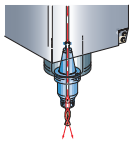
- Chip size guidelines
  Short: chips 50 mm (2.0 in.) or less in length, bundles of chips ϕ40 mm (ϕ1.6 in.) or less
  Long: bigger than the above
- The options table shows the general options when using coolant. Changes may be necessary if you are not using coolant, or depending on the amount of coolant, 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.

Through-spindle coolant system OP

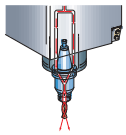
The through-spindle coolant system effectively eliminates chips, cooling the machine point, and lengthening the lives of your tools.

	Unit on coolant tank	Separate type
Discharge pressure MPa (psi)	1.5 (217.5)	1.5/3.5/7.0 (217.5/507.5/1,015)
Installation space <width×depth> mm (in.)	360×360 (14.2×14.2) (line filter unit)	820×1,120 (32.3×44.1) (high-pressure coolant system)
Water-soluble coolant	○	○
Oil-based coolant	×	○*
Coolant filtration accuracy	40 μm	20 μm

* Oil-based coolant may not be filtered appropriately depending on its viscosity. In such cases it is advisable to select the high-pressure coolant unit (special option), which uses a ceramic backwashing filter in the filtration system instead of a regular cyclone filter. Please contact our sales representative for details.



Center through



Side through

High-pressure coolant system (separate type)

⚠ 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 consult with our sales representative.

Rotary table DDRT Series OP

For models (4 axes)
DDRT-200X

It is possible to equip the machine with the high-speed, high-accuracy DDRT Series rotary table which incorporates the DDM (Direct Drive Motor). The high-efficiency machining using 4 axes and high-speed and high-precision indexing realize process integration.
(for details on the machining ranges, please consult with our sales representative.)

- Equipped with DDM
- Zero backlash
- Achieves high-precision indexing
- Offers stable machining through powerful clamping
- Allows high-efficiency machining using 4 axes

Rotational speed of the table

Conventional machine 17 min^{-1} ▶ DDRT-200X 150 min^{-1}
Compared with conventional machine Approx. 9 times greater

Positioning accuracy

Conventional machine 20 sec. ▶ DDRT SERIES 5 sec.
Compared with conventional machine 1/4

Features of DDM DDM® Direct Drive Motor

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

- The colors and configurations shown in the photographs or illustrations may differ from those of the actual product.

Measurement

For the measuring devices, an automatic measuring function can be selected alone or in combination with manual measuring functions.
Select the right devices for your use.

Automatic measurement OP

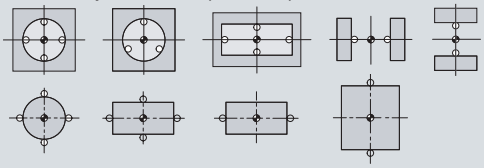
In-machine measuring system (spindle)

- Automatic centering and automatic measurement are possible.
- Automatic measurement applications are included.

Automatic measurement applications

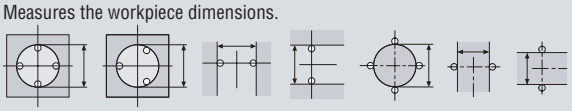
■ **Centering**

Automatically sets the workpiece zero point.



■ **Measurement**

Measures the workpiece dimensions.



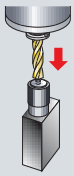
In-machine measuring system (table)

- Automatic tool length measurement and automatic breakage detection are possible.
- Automatic measurement applications are included.

Automatic measurement applications

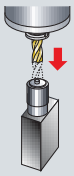
■ **Tool length measurement**

Measures tool length automatically.



■ **Tool breakage detection**

Prevent further damage with the automatic tool breakage detection.



Automatic measurement ⊕ Manual measurement functions OP

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

Workpiece measurement function OP

In-machine measuring system (spindle)
Touch sensor (optical signal transmission type)

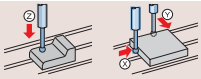
⊕

In-machine measuring system (spindle)
Inductive type touch sensor

Work setter function (manual measurement application)

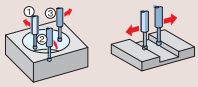
■ **Reference plane measurement**

The machining reference point can be calculated simply by applying the sensor from the Z, X and Y-axis directions.



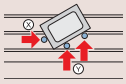
■ **Reference hole measurement**

Centering a boss, hole, groove or width can be done at any two or three points, simply by applying the sensor.



■ **Coordinate rotation measurement**

Machining can be done without changing the program even if the workpiece is attached crookedly, simply by performing this operation within the X-axis and Y-axis plane.



Tool measurement function OP

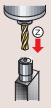
In-machine measuring system (table)
Touch sensor (tool length)

⊕

Tool setter function (manual measurement application)

■ **Tool length measurement**

The tool length value can be registered automatically to the designated tool offset number.



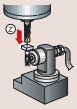
In-machine measuring system (table)
Touch sensor (tool length/tool diameter)

⊕

Tool setter function (manual measurement application)

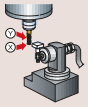
■ **Tool length measurement**

The tool length value can be registered automatically to the designated tool offset number.



■ **Tool diameter measurement**

The tool diameter value can be registered automatically to the designated tool offset number.



Transfer systems

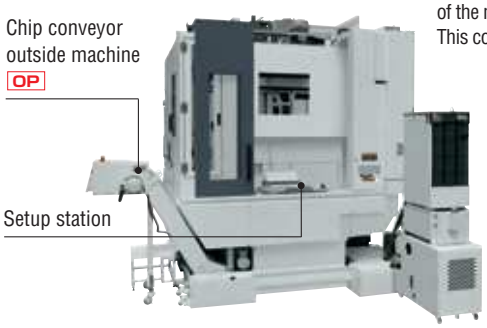
2-station turn-type APC

OP

- We have succeeded in equipping the machine with an APC in the same installation space as previous machines.
- The APC uses a 2-station turn-type design. Cycle time is shorter than that of a shuttle-type machine.
- The new design allows access from the back of the machine during APC setup.

Machine front

Machine rear



A new design allows access from the back of the machine when setting up the APC. This contributes to space savings.

- Separate space is needed for the oil chiller. Depth×width=843 mm×400 mm (28.5×15.7 in.) <on electrical cabinet side of machine rear>
- When APC is selected, raised column specifications <100 mm (3.9 in.) or 200 mm (7.9 in.)> are required.

Pallet changing time

13 sec.

- To prevent APC interference, this specification includes time required for the spindle protection tool to be moved until after the APC turning is complete.

Pallet size

600×400 mm (23.6×15.7 in.)

Tool storage capacity

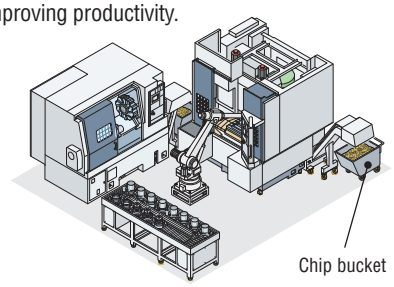
40/60 tools

- For APC specifications, a dummy tool which is mounted on the spindle during APC operation is included.

Workpiece transfer robot

OP Consultation is required

Robots make workpiece loading and unloading more efficient, improving productivity.



CPP (Carrier Pallet Pool) systems

OP Consultation is required

The CPP is a simple and packaged system with a one-level pallet.

- When the number of machines or workpiece setup stations is two or more, the MCC-CPS or MCC-LPS Ⅲ is required.
- For models and systems, please consult with our sales representative.
- The photo shows the NVD4000 DCG.

- The colors and configurations shown in the photographs or illustrations may differ from those of the actual product.

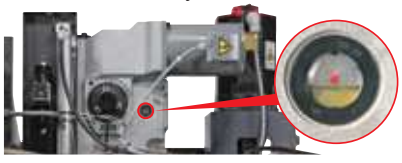
Reduction in environmental burden

Eco-friendly design

Reduced consumption of lubricating oil

Oil-bath ATC

An oil-bath design has been integrated into the ATC unitdesign. 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.

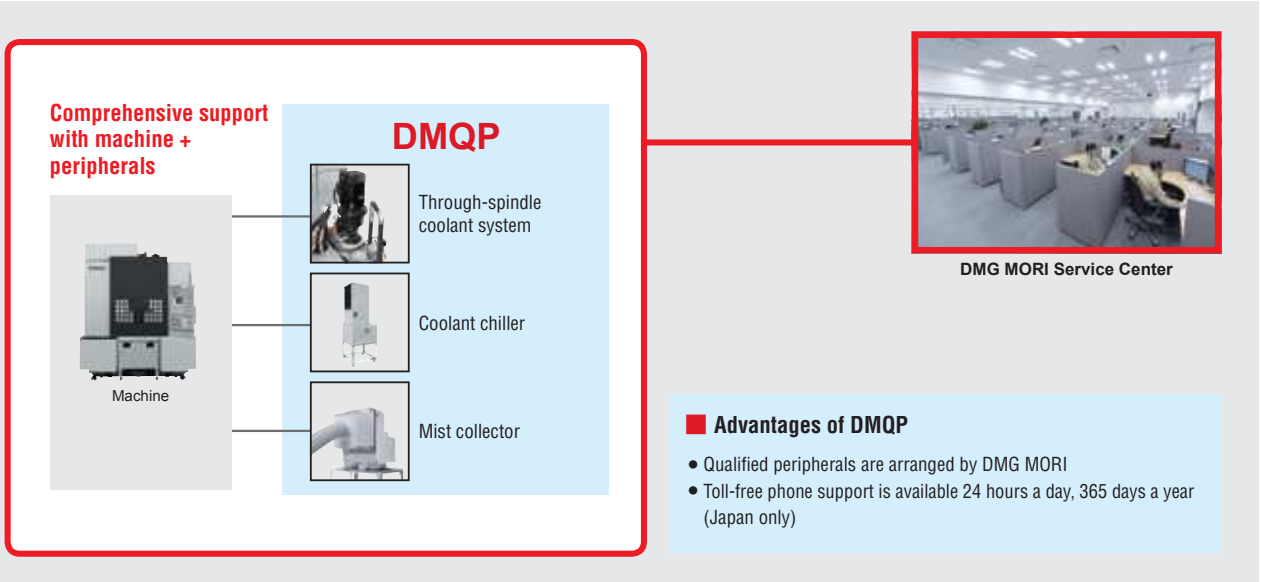
DMQP (DMG MORI Qualified Products) OP

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 (NV4000 DCG)

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

☐ **Coolant cooling system**
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.

☐ **In-machine measuring system (laser sensor)**

☐ **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.

☐ **Tool wagon**

☐ **Tool cabinet**

☐ **Basic tooling kit**

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

MAPPS Ⅳ

High-Performance Operating System
for Machining Centers

● 10.4-inch operation panel

High-performance operating 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**
- **New 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

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.

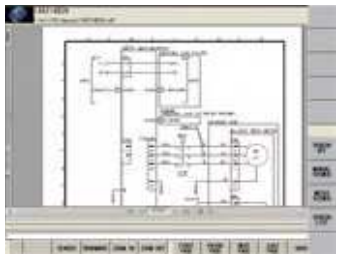
Main specifications

Main memory	1 GB
User area	Standard: 50 MB Option: 6 GB
Interface	·USB 2.0 2 ports (Screen side: 2) ·LAN 1 port (1000BASE-T) ·RS-232-C port (option)
Soft-keys	Right 10 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 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

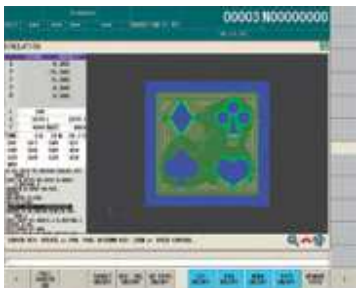
This function allows users to create programs simply by following the guidance on the screen.
Much of the programming process has been simplified due to the minimal key entry required for even the most complex shapes.

Machining menu

List display function

Contour input

Islands, open pockets* OP



MORI-POST advanced mode OP

DXF import function OP

* For Europe, this specification is provided as standard.

Application System

MORI Automatic Programming System for Machining Center

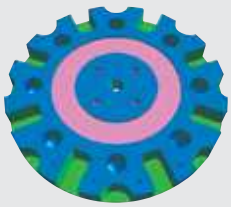
MORI-APM OP

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 May 2016.

MORI-NETWORK

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

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.

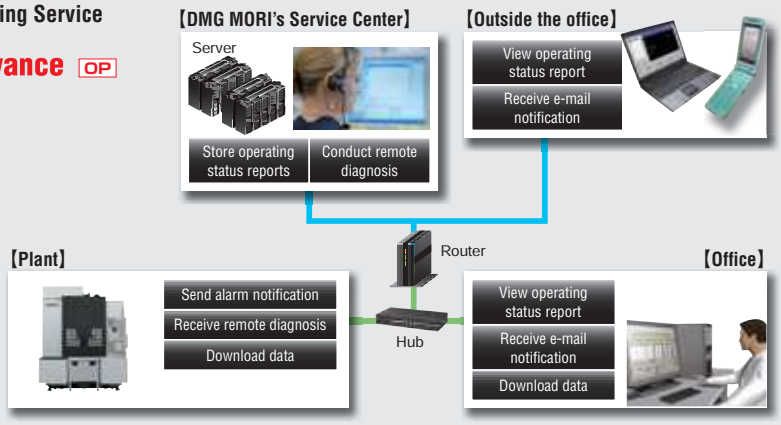
【Internet】
【LAN】

Remote Maintenance/Machine Operation Monitoring Service

MORI-NET Global Edition Advance OP

■ Features

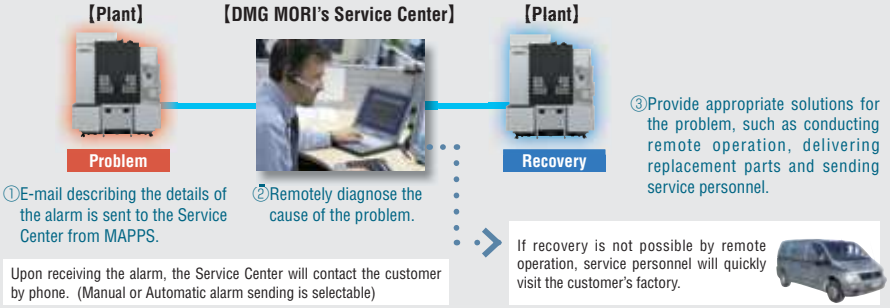
- Remote maintenance service by DMG MORI Service Center
- Internet-based, high speed (max. 1 Gbps), large capacity network
- No server installation is required — reduction in initial cost
- Download various data from the server located at DMG MORI



■ 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.

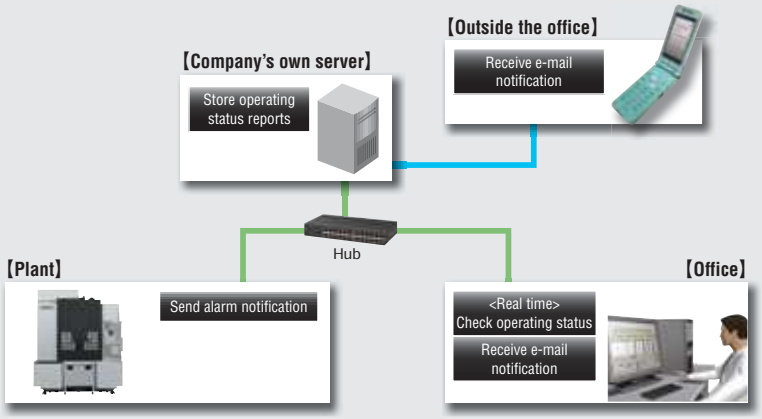


Machine Operation Monitoring System

MORI-NET LAN Edition 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

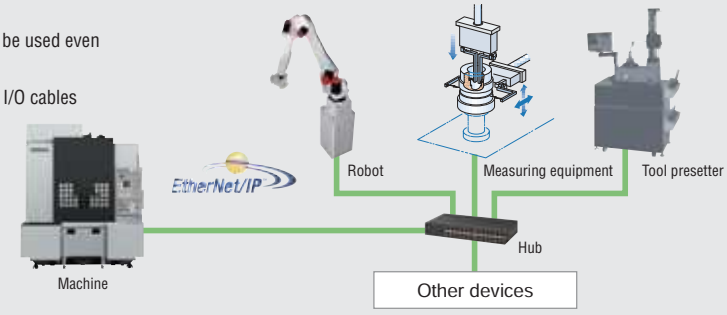
MAPPS EtherNet/IP I/F OP

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

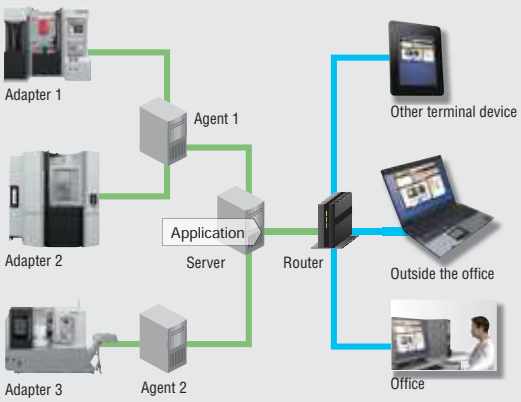
MAPPS MTConnect I/F

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.

<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, contact our sales representative.

+ The information in this catalog is valid as of May 2016. 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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