# Nidec
### All for dreams

**5-axis Control Vertical Machining Center**

# VC-X SERIES

## VC-X350
## VC-X350L
## VC-X500
## VC-X500L

## NIDEC OKK CORPORATION

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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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## NIDEC OKK CORPORATION

VC-X SERIES

# Effective for Highly-efficient Intensive machining of Dies and Parts that are more Complex or more Detailed and Complicated

This specialized 5-axis machining center has been developed from Nidec OKK's advanced technologies. This machine eliminates loss of accuracy and burden on the operators caused by multi-setup operation and shortens lead time under process integration.

## VC-X350

## VC-X500

Machine picture includes optional accessories.

### Specifications — VC-X350

Travel distance
（X×Y×Z）
**600×430×460**mm (23.62"×16.93"×18.11")

（A×C）
**-120°～+30°×360°**

Table size
**φ350**mm (φ13.78")

Number of stored tools
**20**tools

### Specifications — VC-X500

Travel distance
（X×Y×Z）
**700×850×610**mm (27.56"×33.46"×24.02")

（A×C）
**-120°～+30°×360°**

Table size
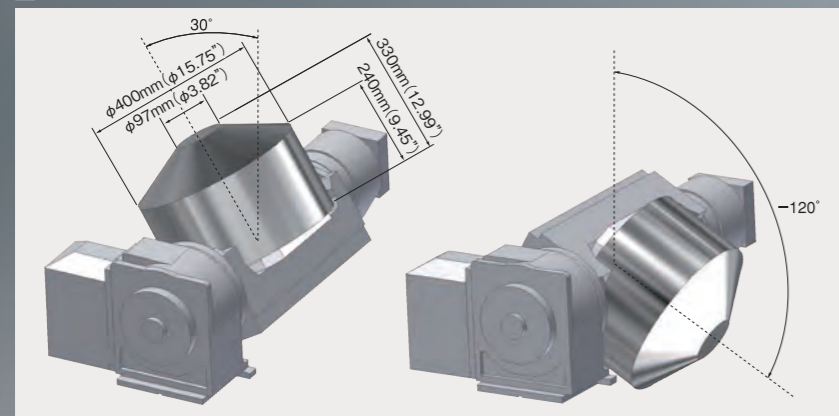**500×500**mm (19.69"×19.69")

Number of stored tools
**40**tools

# VC-X350

# Compact machine with powerfully smooth feed



**■Maximum dimensions loadable on table**



30°
φ400mm(φ15.75″)
φ97mm(φ3.82″)
330mm(12.99″)
240mm(9.45″)
−120°

## Powerfully Smooth Feed

Utilizing the larger than normal linear roller guides has doubled the guide-way rigidity.
The high-rigidity guide combined with the large-diameter ball screws contributes to a vast improvement in cutting performance.



## ATC [Automatic Tool Changer]

Consistent tool change operation and superior durability are ensured by use of Nidec OKK's original proven cam-controlled high-speed synchronized tool changer.
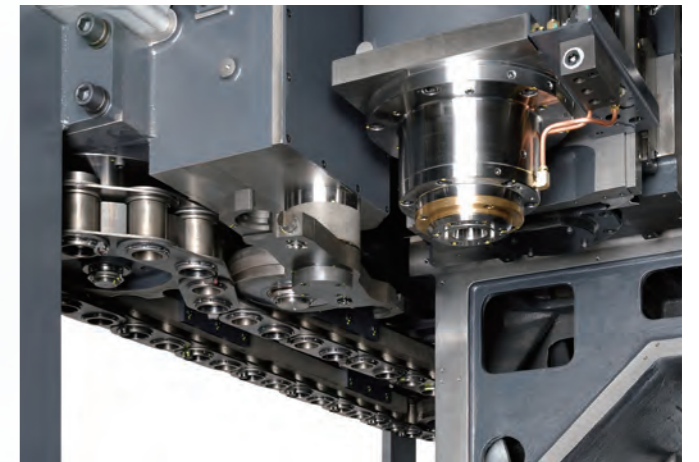


## Environment-friendly eco design

### Extending the maintenance period
Maintenance is extended to a long period by the using self-lubricated sealed ball screws and roller guides which also do not contribute any contaminating oil.

### ECO sleep function
If the machine stands by for the period exceeding the specified time period, the machine's present mode is switched to a power-saving mode to reduce wasteful consumption of power, air and so on. When the power-saving mode is active, the equipment such as servos and chip conveyors are turned off. It is cancelled automatically when the setup operation is completed i.e. when the doors are closed.

### LED light [Option]
LED light is used to reduce heat generated by the lighting system and contribute to power saving.
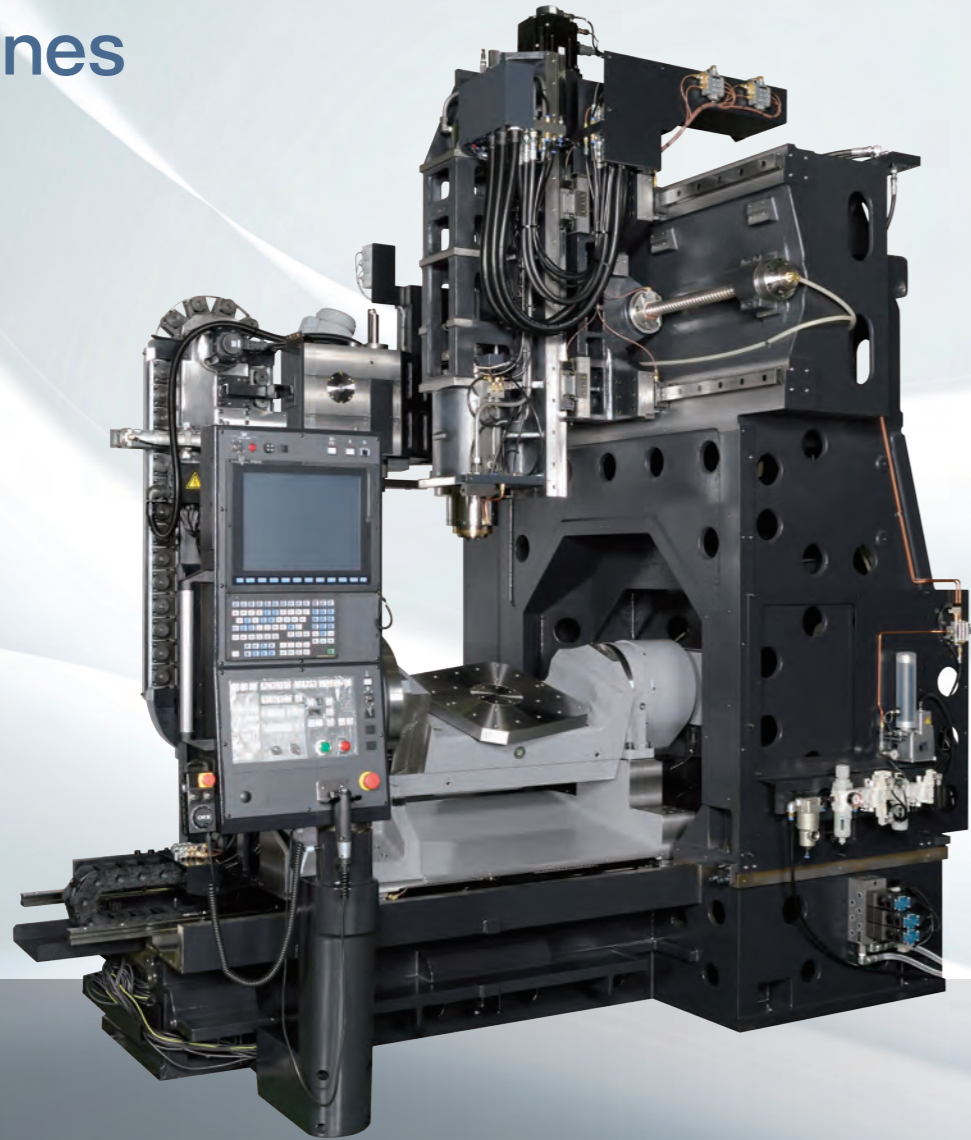
### Provision of inverter-controlled hydraulic unit [Option]
An optional inverter-controlled hydraulic unit can be provided for the 5-axis table and tool clamp/unclamp mechanism which will reduce power consumption during non-operation.
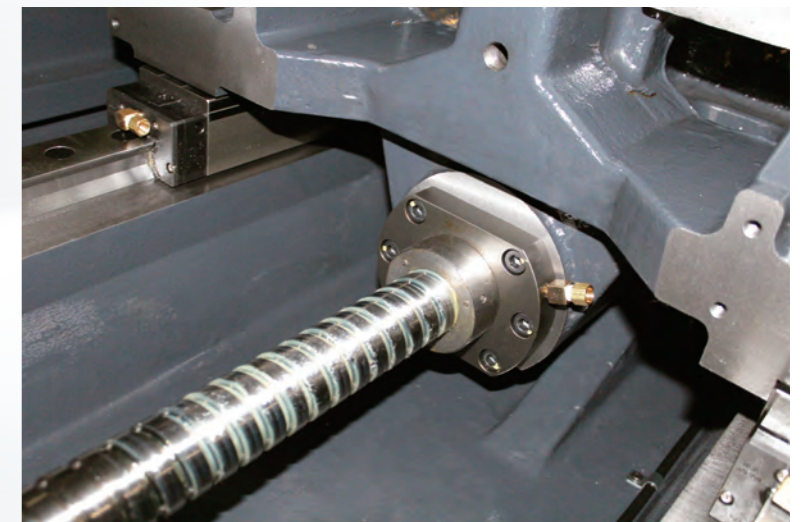
# VC-X500

## Highest-level space saving and loadable workpieces size among the same-class machines



### ■Maximum dimensions loadable on table
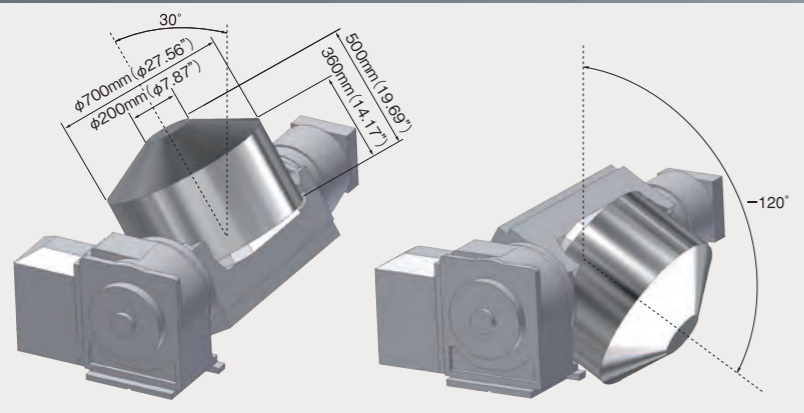


Large workpieces can be handle even though the required floor space is as small as 3300×2450mm（129.92"×96.46"）. （60% up graded workpieces size compare with our company's VP600-5AX）

### Improved accessibility



Distance of front cover to spindle center **120mm**（4.72"）

Distance of front cover to table center **620mm**（24.41"）



120mm (4.72")
620mm (24.41")
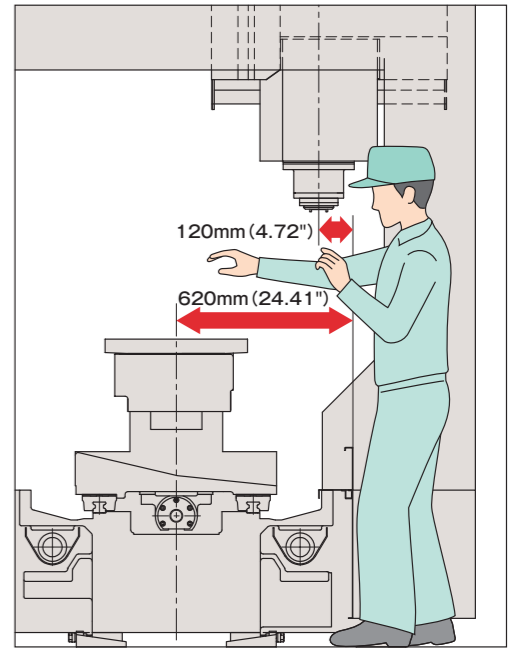
### Tool magazine

Standard specification is the 40-tool storage magazine. The required floor space is not increased when choosing the optional 60-, 80- or 120-tool magazines.



**40**-tool magazine

**60**-tool magazine

# VC-X350L VC-X500L

## Equipped with Direct-Drive rotary table!
## Next-generation 5-axis machine that enables turning!



### Equipped with turning function

**The maximum spindle speed of 1000 min⁻¹ has been realized for the C-axis and hydraulic disc clamp method is employed for the main spindle, which enables stable turning.**



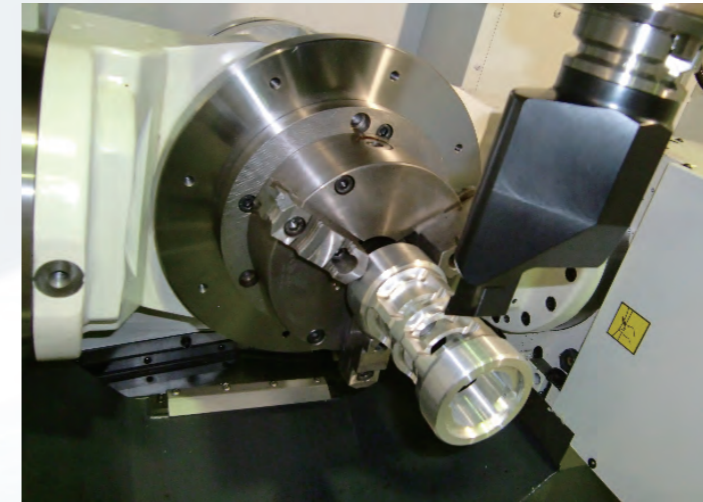Combined with the main unit performance of the base machine, the Direct-Drive rotary table and unique clamp mechanism of the main spindle produce sufficient turning performance in terms of accuracy and rigidity.

### Rotary table exclusive to VC-X350L, VC-X500L

**The 1500 N·m (1106 ft·lbs) hydraulic clamp on the inclined axis (A-axis) and the 500 N·m (369 ft·lbs) air clamp on the rotational axis (C-axis) provide high-accuracy 5-axis machining allowing complex part geometries to be machined in a single operation.**
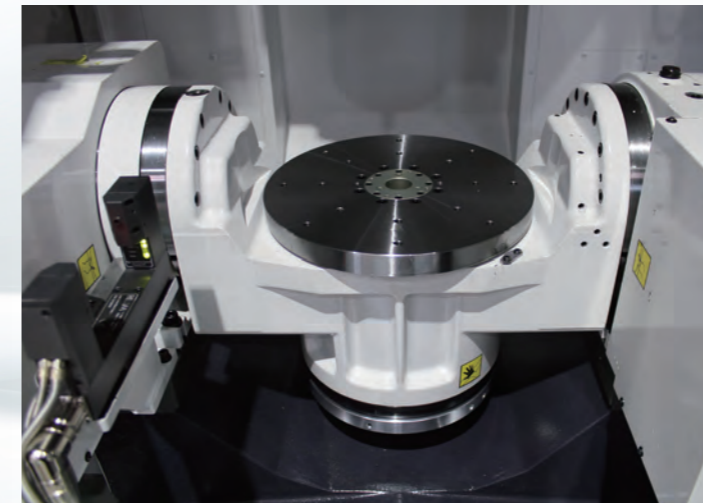


The standard specification includes three ports for supplying hydraulic/pneumatic pressure. They allow preparing for the jig by just adding valves and hoses.
We can increase flexibility of your choice by adding the Automatic Workpiece Changers made by the companies such as System 3R International and EROWA so that we meet users' requirements regarding workpiece sizes, the number of pallets, etc.

The self-lubricating ball screws and roller guide make the machine maintenance free for a long period of time and free from oil contamination.

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## Specifications　　　　　VC-X350L

Rapid speed
（X×Y×Z）
**50×50×36**m/min（1969×1969×1417ipm）
（A×C）
**44.4×100**min⁻¹
in the turning function mode
**C-axis:1000**min⁻¹

Tool shank（nominal number）
**BT40 Dual contact tool**

## Specifications　　　　　VC-X500L

Rapid speed
（X×Y×Z）
**48×48×32**m/min（1890×1890×1260ipm）
（A×C）
**25×100**min⁻¹
in the turning function mode
**C-axis:1000**min⁻¹

Tool shank（nominal number）
**BT40 Dual contact tool**

### Standard NC functions for VC-X350L, VC-X500L

■Constant surface speed control
■Multi spindle control
■Turning G code system B/C

■Multiple repetitive cycles
■Tool geometry/wear compensation
■Tool offset for Milling and Turning function

■Turning/Machining G code system switching function

# Standard provision of 12000min⁻¹ spindle

Cutting performance is largely improved by the use of the motorized spindle (MS) which integrates a motor covering a wide and high output range. Acceleration time of the spindle can be as short as only 1.5 seconds from the non-operating state to the speed of 12000min⁻¹. 37/26/18.5kW (50/35/25HP) high-power spindle or high-speed spindle of 20000min⁻¹ can also be adopted optionally.

Stator

Cooling oil

Rotor

Grease lubrication for bearings    Radiation cooling system

### ● FANUC
**12000min⁻¹ [7.5/5.5kW (10/7HP)]**

7.5 kW (10HP) 30min rating
5.5 kW (7HP) cont. rating
48 N·m (35ft·lbs) 30min rating
35 N·m (26ft·lbs) cont. rating

Spindle output (kW) / Spindle torque (N·m)
Spindle Speed (min⁻¹)

### ● FANUC
**12000min⁻¹ [37/26/18.5kW (50/35/25HP)]**

37 kW (50HP) 15%ED
250 N·m (184ft·lbs) 10%ED
26 kW (35HP) 30min rating
22 kW (30HP) 10%ED
18.5 kW (25HP) cont. rating
18.5 kW (25HP) 15min rating
15 kW (20HP) cont. rating
118 N·m (87ft·lbs) 15min rating
70.7 N·m (52ft·lbs) 15%ED
96.5 N·m (70ft·lbs) cont. rating
35.3 N·m (26ft·lbs) cont. rating

Spindle output (kW) / Spindle torque (N·m)
Spindle Speed (min⁻¹)

### ● FANUC
**20000min⁻¹ [37/26/18.5kW (50/35/25HP)]**

22 kW (30HP) 10%ED
37 kW (50HP) 15%ED
18.5 kW (25HP) 15min rating
221 N·m (163ft·lbs) 10%ED
26 kW (35HP) 30min rating
15 kW (20HP) cont. rating
18.5 kW (25HP) cont. rating
79.6 N·m (59ft·lbs) cont. rating
58.9 N·m (43ft·lbs) 15%ED
98.1 N·m (72ft·lbs) 15min rating
38.2 N·m (28ft·lbs) cont. rating
27.2 N·m (20ft·lbs) cont. rating

Spindle output (kW) / Spindle torque (N·m)
Spindle Speed (min⁻¹)

| | 12000min⁻¹ 7.5/5.5kW | 12000min⁻¹ High-Power Spindle | 20000min⁻¹ High-speed Spindle |
|---|---|---|---|
| VC-X350 | Std. | Opt. | Opt. |
| VC-X350L | Std. | Opt. | Opt. |
| VC-X500 | — | Std. | Opt. |
| VC-X500L | — | Std. | Opt. |

## Dual contact tool BT type    VC-X350 : Option    VC-X350L, VC-X500, VC-X500L : Standard

Improvements in rigidity of tools have been chieved by contact faces of spindle-nose and tool holders flange. This has a great effect not only for heavy load machining but also high speed machining.
(The performance is different due to the cutting tools and cutting conditions.)
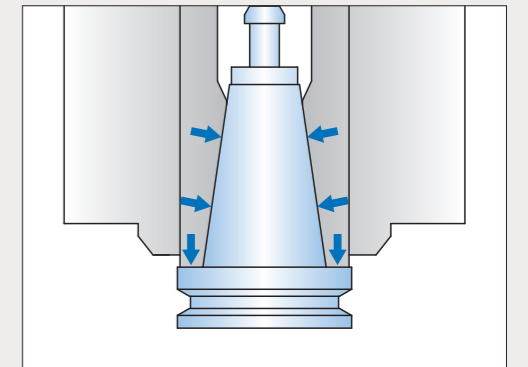
## LED light    VC-X350, VC-X350L, VC-X500, VC-X500L : Standard

LED light is used to reduce heat generated by the lighting system and contribute to power saving.

## Core chilled ball screw and Double-anchor pre-tension system    VC-X350, VC-X350L : Option    VC-X500, VC-X500L : Standard

### Lubricating oil temperature controller

Nut    Nut

Cooling oil

Ball screw

Servo motor

The X, Y and Z-axes use core chilled ball screws. This suppresses thermal displacement and helps maintain high accuracy for many hours of operation by circulating the temperature-controlled oil.
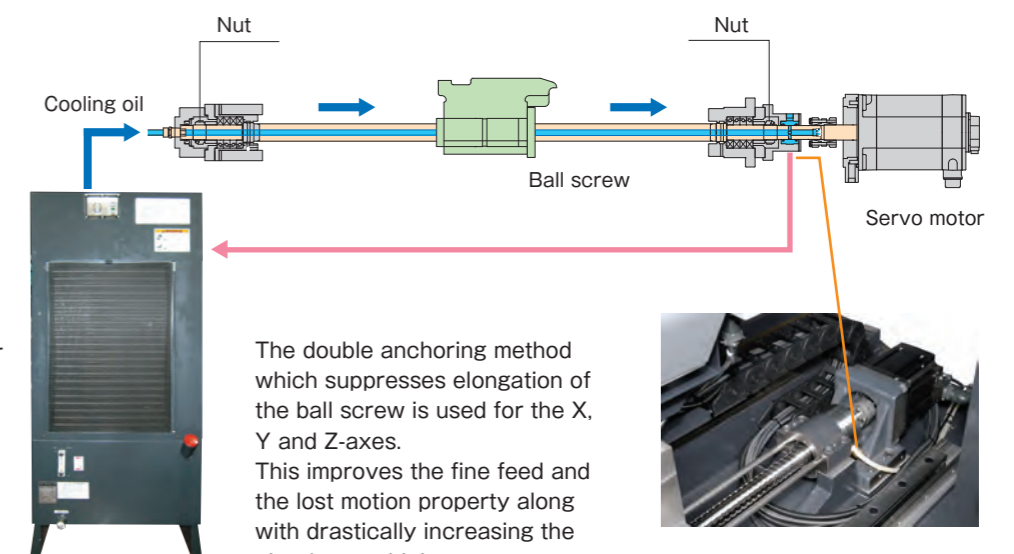
The double anchoring method which suppresses elongation of the ball screw is used for the X, Y and Z-axes.
This improves the fine feed and the lost motion property along with drastically increasing the circular machining accuracy.

# Improved reliability and Operating efficiency

## Maintenance

Daily-inspected equipment are installed together in one place to improve the operating efficiency.

Photo is VC-X500.

## Coil-type chip conveyors (Standard)

### Thorough chip processing measures

Standard machine has two coil-type chip conveyors. (VC-X350, VC-X350L and VC-X500) The coil-type chip conveyors are capable of removing a large amount of chips from the machine promptly.
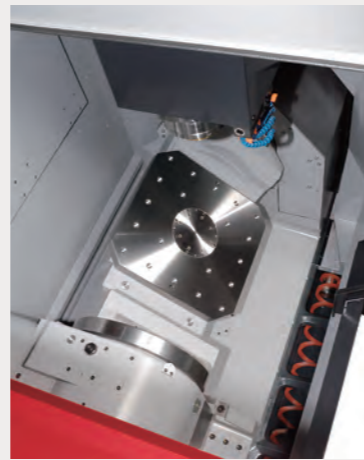
Photo is VC-X500.

## Lift-up Chip Conveyor (Option)

Suitable Lift-up Chip Conveyor according to Type of Chips  ◎ : Most suitable;  ○ : Usable;  △ : Conditionally usable;  × : Not usable;  — : Not applicable

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

Photo is Hinge type (Option).
Chip bucket is another option.
There are fixed type and swivel type.
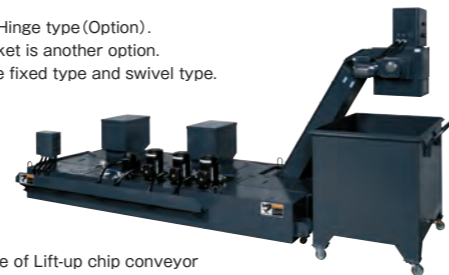
※Example of Lift-up chip conveyor

## Sample workpieces
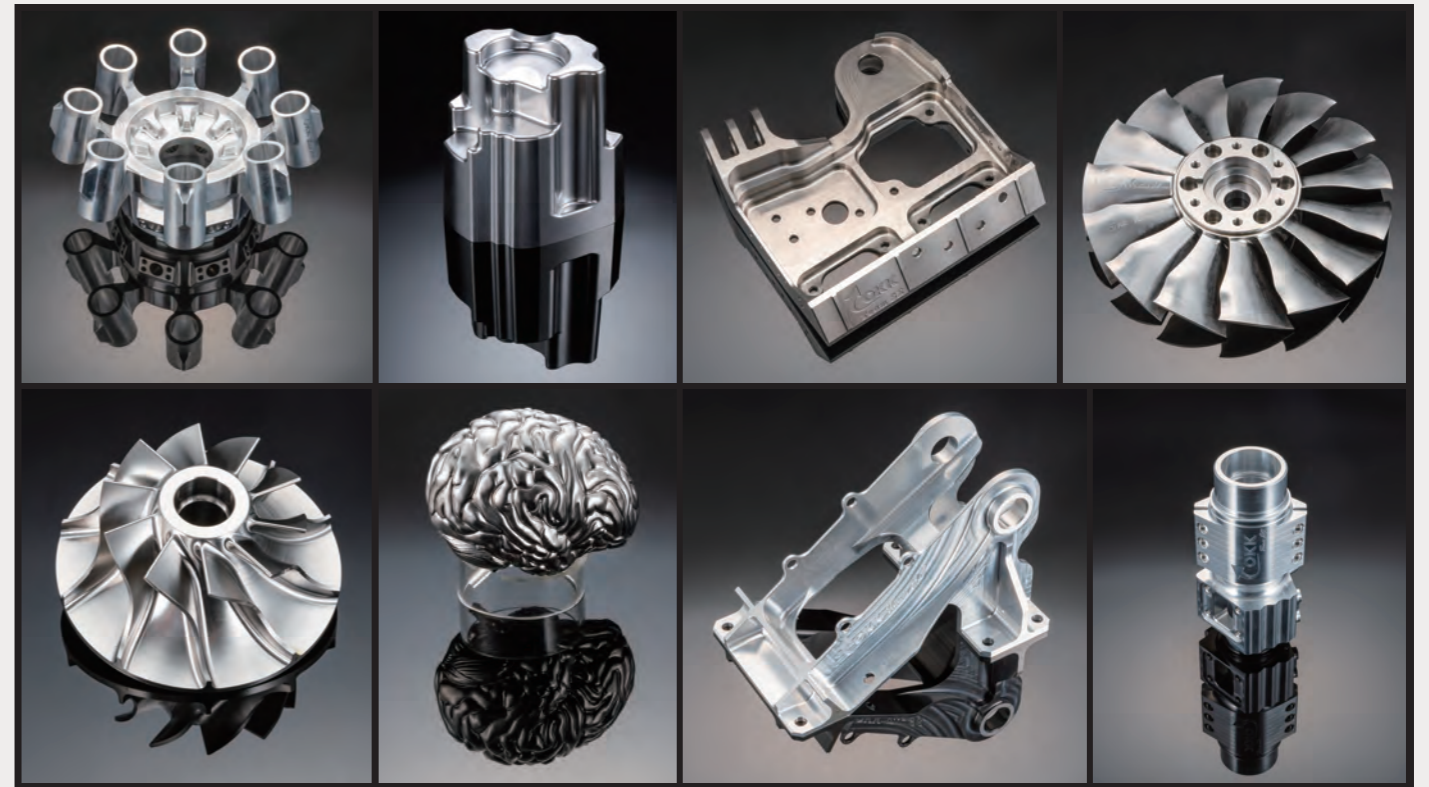
## Accuracy

### ■Positioning accuracy (when Linear scale is not used) mm (inch)

| Positioning accuracy | X,Y,Z : ±0.0020 (±0.00008") /full length |
|---|---|
| Positioning repeatability | X,Y,Z : ±0.0010 (±0.00004") /full length |

(Nidec OKK tolerance)

### ■Positioning accuracy (when Linear scale is used) mm (inch)

| Positioning accuracy | X,Y,Z : ±0.0010 (±0.00004") /full length |
|---|---|
| Positioning repeatability | X,Y,Z : ±0.0005 (±0.00002") /full length |

(Nidec OKK tolerance)

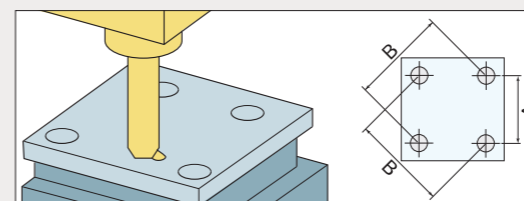### ■Positioning accuracy (when Rotary encoder is not used) mm (inch)

| Positioning accuracy | C-axis : ±10sec |
|---|---|

(Nidec OKK tolerance)

### ■Positioning accuracy (when Rotary encoder is used) mm (inch)

| Positioning accuracy | A-axis : ±5sec    C-axis : ±3sec |
|---|---|

(Nidec OKK tolerance)

A=150 (5.91"), B=212.132 (8.35")

### ■Positioning machining accuracy mm (inch)

| Item | Tolerance | Example record | |
|---|---|---|---|
| | | VC-X350 | VC-X500 |
| Axial direction | 0.015 (0.00059") | 0.003 (0.00012") | 0.003 (0.00012") |
| Diagonal direction | 0.015 (0.00059") | 0.005 (0.00020") | 0.005 (0.00020") |
| Difference in diameter | 0.010 (0.00039") | 0.005 (0.00020") | 0.005 (0.00020") |

### ■Circular machining accuracy mm (inch)

| Item | Tolerance | Example record | |
|---|---|---|---|
| | | VC-X350 | VC-X500 |
| Circularity | 0.005 (0.00020") | 0.0042 (0.00017") | 0.0042 (0.00017") |
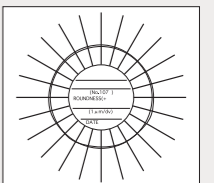
Remarks

※1 : The above sample data shows a short-time machining example and the results of continuous machining may differ from them.

※2 : The above sample data shows the accuracy under Nidec OKK's in-house cutting test conditions. The results may vary with the conditions of the cutting tools and fixtures.

※3 : The accuracy shown above are values obtained based on Nidec OKK's inspection standards under the conditions that the machine is installed according to Nidec OKK's foundation drawing and the ambient temperature remains constant.

# VC-X350  VC-X350L

## SPECIFICATIONS

### ■ Main Specifications

| Item | | Unit | Specification | |
|---|---|---|---|---|
| | | | VC-X350 | VC-X350L |
| Travel | Travel on X axis (Spindle head right / left) | mm | 600 (23.62") | |
| | Travel on Y axis (Table back / forth) | mm | 430 (16.93") | |
| | Travel on Z axis (Spindle head up / down) | mm | 460 (18.11") | |
| | Travel on A axis (Table tilting) | deg | -120~+30 | |
| | Travel on C axis (Table turning) | deg | 360 | |
| | Distance from table top surface to spindle nose | mm | 70~530 (2.76"~20.87") | 110~570 (4.33"~22.44") |
| | Distance from column front to spindle center | mm | 520 (20.47") | |
| Table | Table work surface area | mm | ø350 (ø13.78") | |
| | Max. workpiece weight loadable on table | kg | 200 (441 lbs) | 100(220 lbs)※1 |
| | Table work surface configuration (nominal screw-hole size × number of holes) | | M10×16 holes | |
| | Distance to the table work surface from the floor | mm | 1080 (42.52") | 1120 (44.09") |
| Spindle | Spindle speed | min-1 | 100~12000 | |
| | Number of spindle speed change steps | | Electric stepless speed change(MS) | |
| | Spindle nose (nominal number) | | 7/24 taper, No.40 | |
| | Spindle bearing bore diameter | mm | ø65 (ø2.56") | |
| Feed Rate | Rapid traverse rate | X, Y and Z axes | m/min | XY:50 (1969 ipm) Z:36 (1417 ipm) | |
| | | A and C axes | min-1 | A:44.4 C:66.7 | A:44.4 C:100 |
| | Cutting feed rate | X, Y and Z axes | mm/min | 1~36000 (0.04~1417 ipm)※2 | |
| | | A and C axes | min-1 | A:44.4 C:66.7 | A:44.4 C:100 |
| | in the turning function mode | | min-1 | - | C:1000 |
| Automatic Tool Changer | Tool shank (nominal number) | | JIS B6339 BT40 | BT40 (Dual-contact BT type) |
| | Pull stud (nominal number) | | MAS403 P40T-1 | |
| | Number of stored tools | tool | 20 | |
| | Max. tool diameter | mm | ø125 (ø4.92") | |
| | Max. tool length (from the gauge line) | mm | 300 (11.81") | |
| | Max. tool weight | kg | 7 (15 lbs) | |
| | Tool selection method | | Memory random method | |
| | Tool exchange time (tool-to-tool) | sec | 1.3 | |
| | Tool exchange time (cut-to-cut) | sec | 4.5※3 | |
| Motors | for Spindle (30-min rating/continuous rating) | kW | 7.5/5.5 (10/7 HP) | |
| | for Feed axes | X, Y and Z axes | kW | XY:3 (4 HP) Z:4 (5.4 HP) | |
| | | A and C axes | kW | A:4.5 (6 HP) C:2.7(3.6 HP) | A:4.5 (6 HP) C:6(8 HP) |
| Required Power Supply | Power supply | kVA | 25 | |
| | Supply voltage × supply frequency | V×Hz | 200±10%×50/60±1 | |
| | | | 220±10%×60±1※4 | |
| | Compressed air supply pressure | MPa | 0.5 (73 psi)※5 | |
| | Compressed air supply flow rate | L/min(ANR) | 450 (119gpm)※6 | |
| Tank Capacity | Coolant tank | L | 280 (74 gal) | |
| | Spindle head cooling oil tank | L | 50 (13 gal) | |
| | Hydraulic unit tank | L | 20 (5 gal) | |
| Machine Size and Required Floor Space | Machine height from the floor surface | mm | 3070 (120.87") | 3150 (124.02") |
| | Floor space required for operation (width × depth) | mm | 1895×3440 (74.61"×135.43") | |
| | Machine weight | kg | 8500 (18700 lbs) | |
| | Temperature of operation environment | ℃ | 5~40 | |
| | Humidity of operation environment | % | 10~90 (No dew) | |

※1:Max. inertia is 0.9 kg·m² for turning function.
※2:Under the HQ or Hyper HQ control
※3:Includes thr ATC shutter operating time
※4:When the supply voltage is 220VAC, the supply frequency of 60Hz only is applicable.
※5:Purity of the supplied air should be equivalent to Class 3.5.4 specified in ISO 8573-1 / JIS B8392-1 or higher.
※6:The flow rate for the standard specification machines is specified in the above.
When optional specification such as an air blow is added, add the correspnding air supply according to the operating frequency.

### ■ Standard Accessories

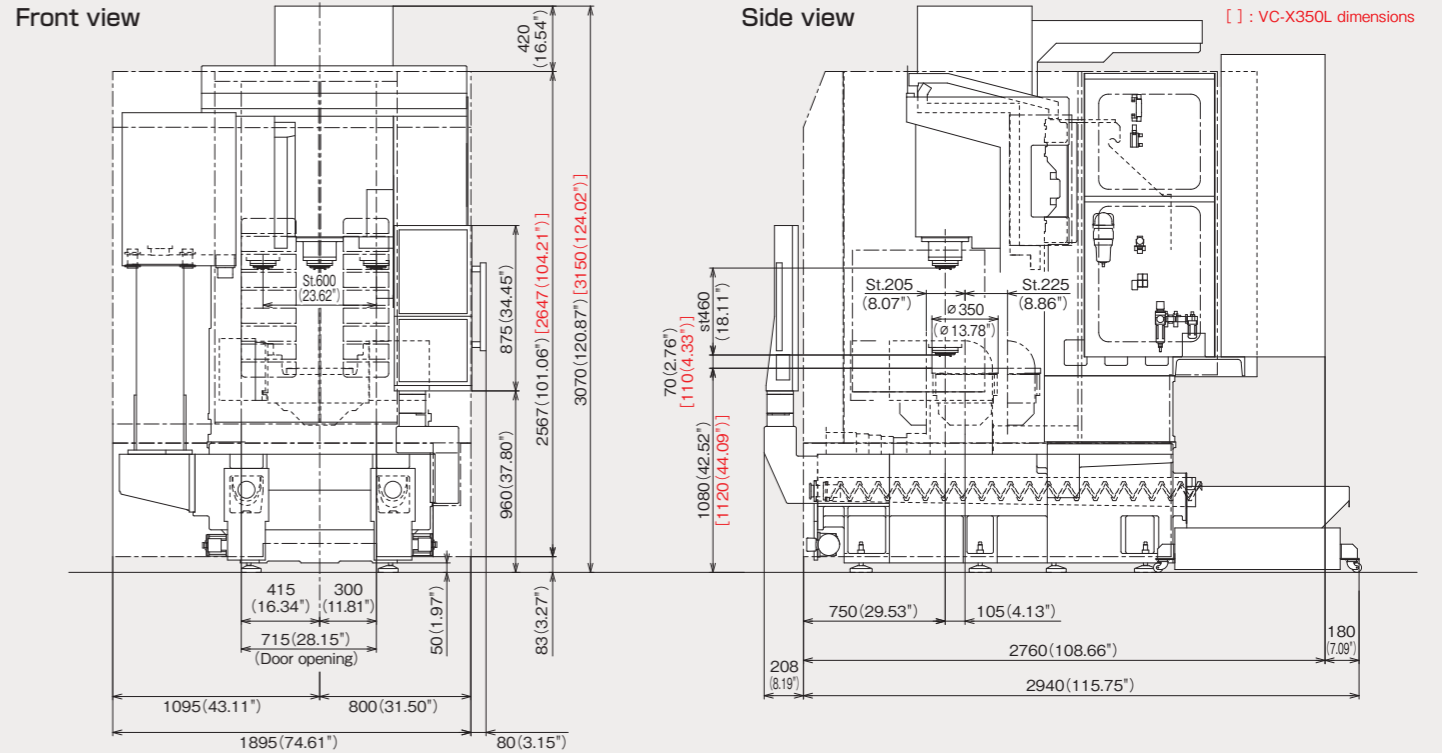| Item | Qty | Remark |
|---|---|---|
| Compatibility with Dual contact tool※1 | 1 set | BT type |
| Compatibility with turning specification※1 | 1 set | C axis:1000min-1 |
| Lighting system | 1 set | LED Light ×2 |
| Coolant unit (Separate coolant tank) | 1 set | Tank capacity:280L (74 gal) |
| Coil-type chip conveyor | 1 set | 1 set for each of right and left |
| Entire machine cover (Splash guard) | 1 set | |
| Ceiling cover | 1 set | |
| Slideway protection covers for X and Y axes | 1 set | |
| ATC shutter | 1 set | |
| Air blow | 1 set | 1 nozzle |
| Signal lamp | 1 set | Three-lamp type (With buzzer) |
| Workpiece flushing equipment | 1 set | Shower gun type |
| Coolant through preparation | 1 set | |
| Spindle head cooling oil temperature controller | 1 set | |
| Hydraulic unit | 1 set | |
| Safty equipment | 1 set | Including frontdoor and magazine door electromagnetic lock |
| Leveling block | 1 set | |
| Parts for machine transfer | 1 set | |
| Automatic power-off unit | 1 set | |
| Rotary encoder | 1 set | for A axis (tilting axis) ※2 for A axis (tilting axis) and C axis (turning axis) ※1 |
| Electric spare parts (fuses) | 1 set | |
| Instruction manual | 1 set | |
| Electrical manuals (operation, maintenance, parts list, hardware diagrams) | 1 set | |

※1:for VC-X350L only
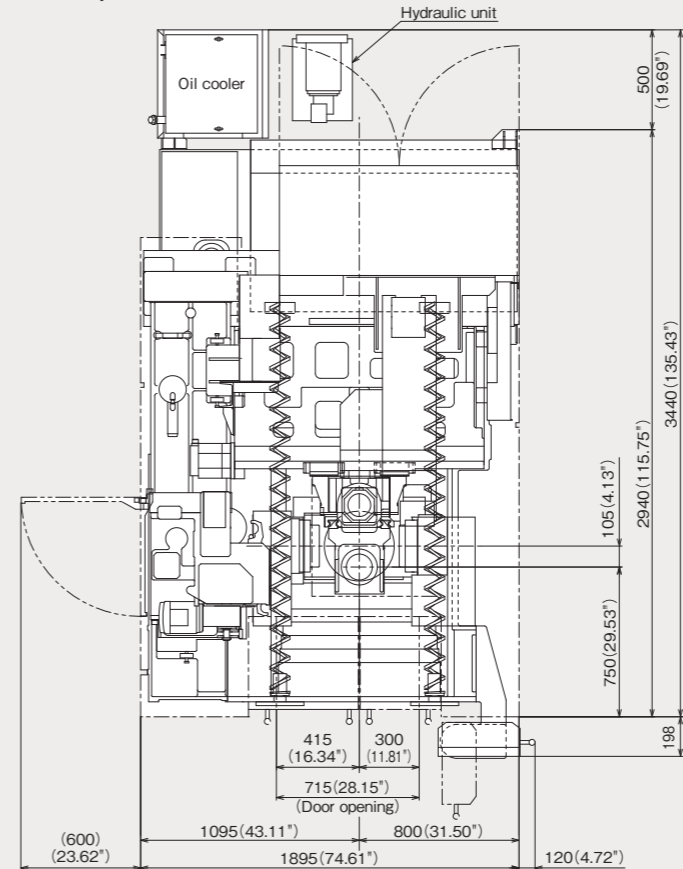※2:for VC-X350 only

### ■ Optional Accessories

| Item | Specification |
|---|---|
| Compatibility with Dual contact tool | BT type※1, HSK-A63 |
| Spindle motor | 12000min-1 MITSUBISHI 22/18.5kW(30/25HP) FANUC 37/26/18.5kW(50/35/25HP) |
| | 20000min-1 MITSUBISHI 22/18.5kW(30/25HP) FANUC 37/26/18.5kW(50/35/25HP) |
| Number of stored tools | 30tools, 40tools, 60tools, 80tools, |
| Linear scale feed back※2 | XY-axis / XYZ-axis |
| Rotary encoder※1 | for C axis (turning axis) |
| Lift-up chip conveyor | Hinged type / Scraraper type / Scraper type with floor magnet / Scraper type with dram filter |
| Flushing chips with coolant | |
| Compatibility with oil-hole holder | 1.1kW(1.5 HP) |
| Spindle through coolant | 2MPa(290 psi) coolant / 7MPa(1015 psi) coolant / with air |
| Foundation parts | Bond anchoring method |
| Oil-mist/air blower | |
| Signal lamp | Two-lamp type (With buzzer / Without buzzer) |
| Splash guard automatically open / close | Front door |
| Hydraulic supply ports for fixture | VC-X350:Max.6 ports, VC-X350L:Max.3 ports |
| Touch sensor system T0 | Workpiece measurement, Tool length/ diameter measurement |
| Touch sensor system T1 | Workpiece measurement, Tool length measurement, Tool break detection |

※1:for VC-X350 only
※2:When the linear scale is added, cleanliness of the supplied air should be equivalent to or higher than the classes 1.5.1 specified in ISO 8573-1 / JIS B8392-1 in order to prevent generating problems.

## Main dimensions of the machine

[ ] : VC-X350L dimensions

### Front view



### Side view



### Floor Space



### Table
#### VC-X350



16-M10 screw 20(0.79")depth (Workpiece clamping screw hole)
Hydraulic/Pneumatic pressure supply ports (Maximum 6 ports)
When both the ports for the oil pressure and the ones for the air pressure coexist, a port between the one for the oil pressure and the one for the air pressure should be left unused.
20(dia. 0.79")H7 hole with 20(0.79")depth
C-axis origin mark

#### VC-X350L



16-M10 screw 20(0.79")depth (Workpiece clamping screw hole)
Hydraulic/Pneumatic pressure supply ports (Maximum 3 ports)
A,B port: Hydraulic pressure
C port: Pneumatic pressure
C-axis origin mark

# VC-X500  VC-X500L

## SPECIFICATIONS

### ■ Main Specifications

| Item | | Unit | Specification | |
| --- | --- | --- | --- | --- |
| | | | VC-X500 | VC-X500L |
| Travel | Travel on X axis (Table right / left) | mm | 700 (27.56") | |
| | Travel on Y axis (Spindle head back / forth) | mm | 850 (33.46") | |
| | Travel on Z axis (Spindle head up / down) | mm | 610 (24.02") | |
| | Travel on A axis (Table tilting) | deg | -120~+30 | |
| | Travel on C axis (Table turning) | deg | 360 | |
| | Distance from table top surface to spindle nose | mm | 150~760 (5.91"~29.92") | |
| | Distance from column front to spindle center | mm | 530 (20.87") | |
| Table | Table work surface area | mm | 500×500 (19.69"×19.69") | φ500 (φ19.69") |
| | Max. workpiece weight loadable on table | kg | 500 (1102 lbs) | 250 (551 lbs)※1 |
| | Table work surface configuration (nominal screw-hole size × number of holes) | | M16×20 holes | M16×24 holes |
| | Distance to the table work surface from the floor | mm | 1080 (42.52") | |
| Spindle | Spindle speed | min⁻¹ | 100~12000 | |
| | Number of spindle speed change steps | | Electric 2-step speed change(MS) | |
| | Spindle nose (nominal number) | | 7/24 taper, No.40 | |
| | Spindle bearing bore diameter | mm | φ65 (φ2.56") | |
| Feed Rate | Rapid traverse rate — X, Y and Z axes | m/min | XY:48 (1890 ipm)  Z:32 (1260 ipm) | |
| | Rapid traverse rate — A and C axes | min⁻¹ | A:25  C:50 | A:25  C:100 |
| | Cutting feed rate — X, Y and Z axes | mm/min | 1~32000 (0.04~1260 ipm)※2 | |
| | Cutting feed rate — A and C axes | min⁻¹ | A:25  C:50 | A:25  C:100 |
| | in the turning function mode | min⁻¹ | — | C:1000 |
| Automatic Tool Changer | Tool shank (nominal number) | | BT40 (Dual-contact BT type) | |
| | Pull stud (nominal number) | | MAS403 P40T-1 | |
| | Number of stored tools | tool | 40 | |
| | Max. tool diameter | mm | φ82 (φ3.23") [φ125 (φ4.92") with no tools in adjacent pots] | |
| | Max. tool length (from the gauge line) | mm | 350 (13.78") | |
| | Max. tool weight | kg | 7 (15 lbs) | |
| | Tool selection method | | Address fixed random method | |
| | Tool exchange time (tool-to-tool) | sec | 2.0 | |
| | Tool exchange time (cut-to-cut) | sec | 4.8 | |
| Motors | for Spindle | kW | (15%ED/30-min rating/continuous rating) 37/26/18.5(50/35/25HP) | |
| | for Feed axes — X, Y and Z axes | kW | X:5.5 (7.4 HP)  YZ:4.5 (6 HP) | |
| | for Feed axes — A and C axes | kW | A:5.5 (7.4 HP) C:4.5 (6 HP) | A:5.5 (7.4 HP) C:12.1 (16.2 HP) |
| Required Power Supply | Power supply | kVA | 44 | 46 |
| | Supply voltage × supply frequency | V×Hz | 200±10%×50/60±1 220±10%×60±1 | |
| | Compressed air supply pressure | MPa | 0.4~0.6 (58~87 psi)※3 | |
| | Compressed air supply flow rate | L/min(ANR) | 600 (158.5gpm)※6 | |
| Tank Capacity | Coolant tank | L | 260 (69 gal) | |
| | Spindle head cooling oil tank | L | 50 (13 gal) | |
| | Hydraulic unit tank | L | 20 (5 gal) | |
| Machine Size and Required Floor Space | Machine height from the floor surface | mm | 3495 (137.60") | 3500 (137.80") |
| | Floor space required for operation (width × depth) | mm | 3720×2450 (146.46"×96.46") | |
| | Machine weight | kg | 12000 (26500 lbs) | |
| | Temperature of operation environment | ℃ | 5~40 | |
| | Humidity of operation environment | % | 10~90 (No dew) | |

※1:Max. inertia is 7.8 kg·m² for turning function.
※2:Under the HQ or Hyper HQ control.
※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 |
| --- | --- | --- |
| Compatibility with Dual contact tool | 1 set | BT type |
| Compatibility with turning specification※1 | 1 set | C axis:1000min⁻¹ |
| Lighting system | 1 set | LED Light ×2 |
| Coolant unit (Separate coolant tank) | 1 set | Tank capacity:260L (69 gal) |
| Coil-type chip conveyor | 1 set | 1 set for each of front and rear sides |
| Entire machine cover (Splash guard) | 1 set | |
| Ceiling cover | 1 set | |
| Slideway protection covers for X and Y axes | 1 set | |
| ATC shutter | 1 set | |
| Air blow | 1 set | 1 nozzle |
| Signal lamp | 1 set | Three-lamp type (With buzzer) |
| Workpiece flushing equipment | 1 set | Shower gun type |
| Coolant through preparation | 1 set | |
| Spindle head cooling oil temperature controller | 1 set | |
| Automatic greasing unit | 1 set | |
| Hydraulic unit | 1 set | for clamping A/C axis table |
| Safty equipment | 1 set | Including magazine door and operater door electromagnetic lock |
| Leveling block | 1 set | |
| Parts for machine transfer | 1 set | |
| Automatic power-off unit | 1 set | |
| Rotary encoder | 1 set | for A axis (tilting axis) and C axis (turning axis) |
| Electric spare parts (fuses) | 1 set | |
| Instruction manual | 1 set | |
| Electrical manuals (operation, maintenance, parts list, hardware diagrams) | 1 set | |

※1:for VC-X500L only

### ■ Optional Accessories

| Item | Specification |
| --- | --- |
| Compatibility with Dual contact tool | HSK-A63 |
| Spindle motor | 20000min⁻¹ MITSUBISHI※1 22/18.5kW(30/25HP) FANUC 37/26/18.5kW(50/35/25HP) |
| Number of stored tools | 60tools, 80tools, 120tools |
| Linear scale feed back※2 | XY-axis / XYZ-axis |
| Lift-up chip conveyor | Hinged type※3 / Scraraper type※3 / Scraper type with floor magnet※3 / Scraper type with dram filter※4 |
| Compatibility with oil-hole holder | |
| Spindle through coolant | 2MPa(290 psi) coolant / 7MPa(1015 psi) coolant / with air |
| Oil-mist/air blower | |
| Signal lamp | Two-lamp type (With buzzer / Without buzzer) |
| Splash guard automatically open / close | Front door |
| Hydraulic supply ports for fixture | Max.8 ports |
| Touch sensor system T0 | Workpiece measurement, Tool length/ diameter measurement |
| Touch sensor system T1 | Workpiece measurement, Tool length measurement, Tool break detection |
| T0 soft | |
| Mist collector | |
| Foundation parts | Bond anchoring method |
| Standard tool set | |
| Color specified by customer | |

※1:for VC-X500 only
※2:When the linear scale is added, cleanliness of the supplied air should be equivalent to or higher than the classes 1.5.1 specified in ISO 8573-1 / JIS B8392-1 in order to prevent generating problems.
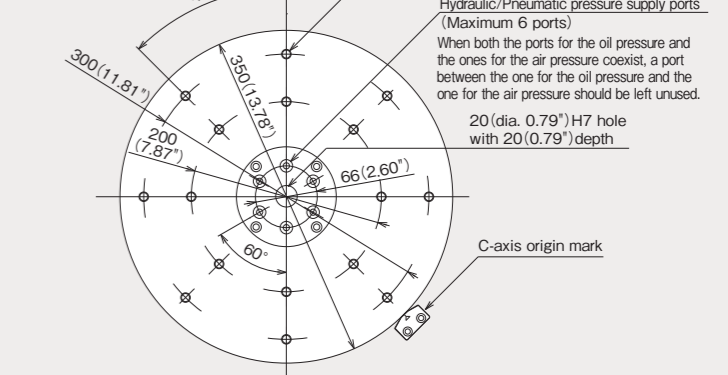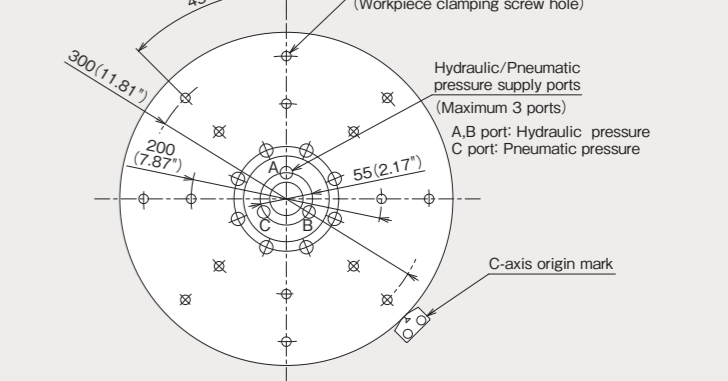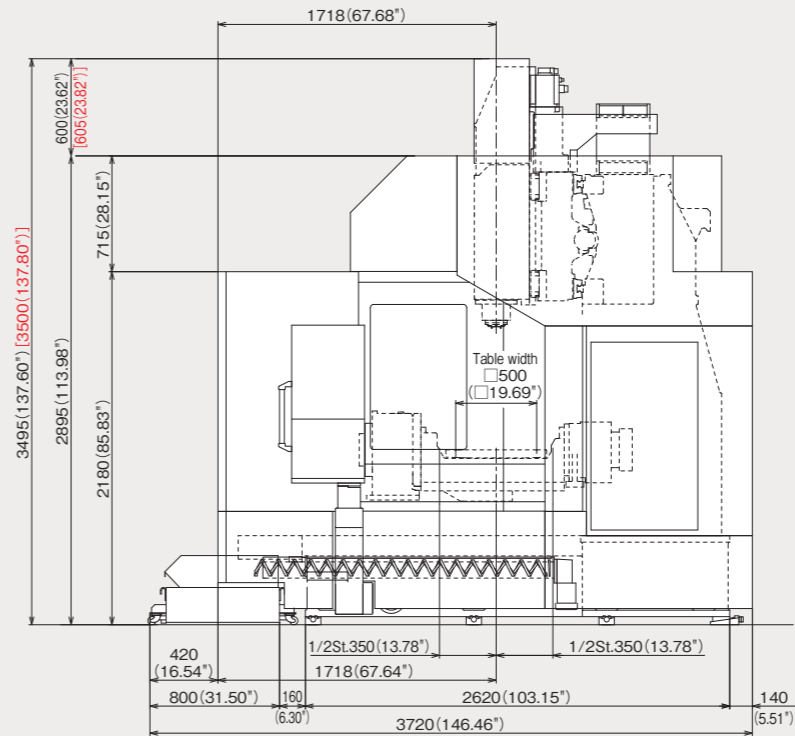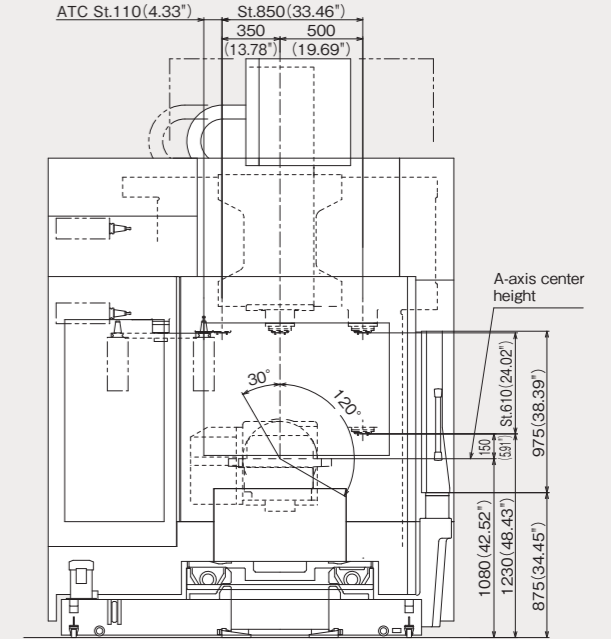※3:The machine columns should be raised by 30 mm.
※4:The machine columns should be raised by 100 mm.
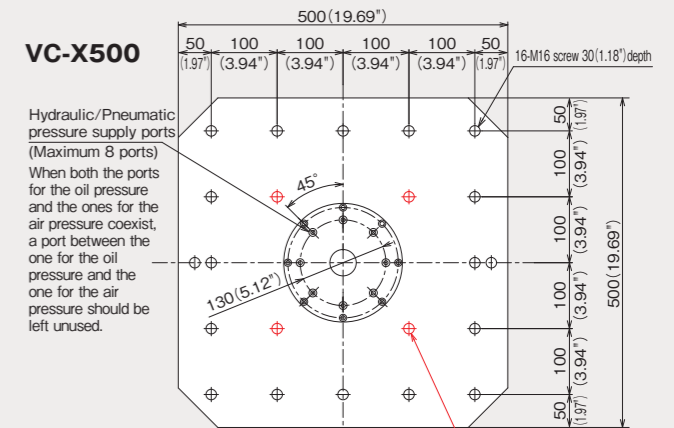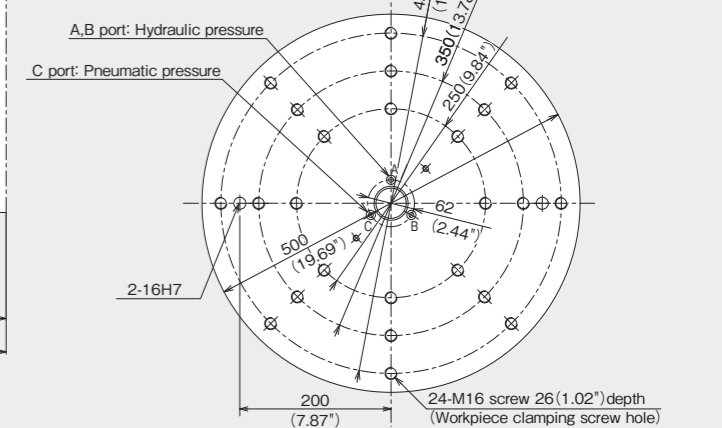
## Main dimensions of the machine

[ ] : VC-X500L dimensions

### Front view



### Side view



### Floor Space



### Table

#### VC-X500

Hydraulic/Pneumatic pressure supply ports (Maximum 8 ports) When both the ports for the oil pressure and the ones for the air pressure coexist, a port between the one for the oil pressure and the one for the air pressure should be left unused.



#### VC-X500L

A,B port: Hydraulic pressure
C port: Pneumatic pressure
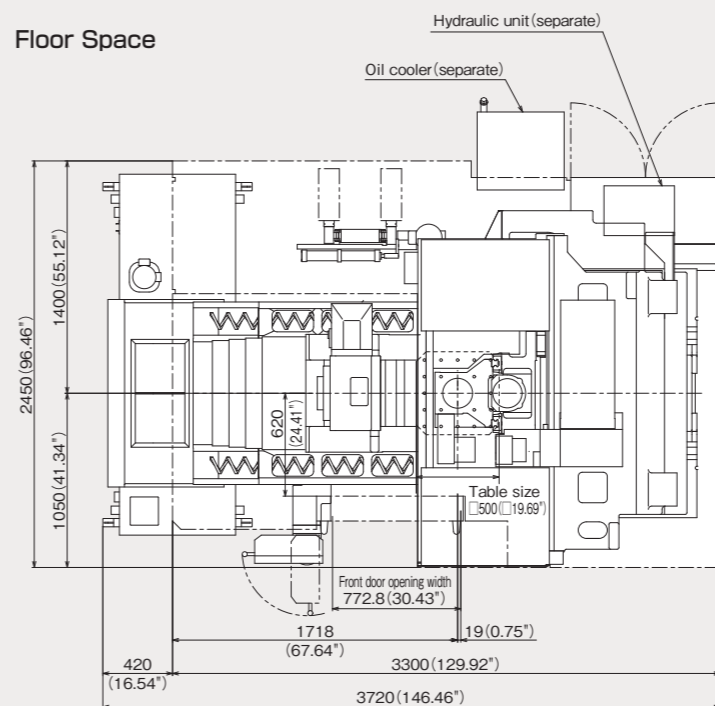
# 5-axis support technologies

## 5-axis Control Function

### Tool center point control (Standard)

Conventional movement

This function's movement

Produces errors due to movement of rotation axis

Loci of the tool tip as instructed
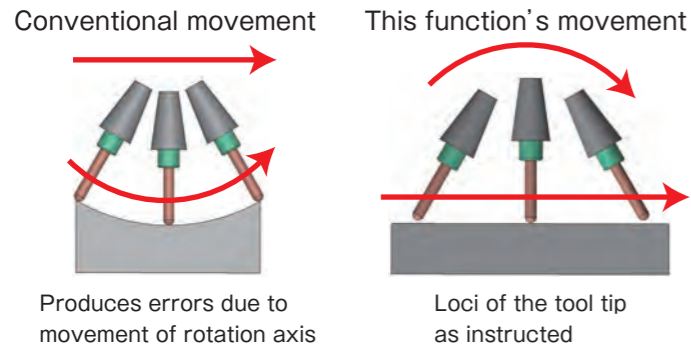
Tool Center Point Control simplifies 5-axis machining by controlling tool movement at the tool center, even if the tool axis direction changes. Tool tip speed is maintained and high-quality surfacing achieved.

## 5-axis indexing function

### Inclined surface indexing (machining) command (Option)

The inclined surface indexing (machining) commands allow easy setting the surface to be machined by using the newly defined coordinate system (feature coordinate system).
It enables the simple creation of the machining programs similar to the programming for the normal 3-axis machining centers.

Original coordinate system

Feature coordinate system
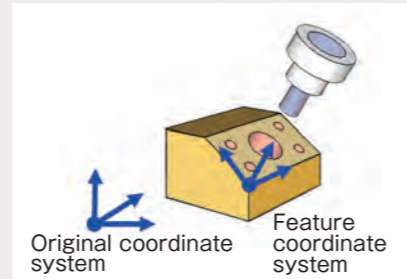
### 5-axis processing software MULTI-FACERII (Standard)

When indexing the planes to be processed on 5-axis machining centers, it may take time for setting the workpiece origins. Those workpiece origins can be set with ease by using MULTI-FACERII that enables creating index programs easily without using calculators.

## A⁵ system (Option)

In the machining with the 5-axis machining center, the geometric errors (rotation axis's inclination and displacement) influence the machining accuracy largely.
This function automatically measures and corrects the geometric errors with the touch sensor.
It makes the high-accuracy 5-axis indexing and the high quality simultaneous 5-axis machining even better.
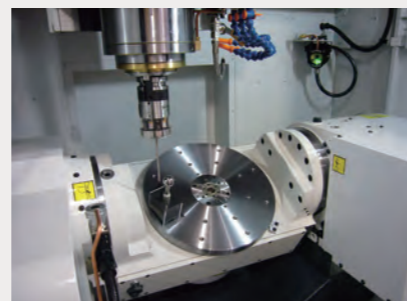
## VC-X350/VC-X350L/VC-X500/VC-X500L CONTROLLER

### ■ FANUC Controller F31i-B5 Plus

(WindowsCE-installed Open CNC)

| Standard Specification |
| --- |
| No. of controlled axes: 5 axes (X, Y, Z ,A ,C) |
| No. of simultaneously controlled axes: 5 axes |
| Least input increment: 0.001mm / 0.0001" |
| Max. programmable dimension: ±999999.999mm / ±39370.0787" |
| Inch/Metric conversion : G20 / G21 |
| Program format: FANUC standard format |
| Decimal point input / Pocket calculator type decimal point input |
| Absolute / Incremental programming: G90 / G91 |
| Program code: ISO / EIA automatic discrimination |
| 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 |

| Standard Specification |
| --- |
| 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) ※1 |
| 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 |
| Emergency stop |
| NC alarm display / alarm history display |
| Machine alarm display |
| Stored stroke check 1 |
| Stored stroke check 2 |
| Load monitor |
| Self-diagnosis |
| Absolute position detection |
| Tool center point control |
| Multi-spindle control ※2 |
| Constant surface speed control ※2 |
| Multiple repetitive canned cycle ※2 |
| Tool offset for Milling and Turning function ※2 |
| Tool geometry/wear compensation ※2 |
| Turning/Machining G code system switching function ※2 |
| Turning G code system B / C ※2 |
| Data server: ATA card (1GB) |

| Optional Specification |
| --- |
| Least input increment: 0.0001mm / 0.00001" |
| Spiral / Conical interpolation |
| Cylindrical interpolation |
| Hypothetical axis interpolation |
| Involute interpolation |

| Optional Specification |
| --- |
| 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) ※1 |
| Addition of tool life management sets: total 1024 sets |
| High-speed skip |
| 3D Coordinate transformation |

| Original Nidec OKK Software | |
| --- | --- |
| Integrated machining support software (incl. help guidance, etc.) | STD |
| Tool support | STD |
| Program Editor | STD |
| EasyPRO | STD |
| A5-system (A) Measurement of turning center | Opt |
| A5-system (B) Measurement of turning center + Measurement of geonentric error | Opt |
| Work Manager | Opt |
| HQ control | STD |
| Hyper HQ control mode B | STD |
| Multi-Facer II (5-Axis processing soft ware) | STD |
| Special canned cycle (including circular cutting) | Opt |
| Cycle Mate F | Opt |
| Soft Scale II m | 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 |

※1: No VC-X350L and VC-X500L
※2: No VC-X350 and VC-X500
STD: Standard    Opt: Option