High Productivity Vertical Machining Center

Doosan Machine Tools

Optimal Solutions for the Future
High Productivity, High Efficiency
Vertical Machining Center

DNM II series are available with a diversity of spindle specifications to meet various requirements. Roller LM guide enhances rigidity and extends service life. Utmost accuracy is achieved with direct coupled spindle structure and standard thermal displacement error compensation. The operator panel is redesigned to improve operator convenience.

DNM 400 II / 500 II / 650 II
Features

1. **High Reliability Spindle & High Precision**
   - 12000 r/min direct coupled spindle provides high cutting capacity and minimizes noise and vibration.
   - Utmost precision cutting is realized with thermal displacement compensation as standard.

2. **Durability**
   - Ball-type is replaced with roller-type LM Guide as standard to improve rigidity and long-term durability.

3. **Improved Usability**
   - The operator panel is redesigned to make operating more convenient.
High Reliability Spindle & High Precision
High rigidity spindle provides stable accuracy in long, heavy duty and high speed cutting.

**Spindle Head**

**Spindle Max. Speed**

8000 r/min \(\text{std.}\)  
12000 r/min \(\text{opt.}\)

(Belt)  
(Direct-coupled)

12000 r/min direct-coupled spindle (option) minimises noise and vibration and reduces spindle start/stop time.

**2-Face Locking Tool System (BIG PLUS) \(\text{std.}\)**

The 2-face locking tool system offers longer tool life, higher power and more precise machining by the dual contact to both of the spindle surface and tool holder flange surface, as well as both the spindle taper and tool holder taper shank.
Thermal Displacement Compensation System std.

Thermal error is minimized with thermal displacement compensation system. Algorithms are used to calculate Y/Z axis heat displacement caused by specific spindle running conditions of r/min and time.

<table>
<thead>
<tr>
<th>Y, Z displacement deviation</th>
<th>Previous model</th>
<th>DN M II</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>75%</td>
</tr>
</tbody>
</table>

Drain Catcher std.

Removes moisture in the compressed air in solenoid valves and cylinders to extend service life of the pneumatic system.

Spindle Head Cooling System opt.

Option for 8000 r/min, standard for 12000 r/min

Spindle Head Cooling System is offered for long, continuous operation. The system circulates cooled oil around spindle bearing to prevent thermal displacement and guarantee high accuracy cutting.
Durability

Main structures including bed and column are designed at optimum conditions for high speed and heavy duty cutting.

High Rigidity Roller Type LM Guide

Ball type LM Guide is replaced with roller type LM Guide to improve cutting performance and surface roughness. Service life is also extended to more than double compared to ball type LM Guide.

Wide Cutting Area

Various shapes can be processed

<table>
<thead>
<tr>
<th></th>
<th>DNM 400 II</th>
<th>DNM 500 II</th>
<th>DNM 650 II</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis (mm)</td>
<td>762 (30.0)</td>
<td>1020 (40.2)</td>
<td>1270 (50.0)</td>
</tr>
<tr>
<td>Y-axis (mm)</td>
<td>435 (17.1)</td>
<td>540 (21.3)</td>
<td>670 (26.4)</td>
</tr>
<tr>
<td>Z-axis (mm)</td>
<td>510 (20.1)</td>
<td>510 (20.1)</td>
<td>625 (24.6)</td>
</tr>
</tbody>
</table>
The highly rigid body raises the static stiffness by 30% compared to the previous model.

**Static Rigidity**

Frequency response and vibration attenuation performances have been improved – high frequency increased by 35% than the previous models.

**Dynamic Rigidity**

* Designed with FEM (Finite Element Method) to implement stable machine structure.
Improved Usability

Easy Operation Package
Doosan’s easy operation software package is customized to provide fast and easy operation for tooling, workpiece and program setup. These features maximize productivity by minimizing time lost during process setup.

- **Data Registry Table**
  Provides tool information for POT in 2D graphics

- **ATC Recovery Help**
  Guides the operator for troubleshooting in case of emergency stop of abnormal operation of ATC

- **G Code List**
  Explanation/help topics for G-Code can be viewed on the screen

- **Sensor Status Monitor**
  Provides view of the operation of the standard sensors and solenoid valves of the machine.

- **Table Moving for Setup**
  Table can be moved to workpiece set-up position with simple key strokes.

- **Easy work coordinate setting**
  A separate screen for viewing customizable parameters

- **M Code List**
  Explanation/help topics for M-Code can be viewed on the screen

- **Tool Load Monitor**
  Damage to tools is minimized by monitoring the axis and spindle load during cutting operations.

Easy-to-use Operator Panel
The operator panel is integrated for convenient usage. Additional, customized function switches can be attached to maximize operator convenience.

- **USB Port**
  Upload/download of NC software programs, NC parameters, tool information and ladder program using USB drive is allowed but, DNC operation is not supported.

- **Swivelling operating console**
  The operation panel can be rotated by up to 90 degrees for convenient operator position. The control provides a wide selection of detailed alarm messages which makes fault-finding easier for better usability.

- **Portable MPG**
  The portable MPG allows you to set a workpiece more easily.

- **Fixture clamp/unclamp button counter, timer or special option buttons can be placed on the panel.**

Partitions are placed between all buttons to prevent pushing an unintended button.
Operator-Friendly Design

Built-in Chip Brush

A brush is provided between the top cover and spindle head to remove chips and coolant from the spindle head.

Top Cover Opening

The top cover on the machine can be opened to allow crane to access the table when working with a heavy workpiece.

Excellent Accessibility

Enhanced operator’s accessibility to machine facilitates mounting of workpieces.
High Productivity

Spindle acceleration/deceleration and cutting rate are further increased.

Reduced Cycle Time

Cycle time is reduced by more than 10% compared to the previous model.

![Cycle Time Chart]

* Based on the productivity specimen of DOOSAN using 18 tools including tap and milling.

Reduced Tapping Cycle Time

Tapping Cycle time is reduced by 40% compared to the previous models.

![Tapping Cycle Time Chart]

* 10-M3x0.5

Reduced Spindle Acceleration/Deceleration Time

Spindle acceleration/deceleration is reduced by 55% from the previous model.

![Spindle Acceleration/Deceleration Time Chart]

* 12K, 12000 r/min motor
* The data above is based on DOOSAN’s test standards, and may vary by testing conditions.
Higher Cutting Power

**Face Milling (max. chip removal capacity)**

SM45C

Higher cutting power is implemented with higher motor power and torque of the spindle motor.

<table>
<thead>
<tr>
<th></th>
<th>Previous Model</th>
<th>DNM II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. spindle motor power</td>
<td>15 kW (20.1 Hp)</td>
<td><strong>18.5 kW</strong> (24.8 Hp)</td>
</tr>
<tr>
<td>Max. spindle torque</td>
<td>106 N·m (78.2 ft-lb)</td>
<td><strong>117 N·m</strong> (86.3 ft-lb)</td>
</tr>
</tbody>
</table>

**Tool Magazine**

Productivity increase with the CAM-type tool changer (standard) that supports faster tool changing.

<table>
<thead>
<tr>
<th>Tool-to-Tool</th>
<th>Tool storage capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.3 s</strong></td>
<td><strong>30 tools</strong></td>
</tr>
<tr>
<td><strong>40 tools</strong></td>
<td>opt.</td>
</tr>
</tbody>
</table>

**Rapid Traverse**

Linear motion guide ways and high speed servomotors apply high rapid axis movement. This reduces non-cutting time and machining time for greater productivity.

<table>
<thead>
<tr>
<th></th>
<th>Rapid traverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis m/min (ipm)</td>
<td><strong>36 (1417.3)</strong></td>
</tr>
<tr>
<td>Y-axis m/min (ipm)</td>
<td><strong>36 (1417.3)</strong></td>
</tr>
<tr>
<td>Z-axis m/min (ipm)</td>
<td><strong>30 (1181.1)</strong></td>
</tr>
</tbody>
</table>
Machining Accuracy

For increased repeatability and reliability

Designed for exceptional high accuracy and minimized thermal displacement and vibration.

Roundness

- Model: DNM 500
- Material: A7075F
- Tool: Endmill Ø16mm (Ø0.6 in.) (4 blades)

Roughness

- Spindle speed: 8000 r/min
- Feedrate: 1000 mm/min (39.4 ipm)

Machining Capacity

Provides high-productivity and high-accuracy in a variety of machining operations

### Face mill Carbon steel (SM45C)
- Ø80mm (3.15 in.) Face mill (6Z)
- Machining rate: 432 cm³/min (26.4 in³/min)
- Spindle speed: 1500 r/min
- Feedrate: 2700 mm/min (106.3 ipm)

### End mill Carbon steel (SM45C)
- Ø30mm (1.2 in.) Endmill (6Z)
- Machining rate: 81 cm³/min (5.0 in³/min)
- Spindle speed: 222 r/min
- Feedrate: 84 mm/min (3.3 ipm)

### Face mill Gray casting (GC25)
- Ø80mm (3.15 in.) Face mill (6Z)
- Machining rate: 691 cm³/min (42.2 in³/min)
- Spindle speed: 1500 r/min
- Feedrate: 3600 mm/min (141.7 ipm)

### U-drill Carbon steel (SM45C)
- Ø80mm (3.15 in.) Face mill (6Z)
- Machining rate: 172 cm³/min (10.5 in³/min)
- Spindle speed: 750 r/min
- Feedrate: 84 mm/min (3.3 ipm)

### Face mill Aluminum (AL6061)
- Ø80mm (3.15 in.) Face mill (6Z)
- Machining rate: 1785 cm³/min (109 in³/min)
- Spindle speed: 1500 r/min
- Feedrate: 5580 mm/min (219.7 ipm)

### Tap Carbon steel (SM45C)
- Ø80mm (3.15 in.) Face mill (6Z)
- Spindle speed: 212 r/min
- Feedrate: 742 mm/min (29.2 ipm)

- Ø80mm Face mill (6Z)
- Spindle speed: 1500 r/min
- Feedrate: 2700 mm/min (106.3 ipm)

- U-drill Carbon steel (SM45C)
- Spindle speed: 750 r/min
- Feedrate: 84 mm/min (3.3 ipm)

- Tap Carbon steel (SM45C)
- Spindle speed: 212 r/min
- Feedrate: 742 mm/min (29.2 ipm)

- Ø80mm Face mill (6Z)
- Spindle speed: 1500 r/min
- Feedrate: 2700 mm/min (106.3 ipm)

The results indicated in this catalog may not be obtained due to differences in environmental conditions during measurement and cutting conditions.
Easy-to-Use Chip Conveyor

Removing chips is very important in terms of productivity and environmental protection. To achieve these goals, the DNM II series provide various chip handling systems for better work environment.

Chip Removal

Easy chip removal design

Chip and coolant are collected from both sides of the table in the chip pan in front of the machine, and discharged by chip conveyor. Left or right hand chip conveyor discharge is available.

Increased flood coolant capacity

Chip handling capacity is improved with a high flood wash pump.

Through-Spindle Coolant System

*Middle pressure : 1.96 Mpa (284.2 psi)
High pressure : 6.86 Mpa (994.7 psi)*

Screw Conveyor*

Internal screw conveyor at left and right sides (standard).

* Please select the chip conveyor considering the material of the workpiece. Consult with sales man for details.

Large capacity coolant tank with chip pan and box filter

Cooolant tank capacity
DNM 400 II : 300L
DNM 500 II : 360L
DNM 650 II : 380L

Easy to discard chips piled up

Shower Coolant

Drum filter type
Scaper type
Hinge type
Optional Equipment

A wide range of options are offered for higher efficiency and convenience of the customers.

4-axis Auxiliary Devices Interface

Hydraulic/Pneumatic Fixture Line

Fixture check list (for hydraulic / pneumatic fixtures)

- **Pressure source**
  - Hydraulic: □ P/T □ A/B
  - Pneumatic: □ P/T □ A/B

- **Hydraulic power unit**
  - Supply scope: □ User □ DOOSAN
    (Please check the below detail specification, if you want Doosan to supply.)
  - □ Use Doosan standard unit
    - 24 L/min (6.3 gal/min) / 4.9 MPa (711 psi)
  - □ Special requirement
    - _______ L / min (gal/min) at _______ MPa (psi)

- **Number of ports**
  - □ 1 pair (2-PT 3/8” port)
  - □ 2 pair (4-PT 3/8” port)
  - □ 3 pair (6-PT 3/8” port)

- **Contact Doosan for more information**

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Recommended Rotary Table:
- ø250 (DNM 400 II, DNM 500 II, ø320 (DNM 650 II)
- Please check the driving system (hydraulic or pneumatic) of the rotary table before ordering the machine.

Hydraulic and Pneumatic Fixture Line

- Automatic tool measurement
- Automatic workpiece measurement
- Minimum Quantity Lubrication
- Oil skimmer

Misting device
**Spindle Power-Torque Diagram**

**DNM 400 II / 500 II**

Max. Spindle Speed: 8000 r/min
Max. Spindle Speed: 15/11 kW (20.1/14.8 Hp)

**DNM 650 II**

Max. Spindle Speed: 8000 r/min
Max. Spindle Speed: 18.5/15 kW (24.8/20.1 Hp)

**DNM 400 II / 500 II**

Max. Spindle Speed: 12000 r/min
Max. Spindle Speed: 18.5/11 kW (24.8/14.8 Hp)

**DNM 650 II**

Max. Spindle Speed: 12000 r/min
Max. Spindle Speed: 18.5/11 kW (24.8/14.8 Hp)
### External Dimensions

#### Top View

![Top View Diagram]

#### Front View

![Front View Diagram]

#### Side View

![Side View Diagram]

#### Table: External Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNM 400</td>
<td>2152</td>
<td>742</td>
<td>2615</td>
<td>594</td>
<td>1317</td>
<td>2711</td>
<td>1900</td>
<td>2465</td>
<td>3655</td>
<td>772</td>
<td>2676</td>
<td>2509</td>
<td>2364</td>
<td>2245</td>
<td>2145</td>
</tr>
<tr>
<td></td>
<td>(84.7)</td>
<td>(29.2)</td>
<td>(103.0)</td>
<td>(23.4)</td>
<td>(51.9)</td>
<td>(106.7)</td>
<td>(74.8)</td>
<td>(97.0)</td>
<td>(143.8)</td>
<td>(30.4)</td>
<td>(105.4)</td>
<td>(98.8)</td>
<td>(93.1)</td>
<td>(88.4)</td>
<td>(106.7)</td>
</tr>
<tr>
<td>DNM 500</td>
<td>2444</td>
<td>641</td>
<td>2960</td>
<td>594</td>
<td>1317</td>
<td>2700</td>
<td>1900</td>
<td>2960</td>
<td>4078</td>
<td>797</td>
<td>2674</td>
<td>2590</td>
<td>2364</td>
<td>2245</td>
<td>2145</td>
</tr>
<tr>
<td></td>
<td>(96.2)</td>
<td>(25.2)</td>
<td>(116.5)</td>
<td>(23.4)</td>
<td>(51.9)</td>
<td>(106.3)</td>
<td>(74.8)</td>
<td>(116.5)</td>
<td>(160.6)</td>
<td>(31.4)</td>
<td>(105.3)</td>
<td>(98.8)</td>
<td>(93.1)</td>
<td>(88.4)</td>
<td>(106.3)</td>
</tr>
<tr>
<td>DNM 650</td>
<td>2642</td>
<td>602</td>
<td>3350</td>
<td>594</td>
<td>1312</td>
<td>2815</td>
<td>1960</td>
<td>3200</td>
<td>4345</td>
<td>785</td>
<td>2789</td>
<td>2624</td>
<td>2364</td>
<td>2245</td>
<td>2145</td>
</tr>
<tr>
<td></td>
<td>(104.0)</td>
<td>(23.7)</td>
<td>(131.9)</td>
<td>(23.4)</td>
<td>(51.7)</td>
<td>(110.8)</td>
<td>(77.2)</td>
<td>(126.0)</td>
<td>(171.1)</td>
<td>(30.9)</td>
<td>(109.8)</td>
<td>(103.3)</td>
<td>(93.1)</td>
<td>(88.4)</td>
<td>(106.3)</td>
</tr>
</tbody>
</table>

Unit: mm (inch)
Table & Tool Shank

Table

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNM 400 II</td>
<td>920</td>
<td>435</td>
</tr>
<tr>
<td>(36.2)</td>
<td>(17.1)</td>
<td></td>
</tr>
<tr>
<td>DNM 500 II</td>
<td>1200</td>
<td>540</td>
</tr>
<tr>
<td>(47.2)</td>
<td>(21.3)</td>
<td></td>
</tr>
<tr>
<td>DNM 650 II</td>
<td>1300</td>
<td>670</td>
</tr>
<tr>
<td>(51.2)</td>
<td>(26.4)</td>
<td></td>
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Unit: mm (inch)

Tool Shank

<table>
<thead>
<tr>
<th></th>
<th>BT40</th>
<th>CAT40</th>
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<tbody>
<tr>
<td>DIN40</td>
<td></td>
<td></td>
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Unit: mm (inch)
## Machine Specifications

### Features

<table>
<thead>
<tr>
<th>Features</th>
<th>Unit</th>
<th>DNM 400 II</th>
<th>DNM 500 II</th>
<th>DNM 650 II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Travels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel distance</td>
<td>mm (inch)</td>
<td>762 (30.0)</td>
<td>1020 (40.2)</td>
<td>1270 (50.0)</td>
</tr>
<tr>
<td></td>
<td>mm (inch)</td>
<td>435 (17.1)</td>
<td>540 (21.3)</td>
<td>670 (26.4)</td>
</tr>
<tr>
<td></td>
<td>mm (inch)</td>
<td>510 (20.1)</td>
<td>625 (24.6)</td>
<td></td>
</tr>
<tr>
<td>Distance from spindle nose to table top</td>
<td>mm (inch)</td>
<td>150-660 (5.9-30.5)</td>
<td>150-775 (5.9-30.5)</td>
<td></td>
</tr>
<tr>
<td>Distance from spindle nose to column</td>
<td>mm (inch)</td>
<td>512 (20.2)</td>
<td>587 (23.1)</td>
<td>747 (29.4)</td>
</tr>
<tr>
<td><strong>Feedrates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid Traverse Rate</td>
<td>m/min (ipm)</td>
<td>X-axis</td>
<td>36 (1417.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y-axis</td>
<td>36 (1417.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z-axis</td>
<td>30 (1181.1)</td>
<td></td>
</tr>
<tr>
<td>Max. Cutting feedrate</td>
<td>m/min (ipm)</td>
<td>15000 (590.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Table</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table size</td>
<td>mm (inch)</td>
<td>920 x 435 (36.2 x 17.1)</td>
<td>1200 x 540 (47.2 x 21.3)</td>
<td>1300 x 670 (51.2 x 26.4)</td>
</tr>
<tr>
<td>Table loading capacity</td>
<td>kg (lb)</td>
<td>600 (1322.8)</td>
<td>800 (1763.7)</td>
<td>1000 (2204.6)</td>
</tr>
<tr>
<td>Table surface type</td>
<td></td>
<td>4-125*18H8</td>
<td>5-125*18H8</td>
<td></td>
</tr>
<tr>
<td>Max. Spindle speed</td>
<td>r/min</td>
<td>8000 (12000)</td>
<td>8000 (12000)</td>
<td>8000 (12000)</td>
</tr>
<tr>
<td><strong>Spindle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle taper</td>
<td></td>
<td>ISO #40, 7/24 TAPER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Spindle torque</td>
<td>N·m (ft-lb)</td>
<td>106.9 (117) (78.9 (88.6))</td>
<td>118.0 (117) (87.1 (88.6))</td>
<td></td>
</tr>
<tr>
<td><strong>Automatic Tool Changer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of tool shank</td>
<td></td>
<td>BT (CAT, DIN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool storage capacity</td>
<td>ea</td>
<td>30 (40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter</td>
<td>mm (inch)</td>
<td>Ø80 (3.1) (Ø3.0)</td>
<td>Ø125 (4.9) (Ø4.9)</td>
<td></td>
</tr>
<tr>
<td>Without Adjacent Tools</td>
<td>mm (inch)</td>
<td>300 (11.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool length</td>
<td>mm (inch)</td>
<td>8 (17.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool weight</td>
<td>kg (lb)</td>
<td>memory random</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool change time (Tool-to-tool)</td>
<td>s</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool change time (Chip-to-chip)</td>
<td>s</td>
<td>3.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant pump motor power</td>
<td>kW (Hp)</td>
<td>0.4 (0.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric power supply (rated capacity)</td>
<td>kVA</td>
<td>30</td>
<td>42.55</td>
<td></td>
</tr>
<tr>
<td>Compressed air supply</td>
<td>Mpa (psi)</td>
<td>0.54 (78.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tank capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant tank capacity</td>
<td>L (gal)</td>
<td>300 (79.3)</td>
<td>380 (100.4)</td>
<td></td>
</tr>
<tr>
<td>Lubrication tank capacity</td>
<td>L (gal)</td>
<td>1.4 (0.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Machine Dimensions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>mm (inch)</td>
<td>2703 (106.4)</td>
<td>2815 (110.8)</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>mm (inch)</td>
<td>2282 (89.8)</td>
<td>2444 (96.2)</td>
<td>2762 (108.7)</td>
</tr>
<tr>
<td>Width</td>
<td>mm (inch)</td>
<td>2615 (103.0)</td>
<td>2960 (116.5)</td>
<td>3350 (131.9)</td>
</tr>
<tr>
<td>Weight</td>
<td>kg (lb)</td>
<td>5000 (11023.0)</td>
<td>6500 (14329.8)</td>
<td>8500 (18739.0)</td>
</tr>
</tbody>
</table>

### Standard Feature
- 10.4" color TFT LCD
- Air tight splash guard
- Built-in screw chip conveyor
- Coolant system
- Coolant tank and chip pan
- Door interlock
- Machine condition indicator lamp (signal tower)
- Non-water miscible coolant filter
- Parts and tools for installation work
- Portable MPG
- Spindle head cooling system (Standard for 12000 r/min)
- Work light
- X, Y, Z Absolute pulse coder
- 4-axes rotary table
- Auto measuring instrument
- Auto power cutoff system
- Auto workpiece length measuring device
- Cam type tool magazine (40 tools)
- Chip conveyor and chip bucket

### Optional Feature
- EZ Guide i
- Minimum Quantity Lubrication
- Oil skimmer
- Spindle head cooling system (Optional for 8000 r/min)
- Test bar
- Through-spindle coolant jet

*Please consult with technical engineer if the density of coolant is higher than 10%, as this could affect the filtration function.

*The specifications and information above-mentioned may be changed without prior notice.

For more details, please contact Doosan
NC Unit Specification
DOOSAN FANUC-i series

AXES CONTROL
- Controlled axes: 3 (X,Y,Z)
- Simultaneously controllable axes: Positioning (G00) / Linear interpolation (G01): 3 axes, Circular interpolation (G02, G03): 2 axes.
- Absolute pulse coder
- Backlash compensation
- Follow up
- Least command increment: 0.001 mm (0.0001 inch)
- Least input increment: 0.001 mm (0.0001 inch)
- Machine lock: all axes / Z axis
- Mirror image: Reverse axis movement (setting screen and M - function)
- Stored pitch error compensation
- Pitch error offset compensation for each axis
- Stored stroke check: 1
- Overtravel controlled by software

INTERPOLATION & FEED FUNCTION
- 2nd reference point return: G30
- Circular interpolation: G02, G03
- Cylindrical interpolation: G07.1
- Dwell: G04
- Exact stop check: G09, G61 (mode)
- Feed per minute
- Feedrate override (10% increments): 0 - 200%
- Helical interpolation
- Jog override (10% increments): 0 - 200%
- Linear interpolation: G01
- Manual handle feed: (1 unit)
- Manual handle feedrate: x1, x10, x100 (per pulse)
- Override cancel: M48 / M49
- Positioning: G00
- Rapid traverse override: F0 (line feed), 25 / 50 / 100%
- Reference point return: G27, G28, G29
- Skip function: G31

SPINDLE & M-CODE FUNCTION
- M-code function: M3 digits
- Spindle orientation
- Spindle serial output
- Spindle speed command: S5 digits
- Spindle speed override (10% increments): 10 - 150%

TOOL FUNCTION
- Cutter compensation C: G40, G41, G42
- Number of tool offsets: 400 ea
- Tool length compensation: G43, G44, G49
- Tool life management: 128 sets
- Tool number command: T2 digits
- Tool offset memory C: Geometry / Wear and Length / Radius offset memory
- Tool position offset: G45 - G48

PROGRAMMING & EDITING FUNCTION
- Absolute/Incremental programming: G90 / G91
- Auto. Coordinate system setting
- Background editing
- Canned cycle: G73, G74, G76, G80 - G89, G99
- Circular interpolation by radius programming
- Custom macro B
- Decimal point input
- Extended part program editing
- I/O interface: RS - 232C
- Inch/metric conversion: G20 / G21
- Label skip
- Local / Machine coordinate system: G52 / G53
- Maximum commandable value: ±99,999.999 mm (±9999.9999 inch)
- No. of Registered programs: 400 ea
- Optional block skip
- Optional stop: M01
- Part program storage: 640 m (2,100 ft) (256 kb)
- Penitum Board
- Program number: Q4 - digits
- Program protect
- Program stop / end: M00 / M02, M30
- Rigid tapping: G84, G74
- Sub program: Up to 4 nesting
- Tape code: ISO / EIA Automatic discrimination
- Thread cutting
- Work coordinate system: G54 - G59

Operation, Setting & Display, etc
- 3rd / 4th reference return: 10.4" color TFT LCD
- Additional work coordinate system: G54.1 P1 - 48 (48 pairs)
- AI APC (Advanced Preview Control): 20 block preview
- Alarm display
- Alarm history display
- Automatic corner override: G62
- Clock function
- Coordinate rotation: G68, G69
- Cycle start / Feed hold
- Control axis detach
- Display of PMC alarm message: Message display when PMC alarm occurred
- Dry run
- Graphic display: Tool path drawing
- Help function
- Loadmeter display
- Look ahead control: G08
- MDI / DISPLAY unit: 10.4" Color TFT LCD, keyboard for data input (small), soft-keys
- Memory card interface
- Operation functions: Tape / Memory / MDI / Manual
- Operation history display
- Optional angle chamfering / corner R
- Polar coordinate command: G15 / G16
- Program restart
- Programmable data input: Tool offset and work offset are entered by G10, G11
- Programmable mirror image: G50.1 / G51.1
- Run hour and part number display
- Scaling: G50, G51
- Search function: Sequence NO. / Program NO.
- Self - diagnostic function
- Servo setting screen
- Single block
- Single direction positioning: G60
- Stored stroke check 2

OPTION SPECIFICATION
- Additional controlled axes: 4 axes in total
- ACC (AI Contour Control) with Hardware: 200 block preview
- Data server: 1024 pairs
- Fast Ethernet function: G45 - G48