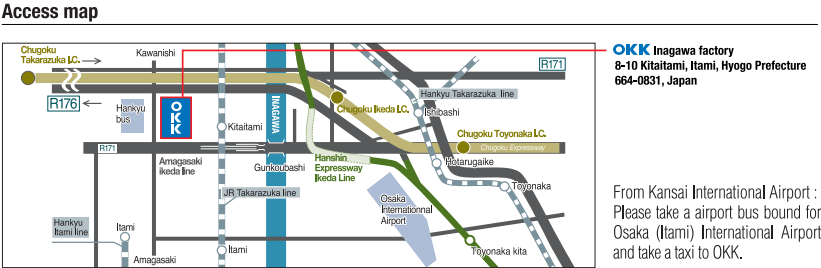


8-10, KITA-ITAMI, ITAMI
HYOGO 664-0831 JAPAN

TEL:(81)72-771-1112/1143
FAX:(81)72-772-7592
https://www.okk.co.jp
E-mail:ovsd@okk.co.jp



Technical Center

M-Plant

W-Plant

Technical center is for test cutting, demonstration and training.
M-plant is for machining and final assembly of machining center.
W-plant is for final assembly of large sized machining centers.
All are located at Inagawa, Itami city, Hyogo, Japan

INAGAWA PLANT:
8-10, KITA-ITAMI, ITAMI, HYOGO 664-0831 JAPAN
TEL:(81)72-782-5121
FAX:(81)72-772-5156
E-mail:eigibu@okk.co.jp

OKK A DIVERSIFIED MANUFACTURER OF MACHINE TOOLS

- Specializes In:**
- Machining centers
 - Graphite cutting machining centers
 - Grinding centers
 - CNC Milling machines
 - Conventional milling machines
 - Total die and mold making systems
 - Flexible manufacturing cells and systems

Other Products Include:
Water Maters

NOTE :
OKK reserves the right to change the information contained in this brochure wihtout notice.
OKK is not responsible to make changes to previously sold machines or accessories.
The machines in the photographs of this brochure may include optional accessories.

The export of this product is subject to an authorization from the government of the exporting country.
Check with the government agency for authorization.

Vertical Machining Center

VM/R II SERIES

VM43R II
VM53R II
VM76R II



VM/R II SERIES

VERTICAL MACHINING CENTER

High Rigidity Heavy Cutting

This vertical machining center series inherits high rigidity traditionally.

Wide column increases rigidity further !

Higher in accessibility and maintainability and easier to use than conventional machines.

Box guide way that is used traditionally provides excellent accuracy and rigidity.

Stable machining of the parts from the general ones to the ones made of the hard-to-cut materials such as titanium is possible with those machining centers and their high rigidity.

The REAL Machine



VM43R II

Travel distance
(X axis × Y axis × Z axis) **630 × 430 × 460mm**
(24.80" × 16.93" × 18.11")
Table size (X axis × Y axis) **800 × 420mm** (31.50" × 16.54")
Spindle motor output
(Short-term/
Continuous ratings) **11/7.5kW** (15/10HP)
(No.40 MITSUBISHI/FANUC)
15/11kW (20/15HP) (No.40 FAI)
15/11kW (20/15HP) (No.50)



VM53R II

Travel distance
(X axis × Y axis × Z axis) **1050 × 530 × 510mm**
(41.34" × 20.87" × 20.08")
Table size (X axis × Y axis) **1050 × 560mm**
(41.34" × 22.05")
Spindle motor output
(Short-term/
Continuous ratings) **11/7.5kW** (15/10HP) (No.40)
18.5/15kW (25/20HP) (No.50)

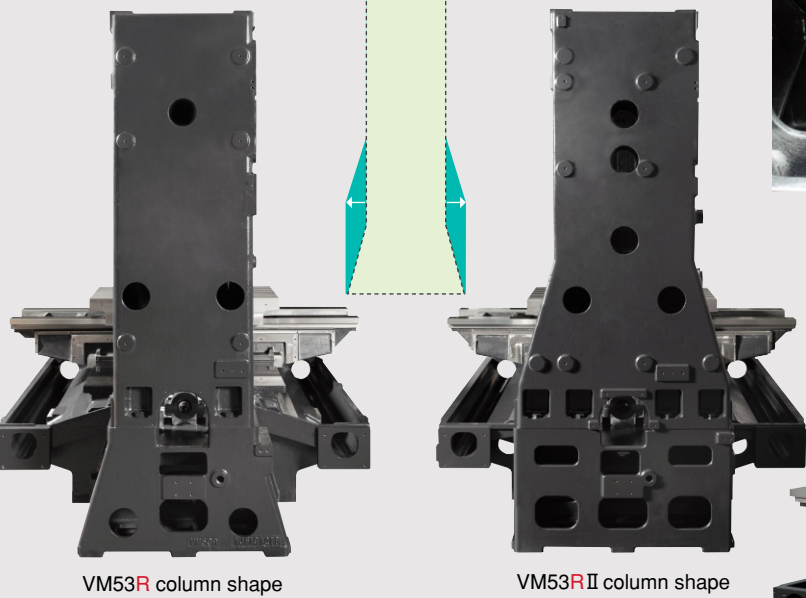


VM76R II

Travel distance
(X axis × Y axis × Z axis) **1540 × 760 × 660mm**
(60.63" × 29.92" × 25.98")
Table size
(X axis × Y axis) **1550 × 760mm**
(61.02" × 29.92")
Spindle motor output
(Short-term/
Continuous ratings) **37/18.5kW** (50/25HP) (No.40 FANUC)
37/22kW (50/30HP) (No.40 MITSUBISHI)
18.5/15kW (25/20HP) (No.50)

Increased rigidity as a result of review of the casting structure!

Tapered column base and increased base width provide higher rigidity. (VM43R II:130%, VM53R II/VM76R II:150% of conventional column width)

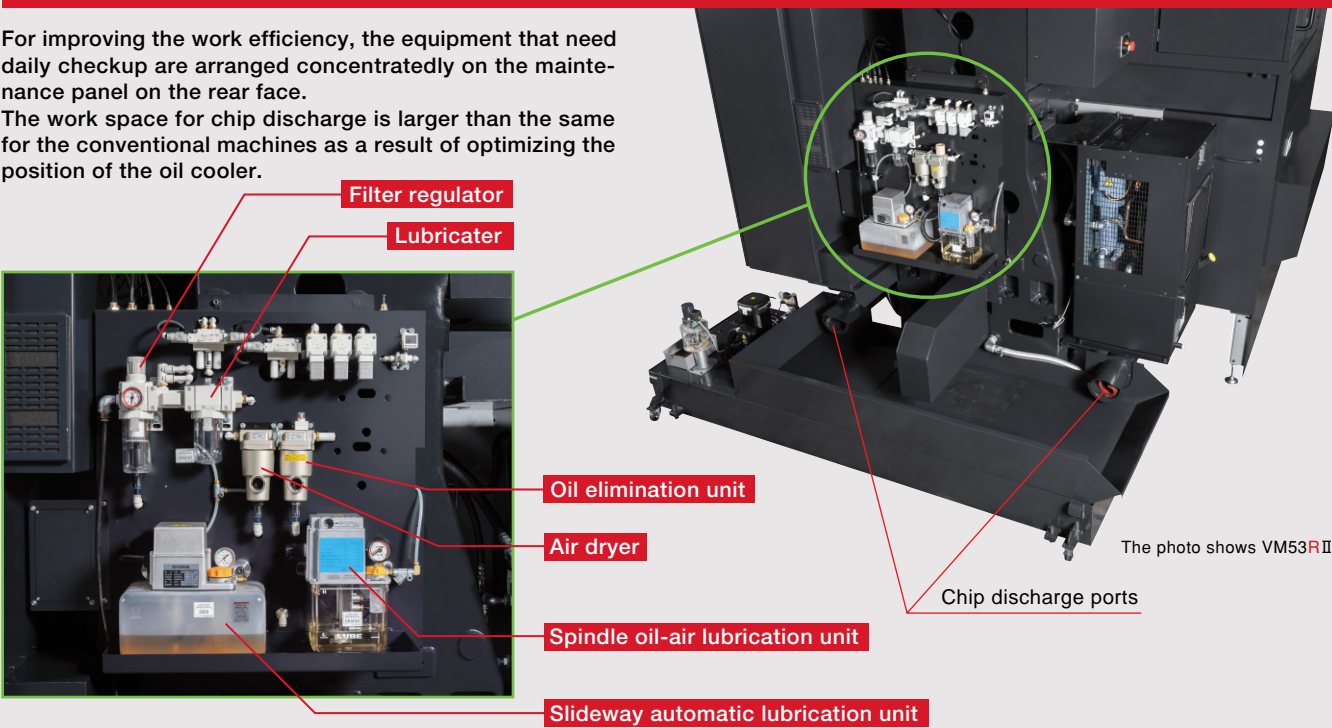


Increased rigidity of main body
High rigidity of the machines has become available by combining the wide column structure with the optimum design obtained from the analysis on the diagonal rib.



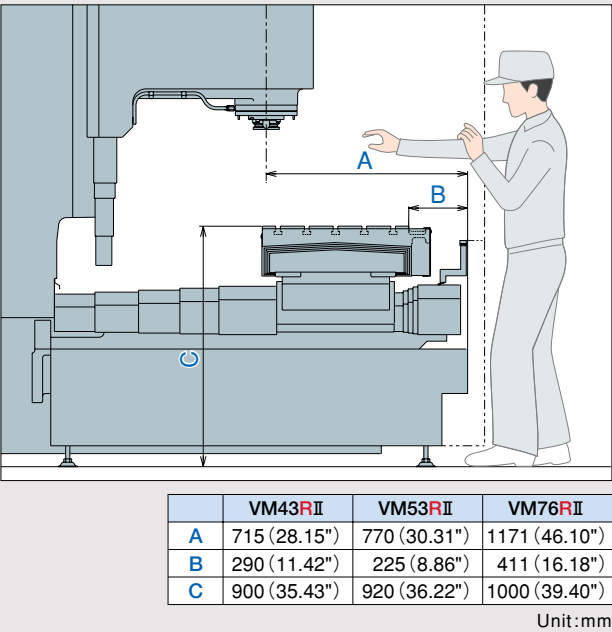
High maintainability

For improving the work efficiency, the equipment that need daily checkup are arranged concentratedly on the maintenance panel on the rear face. The work space for chip discharge is larger than the same for the conventional machines as a result of optimizing the position of the oil cooler.

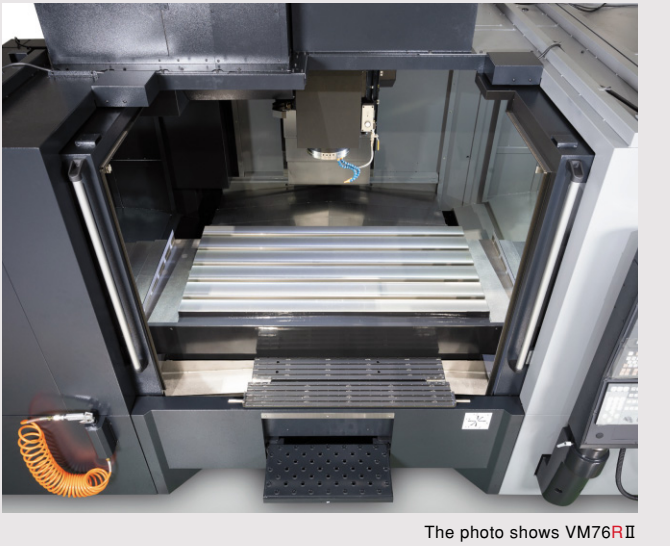


High accessibility and operability

Accessibility is greatly improved and higher operability is available due to 770-mm (30.31") distance to the spindle from the cover front face and 225-mm (8.86") distance to the table.

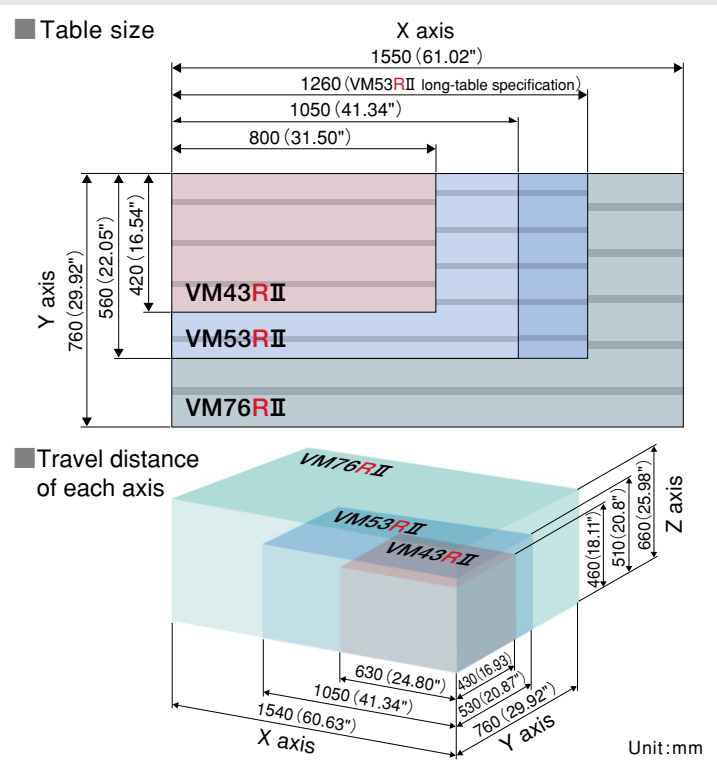


The front doors including the ceiling section open widely and allow smooth loading and unloading of workpieces with a crane. Large-sized VM76R II has storable steps and in-machine in its standard specifications for ease of the work inside the machine.



Wide machining area

Table size and travel distance



Increased turning range of the operation panel enables visual check of the operation panel from inside of the machine. (Available on all models.)

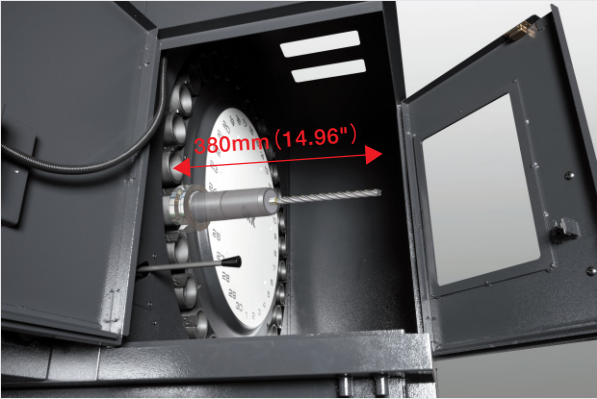


Functions for high operability and environmenta measure

Standard accessories

Compatibility with long tools (VM53R II / VM76R II)

The machines are compatible with 380-mm-long long tools.



Two LED lights on the right and left sides inside the machine

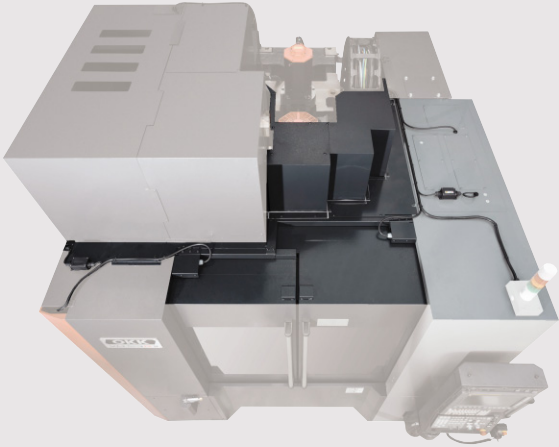


Timer function for oil skimmer



This function enables operating the oil skimmer for a certain period of time after the automatic power-off. Operation time can be set freely. It helps keep the coolant clean by collecting efficiently the oil that flows into the tank just after stoppage of the machine.

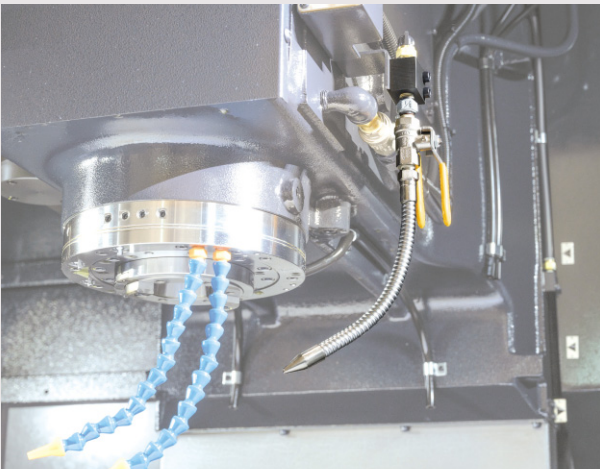
Top covers



Cleaning gun



Nozzles for blowing air toward the spindle



Options for automatization

Manual pallet changer

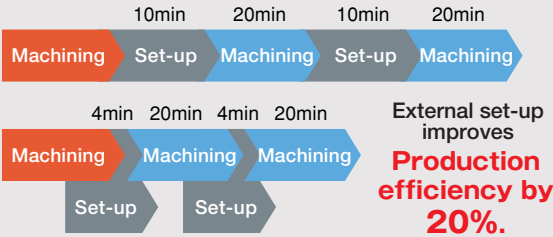
The manual pallet changer saves labor and improves efficiency by setting up externally with the pallet setup unit installed outside the machine. It is retrofittable at low cost. You can lay out the setup unit and the number of pallets freely. You can improve productivity while using the present machine.



Website video



The photo shows VM53R II

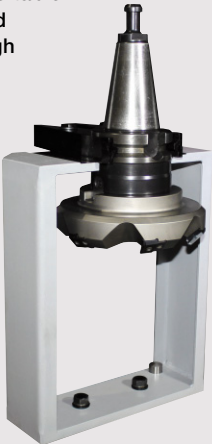


Tool attachment/detachment supporting device

This device enables access to the spindle from the table by just attaching a tool manually to the device placed on the table. Tools are exchanged automatically through the axial movement.



Website video



CRASYS — Robotic pallet change system

Robots take over the continued manufacturing for an hour after the operator moves away from the machine for lunch and after the closing time so as to improve operating efficiency of the machine. It is easily retrofittable to the existing machine. It is easy to operate and you can save labor easily.

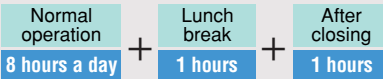


Website video

The photo shows VM53R



Result of the robotic operation



25% improvement of production efficiency

Remote-controlled nozzles

By changing the angle of nozzles easily with the M signals, you can supply coolant to the machining point efficiently. You can also expect the effect of longer tool life caused by the efficient coolant supply.



Website video

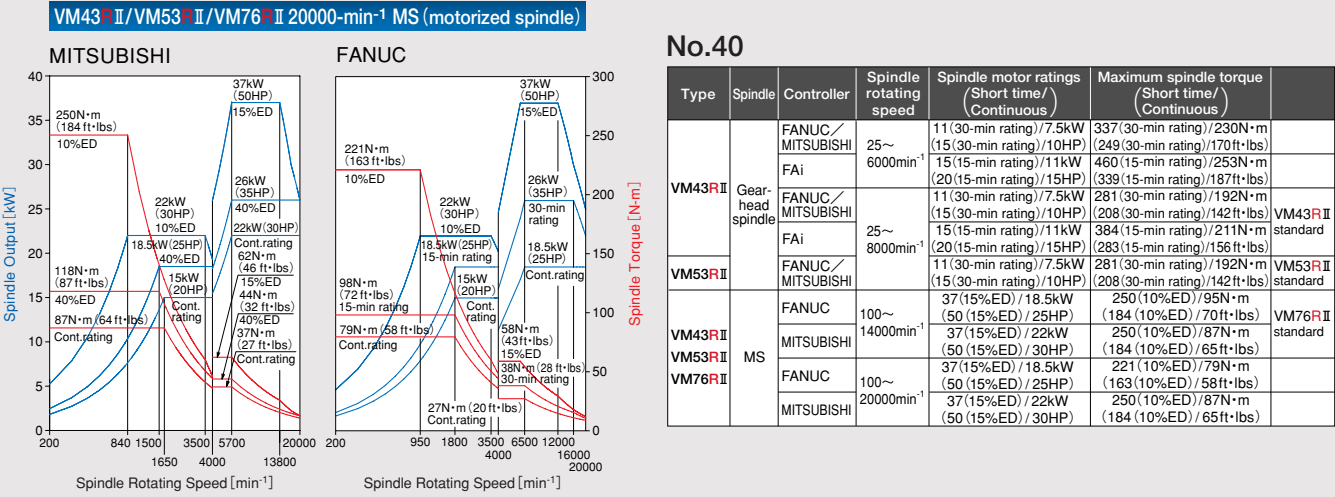
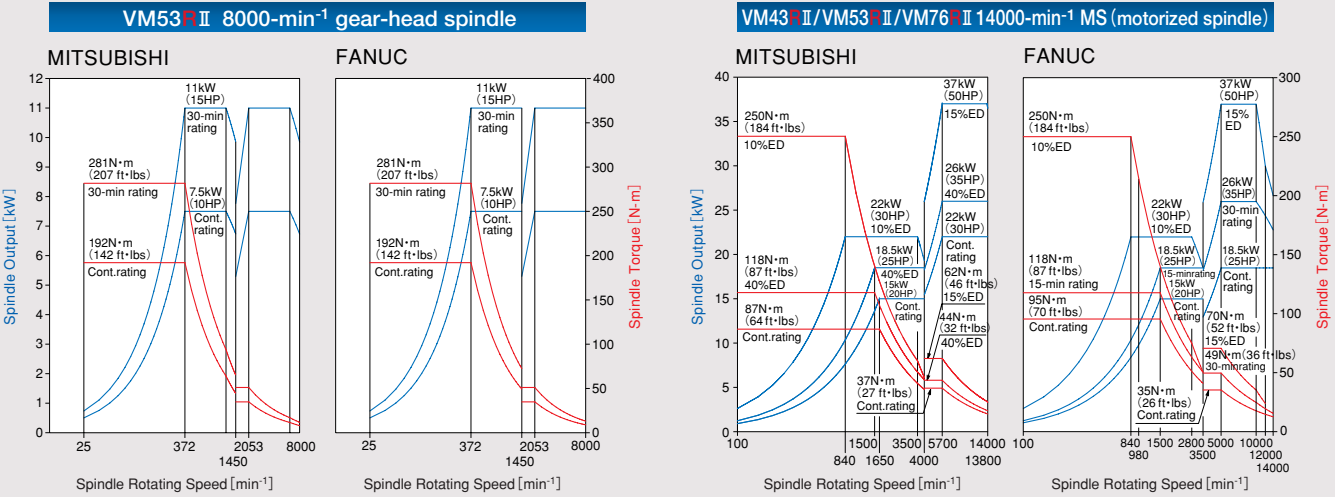
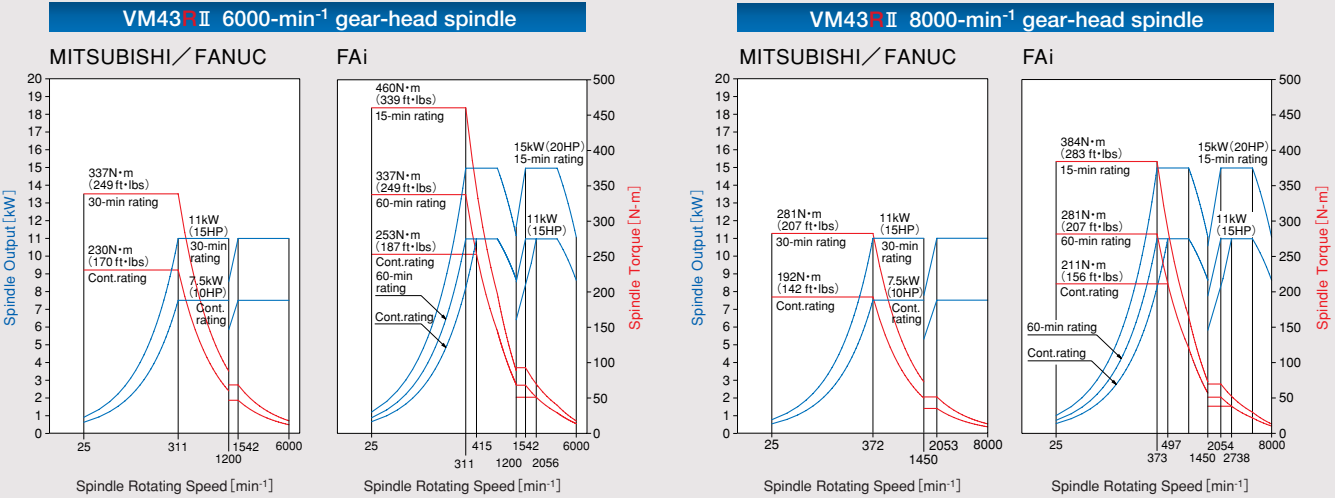


Other options

- Automatically opened and closed ATC cover,
- Automatically opened and closed front doors, and other flexible measures are available.

Rich variations of the spindle allow appropriate selection according to the machining

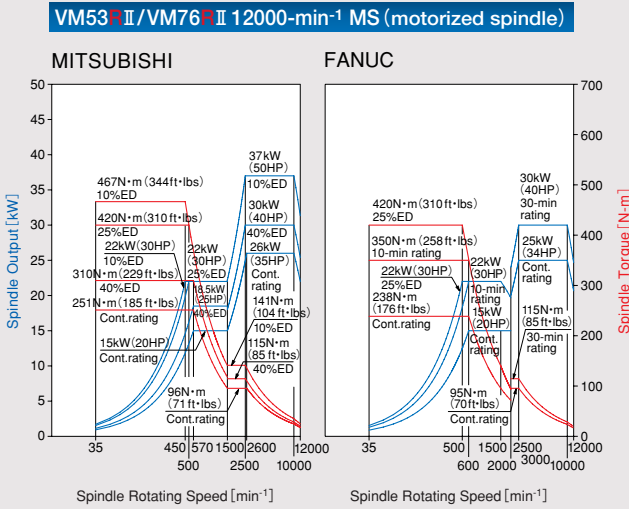
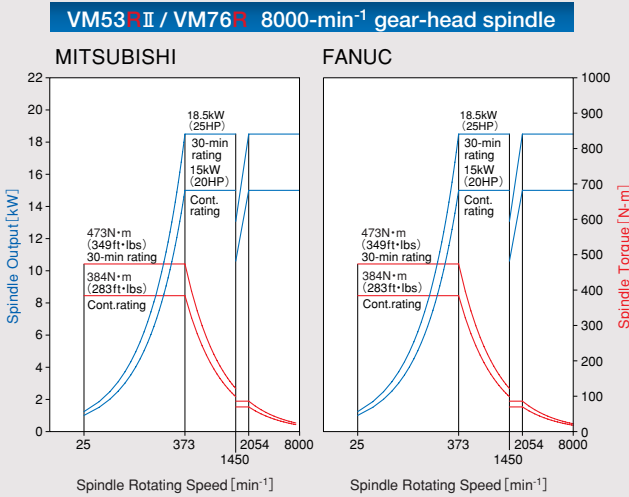
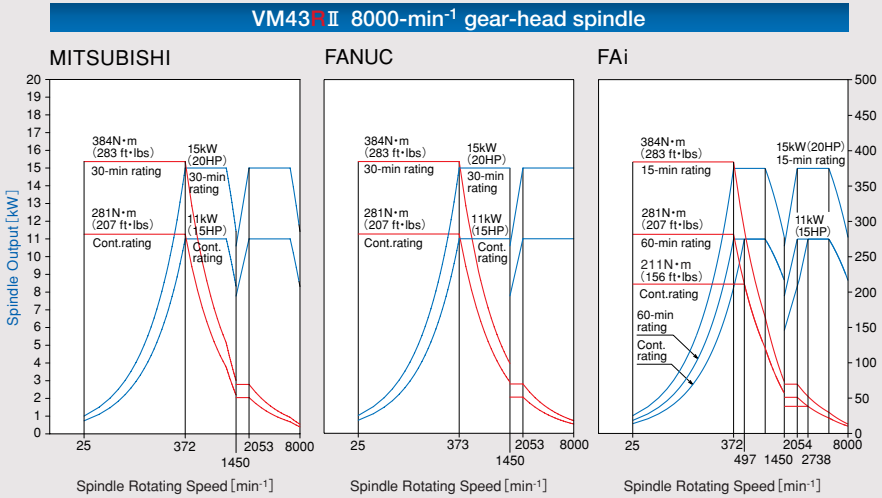
No.40



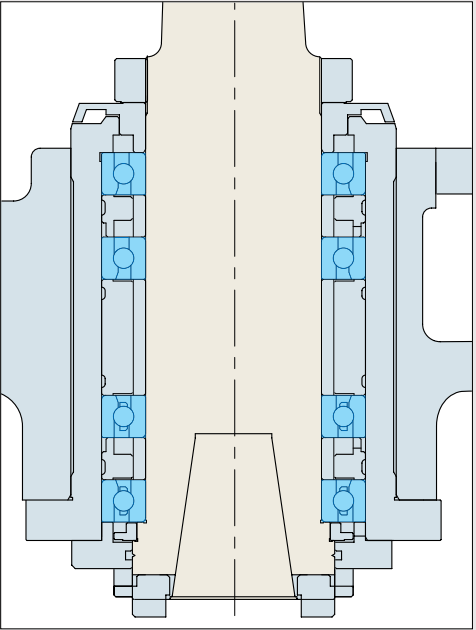
No.40

| Type | Spindle | Controller | Spindle rotating speed | Spindle motor ratings (Short time/Continuous) | Maximum spindle torque (Short time/Continuous) |
|----------|-------------------|------------------|----------------------------|--|--|
| VM43R II | Gear-head spindle | FANUC/MITSUBISHI | 25~6000min ⁻¹ | 11(30-min rating)/7.5kW (15(30-min rating)/10HP) | 337(30-min rating)/230N·m (249(30-min rating)/170ft·lbs) |
| | | FAi | | 15(15-min rating)/11kW (20(15-min rating)/15HP) | 460(15-min rating)/253N·m (339(15-min rating)/187ft·lbs) |
| | Gear-head spindle | FANUC/MITSUBISHI | 25~8000min ⁻¹ | 11(30-min rating)/7.5kW (15(30-min rating)/10HP) | 281(30-min rating)/192N·m (208(30-min rating)/142ft·lbs) |
| | | FAi | | 15(15-min rating)/11kW (20(15-min rating)/15HP) | 384(15-min rating)/211N·m (283(15-min rating)/156ft·lbs) |
| VM53R II | Gear-head spindle | FANUC/MITSUBISHI | 100~14000min ⁻¹ | 11(30-min rating)/7.5kW (15(30-min rating)/10HP) | 281(30-min rating)/192N·m (208(30-min rating)/142ft·lbs) |
| VM43R II | MS | FANUC | 100~14000min ⁻¹ | 37(15%ED)/18.5kW (50(15%ED)/25HP) | 250(10%ED)/95N·m (184(10%ED)/70ft·lbs) |
| VM53R II | MS | MITSUBISHI | 100~14000min ⁻¹ | 37(15%ED)/18.5kW (50(15%ED)/25HP) | 250(10%ED)/95N·m (184(10%ED)/70ft·lbs) |
| VM76R II | MS | FANUC | 100~14000min ⁻¹ | 37(15%ED)/18.5kW (50(15%ED)/25HP) | 221(10%ED)/79N·m (163(10%ED)/58ft·lbs) |
| | | MITSUBISHI | 100~14000min ⁻¹ | 37(15%ED)/18.5kW (50(15%ED)/25HP) | 250(10%ED)/95N·m (184(10%ED)/70ft·lbs) |

No.50



Highly rigid four-row angular bearing is used for all the spindles of this series.



No.50

| Type | Spindle | Controller | Spindle rotating speed | Spindle motor ratings (Short time/Continuous) | Maximum spindle torque (Short time/Continuous) |
|----------|-------------------|------------------|----------------------------|---|--|
| VM43R II | Gear-head spindle | FANUC/MITSUBISHI | 25~8000min ⁻¹ | 15(30-min rating)/11kW (20(30-min rating)/15HP) | 384(30-min rating)/281N·m (283(30-min rating)/207ft·lbs) |
| | | FAi | | 15(15-min rating)/11kW (20(15-min rating)/15HP) | 384(15-min rating)/211N·m (283(15-min rating)/207ft·lbs) |
| VM53R II | Gear-head spindle | FANUC/MITSUBISHI | 25~8000min ⁻¹ | 18.5(30-min rating)/15kW (25(30-min rating)/20HP) | 473(30-min rating)/384N·m (349(30-min rating)/283ft·lbs) |
| VM76R II | | FANUC | 100~12000min ⁻¹ | 30(30-min rating)/25kW (40(30-min rating)/34HP) | 420(25%ED)/238N·m (309(25%ED)/175ft·lbs) |
| | | MITSUBISHI | 100~12000min ⁻¹ | 30(10%ED)/26kW (40(10%ED)/35HP) | 467(10%ED)/251N·m (344(10%ED)/185ft·lbs) |

High cutting capability and highly accurate
high-quality machining

Highest-level heavy cutting capability

Cutting data Workpiece material : S45C

| | | |
|-----------------|-----------------------|---------------------|
| VM43R II :No.50 | 8000min ⁻¹ | 15/11kW (20/15HP) |
| VM53R II :No.50 | 8000min ⁻¹ | 18.5/15kW (25/20HP) |
| VM76R II :No.50 | 8000min ⁻¹ | 18.5/15kW (25/20HP) |

| | VM43R II | VM53R II / VM76R II |
|--|-----------------------------------|----------------------------------|
| Type of machining | Face milling φ125 (4.92") × 6T | |
| Spindle rotating speed min ⁻¹ | 500 | 560 |
| Width of cut (A) mm | 100 (3.94") | 100 (3.94") |
| Depth of cut (B) mm | 5 (0.20") | 6 (0.236") |
| Feed rate mm/min | 720 (28 ipm) | 1000 (39 ipm) |
| Cutting rate cm ³ /min | 360 (21.96 in ³ /min) | 600 (36.60 in ³ /min) |
| Spindle motor load % | 112 | 123 |

| | VM43R II | VM53R II / VM76R II |
|--|--|----------------------------------|
| Type of machining | Side milling φ80 (3.15") × 4 T [Roughing end mill] | |
| Spindle rotating speed min ⁻¹ | 450 | 450 |
| Width of cut (C) mm | 20 (0.79") | 30 (1.18") |
| Depth of cut (D) mm | 50 (1.97") | 50 (1.97") |
| Feed rate mm/min | 324 (13 ipm) | 270 (11 ipm) |
| Cutting rate cm ³ /min | 324 (19.76 in ³ /min) | 405 (24.70 in ³ /min) |
| Spindle motor load % | 101 | 89 |

| | VM43R II | VM53R II / VM76R II |
|--|--|----------------------------------|
| Type of machining | Drilling φ59 (2.32") [Throw-away type] | |
| Spindle rotating speed min ⁻¹ | 650 | 650 |
| Feed rate mm/min | 91 (4 ipm) | 91 (4 ipm) |
| Feed mm/rev | 0.14 (0.0058 in/rev) | 0.14 (0.0058 in/rev) |
| Cutting rate cm ³ /min | 249 (15.19 in ³ /min) | 249 (15.19 in ³ /min) |
| Spindle motor load % | 102 | 73 |

| | VM43R II | VM53R II / VM76R II |
|--|---|---------------------|
| Type of machining | Tapping M30 × P3.5 M48 × P5 | |
| Spindle rotating speed min ⁻¹ | 74 | 47 |
| Feed rate mm/min | 259 (10 ipm) | 235 (9 ipm) |
| Spindle motor load % | 35 | 85 |

The values shown above are reference values indicated as reference information about the cutting capability.

Highly reliable structure realizes the highly accurate
high-quality machining

Soft Scale III

Three functions for improving and maintaining accuracy

- 1 Variable backlash compensation II
Backlash changes with speed/position.
This function reduces the backlash by compensating it according to the slideway's characteristics (Patent No.4750496) .
- 2 Ball screw elongation compensation
This function reduces the error generation caused by repeated feeding and positioning.
- 3 Spindle's thermal displacement compensation
This function compensates the thermal displacement caused by rotation of the spindle.

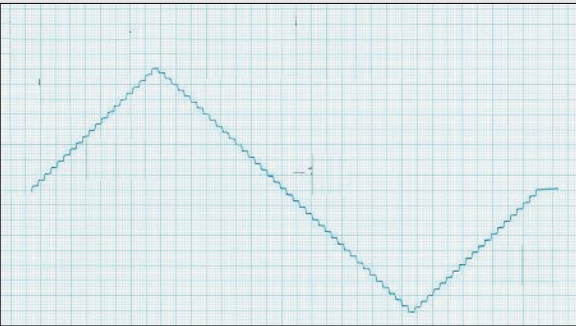
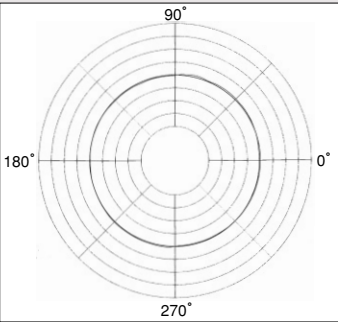


Diagram of 1-μm step-feed measurement



Circularity measurement example

Circularity measurement
VM43R II : 3.30 μm
VM53R II : 3.27 μm
VM76R II : 5.29 μm

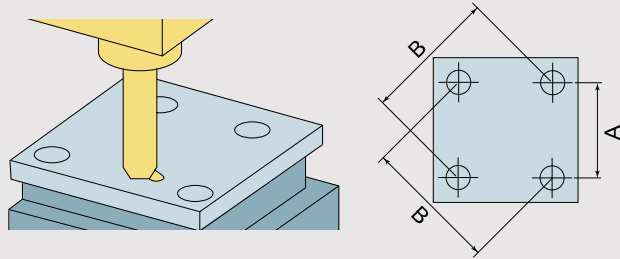
*The above data show the actual values.
The results may vary with the conditions.

Accuracy

Positioning accuracy (mm) (OKK tolerance)

| Item | VM43R II | VM53R II | VM76R II |
|-------------------------------|--|--|--|
| Positioning accuracy | X/Y/Z : ±0.0025 (±0.00010") / full stroke | X/Y/Z : ±0.0030 (±0.00012") / full stroke | X : ±0.0050 (0.00020") / full stroke Y/Z : ±0.0030 (0.00012") / full stroke |
| Repeated positioning accuracy | X/Y/Z : ±0.0015 (±0.00006") / full stroke | X/Y/Z : ±0.0020 (±0.00008") / full stroke | X/Y/Z : ±0.0020 (±0.00008") / full stroke |

Positioning machining accuracy



(mm)

| | VM43R II | VM53R II / VM76R II |
|---|-----------------|---------------------|
| A | 150 (5.91") | 200 (7.87") |
| B | 212.132 (8.35") | 282.843 (11.14") |

Example of actual machining (Unit : mm)

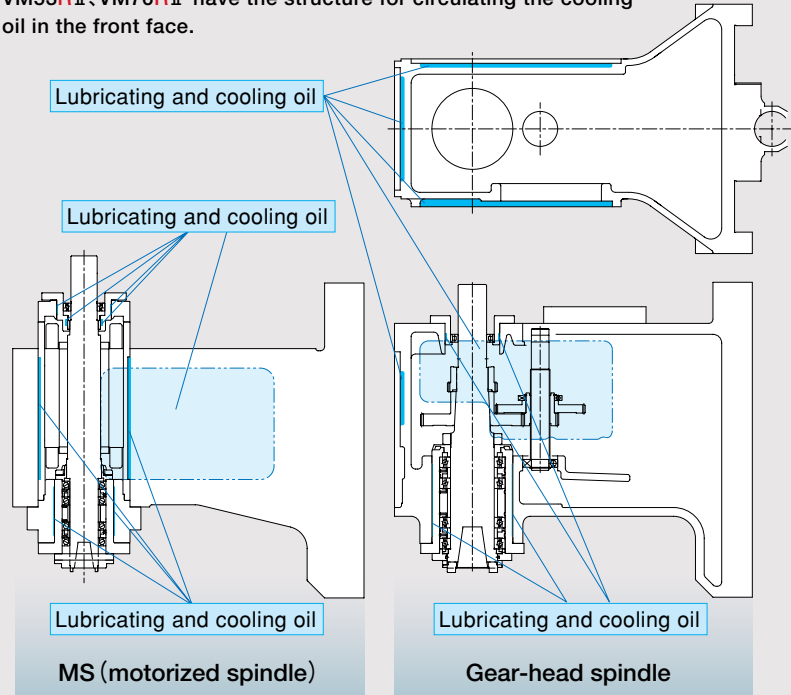
| Item | VM43R II | VM53R II | VM76R II |
|------------------------|------------------|------------------|------------------|
| Axial direction | 0.006 (0.00024") | 0.004 (0.00016") | 0.006 (0.00024") |
| Diagonal direction | 0.004 (0.00016") | 0.001 (0.00004") | 0.003 (0.00012") |
| Difference in diameter | 0.006 (0.00024") | 0.001 (0.00004") | 0.005 (0.00020") |

Notes

1. The data of the short-term machining are shown above as an example.
The results of the continuous machining may be different from the above.
2. The accuracy data obtained under OKK's in-house cutting test conditions are shown above as an example.
The results may vary with the cutting tools and the used jigs.
3. The above accuracy data are the laboratory data obtained by installing the machine according to OKK's foundation drawing and carrying the inspection based on OKK's inspection standard in an environment with controlled temperature.

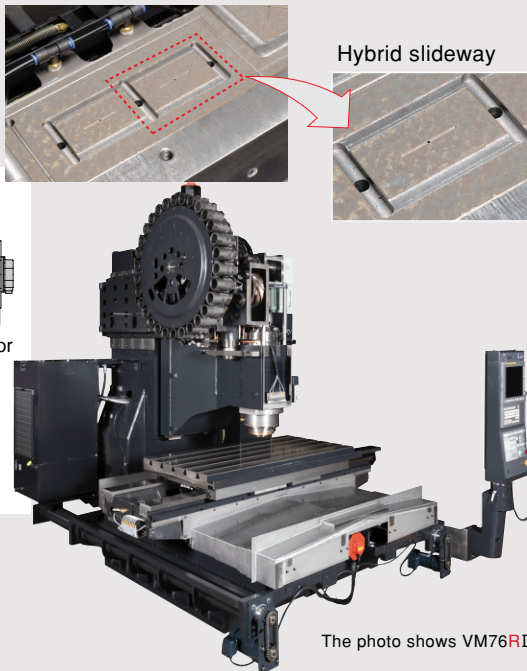
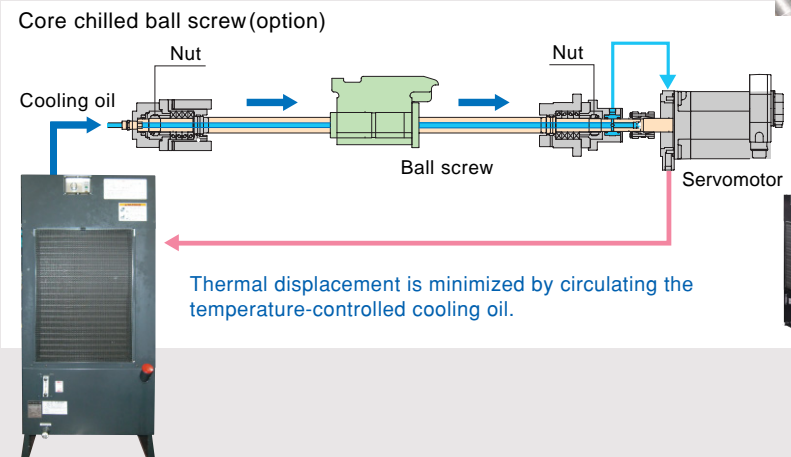
Enhanced measures against thermal displacement

In addition to the side face cooling, the No.50 gear-head spindles for VM53RⅡ、VM76RⅡ have the structure for circulating the cooling oil in the front face.



2-ton specification for allowable mass of a workpiece on the table (Option for VM76RⅡ)

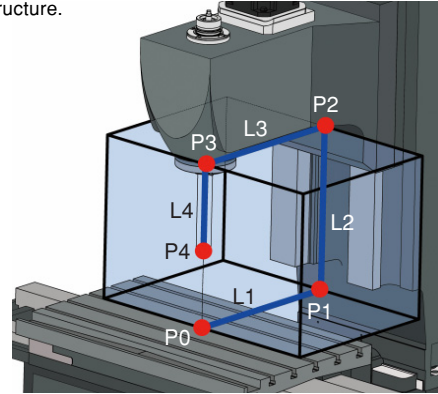
The small-lead ball screw used for the Y axis increases rigidity of the feed system and improves the machining accuracy. In addition, the hydrostatic air bearing decreases the frictional resistance and reduces the loading weight of the table. This specification helps improve the positioning accuracy, the characteristic of micro step feeding precision, and circularity.



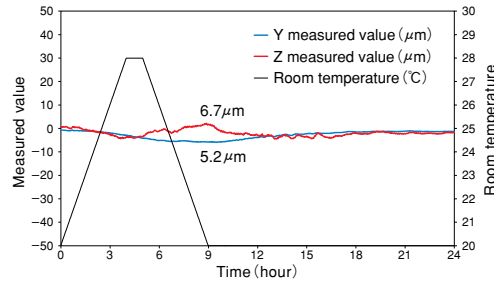
OKK's original environmental thermal displacement correction

Soft Scale Cube

Thermal displacement is corrected adequately by estimating thermal deformation of the reference space assumed in the machining center's machining area based on the information obtained through the temperature sensors in various sections of the machine structure.



Environmental thermal displacement measurement result
8 μ m/8°C can be attained with Soft Scale Cube.

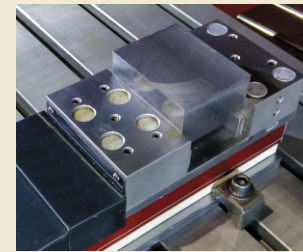


Automatic workpiece measurement by the use of a TOF camera

3D MEISTER (option)



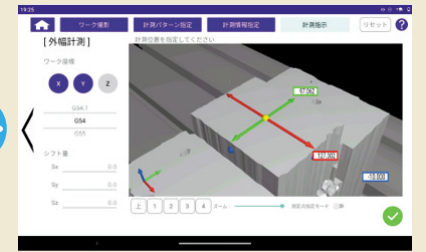
3D MEISTER



Photographing an actual workpiece



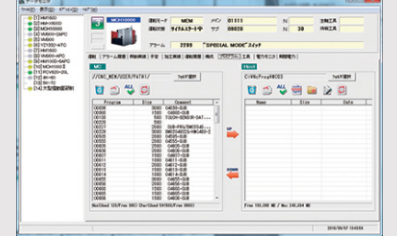
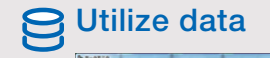
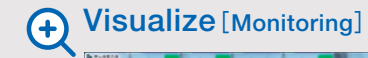
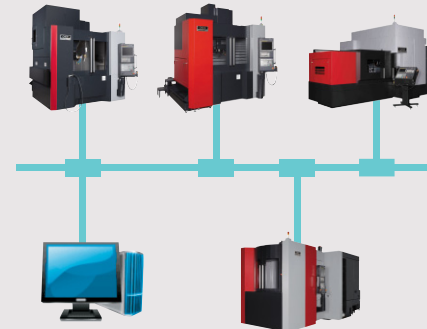
3D modeling



Automatic measurement for centering the workpiece

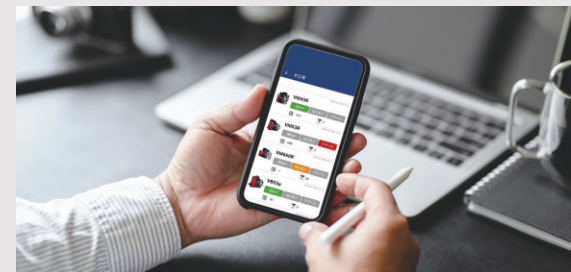
Batch management of data by using a PC/Smartphone

Net Monitor (option)



This function supports “connection”, “visualization” and “utilization of data” of the machine. It monitors the operating performance, the operation history, and the machining results and aggregates their data. It also enables batch management of the machining programs by the use of a PC.

Net Monitor remote control function (option)



At the desks...



On the move...



From outside...

Net Monitor is linked to the cloud service.
You can check a status of the machine and progress of machining even when you are outside the company or at home and even through a smartphone.
There is also the remote-control switch function.

OKK's Dedicated Control Functions

Programming Support Functions

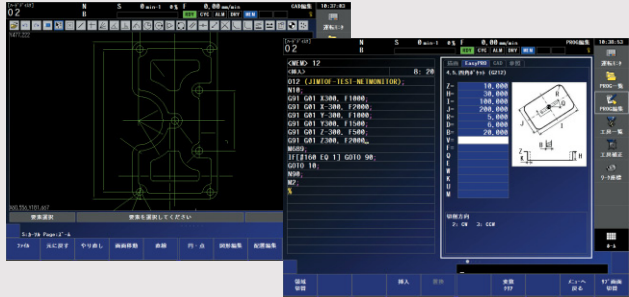
■ Program Editor

It enables editing the programs in the NC memory, the data server (or hard discs) and the memory cards. It also enables managing the programs, i.e., copying, deleting, changing the program name, etc.



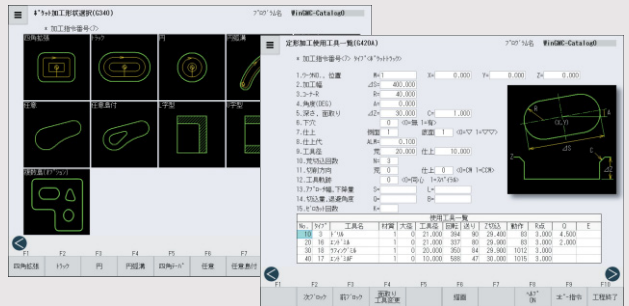
■ EasyPRO (Programming Support Function)

You can display the interactive guide screen and, while referring to the displayed guide charts and description, you can input the programs such as the macro programs for machining and measuring. The incorporated easy-to-operate CAD functions can be used for the input of coordinates, contour machining, etc.



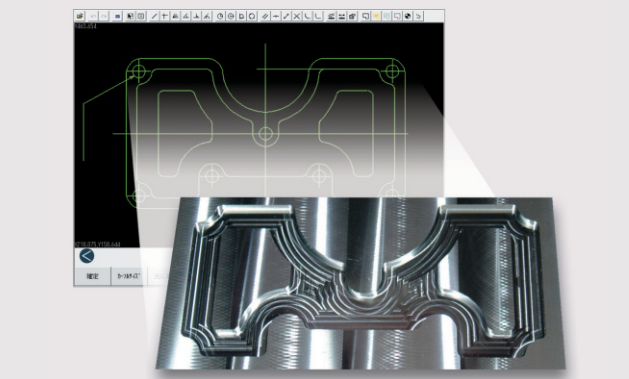
■ WinGMC8 (N830 standard function)

It is an interactive automatic NC programming function that is gentle to human being. It contains various menus such as the hole drilling, contouring, and pocketing. As the machining conditions and machining movements are determined automatically, you can make machining programs easily even if you are not familiar with the NC programs.



● Option H

It enables machining the pocket with multiple islands. As it contains the easy-to-operate CAD functions, you can use them to read out the CAD data and draw figures for machining complicated shapes.



Setup Support Functions

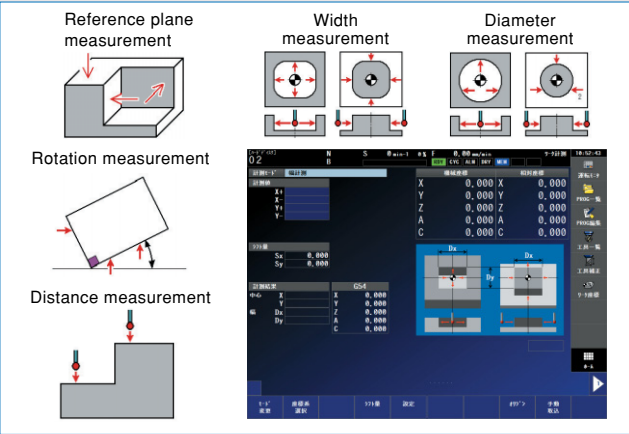
■ Tool Support

It enables batch management of each tool's various information such as the tool name, the form figure, and the offset number through a single screen. As it enables the tool measurement by just switching the menu, it is convenient for the setup operation.



■ T0 Softwaer (Option)

By just operating the handle and moving the sensor to the desired measuring point, you can measure manually and easily. Results of the measurement can be set as the data of the workpiece coordinate system or a specific tool offset number through the single key operation. (Touch Sensor T1-A or T1-B (option) is necessary.)



Performance Management and Maintenance Function

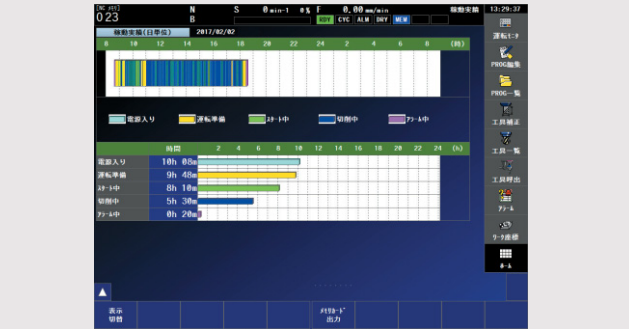
■ Help Guidance

It displays detailed information regarding the machine alarms and the method to recover when a problem occurs on the machine. It also displays a list of G-codes and description of the M signals.



■ Work Manager (Option)

It enables managing the number of machined workpieces and controlling the operation rate easily. It is useful for managing the machine's operational statuses as you can output and write the data to the memory cards.



Functions for Reduced Setup and Unmanned Operation

■ Soft AC (Option)

This function applies the feed rate override control automatically so that the value of the spindle load meter is constant. It helps prevent damages to tools caused by overload and improve cutting efficiency.

● Adaptive control function

Feed override control in the range of 10 to 200% is available. (An alarm is issued at the time of reaching the override lower limit value.)

● Air-cut reduction function

Feed rates during non-cutting operation can be increased up to 200%.

● Tool failure monitoring function

Specifications are similar to the soft CCM.

● Continuous unmanned machining at the time of tool failure

It can be combined with the automatic restart function (different option).

■ Soft CCM (Option)

It monitors the spindle load meter and stops operation when the meter value exceeds the preset value (set with the M signal or set for the relevant T numbers through the setting screen) and generation of abnormal tool load is determined.

High-efficiency Control Function

■ Hyper HQ Control (Option)

It improves the minute line segments processing capability and enables the high-speed machining.

◀N830's minute line segments processing capability▶

| Specification | Line segment data processing speed (m/min) | Commands |
|--------------------------|--|-------------------------|
| Without Hyper HQ control | 16.8 (661 ipm) | |
| Hyper HQ control mode I | 33.7 (1327 ipm) | ON : G5P1 OFF : G5P0 |
| Hyper HQ control mode II | 168 (6614 ipm) | ON : G5P2 OFF : G5P0 |

◀F31i's minute line segments processing capability▶

| Specification | Line segment data processing speed (m/min) | Commands |
|--------------------------|--|-----------------------------|
| Without Hyper HQ control | 15.0 (591 ipm) | |
| Hyper HQ control mode A | 30.0 (1181 ipm) | ON : G5.1Q1 OFF : G5.1Q0 |
| Hyper HQ control mode B | 150 (5906 ipm) | ON : G5.1Q1 OFF : G5.1Q0 |

The above values show (theoretical) maximum speeds for processing 1-mm-segment blocks construction a straight line.

■ HQ Tuner (Option)

It enables adjusting the parameters for the hyper HQ control according to the machining conditions. The hyper HQ control can be adjusted according to the process. For example, for roughing, the machining time can be reduced while focusing on the machining speed, and, for finishing, geometric accuracy of corners and arcs is improved by focusing on accuracy.



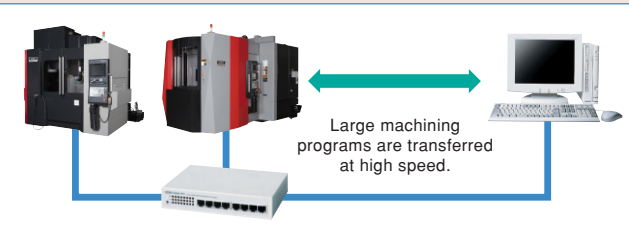
Network Function

■ Data Server (Option for F31i)

Large machining programs can be transferred to the data server through the network connected to the host computer. The transferred machining programs are executed as main programs or sub programs that are called up by using the M198.

■ Hard Disc Operation (N830 standard function)

Large machining programs can be transferred to the hard disc inside the machine through the network connected to the host computer. The transferred machining programs are executed as main programs or sub programs.



Main Specification

| Item | | Unit | Specification | |
|--|----------------|-------------------|---|--|
| | | | No.40 | No.50 |
| | | | Gear-head spindle | |
| | | | 8000min ⁻¹ | 8000min ⁻¹ |
| Travel on X axis (Table longitudinal direction) | | mm | 630 (24.80") | |
| Travel on Y axis (Saddle cross direction) | | mm | 430 (16.93") | |
| Travel on Z axis (Spindle head vertical direction) | | mm | 460 (18.11") | |
| Distance from table top surface to spindle nose | | mm | 150 to 610 (591" to 24.02") | |
| Distance from column front to spindle center | | mm | 445 (17.52") | |
| Table work surface area (X-axis direction×Y-axis direction) | | mm | 800 × 420 (31.50"×16.54") | |
| Max. workpiece mass loadable on table | | kg | 500 (1102 lbs) | |
| Table work surface configuration (T-slot nominal dimension × spacing × number of T slots) | | mm | 18 × 125 × 3 slots (0.71"×4.92"×3 slots) | |
| Distance from floor surface to table work surface | | mm | 900 (35.43") | |
| Spindle rotating speed | | min ⁻¹ | 25 to 8000 | 25 to 8000 |
| Number of spindle rotating speeds | | | 2 speeds | |
| Spindle nose (Nominal number) | | | 7/24-tapered No.40 Two-surface locking type | 7/24-tapered No.50 Two-surface locking type |
| Spindle bearing bore diameter | | mm | φ70 (dia.2.76") | φ85 (dia.3.35") |
| Rapid traverse rate | | m/min | X/Y:30 (1181ipm) | Z:20 (787ipm) |
| Cutting feed rate | | mm/min | 1 to 20000 (0.04 to 787ipm) (See Note 1) | |
| Jog feed rate | | mm/min | 2000 (79ipm) | |
| Type of tool shank (Nominal number) | | | BT40 two-surface locking tool | BT50 two-surface locking tool |
| Type of pull stud (Nominal number) | | | MAS1 45° | OKK 90° |
| Number of storable tools | | tools | 20 | |
| Max. tool diameter (with tools in adjoining pots) | | mm | φ82 (dia.3.23") | φ108 (dia.4.25") |
| Max. tool diameter (with no tools in adjoining pots) | | mm | φ110 (dia.4.33") | φ160 (dia.6.30") |
| Max. tool length (from the gauge line) | | mm | 350 (13.78") | 300 (dia 11.81") (See Note 2)) |
| Max. tool mass (moment) | | kg (N·m) | 10 (22 lbs) / 9.8 (7ft·lbs) | 20 (44 lbs) / 29.4 (22ft·lbs) |
| Tool selection method | | | Memory random method | |
| Tool exchange time (tool-to-tool) | | sec | 1.5 (Speed is changeable for heavy tools.) | 2.0 (Speed is changeable for heavy tools.) |
| Tool exchange time (cut-to-cut) | | sec | 5.0 (12.0 (See Note 2)) | 5.9 (12.9 (See Note 2)) |
| Spindle motor (Short-term rating / Continuous rating) | MITSUBISHI | kW | 11/7.5 (15/10HP) | 15/11 (20/15HP) |
| | FANUC (F31i-B) | kW | 11/7.5 (15/10HP) | 15/11 (20/15HP) |
| | FAi | kW | 15/11 (20/15HP) | 15/11 (20/15HP) |
| Feed motor | MITSUBISHI | kW | X/Y:2.0 (2.7HP) | Z:3.5 (4.7HP) |
| | FANUC (F31i-B) | kW | X/Y:3.0 (4HP) | Z:4.0 (5.4HP) |
| | FAi | kW | X/Y:1.8 (2.4HP) | Z:3.0 (4HP) |
| Motor for coolant pump | | kW | 1.1 (1.5HP) (60Hz) / 0.75 (1.01HP) (50Hz) | |
| Motor for slideway lubrication pump | | kW | 0.017 (0.02HP) | |
| Motor for spindle head cooling pump (oil cooler) | | kW | 1.2 (1.61HP) (compression) / 0.75 (1.01HP) (discharge) | |
| Motor for unclamping the spindle tool / ATC | | kW | 0.4 (0.54HP) | 0.75 (1.01HP) |
| Motor for turning the magazine | | kW | 0.2 (0.3HP) | 0.4 (0.54HP) |
| Motors for coil-type chip conveyors | | kW | 0.2 × 2 (0.3HP × 2) | |
| Power supply (See Note 3) | MITSUBISHI | kVA | 26 | 32 |
| | FANUC (F31i-B) | kVA | 24 | 29 |
| Supply voltage and supply frequency | | V·Hz | 200V±10% 50/60Hz±1Hz 220V±10% 60Hz±1Hz | |
| Compressed air supply pressure (See Note 4) | | MPa | 0.4 to 0.6 (58psi to 87psi) | |
| Compressed air supply flow rate (Atmospheric pressure) (See Notes 3 and 4) | | L / min (ANR) | 360 (95 gal) or more | |
| Coolant tank capacity (See Notes 3) | | L | 250 (66 gal) | |
| Spindle head cooling oil tank capacity (oil cooler) | | L | 50 (13 gal) | |
| Slideway lubrication oil tank capacity | | L | 6.0 (1.6 gal) | |
| Machine height (from the floor surface) | | mm | 2623 (103.27") | 2713 (106.81") |
| Required floor space (width × depth) | | mm | 1980×2710 (77.95"×106.69") | 2090×2710 (82.28"×106.69") |
| Machine mass | | kg | 5500 (12100 lbs) | 5700 (12600 lbs) |
| Operating environment temperature | | ℃ | 5 to 40 | |
| Operating environment humidity | | % | 10 to 90 (No condensation) | |

Note 1: The feed rate under the HQ or Hyper HQ control.

Note 2: ATC shutter specification

Note 3: The value for the standard specification. It may vary with added options.

Note 4: Purity of the supplied air should be equivalent to or higher than the Classes 3, 5 and 4 specified in ISO 8573-1 / JIS B8392-1.

Note: Use the machine in the appropriate environment as the machine installation environment affects accuracies of the machine and the machining.

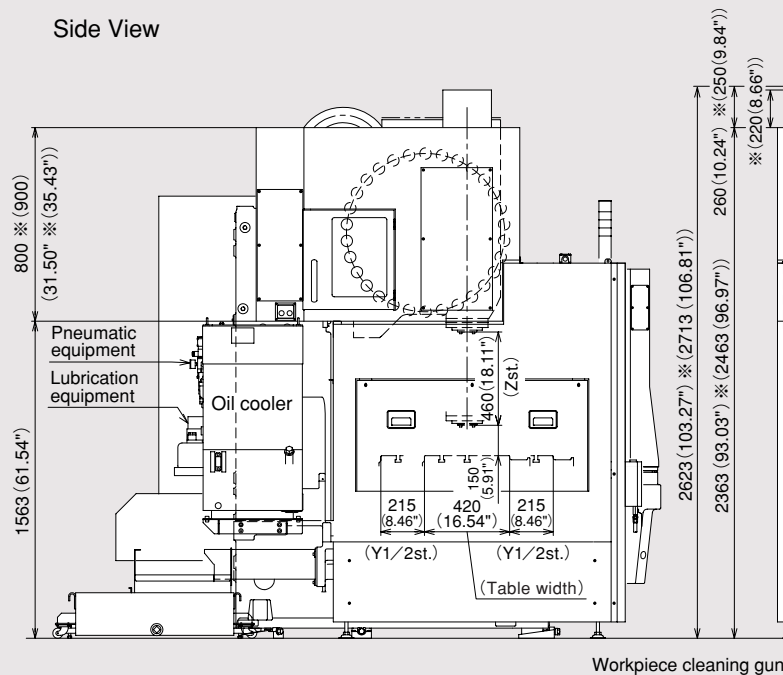
Standard Accessories

| Name | Qty | Remark |
|---|--------------|--|
| Lighting system | 1 set | Two LED lamps |
| Coolant unit (Separately-installed coolant tank) | 1 set | Tank capacity : 250L (66 gal) |
| Overall machine cover (Splash guard) | 1 set | Including electromagnetic locks on front doors and right and left maintenance covers |
| Magazine safety cover | 1 set | Including electromagnetic lock |
| Slideway protection steel sliding covers for X, Y and Z axes | 1 set | |
| Spindle head lubricating oil temperature controller | 1 set | |
| Slideway lubrication unit | 1 set | |
| Rear-discharging coil-type chip conveyor (including the reverse rotation function) | 2 sets | 1 set for each of right and left sides |
| Oil skimmer | 1 set | Screw type |
| Air blower | 1 set | |
| Signal lamp | 1 set | 3-lamp type including buzzer alarm |
| Workpiece cleaning gun | 1 set | Shower gun type (normal pressure) |
| Tool removing device | 1 set | Manual operation type |
| Leveling block | 1 set | |
| Earth leakage breaker | 1 set | |
| Automatic power off (with M02 or M30) | 1 set | |
| Electrical spare parts (fuses) | 1 set | |
| Safety manual and instruction manual for Soft Scale II m / II | 1 set / each | |
| Instruction manual, Foundation and Installation Instruction Manual, and Standard Specifications | 1 set / each | Standard Specifications are not included when Final Specifications are submitted. |
| Electrical instruction manual | 1 set | Including electrical diagrams |
| Instruction manual for integrated machining support software | 1 set | Including the manuals for Program Editor and Tool Support. Manuals are not submitted when FANUC Ai controller is used. |
| Supplementary manual for Manual Guide i | 1 set | This manual is not submitted when MITSUBISHI controller is used. |
| Manual for controller (NC) | 1 set | CD-ROM |
| Programming manual and operating procedures | 1 set / each | |

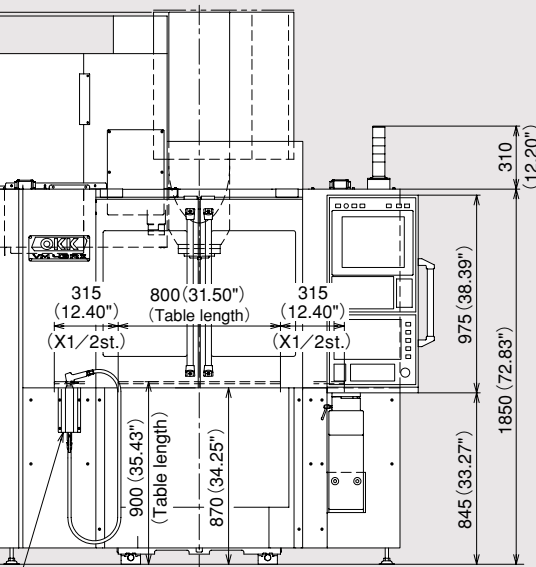
Special Accessories (Option)

| Item | Specification |
|---|--|
| Spindle motor | 6000min ⁻¹ (11/7.5kW (15/10HP)) (MITSUBISHI/FANUC) (No.40 gear-head) 14000min ⁻¹ (37/26/22kW (50/35/30HP)) (MITSUBISHI) (No.40-MS) 14000min ⁻¹ (37/26/18.5kW (50/35/25HP)) (FANUC) (No.40-MS) 20000min ⁻¹ (37/26/22kW (50/35/30HP)) (MITSUBISHI) (No.40-MS) 20000min ⁻¹ (37/26/18.5kW (50/35/25HP)) (FANUC) (No.40-MS) |
| Type of tool shank | CAT40, DIN40 / CAT50, DIN50 |
| Type of pull stud | No.40: MAS2 (60°) / OKK 90° No.50: MAS1 (45°) / MAS2 (60°) |
| Number of storable tools | 30 tools (Drum type) (No.40 only) |
| Pallet changer | Shuttle-type APC (T-slots / Tapped holes on pallet work surface specification) |
| Column raise (Column-UP) | 200mm (7.87") (Standard for the machine with APC) |
| Ejection of chips from the machine | Chip flushing with coolant (Sharing with the coil-type chip conveyor is not possible.) / Coil-type chip conveyor is excluded. |
| Splash guard | Front door automatic opening and closing specification |
| Automatically opened and closed ATC cover | Max. tool length is limited to 300mm (11.80"). |
| Signal lamp | 2-lamp type with/without buzzer alarm |
| Linear scale | X axis, Y axis, Z axis/X axis, Y axis |
| Compatibility with through-spindle | 2-MPa (290psi) coolant / 7-MPa coolant / Air / Preparation for coolant |
| Coolant cooler | Separate tank specification / Integrated with the high-pressure unit (High-pressure unit needs to be selected separately.) |
| Oil mist blower | |
| Minimal quantity coolant supply system | |
| Spindle-nose swirl stopper block | For high-power spindle / For angle attachment |
| Compatibility with oil hole holder | |
| Mist collector | Installed separately / Installation of the supplied equipment |
| Lift-up type chip conveyor | Hinged type / Scraper type / Scraper type with floor magnet / Backwashing filtration type for aluminum / Backwashing filtration type for aluminum and casting Chip discharge from left / right side |
| Chip bucket | Fixed chip bucket / Tilting chip bucket |
| Spare Thickener bag filter | 6 pieces (1 set) |
| Change of operation panel | Pendant type / Movable console type |
| 3-axis manual pulse generator | Stand type / Handy type |
| Foundation parts | For bond anchoring method |
| Bond for foundation work | HILTI |
| Change in machine coating color | Color specified by customer |
| Standard tool set | Including a tool box |
| NC rotary table | |
| Electrical indexing table (Rotary table with controller) | |
| Touch sensor system T0 | Workpiece measurement, Tool length/diameter measurement |
| Touch sensor system T1 (Workpiece measurement) | Workpiece measurement |
| Touch sensor system T1 (Tool measurement) | Tool length measurement, Tool break detection |

Side View

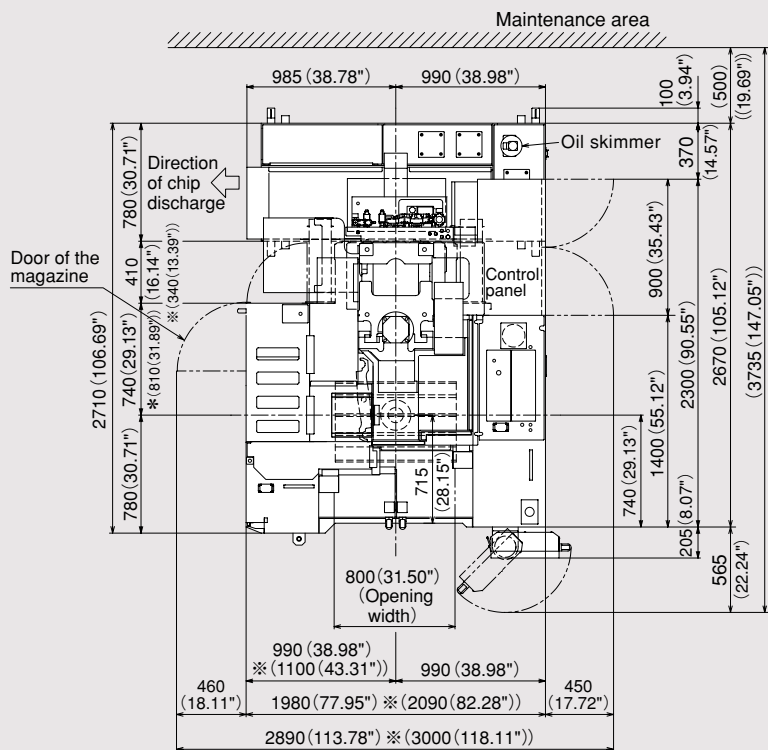


Front View



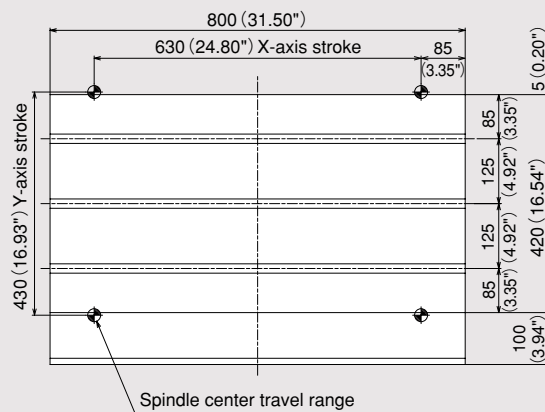
Note: Asterisked dimension changes with the machine specification.
※: No.50

Floor Space

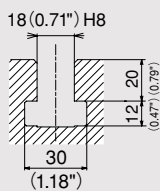


Note: Asterisked dimension changes with the machine specification.
※: No.50

Table Dimensions



T-slot Dimensions



Main Specification

| Item | Unit | Specification | |
|--|-------------------|---|--|
| | | No.40 | No.50 |
| | | Gear-head spindle | |
| | | 8000min ⁻¹ | 8000min ⁻¹ |
| Travel on X axis (Table longitudinal direction) | mm | 1050 (41.34") | |
| Travel on Y axis (Saddle cross direction) | mm | 530 (20.87") | |
| Travel on Z axis (Spindle head vertical direction) | mm | 510 (20.08") | |
| Distance from table top surface to spindle nose | mm | 150~660 (5.91" to 25.98") | |
| Distance from column front to spindle center | mm | 565 (22.24") | |
| Table work surface area (X-axis direction×Y-axis direction) | mm | 1050×560 (41.34"×22.05") | |
| Max. workpiece mass loadable on table | kg | 800 (1764 lbs) | |
| Table work surface configuration (T-slot nominal dimension × spacing × number of T slots) | mm | 18×110×5 slots (0.71"×4.33"×5 slots) | |
| Distance from floor surface to table work surface | mm | 920 (36.22") | |
| Spindle rotating speed | min ⁻¹ | 25 to 8000 | 25 to 8000 |
| Number of spindle rotating speeds | | 2 speeds | |
| Spindle nose (Nominal number) | | 7/24-tapered No.40 Two-surface locking type | 7/24-tapered No.50 Two-surface locking type |
| Spindle bearing bore diameter | mm | φ70 (dia.2.76") | φ100 (dia.3.94") |
| Rapid traverse rate | m/min | X/Y:30 (1181 ipm) | Z:20 (787 ipm) |
| Cutting feed rate | mm/min | 1 to 20000 (0.04 to 787ipm) (See Note 1) | |
| Jog feed rate | mm/min | 2000 (79ipm) | |
| Type of tool shank (Nominal number) | | BT40 two-surface locking tool | BT50 two-surface locking tool |
| Type of pull stud (Nominal number) | | MAS1 45° | OKK 90° |
| Number of storable tools | tools | 30 | |
| Max. tool diameter (with tools in adjoining pots) | mm | φ80 (dia.3.15") | φ103 (dia.4.06") |
| Max. tool diameter (with no tools in adjoining pots) | mm | φ110 (dia.4.33") | φ200 (dia.7.87") |
| Max. tool length (from the gauge line) | mm | 380 (14.96") | |
| Max. tool mass (moment) | kg (N·m) | 10 (22 lbs) / 9.8 (71·lbs) | 20 (44 lbs) / 29.4 (221·lbs) |
| Tool selection method | | Memory random method | |
| Tool exchange time (tool-to-tool) | sec | 2.0 (Speed is changeable for heavy tools.) | |
| Tool exchange time (cut-to-cut) | sec | 5.5 (13.5 (See Note 2)) | 5.9 (13.9 (See Note 2)) |
| Spindle motor (Short-term rating / Continuous rating) | MITSUBISHI | kW | 11 / 7.5 (15/10HP) |
| | FANUC (F31-B) | kW | 11 / 7.5 (15/10HP) |
| Feed motor | MITSUBISHI | kW | X / Y:2.0 (2.7HP) |
| | FANUC (F31-B) | kW | X / Y:3.0 (4.4HP) |
| Motor for coolant pump | kW | 1.1 (1.48HP) (60Hz) / 0.75 (1.01HP) (50Hz) | |
| Motor for slideway lubrication pump | kW | 0.017 (0.02HP) | |
| Motor for spindle head cooling pump (oil cooler) | kW | 1.2 (1.61HP) (compression) / 0.75 (1.01HP) (discharge) | |
| Motor for spindle oil-air lubrication pump | kW | — 0.017 (0.023HP) (60Hz) / 0.018 (0.024HP) (50Hz) | |
| Motor for unclamping the spindle tool / ATC | kW | 0.4 (0.54HP) | 0.75 (1.01HP) |
| Motor for turning the magazine | kW | 0.2 (0.3HP) | 0.4 (0.54HP) |
| Motors for coil-type chip conveyors | kW | 0.2 × 2 (0.3HP × 2) | |
| Power supply (See Note 3) | MITSUBISHI | kVA | 26 |
| | FANUC (F31-B) | kVA | 33 |
| Supply voltage and supply frequency | V·Hz | 200V±10% | 50/60Hz±1Hz |
| | | 220V±10% | 60Hz±1Hz |
| Compressed air supply pressure (See Note 4) | MPa | 0.4 to 0.6 (58 psi to 87 psi) | |
| Compressed air supply flow rate (Atmospheric pressure) (See Notes 3 and 4) | L / min (ANR) | 360 (95 gal) or more | |
| Coolant tank capacity (See Notes 3) | L | 280 (74 gal) | |
| Spindle head cooling oil tank capacity (oil cooler) | L | 50 (13 gal) | |
| Spindle oil-air lubrication oil tank capacity | L | — | 2.0 (0.5 gal) |
| Slideway lubrication oil tank capacity | L | 6.0 (1.6 gal) | |
| Machine height (from the floor surface) | mm | 2752 (108.35") | 2815 (110.83") |
| Required floor space (width × depth) | mm | 2825 × 2985 (111.22" × 117.52") | |
| Machine mass | kg | 7800 (17200 lbs) | 8000 (17600 lbs) |
| Operating environment temperature | °C | 5 to 40 | |
| Operating environment humidity | % | 10 to 90 (No condensation) | |

Note 1: The feed rate under the HQ or Hyper HQ control.

Note 2: ATC shutter specification

Note 3: The value for the standard specification. It may vary with added options.

Note 4: Purity of the supplied air should be equivalent to or higher than the Classes 3, 5 and 4 specified in ISO 8573-1 / JIS B8392-1.

Note: Use the machine in the appropriate environment as the machine installation environment affects accuracies of the machine and the machining.

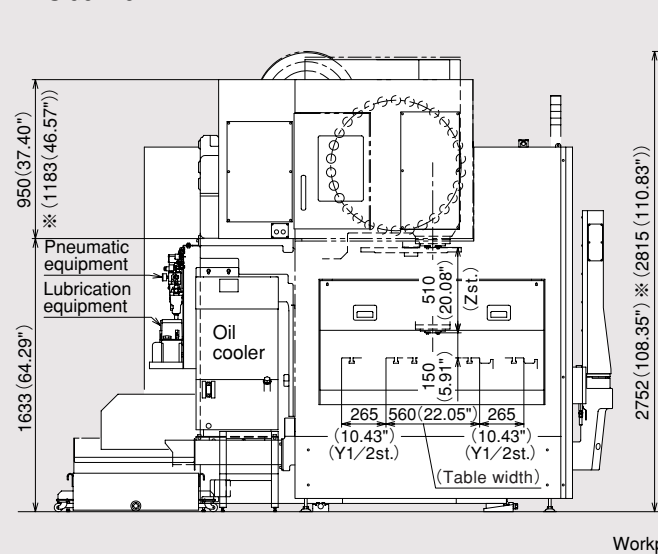
Standard Accessories

| Name | Qty | Remark |
|---|----------------|--|
| Lighting system | 1 set | Two LED lamps |
| Coolant unit (Separately-installed coolant tank) | 1 set | Tank capacity : 250L (66 gal) |
| Overall machine cover (Splash guard) | 1 set | Including electromagnetic locks on front doors and right and left maintenance covers |
| Magazine safety cover | 1 set | Including electromagnetic lock |
| Slideway protection steel sliding covers for X, Y and Z axes | 1 set | |
| Spindle head lubricating oil temperature controller | 1 set | |
| Slideway lubrication unit | 1 set | |
| Rear-discharging coil-type chip conveyor (including the reverse rotation function) | 2 sets | 1 set for each of right and left sides |
| Oil skimmer | 1 set | Screw type |
| Air blower | 1 set | |
| Signal lamp | 1 set | 3-lamp type including buzzer alarm |
| Workpiece cleaning gun | 1 set | Shower gun type (normal pressure) |
| Tool removing device | 1 set | Manual operation type |
| Leveling block | 1 set | |
| Earth leakage breaker | 1 set | |
| Automatic power off (with M02 or M30) | 1 set | |
| Electrical spare parts (fuses) | 1 set | |
| Safety manual and instruction manual for Soft Scale II μ /III | 1 set/ each | |
| Instruction manual, Foundation and Installation Instruction Manual, and Standard Specifications | 1 set/ each | Standard Specifications are not included when Final Specifications are submitted. |
| Electrical instruction manual | 1 set | Including electrical diagrams |
| Instruction manual for integrated machining support software | 1 set | Including the manuals for Program Editor and Tool Support. |
| Supplementary manual for Manual Guide i | 1 set | This manual is not submitted when MITSUBISHI controller is used. |
| Manual for controller (NC) | 1 set | CD-ROM |
| Programming manual and operating procedures | 1 set/ each | |

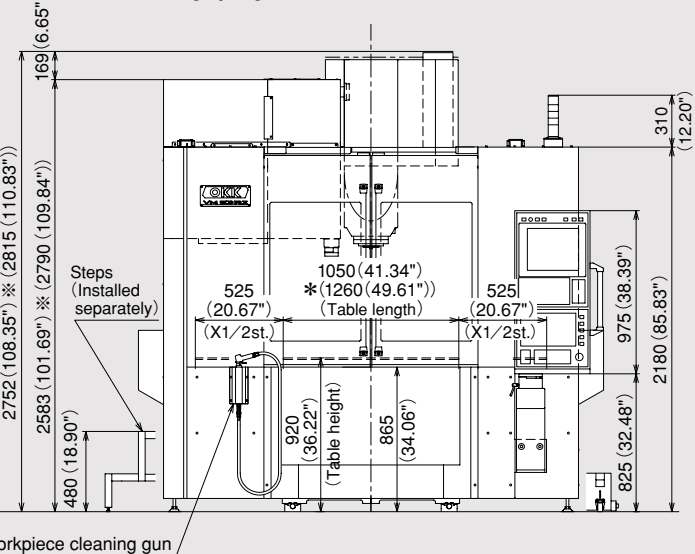
Special Accessories (Option)

| Item | Specification |
|---|---|
| Long-table specification | 1260-mm (49.61") table width |
| Spindle motor | 14000min ⁻¹ (37/26/22kW) (50/35/30HP) (MITSUBISHI) (No.40-MS) 14000min ⁻¹ (37/26/18.5kW) (50/35/25HP) (FANUC) (No.40-MS) 20000min ⁻¹ (37/26/22kW) (50/35/30HP) (MITSUBISHI) (No.40-MS) 20000min ⁻¹ (37/26/18.5kW) (50/35/25HP) (FANUC) (No.40-MS) 12000min ⁻¹ (37/30/26kW) (50/40/35HP) (MITSUBISHI) (No.50-MS) 12000min ⁻¹ (30/25kW) (40/34HP) (FANUC) (No.50-MS) |
| Type of tool shank | CAT40, DIN40 / CAT50, DIN50 |
| Type of pull stud | No.40: MAS2 (60°) / OKK 90° No.50: MAS1 (45°) / MAS2 (60°) |
| Number of storable tools | 40 tools (Chain type) |
| Pallet changer | Shuttle-type APC (T-slots / Tapped holes on pallet work surface specification) |
| Column raise (Column-UP) | 250mm (9.84") (Standard for the machine with APC) |
| Ejection of chips from the machine | Chip flushing with coolant (Sharing with the coil-type chip conveyor is not possible.) / Coil-type chip conveyor is excluded. |
| Splash guard | Front door automatic opening and closing specification |
| Automatically opened and closed ATC cover | |
| Signal lamp | 2-lamp type with/without buzzer alarm |
| Linear scale | X axis, Y axis, Z axis / X axis, Y axis |
| Compatibility with through-spindle | 2-MPa (290psi) coolant / 7-MPa coolant / Air / Preparation for coolant |
| Coolant cooler | Separate tank specification / Integrated with the high-pressure unit (High-pressure unit needs to be selected separately.) |
| Oil mist blower | |
| Minimal quantity coolant supply system | |
| Spindle-nose swirl stopper block | For high-power spindle / For angle attachment |
| Compatibility with oil hole holder | |
| Mist collector | Installed separately / Installation of the supplied equipment |
| Lift-up type chip conveyor | Hinged type / Scraper type / Scraper type with floor magnet / Backwashing filtration type for aluminum / Backwashing filtration type for aluminum and casting Chip discharge from left / right side |
| Chip bucket | Fixed chip bucket / Tilting chip bucket |
| Spare Thickener bag filter | 6 pieces (1 set) |
| Change of operation panel | Pendant type / Movable console type |
| 3-axis manual pulse generator | Stand type / Handy type |
| Foundation parts | For bond anchoring method |
| Bond for foundation work | HILTI |
| Change in machine coating color | Color specified by customer |
| Standard tool set | Including a tool box |
| NC rotary table | |
| Electrical indexing table (Rotary table with controller) | |
| Touch sensor system T0 | Workpiece measurement, Tool length/diameter measurement |
| Touch sensor system T1 (Workpiece measurement) | Workpiece measurement |
| Touch sensor system T1 (Tool measurement) | Tool length measurement, Tool break detection |

Side View



Front View

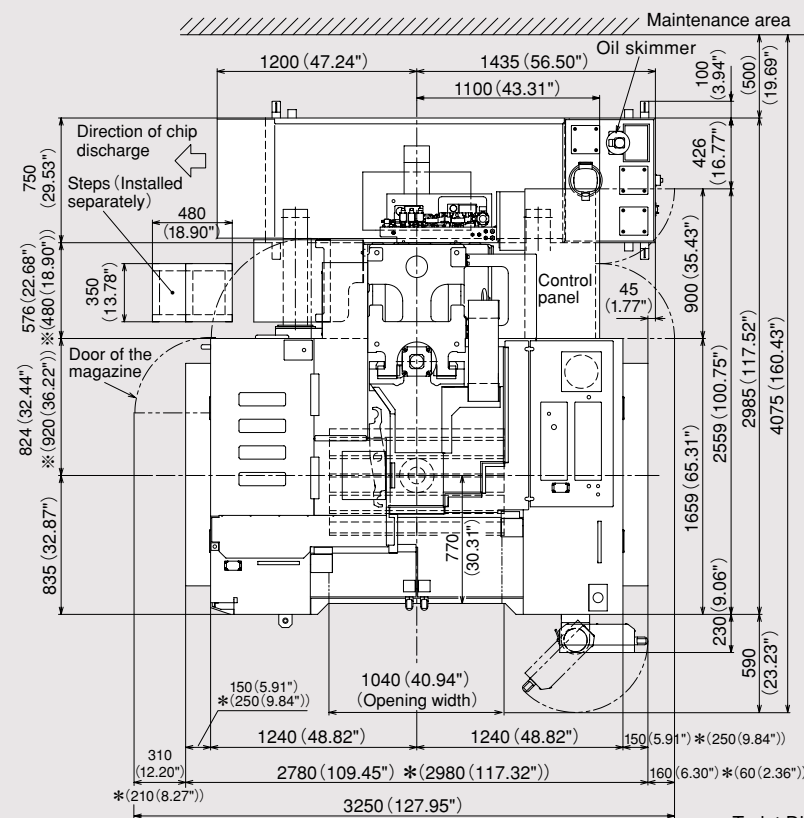


Note: Asterisked dimension changes with the machine specification.

※: No.50

*: Long-table specification (Table width:1260mm(49.61"))

Floor Space

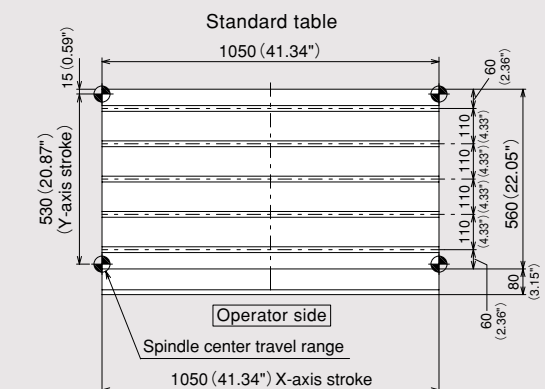


Note: Asterisked dimension changes with the machine specification.

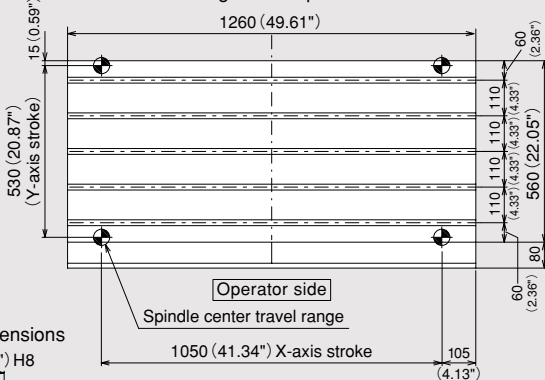
※: No.50

*: Long-table specification (Table width:1260mm(49.61"))

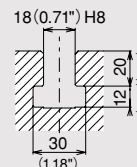
Table Dimensions



Long table (Option)



T-slot Dimensions



Main Specification

| Item | Unit | Specification | |
|--|-------------------|--|--|
| | | No.40 | No.50 |
| | | MS (Motorized spindle) 14000min ⁻¹ | Gear-head spindle 8000min ⁻¹ |
| Travel on X axis (Table longitudinal direction) | mm | 1540 (60.63") | |
| Travel on Y axis (Saddle cross direction) | mm | 760 (29.92") | |
| Travel on Z axis (Spindle head vertical direction) | mm | 660 (25.98") | |
| Distance from table top surface to spindle nose | mm | 150~810 (5.91" to 31.89") | |
| Distance from column front to spindle center | mm | 785 (30.91") | |
| Table work surface area (X-axis direction×Y-axis direction) | mm | 1550×760 (61.02"×29.92") | |
| Max. workpiece mass loadable on table | kg | 1500 (3300 lbs) | |
| Table work surface configuration (T-slot nominal dimension × spacing × number of T slots) | mm | 22×140×5 slots (0.87"×5.51"×5 slots) | |
| Distance from floor surface to table work surface | mm | 1000 (39.37") | |
| Spindle rotating speed | min ⁻¹ | 100 to 14000 | 25 to 8000 |
| Number of spindle rotating speeds | | 2 speeds | |
| Spindle nose (Nominal number) | | 7/24-tapered No.40 Two-surface locking type | 7/24-tapered No.50 Two-surface locking type |
| Spindle bearing bore diameter | mm | φ70 (dia.2.76") | φ100 (dia.3.94") |
| Rapid traverse rate | m/min | X/Y:24 (945 ipm) | Z:20 (787 ipm) |
| Cutting feed rate | mm/min | 1~20000 (0.04" to 787 ipm) See note 1 | |
| Jog feed rate | mm/min | 2000 (79 ipm) | |
| Type of tool shank (Nominal number) | | BT40 two-surface locking tool | BT50 two-surface locking tool |
| Type of pull stud (Nominal number) | | MAS1 45° | OKK 90° |
| Number of storable tools | tools | 30 | |
| Max. tool diameter (with tools in adjoining pots) | mm | φ80 (dia.3.15") | φ103 (dia.4.06") |
| Max. tool diameter (with no tools in adjoining pots) | mm | φ110 (dia.4.33") | φ200 (dia.7.87") |
| Max. tool length (from the gauge line) | mm | 380 (14.96") | |
| Max. tool mass (moment) | kg (N·m) | 10 (22 lbs) (9.8 (7ft·lbs)) | 20 (44 lbs) (29.4 (22ft·lbs)) |
| Tool selection method | | Memory random method | |
| Tool exchange time (tool-to-tool) | sec | 2.0 (Speed is changeable for heavy tools.) | |
| Tool exchange time (cut-to-cut) | sec | 7.0 (16.0 (See Note 2)) | |
| Spindle motor (Short-term rating / Continuous rating) | MITSUBISHI | kW | 37/22 (50/30HP) |
| | FANUC (F31i-B) | kW | 37/18.5 (50/25HP) |
| Feed motor | MITSUBISHI | kW | X/Y:4.5 (6HP) |
| | FANUC (F31i-B) | kW | X/Y:7.0 (9.4HP) |
| Motor for coolant pump | kW | 1.1 (1.5HP) (60Hz) / 0.75 (1.01HP) (50Hz) | |
| Motor for slideway lubrication pump | kW | 0.017 (0.02HP) | |
| Motor for spindle head cooling pump (oil cooler) | kW | 1.2 (1.61HP) (compression) / 0.75 (1.01HP) (discharge) | |
| Motor for spindle oil-air lubrication pump | kW | 0.017 (0.023HP) (60Hz) / 0.018 (0.024HP) (50Hz) | |
| Motor for unclamping the spindle tool / ATC | kW | 0.4 (0.54HP) | |
| Motor for turning the magazine | kW | 0.2 (0.3HP) | |
| Motors for coil-type chip conveyors | kW | 0.2 (0.3HP) × 2 | |
| Power supply (See Note 3) | MITSUBISHI | kVA | 46 |
| | FANUC (F31i-B) | kVA | 41 |
| Supply voltage and supply frequency | V·Hz | 200V±10% 50/60Hz±1Hz 220V±10% 60Hz±1Hz | |
| Compressed air supply pressure (See Note 4) | MPa | 0.4 to 0.6 (58psi to 87psi) | |
| Compressed air supply flow rate (Atmospheric pressure) (See Notes 3 and 4) | L/min (ANR) | 400 (106gal) or more | |
| Coolant tank capacity (See Notes 3) | L | 600 (159gal) or more | |
| Spindle head cooling oil tank capacity (oil cooler) | L | 50 (13gal) | |
| Spindle oil-air lubrication oil tank capacity | L | 2.0 (0.5gal) | |
| Slideway lubrication oil tank capacity | L | 6.0 (1.6gal) | |
| Machine height (from the floor surface) | mm | 3130 (123.23") | 3185 (125.39") |
| Required floor space (width × depth) | | 3980×3700 | |
| Machine mass | kg | 13000 (28700 lbs) | |
| Operating environment temperature | ℃ | 5 to 40 | |
| Operating environment humidity | % | 10 to 90 (No condensation) | |

Note 1: The feed rate under the HQ or Hyper HQ control.
Note 2: ATC shutter specification
Note 3: The value for the standard specification. It may vary with added options.
Note 4: Purity of the supplied air should be equivalent to or higher than the Classes 3, 5 and 4 specified in ISO 8573-1 / JIS B8392-1.
Note: Use the machine in the appropriate environment as the machine installation environment affects accuracies of the machine and the machining.

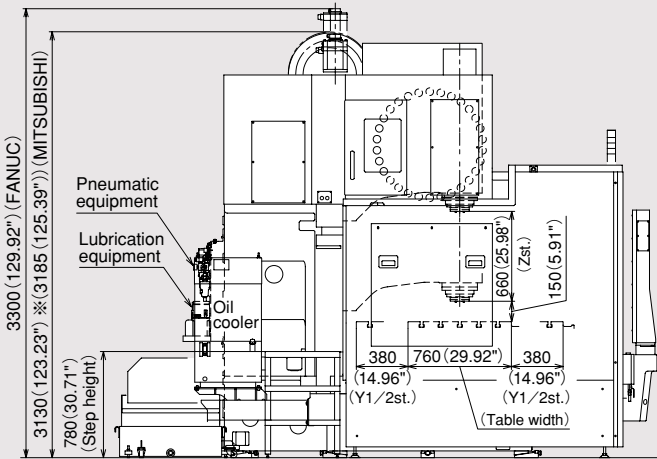
Standard Accessories

| Name | Qty | Remark |
|---|--------------|--|
| Lighting system | 1 set | Two LED lamps |
| Coolant unit (Separately-installed coolant tank) | 1 set | Tank capacity : 250L (66 gal) |
| Overall machine cover (Splash guard) | 1 set | Including electromagnetic locks on front doors and right and left maintenance covers |
| Magazine safety cover | 1 set | Including electromagnetic lock |
| Slideway protection steel sliding covers for X, Y and Z axes | 1 set | |
| Spindle head lubricating oil temperature controller | 1 set | |
| Slideway lubrication unit | 1 set | |
| Oil-air unit | 1 set | |
| Rear-discharging coil-type chip conveyor (including the reverse rotation function) | 1 set | 1 set for each of right and left sides |
| Oil skimmer | 1 set | Screw type |
| Air blower | 1 set | |
| Signal lamp | 1 set | 3-lamp type including buzzer alarm |
| Workpiece cleaning gun | 1 set | Shower gun type (normal pressure) |
| Tool removing device | 1 set | Manual operation type |
| Leveling block | 1 set | |
| Earth leakage breaker | 1 set | |
| Automatic power off (with M02 or M30) | 1 set | |
| Electrical spare parts (fuses) | 1 set | |
| Safety manual and instruction manual for Soft Scale II ^m / III ^m | 1 set / each | |
| Instruction manual, Foundation and Installation Instruction Manual, and Standard Specifications | 1 set / each | Standard Specifications are not included when Final Specifications are submitted. |
| Electrical instruction manual | 1 set | Including electrical diagrams |
| Instruction manual for integrated machining support software | 1 set | Including the manuals for Program Editor and Tool Support. |
| Supplementary manual for Manual Guide i | 1 set | This manual is not submitted when MITSUBISHI controller is used. |
| Manual for controller (NC) | 1 set | CD-ROM |
| Programming manual and operating procedures | 1 set / each | |

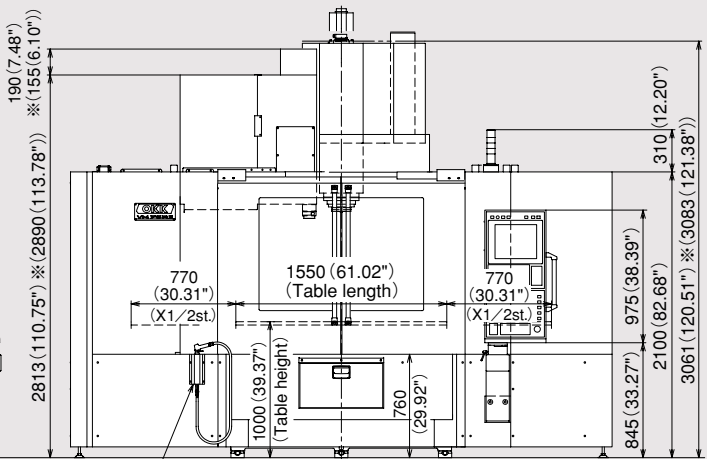
Special Accessories (Option)

| Item | Specification |
|--|--|
| Type of feeding equipment | Double anchor specification, Ball screw cooling |
| 2000-kg loading capacity of the table | Ball screw dedicated to Y axis, Y-axis static pressure guiding specification, Double anchor specification, Ball screw cooling |
| Spindle motor | 20000min ⁻¹ (37/26/22kW) (50/35/30HP) (MITSUBISHI) (No.40-MS) 20000min ⁻¹ (37/26/18.5kW) (50/35/25HP) (FANUC) (No.40-MS) 12000min ⁻¹ (37/30/26kW) (50/40/35HP) (MITSUBISHI) (No.50-MS) 12000min ⁻¹ (30/25kW) (40/34HP) (FANUC) (No.50-MS) |
| Type of tool shank | CAT40, DIN40 / CAT50, DIN50 |
| Type of pull stud | No.40:MAS2 (60°) / OKK 90° No.50:MAS1 (45°) / MAS2 (60°) |
| Number of storable tools | 40 tools, 60 tools (Chain type) (60 tools are available only in the case of No. 50) |
| Pallet changer | Shuttle-type APC (T-slots / Tapped holes on pallet work surface specification) |
| Column raise (Column-UP) | 250mm (9.84") (Standard for the machine with APC) |
| Ejection of chips from the machine | Chip flushing with coolant (Sharing with the coil-type chip conveyor is not possible.) / Coil-type chip conveyor is excluded. |
| Splash guard | Front door automatic opening and closing specification |
| Automatically opened and closed ATC cover | |
| Signal lamp | 2-lamp type with/without buzzer alarm |
| Linear scale | X axis, Y axis, Z axis / X axis, Y axis |
| Compatibility with through-spindle | 2-MPa (290psi) coolant / 7-MPa coolant / Air / Preparation for coolant |
| Coolant cooler | Separate tank specification / Integrated with the high-pressure unit (High-pressure unit needs to be selected separately.) |
| Oil mist blowe | |
| Minimal quantity coolant supply system | |
| Spindle-nose swirl stopper block | For high-power spindle / For angle attachment |
| Compatibility with oil hole holder | |
| Mist collector | Installed separately / Installation of the supplied equipment |
| Lift-up type chip conveyo | Hinged type / Scraper type / Scraper type with floor magnet / Backwashing filtration type for aluminum / Backwashing filtration type for aluminum and casting Chip discharge from left / right side |
| Spare Thickener bag filter | 6 pieces (1 set) |
| Chip bucket | Fixed chip bucket / Tilting chip bucket |
| Change of operation panel | Pendant type / Movable console type |
| 3-axis manual pulse generator | Stand type / Handy type |
| Foundation parts | For bond anchoring method |
| Bond for foundation work | HILTI |
| Change in machine coating color | Color specified by customer |
| Standard tool set | Including a tool box |
| NC rotary table | |
| Electrical indexing table (Rotary table with controller) | |
| Touch sensor system T0 | Workpiece measurement, Tool length/diameter measurement |
| Touch sensor system T1 (Workpiece measurement) | Workpiece measurement |
| Touch sensor system T1 (Tool measurement) | Tool length measurement, Tool break detection |

Side View



Front View



Note: Asterisked dimension changes with the machine specification.
※ : No.50

Floor Space

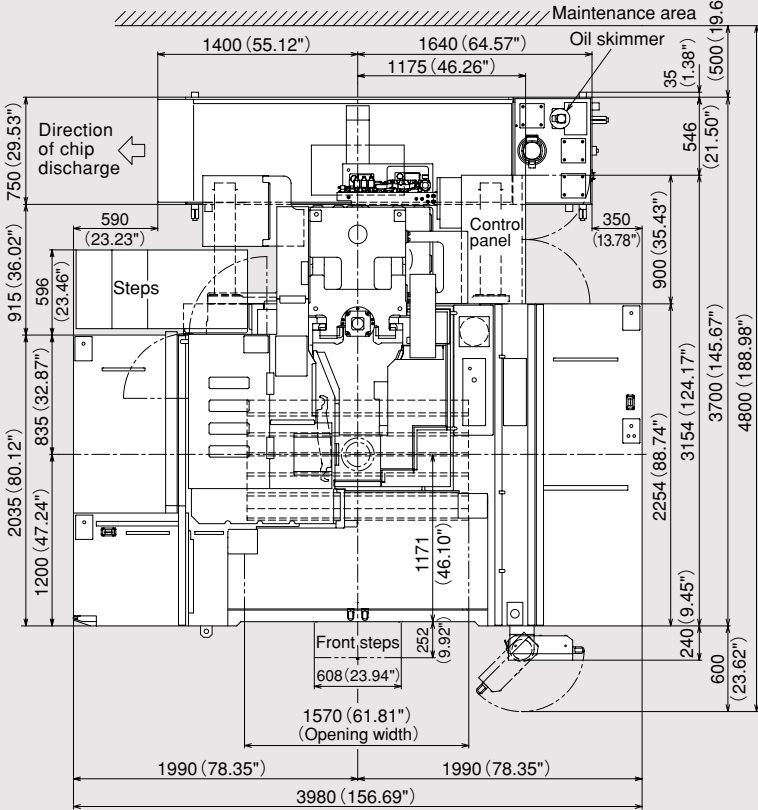
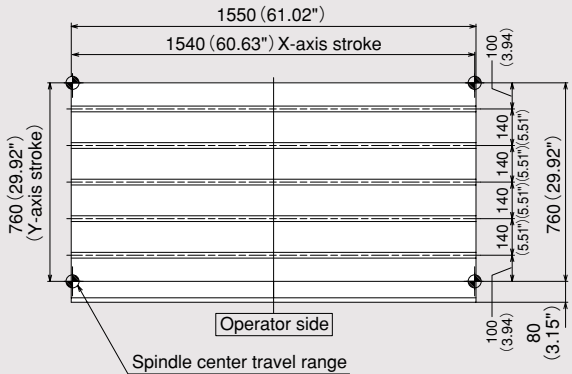
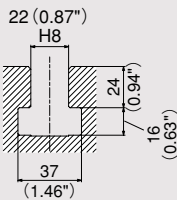


Table Dimensions



T-slot dimention



N830 (Windows 8-installed Open CNC)

| Standard Specification | Automatic reference position return |
|---|--|
| No. of controlled axes: 3 axes (X, Y, Z) | 2nd to 4th reference position return: G30 P2 to P4 |
| No. of simultaneously controlled axes: 3 axes | Reference position return check: G27 |
| Least input increment: 0.001mm / 0.0001" | Optional block skip: / n (n:1 to 9) |
| Max. programmable dimension:±99999.999mm / ±9999.9999" | Single block |
| Inch / Metric conversion: G20 / G21 | Dry run |
| Program format: Meldas standard format (M2 / M0 format needs to be instructed separately.) | Machine lock |
| Decimal point input I / II | Z-axis feed cancel |
| Absolute / Incremental programming: G90 / G91 | Miscellaneous function lock |
| Program code: ISO / EIA automatic discrimination | 3D solid program check |
| Least control increment: 1nm | Graphic display check |
| Positioning: G00 | Program number search |
| Linear interpolation: G01 | Sequence number search |
| Circular interpolation: G02 / G03 (Including radius designation) | Sequence number comparison and stop |
| Unidirectional positioning | Program restart function |
| Helical interpolation | Cycle start |
| Cutting feed rate: 5.3-digit F-code, direct designation | Feed hold |
| One digit F-code feed | Manual absolute (ON / OFF with PLC parameter) |
| Rapid traverse override: 0 / 1 / 10 / 25 / 50 / 100% | Auto restart |
| Cutting feed rate override: 0 to 200% (every 10%) | Program stop: M00 |
| Feed rate override cancel: M49 / M48 (cancel) | Optional stop: M01 |
| Rigid tap cycle: G74, G84 | Machining time computation |
| Manual handle feed: Least input increment X1, X10, X100 / graduation | Automatic operation handle interruption |
| Dwell: G04 | Manual numerical command |
| Part program storage capacity: 1280m [500KB] | Sub program control: M98, M99 |
| No. of registered programs: 1000 | Canned cycle: G73, G74, G76, G81 to G89, G80 (cancel) |
| Part program editing | Linear angle designation |
| Background editing: Possible to program or edit the machining program while NC machining is executed. | Circular cutting: G12, G13 |
| Buffer modification | Parameter mirror image |
| Color touch-panel display (15" LCD / QWERTY key MDI) | Programmable mirror image: G51.1, G50.1 (cancel) |
| Integrating time display | User macro and user macro interruption |
| Clock function | Variable command: total 700 sets |
| User definable key | Programmable coordinate system rotation: G68, G69 (cancel) |
| MDI (Manual Data Input) operation | Parameter coordinate system rotation |
| Menu list | Corner chamfering / corner R: Insert between straight line-straight line / straight line-circle blocks |
| Parameter / Operation guidance | Programmable data input: G10 / G11 (cancel) |
| Alarm guidance | Automatic corner override |
| Ethernet interface | Exact stop check / mode |
| SD card / USB memory interface | Playback |
| Operation inside display unit with high-speed program server | Memory pitch error compensation |
| Operation with SD card / USB memory | Backlash compensation |
| Spindle function: Direct designation of spindle speed with 5-digit S-code | Skip function: G31 |
| Spindle speed override: 50 to 150% (every 5%) | Manual tool length measurement |
| Tool function: Direct designation of called tool number with 4-digit T-code | Tool life management II: 200 sets |
| ATC tool registration | External search |
| Miscellaneous function: Designation with 3-digit M-code | Emergency stop |
| Multiple M-codes in 1 block: Maximum 3 codes in 1 block (Maximum 20 settings) | Data protection key |
| Tool length offset: G43, G44, G49 (cancel) | NC alarm display |
| Tool position offset: G45 to G48 | Machine alarm message |
| Cutter compensation: G38 to G42 | Stored stroke limit I / II |
| Tool offset sets: 200 sets | Load monitor |
| Tool offset memory II: tool geometry (length/diameter) and wear offset | Self-diagnosis |
| Machine coordinate system: G53 | Absolute position detection |
| Coordinate system setting: G92 | |
| Automatic coordinate system setting | |
| Workpiece coordinate system: G54 to G59 | |
| Local coordinate system: G52 | |
| Manual reference position return | |

| Optional Specification |
|--|
| Additional one axis control: name of axis (A, B, C, U, V, W) |
| Additional two axes control: name of axis (A, B, C, U, V, W) ^{Note} |
| Simultaneously controlled axes: 4 axes |
| Simultaneously controlled axes: 5 axes ^{Note} |
| Least input increment: 0.0001mm / 0.00001" |

| |
|--|
| Program format: M2 / M0 format |
| Spiral / Conical interpolation |
| Cylindrical interpolation |
| Hypothetical axis interpolation |
| NURBS interpolation (Hyper HQ control mode II is required) |
| Handle feed 3 axes: Standard pulse handle is removed |
| Inverse time feed |
| Part program storage capacity: 2560m [1Mbyte] (No.of registered programs: 1000) |
| Part program storage capacity: 5120m [2Mbyte] (No.of registered programs: 1000) |
| Color touch-panel display (19" LCD / Software key MDI) |
| RS232C interface: RS232C-1CH |
| Computer link B: RS232C |
| Spindle contour control (Spindle position control) |
| 3-dimensional cutter compensation |
| Tool offset sets: 400 sets |
| Tool offset sets: 999 sets |
| Addition of workpiece coordinate system (total 96): G54.1 P1 to G54.1 P96 |
| Addition of workpiece coordinate system (total 300): G54.1 P1 to G54.1 P300 |
| Tool retract and return |
| Scaling: G51, G50 (cancel) |
| Pattern rotation |
| Chopping function |
| Special canned cycles: G34, G35, G36, G37 |
| Additional tool life management sets: total 400 sets |
| Additional tool life management sets: total 999 sets |

| Original OKK Software | | | |
|--|---------|---------|---------|
| | VM43RII | VM53RII | VM76RII |
| Integrated machining support system | STD | STD | STD |
| Tool support | STD | STD | STD |
| Program Editor | STD | STD | STD |
| EasyPRO | STD | STD | STD |
| Work Manager | OP | OP | OP |
| HQ control | STD | STD | STD |
| Hyper HQ control mode I | OP | OP | OP |
| Hyper HQ control mode II | OP | OP | OP |
| Soft Scale III | STD | STD | STD |
| Cube environmental thermal displacement correction | STD | STD | STD |
| WinGMC8 (including the option H) | STD | STD | STD |
| Cycle Mate | OP | OP | OP |
| Touch sensor T0 software | OP | OP | OP |
| Soft CCM (Cutting failure monitoring) | OP | OP | OP |
| Soft AC (Adaptive control) | OP | OP | OP |
| Automatic restart at the time of tool breakage | OP | OP | OP |

Note: The controller N850 (Windows 8-installed Open CNC) is used when five axes are controlled simultaneously.

F31i-B (WindowsCE-installed Open CNC), OKK-FANUC Ai

| Standard Specification | F31i | FAi |
|--|------|-----|
| No. of controlled axes: 3 axes (X, Y, Z) | | |
| No. of simultaneously controlled axes: 3 axes | | |
| Least input increment: 0.001mm / 0.0001" | | |
| Max. programmable dimension: ±999999.999mm / ±39370.0787" | | |
| Absolute / Incremental programming: G90 / G91 | | |
| Decimal point input / Pocket calculator type decimal point input | | |
| Inch / Metric conversion: G20 / G21 | | |
| Program code: ISO / EIA automatic discrimination | | |
| Program format: FANUC standard format | | |
| Nano interpolation (internal) | | |
| Positioning: G00 | | |
| Linear interpolation: G01 | | |
| Circular interpolation: G02 / G03 (CW / CCW) (Including radius designation) | | |
| Helical interpolation | | |
| Cutting feed rate: 6.3-digit F-code, direct designation | | |
| Dwell: G04 | | |
| Manual handle feed: Least input increment X1, X10, X100 / graduation | | |
| Rapid traverse override: 0 / 1 / 10 / 25 / 50 / 100% | | |
| Cutting feed rate override: 0 to 200% (every 10%) | | |
| Feed rate override cancel: M49 / M48 | | |
| Rigid tapping: G84, G74 (Mode designation: M29) | | |
| Inverse time feed | — | |
| Part program storage capacity: total 1280m [512KB] | | |
| Number of registerable programs: 400 | — | |
| Part program editing | | |
| Background editing: Possible to program or edit the machining program while NC machining is executed. | | |
| Extended part program editing | | |
| 15-inch color LCD/QWERTY key MDI | | — |
| 10.4-inch color LCD/MDI | — | |
| Clock function | | |
| MDI (manual data input) operation | | |
| Run hour and parts count display | | |
| Memory card / USB interface | | |
| Spindle function: Direct designation of spindle speed with 5-digit S-code | | |
| Spindle speed override: 50 to 150% (every 5%) Tool function: Direct designation of called tool number with 4-digit T-code | | |

| | | |
|--|---|---|
| ATC工具登録 | | |
| ATC tool registration | | |
| Multiple M-codes in 1 block: Maximum 3 codes in 1 block (Maximum 20 settings) | | |
| Tool length offset: G43, G44 / G49 | | |
| Tool diameter and cutting edge R compensation: G41, G42 / G40 | | |
| Tool offset sets: 200 sets | | — |
| Tool offset sets: 400 sets | — | |
| Tool offset memory C | | |
| Manual reference position return | | |
| Automatic reference position return: G28/G29 | | |
| 2nd reference position return: G30 | | |
| Reference position return check: G27 | | |
| Automatic coordinate system setting | | |
| Coordinate system setting: G92 | | |
| Machine coordinate system: G53 | | |
| Workpiece coordinate system: G54 to G59 Addition of workpiece coordinate system (total 48 sets) : G54.1 P1 to P48 | | |

| Standard Specification | F31i | FAi |
|--|------|-----|
| Local coordinate system: G52 | | |
| Program stop: M00 | | |
| Optional stop: M01 | | |
| Optional block skip: / | | |
| Dry run | | |
| Machine lock | | |
| Z-axis feed cancel | | |
| Auxiliary function lock | | |
| Program number search | | |
| Sequence number search | | |
| Program restart | | |
| Cycle start | | |
| Auto restart | | |
| Single block | | |
| Feed hold | | |
| Manual absolute (ON/OFF with PMC parameter) | | |
| Sub program control | | |
| Canned cycle: G73, G74, G76, G80 to G89 | | |
| Mirror image function parameter | | |
| Automatic corner override | | |
| Exact stop check / mode | | |
| Programmable data input: G10 | | |
| Programmable mirror image | | |
| Custom macro | | |
| Interactive graphic input | — | |
| Graphic function | | |
| Backlash compensation for each rapid traverse and cutting feed | | |
| Smooth backlash compensation Memory pitch error compensation (Interpolation type for F31i) | | — |
| Skip function | | |
| Tool length manual measurement | | |
| Tool life management: 256 sets | | — |
| Tool life management: 128 sets | — | |
| Emergency stop | | |
| Data protection key | | |
| NC alarm display / alarm history display | | |
| Machine alarm display | | |
| Stored stroke check 1 | | |
| Load monitor | | |
| Self-diagnosis function | | |
| Absolute position detection | | |
| Manual Guide i (Basic) | | |

| Optional Specification | F31i | FAi |
|---|------|-----|
| Additional one axis control: name of axis (A,B,C,U,V,W) ^{Note 1} | | |
| Additional two axis control: name of axis (A,B,C,U,V,W) ^{Note 2} | | — |
| No. of simultaneously controlled axes: 4 axes | | — |
| No. of simultaneously controlled axes: 5 axes ^{Note 2} | | — |
| Least input increment: 0.0001mm / 0.00001" | | |
| FS15 tape format | | — |
| FS10 / F11 tape format | — | |
| Unidirectional positioning: G60 | | STD |
| Cylindrical interpolation | | STD |
| Hypothetical axis interpolation | | — |
| Spiral / Conical interpolation | | — |
| Smooth interpolation (Hyper HQ control B mode is required) | | — |
| NURBS interpolation (Hyper HQ control B mode is required) | | — |
| Involute interpolation | | — |
| One-digit F code feed | | STD |
| Handle feed 3 axes: Standard pulse handle is removed | | |

| Optional Specification | F31i | FAi |
|--|------|-----|
| Part program storage capacity: 2560m [1MB] (1000 in total) | | — |
| Part program storage capacity: 5120m [2MB] (1000 in total) | | — |
| Part program storage capacity: 5120m [2MB] (400 in total) | — | |
| Part program storage capacity: 10240m [4MB] (1000 in total) | | — |
| Part program storage capacity: 20480m [8MB] (1000 in total) | | — |
| RS232C interface: RS232C-1CH | | |
| Data server: ATA card (1GB) | | |
| Data server: ATA card (4GB) | | — |
| Spindle contour control (Cs contour control) | | |
| Tool position offset | | STD |
| 3-dimensional cutter compensation | | — |
| Tool offset sets: 400 sets | | — |
| Tool offset sets: 499 sets | | — |
| Tool offset sets: 999 sets Addition of workpiece coordinate system (total 300 sets) : G54.1 P1~P300 | | — |
| Machining time stamp | | — |
| Optional block skip: Total 9 | | STD |
| Tool retract and return | | — |
| Sequence number comparison and stop | | STD |
| Manual handle interruption | | STD |
| Optional chamfering / corner R | | STD |
| Interruption type custom macro | | STD |
| Addition of custom macro common variables: total 600 | | STD |
| Figure copy | | — |
| Coordinate system rotation: G68, G69 | | STD |
| Scaling: G50, G51 | | STD |
| Chopping | | |
| Playback | | — |
| Addition of tool life management sets: total 1024 sets | | — |
| High-speed skip | | |
| Stored stroke check 2, 3 (3: Interference area preset by the manufacturer) | | STD |
| Manual Guide i (Milling cycle) | | |

| Original OKK Software | F31i | FAi |
|--|------|-----|
| Special canned cycle (including circular cutting) | STD | — |
| Tool support | STD | — |
| Program Editor | STD | — |
| EasyPRO | STD | — |
| Work Manager | OP | — |
| HQ control | STD | STD |
| Hyper HQ control Mode A | OP | OP |
| Hyper HQ control Mode B ^{Note 3} | OP | — |
| Hyper HQ value kit ^{Note 4} | OP | — |
| Special canned cycle (including circular cutting) | OP | OP |
| Cycle Mate F | OP | OP |
| Soft Scale II m | — | STD |
| Soft Scale III | STD | — |
| Cube environmental thermal displacement correction | STD | — |
| Touch sensor T0 software | OP | OP |
| Soft CCM (Cutting failure monitoring) | OP | OP |
| Soft AC (Adaptive control) | OP | OP |
| Automatic restart at the time of tool breakage | OP | OP |

Note 1: FAi enables indexing only.
Note 2: The controller F31i-B5 (Windows CE-installed Open CNC) is used when five axes are controlled simultaneously.
Note 3: FAi is not compatible with the hyper HQ control Mode B.
Note 4: The hyper HQ value kit is accompanied by the"data server: ATA card (1GB)" and the hyper HQ control Mode B.
— : Not supported
Note: The controller FAi is compatible only with VM43RII.