HP 4000 II / 5100 II
High Speed High Performance Horizontal Machining Center
HP 4000 II / 5100 II

Designed to implement highly fast and precise heavy-duty cutting, HP 4000 II & 5100 II use a roller type LM guide on all axes for a higher speed and rigidity. Also, the 22kw (29.5Hp) high torque spindle motor, high feed rate and fast tool exchange time help minimize non-cutting time and perform a variety of machining tasks with different tools and highly reliable operations without breakdown, enhancing your productivity significantly. The easy-to-use operation panel and zero leakage of cutting oil allow you to use this machine more easily.
High Speed and Productivity Horizontal Machining Center
High Productivity

High Speed Spindle

This machining center is designed to minimize vibration and heat when the spindle spins at a high speed and enable quick increase or decrease of speed. Also, the main spindle is supported by P4-level high precision bearings and maintains stable precision even under fast high-duty operations.

Max. Spindle Speed

14000 rpm

Spindle Motor (30-min. rating)

22 kW (29.5 Hp)

Oil cooler

The refrigerated cooling system maintains a uniform spindle temperature required for high accuracy and minimizing thermal extension. Thermo sensors regulate the temperature of the oil which is circulated through oil jackets around the spindle bearing and motor housing.

Tool clamping force

10000 N
This system makes it possible for simultaneous dual contact of the taper and spindle front side by using elastic deformation of the spindle and implementing perfect control of the gauge.

- The tool contacts the spindle front side and taper simultaneously. → Rigidity is enhanced and vibration reduced.
- The machining performance and surface roughness are improved under even the worst conditions.
- The existing tool can be used. (100% compatible)

**Key benefits**

- Higher rigidity
- Improved ATC repeatability, surface finish and higher precision
- Prevents displacement of Z axis in a fast spinning
- Increases the tool life

**Main features**

**High precision, high efficiency, high quality**

This holder helps keep productivity and precision at high levels when machining high value curved surfaces or difficult-to-cut materials (high performance parts). Also, as it disperses cutting heat along with chips, the holder helps minimize thermal deformation of workpiece.
Tool Magazine

Tool storage capacity

40 ea

[60/80/120/170/262 : ]

The ATC is composed of tool magazine and changer. The servo driven tool magazine allows a quick movement to a specified tool. The tools are selected by a fixed address method. All tools are returned to the pots from which they were originally taken so that collision problems involving large-sized tools need to be considered only once when they are first mounted.

- The tool magazine is operated on:
  servo motor control

Automatic Tool Changer

Tool Change Time (Tool-to-Tool)

1.0 s

This changer is highly reliable and durable and helps minimize non-cutting time by using the CAM method.

(Tool to Tool 1.0 s,
Chip to Chip HP 4000 II : 3.6 s HP 5100 II : 4.0 s)

Max. Tool Diameter

Ø75 mm (3.0 inch)
(For continuous loading)

Ø140 mm (5.5 inch)
(When adjacent ports are empty)

Max. Tool Length

330 mm (13.0 inch) (HP 4000 II)
400 mm (15.7 inch) (HP 5100 II)

Max. Tool Weight

10 kg (22.0 lb)
Automatic Pallet Changer

HP 4000 II / 5100 II are equipped with rotary shuttle type APC (Automatic Pallet Changer) as a standard feature. It provides high reliability and wide working area for easy setup.

Pallet Change Time

7.0 s (HP 4000 II) 7.5 s (HP 5100 II)

The possibility that chips might degrade the meshing accuracy of the pallet positioning mechanism increases during APC operation. On the HP 5100 strong jets of air are discharged from the tapered cones when pallets are changed to clean any chips for assuring accurate pallet positioning.

Max. Workpiece size

<table>
<thead>
<tr>
<th>Pallet size</th>
<th>400 (15.7) X 400 (15.7)</th>
<th>500 (19.7) X 500 (19.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 4000 II</td>
<td>mm (inch)</td>
<td>mm (inch)</td>
</tr>
<tr>
<td>HP 5100 II</td>
<td>mm (inch)</td>
<td>mm (inch)</td>
</tr>
</tbody>
</table>

Max. workpiece size

<table>
<thead>
<tr>
<th>Pallet size</th>
<th>Ø 600 (23.6) X H 800 (31.5)</th>
<th>Ø 800 (31.5) X H 930 (36.6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 4000 II</td>
<td>mm (inch)</td>
<td>mm (inch)</td>
</tr>
<tr>
<td>HP 5100 II</td>
<td>mm (inch)</td>
<td>mm (inch)</td>
</tr>
</tbody>
</table>

Max. workpiece weight

<table>
<thead>
<tr>
<th>Pallet size</th>
<th>kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 4000 II</td>
<td>400 (881.8)</td>
</tr>
<tr>
<td>HP 5100 II</td>
<td>500 (1102.3)</td>
</tr>
</tbody>
</table>

Table

Minimum table indexing angle 1° 1.4 s (0 → 90°)
Rigidity Structure

Rigid Structure Bed and Column

The machine is designed to build rigidity into a stable body. The construction of the machine was thoroughly examined from the stage of basic design to ensure consistent high-speed and high-accuracy operation. The machine is optimized by FEM to prevent the deformation from machining force, axies travel and weight of workpiece.

### Feed axis

<table>
<thead>
<tr>
<th></th>
<th>HP 4000 II</th>
<th>HP 5100 II</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-axis</td>
<td>600 (23.6)</td>
<td>850 (33.5)</td>
</tr>
<tr>
<td>Y-axis</td>
<td>560 (22.0)</td>
<td>700 (27.6)</td>
</tr>
<tr>
<td>Z-axis</td>
<td>600 (23.6)</td>
<td>750 (29.5)</td>
</tr>
</tbody>
</table>

Guideways and Axis Travel System

The axis travel system adopt roller type LM guides that provide high speed axis travel and heavy duty machining.

**Rapid traverse**

60 m/min (2362.2 ipm)
Axis travel systems are designed for reducing thermal extension by nut cooling and shaft cooling (option) of ball screw. The ball screw is assembled under proper pretension to minimize thermal deformation.

Minimum thermal deformation for high accuracy

Interface for Fixture

Fixture check list (for hydraulic/pneumatic fixtures)

- Oil & air pressure ports
  - A/B Line : 2, 4, 6, 8 Pairs (includes solenoid valve)
  - P/T Line : 2, 4, 6, 8 Pairs (does not include solenoid valve)
- Hydraulic power unit
  - 2.2 kW (3.0 Hp) / 7 MPa (1015.0 psi)
  - 3.7 kW (5.0 Hp) / 15 MPa (2175.0 psi)
  - 5.5 kW (7.4 Hp) / 21 MPa (3045.0 psi)
- Contact Doosan for more information
Ergonomic and Eco-Friendly Design

Easy setup

A belt-driven type oil skimmer picks up and removes waste oil from the coolant tank that is easily drained.

Collection of waste lubrication oil

Less waste lubrication oil extends the life time of the coolant and cut down the grime and offensive smell of the machine inside.

No coolant leakage

Rigorously designed, manufactured and tested machine covers do not permit coolant leakage in any condition. The factory always keeps our environment clean.

Oil skimmer

Another suggestion to prolong the life time of the coolant. A belt-driven type oil skimmer picks up and removes waste oil from the coolant tank that is easily drained.

User-friendly Operation Panel

Consolidate a variety of control panel into unified concept design to provide convenience of operation as user-friendly design.

Button for customized functions can be placed, for example fixture clamp/unclamp button, counter, timer or special optional buttons.

Partitions are placed between all buttons to prevent pushing an unintended button.

Swivelling operator’s panel

The operation panel can be rotated up to 90 degrees and the detailed alarm messages about errors that occur in the control devices allow users to operate the machine more easily.

Easy Operation

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Ergonomic and Eco-Friendly Design

Easy setup

<table>
<thead>
<tr>
<th>Model</th>
<th>Distance to table</th>
<th>Height to table</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 4000 II</td>
<td>400 mm (15.7 inch)</td>
<td>1130 mm (44.5 inch)</td>
</tr>
<tr>
<td>HP 5100 II</td>
<td>500 mm (19.7 inch)</td>
<td>1140 mm (44.9 inch)</td>
</tr>
</tbody>
</table>

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### Improved chip disposal

The X- and Z-axis slide cover, a hill-like table and the circular spindle shape help prevent chips from accumulating in main areas of the machine and any chips that fall onto the machine bed are ejected efficiently by two spiral conveyors on either side of the table.

### Types of conveyors specific to chip shape

<table>
<thead>
<tr>
<th>Category</th>
<th>Steel</th>
<th>Cast</th>
<th>Aluminum and nonferrous metals</th>
<th>Compound</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chip shape</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hinge type</td>
<td>○</td>
<td>△</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Scraper type</td>
<td>×</td>
<td>○</td>
<td>△</td>
<td>○</td>
</tr>
<tr>
<td>Drum Filter type</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

○ : Applicable  × : Not applicable,  △ : Applicable, but not recommended

Some types of chips may not be completely removed from the chip conveyor.
**Coolant System**

Through-spindle coolant system

Oil mist collector

Minimum Quantity Lubrication

Shower coolant

Flood coolant

Coolant gun

**Improved Units for Maintenance**

**Single-stage Slide Cover**

The single-stage slide cover helps not only enhance precision and durability but also minimize minor breakdowns caused by chips in the coolant device and transfer system.

**X-axis**

(HP 4000 II)

**Z-axis APC part**

(HP 4000 II / 5100 II)

**Double filter air serve unit**

This machine uses a dual filter air service unit to remove dust and foreign materials generated during machining and has an automatic drainer installed as a standard unit for higher durability and usability.

**Large lubrication pump & tank**

The lubrication device is located at the place where operator can easily. Also, a warning signal appears when lubricant runs out so that the exact amount of it can be automatically applied to all guide-ways and ball screws.
Machining Performance

Machining performance enhanced by 7% compared with the previous model

Productivity
7% higher than the previous model

- ABS block
- Made of: Aluminum alloy
- Number of used tools 16ea

Cutting Performance

**HP 4000 II / 5100 II**

<table>
<thead>
<tr>
<th>Face mill Carbon steel (SM45C)</th>
<th>Ø80mm (3.15 in.) Face mill (6Z)</th>
</tr>
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<tbody>
<tr>
<td>Machining rate</td>
<td>614 cm³/min (37.5 in³/min)</td>
</tr>
<tr>
<td>Spindle speed</td>
<td>950 rpm</td>
</tr>
<tr>
<td>Feedrate</td>
<td>3200 mm/min (126.0 ipm)</td>
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<tr>
<th>Tap Carbon steel (SM45C)</th>
<th>d50 U-drill(2Z)</th>
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<tr>
<td>Machining rate</td>
<td>490 cm³/min (29.9 in³/min)</td>
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<tr>
<td>Spindle speed</td>
<td>955 rpm</td>
</tr>
<tr>
<td>Feedrate</td>
<td>250 mm/min (9.8 ipm)</td>
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<table>
<thead>
<tr>
<th>Drill Carbon steel (SM45C)</th>
<th>Ø38mm (1.5 in.) Drill (2Z)</th>
</tr>
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<tbody>
<tr>
<td>Tool</td>
<td>M42×P4.5</td>
</tr>
<tr>
<td>Spindle speed</td>
<td>120 rpm</td>
</tr>
<tr>
<td>Feedrate</td>
<td>540 mm/min (21.3 ipm)</td>
</tr>
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</table>

Cycle time

| HP 4000 / 5100 | 1553 s |
| HP 4000 II / 5100 II | 1443 s |

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</tbody>
</table>
Doosan Multi-Pallet System [MPS]

Compared to a standard twin-pallet machine, the MPS offers a long period of unmanned operation and flexibility to produce many different workpieces using the work scheduling function. This system can be easily retrofitted to existing machines in the field.

Doosan Linear Pallet System [LPS]

LPS is designed to provide the most optimized system for the customer. The customer can choose the most suitable package solution to their output and workspace. System expansion and changes in layout are easy.

- Easily scalable
  up to 3 HMCs, 2 setup stations
- High efficiency of workpiece load space
- Quick installation
- Easy extension of system by modulized storage rack
- Stable and efficient system operation
- Easy-to-use operation system
- Retrofit, easy to repair

Sample Workpiece

X-frame  Inboard door  Ring-rib  Water pump cover  Control valve  Casting
Front cover  Brake caliper  Control valve  Pump body  Cylinder/Crank case  Grip arm
Standard feature

- Oil cooler
- Flood coolant
- Operator call lamp (red / yellow / green)
- FANUC 31i-B controller
- Portable MPG
- Rigid tapping
- APC operator’s panel
- Work light
- Screw conveyor

Optional feature

- Multi-pallet system [MPS] 120 Tools
- Matrix magazine (170 / 262 tools)
- Automatic tool length measurement with sensor
- Linear scale feedback system
- Automatic measuring system
- Built in Rotary Table (0.001°)
- LPS
- Through the spindle coolant
- Chip conveyor / bucket
- T-slot pallet
- Shower coolant
- Air gun
- Automatic power off
- Center Bush
- Coolant chiller
- Coolant gun
- Doosan Infracor tool monitoring system
- Hyd. cooling / Heating device
- Hydraulic line for fixture
- HSK tooling
- Rear type chip conveyor
- Test bar
Table Shape

HP 4000 II

HP 5100 II

Tool Shank

MAS403 BT40

PS-806 (NIKKEN)
## Machine Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>HP 4000 II</th>
<th>HP 5100 II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis (left and right of the column)</td>
<td>mm (inch)</td>
<td>600 (23.6)</td>
<td>850 (33.5)</td>
</tr>
<tr>
<td>Y-axis (top and bottom)</td>
<td>mm (inch)</td>
<td>560 (22.0)</td>
<td>700 (27.6)</td>
</tr>
<tr>
<td>Z-axis (front and rear of the pallet)</td>
<td>mm (inch)</td>
<td>600 (23.6)</td>
<td>750 (29.5)</td>
</tr>
<tr>
<td>Distance from spindle center to pallet top</td>
<td>mm (inch)</td>
<td>50~610 (2.0 ~ 24.0)</td>
<td>50~750 (2.0 ~ 29.5)</td>
</tr>
<tr>
<td>Distance from spindle nose to table center</td>
<td>mm (inch)</td>
<td>150~750 (5.9 ~ 29.5)</td>
<td>150~900 (5.9 ~ 35.4)</td>
</tr>
<tr>
<td>Feedrates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid traverse rate (x/y/z)</td>
<td>m/min (ipm)</td>
<td>60 (2362.2)</td>
<td>30000 (1181.1)</td>
</tr>
<tr>
<td>Cutting feedrate (X/Y/Z)</td>
<td>mm/min (ipm)</td>
<td>400 (15.7)</td>
<td>500 (19.7)</td>
</tr>
<tr>
<td>Table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pallet size</td>
<td>mm (inch)</td>
<td>400 x 400 (15.7 x 15.7)</td>
<td>500 x 500 (19.7 x 19.7)</td>
</tr>
<tr>
<td>Pallet loading capacity</td>
<td>kg (lb)</td>
<td>400 (15.7)</td>
<td>500 (19.7)</td>
</tr>
<tr>
<td>Pallet type</td>
<td></td>
<td>24-M16+P2.0</td>
<td>1 (0.001)</td>
</tr>
<tr>
<td>Pallet index degree</td>
<td>deg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. spindle speed</td>
<td>rpm</td>
<td>14000 (20000)</td>
<td></td>
</tr>
<tr>
<td>Spindle taper</td>
<td>ISO/40 7/24Taper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. spindle torque</td>
<td>kgf·m (ft-lb)</td>
<td>22.5 (9.5) (162.7 (68.7))</td>
<td></td>
</tr>
<tr>
<td>Automatic Tool Changer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of tool shank</td>
<td></td>
<td>MAS403 BT40</td>
<td></td>
</tr>
<tr>
<td>Tool storage capa.</td>
<td></td>
<td>40 (60/80/120/170/262)</td>
<td></td>
</tr>
<tr>
<td>Max. Tool diameter</td>
<td>mm (inch)</td>
<td>75 (3.0)</td>
<td></td>
</tr>
<tr>
<td>Max. Tool diameter without adjacent tools</td>
<td>mm (inch)</td>
<td>140 (5.5)</td>
<td></td>
</tr>
<tr>
<td>Max. tool length</td>
<td>mm (inch)</td>
<td>330 (13.0)</td>
<td>400 (15.7)</td>
</tr>
<tr>
<td>Max. tool weight</td>
<td>kg (lb)</td>
<td>10 (22.0)</td>
<td></td>
</tr>
<tr>
<td>Tool selection</td>
<td></td>
<td>Fixed address</td>
<td></td>
</tr>
<tr>
<td>Tool change time (tool-to-tool)</td>
<td>sec</td>
<td>1.0 (Less than 7.5kg (16.5 lb)), 1.5 (more than 7.5kg (16.5 lb))</td>
<td></td>
</tr>
<tr>
<td>Tool change time (chip-to-chip)</td>
<td>sec</td>
<td>HP 4100 II : 3.6 (Less than 7.5kg (16.5 lb)), 4.0 (more than 7.5kg (16.5 lb))</td>
<td>HP 5100 II : 4.0 (Less than 7.5kg (16.5 lb)), 4.5 (more than 7.5kg (16.5 lb))</td>
</tr>
<tr>
<td>Automatic Pallet Changer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pallet</td>
<td>ea</td>
<td>2</td>
<td>2 (7/9/11/13)</td>
</tr>
<tr>
<td>Type</td>
<td></td>
<td>Rotary type</td>
<td></td>
</tr>
<tr>
<td>Pallet change time</td>
<td>sec</td>
<td>7.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Pallet rotation in loading station</td>
<td>deg</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Motors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle motor (10-min. rating)</td>
<td>kW (Hp)</td>
<td>18.5 / 22 (25%SED) (24.8 / 29.5)</td>
<td></td>
</tr>
<tr>
<td>Feed motor (X/Y/Z/B)</td>
<td>kW (Hp)</td>
<td>7.0 / 7.0 / 2.7 (9.4 / 9.4 / 3.6)</td>
<td></td>
</tr>
<tr>
<td>Power source</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine height</td>
<td>mm (inch)</td>
<td>2880 (113.4)</td>
<td>3025 (119.1)</td>
</tr>
<tr>
<td>Machine dimension</td>
<td>mm (inch)</td>
<td>5080 x 2600 (200.0 x 102.4)</td>
<td>5380 x 2780 (211.8 x 109.4)</td>
</tr>
<tr>
<td>Machine weight</td>
<td>kg (lb)</td>
<td>12500 (27557.4)</td>
<td>15000 (33068.9)</td>
</tr>
</tbody>
</table>

### Standard Feature
- Spindle cooler and oil cooler
- Cutting oil tank and coolant
- Rigid tapping
- Screw conveyor
- MPG
- Splash guard (totally enclosed cover)
- Patrol light (three-color signal tower type)
- Work light
- Parts for installation

### Optional Feature
- Linear scale
- Air gun
- Auto. workplace measurement
- Automatic power off
- Automatic tool measurement
- Coolant gun
- Chip conveyor / Bucket
- Through spindle coolant
  (In Case of water soluble)

### Type
- Test bar
- Hyd. Fixture Interface
- Shower Coolant
- Chip conveyor / Bucket

### Pressure (MPa)
- 1.9 MPa
  - T.S.C: 50 / 8 (1.76 / 25.2 psig)
  - 60 / 10 (1.91 / 27.7 psig)
- 2.94 MPa
  - T.S.C: 50 / 12 (2.74 / 39.7 psig)
  - 60 / 16 (2.94 / 42.6 psig)
- 6.86 MPa
  - T.S.C: 50 / 22 (6.86 / 99.4 psig)
  - 60 / 30.7 (6.86 / 99.4 psig)
NC Unit Specifications
Fanuc 31iB

AXES CONTROL
- Controlled axes: 4 (X,Y,Z,B)
- Simultaneous controlled axes: 4 axes
- Positioning (G00) / Linear interpolation (G01): 3 axes
- Circular interpolation (G02, G03): 2 axes
- Backlash compensation
- Emergency stop / overtravel
- Follow up
- Least command increment: 0.001mm (inch) / 0.0001"
- Least input increment: 0.001mm (inch) / 0.0001"
- 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
- Overtravel controlled by software

INTERPOLATION & FEED FUNCTION
- Positioning: G00
- Linear interpolation: G01
- Circular interpolation: G02, G03
- 2nd reference point return: G30
- Dwell: G04
- Exact stop check: G09, G61(mode)
- Skip function: G31
- Reference point return: G27, G28
- 2nd reference point return: G30
- Feed per minute: mm / min (m/min)
- Rapid traverse override: F0 (fine feed), 25 / 50 / 100%
- Feedrate override (10% increments): 0 - 200%
- Jog override (10% increments): 0 - 200%
- Override cancel: M48 / M69
- Manual handle feed (1 unit):
- Manual handle feedrate:
  0.1/0.01/0.001mm/inch
- Automatic acceleration/deceleration
- Helical interpolation
- DSQ1 (ACC II + Machine condition selection function): 200 block preview
- Thread cutting, synchronous cutting
- Program restart
- Automatic corner deceleration
- Feedrate clamp by circular acceleration
- Linear ACC/DEC before interpolation
  (Specific ACC/DEC 2)
- Linear ACC/DEC after interpolation
- Rapid traverse bell-shaped acceleration

SPINDLE & M-CODE FUNCTION
- M code function: M 3 digits
- Spindle orientation
- Spindle serial output
- Spindle speed command: 55 digits
- Spindle speed override (10% increments):
  10 - 150%
- Spindle output switching
- Retraction for rigid tapping
- Rapid tapping: G84, G74

TOOL FUNCTION
- Tool nose radius compensation: G45, G41, G42
- Number of tool offsets: 200 ea
- Tool length compensation: G43, G44, G49
- Tool number command
- Tool life management: Geometry / Wear and Length / Radius offset memory
- Tool offset memory C
- Tool length measurement

PROGRAMMING & EDITING FUNCTION
- Absolute / Incremental programming: G90 / G91
- Auto. Coordinate system setting: 200 ea
- Background editing
- Canned cycle: G73, G74, G76, G80 - G89, G99
- Circular interpolation by radius programming
- Custom macro B
- Custom size: 2MB
- Addition of custom macro common variables
- Decimal point input
- I / O interface: RS - 232C
- Inch / metric conversion: G20 / G21
- Label skip
- Local / Machine coordinate system: G52 / G53
- Maximum commandable value: ±99999.999mm
- No. of Registered programs: 500 ea
- Optional block skip
- Optional stop: M01
- Part program storage: 256kb (640m)
- Program number: 04-digits
- Program protect
- Program stop / end: M00 / M02, M30
- Programmable data input: Tool offset and work offset are entered by G10, G11
- Sub program
- Tape code: ISO / EIA Automatic discrimination
- Work coordinate system: G54 - G59

Others Function (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
- Loadmeter 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

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 1path
- Additional work coordinate system: G54.1 P1 - 300 (300 pairs)
- Part Program Storage: 512kb/1MB/2MB/3MB/4MB
- DSQ 2: 200 block preview
  (ACC II + Machine condition selection function + Data server + 1GB)
- DSQ 3: 600 block preview
  (ACC II with High speed processing + Machine condition selection function + Data server + 1GB)
- Automatic corner override: G62
- Chopping function: G81.1
- Cylindrical interpolation: G07.1
- Dynamic graphic display: Machining profile drawing
- Interpolation type pitch error compensation
- 1Z Guide (Doosan Infracore Conversational Programming Solution) with 10.4" Color TFT

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