



PUMA 240

High Performance Turning Center



High Performance Turning Center

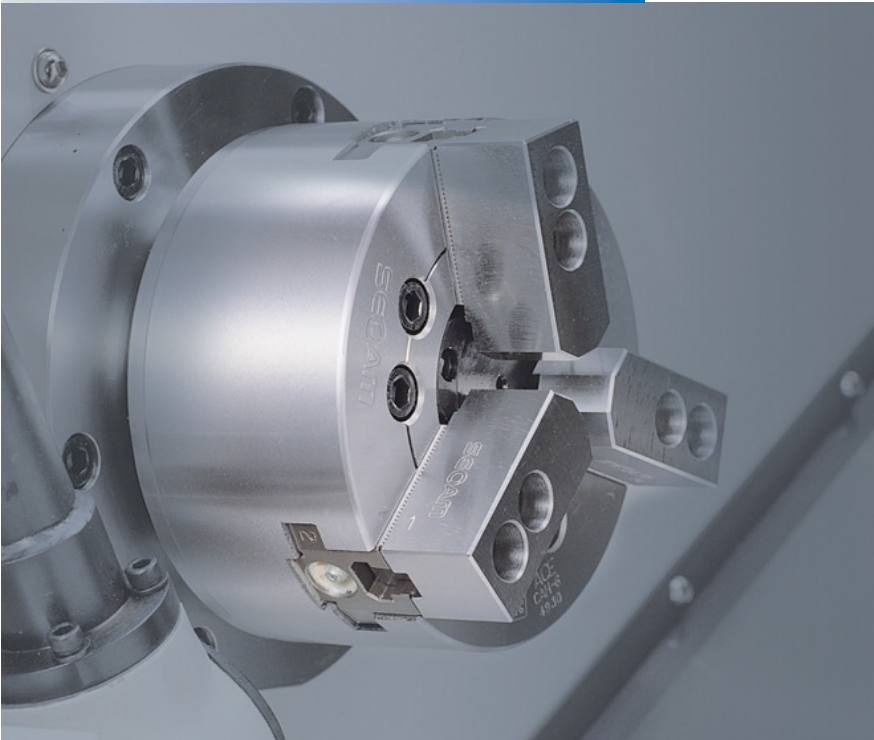
Fast and highly efficient, this compact machine offers excellent productivity Improved operation capability and ease of use. Upholding the great traditions of PUMA 240 series, the new PUMA 240 series will be your unavoidable choice.

PUMA 240





Main Spindle



Each spindle of PUMA 240series uses 210mm (8.3inch), 255mm (10.0inch) chuck suitable for handling small to middle size workpiece.

Max. spindle speed

4500^{*1} r/min

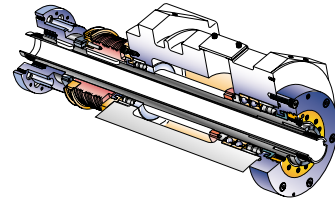
Motor (30 min)

**HTM18.5^{*1} kW
(24.8 Hp)**

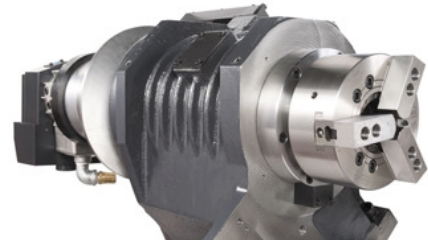
General torque motor to high torque motor, variable motors of the machine provide wide range of machining application from heavy duty with high power torque to fine and finish at high speed.

*1: PUMA 240B

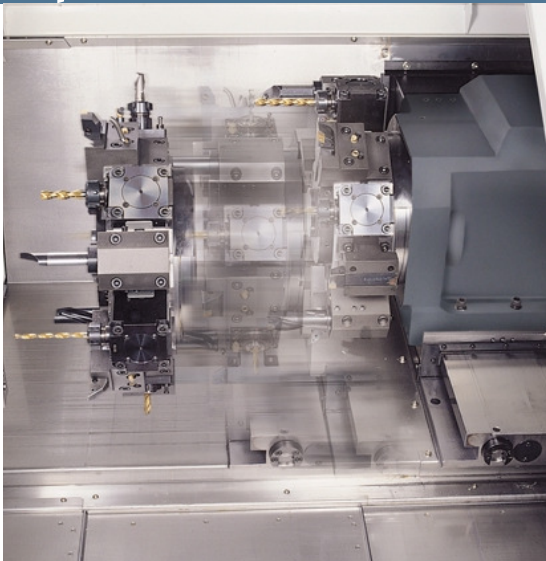
Main Spindle Head



Headstock and Spindle



Rapid Traverse



X-axis

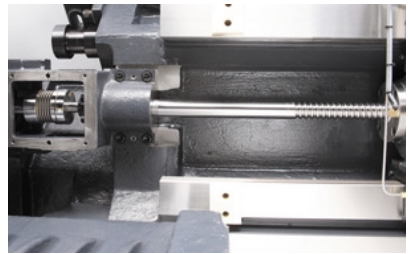
**24 m/min
(944.9 ipm)**

Z-axis

**30 m/min
(1181.1 ipm)**

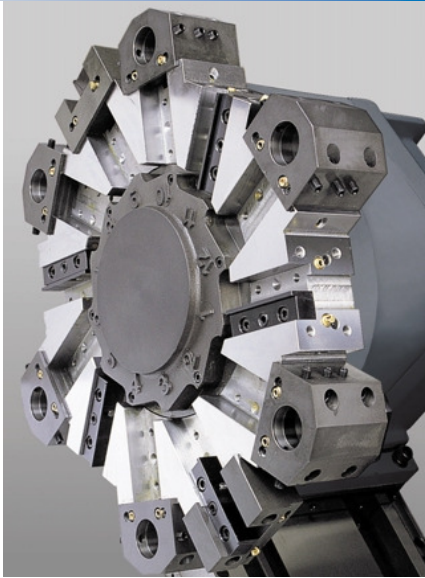


• Scraping of Slideway

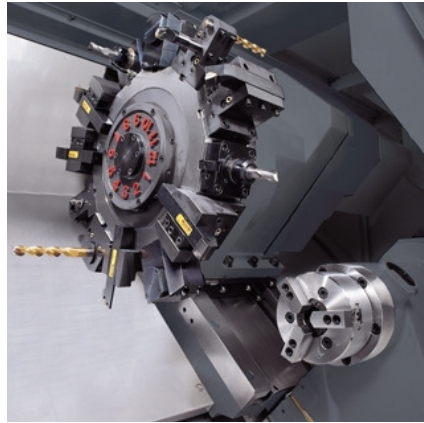


• Outstanding rigidity for high feedrates

Turret



The large 12 station heavy duty turret features a large diameter Curvic coupling and heavy duty design with unsurpassed rigidity. Turret rotation, acceleration and deceleration are all controlled by a reliable high torque servo motor. Unclamp and rotation are virtually simultaneous. Its fast index response reduces the total cycle time required to machine parts.



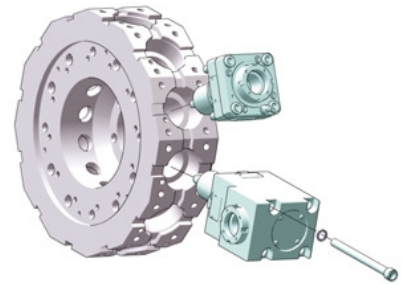
Index time (1-station swivel)

0.15 s

No. of tool station

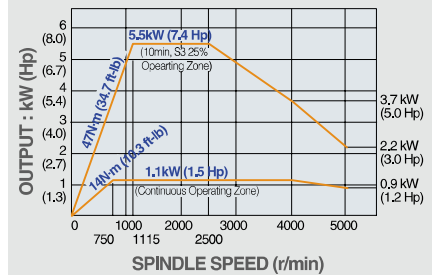
12 stations

Radial BMT Turret



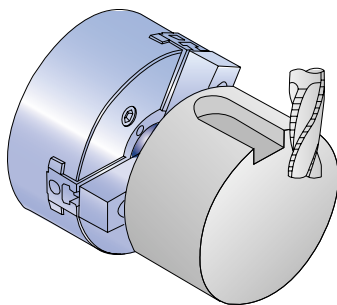
Rotary tool spindle power-torque diagram

• PUMA 240M/MS (5000 r/min)



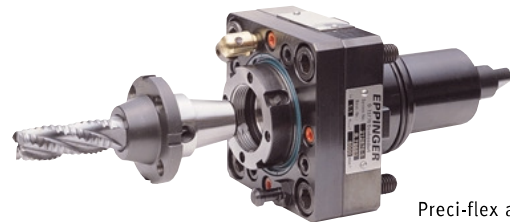
Rotary Tool Head

The new rotary tool head confirms the high rigidity and accuracy by simultaneous dual contact between the rotary tool head face and tool holding insert (called Preci-flex adapter) flange face as well as tool head pocket taper and the insert' taper shank.

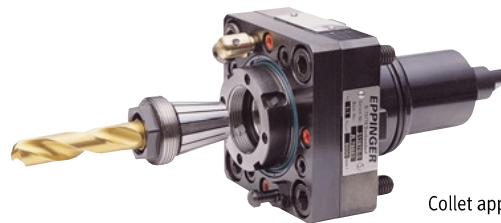


Increased machining capacity

1.84 times



Preci-flex adapter application



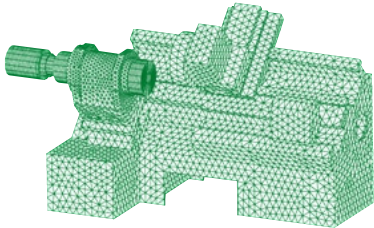
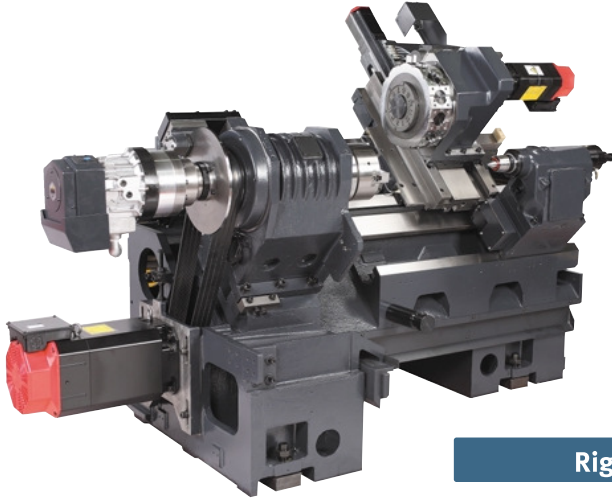
Collet application

• Material : Carbon steel SM45C

| Cutting Condition | | Previous Head | New Head |
|--|--------------------------------------|---------------------------|---------------------------|
| End mill $\phi 16$ (Hss) 2 Flutes V : 50 m/min S : 1000 r/min F : 0.2 mm/rev | Max. Cutting Depth (without chatter) | 6 mm (0.2 inch) | 11 mm (0.4 inch) |
| | Chip Removal Rate | 19.2 cm ³ /min | 35.2 cm ³ /min |

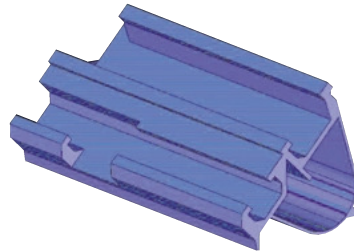
Robust Design

Stable base for supporting high-speed, high-precision machining.



FEM analysis used to design a stable body. (FEM : Finite Element Method)

Rigid slant bed



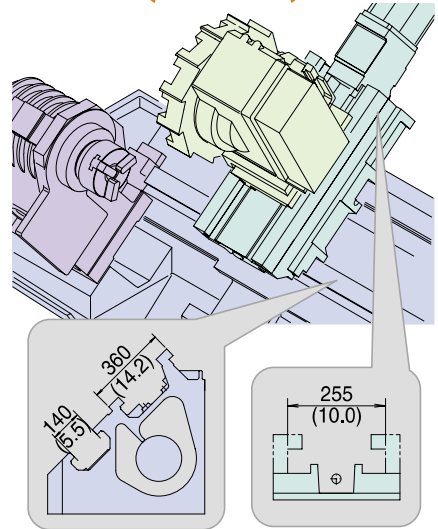
The heavily ribbed torque tube design prevents twisting and deformation. All guideways are wide wrap-around rectangular type for unsurpassed long-term rigidity and accuracy.

Rigid Slant Bed

Slideway width

X-axis : **255 mm**
(10.0 inch)

Z-axis : **360 mm**
(14.2 inch)



Compact But Wide Working Ares

Designed specifically for machining small to middle parts.

Machining Range

X-axis travel

242 mm (9.5 inch)

A : Max. turning diameter

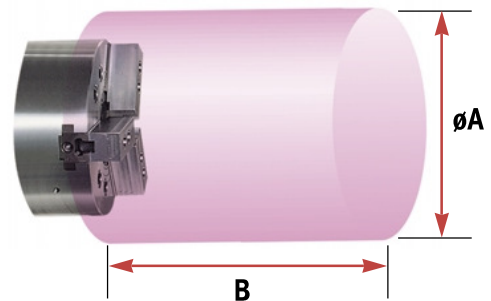
350 mm (13.8 inch)

Z-axis travel

580 mm (22.8 inch)

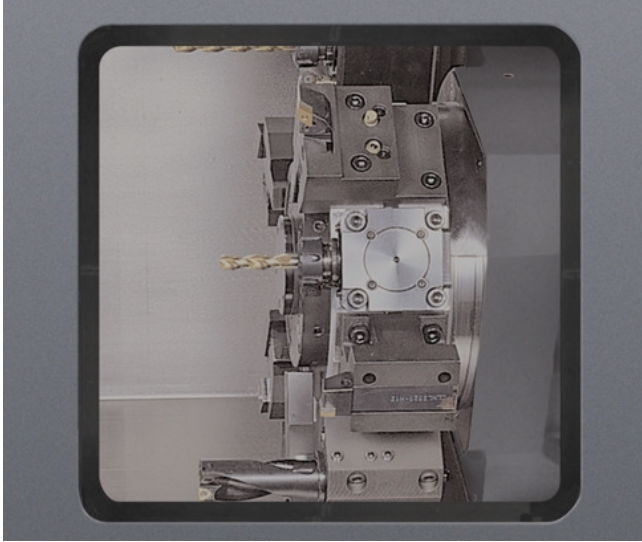
B : Max. turning length

562^{*1} / 550^{*2} mm
(22.1 / 21.7 inch)



*1: PUMA 240B *2: PUMA 240C

Safety Design for Human

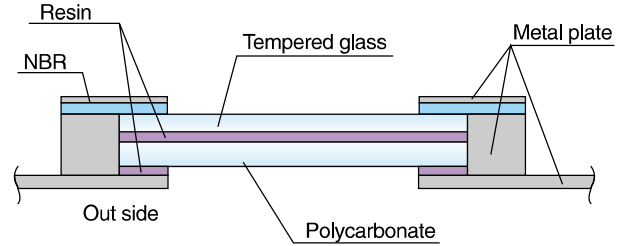


Front Door Interlock

The front door opening is detected and locked by CE certified safety switch. All the automatic operations are only effective at the door-closed status for operator safety.

Double-Paneled Safety Window

The operator safety can be enhanced through the front door with its shock absorbing laminated glass and double panel construction. The windows without grating also provide a clear view of the machine inside.



Safety Design

Higher performance, lower hazard. The operator's risk is minimized by upgraded safe product through hazardous analysis, FMEA (Failure Mode Effect Analysis) and human engineering design.

Machine Capacity

Front Door Interlock

The front door opening is detected and locked by CE certified safety switch. All the automatic operations are only effective at the door-closed status for operator safety.



Chip removal rate

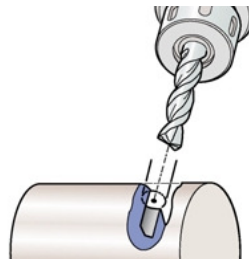
384 cm³/min

Cutting depth

8 mm

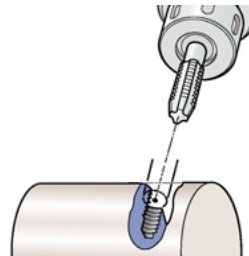
| Material | Carbon steel SM45C |
|-----------------------|--------------------|
| Cutting speed (m/min) | 120 |
| Feedrate (mm/rev) | 0.4 |
| Spindle speed (r/min) | 560 |

Drilling



| Tool | D22 U-drill (with shank size ø 16) |
|--|------------------------------------|
| Material | Carbon steel SM45C |
| Rotary tool spindle speed (r/min) | 500 |
| Feedrate (mm/rev) | 0.3 |
| Chip removal rate (cm ³ /min) | 33.6 |

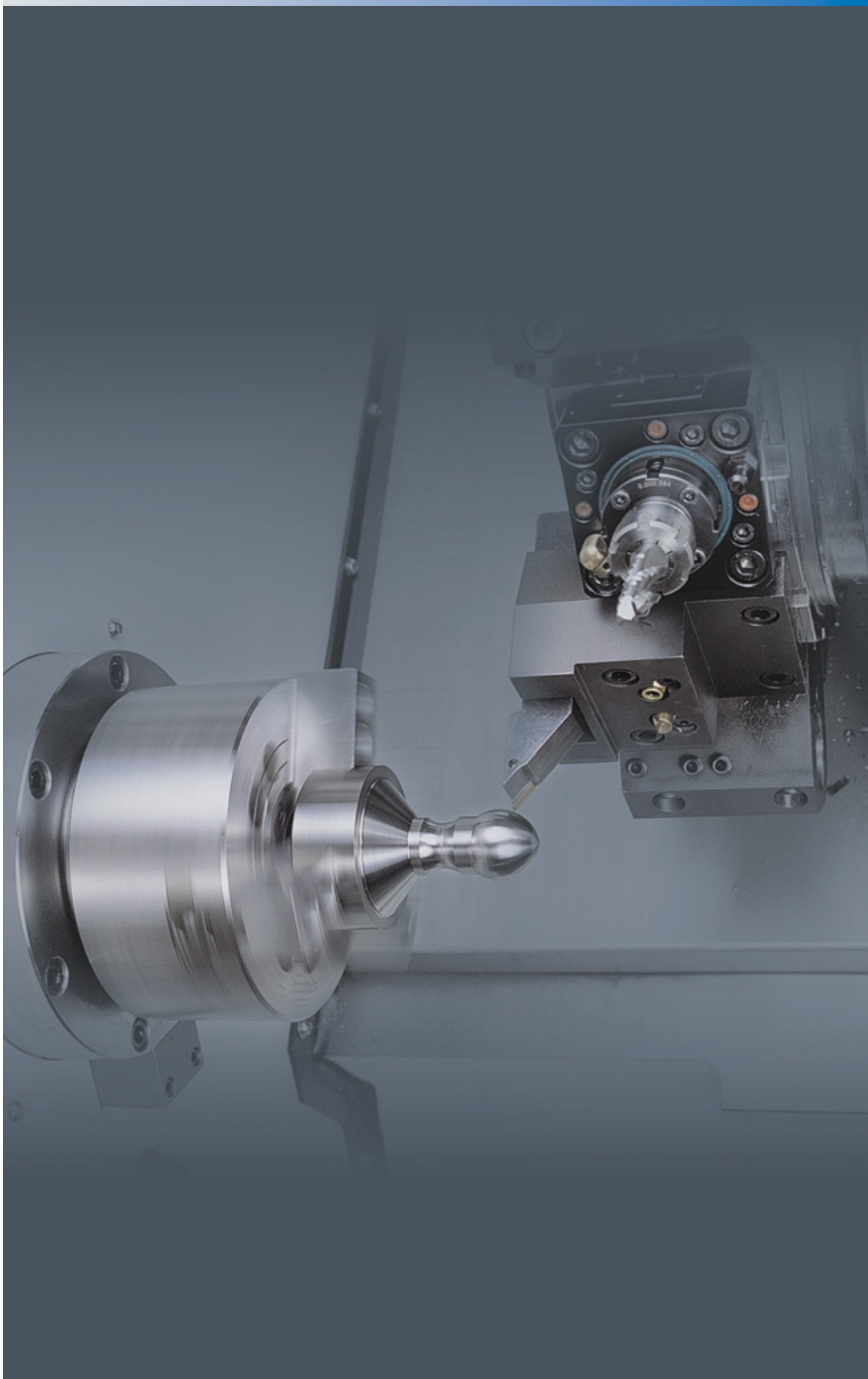
Tapping



| Tool | M16 x 2.0 |
|-----------------------------------|--------------------|
| Material | Carbon steel SM45C |
| Rotary tool spindle speed (r/min) | 200 |
| Feedrate (mm/ min) | 400 |

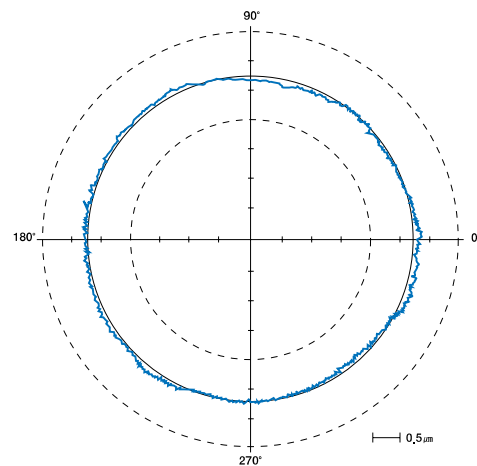
The cutting test results indicated above are obtained as an example through real test cutting with PUMA 240MB. The results may not be obtained due to differences in cutting and environmental conditions during measurement.

Reliable Long-Run Machining Accuracy

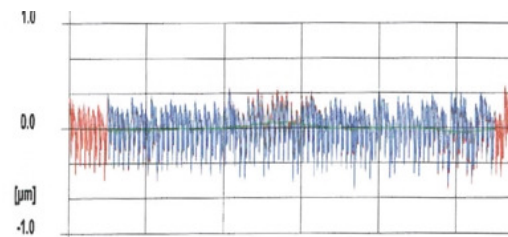


Roundness & Roughness (O.D. cutting)

0.40 μm



0.15 $\mu\text{m Ra}$



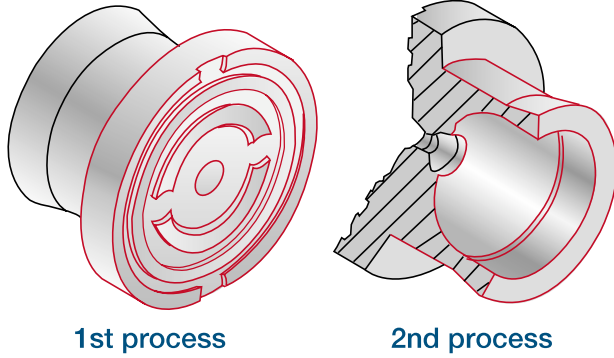
The cutting test results indicated above are obtained as an example through real test cutting. The results may not be obtained due to differences in cutting and environmental conditions during measurement.

Users enjoy stable performance in all types of operations from heavy-duty cutting to high speed machining. And machining operations are highly efficient and precise.

| Tool | Diamond Tool [nose R0.8] |
|-----------------------|--------------------------|
| Work material | AL2024 |
| Cutting speed (m/min) | 300 |
| Feedrate (mm/rev) | 0.05 |
| Cutting depth (mm) | 0.2 |

Productivity

- High productivity get realized through PUMA 240 machines.



Cycle time table shown below is the results from real test cutting. The results can be different on cutting condition and strategy.

| Machining operations | | Cycle time |
|----------------------------|------------------|------------|
| 1st Process | O.D Turning | 11 s |
| | D4 Endmill | 9 s |
| | Face Grooving | 10 s |
| | D2 Center Drill | 5 s |
| | D2 Drill | 8 s |
| 1st process Machining time | | 43 s |
| 2st Process | O.D Turning | 15 s |
| | I.D Ball Endmill | 11 s |
| | I.D Finishing | 15 s |
| 2nd process Machining time | | 41 s |

Machining time
PUMA 240

1st process

43 s

2st process

41 s

Total machining time

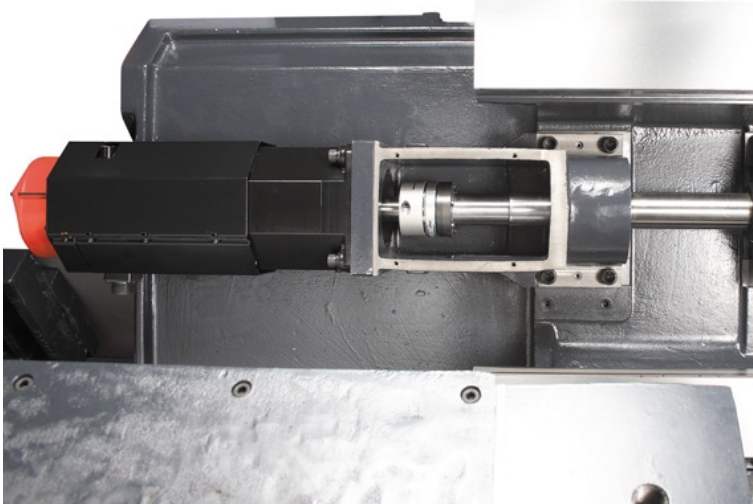
84 s

Sample Workpieces



Axis Drive Construction And Tail Stock

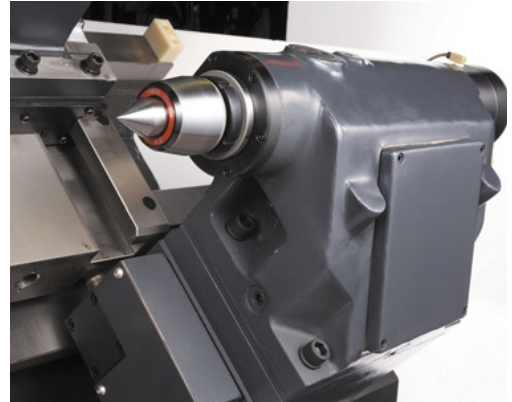
Axis Drive & Ball Screw



Each axis is powered by a maintenance free digital AC servo motor. These high torque drive motors are connected to the ball screws without intermediate gears for quiet and responsive slide movement with virtually no backlash. The X-axis features a double pretensioned ball screw, supported on each end by precision class P4 angular contact thrust bearings. Both axis are driven by large diameter, high precision ball screws. Each ball screw has been carefully selected to achieve a combination of high accuracy, high rapid traverse rates and high feed thrust. All ball screws are fully supported on both ends.

Tail stock

Widely spaced guideways and heavy-duty design of the tailstock body ensure ample rigidity. The tailstock body is positioned by a drive bar, which engages with the carriage. The drive bar movement and hydraulic body clamping are manual or programmable(opt).



Tailstock specification

| | | |
|--------------------------------|-----------|-------------------|
| Tails tock travel | mm (inch) | 580 (22.8) |
| Tail stock quill diameter | mm (inch) | 80 (3.1) |
| Taper hole of tail stock quill | | MT4 <Live center> |
| Tail stock quill travel | mm (inch) | 80 (3.1) |

Automatic Operation Support (opt.)

Gantry Loader System

The gantry systems makes PUMA 240 series integrated perfectly with a high speed gantry loader. The result is a superior automated turning center, PUMA 240 series that will increase productivity in both short and long production runs. It has dual gripper system of 3-jaw for flange and 2-jaw for shaft to get fast workpiece exchanges and workstockers capable of large parts with 14-station.



- Dual gripper swivel head (Flange module)

| | |
|--------------------------------|-----------|
| Max. loading weight | 10kg x 2 |
| Applicable work diameter *1 | 20~210 mm |
| Applicable work length *1 | 15~150 mm |
| Max. speed(Z-axis, left-right) | 150 m/min |
| Max. speed(X-axis, up-down) | 100 m/min |

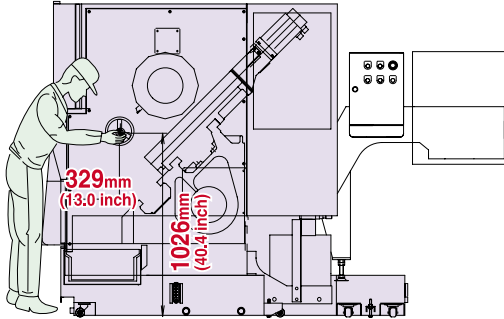
*1 : In case of Flange work

Ergonomic Design

Carefully tailored ergonomic operating environment.

Operability

Approach to spindle



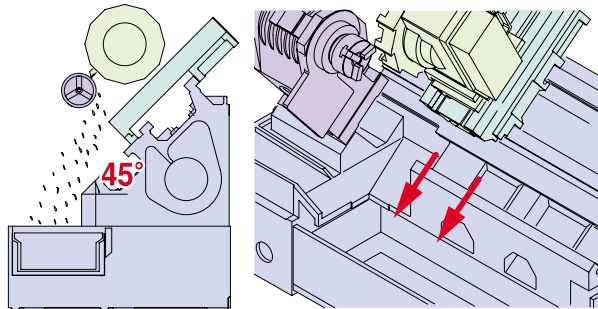
The spindle has been ideally located to ensure maximum operability.

Adjustable thin operator's panel



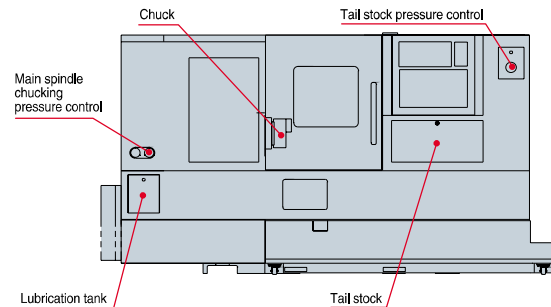
The easy-to-use operator's panel swivels 85°

Chip disposal



The slant angle bed and guideway allows ease chip disposal with easy loading, changing and inspection of tools.

High maintainability



All daily maintenance such as checking chuck and tailstock pressure and replacing lubricant can be carried out at the front of the machine.

Eco-Friendly Design

Perfect integration to care environment of human and earth

Collection of Waste Lubrication Oil

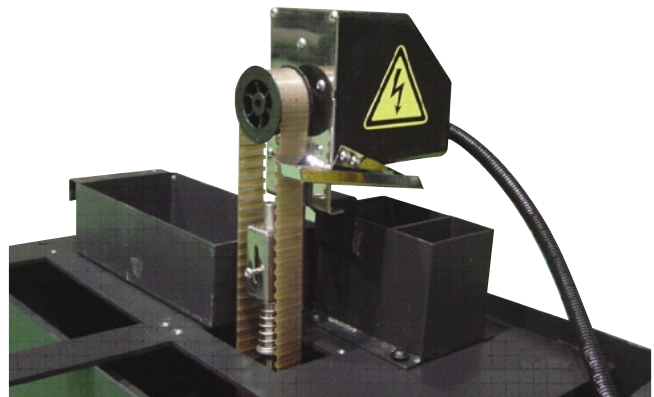
Less waste lubrication oil extends the life time of the coolant water and cut down the grime and offensive smell of the machine inside.

Oil Skimmer (opt.)

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

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.



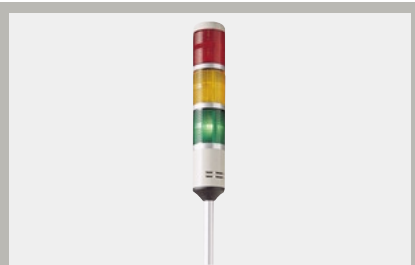
Optional Equipments



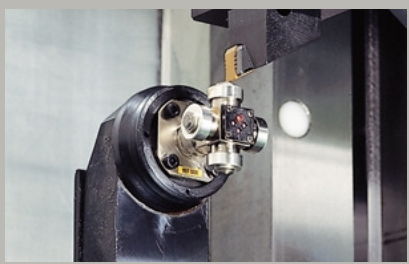
Chuck air blow



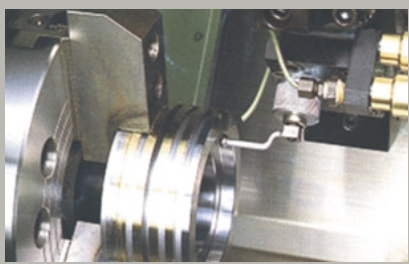
Collet chuck



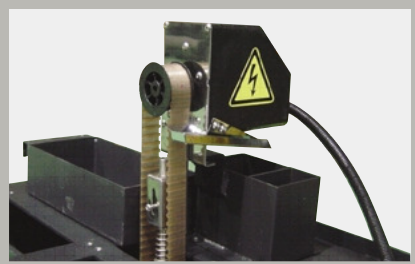
Signal tower



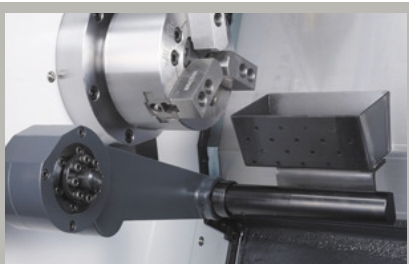
Automatic Tool Setter



Work measurement



Oil skimmer



Part catcher



Part conveyor



Chip conveyor

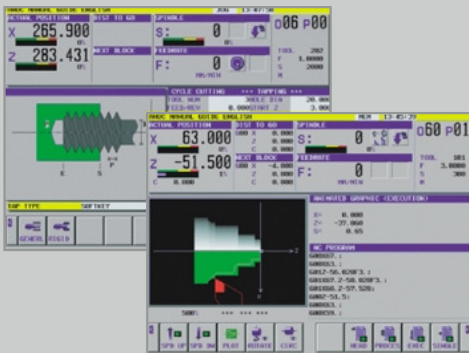
Easy Operating System*



Easy operating system has designed operation the many different machine in our products. We has supplied ease operation and high reliability with user-friendly interface to customer production lines.

Easy operation system

One single screen provides handy operation guidance for programming through machine operation.



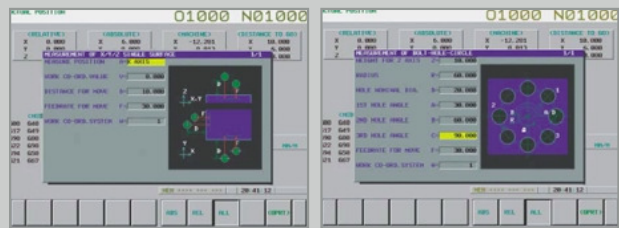
- For machining center, turning center and compound machine with milling and turning.
- Solid modeling provides high speed animation.
- Icon menu soft-keys provide convenient programming for sophisticated milling and turning.
- Measurement cycles provide automatic offset measurement of workpiece (Available for machining center and for compound machine).

Standard Features

- High compact CNC is realized through LCD display with integrated CNC and a flash memory card interface is standard features.
- Provides many support functions for set-ups, such as tool measurement, workpiece measurement at the original point, and workpiece measurement inside the machine.
- Uses one display screen to perform all operations including programming, checking by animation, and real machining.
- User-Friendly Operation : Soft key Selection of Comprehensive Cycle Library

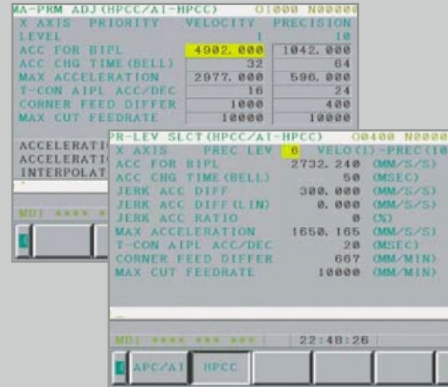
Guide for machining preparation

In preparation for machining, simple instructions on a selected screen allow to measure the setting error of workpiece and tool offset value for automated adjustment.



Machining condition selecting function

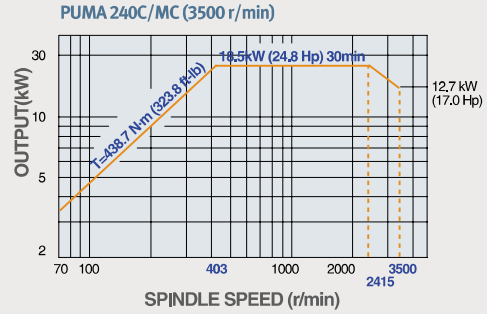
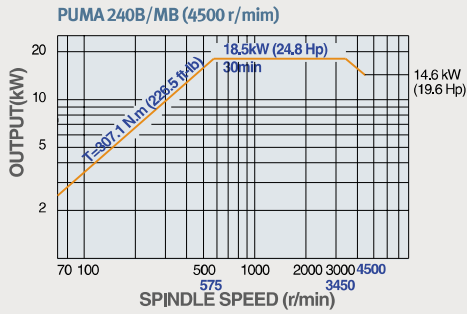
One single screen provides convenient operation & parameter setting for high speed and high precision machining instructions.



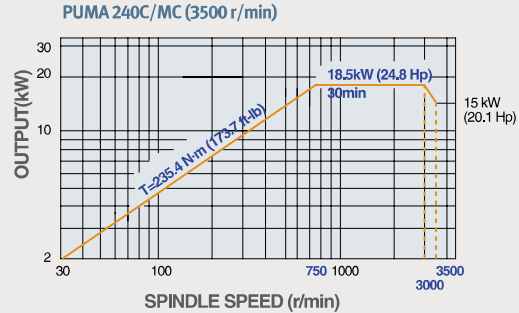
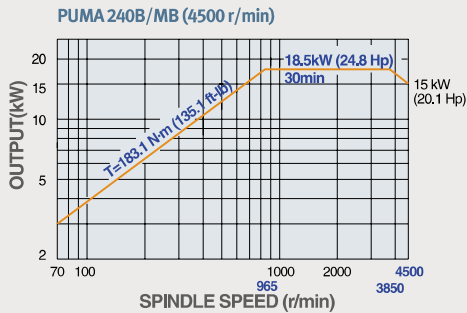
- Registration of parameter sets for high speed machining and/or for high precision machining with machine configurations.
- Instruction of precision level for desired machining selects appropriate parameters automatically.
- Precision level can be instructed through NC program.

Spindle Power - Torque Diagram

High Torque Motor



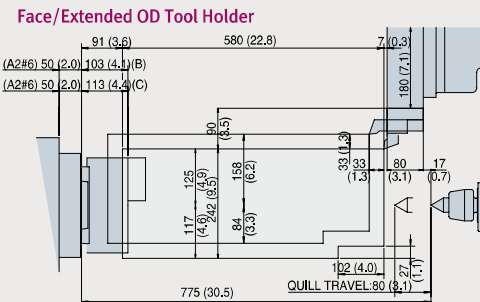
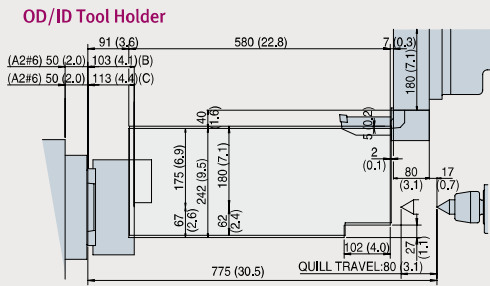
General Torque Motor



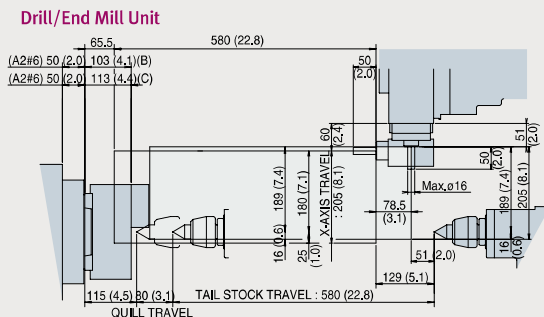
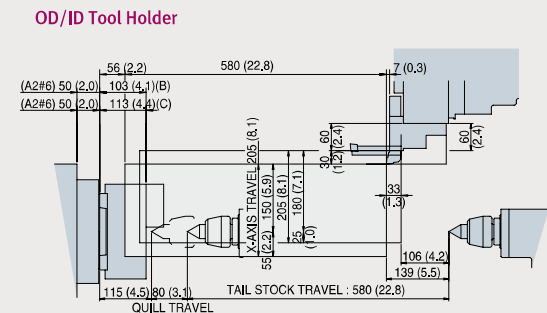
Working Ranges

PUMA 240

unit : mm (inch)



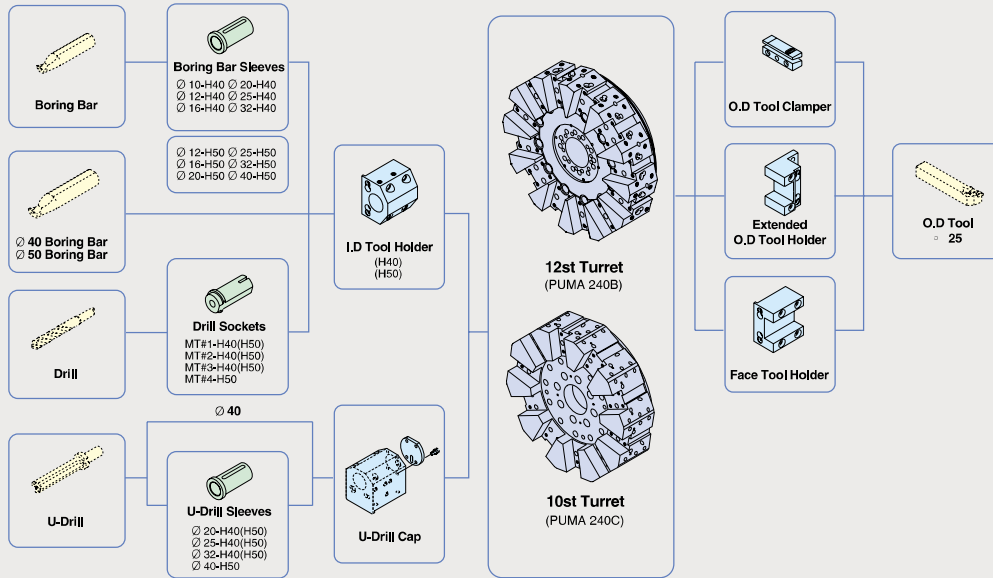
PUMA 240 M



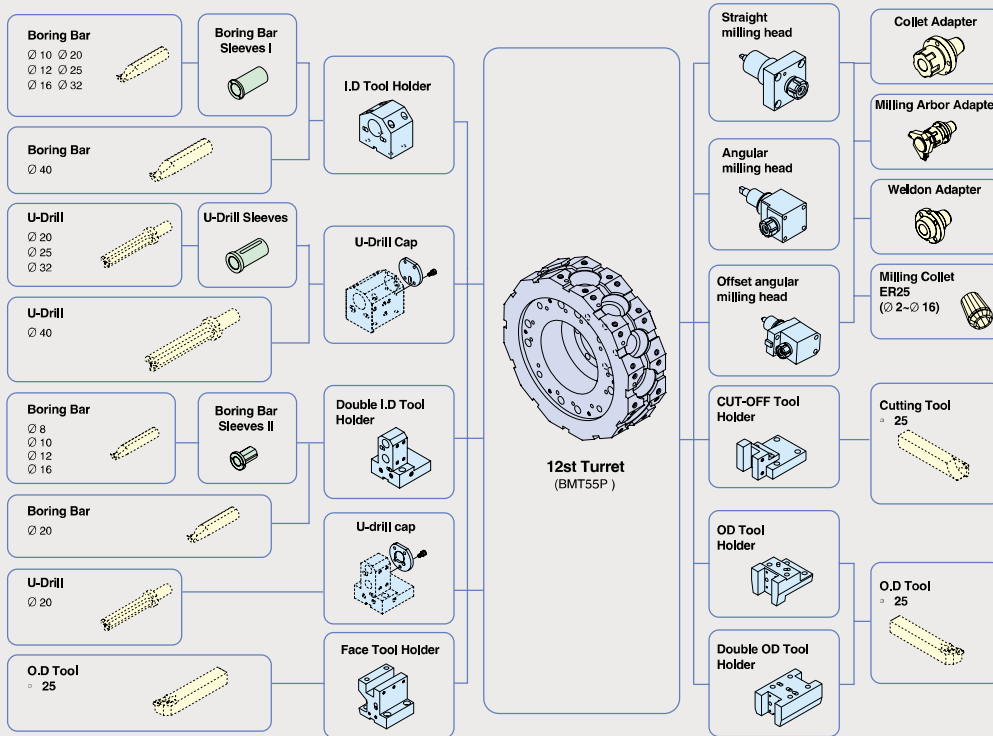
Tooling System

unit : mm

PUMA 240



PUMA 240 M

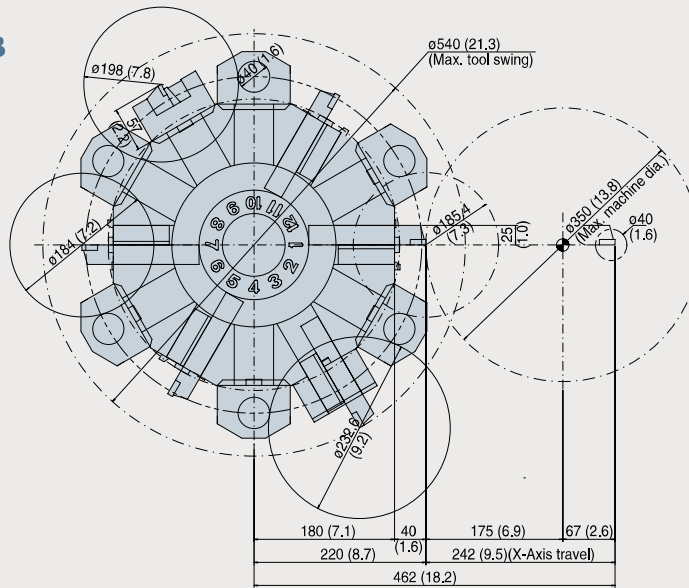


Note) Above tooling system is our recommendation. Depending on export condition, the standard tooling packed with the machine can be different.

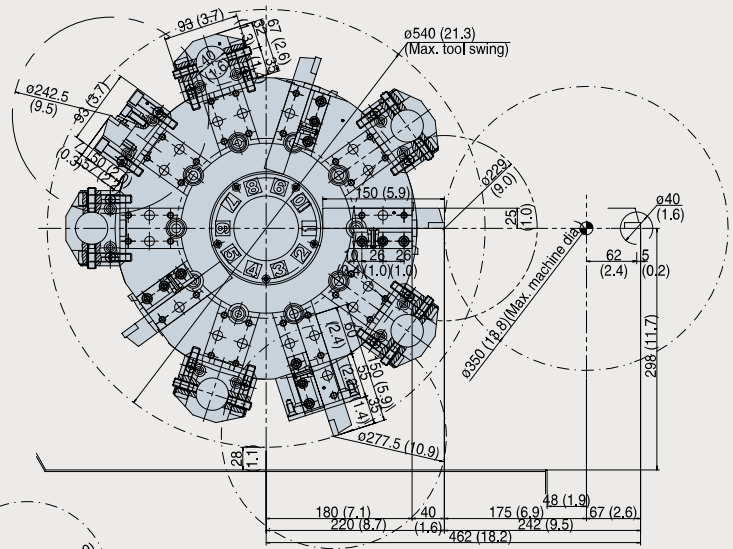
Tool Interference Diagram

unit : mm (inch)

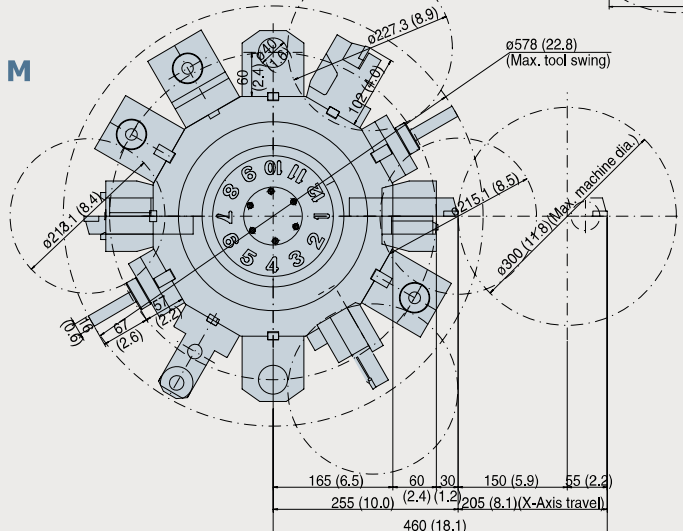
PUMA 240B



PUMA 240C



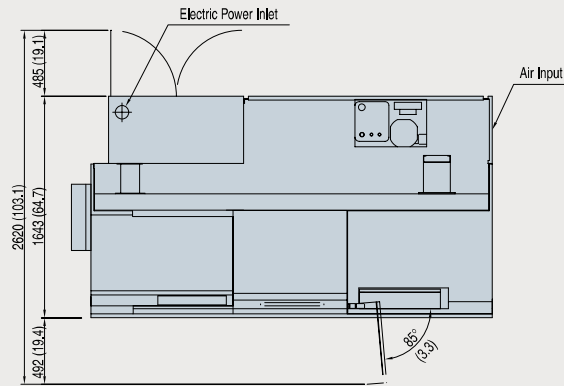
PUMA 240M



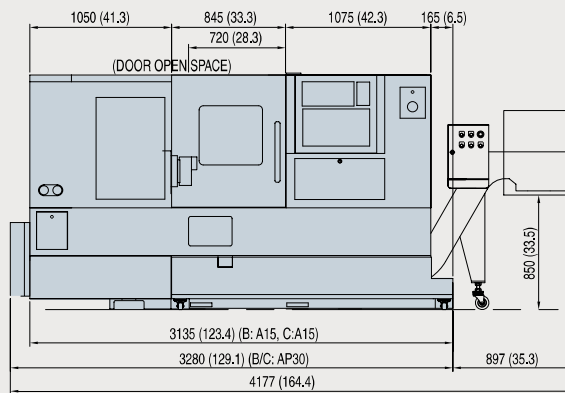
External Dimension

unit : mm (inch)

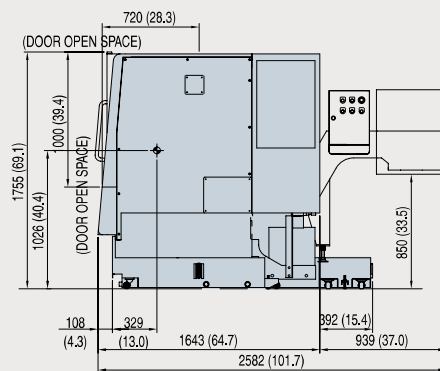
TOP VIEW



FRONT VIEW



SIDE VIEW



Machine Specifications

| Item | | | PUMA 240B/C | | PUMA 240MB/MC | |
|---------------------|--|-------------|---------------------------------|-------------|---------------------------------|-------------|
| | | | Doosan Fanuc-i series | Fanuc 32i-A | Doosan Fanuc-i series | Fanuc 32i-A |
| Capacity | Swing over bed | mm (inch) | 550 (21.7) | | 550 (21.7) | |
| | Swing over saddle | mm (inch) | 390 (15.4) | | 390 (15.4) | |
| | Recom. turning diameter | mm (inch) | 210 / 255 (8.3 / 10.0) | | 210 / 255 (8.3 / 10.0) | |
| | Max. turning diameter | mm (inch) | 350 (13.8) | | 300 (11.8) | |
| | Max. turning length | mm (inch) | 562 / 550 (22.1 / 21.7) | | 513 / 501 (20.2 / 19.7) | |
| Carriage | Bar working diameter | mm (inch) | 65 / 76 (2.6 / 3.0) | | 65 / 76 (2.6 / 3.0) | |
| | X-axis travel | mm (inch) | 242 (9.5) | | 205 (8.1) | |
| Main spindle | Z-axis travel | mm (inch) | 580 (22.8) | | 580 (22.8) | |
| | Spindle speed | r/min | 4500 / 3500 | | 4500 / 3500 | |
| | Spindle nose | | ASA A2-6 / A2-8 | | ASA A2-6 / A2-8 | |
| | Spindle bearing diameter (Front) | mm (inch) | 110 / 130 (4.3 / 5.1) | | 110 / 130 (4.3 / 5.1) | |
| | Spindle through hole | mm (inch) | ø76 / 86 (3.0 / 3.4) | | ø76 / 86 (3.0 / 3.4) | |
| | Cs spindle index angle | deg | - | | 360 [0.001] | |
| Tool post | No. of tool station | st | 12 / 10 | | 12 | |
| | OD tool height | mm (inch) | 25 x 25 (1.0 x 1.0) | | 25 x 25 (1.0 x 1.0) | |
| | Boring bar diameter | mm (inch) | 40 (1.6) | | 40 (1.6) | |
| | Indexing time (1st swivel) | s | 0.15 | | 0.15 | |
| | Rotary tool spindle speed | r/min | - | | 5000 | |
| Tail stock | Quill diameter | mm (inch) | 80 (3.1) | | 80 (3.1) | |
| | Quill bore taper | | MT 4 | | MT 4 | |
| | Quill travel | mm (inch) | 80 (3.1) | | 80 (3.1) | |
| Feedrate | Rapid traverse(X/Z/B-axis) | m/min (ipm) | X : 24 (944.9), Z : 30 (1181.1) | | X : 24 (944.9), Z : 30 (1181.1) | |
| | Main spindle motor (30min) | kW (Hp) | 18.5 (24.8) | | 18.5 (24.8) | |
| Motors | Servo motor (X/Z/B-axis) | kW (Hp) | X : 1.6 (2.1), Z : 3.0 (4.0) | | X : 1.6 (2.1), Z : 3.0 (4.0) | |
| | Rotary tool spindle motor | kW (Hp) | - | | 5.5 (7.4) | |
| | Coolant pump | kW (Hp) | 0.4 (0.5) | | 0.4 (0.5) | |
| Power source | Electric power supply (Rated capacity) | kVA | 32.62 | | 34.01 | |
| Machine size | Machine height | mm (inch) | 1755 (69.1) | | 1755 (69.1) | |
| | Machine dimension length | mm (inch) | 3135 (123.4) | | 3135 (123.4) | |
| | Machine dimension width | mm (inch) | 1643 (64.7) | | 1643 (64.7) | |
| | Machine mass | kg (lb) | 4500 (9920.7) | | 4700 (10361.6) | |

* HTM : High torque motor

Standard Feature

- Coolant supply equipment
- Full enclosure chip and coolant shield
- Hand tool kit, including small hand tool for operations
- Hydraulic chuck & actuating cylinder
- Hydraulic power unit
- Leveling bolts & plates

- Live center
- Lubrication equipment
- Soft jaws
- Standard tooling kit (tool holders & boring sleeves)
- Work light

Safety devices

- Door interlock
- Electrical torque limiter clutches
- Splash guard with lexan sheet
- Symbolic operation panel
- Various safety precautions name plate

Optional Feature

- Air blast for chuck jaw cleaning
- Air gun
- Automatic door
- Automatic door with safety device
- Automatic measuring system (in process touch probe)
- Automatic power off
- Bar feeder interface

- Chip conveyor & chip bucket
- Hardened & ground jaws
- Linear scale (X,Z-axis)
- Oil skimmer
- Parts catcher & conveyor
- Programmable tailstock
- Proximity switches for chuck clamp detection

- Proximity switches for tail stock quill position detection
- Signal tower (yellow, red, green)
- Tool monitoring system
- Tool pre-setter
 - Hydraulic type
 - Manual type

- Design and specifications are subject to change without prior notice.
- We are not responsible for difference between the information in the catalogue and the actual machine.

NC Specifications

| | Item | Spec. | Doosan Fanuc i-series | Fanuc 32i-A ^{opt.} |
|--|--|----------------------------------|-----------------------|-----------------------------|
| Controls | Controlled axes | | X, Z, C (!) | X, Z, C (!) |
| | Simultaneously controlled axes | Std. 2 axes | 3 axes (!) | 3 axes (!) |
| Axis Functions | Backlash compensation | 0~±9999 pulses | ○ | ○ |
| | Cs contouring control | | ○(!) | ○(!) |
| | Follow-up / Chamfering on/off | | ○ | ○ |
| | HRV2 control | | ○ | ○ |
| | Increment system 1/10 | 0.0001mm / 0.00001" | ○ | ○ |
| | Least input increment | 0.001mm / 0.0001" | ○ | ○ |
| | Stored stroke check1 | Overtravel control | ○ | ○ |
| Operation | Stored stroke check2, 3 | Overtravel control | ○ | - |
| | Automatic operation (memory) / Buffer register | | ○ | ○ |
| | Search function | Sequence NO. / Program NO. | ○ | ○ |
| Interpolation | Handle incremental feed | X1, X10, X100 | ○ | ○ |
| | 1 st. reference position return | Manual, G28 | ○ | ○ |
| | 2nd. reference position return | G30 | ○ | ○ |
| | Circular interpolation | G02 | ○ | ○ |
| | Continuous thread cutting | | ○ | ○ |
| | Dwell (per sec) | G04 | ○ | ○ |
| | Linear interpolation | G01 | ○ | ○ |
| | Multiple threading / Thread cutting retract | | ○ | ○ |
| | Polar coordinate interpolation | | ○(!) | ○(!) |
| | Thread cutting / Synchronous cutting | | ○ | ○ |
| Feed Functions | Feed per minute / Feed per revolution | | ○ | ○ |
| | Feedrate override | 0 - 200 % (10 % unit) | ○ | ○ |
| | Jog feed override | 0 - 2000 mm/min | ○ | ○ |
| | Rapid traverse override | F0 / 25 / 100 % | ○ | ○ |
| | Tangential speed constant control | | ○ | ○ |
| Auxiliary & Spindle Functions | Spindle orientation | | ○ | ○ |
| | spindle serial output | S4 / S5 digits | ○ | ○ |
| | Constantant surface speed control | | ○ | ○ |
| | M-function | M3 digits | ○ | ○ |
| | Multi-spindle control | | ○(!) | ○(!) |
| | Rigid tapping | | ○ | ○ |
| | Spindle speed override | 0~150% | ○ | ○ |
| Programming Functions | Absolute / Incremental programming | | ○ | ○ |
| | Canned cycle for drilling / Turning | | ○ | ○ |
| | Custom macro | | ○ | ○ |
| | Decimal point programming / pocket calculator type decimal point programming | | ○ | ○ |
| | Direct drawing dimension programming | | ○ | ○ |
| | eZ Guide 1 | Conversational programming | ○ | ○ |
| | Maximum program dimension | ±9 digits | ○ | ○ |
| | Multi repetitive canned cycle | G70~G76 | ○ | ○ |
| | Multi repetitive canned cycle 2 | | ○ | ○ |
| | Optional block skip (without hardware) | Total 9 (Only NC function) | ○ | ○ |
| | Sequence number | | N5 | N8 |
| | Programmable data input | G10 | ○ | ○ |
| | Sub program call | Nested holds | 4 | 10 |
| | Tape format for FANUC series 10/11 | | ○ | - |
| | Work coordinate system | G52~G59 | ○ | ○ |
| Tool Functions | Auto tool offset | | ○ | ○ |
| | Tool load monitoring system | | Opt. | Opt. |
| | Direct input of tool offset value measured B | | ○ | ○ |
| | Tool geometry / wear compensation | Geometry & wear data | ○ | ○ |
| | Tool life management | | ○ | ○ |
| | Tool nose radius compensation | | ○ | ○ |
| | T-code function | T2+2 digits | ○ | ○ |
| | Tool offset pairs | | 64pairs | 64pairs |
| Editing Op. Functions | Tool offset value counter input | | ○ | ○ |
| | Background editing | | ○ | ○ |
| | Expanded part program editing | Copy, Move, Change of NC program | ○ | ○ |
| | No. of Registered programs | | 400ea | 500ea |
| | Part program editing / Program protect | | ○ | ○ |
| Setting & Display | Part program storage length ^{*1} | | 1280m | 640m |
| | Display of spindle speed and T-code at all screen | | ○ | ○ |
| | Help function | Alarm&Operation display | ○ | ○ |
| | Self diagnostic function | | ○ | ○ |
| | Servo setting screen / Spindle setting screen | | ○ | ○ |
| Data Input & Output | Tool path graphic display | | ○ | ○ |
| | I/O interface | RS-232C | ○ | ○ |
| | Memory card input and output | | ○ | ○ |
| Other Functions | Reader puncher control | CHI interface | ○ | ○ |
| | Ethernet function | Embedded ethernet function | ○ | ○ |
| | MDI / DISPLAY unit | | 10.4" color TFT LCD | 10.4" color TFT LCD |
| | PMC system | | ○ | ○ |

*1 : Standard Part program length is different on export condition. On the addition of optional functions, its length can be reduced.

○ : Std OPT : Option (!) : only M type

PUMA 240

<http://www.doosaninfracore.com/machinetools>

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