NX II series
NX 4500 II / 5500 II / 6500 II
High-Precision High-Speed Vertical Machining Center

Doosan Machine Tools
Optimal Solutions for the Future
The NX II series aims to strengthen the spindle and have a long life compared to previous models by adopting a static pressure spindle. Operation has been made more convenient by improving chip disposal, accessibility and reducing the installation space.

**Greater strength and life of spindle**

Uses static pressure spindle to maintain strength in the low speed section and increase life in the high-speed area.

**Accessibility improvements (NX 6500 II)**

- **A:** 970 mm (38.2 inch)  
  Previous model  
  930 mm (36.6 inch)  
  40 mm Reduction (1.57 inch)

- **B:** 320 mm (12.6 inch)  
  Previous model  
  280 mm (11.0 inch)  
  40 mm Reduction (1.57 inch)

- **C:** 1890 mm (74.4 inch)  
  Previous model  
  1750 mm (68.9 inch)  
  140 mm Reduction (5.51 inch)

**Improvement of standardized chip pan and chip disposal (NX 4500 II, NX 6500 II)**

Apply standard screw conveyor

**Upgrade** NX 4500 II, NX 5500 II, NX 6500 II Areas of improvement
High-Precision, High-Speed Die & Mold Vertical Machining Center

The NX II series takes performance and strength to a whole new level. With its double column design and high speed spindle, it provides the best stability and rigidity possible for today's market demand for high-precision, high-efficiency part machining.

**Reduction of installation area (NX 6500 II)**

**Excellent accessibility**

- **H:** 2650 mm (104.3 inch)
- **Previous model** 150 mm Reduction (5.91 inch)
- **W:** 3260 mm (128.6 inch)
- **Previous model** 300 mm Reduction (11.8 inch)

**Thermal displacement reducing function**

- Spindle head cooling system
- Ball screw nut cooling system

**Automatic tool measuring system**

- Measurement of tool length
- Measurement of tool diameter
- Detection of tool damage

**Graphite processing solution**

- Graphite fine powder sealing treatment
- Wet / dry type chip treatment
Spindle

The precision dynamic balanced spindle of the NX II series is result of years of machining industry experience. Assures lasting performance, high-stiffness and thermal control.

NX 4500 II / 5500 II / 6500 II

Spindle power - torque diagram

Spindle strength and stiffness has been increased while reducing vibration through bearing optimization and spindle length reduction.

0.1 degree control oil cooler

To minimize the bearing and motor heat a high-precision oil cooler controls the temperature to 0.1 degree.

2-face locking tool system

The dual contact system offers simultaneous contact between the machine spindle face and the tool holder flange.

Oil air lubrication

A optimal amount lubrication oil is applied by high pressure air to the bearings.

NX 4500 II / 5500 II / 6500 II

Max. Spindle Speed 20000 r/min
Spindle motor 22 kW (29.5 Hp)
Taper type: ISO #40

Max. Spindle Speed 30000 r/min
Spindle motor 18.5 kW (24.8 Hp)
Taper type: HSK-F63

Max. Spindle Speed 45000 r/min
Spindle motor 5.5 kW (7.4 Hp)
Taper type: HSK-E40
Structure

Its double column design and robust base give the NX II series an excellent foundation for high-performance, high-accuracy machining.

Rigidity

Thermal analysis of the symmetrical structure and minimal overhang shows the rigidity of the enclosed design thus providing the optimal solution for high-speed / high-precision processing.

Center weight

By minimizing the distance between weight center and the feed drive center, the inertia movement is reduced allowing for faster feed rates and a more precise part.

ATC & Magazine

Tool storage capacity

<table>
<thead>
<tr>
<th>Tool storage capacity</th>
<th>Tool change time</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 ea (NX 4500 II)</td>
<td>30 ea (NX 5500 II, NX 6500 II)</td>
</tr>
<tr>
<td>1.5 s</td>
<td></td>
</tr>
</tbody>
</table>

High output / High inertia motor

Through overall axial load / motor inertia ratio of less than 50%, we have improved the responsiveness of feed drive.

Shielding of magazine and machining area

By installing an automatic open-and-shut door on the magazine, we have completely shielded the tool compartment from the machining area.

High strength feed drive

Roller guide applied

Rigid coupling

Ball screw nut cooling
Feed axis thermal displacement largely reduced Feed drive strength maintained in stable condition
Optimized Tool Processing Solution

Superior surface finishes and machining accuracy are achieved through using standard processing solutions such as high-speed / high-precision contour control and thermal displacement compensation.

High-Speed / High-Precision Contour Control

- **DSQ**: Doosan Super Quality

| DSQ3 | • AICC2 | • 600 Block Look ahead | • Selection of processing condition | • High-speed Data Server 1GB | • High-speed CPU mounted |

**Machining condition selection function**

<table>
<thead>
<tr>
<th>Machining condition</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>R5</th>
<th>R6</th>
<th>R7</th>
<th>R8</th>
<th>R9</th>
<th>R10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result</td>
<td>Normal</td>
<td>Long</td>
<td>Normal</td>
<td>Initial Choice</td>
<td>Good</td>
<td>Long</td>
<td>Normal</td>
<td>High quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>Good</td>
<td>Long</td>
<td>Normal</td>
<td>High quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool life</td>
<td>Good</td>
<td>Long</td>
<td>Normal</td>
<td>High quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application</td>
<td>High speed</td>
<td>Long</td>
<td>Normal</td>
<td>High quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specimen tested: VASE

with DSQ  without DSQ

It is possible to change machining condition in 10 steps by using R code at the program.

- Improving productivity (high speed at rough machining, high precision at precision machining)
- NC parameter such as maximum feed and acceleration time constant can be set automatically

Thermal Displacement Compensation

- **DHC**: Doosan Heat Control

**Calibration of static displacement of spindle**

It enables to calibrate the change in position of tool through the expansion of spindle shaft at high-speed rotation.

**Calibration of dynamic displacement of spindle**

Spindle thermal displacement calibration and compensation is performed through spindle rotation measurement analysis and adjustment within 5 algorithms.

**Calibration of structure thermal displacement**

It calibrates inconsistent bending or expansion owing to the change in external temperature using a number of temperature sensors.
Performance of Processing

Test results prove greater workpiece precision and shorter cycle times.

Comparison of Processing Time & Examples of Processing

<table>
<thead>
<tr>
<th>Processed goods</th>
<th>Processing time</th>
<th>Materials and tools</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>699 min</td>
<td>NAK 80</td>
<td>ø1 Ball 20000 r/min Feed 2200 mm/min.</td>
</tr>
<tr>
<td>NX 4500 II</td>
<td>450 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>saving 36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous Models</td>
<td></td>
<td>NAK 80</td>
<td>ø6 Ball 20000 r/min Feed 2000 mm/min.</td>
</tr>
<tr>
<td></td>
<td>90 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pocket</td>
<td></td>
<td></td>
<td>ø4 Ball 20000 r/min Feed 2200 mm/min.</td>
</tr>
<tr>
<td>NX 4500 II</td>
<td>60 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>saving 34%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pet Bottle</td>
<td>98 min</td>
<td>NAK 80</td>
<td>ø6 Ball 20000 r/min Feed 3000 mm/min.</td>
</tr>
<tr>
<td>NX 4500 II</td>
<td>66 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>saving 33%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door Knob</td>
<td>396 s</td>
<td>NAK 80</td>
<td>ø6 Ball 20000 r/min Feed 2200 mm/min.</td>
</tr>
<tr>
<td>NX 4500 II</td>
<td>290 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>saving 27%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example of processing needle pin

Company: DOOSAN
NX 4500 II
Time: 2 hours 27 minutes

One Needle (PMS 200, 3 Dimensional Measuring Machine)

Processing condition of needle pin

- Dia: 0.2 mm
- Length: 20 mm
- Material: NAK80
- Hardness: HRC43
- r/min: 20000
- Feedrate: 1400

Example of processing cellular phone key pad

Micron Cutting Depth
1~10 µm
Depth: 2 µm
Depth: 5 µm
Depth: 10 µm

Processing condition of needle pin

<table>
<thead>
<tr>
<th>Processed goods</th>
<th>Size</th>
<th>Material</th>
<th>Tool</th>
<th>r/min (min.-1)</th>
<th>Feed (m/min.)</th>
<th>Processing time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Pad</td>
<td>60 x 60 x 30</td>
<td>NAK 80</td>
<td>ø1 Ball</td>
<td>20000</td>
<td>850</td>
<td>1H 13 min.</td>
</tr>
</tbody>
</table>
**Operation & Chip Disposal**

**Operation**

Improved work efficiency and convenience through ergonomic design analysis.

**Operating console**

- 10.4" Color TFT LCD Monitor
- Membrane model
- Monolever
- Swivel-type operating panel
- Hot Key
- Portable MPG
- LCD Portable MPG Handle

**Excellent accessibility**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX 4500 II</td>
<td>800 (31.5)</td>
<td>325 (12.8)</td>
<td>770 (30.3)</td>
</tr>
<tr>
<td>NX 5500 II</td>
<td>815 (32.1)</td>
<td>265 (10.4)</td>
<td>860 (33.9)</td>
</tr>
<tr>
<td>NX 6500 II</td>
<td>930 (36.6)</td>
<td>280 (11.0)</td>
<td>780 (30.7)</td>
</tr>
</tbody>
</table>

**Signal tower**

- Warning light (Indicates unusual condition of the equipment)
- Completion light (Indicates the completion of procession)
- Progress Light (Indicates the processing in progress)

**LED selected for indoor work light**

LED lights decrease power consumption. Light is brighter inside and lasts longer.

**Convenient absolute transfer**

Even if you turn the machine off, it remembers its location using the battery. This makes it possible to begin operation as soon as you turn the device on again without starting from scratch.

**Chip disposal**

Through rapid discharge of chips, it maintains the degree of precision in processing, and supports the operator to work in improved environment by providing a variety of chip treatment devices.

- Cutting coolant oil dispenser
- Side coolant
- Chip air blower
- Cutting coolant residue stopping device
- Spindle section coolant

**Inside screw conveyor**

We adopted 2-row screw.

**Oil/Water separation structure**

Discharging cutting coolant separately from lubricating oil.

**Chip conveyor**

NX 4500 II, 6500 II - Side discharge, NX 5500 II - Side discharge

- Hinge type
- Scraper type
- Drum filter type

**Coolant chiller**

The coolant chiller lowers coolant temperature, helping to cool both the workpiece and tool during the machining operation. When using insoluble cutting oils, a coolant chiller is recommended to cool heated oil and preserve machining precision.
Easy Operation Package

Machine operation, setup, programing functions and operator efficiency is increased through the use of Fanuc 31i series of control.

**Fanuc 31i**

- 10.4" color TFT LCD
- Part Program Storage 640m
- Ethernet Function (Embedded)

**Programming**

**Renishaw gui - Tool measure**

Embodying the function of automatically measuring tool length/diameter and detecting the tool damage in interactive service style.

**Tool load monitor**

Function of detecting tool wear and damage status through setting up load limits by the spindles and axis during cutting / moving so as to minimize the damage of the apparatus part.

**Pattern cycle**

It automatically generates its pattern cycle program through the method of inputting interactive factor.

**Tool data registry table**

Displaying tool information on POT in 2D graphic.

**ATC recovery help**

It guides the user to easily restore original condition, when ATC suddenly stops its operation, due to emergency stop or unusual operation.

**Operation rate**

Function of measuring and monitoring of the operation ratio for the equipment by each operator.

**Doosan adaptive feed control**

By detecting cutting load at real time basis during processing and subsequently adjusting cutting speed automatically, which can be minimized the damage of the tool and equipment, through enhancing processing productivity.
External Dimensions & Table Dimensions

Table

<table>
<thead>
<tr>
<th>Tool Shank</th>
<th>20000 r/min</th>
<th>30000 r/min</th>
<th>45000 r/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAS 403 BT40</td>
<td>PS-806 (NIIKEN)</td>
<td>DIN 69893 HSK-F63</td>
<td>DIN 69893 HSK-E40</td>
</tr>
</tbody>
</table>

Unit: mm (inch)

NX 4500 II | NX 5500 II | NX 6500 II

<table>
<thead>
<tr>
<th></th>
<th>NX 4500 II</th>
<th>NX 5500 II</th>
<th>NX 6500 II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A(L)</td>
<td>2400 (94.5)</td>
<td>2590 (102.0)</td>
<td>2822 (111.8)</td>
</tr>
<tr>
<td>B(W)</td>
<td>2895 (114.0)</td>
<td>2800 (110.2)</td>
<td>2966 (116.8)</td>
</tr>
<tr>
<td>C</td>
<td>2592 (102.0)</td>
<td>2891 (113.8)</td>
<td>2907 (114.4)</td>
</tr>
<tr>
<td>D(H)</td>
<td>2870 (113.0)</td>
<td>3060 (120.1)</td>
<td>3033 (119.3)</td>
</tr>
</tbody>
</table>
## Machine Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>NX 4500 II</th>
<th>NX 5500 II</th>
<th>NX 6500 II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travels</td>
<td></td>
<td>600 / 450 / 400</td>
<td>900 / 550 / 500</td>
<td>1050 / 650 / 550</td>
</tr>
<tr>
<td></td>
<td>(mm / inch)</td>
<td>(23.6 / 17.7 / 15.7)</td>
<td>(35.4 / 21.7 / 19.7)</td>
<td>(41.3 / 25.6 / 21.7)</td>
</tr>
<tr>
<td>Distance from spindle nose to table top</td>
<td>mm / inch</td>
<td>150 ~ 550 / 5.9 ~ 21.7</td>
<td>150 ~ 650 / 5.9 ~ 25.6</td>
<td>150 ~ 700 / 5.9 ~ 27.6</td>
</tr>
<tr>
<td>Feedrates</td>
<td>Rapid traverse (X / Y / Z axis)</td>
<td>m/min (ipm)</td>
<td>30 / 30 / 30 (1181.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cutting feedrate</td>
<td>m/min (ipm)</td>
<td>15 (590.6)</td>
<td></td>
</tr>
<tr>
<td>Table</td>
<td>Table size</td>
<td>800 x 500 (31.5 x 19.7)</td>
<td>1000 x 550 (39.4 x 21.7)</td>
<td>1200 x 650 (47.2 x 25.6)</td>
</tr>
<tr>
<td></td>
<td>Table loading capacity</td>
<td>Kg / lb</td>
<td>600 (1322.8) / 700 (1543.2) / 800 (1763.7)</td>
<td></td>
</tr>
<tr>
<td>Spindle</td>
<td>Max. spindle speed</td>
<td>r/min</td>
<td>20000 (30000, 45000)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Taper spindle</td>
<td>tapered</td>
<td>ISO 40 / 724 (HSK-F63, HSK-E40)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. spindle torque (10min)</td>
<td>N-m (ft-lbs)</td>
<td>60 (44.3) (9.5, 3.5, (4.3, 2.6))</td>
<td></td>
</tr>
<tr>
<td>Automatic Tool Changer</td>
<td>Number of tools</td>
<td>ea</td>
<td>24 / 30 / 30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. tool diameter</td>
<td>mm / inch</td>
<td>90 (3.5) / 80 (3.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. tool diameter without adjacent tools</td>
<td>mm / inch</td>
<td>140 (5.5) / 125 (4.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. tool length</td>
<td>mm / inch</td>
<td>250 (9.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max. tool weight</td>
<td>Kg / lb</td>
<td>8 (17.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tool change time (tool-to-tool)</td>
<td>s</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Motor</td>
<td>Spindle motor (10min/cont.)</td>
<td>kW / Hp</td>
<td>22 / 11 (29.5 / 14.8) / 18.5 / 13 (24.8 / 17.4), 5.5 / 3.7 (7.4 / 5.0)</td>
<td></td>
</tr>
<tr>
<td>Power Source</td>
<td>Electric power supply</td>
<td>kVA</td>
<td>43.5 / 45.5 / 49.5</td>
<td></td>
</tr>
<tr>
<td>Tank Capacity</td>
<td>Coolant tank capacity</td>
<td>L / gal</td>
<td>230 (60.8) / 300 (79.3) / 330 (87.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lubrication tank capacity</td>
<td>L / gal</td>
<td>3.0 (0.8) / 4.3 (1.1)</td>
<td></td>
</tr>
<tr>
<td>Machine Dimensions</td>
<td>Length X Width</td>
<td>mm / inch</td>
<td>2270 x 2756 (89.4 x 108.5) / 2590 x 2800 (102.0 x 110.2) / 2822 x 2966 (111.1 x 116.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Height</td>
<td>mm / inch</td>
<td>2870 (113.0) / 2971 (117.0) / 3031 (119.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>Kg / lbs</td>
<td>9000 (19841.3) / 10000 (22046.2)</td>
<td></td>
</tr>
<tr>
<td>NC system</td>
<td></td>
<td>Fanuc 31i</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Standard feature
- Splash Guard
- Coolant tank & Chip fan
- Assembly & operation tools
- Automatic tool measurement
- Air blower
- DSQ 3 (AICC2 / 600 Block Look ahead / Processing condition can be selected / High-speed Data Sever 1GB / High-speed CPU mounted)
- Screw conveyor
- Auto power off
- BIG PLUS Dual Contact Spindle (20000 r/min)
- HSK-F63 Dual Contact Spindle (30000 r/min)
- HSK-E40 Dual Contact Spindle (40000 r/min)
- DHC (Thermal Displacement Calibration System)
- Mono-Lever
- Ball Screw Nut Cooling System
- Spindle Cooling System
- Work light

### Optional feature
- Through spindle coolant
- Mist collector
- 4th / 5th axis preparation
- Chip conveyor & chip bucket
- Air dryer
- Test bar
- DAF
- DTM
- Graphite Processing Package Operation
- Coolant Chiller

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

*For more details, please contact Doosan*
NC Unit Specifications
Fanuc 31i

- Tool length compensation G43, G44, G49
- Tool number command 11 digits
- Tool life management
- Tool offset memory C H I D Code, Geometry Wear memory
- Tool length measurement

PROGRAMMING & EDITING FUNCTION
- Absolute Incremental programming 699 / 691
- Auto Coordinate system setting
- Background editing
- Canned cycle 673, 672, 676, 680-689, 699
- Circular interpolation by radius programming
- Custom macro B
- Custom size 512k
- Addition of custom macro common variables
- Inch metric conversion 620 / 621
- Label skip
- Linear Machine coordinate system 652 / 653
- Maximum commandable value +9999.9999m (+9999.9999 in)
- No. of Registered programs 500 ea.
- Optional block skip
- Optional stop M01
- Part program storage 640 m
- Program number 04-digits
- Program step end M00 / M03, M30
- Programmable data input Tool offset and work offset are entered by G10, G11
- Sub program ISO / EIA Automatic discrimination
- Work coordinate system 654-659
- Additional work coordinate system ( 48 Pairs ) 654.1 PI-48 pairs
- Coordinate system rotation 668, 669
- Extended part program editing

OPERATION, SETTING & DISPLAY, ETC
- Alarm display
- Alarm history display
- Clock function
- Cycle start Feed hold
- Display of PMC alarm message Message display when PMC alarm occurred
- Dry run
- Ethernet function ( Embedded )
- Graphic display Tool path drawing
- Help function
- Loadstatus display
- MDI / DISPLAY unit
- 10.4” color LCD Keyboard for data input, soft keys

- Memory card interface
- Operation functions Tape / Memory / MDI / Manual
- Operation history display
- Program restart
- Run hour and part number display
- Search function Sequence NO. Program NO.
- Self-diagnostic function
- Servo setting screen
- Single block
- External data input
- Multi-language display
- Handle interruption
- Tool load monitoring function ( Doosan )

OPTIONAL SPECIFICATIONS
- 3-dimensional coordinate conversion
- 3-dimensional tool compensation
- 3rd / 4th reference return
- Addition of tool pairs for tool life management 1024 pairs
- Additional controlled axes max. 12 axes per tool
- Additional work coordinate system 654.1 PS-300 ( 300 pairs )
- Automatic corner override 682
- Chopping function / Cylindrical interpolation 681.1 / 660.1
- Dynamic graphic display This can’t use with the EZ Guide i
- Machining profile drawing
- Interpolation type pitch error compensation EZ Guide i
- ( Doosan Infracore Conversational Programming Solution ) with 10.4” Color TFT

- Tape format for FSS1
- Increment system 1 / 10
- Figure copying 672.1, 672.2
- Manual handle feed 2 / 3 unit
- High speed skip function
- Involute interpolation 662, 663.2
- Machining time stamp function
- No. of Registered programs 1000 ea
- Number of tool offsets 9 / 200 / 400 / 499 / 999 / 2000 ea
- Optional block skip addition 2-9 blocks
- Part program storage 1280 / 2560 / 5120 / 20480 m
- Playback function
- Polar coordinate command 615 / 616
- Polar coordinate interpolation 612.1 / 613.1
- Programmable mirror image 650.1 / 651.1
- Scaling 650, 651
- Single direction positioning 660
- Stored stroke check 2 / 3
- Tool offset G45 - G48
- Position switch

- Optional block preview ( ACC II with High speed processing + Machine condition selection function + Data server + 1GB )
- Thread cutting, synchronous cutting
- Program restart
- Automatic corner deceleration Specify AI Contour control II
- Linear ACC DEC before interpolation
- ( Specify AI Contour control II )
- Linear ACC DEC after interpolation
- Rapid traverse bell-shaped acceleration deceleration
- Smooth backlash compensation

SPINDLE & M-CODE FUNCTION
- M-code function M 3 digits
- Spindle orientation
- Spindle speed command 55 digits
- Spindle speed override 10% increments 50 - 110%
- Spindle output switching
- Rapid tapping 68A, 674

TOOL FUNCTION
- Tool nose radius compensation G48, G44, G42
- Number of tool offsets 64 ea
- Tool load monitoring function ( Doosan )

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- The specifications and information above-mentioned may be changed without prior notice.
- For more details, please contact Doosan.