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### NIDEC 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

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Vertical Machining Center

VB53α

VB53α



# Vertical Machining Center that Realizes High-quality Machining of Dies and Precision Parts

## VB53 $\alpha$



### For Higher Accuracy and Higher Quality

It improves quality of machined surfaces and reduces machining time by minimizing residual vibration at the time of high-speed machining.

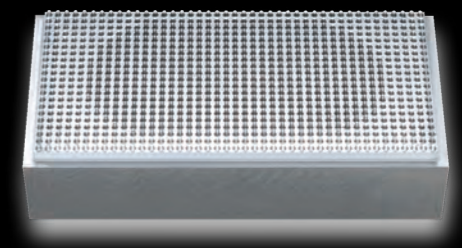
It incorporates the environmental thermal displacement correction "Soft Scale Cube" that responds to the changes in temperature in the general factories' environment and supports stabilization of the machining accuracy.

Its standard specification includes the linear scale, the high-resolution (small-lead) ball screw, the Hyper HQ Control, and the large-capacity data server and supports the high-speed and high-quality machining of dies.



Automobile interior part  
Material: NAK80

Sample die  
Material: NAK80



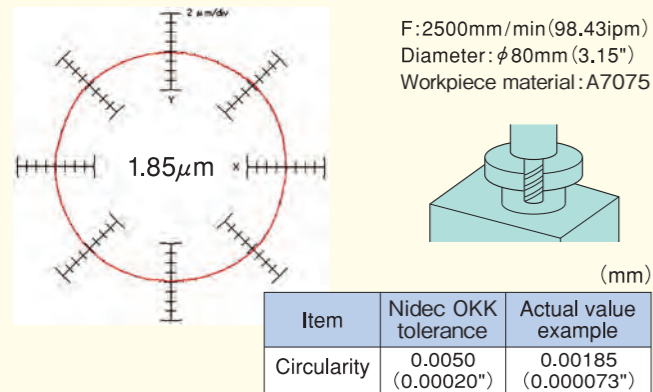
Loudspeaker  
Material: NAK80

#### Main Specification

Spindle speed	<b>100 to 20000min<sup>-1</sup></b>	Number of stored tools	<b>30 tools</b>
Rapid traverse rate (X×Y×Z)	<b>20×20×20m/min</b> (787×787×787 ipm)	Tool exchange time (tool-to-tool)	<b>2 sec</b>

## Accuracy

### Circular Cutting Accuracy

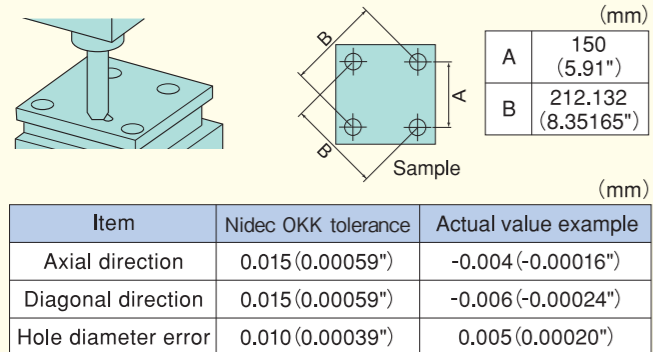


### Positioning Accuracy

Item	Nidec OKK tolerance
Positioning accuracy	XYZ standard $\pm$ 0.0010/full stroke
Repeated positioning accuracy	XYZ standard $\pm$ 0.0005/full stroke

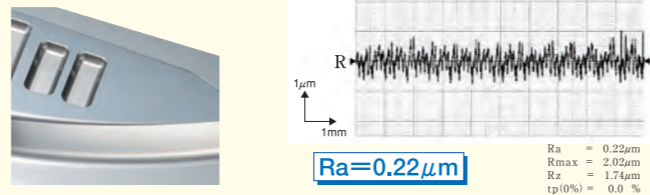
With linear scale

### Machined Position Accuracy

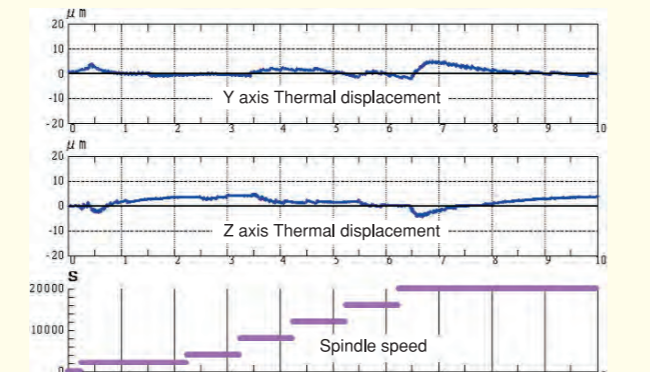


- Notes:
- The data show example which obtained in short run. It may differ from data obtained in continuous run.
  - The data were obtained under Nidec OKK's test cutting conditions. The data may differ due to conditions of cutting tools, fixtures, cutting speed and room temperature.
  - The above accuracies are subject to machine installed according to Nidec OKK specifications and constant temperature environment. Accuracy are based on Nidec OKK inspection standard.

### Surface roughness



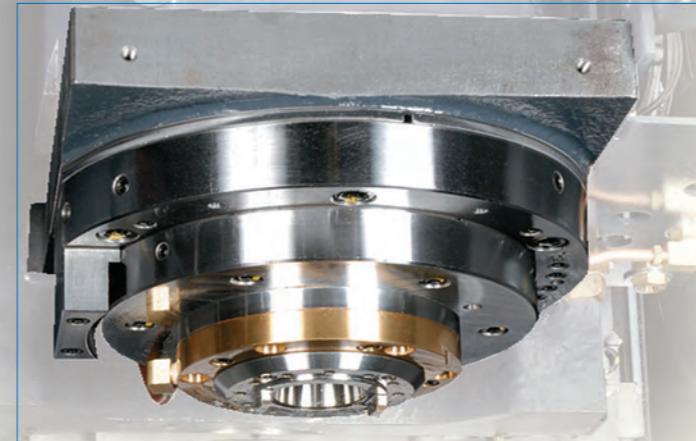
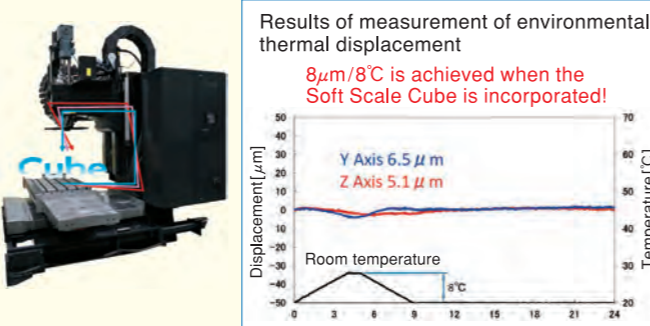
### Soft Scale II Thermal displacement data



NOTE: The data were obtained under Nidec OKK's test conditions. The data may differ due to conditions.

### Environmental Thermal Displacement Correction Soft Scale Cube

The environmental thermal displacement correction "Soft Scale Cube" that is included in the standard specification improves further the machining accuracy by correcting displacement of the machining point on a real-time basis based on the data of change in temperature obtained from a sensor installed on the machine.



## High-speed Spindle

The standard specification includes a 20000min<sup>-1</sup> Dual-contact spindle.

The lightweight spindle head section achieves agile response.

### Lubrication

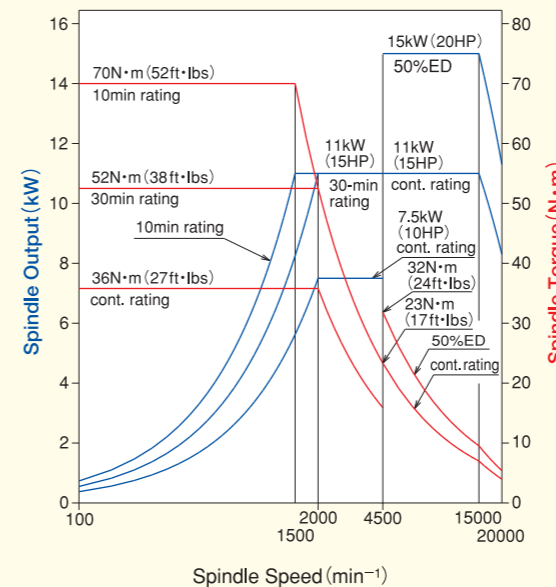
The spindle bearing utilizes an oil-air lubrication method delivering stable lubrication property throughout the speed range.

### Cooling

Working together the forced cooling oil is circulated in the bearing section and an air-cooling system circulates around the spindle motor to suppress heat and minimize the spindle's thermal displacement.

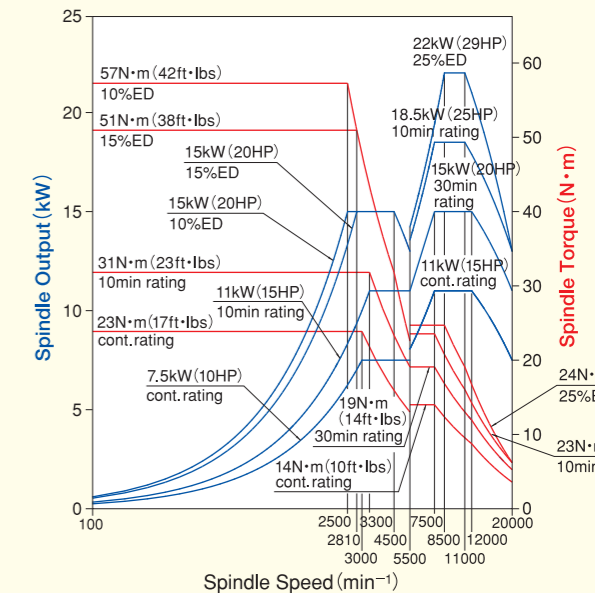
### MITSUBISHI

Spindle motor specification	Low speed: 100~4500min <sup>-1</sup>		High speed: 4501~20000min <sup>-1</sup>	
	Output	Torque	Output	Torque
Output	Continuous rating	7.5kW (10HP)	Continuous rating	11kW (15HP)
	10min rating	11kW (15HP)	10min rating	15kW (20HP)
	30min rating	15kW (20HP)	30min rating	22kW (29HP)
Torque	Continuous rating	36N·m (27ft·lbs)	Continuous rating	23N·m (17ft·lbs)
	10min rating	52N·m (38ft·lbs)	10min rating	32N·m (24ft·lbs)
	30min rating	70N·m (52ft·lbs)	30min rating	32N·m (24ft·lbs)



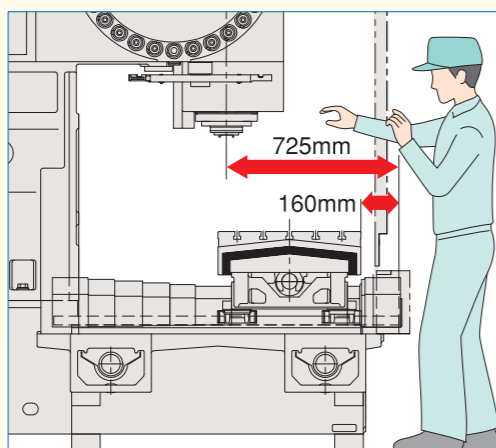
### FANUC

Spindle motor specification	Low speed: 100~5500min <sup>-1</sup>		High speed: 5501~20000min <sup>-1</sup>	
	Output	Torque	Output	Torque
Output	Continuous rating	7.5kW (10HP)	Continuous rating	11kW (15HP)
	10min rating	11kW (15HP)	10min rating	15kW (20HP)
	30min rating	15kW (20HP)	30min rating	22kW (29HP)
Torque	Continuous rating	23N·m (17ft·lbs)	Continuous rating	14N·m (10ft·lbs)
	10min rating	31N·m (23ft·lbs)	10min rating	19N·m (14ft·lbs)
	30min rating	51N·m (38ft·lbs)	30min rating	23N·m (17ft·lbs)



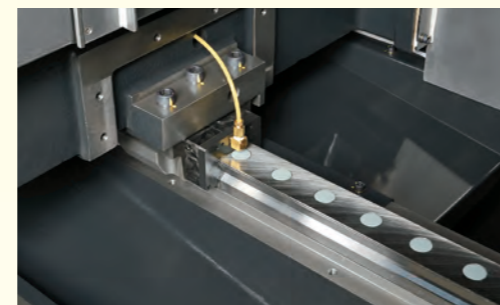
## High Accessibility

Excellent operator accessibility to the machines work space reduces the operator's load.



## Powerfully Smooth Feed

The machine secures powerfully smooth feed operation by using the wide linear roller guides and high-resolution ball screws.



## Chip Removability

The coil-type chip conveyors [Standard] are installed on the back and front of the table delivering excellent chip evacuation and space-savings.



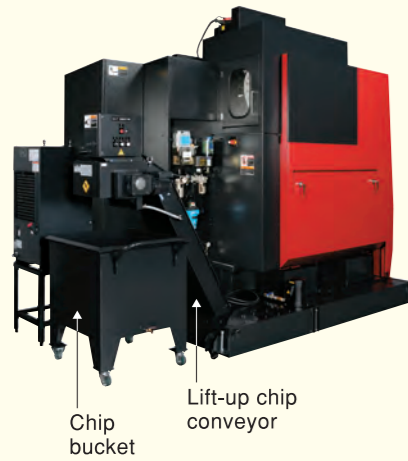
## Easy Maintenance



The lubrication unit and the pneumatic unit are centrally located on the machine's outside to facilitate the machine's maintenance work.

## Peripheral Equipment (Optional Equipment)

### Lift-up Chip Conveyor & Chip Bucket [Option]



Suitable Lift-up Chip Conveyor according to Type of Chips

○ : Most suitable; ◯ : Usable; △ : Conditionally usable; × : Not usable; - : Not applicable

Type of chips	Type of chip conveyor	Use or not use of coolant oil	Hinged type		Scraper type		Magnet scraper type		Scraper type with drum filter		Magnet scraper type with drum filter	
			Use	Not use	Use	Not use	Use	Not use	Use	Not use	Use	Not use
Magnetizable chips	Steel	Short curl	○	○	○	○	○	○	○	-	○	-
		Spiral	○	○	△+2	△+2	△+2	△+2	×	-	×	-
		Long	○	○	×	×	×	×	×	-	×	-
		Needle shape	×	△+1	×	○	○+3	○	○	-	○	-
Non-magnetizable chips	Cast iron	Powder or small lump	×	△+1	×	○	○+3	○	○	-	○	-
		Needle shape	×	△+1	×	○	○+3	○	○	-	○	-
		Powder or small lump	×	△+1	×	○	○+3	○	△+3	-	○	-
		Needle shape	×	△+1	×	○	○	-	-	-	○	-
Non-magnetizable chips	Aluminum	Short curl	×	○	△+4	○	-	-	-	-	○	-
		Spiral	○	○	○	○	-	-	△+5	-	△+5	-
		Long	○	○	○	○	-	-	△+5	-	△+5	-
		Needle shape	×	△+1	×	○	-	-	-	-	○	-
Non-magnetizable chips	Aluminum	Powder or small lump	×	△+1	×	○	-	-	-	-	○	-

- \*1: Minute chips can enter the conveyor casing through a gap between hinged plates. Therefore, cleaning inside the conveyor frequently is needed.
- \*2: Long chips can easily be caught by a scraper. Therefore, measures for shortening the chips such as the step feed and removing the caught chips are needed.
- \*3: If the coolant flow rate is large, chips can flow out of the conveyor casing and cause clogging of filters. Therefore, combined use of a magnet plate is recommended.
- \*4: If the coolant flow rate is large, chips can flow out of the conveyor casing and cause clogging of filters. Therefore, cleaning filters frequently is needed.
- \*5: Long chips can easily be caught by a scraper. Therefore, removing them regularly is needed. Drum filters are damaged if they are not removed.

### Measurement with Laser [Option]



Use of the laser sensor enables high-accuracy measurement of the tool length and diameter even for the ball-end mill with very small diameter.

### Touch Sensor System [Option]



#### T1-A: Automatic workpiece measurement / compensation

The touch sensor attached to the spindle is moved to a workpiece in the automatic operation until it contacts the workpiece then based on the travel distance at that time, the required compensation amount is calculated and set as the data for the workpiece coordinate system. The measurement and compensation program is created according to the specified format and then executed.

#### T0: Manual workpiece measurement

This is helpful for the workpiece centering operation and the tool length measurement. The sensor can be moved to the desired measurement point by using handle mode. The machine starts measurement automatically when the sensor contacts the workpiece. The result of the measurement can be set as the data for the desired workpiece coordinate system or tool offset number in a simple operation.

### Coolant Cooler [Option]



Increase in temperature of the cutting oil is a major cause of the thermal displacement. The coolant cooler suppresses cutting oil temperature fluctuations caused by the machining operation and stabilizes machining accuracy. The coolant cooler is recommended particularly when using oil-based cutting oil.

### Air-through Spindle [Option]

It is used when machining a deep hole, etc.



### MQL (Oil-mist Lubricator) [Option]



The MQL is the machining method that applies minimal quantity of the cutting oil to the cutting tool. Since quantity of the oil used for machining is very small, it leads reduction in costs and is also environment-friendly.

MQL : Minimal Quantity Lubrication

### Coolant-through Spindle [Option]

It is used when machining a deep hole, etc.



## Nidec OKK's Dedicated Control Functions

### Maintenance Functions

#### Help Guidance [Standard]

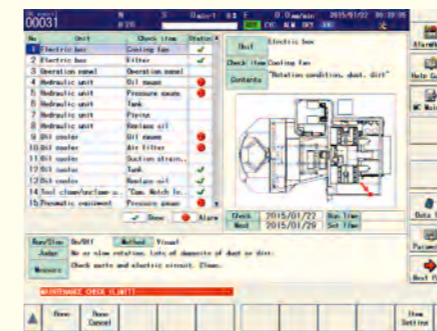
It displays detailed information regarding the machine alarms and the method to recover when a problem occurs on the machine. It also displays a list of G-codes and description of the M signals.

#### Description of Alarm Display Screen



### Maintenance and Inspection Screen

The screen will display machine inspection details, status, and time. Supporting machine maintenance work.



### HQ Tuner [Option]



It enables adjusting the parameters for the hyper HQ control according to the machining conditions.

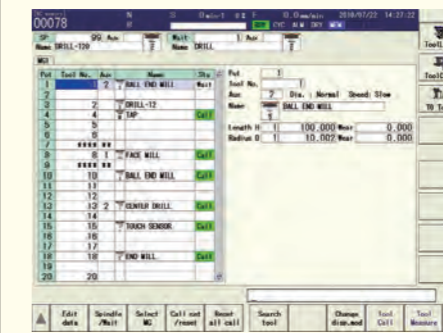
The hyper HQ control can be adjusted according to the process. For example, for roughing, the machining time can be reduced while focusing on the machining speed, and, for finishing, geometric accuracy of corners and arcs is improved by focusing on accuracy.

### Setup Support Function

#### Tool Support [Standard]

You can manage each tool's various information such as the tool name, schematic and offset number comprehensively through a single screen. It contains the functions that are convenient for the set-up operation. For example the tool measurement is also available by just switching the menu.

#### Tool Setup Screen



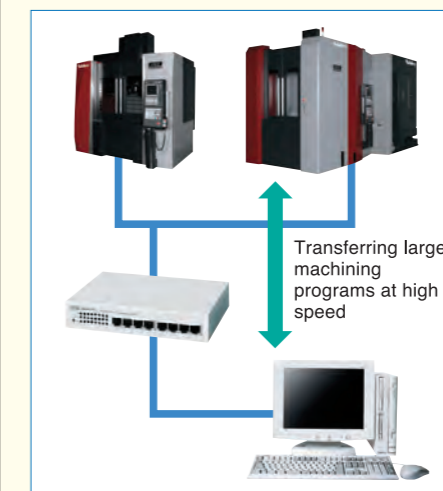
### Network Function

#### Data Server (F31i-B Standard Function)

Large machining programs can be transferred to the data server through the network connected to the host computer at high speed. The transferred machining programs are executed as the main program or the sub program called up with the M198.

#### Hard Disc Mode (N830 Standard Function)

Large machining programs can be transferred to the hard disc installed in the machine through the network connected to the host computer at high speed. The transferred machining programs are executed as the main program or the sub program.

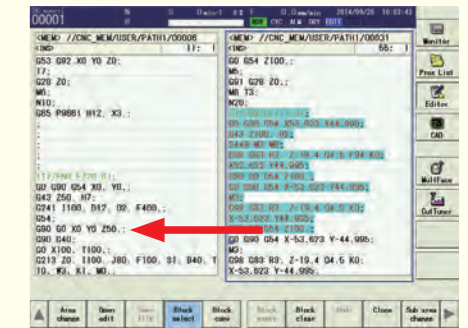


### Programming Support Function

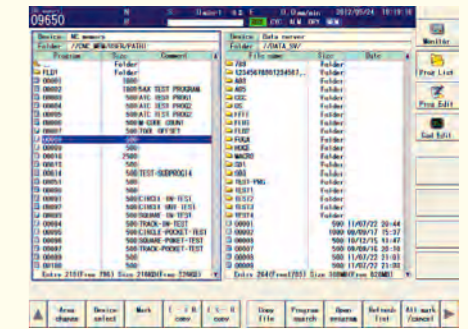
#### Program Editor [Standard]

It enables editing of the programs in the NC memory, data server (or hand disc) and memory card. It also enables managing the programs i.e. copying, deleting, changing the program name, etc.

- Two programs can be displayed side by side.
- Batch conversion of certain characters in a program is possible. (Example: Change from "F1000" to "F1200")
- The data of the multiple lines in one program can be copied easily to another program.



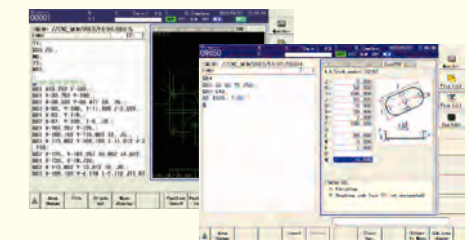
- By switching the right-side reference screen, you can view a list of the M signals or G-codes or the data regarding the tools in the magazine.



- You can easily copy and delete the programs and change the program name.
- By using the multiple file batch copy function, you can easily make backup copies of the NC memory's or had disc's programs in a memory card.

### EasyPRO [Standard]

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.



## Specifications

### ●Main Specifications

Item	Unit	Specification
Travel on X axis (Table right / left)	mm	1050 (41.34")
Travel on Y axis (Saddle back / forth)	mm	530 (20.87")
Travel on Z axis (Spindle head up / down)	mm	510 (20.08")
Distance from table top surface to spindle nose	mm	150 (5.91")~660 (25.98")
Distance from column front to spindle center	mm	616 (24.25")
Table work surface area (X-axis direction × Y-axis direction)	mm	1260 (49.61")×600 (23.62")
Max. workpiece weight loadable on table	kg	1200 (2646 lbs)
Table work surface configuration (T-slot nominal dimension × spacing × number of T slots)	mm	18 (0.71")×110 (4.33")×5 slots
Distance from floor to table work surface	mm	900 (35.43")
Spindle speed	min <sup>-1</sup>	100~20000
Number of spindle speeds		Electric 2 steps (MS)
Spindle nose (nominal number)		7/24-tapered No.40
Spindle bearing bore diameter	mm	φ65 (2.56")
Rapid traverse rate	m/min	X/Y/Z : 20 (787 ipm)
Cutting feed rate	mm/min	X/Y/Z : 1~20000 (0.04 to 787ipm)*1
<b>Automatic Tool Changer (ATC)</b>		
Type of Tool shank		BT40 (Dual-contact BT type)
Type of Pull stud		MAS 403 P40T-1
Number of stored tools	tools	30
Max. tool diameter (with tools in adjacent pots)	mm	φ 80 (3.15")
Max. tool diameter (with no tools in adjacent pots)	mm	φ 110 (4.33")
Max. tool length (from gauge line)	mm	350 (13.78")
Max. tool mass [moment]	kg [N·m]	10 (22 lbs) [9.8 (7.2ft·lbs)]
Tool selection method		Memory random method
Tool exchange time (tool-to-tool)	sec	2.0
Tool exchange time (cut-to-cut)	sec	5.5
<b>Motor</b>		
Spindle motor	kW	MITSUBISHI 15/11 (20/15HP) FANUC 22/18.5/15/11 (30/25/20/15HP)
Feed motors	kW	MITSUBISHI X/Y:3 (4HP) Z:3.5 (4.7HP) FANUC X/Y:3 (4HP) Z:4 (5.4HP)
Coolant pump motor	kW	0.4 (0.5HP)
Spindle head cooling pump motor	kW	0.4 (0.5HP)
Motor for coil-type chip conveyor	kW	0.1 (0.13HP) × 2
Motor for ATC	kW	0.4 (0.5HP)
<b>Required power sources</b>		
Power supply	kVA	MITSUBISHI 31 FANUC 29
Supply voltage	V	AC200V±10% AC220V±10%
Supply frequency	Hz	50/60Hz±1Hz 60Hz±1Hz
Compressed air supply pressure	MPa	0.4~0.6 (58~87 psi)*2
Compressed air supply flow rate	L/min (ANR)	650 (172 gpm)*2 *3
Spindle cooling oil tank capacity	L	50 (13 gal)
Coolant tank capacity	L	260 (69 gal)
Machine height (from floor surface)	mm	2,910 (114.57")
Floor space required for operation (width × depth)	mm	2,885 (113.58")×3,050 (120.08")
Required floor space incl. maintenance area (width×depth)	mm	3,900 (153.54")×4,100 (161.42")
Machine weight	kg	7,300 (16094 lbs)
Operation environment temperature	°C	5~40
Operation environment humidity	%	10~90 (No dew)

\*1: The rate under the HQ or hyper HQ control

\*2: The value for the standard specification It may vary with added options.

\*3: Purity of the supplied air should be equivalent to Class 3.5.4 specified in ISO 8573-1/JIS B8392-1 or higher.

### ●Standard Accessories

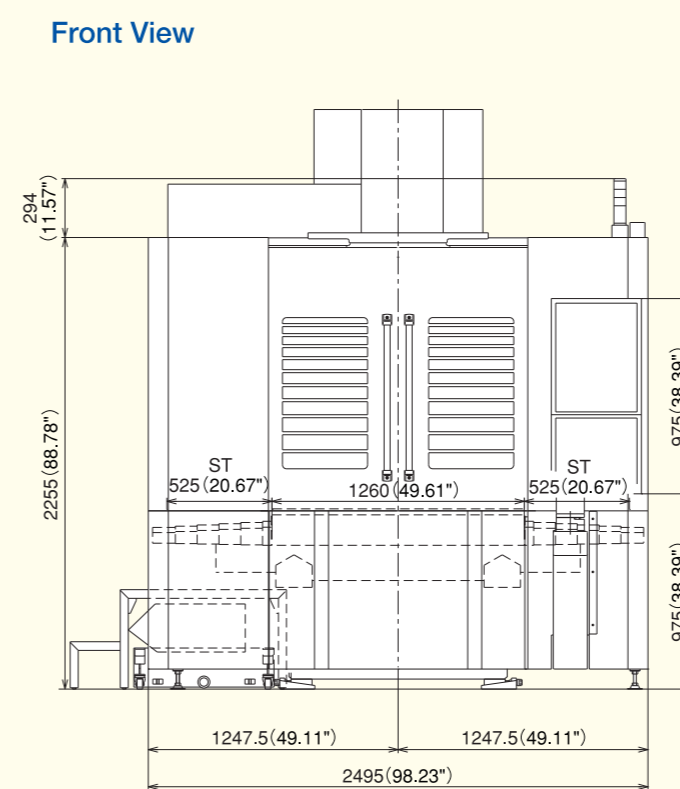
Item	Qty	Remark
Lighting equipment	1 set	Two LED lamps
Linear scale	1 set	For X, Y and Z axes
Coolant unit (Separately-installed coolant tank)	1 set	Tank capacity: 260L
Overall machine cover (Splash guard)	1 set	Including front door and electromagnetic lock
Top cover	1 set	
Magazine safety cover	1 set	Including electromagnetic lock
Sliding surface protection steel sliding cover for X / Y axes	1 set	
Spindle head lubrication oil temperature controller	1 set	
Coil-type chip conveyor (with reverse rotation function)	1 set	1 unit for each of front and rear sides
Air blower	1 set	
Signal lamp	1 set	Three-lamp type with buzzer
Workpiece flushing gun	1 set	Shower gun (Medium pressure)
Leveling block	1 set	
Parts for machine transfer	1 set	
Automatic power-off unit (for M02 and M30)	1 set	
Electrical spare parts (fuses)	1 set	
Instruction manual (Specification, Maintenance Manual, Foundation & Installation Manual)	2 set	
Electrical instruction manuals (including electrical diagrams)	1 set	

### ●Special Accessories

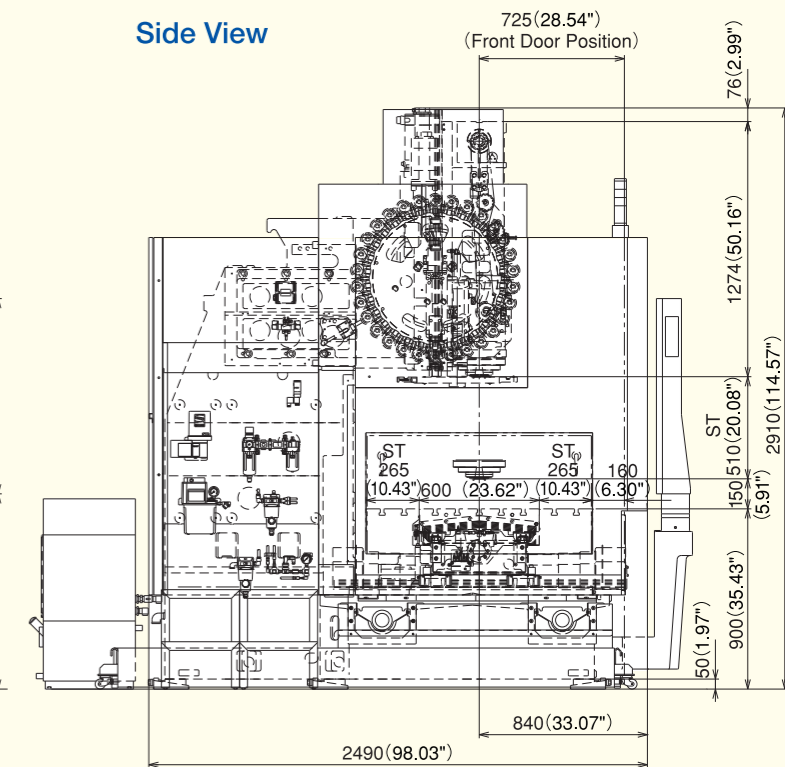
Item	Specification
Compatibility with two-surface locking tool	HSK-A63
Number of storable tools	36
Column raise (Column-up)	250mm (9.84")
Signal lamp	Two-lamp type with / without buzzer
Flushing chips with coolant	400W (Standard: Coil-type chip conveyor)
Lift-up type chip conveyor	Hinged type / Scraper type / Scraper type with floor magnet / Backwashing filtration type for aluminum chips
Compatibility with through-spindle	2MPa / 7MPa / Air
Oil-mist blower	
Minimal quantity coolant supply system	
ATC shutter	
Foundation parts	Bond anchoring method
Bond for foundation work	330ml (11.16us fl oz)
Sub-table	T-slot type / Specified by customer
NC rotary table	Rotary table type
Mist collector	2.2kW, installed separately
Coolant cooler	Separately installed type / High-pressure unit integrated type (High-pressure unit is required separately)
Touch Sensor system	Workpiece measurement / Tool length measurement / Tool break detection

## Dimensions

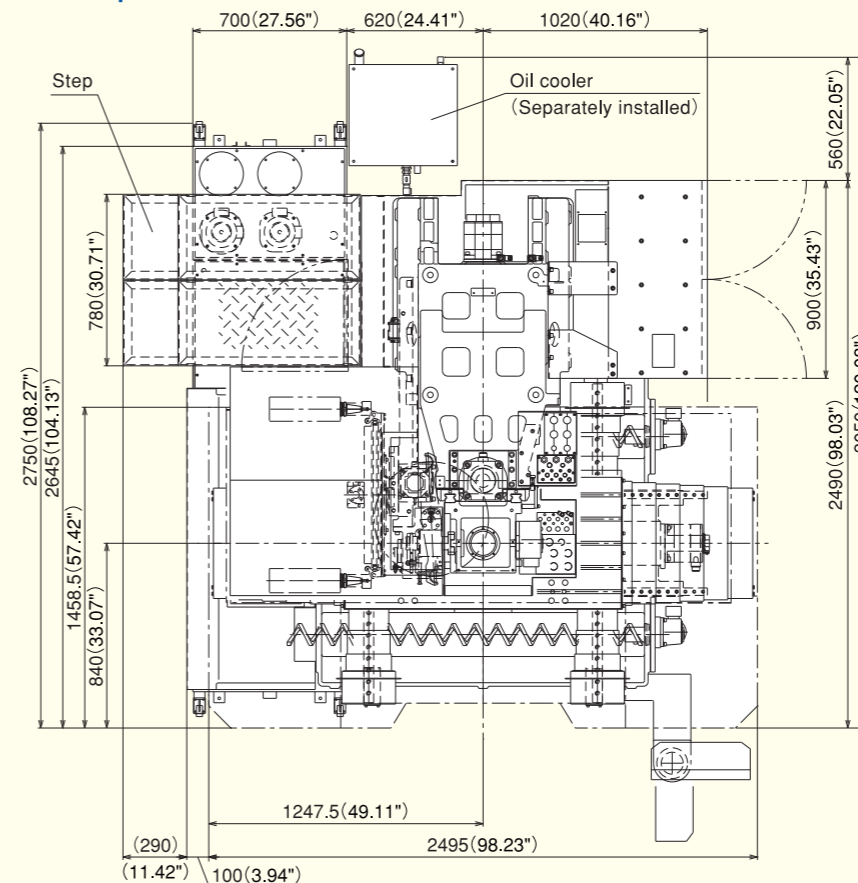
### Front View



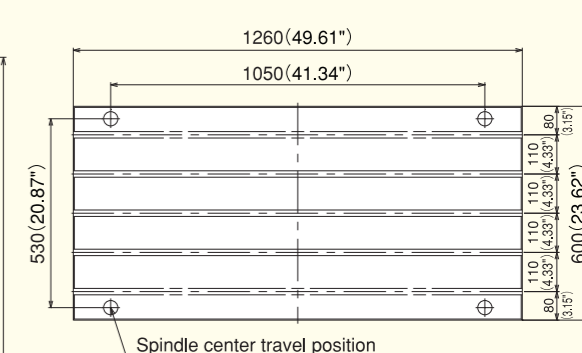
### Side View



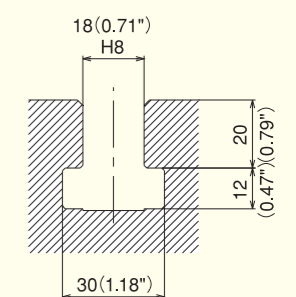
### Floor Space



### Table



### T-slot



## N830 (Windows 8-installed Open CNC)

### Standard Specification

No. of controlled axes: 3 axes (X, Y, Z)  
 No. of simultaneously controlled axes: 3 axes  
 Least input increment: 0.001 mm / 0.0001"  
 Max. programmable dimension:  
 ±99999.999 mm / ±9999.9999"  
 Inch / Metric conversion: G20 / G21  
 Program format: Meldas standard format  
 (M2 / M0 format needs to be instructed separately.)  
 Decimal point input I / II  
 Absolute / Incremental programming: G90 / G91  
 Program code: ISO / EIA automatic discrimination  
 Least control increment: 1nm  
 Positioning: G00  
 Linear interpolation: G01  
 Circular interpolation: G02 / G03  
 (Including radius designation)  
 Unidirectional positioning  
 Helical interpolation  
 Cutting feed rate: 5.3-digit F-code, direct designation  
 One digit F-code feed  
 Rapid traverse override: 0 / 1 / 10 / 25 / 50 / 100%  
 Cutting feed rate override: 0 to 200% (every 10%)  
 Feed rate override cancel: M49 / M48 (cancel)  
 Rigid tap cycle: G74, G84  
 Manual handle feed:  
 Least input increment: ×1, ×10, ×100 / graduation  
 Dwell: G04  
 Part program storage capacity: 1280m [500KB]  
 No. of registered programs: 1000  
 Part program editing  
 Background editing: Possible to program or edit the  
 machining program while NC machining is executed.  
 Buffer modification  
 Color touch-panel display (15" LCD / QWERTY key MDI)  
 Integrating time display  
 Clock function  
 User definable key  
 MDI (Manual Data Input) operation  
 Menu list  
 Parameter / Operation guidance  
 Alarm guidance  
 Ethernet interface  
 SD card / USB memory interface  
 Operation inside display unit with high-speed program server  
 Operation with SD card / USB memory  
 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 tool registration  
 Miscellaneous function: Designation with 3-digit M-code  
 Multiple M-codes in 1 block: Maximum 3 codes in 1 block  
 (Maximum 20 settings)  
 Tool length offset: G43, G44, G49 (cancel)  
 Tool position offset: G45 to G48  
 Cutter compensation: G38 to G42  
 Tool offset sets: Total 200 sets  
 Tool offset memory II :  
 tool geometry (length / diameter) and wear offset  
 Machine coordinate system: G53  
 Coordinate system setting: G92  
 Automatic coordinate system setting

Workpiece coordinate system: G54 to G59  
 Local coordinate system: G52  
 Manual reference position return  
 Automatic reference position return  
 2nd to 4th reference position return:  
 G30 P2 to P4  
 Reference position return check: G27  
 Optional block skip: / n (n: 1 to 9)  
 Single block  
 Dry run  
 Machine lock  
 Z-axis feed cancel  
 Miscellaneous function lock  
 3D solid program check  
 Graphic display check  
 Program number search  
 Sequence number search  
 Sequence number comparison and stop  
 Program restart function  
 Cycle start  
 Feed hold  
 Manual absolute  
 (ON / OFF setting with PLC parameter)  
 Auto restart  
 Program stop: M00  
 Optional stop: M01  
 Machining time computation  
 Automatic operation handle interruption  
 Manual numerical command  
 Sub program control: M98, M99  
 Canned cycle: G73, G74, G76, G81 to G89,  
 G80 (Cancel)  
 Linear angle designation  
 Circular cutting: G12, G13  
 Parameter mirror image  
 Programmable mirror image:  
 G51.1, G50.1 (Cancel)  
 User macro and user macro interruption  
 Variable command: total 700 sets  
 Programmable coordinate system rotation: G68,  
 G69 (Cancel)  
 Parameter coordinate system rotation  
 Corner chamfering / corner R:  
 Insert between straight line-straight line /  
 straight line-circle blocks  
 Programmable data input: G10 / G11 (Cancel)  
 Automatic corner override  
 Exact stop check / mode  
 Playback  
 Memory pitch error compensation  
 Backlash compensation  
 Skip function: G31  
 Manual tool length measurement  
 Tool life management II : 200 sets  
 External search  
 Emergency stop  
 Data protection key  
 NC alarm display  
 Machine alarm message  
 Stored stroke limit I / II  
 Load monitor  
 Self-diagnosis  
 Absolute position detection

### 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: 0.0001 mm / 0.00001 inch  
 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 [1MB]  
 (No. of registered programs: total 1000)  
 Part program storage capacity: 5120m [2MB]  
 (No. of registered programs: total 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: total 400 sets  
 Tool offset sets: total 999 sets  
 Addition of workpiece coordinate system (total 96 sets):  
 G54.1 P1 to G54.1 P96  
 Addition of workpiece coordinate system (total 300 sets):  
 G54.1P1 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 Nidec OKK Software

Integrated machining support system ..... STD  
 Tool support ..... STD  
 Program Editor ..... STD  
 EasyPRO ..... STD  
 Work Manager ..... Opt  
 HQ control ..... STD  
 Hyper HQ control mode II ..... STD  
 Soft Scale II m ..... STD  
 Cube environmental thermal displacement  
 correction ..... STD  
 WinGMC8 ..... Opt  
 Cycle Mate ..... Opt  
 Touch sensor T0 software ..... Opt  
 Soft CCM (Tool failure detection system) ..... Opt  
 Soft AC (Adaptive control unit) ..... Opt  
 Automatic restart at tool damage ..... Opt

Note: N850 (Windows 8-installed Open CNC)  
 STD : Standard Opt : Option

## F31i-B PLUS (WindowsCE-installed Open CNC)

### Standard Specification

No. of controlled axes: 3 axes (X, Y, Z)  
 No. of simultaneously controlled axes: 3 axes  
 Least input increment: 0.001 mm / 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  
 FS15 tape format  
 Nano interpolation (internal)  
 Positioning: G00  
 Linear interpolation: G01  
 Circular interpolation: G02 / G03 (CW / CCW)  
 (Including radius designation)  
 Helical interpolation  
 Unidirectional positioning: G60  
 Cutting feed rate: 6.3-digit F-code, direct designation  
 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)  
 Manual handle feed:  
 Least input increment ×1, ×10, ×100 / graduation  
 Dwell: G04  
 One-digit F code feed  
 Inverse time feed  
 Part program storage capacity: total 10240m [4MB]  
 (total 1000 programs)  
 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  
 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 tool registration  
 Auxiliary function: Designation with 3-digit M-code  
 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: total 400 sets  
 Tool offset memory C  
 Tool position offset  
 Automatic reference position return: G28 / G29  
 2nd reference position return: G30  
 Machine coordinate system: G53  
 Coordinate system setting: G92  
 Automatic coordinate system setting  
 Workpiece coordinate system:  
 G54 to G59 G54.1 P1 ~ P48  
 Local coordinate system: G52

Polar coordinate command: G15, G16  
 Manual reference position return  
 Reference position return check: G27  
 Optional block skip: /  
 Single block  
 Dry run  
 Machine lock  
 Z-axis feed cancel  
 Auxiliary function lock  
 Graphic function  
 Program number search  
 Sequence number search  
 Program restart  
 Cycle start  
 Feed hold  
 Manual absolute (ON / OFF with PMC parameter)  
 Auto restart  
 Program stop: M00  
 Optional stop: M01  
 Sequence number collation and stop  
 Sub program control  
 Canned cycle: G73, G74, G76, G80 to G89  
 Mirror image function parameter  
 Custom macro  
 Programmable mirror image  
 Programmable data input: G10  
 Automatic corner override  
 Manual Guide i (Basic)  
 Exact stop check / mode  
 Scaling: G50, G51  
 Additional custom macro common variables: 1000  
 Coordinate system rotation: G68, G69  
 Optional chamfering / corner R  
 Playback  
 Interpolation type pitch error compensation  
 Backlash compensation for each rapid traverse and  
 cutting feed  
 Smooth backlash  
 Skip function  
 Tool life management: total 256 sets  
 Tool length manual measurement  
 Data protection key  
 NC alarm display / alarm history display  
 Machine alarm display  
 Stored stroke check 1  
 Stored stroke check 2  
 Load monitor  
 Self-diagnosis  
 Absolute position detection  
 Data server: ATA card (1GB)

### 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 1  
 No. of simultaneously controlled axes: 4 axes  
 No. of simultaneously controlled axes: 5 axes Note 1  
 Least input increment: 0.0001mm / 0.00001"  
 Spiral / Conical interpolation  
 Cylindrical interpolation  
 Hypothetical axis interpolation  
 Involute interpolation  
 NURBS interpolation

Smooth interpolation  
 (Hyper HQ control B mode is required)  
 Handle feed 3 axes: Standard pulse handle is removed  
 Part program storage capacity:  
 total 20480m [8MB] (1000 in total)  
 Machining time stamp  
 Data server: ATA card (4GB)  
 RS232C interface: RS232C-1CH  
 Spindle contour control (Cs contour control)  
 Tool position offset  
 Tool offset sets: total 499 sets  
 Tool offset sets: total 999 sets  
 Addition of workpiece coordinate system  
 (total 300 sets): G54.1 P1 to P300  
 Optional block skip: Total 9  
 Manual handle interruption  
 Tool retract and return  
 Figure copy  
 Interruption type custom macro  
 Instruction of inclined plane indexing  
 Chopping  
 Manual Guide i (Milling cycle)  
 Addition of tool life management sets: total 1024 sets  
 High-speed skip

### Original Nidec OKK Software

Integrated machining support software  
 (incl. help guidance, etc.) ..... STD  
 Tool support ..... STD  
 Program Editor ..... STD  
 EasyPRO ..... STD  
 Work Manager ..... Opt  
 HQ control ..... STD  
 Hyper HQ control mode B ..... STD  
 Special canned cycle (including circular cutting) .. Opt  
 Cycle Mate F ..... Opt  
 Soft Scale II m ..... STD  
 Cube environmental thermal displacement  
 correction ..... STD  
 Touch sensor T0 software ..... Opt  
 Soft CCM (Tool failure detection system) ..... Opt  
 Soft AC (Adaptive control unit) ..... Opt  
 Automatic restart at tool damage ..... Opt

Note 1 : F31i-B5 Plus (WindowsCE-installed Open  
 CNC)  
 STD : Standard Opt : Option