Doosan Infracore
Machine Tools

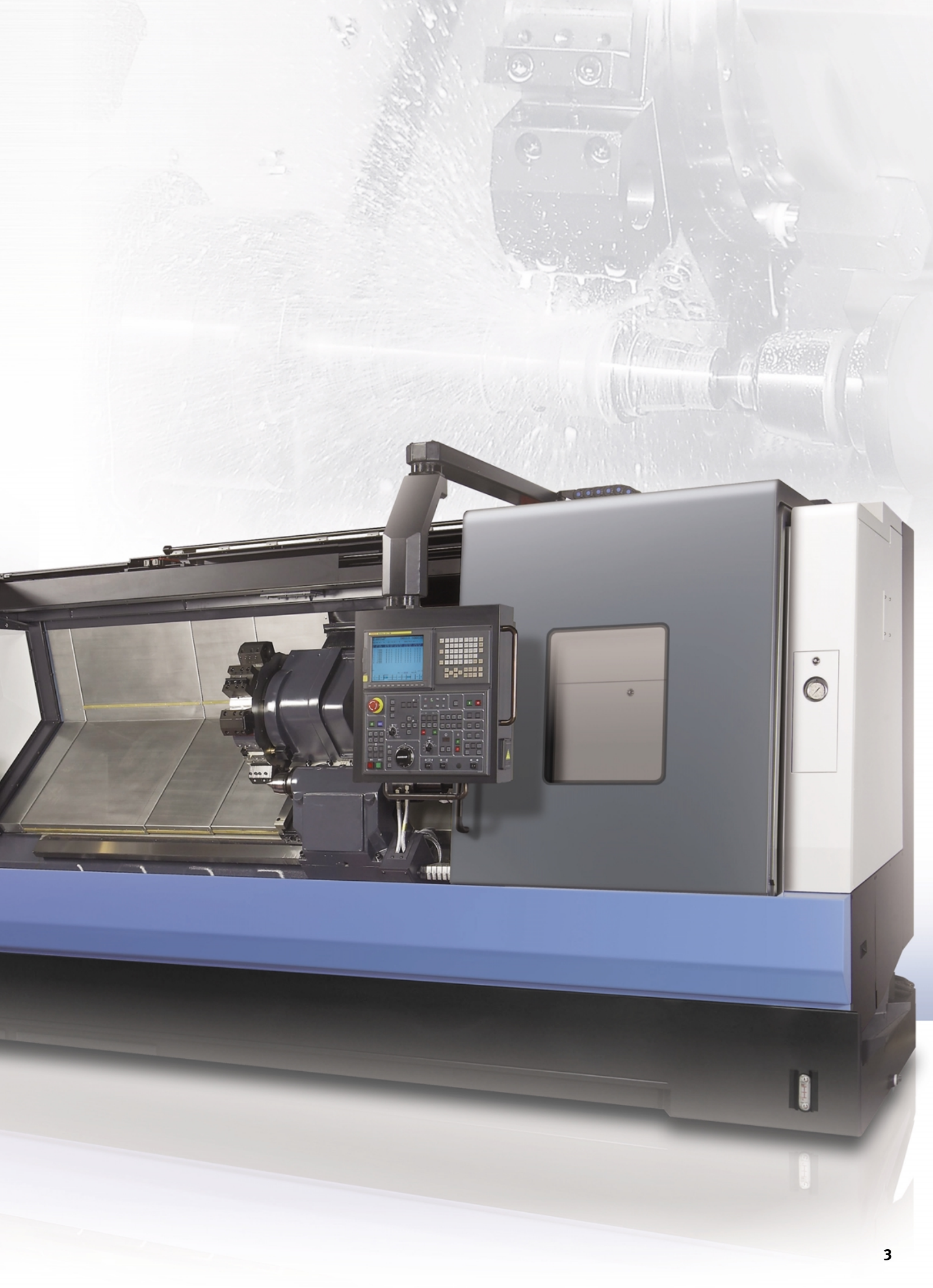
PUMA 400

High Performance Turning Center

Massive yet responsive Turning Centers without compromise. The most powerful machines in their class.

The PUMA 400 series turning centers are without a doubt the most powerful machines in their class. High metal removal rates, along with rapid positioning and fast bi-directional turret indexing, guarantee unmatched cycle times when real cutting is essential.

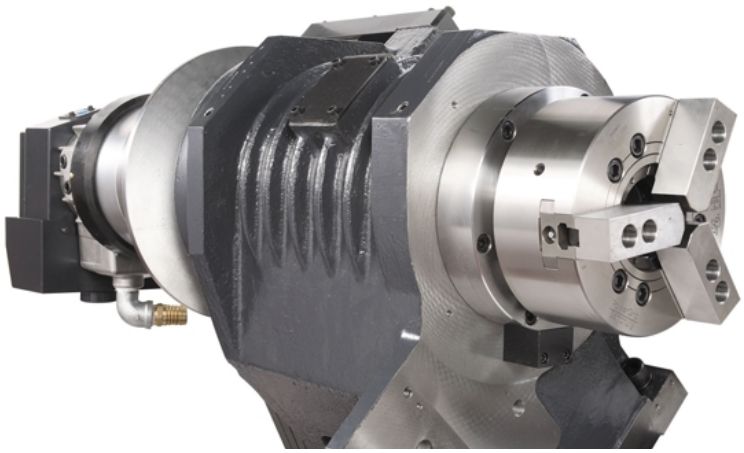
PUMA 400



Main Spindle

The headstock casting is made of Meehanite and ribbed on the outside to increase the surface area for better heat dissipation. The headstock and main spindle are manu-factured in a temperature controlled environment then assembled and tested in our clean room. Double row of cylindrical roller bearings and duplex angular contact ball bearings, P4 class of the spindle ensure the highest rigidity and efficiency to transmit motor power to the end.

Headstock and Spindle



Max. spindle speed

1500 r/min

- PUMA 400C/MC/LC/LMC/XLC/XLMC

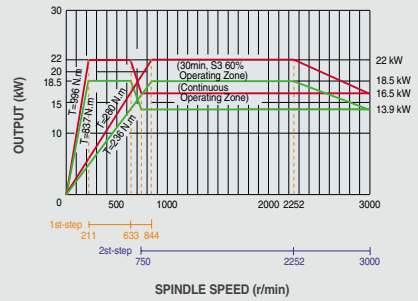
Motor

37 kW

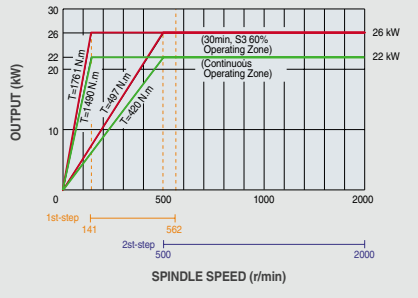
- PUMA 400C/MC/LC/LMC/XLC/XLMC

• Main spindle power-torque diagram

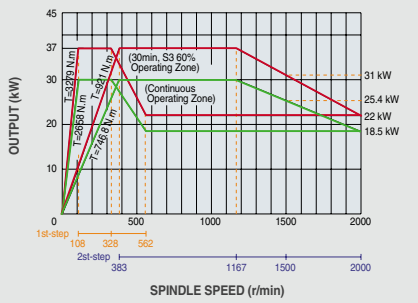
• PUMA 400A/LA/XLA : 22kW/30min



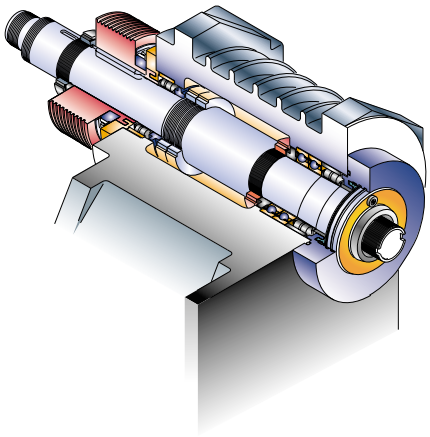
• PUMA 400B/LB/XLB : 26kW /30min



• PUMA 400C/LC/XLC : 37kW/30min



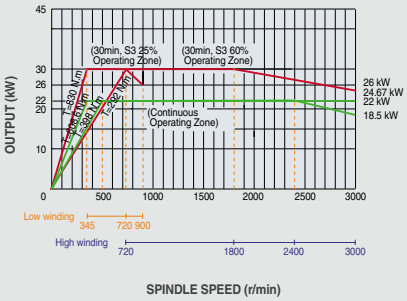
Main Spindle Drive



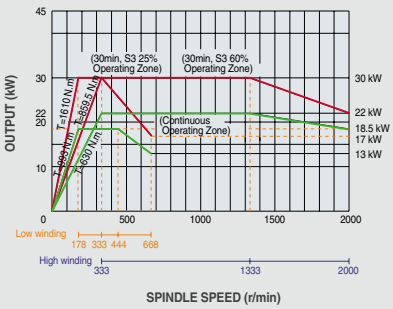
The high-torque spindle motor provides power for heavy stock removal, greatly reducing the number of roughing passes required. For 3 axis milling models, the motor is a spindle servo type controlling both the spindle in 2 axis mode and full contouring C-axis in the 3 axis mode. Switching between the two modes is nearly instantaneous.

• Main spindle power-torque diagram

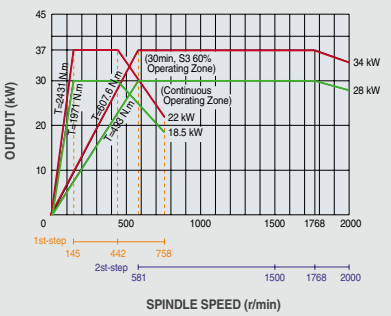
• PUMA 400MA/LMA/XLMA : 30kW/30min.



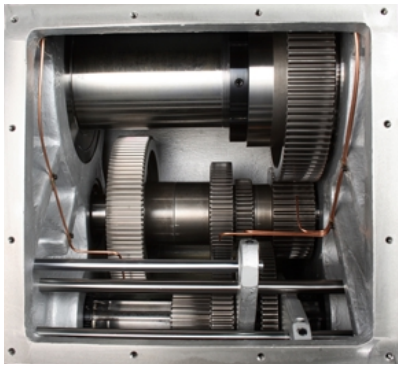
• PUMA 400MB/LMB/XLMB : 30kW/30min.



• PUMA 400MC/LMC/XLMC : 37kW/30min. (BF Gear Box)



Isolated Gear Box (DI Gear Box)*

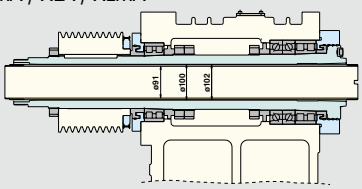


Power is delivered to the spindle through a two speed gearbox allowing high spindle speeds as well as powerful low end torque. The gearbox and spindle motor are isolated from the spindle, eliminating transfer of heat and vibration.

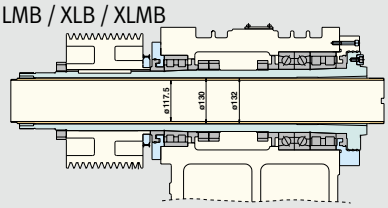
- standard
  PUMA 400 A/B/C/LA/LB/LC/XLA/XLB/XLC/MC/LMC/XLMC
- Option
  PUMA 400 MA / LMA / XLMA / MB / LMB / XLMB

• Headstock Cross Section

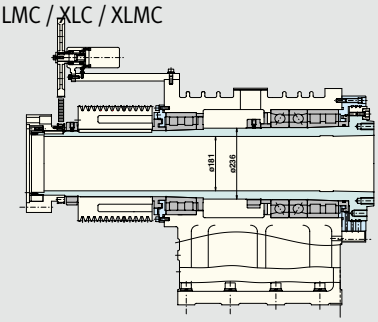
PUMA 400A / LA / MA / LMA / XLA / XLMA
(A-type)



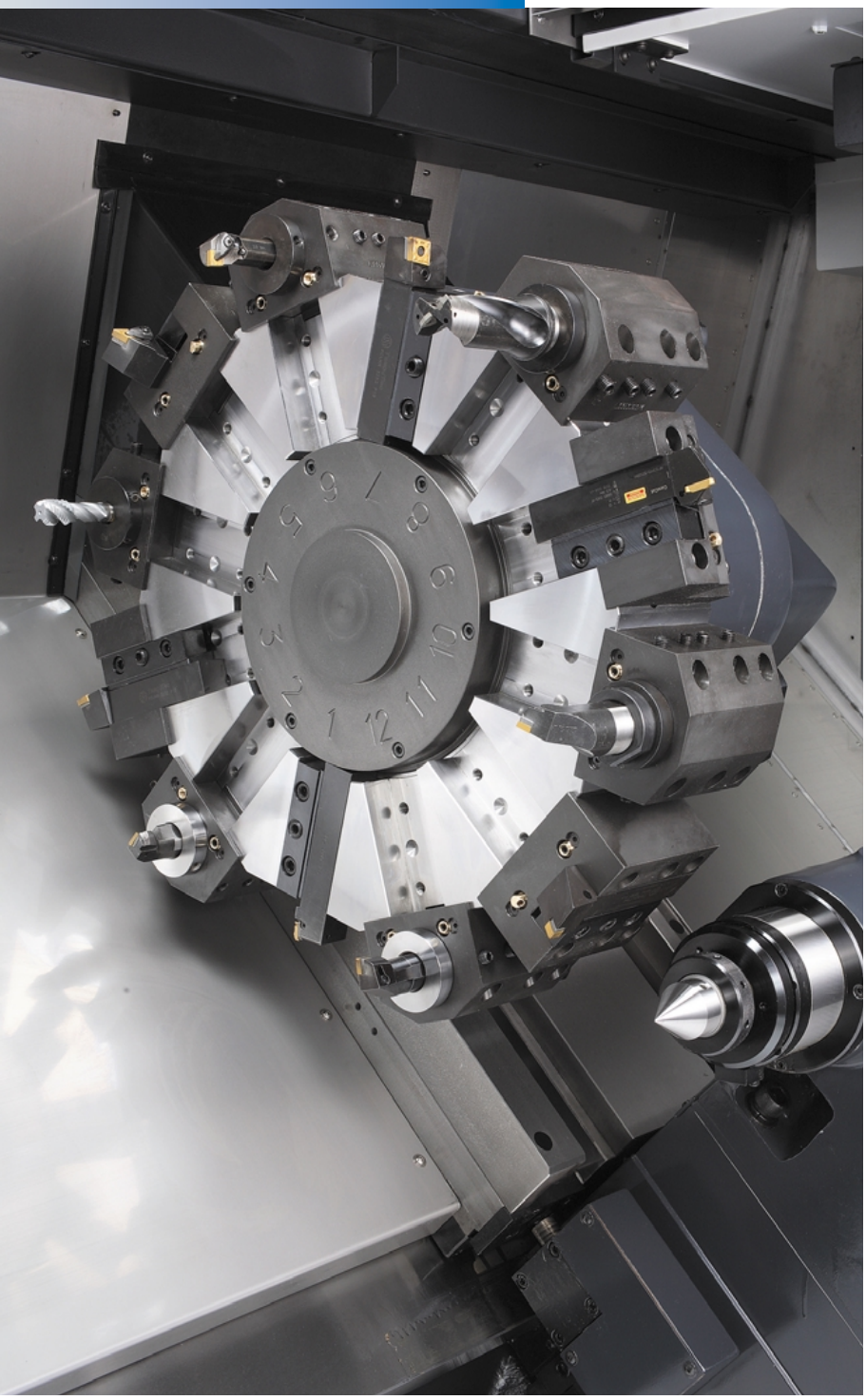
PUMA 400B / LB / MB / LMB / XLB / XLMB
(B-type)



PUMA 400C / LC / MC / LMC / XLC / XLMC
(C-type)



Turret



Index time (1-station swivel)

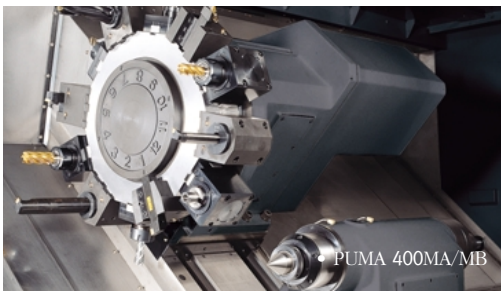
0.25 s

No. of tool station

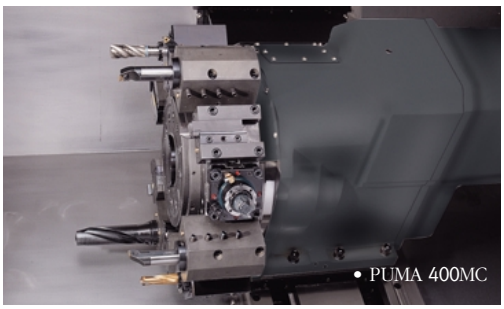
12 stations

BMT Milling Turret

The large 12 station heavy duty turret features a large Curvic coupling diameter. This heavy duty design provides unsurpassed rigidity for heavy stock removal, fine surface finishes, and extended tool life. Indexing repeatability is ±0.0055 degrees. Turret indexing is non-stop bi-directional. An extremely reliable high-torque hydraulic motor provides for quick turret indexing. 32mm square tool holders are mounted directly to the turret. The boring bar capacity is 60mm. The turret features a flexible design, allowing for left or right handed, ID or OD tool placement.



• PUMA 400MA/MB



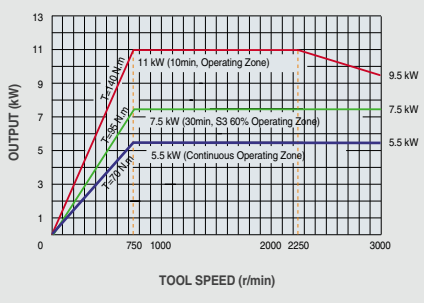
• PUMA 400MC

The exceptionally stable turret has a wide turret plate to ensure long boring bar over-hang ratios. The thickness of turret plate is 126mm.

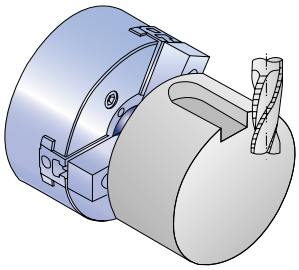
Fast Turret Indexing

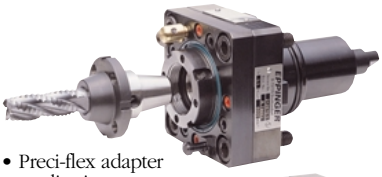
The large 12 and 10 station heavy duty turret features a large diameter Curvic coupling and hydraulic clamp force. The heavy duty design provides unsurpassed rigidity for heavy stock removal, fine surface finishes, long boring bar overhang ratios, and extended tool life. Turret rotation, deceleration and clamp are all controlled by a reliable high torque-hydraulic index motor. Unclamp and rotation are virtually simultaneous. Turret indexing is non-stop bi-directional, with a 0.25 second next station index time. Turning tools are securely attached to the turret by wedge clamps.

• Rotary tool spindle power-torque diagram

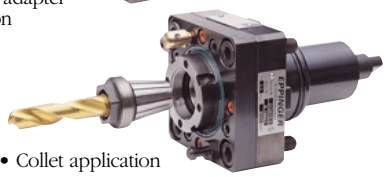


Preci-Flex Ready Rotary Tools



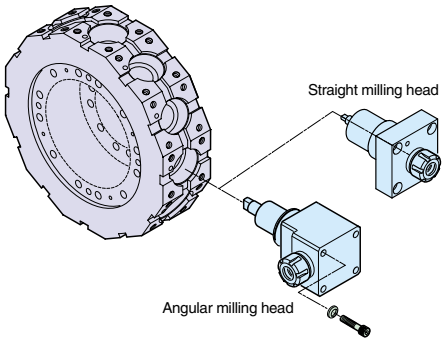


• Preci-flex adapter application



• Collet application

Preci-Flex ready rotary tool holders are available on the milling versions. Preci-Flex is a tooling system utilizes the existing ER collet taper in the rotary holders. The spindle face is precision ground relative to the taper and there are four drilled and tapped holders in this face. The Preci-Flex adapters locate on both the taper and the spindle face for maximum rigidity. A variety of Preci-Flex adapters are available for special applications.



Radial BMT

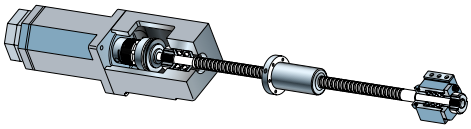
- Base mounting tool holder (BMT 75P)
- More rigid clamp by 4 screws
- Higher accuracy by 4 keys guide
- 12 rotary tool stations

Operator's Panel

The operator control panel is mounted on an adjustable pendant for easy viewing and accessibility during set-up and operation. The layout and location of the panel is ergonomically designed to be efficient and convenient for the operator. Comprehensive alarm diag-nostics are provided for the machine, control and programming errors.

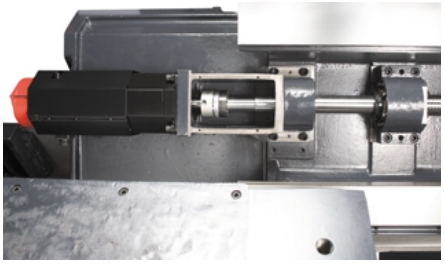
Axis Drive Construction and Tail Stock

Double Pretensioned Ball Screw



Both the X and Z axes features a double pretensioned ball screw, supported on each end by precision class P4 angular contact thrust bearings. Both axes 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.

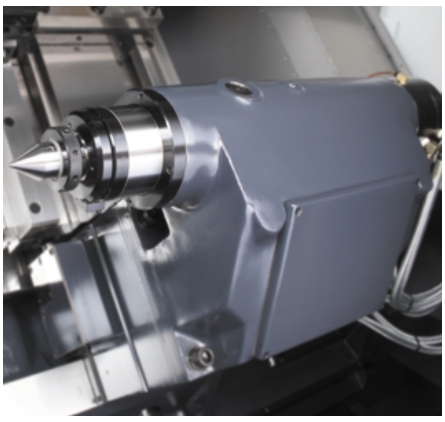
Asix Drives



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.

Operator's Panel

The programmable tailstock body is mounted on the same guideway surface as the headstock. The heavy casting, large 120mm diameter quill, and precision Morse Taper #6 live center provide outstanding rigidity. The 120 mm quill stroke is activated by either the program or foot switch. Auto lubrication is provided to the quill and guideways.

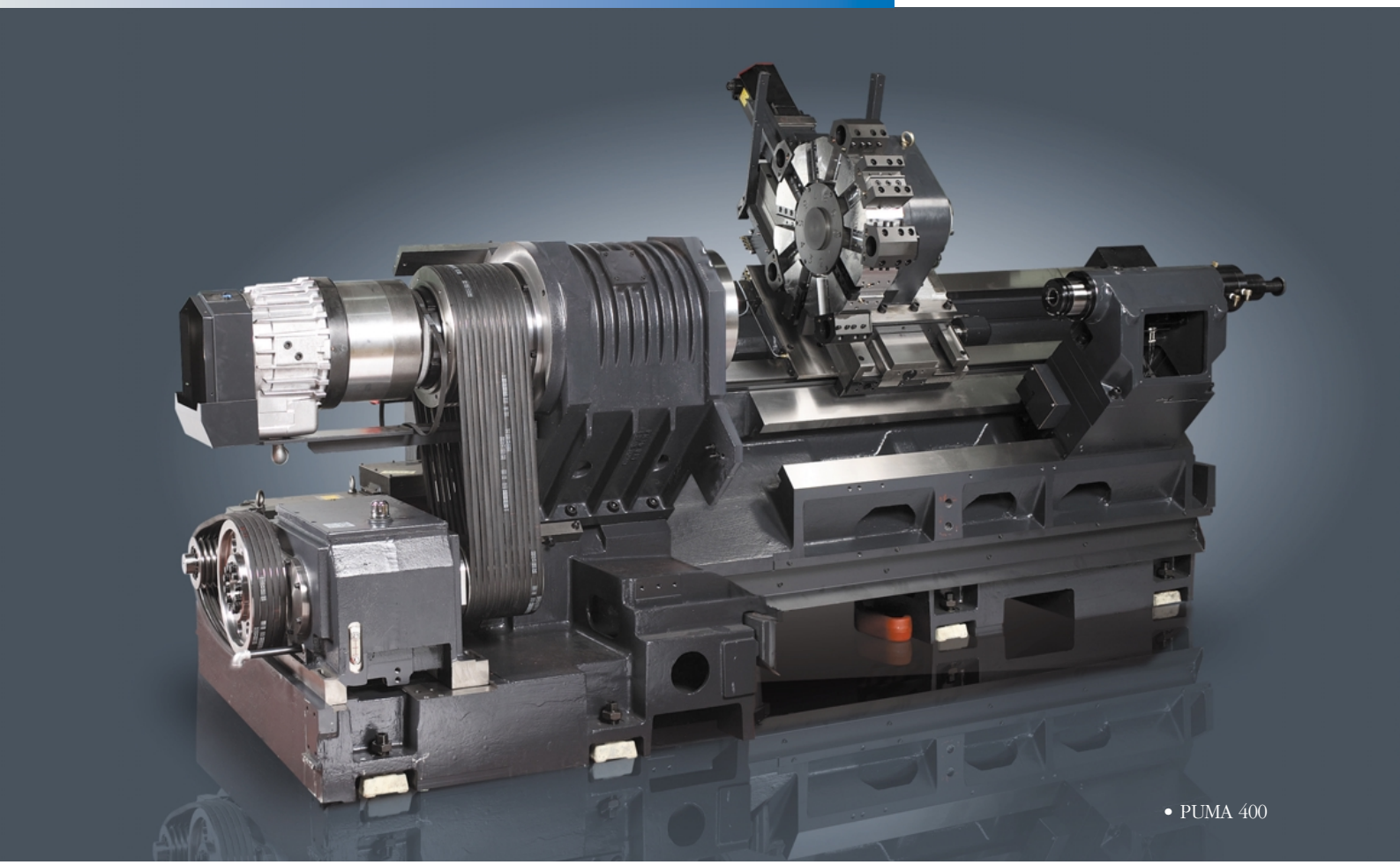


PUMA 400MC/LMC BF Gear Box (std)*

The 37 kW spindle motor is directly coupled to Baruffaldi 2-speed electronic transmission, which provides maximum torque. The 2 speed gear box with its precision ground gears provide quiet operation at high speed then transfers its power to the main spindle for vibration free operation resulting in excellent surface finishes.

* : The PUMA 400A/B/C and MA/MB are available as optional specification.

Bed and Way Construction



• PUMA 400

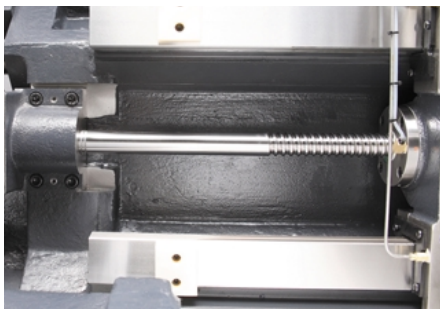
The PUMA 400 series is a true 45 degree slant bed design. The bed is a one piece casting with both the saddle and tailstock guideways in the same plane to eliminate thermal distortion. The heavily ribbed torque tube design prevents twisting and deformation. Fine grain Meehanite processed cast iron is used because of its excellent dampening characteristics. This ensures high rigidity with no deformation during heavy cutting. The slant angle allows for easy loading, changing and inspection of tools. All guideways are wide wrap-around rectangular type for un-surpassed long-term rigidity and accuracy. The guideways are widely spaced to ensure stability and fully protected. Each guide-way is induction hardened and precision ground. A fluroplastic resin, Rulon® 142, is bonded to the mating way surfaces, for its wear and friction characteristics and then hand scraped for a perfect fit and center height. Optional long bed enables extra-long shaft machining.

Rapid Traverse

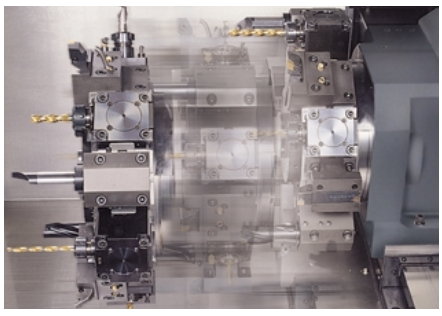
X-axis **16 m/min**

Z-axis **20 (18) m/min**

• Scraping of surface



• Outstanding rigidity for high feedrates



Eco-Friendly Design

Collection of Waste Lubrication Oil

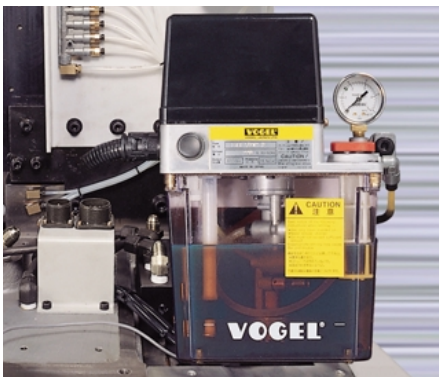
Less waste lubrication oil extends the life time of the coolant water and cut down the grime and offensive smell of the machine inside.

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.

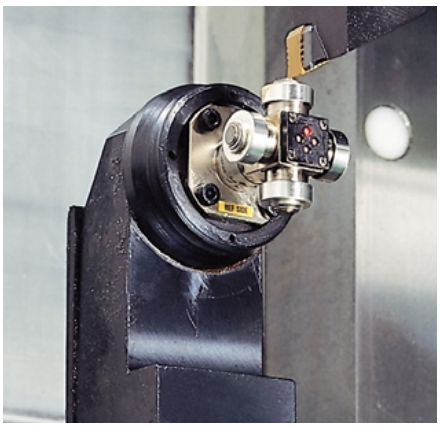
Metered Way Lubrication

Automatic lubrication is provided to all guideways, ball screws and the tailstock quill. A maintenance free piston distributor delivers a precise quantity of oil to each lubrication point. The 1.8L reservoir lasts up to 80 hours. A low level alarm prevents the machine from restarting without lubricant.



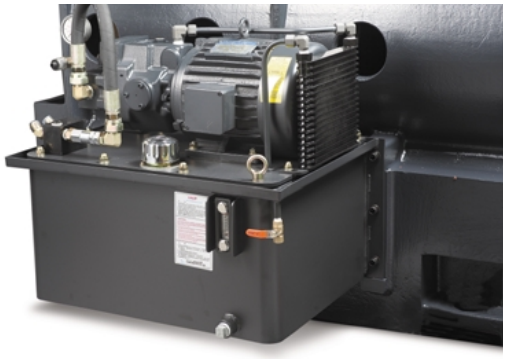
Tool Pre-Setter(Opt.)

The automatic tool setter reduces set-up time by minimizing the need for skim cuts, measurements and entering tool offsets. The tool setting arm manually or can be controlled through the program.



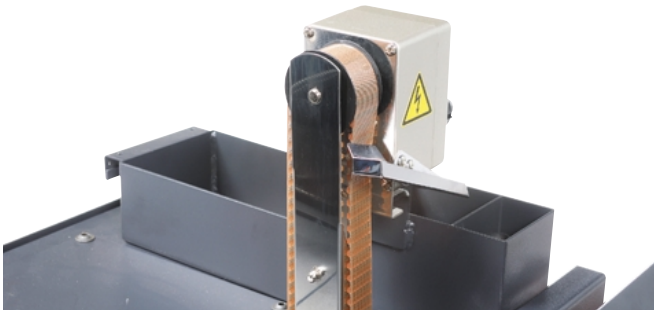
Option

Hydraulic Power Unit



The temperature of the hydraulic oil is regulated by a cooling system.

Oil Skimmer (Opt.)



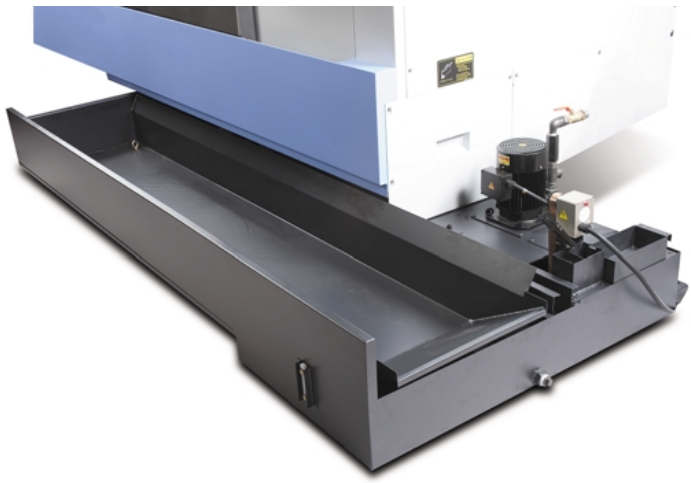
The coolant is kept clean and its life is extended with bed casting channels from the Z axis to a separate reservoir. A belt oil skimmer picks up and removes waste oil from the coolant tank that is easily drained.

Electric Torque Limiters

Each axis ball screw is protected by electric torque limiters to minimize damage in the event of a crash. Upon impact, the limiter immediately stops the machine.

Coolant System

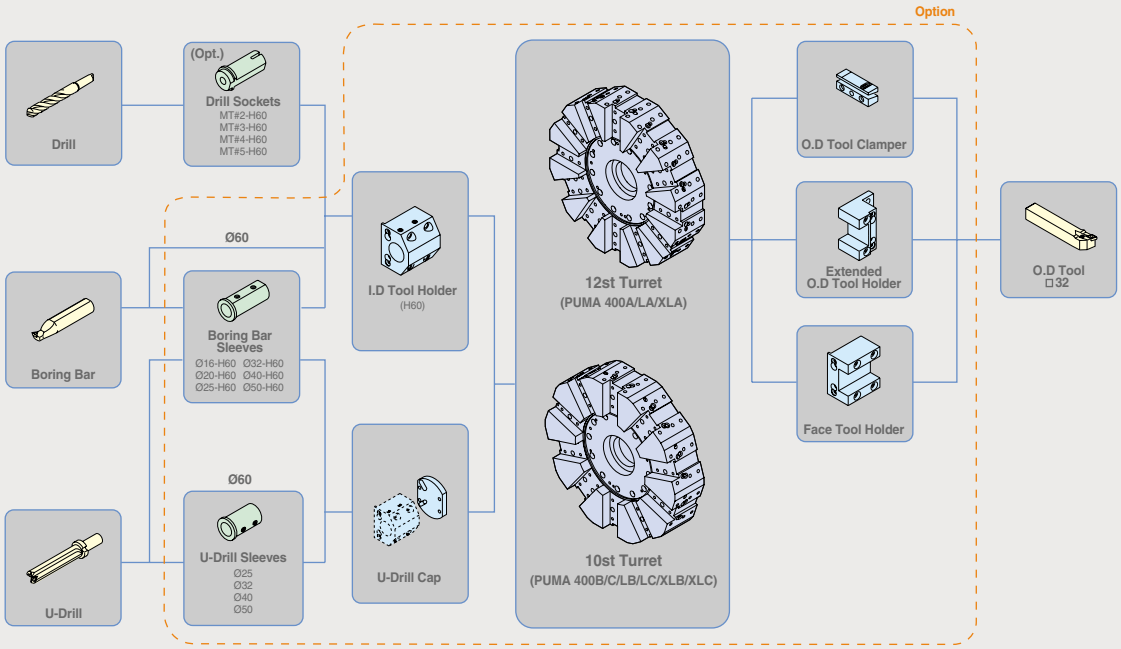
The high pressure flushes chips out of drilled holes, reduces the need for peck drill cycles, meets the requirements of most insert drill manufactures and significantly increases tool life.



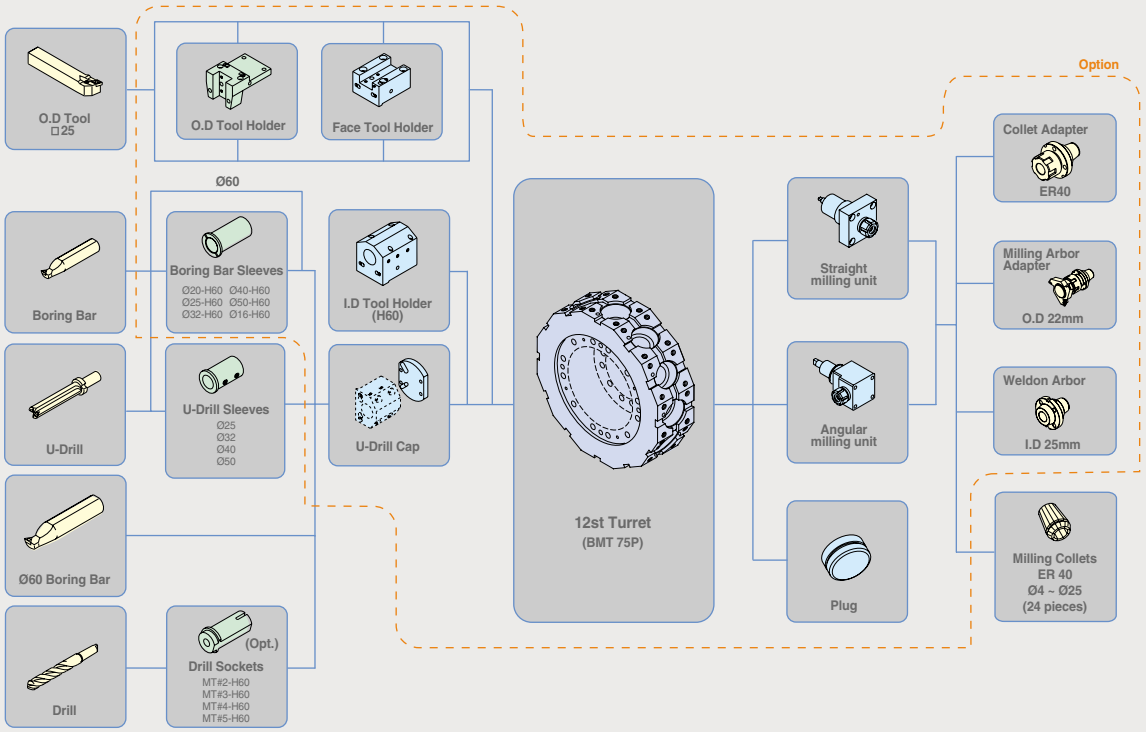
The separate, large 280[370]L capacity coolant tank and chip pan are separate from the machine bed to prevent heat trans-fer and easy cleaning. [ ] : Long bed

Tooling System

PUMA 400/L/XL



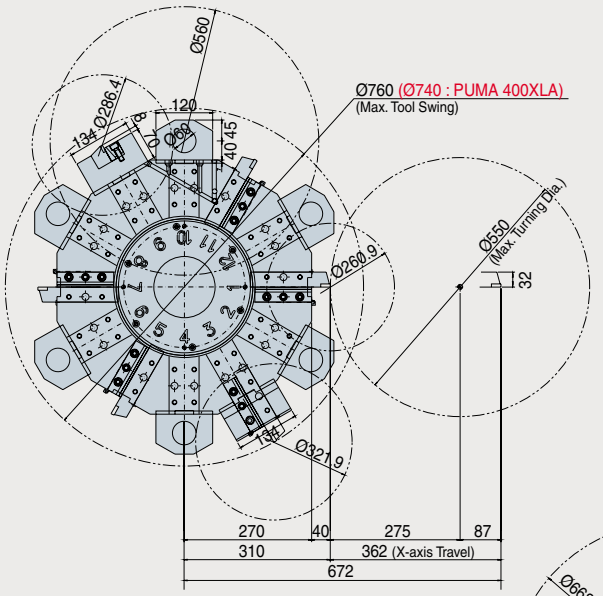
PUMA 400M/LM/XLM



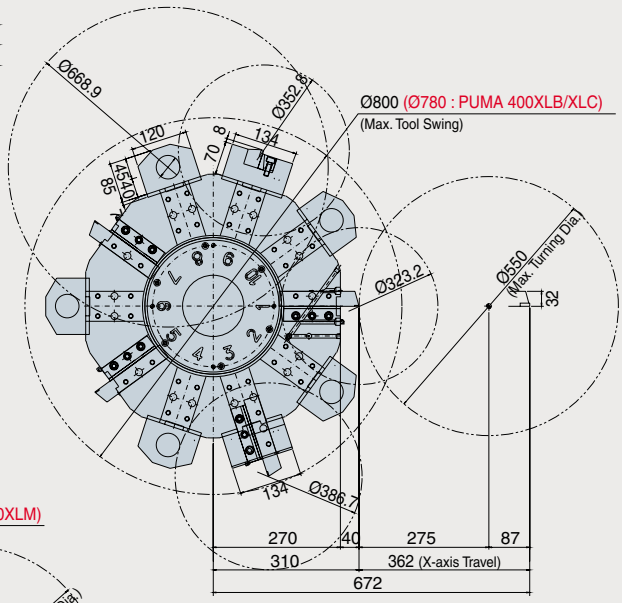
Tool Interference Diagram

unit : mm

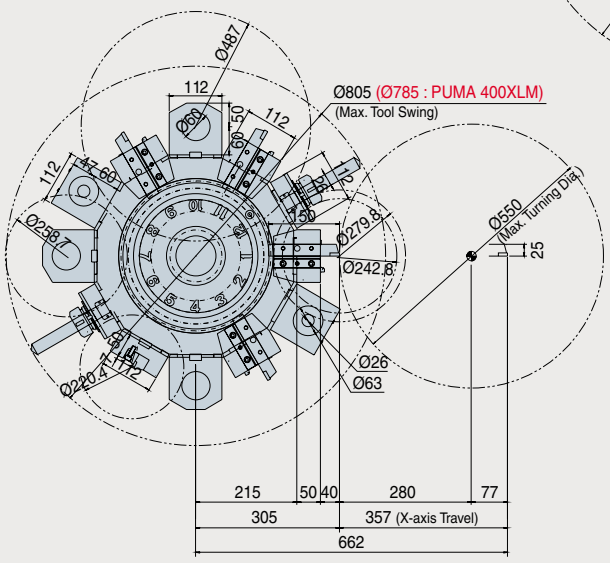
PUMA 400A/LA/XLA



PUMA 400B/C/LB/LC/XLB/XLC



PUMA 400M/LM/XLM

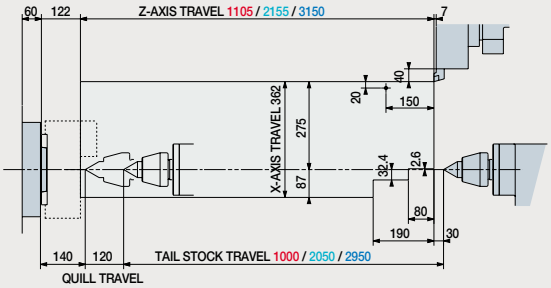


Working Ranges

unit : mm

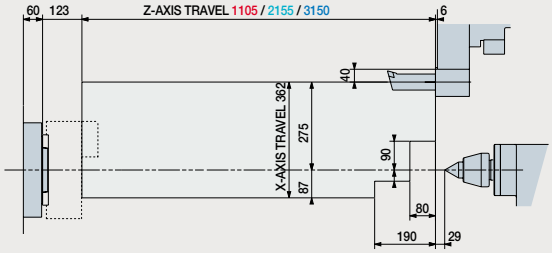
PUMA 400/400L/400XL

OD Tool Holder



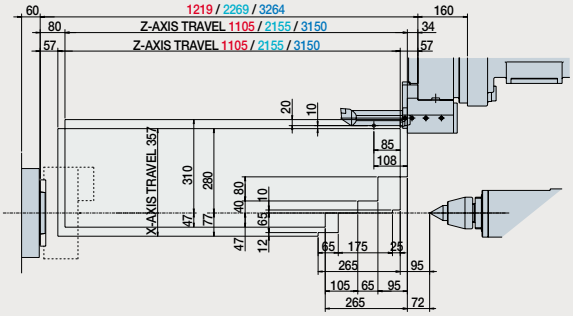
PUMA 400
PUMA 400L
PUMA 400XL

ID Tool holder



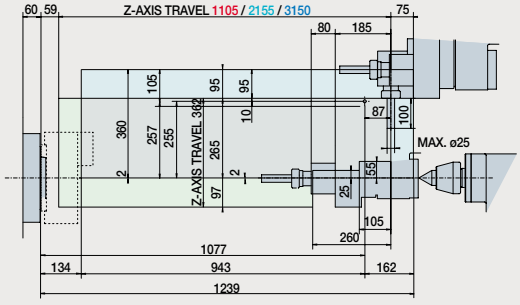
PUMA 400M/400LM/400XLM

OD/ID Tool Holder



PUMA 400M
PUMA 400LM
PUMA 400XLM

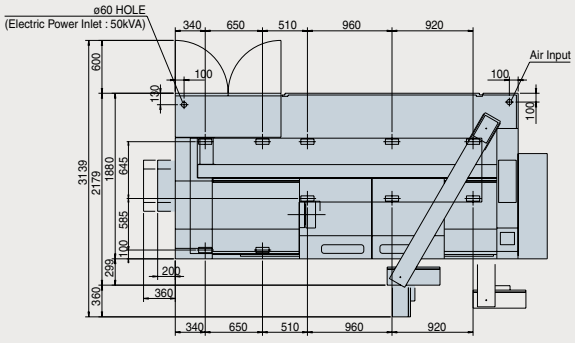
Straight / Angular Milling Unit



External Dimension

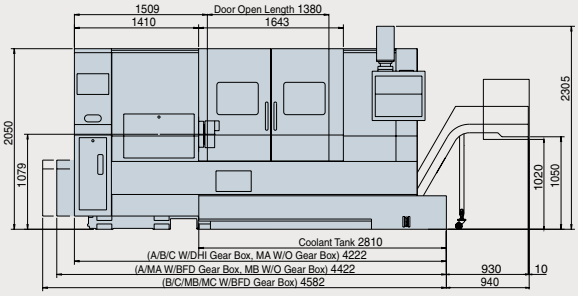
unit : mm

Top View

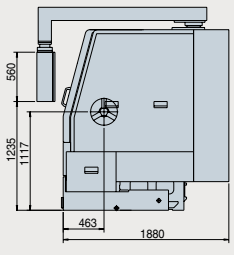


PUMA 400/400M

Front View



Side View

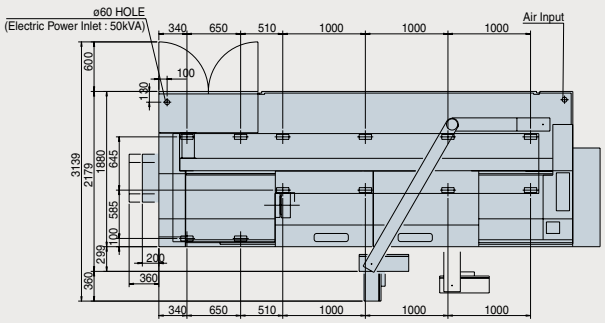


External Dimension

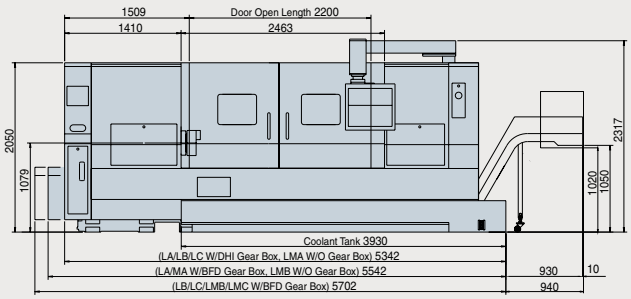
unit : mm

PUMA 400L/400LM

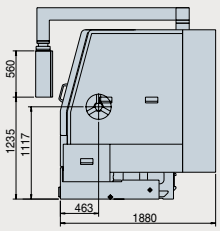
Top View



Front View

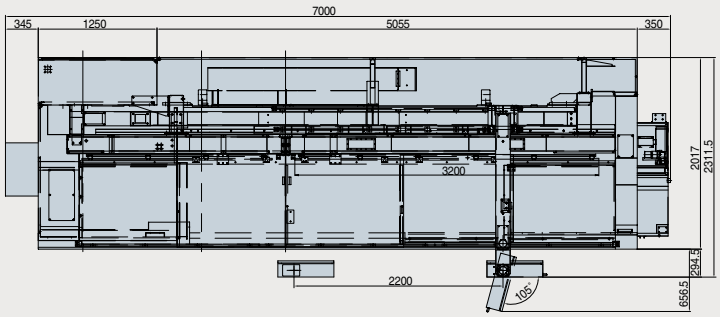


Side View

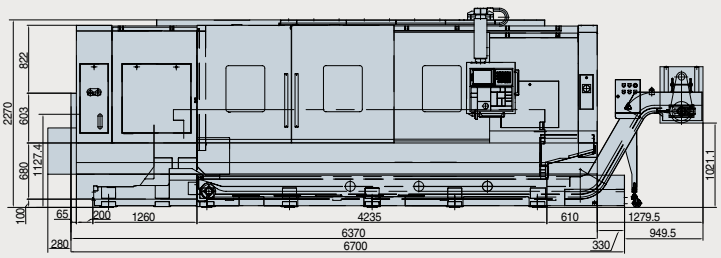


PUMA 400XL/400XLM

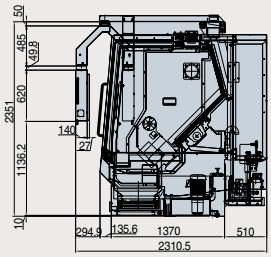
Top View



Front View



Side View



Machine Specifications

	Description		Unit	PUMA 400A [LA]	PUMA 400B [LB]	PUMA 400C [LC]	PUMA 400MA [LMA]	PUMA 400MB [LMB]	PUMA 400MC [LMC]	PUMA 400XLA [XLB/XLC]	PUMA 400XLMA [XLMB/XLMC]
Capacity	Swing over bed		mm	770							
	Swing over saddle		mm	590							
	Recom. turning diameter		mm	305	380		305	380		305 [380]	
	Max. turning diameter		mm	550			560			550	
	Max. turning length		mm	1079 [2129]	1043 [2093]	1024 [2074]	1014 [2064]	978 [2028]	959 [2009]	3150 [3114/3095]	
	Bar working diameter		mm	90	116.5	165.5	90	116.5	165.5	90 [116.5/165.5]	
Carriage	Travel distance	X-axis	mm	362 (87+275)			357 (77+280)			362 (87+275)	357 (77+280)
		Z-axis	mm	1105 [2155]						3150	
Main Spindle	Spindle speed		r/min	3000	2000	1500	3000	2000	1500	3000 [2000/1500]	
	Spindle nose		ASA	A2 #8	A2 #11	A1 #15	A2 #8	A2 #11	A1 #15	A2 #8 [A2 #11/A1 #15]	
	Spindle bearing diameter (Front)		mm	160	180	240	160	180	240	160 [180/240]	
	Spindle through hole		mm	102	132	181	102	132	181	102 [132/181]	
	Cs spindle index angle		deg	-			360 (in 0.001)			-	360 (in 0.001)
Tool Post	No. of tool station		st	12	10	10	12			12 [10]	12
	OD tool height		mm	32 x 32			25 x 25			32 x 32	25 x 25
	Boring bar diameter		mm	Ø 60							
	Indexing time (1st swivel)		s	0.25							
	Rotary tool spindle speed		r/min	-			3000			-	3000
Feedrate	Rapid traverse	X-axis	m/min	16							
		Z-axis	m/min	20 [18]						10	
	Max. cutting feedrate	X-axis	mm/rev	500							
		Z-axis	mm/rev	500							
Tail Stock	Quill diameter		mm	120							
	Quill bore taper		MT#	MT#6							
	Quill travel		mm	120							
Motors	Main spindle motor (30min)		kW	22	26	37	30		37	22 [26/37]	30 [30/37]
	Servo motor	X-axis	kW	4.0							
		Z-axis	kW	6.0							
	Rotary tool spindle motor		kW	-			7.5		11	-	7.5 [7.5/11]
	Coolant pump		kW	0.4							
Power Source	Electric power supply (Rated capacity)		kVA	35.5	43	53.1	48	58.1		35.5 [43/53.1]	48 [58.1]
Machine Dimensions	Machine height		mm	2250 [2317]						2411	
	Machine size	length	mm	4222 [5342]						6635	
		width	mm	2179						2340	
	Machine weight		kg	9050 [10500]			9200 [10700]			11000 [11500/12000]	

Standard Feature

- Coolant supply equipment
- Foot switch
- Full enclosure chip and coolant shield
- Hand tool kit, including small hand tool for operations
- Hydraulic chuck & actuating cylinder
- Hydraulic power unit
- Leveling jack screw & plates
- Live center
- Lubrication equipment
- Soft jaws
- Standard tooling kit (tool holders & boring sleeves)
- Work light

Optional Feature

- Additional tool holders & sleeves
- Air blast for chuck jaw cleaning
- Air gun
- Automatic door with safety device
- Automatic measuring system (in process touch probe)
- Automatic power off
- Automatic work loading & unloading equipment
- Bar feeder interface
- Chip bucket
- Chip conveyor
- Controller : Fanuc 31i-A
- Dual chucking pressure
- Hardened & ground jaws
- Hydraulic steady rest
- Long boring bar (ø 100)
- Manual steady rest
- Oil skimmer
- Pressure switch for chucking pressure check
- Programmable tail stock
- Proximity switches for chuck clamp detection
- Proximity switches for quill position detection
- Signal tower (yellow, red, blue)
- Special chucks
- Tailstock quill for dead center (MT #5)
- Tool monitoring system
- Tool pre-setter (hydraulic type)

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

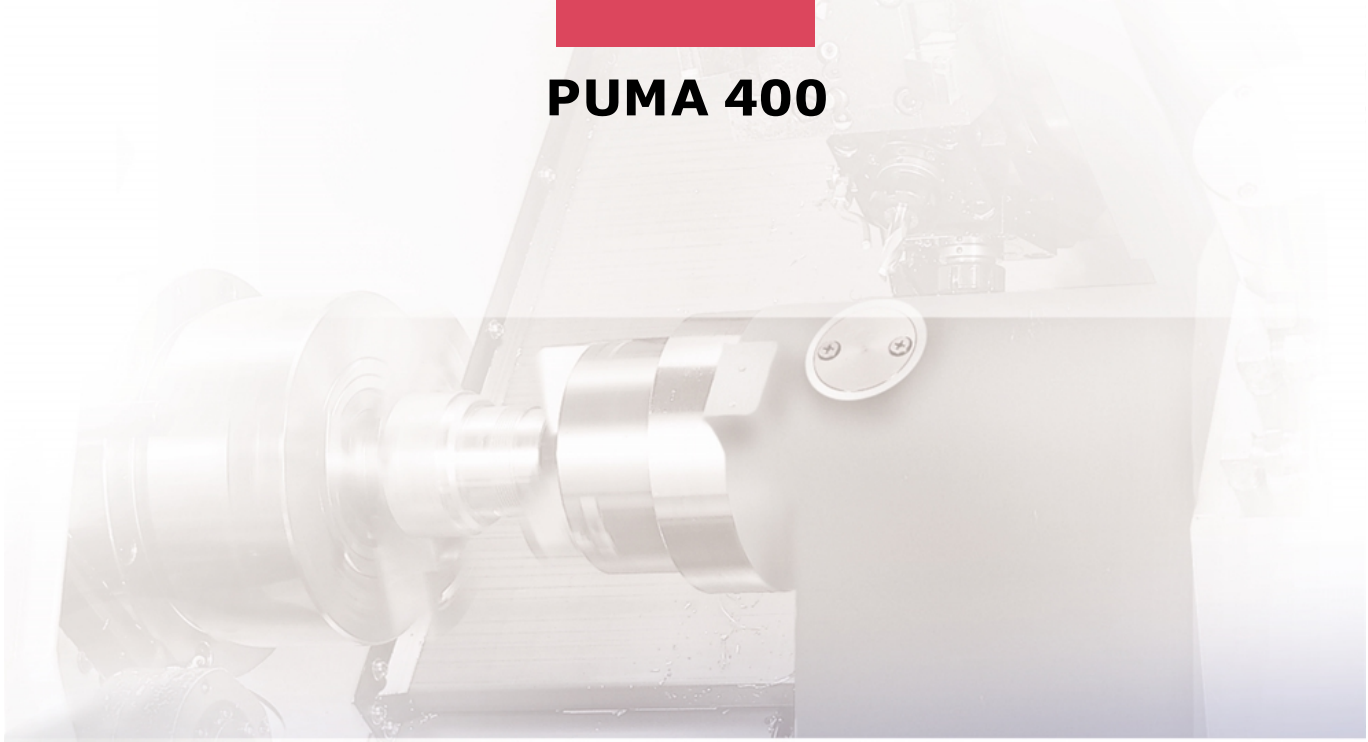
NC Unit Specifications

	Item	Spec.	Fanuc 32i-A
Controls	Controlled axes		X, Z, C (!)
	Simultaneously controlled axes	Std. 2 axes	3 axes (!)
Axis Functions	Backlash compensation	0~±9999 pulses	○
	Cs contouring control		○(!)
	Follow-up / Chamfering on / off		○
	HRV2 control		○
	Least input increment	0.001mm / 0.0001"	○
	Stored stroke check1	Overtravel control	○
Operation	Automatic operation (memory) / Buffer register		○
	Handle incremental feed	X1, X10, X100	○
	Search function	Sequence NO. / Program NO.	○
Interpolation	1st reference position return	Manual, G28	○
	2nd reference position return	G30	○
	Reference position return check	G27	○
	Circular interpolation	G02	○
	Continuous thread cutting		○
	Dwell	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		○
Axuiliary & Spindle Functions	Spindle orientation		○
	Constantant surface speed control	G96, G97	○
	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 i	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	N8 digits	○
	Programmable data input	G10	○
	Sub program call	10 folds nested	10
	Work coordinate system selection	G52~G59	○
Tool Functions	Auto tool offset		○
	Tool monitoring system		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	G43, G44, G49	○
	Tool offset pairs	±6 digits	64
	Tool offset value counter input		○
Editing Op. Functions	Background editting		○
	Expanded part program editting	Copy, Move, Change of NC program	○
	No. of Registered programs		500ea
	Part program editing / Program protect		○
	Part program storage length*1		640m
Setting & Display	Display of spindle speed and T-code at all screen		○
	Help function	Alarm & Operation display	○
	Self diagnostic function		○
	Servo setting screen / Spindle setting screen		○
	Status display / Lock function		○
	Tool path graphic display		Opt.(!)
Data Input & Output	External key input / External data input		○
	External work number search		○
	I/O interface	RS-232C	○
	Memory card input and output		○
	Reader puncher control	CH1 interface	○
Other Functions	Ethernet function	Embedded ethernet function	○
	MDI / DISPLAY unit		10.4" color TFT LCD
	PMC system		○

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

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

PUMA 400



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