PUMA MX series
Multi-Tasking Turning Center

Doosan Machine Tools
Optimal Solutions for the Future
The integration of machining center and turning center gives you unmatched flexibility in a wide variety of part configurations. From simple turning and milling, to complex multi-axis simultaneous machining, all operations can be completed in one machine. Off-center machining with the Y-axis and milling of angled surfaces with the B-axis greatly increases the range of machine applications.
Multi-Tasking Turning Center
Machine Construction

The milling spindle(s) and the lower turret can be coordinated to enable machining at the left or right spindle.

Robust Design  PUMA MX2100

Stable base for supporting multi-machining

The heavily ribbed torque tube design prevents twisting and deformation. All guideways are wide wrap-around rectangular type for unsurpassed long-term rigidity and accuracy.

<table>
<thead>
<tr>
<th>Guideway span</th>
<th>MX2100</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1-axis</td>
<td>285 / 315 mm (11.2 / 12.4 inch)</td>
</tr>
<tr>
<td>Z1-axis</td>
<td>540 / 473 mm (21.3 / 18.6 inch)</td>
</tr>
<tr>
<td>Y-axis</td>
<td>435 mm (17.1 inch)</td>
</tr>
</tbody>
</table>

FEM

Finite Element Method (FEM) analysis results in superior machine stability.

Linear Motion Guide (Roller type)

All carriages are mounted on roller-type, linear motion guides to provide high accuracy and rigidity while reducing non-cutting time.
- Zero clearance from preload → High permissible load
- Low friction & wear (LM μ = 0.002~0.003)
- Simple maintenance over the long haul

Rapid traverse

| X1-axis | 36 m/min (1417.3 ipm) |
| Z1-axis | 36 m/min (1417.3 ipm) |
| Y-axis  | 26 m/min (1023.6 ipm) |

PUMA MX1600

<table>
<thead>
<tr>
<th>Feature</th>
<th>PUMA MX1600</th>
<th>PUMA MX1600S</th>
<th>PUMA MX1600T</th>
<th>PUMA MX1600ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Left spindle (Mill-turn)</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>2 Right spindle (Mill-turn)</td>
<td>●</td>
<td></td>
<td>X</td>
<td>●</td>
</tr>
<tr>
<td>3 Tail stock : Servo driven type</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>X</td>
</tr>
<tr>
<td>4 Lower turret : 16-station, 6000 r/min rotary tool</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>X</td>
</tr>
<tr>
<td>5 Roller guide ways for all axes</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>6 Milling spindle : 12000 r/min, Capto C5</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>7 B-axis : Roller gear cam</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>8 ATC &amp; Magazine : 40 ea, Servo driven</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
Thermal compensation system
Milling spindle thermal growth can be compensated for spindle axis direction only. Effectively removes positional deviation of spindle nose due to changing rotational speed.

Axis Features
Max. working diameter, length (MX 2100 / MX 2600, 3100)

<table>
<thead>
<tr>
<th>Axis</th>
<th>Unit : mm (inch)</th>
<th>Rapid travel Unit : m/min (ipm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1-axis</td>
<td>565 (22.2)</td>
<td>36 (1417.3)</td>
</tr>
<tr>
<td>X2-axis</td>
<td>187 (7.4)</td>
<td>24 (944.9)</td>
</tr>
<tr>
<td>Z1-axis</td>
<td>1050/1550 (41.3)</td>
<td>1585 (62.4)</td>
</tr>
<tr>
<td>Z2-axis</td>
<td>1050/1550 (41.3)</td>
<td>1585 (62.4)</td>
</tr>
</tbody>
</table>

B-Axis with Virtual Y-Axis
Precise indexing control of B-axis makes milling jobs on inclined plane possible.
- $5^\circ$ indexing (by coupling clamp)
- Contouring control in 0.001° increment

B-axis rotation range $\pm 120^\circ$
B-axis indexing time 2 s (90°)

Precision control B-axis movement
The angular position of the B-axis is controlled using precision ground roller gear cam and a highly accurate servo motor.

Virtual Y-axis function
A rigid, double-slide Y-axis construction withstands cutting forces generated during heavy-duty turning and milling.

Y-axis stroke 170 mm (6.7 inch) / 230 mm (9.1 inch)
[±85 mm (3.4 inch) / ±115 mm (4.5 inch)]

Y-axis rapid traverse 26 m/min (1023.6 ipm)
Main Spindle

The Perfect Design for Built-in Motor-Driven Spindles.

Both spindles, left and right, are engineered to minimize the loss of precision through thermal distortion, and to ensure superior performance in applications ranging from heavy-duty cutting at high power and low speed, to fine finishing at high speed.

<table>
<thead>
<tr>
<th></th>
<th>Max. spindle speed</th>
<th>Motor (30 min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMA MX1600</td>
<td>6000 r/min</td>
<td>15 kW (20.1 Hp)</td>
</tr>
<tr>
<td>PUMA MX2100</td>
<td>5000 r/min</td>
<td>22 kW (29.5 Hp)</td>
</tr>
<tr>
<td>PUMA MX2600</td>
<td>4000 r/min</td>
<td>26 kW (34.9 Hp)</td>
</tr>
<tr>
<td>PUMA MX3100</td>
<td>3000 r/min</td>
<td>30 kW (40.2 Hp)</td>
</tr>
</tbody>
</table>

Perfect C-axis control of both spindles

C1, C2-axis Index $360^\circ$ [in 0.001° increment]

<table>
<thead>
<tr>
<th></th>
<th>C1, C2-axis contouring torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX1600</td>
<td>208 N·m (153.5 ft·lb)</td>
</tr>
<tr>
<td>MX2100S [L/ST/LST]</td>
<td>318 N·m (125.5 ft·lb)</td>
</tr>
<tr>
<td>MX2600S/ST</td>
<td>700 N·m (516.6 ft·lb)</td>
</tr>
<tr>
<td>MX3100S</td>
<td>1203 N·m (887.8 ft·lb)</td>
</tr>
</tbody>
</table>
Oil cooling unit for left & right spindles

Both the left and right spindles employ an integral cooling system that circulates coolants through the entire spindle structure. This eliminates thermal distortion in all applications from heavy-duty cutting at high power and low speeds to fine and finish cutting at high speed.

Spindle power-torque diagram

PUMA MX 1600

- Torque : N·m (ft·lb)
- Power : kW (Hp)

PUMA MX 2100 series (Left & right spindle)
- Spindle motor power : 22 kW (29.5 Hp)
- Max. Spindle speed : 5000 r/min

PUMA MX 2600 series (Left & right spindle)
- Spindle motor power : 26 kW (34.9 Hp)
- Max. Spindle speed : 4000 r/min

PUMA MX 3100 series (Left spindle)
- Spindle motor power : 30 kW (40.2 Hp)
- Max. Spindle speed : 3000 r/min

PUMA MX 3100 series (Right spindle)
- Spindle motor power : 26 kW (34.9 Hp)
- Max. Spindle speed : 4000 r/min
Milling Spindle

The 360° angular positioning of the milling spindle can accommodate multi insert turning tools that are equipped with two, three, or four inserts.

Dual Contact Tools (MX 1600 - CAPTO C5, MX2100/2600/3100 - CAPTO C6)

The 360° angular positioning of the milling spindle can accommodate multi insert turning tools that are equipped with two, three, or four inserts.

Milling Spindle power-torque diagram

PUMA MX series

<table>
<thead>
<tr>
<th>Motor Description</th>
<th>Torque (N·m)</th>
<th>Spindle Speed (r/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMA MX1600</td>
<td>49</td>
<td>12000</td>
</tr>
<tr>
<td>PUMA MX2100</td>
<td>81</td>
<td>12000</td>
</tr>
<tr>
<td>PUMA MX2600/3100</td>
<td>118</td>
<td>12000</td>
</tr>
</tbody>
</table>
Tool Magazine with ATC

The ATC consists of a servo-driven tool magazine and change arm.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMA MX1600</td>
<td>200 mm (7.9 inch)</td>
<td>Ø 95 mm (3.7 inch)</td>
<td>4 kg (8.8 lb)</td>
</tr>
<tr>
<td>PUMA MX2100</td>
<td>300 mm (11.8 inch)</td>
<td>Ø 120 mm (4.7 inch)</td>
<td>8 kg (17.6 lb)</td>
</tr>
<tr>
<td>PUMA MX2600/3100</td>
<td>400 mm (15.8 inch)</td>
<td>Ø 130 mm (5.1 inch)</td>
<td>10 kg (22.0 lb)</td>
</tr>
</tbody>
</table>

**Automatic Tool Changer (ATC)**

Advanced mechanisms significantly reduce non-cutting time.

<table>
<thead>
<tr>
<th>Tool change time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMA MX1600</td>
</tr>
<tr>
<td>PUMA MX2100</td>
</tr>
<tr>
<td>PUMA MX2600/3100</td>
</tr>
</tbody>
</table>

**Tool storage capacity**

The ATC consists of a servo-driven tool magazine and change arm.

40 ea / 80 ea opt
Lower Turret

The 12-station, heavy-duty lower turret features a large-diameter Curvic coupling with heavy-duty design for maximum rigidity under tough cutting conditions. Turret rotation, acceleration and deceleration are controlled by a high-torque servo motor. Unclamp and rotation are virtually simultaneous. The fast index response keeps cycle times short.

Index time (1-station swivel) \(0.2\) s

No. of tool station

- 12 ea (MX2100/2600/3100)
- 16 ea (MX1600)

*1 : on only T, ST type machine

Radial BMT45P (MX1600), BMT55P (MX2100) and the BMT65P (MX2600)

The turret accommodates BMT55P and BMT65P tooling in which the toolholders are mounted directly to the turret’s periphery with 4 large bolts. This type of mounting system generates exceptionally high rigidity.

Rotary tool spindle power-torque diagram

PUMA MX1600

- Spindle motor power : 5.5 kW (7.4 Hp)
- Max. Spindle speed : 5000 r/min

PUMA MX2100 series

- Spindle motor power : 5.5 kW (7.4 Hp)
- Max. Spindle speed : 5000 r/min

PUMA MX2600 series

- Spindle motor power : 7.8 kW (10.5 Hp)
- Max. Spindle speed : 4000 r/min

BMT45P (MX1600)

BMT55P (MX2100)

BMT65P (MX2600)
The tail stock is driven by an AC servo motor and ball screw. Tail stocks thrust force can be controlled and adjusted by using the controls M-code function.

Servo Driven Tail Stock *1

*1: The servo-driven tail stock with dead center (built in center) is standard on MX2100, 2600/3100 models, but not on those designated as S and ST models.

Machining Capacity

Programmable tail stock specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Unit</th>
<th>MX1600</th>
<th>MX2100</th>
<th>MX2600 / 3100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore taper</td>
<td>mm</td>
<td>MT#4</td>
<td>MT#4</td>
<td>MT#5</td>
</tr>
<tr>
<td>Travel</td>
<td>mm</td>
<td>935 (36.8)</td>
<td>1050 (41.3)</td>
<td>1550 (61.0)</td>
</tr>
<tr>
<td>Max. thrust force</td>
<td>N (lbs)</td>
<td>3500 (786.8)</td>
<td>7000 (1573.6)</td>
<td>10000 (22480.0)</td>
</tr>
</tbody>
</table>

Heavy duty cutting (MX2600)

<table>
<thead>
<tr>
<th>Spindle speed</th>
<th>Cutting speed</th>
<th>Feedrate</th>
<th>Cutting depth</th>
<th>Material removal rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>r/min</td>
<td>m/min (ipm)</td>
<td>m/rev</td>
<td>mm (inch)</td>
<td>cm³/min (in³/min)</td>
</tr>
<tr>
<td>910</td>
<td>200 (7874)</td>
<td>0.4</td>
<td>10 (0.4)</td>
<td>800 (315.0)</td>
</tr>
</tbody>
</table>

Milling 1 (MX2600)

<table>
<thead>
<tr>
<th>Milling Spindle speed</th>
<th>Tool [6Z]</th>
<th>Cutting depth</th>
<th>Feedrate</th>
<th>Material removal rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>r/min</td>
<td>mm (inch)</td>
<td>mm (inch)</td>
<td>m/rev</td>
<td>cm³/min (in³/min)</td>
</tr>
<tr>
<td>1100</td>
<td>Ø80 (3.2)</td>
<td>5 (0.2)</td>
<td>1.0</td>
<td>330 (129.9)</td>
</tr>
</tbody>
</table>

Milling 2 (MX2600)

<table>
<thead>
<tr>
<th>Milling Spindle speed</th>
<th>Tool [U-drill]</th>
<th>Cutting depth</th>
<th>Feedrate</th>
<th>Material removal rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>r/min</td>
<td>mm (inch)</td>
<td>mm (inch)</td>
<td>m/rev</td>
<td>cm³/min (in³/min)</td>
</tr>
<tr>
<td>380</td>
<td>Ø25 (1.0)</td>
<td>25 (1.0)</td>
<td>0.5</td>
<td>119 (46.9)</td>
</tr>
</tbody>
</table>

Milling 3 (MX2100)

<table>
<thead>
<tr>
<th>Milling Spindle speed</th>
<th>Tool [U-drill]</th>
<th>Feedrate</th>
<th>Material removal rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>r/min</td>
<td>mm (inch)</td>
<td>m/rev</td>
<td>cm³/min (in³/min)</td>
</tr>
<tr>
<td>2000</td>
<td>Ø40 (3.2) [6Z]</td>
<td>0.2</td>
<td>503 (9.7)</td>
</tr>
</tbody>
</table>

- Workpiece material, KS (JIS): SM45C (S45C), Carbon steel
- The cutting test results indicated above are obtained as an example through real test cutting.
- The results, indicated in this catalogue are provides as example. They may not be obtained due to differences in cutting conditions and environmental conditions during measurement.
Application of Hybrid Motor Starter (Standard Specifications)

Innovative maintenance-free conditions have been realized compared with conventional motor-driven starters via the application of a hybrid motor starter that allows intellectual switching and simple cabling upon frequent operation of the coolant pump motor.

Hybrid motor starter that allows intellectual motor switching and simple cabling

The hybrid motor starter is capable of starting up the motor faster and more securely than competing motor starters. Hybrid switching technology, fitted with semiconductors for the supply of power, allows streamlined switching, thereby radically reducing the load on relay contacts and extending the lifecycle of the motor starter tenfold compared with conventional switch gear, and facilitates simple and efficient cabling design at the control and signal levels.

Easy Operation System

Alarm Guidance

- User check-up points notice function
- Self check-up function (OK / NG)
- Status of actuators & sensors of unit

Easy Alarm Check-up & Troubleshooting

Periodic maintenance function

- Avoid Unexpected Downtime
- Optimize the performance
- Increase Efficiently
- Reduce operating costs

Extends the Life of the Tool Machine

Machine - Airbag Function

- It is available on the servo axis (X, Z, B, Y-AXIS).
- This function can not prevent collision but can minimize collision damage.

Machine collision, defection or cutter damage

Caused large load torque

The principle of Machine-airbag Function

1. Higher torque load can be detected than setting vale if machine come into collision.
2. Servo Unit automatically move in the reverse direction instaneously.

Detect the torque data

Machine collision

Instaneous reverse direction moving

Minimize the damage

Protect the machine unit
Various Optional Equipments

- **Bar feeder**
- **Parts unloader & Parts conveyor**
- **Work ejector**

**Guide bush**

- Combined MX technology with Swiss-turn function for biomedical complex shapes
- **Rotary guide bush** Below 21 mm (0.8 inch)
- **Fixed guide bush** Below 22 mm ~ 42 mm (0.9 inch ~ 1.7 inch)

* : PUMA MX1600T / ST

**Coolant chiller**

- Thermal displacement and dimensional accuracy are greatly influenced by oil temperature in a machine. Coolant Temperature Control unit prevents the coolant from heating. Especially, when using oil-based coolant, the oil temperature can become extremely high.

---

**Optional Equipments for Automation**

- Coolant chiller
- Coolant tank
- Air+Oil mist
- MQL (Minimum quantity lubrication)
- Mist device
- Tool magazine 80 tools

---

**Tool magazine 80 tools**
Tooling System

PUMA MX1600

16ST TURRET
BMT 45P

TURNING TOOL

OD, FACE, CUT-OFF

OD Tool
Holder

Double OD Tool
Holder

Face Tool
Holder

Cut-off Tool Holder

ID HOLDER

ID Tool
Holder

Cut-off holder
(ER20)

Boring Bar Sleeves

Boring Bar

U-drill Sleeves
Ø20-H32 Ø25-H32

U-Drill (Ø35)

Drill Socket
MT NO.1 MT NO.2 MT NO.3

Holder Cover
for U-Drill

Collet
Chuck

Milling
Adapter

Weldon
Adapter
(Ø16)

COLLET
(ER20) Ø2-Ø13

ROATRY TOOL

Straight Milling
Unit For Face
Cutting

Angular Milling
Unit For Face
Cutting

PLUG

Dummy Plug

GUIDE BUSH

Fixed Guide Bush

Rotary Guide Bush

OD Tool
(ER20)

Boring Bar Sleeves

U-drill Sleeves

Drill Socket

Holder Cover

Collet

Milling

Weldon

NC

Unit : mm (inch)
Note: Above tooling system is our recommendation. Depending on export condition, the standard tooling packed with the machine can be different.
Milling spindle

The adapters, in long and short version, make it possible to extend the total length.

CoroMill milling cutters with Coromant Capto coupling
CoroMill milling cutters and adapters
CoreMill modular cutting heads and a variety of shanks
Endmills, shank hole drills and taps with a large number of adapter
Indexable insert drills with Coromant Capto coupling
Indexable insert drills and adapters
Boring tools with Coromant Capto coupling

MX1600: CAPTO C5
MX2100/2600/3100: CAPTO C6

External machining
45° Coromant Capto cutting units for turning
90° Coromant Capto cutting units for turning, threading parting and grooving
Standard shank tools and adapters for turning, threading parting and grooving
Coromant Capto cutting units for turning, threading

Internal machining
Modular tooling system 5/70 cutting heads for turning, threading, parting and grooving and boring bars in different designs
Boring bars and adapters

Mini-turret
Three tools in one: one position in the magazine containing three standard shank tools.

Multi-function type, suitable for both rotary and fixed tool cutting in milling and lathe
Special tools and engineered products
Blanks to be shaped according to your needs

All holders are not supplied. It is only reference for you.
Working Range

PUMA MX2100LS

PUMA MX2100LST

PUMA MX2600

PUMA MX2600S

Unit: mm (inch)
Working Range

PUMA MX2600T

PUMA MX2600ST

PUMA MX3100

PUMA MX3100S

Unit: mm (inch)
Lower Turret Working Range

PUMA MX1600T

Unit: mm (inch)
Lower Turret Working Range

PUMA MX1600ST

Single OD Tool holder

Double OD Tool holder

Angular milling head

Straight milling head

ID Tool holder
Lower Turret Working Range

PUMA MX2100ST / PUMA MX 2100T

Single OD Tool holder

Double OD Tool holder

Angular milling head

Straight milling head

ID Tool holder

Unit: mm (inch)
Lower Turret Working Range

PUMA MX2100LST

Single OD Tool holder

Double OD Tool holder

Milling (Angle) head

Milling (ST) head

ID Tool holder

Unit: mm (inch)
B-axis, Y-axis Working Range

PUMA MX1600
Y-axis working range

PUMA MX2100
Y-axis working range

PUMA MX2600 / 3100
Y-axis working range

B-axis rotating range

Unit: mm (inch)
Lower Turret Interference Diagram

PUMA MX1600

PUMA MX2100

PUMA MX2600
External Dimensions

PUMA MX1600

Top view

Front view

Side view

Unit: mm (inch)
External Dimensions

PUMA MX2100 (40 Tools)

Top view

Front view

Side view

PUMA MX2100 (80 Tools)

Top view

Front view

Side view

Unit: mm (inch)
# Machine Specifications

## PUMA MX1600

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>PUMA MX1600</th>
<th>PUMA MX1600S</th>
<th>PUMA MX1600T</th>
<th>PUMA MX1600ST</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swing over bed</td>
<td>mm (inch)</td>
<td>680 (26.8)</td>
<td>630 (24.8)</td>
<td>330 (13.0)</td>
<td>900 (35.4)</td>
</tr>
<tr>
<td>Swing over saddle</td>
<td>mm (inch)</td>
<td>630 (24.8)</td>
<td>630 (24.8)</td>
<td>330 (13.0)</td>
<td>900 (35.4)</td>
</tr>
<tr>
<td>Recom. Turning diameter</td>
<td>mm (inch)</td>
<td>170 (6.7)</td>
<td>170 (6.7)</td>
<td>170 (6.7)</td>
<td>170 (6.7)</td>
</tr>
<tr>
<td>Max. turning diameter</td>
<td>mm (inch)</td>
<td>330 (13.0)</td>
<td>330 (13.0)</td>
<td>330 (13.0)</td>
<td>330 (13.0)</td>
</tr>
<tr>
<td>Max. turning length</td>
<td>mm (inch)</td>
<td>900 (35.4)</td>
<td>900 (35.4)</td>
<td>900 (35.4)</td>
<td>900 (35.4)</td>
</tr>
<tr>
<td>Chuck size</td>
<td>inch</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Bar working diameter</td>
<td>mm (inch)</td>
<td>44 (1.7)</td>
<td>44 (1.7)</td>
<td>44 (1.7)</td>
<td>44 (1.7)</td>
</tr>
<tr>
<td><strong>Travels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1-axis</td>
<td>mm (inch)</td>
<td>450 (17.7)</td>
<td>935 (36.8)</td>
<td>26 (10.2)</td>
<td>925 (36.4)</td>
</tr>
<tr>
<td>Z1-axis</td>
<td>mm (inch)</td>
<td>935 (36.8)</td>
<td>935 (36.8)</td>
<td>935 (36.8)</td>
<td>935 (36.8)</td>
</tr>
<tr>
<td>X2-axis</td>
<td>mm (inch)</td>
<td>170 (6.7)</td>
<td>165 (6.5)</td>
<td>925 (36.4)</td>
<td>925 (36.4)</td>
</tr>
<tr>
<td>Z2-axis</td>
<td>mm (inch)</td>
<td>-</td>
<td>-</td>
<td>925 (36.4)</td>
<td>925 (36.4)</td>
</tr>
<tr>
<td>A-axis</td>
<td>mm (inch)</td>
<td>935 (36.8)</td>
<td>935 (36.8)</td>
<td>935 (36.8)</td>
<td>935 (36.8)</td>
</tr>
<tr>
<td><strong>Feedrates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Spindle speed</td>
<td>r/min</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
</tr>
<tr>
<td>Spindle nose</td>
<td>ASA</td>
<td>A2-5</td>
<td>A2-5</td>
<td>A2-5</td>
<td>A2-5</td>
</tr>
<tr>
<td>Spindle bearing diameter (Front)</td>
<td>mm (inch)</td>
<td>100 (3.9)</td>
<td>100 (3.9)</td>
<td>100 (3.9)</td>
<td>100 (3.9)</td>
</tr>
<tr>
<td>Spindle through hole</td>
<td>mm (inch)</td>
<td>62 (2.4)</td>
<td>62 (2.4)</td>
<td>62 (2.4)</td>
<td>62 (2.4)</td>
</tr>
<tr>
<td>Min. spindle indexing angle(C-axis)</td>
<td>deg</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>Max. Spindle speed</td>
<td>r/min</td>
<td>-</td>
<td>6000</td>
<td>-</td>
<td>6000</td>
</tr>
<tr>
<td>Spindle nose</td>
<td>ASA</td>
<td>-</td>
<td>A2-5</td>
<td>-</td>
<td>A2-5</td>
</tr>
<tr>
<td>Spindle bearing diameter (Front)</td>
<td>mm (inch)</td>
<td>-</td>
<td>100 (3.9)</td>
<td>-</td>
<td>100 (3.9)</td>
</tr>
<tr>
<td>Spindle through hole</td>
<td>mm (inch)</td>
<td>-</td>
<td>62 (2.4)</td>
<td>-</td>
<td>62 (2.4)</td>
</tr>
<tr>
<td>Min. spindle indexing angle(C-axis)</td>
<td>deg</td>
<td>-</td>
<td>0.001</td>
<td>-</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Milling spindle</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. spindle speed</td>
<td>r/min</td>
<td>12000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. spindle indexing angle(B-axis)</td>
<td>deg.</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool storage capa. (Max.)</td>
<td>ea</td>
<td>40 (1.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool changer arm</td>
<td></td>
<td>SWING ARM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic Tool Changerner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool diameter</td>
<td>mm (inch)</td>
<td>70 (2.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without Adjacent tools</td>
<td>mm (inch)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool length</td>
<td>mm (inch)</td>
<td>200 (7.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tool weight</td>
<td>kg (lb)</td>
<td>4 (8.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool change time (T-T-T)</td>
<td>s</td>
<td>2.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower Turret</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of tool stations</td>
<td>ea</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>OD tool size</td>
<td>mm (inch)</td>
<td>-</td>
<td>-</td>
<td>20 x 20 (0.8 x 0.8)</td>
<td></td>
</tr>
<tr>
<td>Max. boring bar size</td>
<td>mm (inch)</td>
<td>-</td>
<td>32 (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turret indexing time (1 station swivel)</td>
<td>s</td>
<td>0.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Rotary tool speed</td>
<td>r/min</td>
<td>-</td>
<td>6000</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Tail Stock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quill diameter</td>
<td>mm (inch)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Quill bore taper</td>
<td>MT</td>
<td>#4</td>
<td>#4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Quill travel (mm)</td>
<td>mm (inch)</td>
<td>935 (36.8)</td>
<td>935 (36.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left spindle motor power</td>
<td>kW (Hp)</td>
<td>15 / 11 (20.1 / 14.8)</td>
<td>15 / 11 (20.1 / 14.8)</td>
<td>15 / 11 (20.1 / 14.8)</td>
<td></td>
</tr>
<tr>
<td>Right spindle motor power</td>
<td>kW (Hp)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Milling spindle motor power</td>
<td>kW (Hp)</td>
<td>9 / 7.7 (12.1 / 5.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant pump motor power</td>
<td>kW (Hp)</td>
<td>8.7 (3.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power source</td>
<td>kVA</td>
<td>43.35</td>
<td>55.28</td>
<td>52.04</td>
<td></td>
</tr>
<tr>
<td>Machine Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>mm (inch)</td>
<td>2760 (108.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>mm (inch)</td>
<td>3800 (149.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>mm (inch)</td>
<td>2530 (99.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg (lb)</td>
<td>11100 (24470.9)</td>
<td>11400 (25132.3)</td>
<td>11300 (24911.9)</td>
<td>11600 (25573.2)</td>
</tr>
</tbody>
</table>

### Standard Feature
- Tool locating confirmation
- Spindle thermal (Milling Spindle)
- Through spindle coolant for milling spindle
- Door interlock
- Level bolt and plate
- Manual
- Name plate
- Work light
- Tool locating confirmation (Milling Spindle)
- Through spindle coolant
- Compensation for milling spindle
- Standard tooling kit
- Foot switch
- Workpiece cut off Confirmation
- Signal tower
- B axis contouring Function (axes control unit)
- Dual pressure chucking
- Coolant chiller
- B axis contouring Function (axes control unit)
- Linear scale
- Cooling flow detector
- Steady rest for turret
- Guide bush
- Hardened & ground jaws
- Oil mist collector
- Oil skimmer
- Pressure switch for chucking pressure check
- Parts unloaders and conveyor
- Special chucks
- Through spindle coolant (Left/ Right spindle)
- Chip conveyor & bucket
- Combustion blower
- Tool monitoring System
- Automatic Tool Changer
- FIXED ADDRESS
- Continuous
- Without Adjacent Tool
- Tool selection
- Min. tool length
- Max. tool weight
- Tool change time (T-T-T)
- s
- 2.1
- 16
- 20 x 20 (0.8 x 0.8)
- 32 (1.3)
- 0.35
- 6000
- 4 (8.8)
- 15 / 11 (20.1 / 14.8)
- 15 / 11 (20.1 / 14.8)
- 9 / 7.7 (12.1 / 5.0)
- 8.7 (3.0)
- 43.35
- 55.28
- 52.04
- 2760 (108.7)
- 3800 (149.6)
- 2530 (99.6)
- 11100 (24470.9)
- 11400 (25132.3)
- 11300 (24911.9)
- 11600 (25573.2)

<table>
<thead>
<tr>
<th>Optional Feature</th>
</tr>
</thead>
</table>
- Parts unloaders and conveyor
- Workpiece ejector
- Rotary type window Wiper
- Linear scale
- Bar feeder interface
- Air gun
- Tool setter
- Auto. Workpiece Measurement
- Automatic front door
- Dual pressure chucking
- Coolant chiller
- B axis contouring Function (axes control unit)
- Linear scale
- Cooling flow detector
- Steady rest for turret
- Guide bush
- Hardened & ground jaws
- Oil mist collector
- Oil skimmer
- Pressure switch for chucking pressure check
- Parts unloaders and conveyor
- Special chucks
- Through spindle coolant (Left/ Right spindle)
- Chip conveyor & bucket
- Combustion blower
- Tool monitoring System

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

#### PUMA MX2100

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>PUMA MX2100(L)</th>
<th>PUMA MX2100S(LS)</th>
<th>PUMA MX2100T(LT)</th>
<th>PUMA MX2100ST(LST)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swing over bed</td>
<td>mm (inch)</td>
<td>750 (29.5)</td>
<td>750 (29.5)</td>
<td>750 (29.5)</td>
<td>750 (29.5)</td>
</tr>
<tr>
<td>Swing over saddle</td>
<td>mm (inch)</td>
<td>650 (25.6)</td>
<td>650 (25.6)</td>
<td>650 (25.6)</td>
<td>650 (25.6)</td>
</tr>
<tr>
<td>Recom. Turning diameter</td>
<td>mm (inch)</td>
<td>210 (8.3)</td>
<td>210 (8.3)</td>
<td>210 (8.3)</td>
<td>210 (8.3)</td>
</tr>
<tr>
<td>Max. Turning diameter</td>
<td>mm (inch)</td>
<td>540 (21.3)</td>
<td>540 (21.3)</td>
<td>540 (21.3)</td>
<td>540 (21.3)</td>
</tr>
<tr>
<td>Max. Turning length</td>
<td>mm (inch)</td>
<td>1020 (40.2)</td>
<td>1020 (40.2)</td>
<td>1020 (40.2)</td>
<td>1020 (40.2)</td>
</tr>
<tr>
<td>Chuck size</td>
<td>inch</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Bar working diameter</td>
<td>mm (inch)</td>
<td>65 (2.6)</td>
<td>65 (2.6)</td>
<td>65 (2.6)</td>
<td>65 (2.6)</td>
</tr>
</tbody>
</table>

| **Travels** | | | | | |
| X1-axis | mm (inch) | 565 (22.2) | 565 (22.2) | 565 (22.2) | 565 (22.2) |
| Z1-axis | mm (inch) | 1050 (41.3) | 1050 (41.3) | 1050 (41.3) | 1050 (41.3) |
| Y-axis | mm (inch) | 2170 (85.3) | 2170 (85.3) | 2170 (85.3) | 2170 (85.3) |
| Z2-axis | mm (inch) | 187 (7.4) | 187 (7.4) | 187 (7.4) | 187 (7.4) |
| X2-axis | mm (inch) | - | - | - | - |
| A-axis | mm (inch) | 1050 (41.3) | 1050 (41.3) | 1050 (41.3) | 1050 (41.3) |

| **Feedrates** | | | | | |
| X1-axis | m/min (ipm) | 36 (1417.3) | 36 (1417.3) | 36 (1417.3) | 36 (1417.3) |
| Z1-axis | m/min (ipm) | 36 (1417.3) | 36 (1417.3) | 36 (1417.3) | 36 (1417.3) |
| Y-axis | m/min (ipm) | 26 (1023.6) | 26 (1023.6) | 26 (1023.6) | 26 (1023.6) |
| X2-axis | m/min (ipm) | - | - | - | - |
| A-axis | m/min (ipm) | - | - | - | - |

| **Spindle** | | | | | |
| Max. Spindle speed | r/min | 5000 | 5000 | 5000 | 5000 |
| Spindle nose | ASA | A2-6 | A2-6 | A2-6 | A2-6 |
| Spindle bearing diameter (Front) | mm (inch) | 110 (4.3) | 110 (4.3) | 110 (4.3) | 110 (4.3) |
| Spindle through hole | mm (inch) | 76 (3.0) | 76 (3.0) | 76 (3.0) | 76 (3.0) |
| Min. spindle indexing angle | deg | 0.001 | 0.001 | 0.001 | 0.001 |

| **Automatic Tool Changer** | | | | | |
| Tool storage capacity. (Max.) | ea | 40 | 80 | 80 | 80 |
| Tool changer arm | SWING ARM | | | | |
| Tool selection | FIXED ADDRESS | | | | |
| Tool shank | | | | | |
| Max. tool diameter | mm (inch) | 90 (3.5) | 90 (3.5) | 90 (3.5) | 90 (3.5) |
| Without Adjacent Tools | mm (inch) | 120 (4.7) | 120 (4.7) | 120 (4.7) | 120 (4.7) |
| Max. tool length | kg (lb) | 300 (661.4) | 300 (661.4) | 300 (661.4) | 300 (661.4) |
| Max. tool weight | s | 9 | 9 | 9 | 9 |
| Tool change time (T-T-T) | s | | | | |
| No. of tool stations | ea | - | - | - | - |
| OD tool size | mm (inch) | - | - | - | - |
| Max. boring bar size | mm (inch) | - | - | - | - |
| Turret indexing time (station swivel) | s | 0.2 | 0.2 | 0.2 | 0.2 |
| Max. Rotary tool speed | r/min | 5000 | 5000 | 5000 | 5000 |

| **Lower Turret** | | | | | |
| Quill bore taper | MT | #4 | #4 | #4 | #4 |
| Quill travel | mm (inch) | 1050 (41.3) | 1050 (41.3) | 1050 (41.3) | 1050 (41.3) |

| **Tail Stock** | | | | | |
| Quill bore taper | MT | - | - | - | - |
| Quill travel | mm (inch) | - | - | - | - |
| Left spindle motor power | kW (Hp) | 22 / 18.5 (29.5 / 24.8) | 22 / 18.5 (29.5 / 24.8) | 22 / 18.5 (29.5 / 24.8) | 22 / 18.5 (29.5 / 24.8) |
| Right spindle motor power | kW (Hp) | - | - | - | - |
| Coolant pump motor power | kW (Hp) | - | - | - | - |
| Power source | Electric power supply (rated capacity) | kVA | 50 (53) | 56.7 (75) | 50 (53) | 88 (89.8) |

| **Machine Dimensions** | | | | | |
| Height | mm (inch) | 2805 (110.4) | 2805 (110.4) | 2805 (110.4) | 2805 (110.4) |
| Length | mm (inch) | 4850 (190.9) | 4850 (190.9) | 4850 (190.9) | 4850 (190.9) |
| Width | mm (inch) | 2525 (99.4) | 2525 (99.4) | 2525 (99.4) | 2525 (99.4) |
| Weight | kg (lb) | 11500 (25352.8) | 11500 (25352.8) | 11500 (25352.8) | 11500 (25352.8) |

### Standard Feature
- Air blast (for chuck)
- Coolant supply equipment
- Door interlock
- Standard work tools (including holders)
- Hyd. chuck & actuating cylinder
- Level bolt and plate
- Soft jaws
- Spindle head cooling system
- Work light
- Through spindle coolant for milling spindle
- Signal tower
- Hydraulic power unit
- Servo driven tailstock (except S/ST type machine)
- Special chucks
- Coolant blower
- Dual chucking pressure
- Hardened & ground jaws
- Oil mist collector
- Oil skimmer
- Pressure switch for chucking
- Parts unloader and conveyor
- Through spindle coolant (Left/Right spindle)
- Coolant blower
- Dual chucking pressure
- Servo driven steady rest (except S/ST type machine)
- Tool monitoring system

### Optional Feature
- Air gun
- Automatic door with safety device
- Automatic power off
- Tool setter
- Bar feeder
- Bar puller
- Chip Conveyor & Bucket
- Special chucks
- Through spindle coolant
- Minimum Quantity Lubrication (MQL) system
- Coolant chiller
- Gantry loader
- Servo driven steady rest
- Tool monitoring system

---

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

### PUMA MX2600 / MX3100

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit PUMA MX2600</th>
<th>Unit PUMA MX3100</th>
<th>Unit PUMA MX26000S</th>
<th>Unit PUMA MX31000S</th>
<th>Unit PUMA MX2600ST</th>
<th>Unit PUMA MX31000ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swing over bed</td>
<td>mm (inch)</td>
<td>1000 (39.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swing over saddle</td>
<td>mm (inch)</td>
<td>700 (27.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recom. Turning diameter</td>
<td>mm (inch)</td>
<td>255 (10.0)</td>
<td>310 (12.2)</td>
<td>255 (10.0)</td>
<td>310 (12.2)</td>
<td>255 (10.0)</td>
</tr>
<tr>
<td>Max. Turning diameter</td>
<td>mm (inch)</td>
<td>760 (29.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Turning length</td>
<td>mm (inch)</td>
<td>1560 (61.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chuck size</td>
<td>inch</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Bar working diameter</td>
<td>mm (inch)</td>
<td>76 (3.0)</td>
<td>102 (4.0)</td>
<td>76 (3.0)</td>
<td>102 (4.0)</td>
<td>76 (3.0)</td>
</tr>
</tbody>
</table>

### Capacity

<table>
<thead>
<tr>
<th>Travel distance</th>
<th>X1-axis mm (inch)</th>
<th>630 (24.8)</th>
<th>Z1-axis mm (inch)</th>
<th>558 (22.0)</th>
<th>X2-axis mm (inch)</th>
<th>-</th>
<th>Z2-axis mm (inch)</th>
<th>-</th>
<th>A-axis mm (inch)</th>
<th>1550 (61.0)</th>
<th>Z1-axis mm (inch)</th>
<th>36 (1417.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1-axis mm (inch)</td>
<td>36 (1417.3)</td>
<td></td>
<td>Z1-axis mm (inch)</td>
<td>26 (1023.6)</td>
<td>X2-axis mm (inch)</td>
<td>-</td>
<td>Z2-axis mm (inch)</td>
<td>-</td>
<td>A-axis mm (inch)</td>
<td>24 (944.9)</td>
<td>Z1-axis mm (inch)</td>
<td>36 (1417.3)</td>
</tr>
<tr>
<td>X1-axis mm (inch)</td>
<td>-</td>
<td></td>
<td>Z1-axis mm (inch)</td>
<td>-</td>
<td>X2-axis mm (inch)</td>
<td>-</td>
<td>Z2-axis mm (inch)</td>
<td>-</td>
<td>A-axis mm (inch)</td>
<td>1550 (61.0)</td>
<td>Z1-axis mm (inch)</td>
<td>36 (1417.3)</td>
</tr>
</tbody>
</table>

### Travels

<table>
<thead>
<tr>
<th>Feedrates</th>
<th>RAPID TRAVERSE RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1-axis m/min (ipm)</td>
<td>36 (1417.3)</td>
</tr>
<tr>
<td>Z1-axis m/min (ipm)</td>
<td>26 (1023.6)</td>
</tr>
<tr>
<td>Y-axis m/min (ipm)</td>
<td>24 (944.9)</td>
</tr>
<tr>
<td>X2-axis m/min (ipm)</td>
<td>36 (1417.3)</td>
</tr>
<tr>
<td>Z2-axis m/min (ipm)</td>
<td>1550 (61.0)</td>
</tr>
</tbody>
</table>

### Left spindle

| Max. Spindle speed r/min    | 4000                |
| Spindle nose                | A2-8                |
| Spindle bearing diameter    | 130 (5.1)           |
| Spindle through hole        | 86 (3.4)            |
| Min. spindle indexing angle (C-axis) | 0.001 |

### Right spindle

| Max. Spindle speed r/min    | -                   |
| Spindle nose                | A2-8                |
| Spindle bearing diameter    | 130 (5.1)           |
| Spindle through hole        | 86 (3.4)            |
| Min. spindle indexing angle (C-axis) | 0.001 |

### Milling spindle

| Max. Spindle speed r/min    | 12000               |
| Min. spindle indexing angle (B-axis) | 0.001 |

### Automatic Tool Changer

| Tool storage capa. (Max.)   | 40 (90)             |
| Tool changer arm            | SWING ARM           |
| Tool selection              | FIXED ADDRESS       |
| Max. tool diameter          | 90 (3.5)            |
| Max. tool length kg (lb)    | 400 (881.8)         |
| Max. tool weight s          | 10                  |
| Tool change time (T-T-T) s  | 5                   |
| Lower Turret No. of tool stations ea | - |
| OD tool size                | 25 x 25 (1.0 x 1.0) |
| Max. boring bar size        | 40 (1.6)            |
| Turret indexing time (station swivel) s | 0.2 |
| Max. Rotary tool speed m/min | 4000               |
| Tail Stock Quill bore taper MT | 5 #5               |
| Quill travel mm (inch)      | 1550 (61.0)         |
| Quill travel                | 1550 (61.0)         |

### Motors

| Left spindle motor power kW (Hp) | 26 / 22 (34.9 / 29.5) |
| Right spindle motor power kW (Hp) | 26 / 22 (34.9 / 29.5) |
| Milling spindle motor power kW (Hp) | 22 / 18.5 / 15.6 (24.8 / 20.1) |
| Coolant pump motor power kW (Hp) | 2.2 (3.0) |

### Power source

| Electric power supply (rated capacity) kVA | 70 |
| Machine Dimensions                      | 13900 (30643.8) |
| Height mm (inch)                         | 100 |
| Length mm (inch)                         | 70 |
| Width mm (inch)                          | 100 |
| Weight kg (lb)                           | 34 |

### Standard Feature

- Air blast
- Coolant chiller
- Door interlock
- Standard work tools (including holders)
- Hydraulic power unit
- Level bolt and plate
- Soft jaws

### Optional Feature

- Air gun
- Automatic door with safety device
- Automatic power off
- Tool setter
- Bar feeder
- Bar puller
- Chip Conveyor & Bucket
- Coolant blower
- Dual chucking pressure
- Hardened & ground jaws
- Oil mist collector
- Oil skimmer
- Pressure switch for chucking pressure check
- Parts unloader and conveyor
- Special chuck
- Through spindle coolant (Left/Right spindle)
- Wire ejector
- Linear scale
- Minimum Quantity Lubrication (MQL) system
- Coolant Chiller
- Gantry loader
- Servo driven steady rest (except T/ST type machine)
- Tool monitoring system

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

Fanuc 31i

**AXES CONTROL**
- Controlled path: 1 path / 2 path
- Controlled axes: X1, Z1, C1, Y, R, A, X2, Z2, C2
- Simultaneous controlled axes: 4 (Only for Fanuc 31i-A5 / B5)axes
- Angular axis control
- Backlash compensation: 0 ~ ±9999 pulses
- Backlash compensation for each rapid traverse and cutting feed
- Synchronous / Composite control
- Superimposed Control
- HRV2 control
- Inch / Metric conversion
- Interlock: All axis / each axis
- Least input command: 0.001 / 0.001 mm/inch
- Mirror image: All axis / each axis
- Position switch
- Servo off
- Stored pitch error compensation
- Stored stroke check 1
- Torque control
- Tolerance check for rotary axis
- Unexpected disturbance torque detection function

**OPERATION**
- DNC operation with Memory card
- Buffer register
- Dry run
- Handle incremental feed X1, X10, X100
- Manual reference position return
- Manual pulse generator (Portable MPG) 1 ea
- Single block
- Tool direction handle feed (G68.1)
- Work coordinate system G52 - G59

**INTERPOLATION FUNCTIONS**
- 3D coordinate conversion
- Addition of custom macro common variables R100~#199, #500~#999
- canned cycle for turning
- Circularity interpolation by R programming
- Coordinate system feed (G50)
- Coordinate system shift
- Custom macro
- Diameter / radius programming (X axis)
- Direct drawing dimension programming
- Direct input of coordinate system shift
- G code system A
- G code system B/C
- Input unit 10 time multiply
- Label skip
- Macro executor
- Manual absolute on and off
- Maximum program dimension ±9999
- Multiple repetitive canned cycle G70 - G76
- Multiple repetitive canned cycle II
- Optional block skip 1 piece
- Plane selection G17, G18, G19
- Programmable data input G10
- Program file name 32 characters
- Program number N11 digit
- SUB program call 10 folds nested
- Tape code: ISO / EIA auto recognition
- EIA RS422/ISO8400
- Tape format for FANUC Series 15
- Work coordinate system G52 - G59

**TOOL FUNCTION / TOOL COMPENSATION**
- Automatic tool offset
- Direct input of offset value measured
- Direct input of offset value measured B
- Tool geometry / wear compensation
- Tool life management
- Tool nose radius compensation
- Tool offset G63, G64, G69
- Tool offset pairs Upper: ±6 digits: 400 pairs Lower: ±6 digits: 99 pairs
- Tool offset value counter input
- Y-axis offset

**EDITOR OPERATION**
- Enhanced part program editing
- Number of registered programs 1000 ea
- Part program storage size 512 Kbyte (Note) Specify total of part program storage size of each path
- Memory card program edit & operation
- Program protect

**SETTING AND DISPLAY**
- Actual cutting feedrate display
- Alarm history display
- Permissible motion screen
- Display of spindle speed and T code at all screens
- Optional path name display (Only for 2path)
- Multi-language display
- Operation history display
- Run hours / part count display
- Self-diagnosis function
- Servo setting screen
- Spindle setting screen

**DATA INPUT / OUTPUT**
- External key input
- External data input
- External work number search 15 points
- Memory card input/output
- Reader/puncher interface CH1 interface
- RS232C interface
- Automatic data backup (Note) Include 100 pairs
- Screen hard copy

**CONTOURING FUNCTION**
- Tool center point control by 5-axes: just on FANUC 31i-5
- Tool center point control by 5-axes: just on FANUC 31i
- Tool center point control by 5-axes: just on FANUC 31i

**OTHERS**
- Cycle start and lamp
- Display unit: 10.4" Color LCD
- Feed hold and lamp
- MDI unit for: 10.4" LCD
- NC and servo ready
- PMC system: PMC-31A
- Reset / rewind

**INTERFACE FUNCTION**
- Ethernet function
- Embedded ethernet

**OPERATION**
- DNC operation (Reader/puncher interface is required)
- Reference position shift

**OPERATION GUIDANCE FUNCTION**
- EZ Guide (Convolutional Programming Solution)

**TOOL FUNCTION / TOOL COMPENSATION**
- Tool monitoring system

**OPTIONAL SPECIFICATIONS**

**INTERPOLATION FUNCTIONS**
- Circular threading
- Multi step skip
- Variable lead threading
- High speed skip

**FEED FUNCTION**
- NC Contour control (Look-ahead block no. is MAX.200)
- External deceleration
- Feed Skip

**OPERATION**
- Manual handle interruption
- Tool retract and recover

**PROGRAM INPUT**
- Addition of workpiece coordinate system pair 48 pairs
- Interpolation type custom macro
- Pattern data input
- Work coordinate system preset
- Optional block skip 9 piece

**EDITING OPERATION**
- Part program storage size: 1MB / 2MB
- Play back

**SETTING AND DISPLAY**
- Directory display of floppy cassette

**DATA INPUT / OUTPUT**
- Data server
- DNC control

**CONTOURING FUNCTION**
- Tool center point control by 5-axes: just on FANUC 31i
- AICC600 blocks

**ROBOT INTERFACE**
- Robot interface with PMC I/O module
- Robot interface with PROFIBUS-DP
Doosan Machine Tools
http://www.doosanmachinetools.com
www.facebook.com/doosanmachinetools

Optimal Solutions for the Future

Doosan Machine Tools China
Room 101,201,301, Building 39 Xinzhuang Highway
No.258 Songjiang District, China Shanghai(201612)
Tel +86 21-5445-1155
Fax +86 21-6405-1472

Doosan Machine Tools Europe
Emdener Strasse 24, D-41540 Dormagen, Germany
Tel +49-2133-5067-100
Fax +49-2133-5067-001

Doosan Machine Tools Japan
#2412, Mita Kokusai Bldg. 1-4-28 Mita,
Minato-ku, Tokyo 108-0073, Japan
Tel +81 3 5730 9013
Fax +81 3 5730 9016

Doosan Machine Tools India
106 / 10-11-12, Amruthahalli, Byatarayanapura,
Bellary road, Bangalore-560 092, India
Tel +91-80-4266-0122 / 121 / 100

* For more details, please contact Doosan Machine Tools.
* The specifications and information above-mentioned may be changed without prior notice.
* Doosan Machine Tools Co., Ltd. is a subsidiary of MBK Partners, a Korean private equity firm. The trademark is used under a licensing agreement with Doosan Corporation, the registered trademark holder.