OKUMA

OPEN POSSIBILITIES

MU-400V III
MU-500V III

5-Axis Vertical Machining Centers

MU-400VⅢ/MU-500VⅢ

5-Axis Vertical Machining Centers

Intelligent Technology | Thermo-Friendly Concept | Collision Avoidance System | Machining Navi | 5-Axis Auto Tuning System | SERVONAVI

Productivity is higher with process-intensive machining 5-Axis Vertical Machining Center achieves high accuracy and decarbonization with space-saving and a large machining area

The best match for efficient production of high value-added parts through one-chucking multi-sided machining.

This 5-axis control vertical machining center is based on our best-selling vertical machining center MB-V and is equipped with a trunnion structure rotary table.

Added to the basic performance of high speed, high precision, and high rigidity, we achieve new value creation with the new generation CNC OSP-P500 control that makes manufacturing DX a reality.

MU-400VⅢ

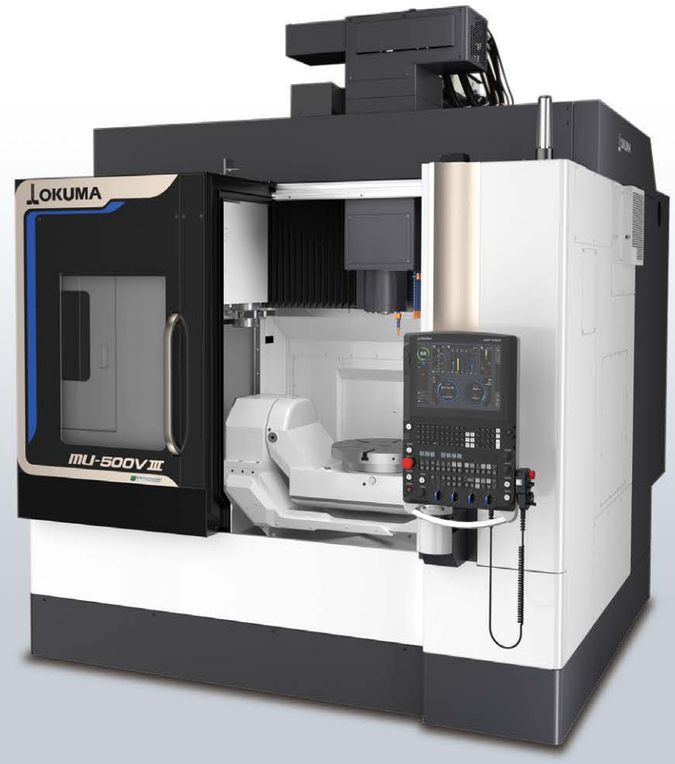
High value-added production through process-intensive machining

- Highly efficient production with one-chucking multi-face processing
- Cutting the number of jigs reduces workload and costs
- Reduce mounting errors that accumulate each time a workpiece is attached or detached

Hypoid gears provide fast and accurate machining with 2-axis trunnion table

● Rotation speed	C-axis: 50 min^{-1} (300 deg/sec)
	A-axis: 40 min^{-1} (240 deg/sec)
● Indexing accuracy	A-, C-axis: ±4 sec*
● Repeatability	A-, C-axis: ±1 sec*
● Indexing angle minimum command	0.0001°

* The data mentioned in this brochure are “actual data” and do not represent guaranteed accuracies.



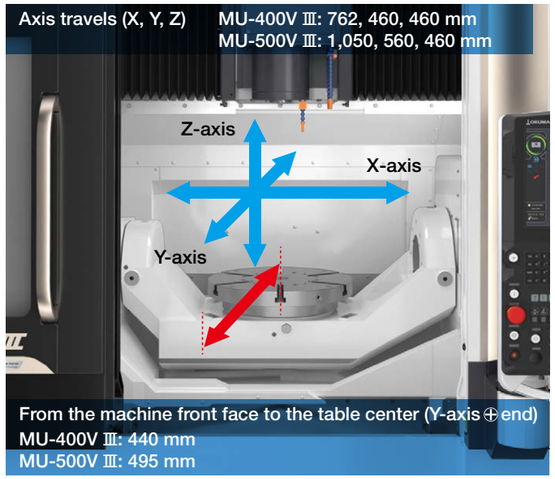
MU-500VⅢ

Photographs and images used in this brochure may include optional equipment.

High value-added production in a compact space

Realizes wide processing area in a space-efficient way

Even though they are as space-saving as vertical machining centers, these models have the largest machining areas among machines in the same class. They can also handle with high efficiency the 5-axis machining of large workpieces. And they can also easily replace existing machines.



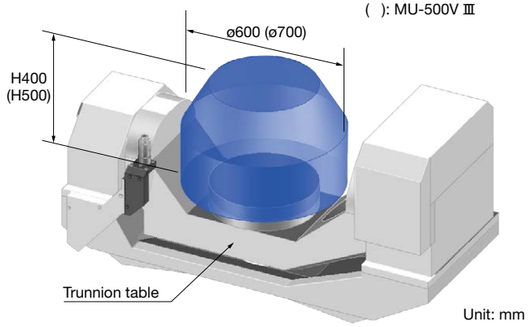
MU-500V Ⅲ is pictured.

■ Rotation range
C-axis: 360 degrees
A-axis: +20 to -110 degrees

■ Maximum workpiece size
MU-400V Ⅲ: ø600 × h400 mm
MU-500V Ⅲ: ø700 × h500 mm
[See details on page 13.]

■ Maximum load
MU-400V Ⅲ: 300 kg
MU-500V Ⅲ: 400 kg

Illustration: MU-400V Ⅲ
( ): MU-500V Ⅲ



Unit: mm

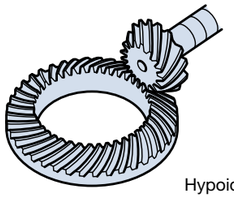
Solid trunnion construction permits fast and accurate machining

The trunnion table is driven by a hypoid gear made of high-precision ground heat-treated steel. It has high wear resistance and can operate at high speed and high torque.

Equipped with a high-precision DD encoder as standard, it achieves high-precision positioning.

■ High accuracies Indexing: ±4 sec (A-, C-axis)*
Repeatability: ±1 sec (A-, C-axis)*

■ High speeds C-axis: 50 min^{-1} (300 deg/sec)
A-axis: 40 min^{-1} (240 deg/sec)



Hypoid gears

* The data mentioned in this brochure are “actual data” and do not represent guaranteed accuracies.

A full spindle lineup to meet a wide range of needs

Increased productivity with enhanced machining capacity

■ Machining capacity 504 cm^3/min (face milling) / 672 cm^3/min (end milling) (actual data*)

MU-400V Ⅲ 15,000 min^{-1} (No. 40) wide range spindle (standard) **actual data** Workpiece material: S45C

Cutting Tool	Spindle min^{-1}	Cutting m/min	Feed rate mm/min	Width mm	Depth mm	Removed cm^3/min
ø80 face mill 8 blades (cermet)	895	225	3,000	56	3	**504**
ø20 roughing end mill 7 flutes (carbide)	4,000	251	4,300	7	20	**602**
ø63 insert drill (carbide)	606	120	91	–	–	–
M30 P3.5 tap	318	30	1,113	–	–	–

MU-500V Ⅲ 15,000 min^{-1} (No. 40) wide range spindle (option) **actual data** Workpiece material: S45C

Cutting Tool	Spindle min^{-1}	Cutting m/min	Feed rate mm/min	Width mm	Depth mm	Removed cm^3/min
ø80 face mill 8 blades	895	225	3,000	56	3	**504**
ø20 end mill 7 flutes (carbide)	4,000	251	8,400	4	20	**672**
ø63 insert drill (carbide)	720	143	108	–	–	–
M30 P3.5 tap	255	24	893	–	–	72% (Spindle load)

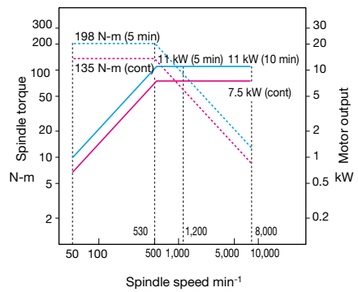
Note: The “actual data” referred to above for this brochure represent examples, and may not be obtained due to differences in specifications, tooling, cutting condition, and others.

You can select the optimum spindles to match your application requirements

■ Standard spindle

For general parts applications

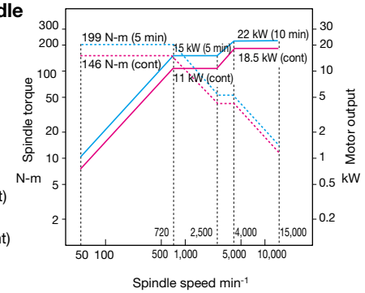
- Spindle speed 8,000 min^{-1}
- Max output 11/7.5 kW (10 min/cont)
- Max torque 198/135 N-m (5 min/cont)



■ Wide-range spindle

Highly efficient machining of light alloys such as steel and aluminum

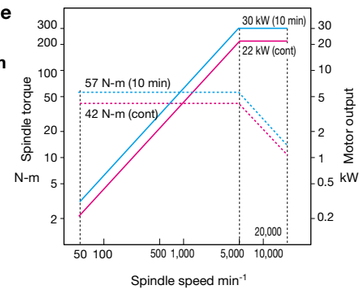
- Spindle speed 15,000 min^{-1}
- Max output 22/18.5 kW (10 min/cont)
- Max torque 199/146 N-m (5 min/cont)



■ High-speed spindle (option)

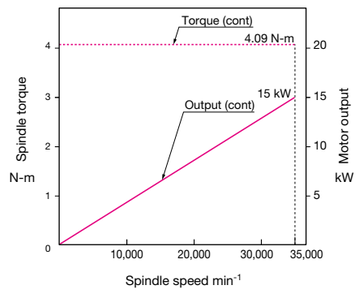
Die/mold and aluminum applications

- Spindle speed 20,000 min^{-1}
- Max output 30/22 kW (10 min/cont)
- Max torque 57/42 N-m (10 min/cont)



Die/mold and small precision parts

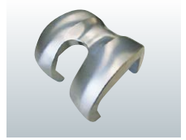
- Spindle speed 35,000 min^{-1}
- Max output 15 kW (cont)
- Max torque 4 N-m



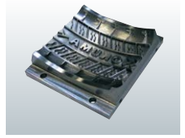
Highly efficient 5-axis machining of complex-shaped parts

Highly efficient machining with 5-axis machining

Process-intensive machining through 5-axis machining saves setup time, reduces waste between processes, improves machining accuracy and also enables machining with simultaneous 5-axis control.

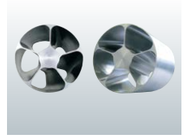

Artificial joint


Bone setting plates


Tire mold

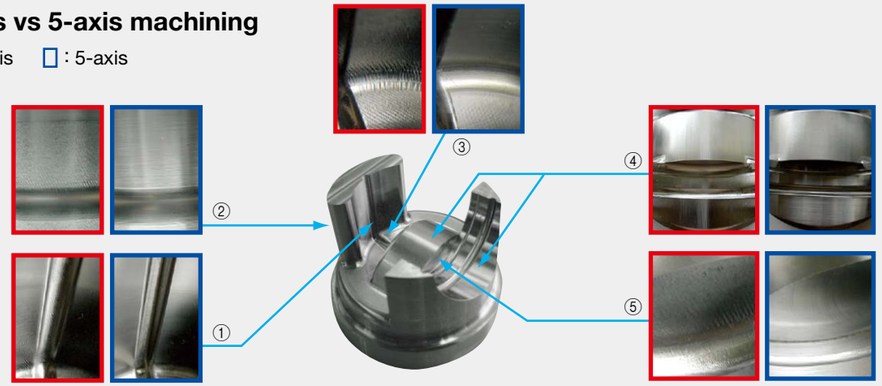

Artificial satellite part


Blisk


Rolls

3-axis vs 5-axis machining

□ : 3-axis □ : 5-axis



- Machine MU-400V Ⅲ 15,000 min^{-1}
- Workpiece Rubber mold
- Material NAK80
- Work size ø100 × 75 mm
- Data NX (Unigraphics)

Advantages	Application Used
① Can use smaller-dia tools (ø6 → ø3 mm)	Shorter tool lengths for tools with higher rigidity
② Perpendicular wall (height: 45 mm) vibration eliminated	
③ Corner R vibration eliminated	
④ Higher quality cuts; concave bottom (convex top)	Avoid machining by the ball end milling cutting tip*
⑤ Can cut pin corners	Workpiece oriented (positioned) to ideal cutting conditions

* Cutting speed is 0

Cutting conditions

Area machined	Tool	Spindle speed min^{-1}	Cutting speed m/min	Feed rate mm/min
Half cylinder	ø16 end mill	4,000	215	400
Center cylinder	ø4 ball end mill	10,000	125	1,500
All corners	ø3 ball end mill	8,000	75	1,000
Cylinder groove	ø1.5 ball end mill	12,000	55	1,500

Quick machine components reduce non-cutting times

- Rapid traverse: X-, Y-axis: 40 m/min
- Spindle accel/decel: 1.2 sec (0↔8,000 min^{-1})
- ATC movement: 1.5 sec (T-T)*1, 3.4 sec (CTC min)*2

*1. MU-500V Ⅲ performance, MAS standard measurement (formerly JIS B 6013)
*2. MU-500V Ⅲ performance, ISO 10791-9 (2001) (JIS B 6336-9) measurement

Cycle time reduction

- Operation time reduction

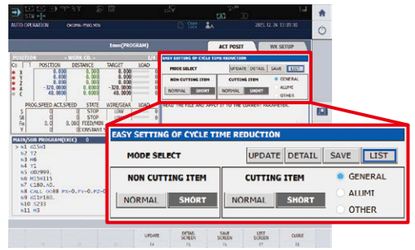
The non-cutting time is shortened by simultaneously performing multiple operations, such as spindle rotation and axis feed, and allowing the rotary axis to take the shortest path.

- Machining time shortening

The cycle time is reduced for parts machining with frequent switches between cutting feed and rapid traverse by using feeder-mode high-speed switching and optimal acceleration/deceleration.

- Easy parameter setting

Collects parameters related to cycle time reduction in a single screen for enabling changes and reuse in a single operation.



Easy parameter setting input screen

Hyper-SurfaceⅡ (option)

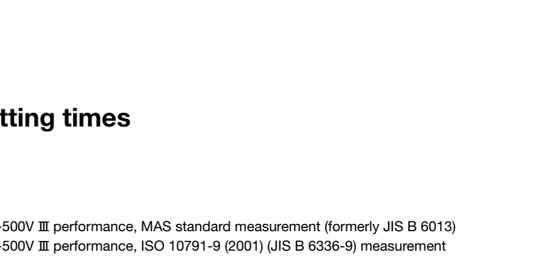
Improves the machined surface quality of dies and free-form surfaces.

When dies and free-form surfaces are machined, streaks and edge irregularities caused by CAM data, irregular widths of tool marks in shuttle machining, etc., are suppressed with optimal axis control based on sophisticated digital technology to finish machining with high speed and high quality.

Finishing of die machining

[Axis control optimal for the machining shape]

- Controlling vibration without slowing down for corners
- Shortening machining time while also improving surface quality

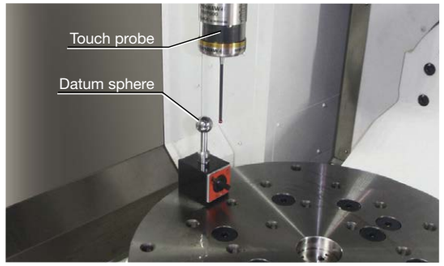


5-Axis Auto Tuning SystemⅡ (option)

Gauging and compensation of geometric error

Higher accuracies in 5-axis machining

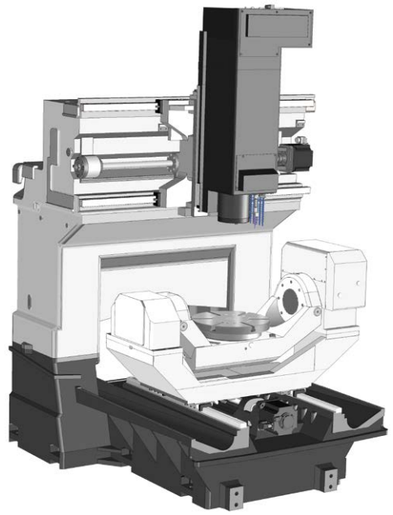
5-axis machining accuracy is greatly affected by misalignment and other "geometric errors" on the rotary axis. The 5-Axis Auto Tuning SystemⅡ measures geometric error using a touch probe and datum sphere, and performs compensation using measurement results to tune the movement accuracy on 5-axis machines. In addition, self-diagnosis of changes in "geometric errors" is performed, and the system indicates optimal timing for tuning. In this way 5-axis machining accuracy on a higher level is achieved.



Geometric error measuring and auto tuning performed with a touch probe and a datum sphere

Thermally stable structure with outstanding precision

Superior machine structure



Thermally stable structure
- Thermally symmetric and with “box-build” structure
- Cooling unit and NC control box designed to dissipate waste heat
- Thermally balanced structure
- Structure that isolates heat from coolant and chips

Extremely rigid machine structure
- From extended use of the advanced 3D-CAD and FEM analysis
- With ram-saddle feed

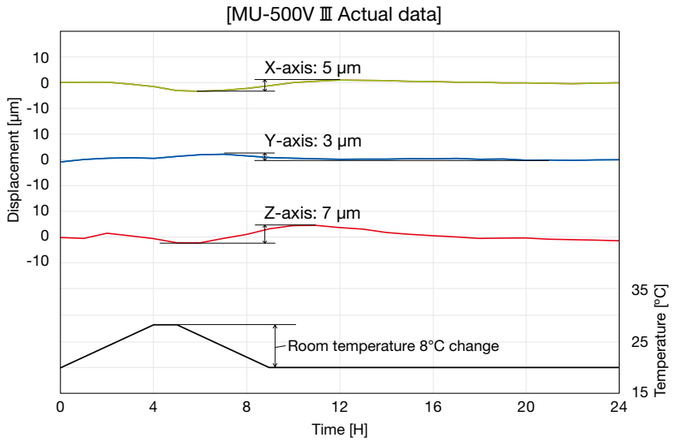
Easy to use
- Good visibility of the machining process
- Good table access

Thermo-Friendly Concept
The unique approach of “accepting temperature changes”

The machining accuracy of the workpiece changes significantly due to temperature change in the machine’s periphery, heat generated from the machine itself, and heat generated from machining.

This unique Thermo-Friendly Concept, which accommodates such temperature changes, achieves high accuracy in normal factory environments.

Thermal deformation over time **7 µm** /Per 8˚C room temp change (TAS-C)



Note: The data mentioned in this brochure are “actual data” and do not represent guaranteed accuracies.

Eliminate waste with the Thermo-Friendly Concept

Okuma’s Thermo-Friendly Concept achieves high dimensional stability not only when the room temperature changes, but also at machine startups or when machining is resumed.

The warm-up operation time to stabilize thermal deformation is shortened, and the burden of dimensional correction when resuming machining is reduced.

Machine startup
Machining restart
Room temp change

High dimensional stability

TAS-C (Thermo Active Stabilizer – Construction)
TAS-C estimates and accurately controls the volumetric thermal deformation of the machine's construction due to ambient temperature changes; based on data from properly placed sensors, feed axis positions, and actual machine thermal deformation characteristics.

TAS-S (Thermo Active Stabilizer – Spindle)
The TAS-S spindle thermal deformation control takes into account various conditional changes such as the spindle's temperature data, modification of the spindle rotation and speed, as well as spindle stoppage. The spindle's thermal deformation will be accurately controlled, even when the rotating speed changes frequently.

Okuma’s advanced technology enhance machine shop performance

SERVONAVI
Optimized Servo Control

Achieves long term accuracy and surface quality

SERVONAVI AP (Automatic Parameter setting)
Optimum settings automatically identified

On table travel type machining centers, the table feed acceleration with the previous system was the same regardless of weight, such as workpieces and fixtures loaded on the table.

Work Weight Auto Setting estimates the weight of the workpiece and fixture on the table and automatically sets servo parameters, including acceleration, to the optimum values. Cycle times are shortened with no changes to machining accuracy.

SERVONAVI SF (Surface Fine-tuning)
Enables longer machine use

When decreased machining accuracy is recognized to have occurred with many years of use, SERVONAVI restores machined surface accuracy. It can improve crease marks in machined surfaces that occur where the feed axis reverses with worn ball-screws or guideways.

Even noise or vibration that occurs when there are large changes in the machine state can be immediately eliminated.

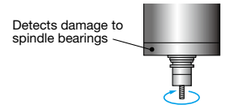
AI Machine Diagnosis (option)
Machine tool diagnostics technology with artificial intelligence (AI)

With predictive maintenance, prevent machine stoppages just in time

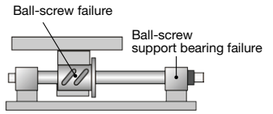
Okuma’s AI-equipped control diagnoses the presence or absence of abnormalities in the machine spindle and feed axes and identifies any irregularities found. Downtime from machine stoppage is minimized, so the benefits are highly accurate, productive, and stable operations over the long term. The operators themselves can easily diagnose the machine by following simple screen guidelines on the Okuma control.

Notes:
- AI diagnostic models are already installed, and diagnoses can be performed by the machine itself. AI diagnostic models can be updated through Okuma's Connect Plan.
- Feed axis diagnosis is for linear axes.
- With AbsoScale detection specs, ball-screw wear detection is possible.

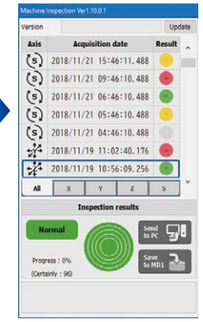
AI Spindle Diagnosis Function



AI Feed Axis Diagnosis Function

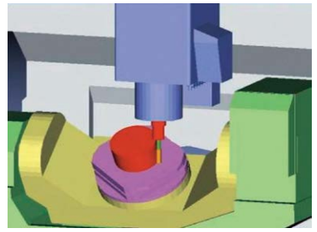


Self-diagnosis of spindle and feed axis status with AI



Collision Avoidance System (option)
Collision prevention

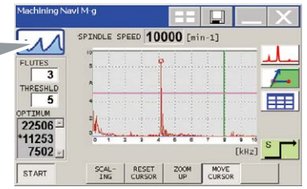
World’s first “Collision-Free Machine”
CAS prevents collisions in automatic or manual mode, providing risk-free protection for the machine and great confidence for the operator.



Machining Navi M-*i*, M-*g*Ⅱ+ (option)
Cutting condition search for milling

Search for optimum cutting conditions
- Machining Navi M-*i* changes automatically to optimum spindle speed
- Machining Navi M-*g*Ⅱ+ displays several spindle speed possibilities

Machining Navi (OSP) provides the answer!



Contribution to the realization of a carbon-free society

Highly productive, accurate and eco-friendly

Green-Smart Machine

Okuma has worked to reduce energy consumption in order to achieve carbon neutrality at the three factories in Japan which are our main production bases.

We have realized high productivity through automation and process-intensive machining, in addition to high-accuracy machining, and we then introduced the use of green energy to transform the three domestic factories into carbon-neutral factories.
“Green-Smart Machines” is our definition of Okuma’s intelligent machine tools, which autonomously achieve stable dimensional accuracy and reduced energy consumption, to support environmentally friendly production. Our policy is to deploy “Green-Smart Machines” fully, to help achieve a carbon-free society.

Starting with products manufactured at those carbon-neutral factories and supplying them all over the world, we will work together with our customers to help solve the social issues faced by the manufacturing industry.

Green-Smart Machines are **environmentally friendly**
products that autonomously achieve stable dimensional accuracies and reduced energy consumption.

Green-Smart Machine Technology that achieves Green-Smart Machine

Thermo-Friendly Concept

The Okuma Intelligent Technology that enables machines to autonomously maintain high accuracy stability

The unique concept of accepting temperature changes achieves consistent high accuracy without special coolers or excessive air conditioning.

Reduction of warm-ups and dimensional compensation

Reduce the time needed for daily warm-ups and dimensional compensation to adjust to ambient temperature changes.

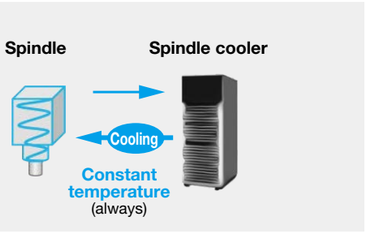
Reduction of power used for air conditioning

Maintain high stability of dimensional accuracy even if the air conditioning temperature range is expanded.

Reduction of machine body coolers

Achieve outstanding dimensional accuracy without any special machine body cooling being required to maintain accuracy.

The Okuma way to cool



By always setting a constant coolant supply temperature, the cooler power consumption is reduced.

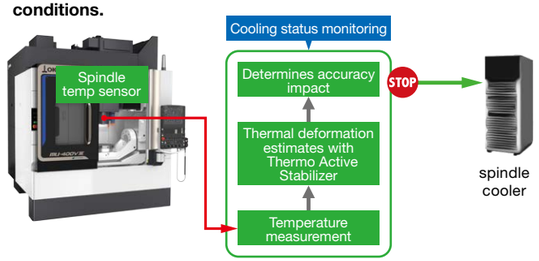
ECO suite plus

A system for an energy-saving society

ECO Idling Stop

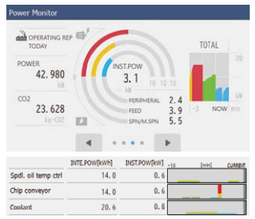
Auxiliary equipment consume a substantial portion of the power used in a factory. This function enables each of them to be turned off when not needed to reduce power consumption. In addition to when automatic operation is suspended, it is now possible to stop idling during manual operation. Power consumption and carbon dioxide emissions are reduced without conscious effort by the operator.

The machine monitors the cooling level when not machining, and proactively turns off the cooler while maintaining high accuracy conditions.



ECO Power Monitor

Power is shown individually for spindle, feed axes, and auxiliaries on the OSP operation screen. In addition to regenerative power, the energy-saving benefits from auxiliary equipment stopped with ECO Idling Stop can be confirmed on the spot.



ECO Operation

By using only the required peripherals (chip conveyor, mist collector), energy-saving operations are possible.

Sludgeless Tank (option)

Reducing waste liquid by suppressing coolant deterioration

The number of troublesome coolant tank cleaning operations is significantly reduced, improving productivity. Furthermore, environmental impact due to coolant disposal is also reduced.

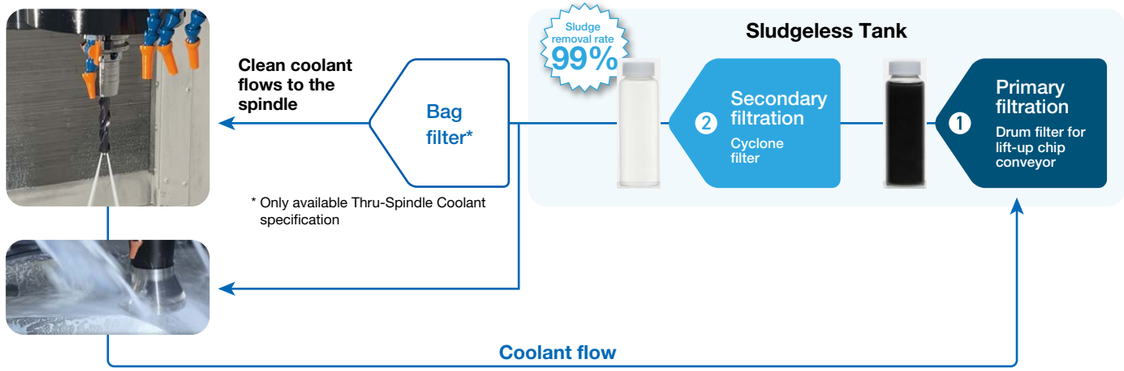
It is important to remove impurities (sludge) contained in the coolant for the stable operation of the machine, and coolant tank cleaning is indispensable. The Sludgeless Tank (option) circulates coolant at a constant speed in the tank to effectively collect sludge even during non-machining while reducing defects caused by the sludge contained in the coolant, such as scratches on machined surfaces and troubles of cutters, as well. Sludge accumulation in the tank is suppressed, which also drastically reduces the frequency of troublesome tank cleaning and enables stable operation over long hours. In addition, the frequency of coolant replacement can be greatly reduced, which also reduces the environmental impact of coolant disposal. With Thru-Spindle Coolant specification (option), the bag filter collects even finer sludge to improve the quality of machined surfaces.

Sludge removal rate **99%** (when the material is casting and aluminum)
Notes: After secondary filtration (cyclone filter) permeation
Okuma evaluated removal rate

No coolant tank cleaning required for 3 years
(okuma equipment actual data)

No coolant replacement required for 3 years
(okuma equipment actual data)

Note: If the Sludgeless Tank is chosen, it is necessary to select a hinge + scraper chip conveyor with drum filter.



Suction of excess coolant in spindle (option)

Shorter tool change times are possible when using Thru-Spindle Coolant

Removes residual spindle coolant dripping from the tool in 0.6 seconds (actual value using a drill tool). In-spindle coolant suction eliminates the need for an air blow to remove residual coolant, shortening tool change time. It also avoids the generation of mist due to air blowing, and prevents deterioration of the working environment. The frequency of required cleaning can also be reduced, to ease the workload on the operator.

Residual coolant suction time **0.6** sec

Machine specifications

	Item	Unit	MU-400V Ⅲ	MU-500V Ⅲ
Travel	X-axis (ram saddle R/L)	mm (in)	762 (30.00)	1,050 (41.34)
	Y-axis (table B/F)	mm (in)	460 (18.11)	560 (22.05)
	Z-axis (spindle U/D)	mm (in)	460 (18.11)	
	A-axis (trunnion rotation)	deg	+20 to –110	
	C-axis (table rotation)	deg	360	
	Table surface to spindle nose	mm (in)	100 to 560 (3.94 to 22.05)	160 to 620 (6.30 to 24.41)
Table	Table size	mm (in)	ø400 (ø15.75)	ø500 (19.69)
	Max workpiece dimensions*	mm (in)	ø600 × h400 (ø23.62 x h15.75)	ø700 × h500 (ø27.56 x h19.69)
	Floor to table top	mm (in)	1,050 (41.34)	1,090 (42.91)
	Max load capacity	kg (lb)	300 (660)	400 (880)
Spindle	Spindle speed	min^{-1}	15,000	8,000
	No. of spindle range		Infinitely variable	
	Tapered bore		7/24 taper No. 40	
	Bearing dia	mm (in)	ø70 (ø2.76)	
Feed rate	Rapid traverse	m/min (ipm)	X, Y: 40 (1,575) Z: 32 (1,260)	
	Rapid traverse (A, C)	deg/min	A: 14,400 C: 18,000	
	Cutting feed rate	mm/min (ipm)	X, Y, Z: 32,000 (1,260)	
Motor	Spindle (10 min/cont)	kW (hp)	22/18.5 (30/25)	11/7.5 (15/10)
	Feed axes	kW (hp)	X, Y, Z: 3.5 (4.7) A: 4.2 (5.6) C: 3.0 (4.0)	
Auto tool changer (ATC)	Tool shank		MAS BT40	
	Pull stud		MAS2	
	Tool capacity	tools	32	20
	Max tool dia (w/ adjacent tool)	mm (in)	ø90 (ø3.54)	
	Max tool dia (w/o adjacent tool)	mm (in)	ø125 (ø4.92)	
	Max tool length	mm (in)	240 (9.45)	300 (11.81)
	Max tool mass	kg (lb)	8 (17.6)	
	Max tool moment	N-m (ft-lbf)	7.8 <8 kg × 100 mm> (5.7 <17.6 lb × 3.94 in>)	
	Tool selection		Memory random	
Machine size	Height	mm (in)	2,946 (115.98)	3,045 (119.88)
	Floor space W × D	mm (in)	2,160 × 2,783 (85.04 × 109.57)	2,515 × 3,231 (99.02 × 127.20)
	Mass	kg (lb)	8,300 (18,260)	9,600 (21,120)
CNC			OSP-P500M-H	

* Some restrictions apply. See p13 for details.

Standard specifications/accessories

Spindle speed	MU-400V Ⅲ	50 to 15,000 min^{-1}
		7/24 taper No. 40, 22/18.5 kW
	MU-500V Ⅲ	50 to 8,000 min^{-1}
		7/24 taper No. 40, 11/7.5 kW
Spindle / Spindlehead cooling system		Oil temperature controller
Air cleaner (filter)		Including regulator
Spindle oil-air lubrication system		
TAS-S		Thermo Active Stabilizer – Spindle
TAS-C		Thermo Active Stabilizer – Construction
Dual contact spindle*1	MU-400V Ⅲ	BIG-PLUS® preps
A-, C-axis rotary table		0.0001 deg, includes DD encoders
C-axis table		T-slot 18H7 6 places
ATC tool magazine capacity	MU-400V Ⅲ	32-tool
	MU-500V Ⅲ	20-tool
ATC magazine shutter		
Coolant supply system*2	MU-400V Ⅲ	Tank: 190 L [effective: 100 L], pump: 250 W
	MU-500V Ⅲ	Tank: 230 L [effective: 120 L], pump: 250 W
Coolant nozzle		5 flexible nozzles
Chip flusher system*3		Table L/R
Chip pan	MU-400V Ⅲ	Effective capacity: 60 L
	MU-500V Ⅲ	Effective capacity: 69 L
ATC air blower (blast)		
Chip air blower (blast)		Nozzle type
Cleaning of the Y-axis cover	MU-400V Ⅲ	Telescopic cover
	MU-500V Ⅲ	Slideway cover

Foundation blocks (with jack bolts)		8 pcs (with jack bolts)
3-lamp status indicator		Type C (LED signal tower)
Work lamp		LED*4
Full enclosure shielding		With ceiling
Tapered bore cleaning bar		
Hand tools		
Tool box		
Operation panel with color LCD		15-inch
Pulse handle		
Simultaneous 5-axis kit*1	MU-400V Ⅲ	Tool center point control Ⅱ
		Tool center point manual feed
		Hyper-Surface Ⅱ 3 linear axes + 2 rotary axes
		Table origin coordinate system manual feed
		Slope machining
		Inverse time feed
		Tool tilt command
		DNC-DT

*1. Optional on MU-500V Ⅲ
*2. 800 W pump required with oil-based coolant.
*3. Use an in-machine coil type chip conveyor when using an oil-based coolant.
*4. Installed on the right side for MU-400V Ⅲ, and on the right and left sides for MU-500V Ⅲ.
Note: Oil-based coolants are highly flammable, so fire prevention measures must always be taken when using these coolants. Do not operate unattended.

Optional specifications/accessories

Optional spindle speeds		Oil mist coolant	
Wide-range spindle 50 to 15,000 min^{-1}*1 △	22/18.5 kW [10 min/cont]*2	Mist collector	
High-speed spindle 50 to 20,000 min^{-1} △	30/22 kW [10 min/cont]*3	Semi-dry machining	
High-speed spindle 50 to 35,000 min^{-1} △	15 kW [cont], HSK-F63	Shower coolant systems	
Dual contact spindle*4 △	HSK, BIG-PLUS®	Sludgeless Tank	
Special ATC capacities △	32*1, 48, 60*5-tool (chain system)	Workpiece washing gun	
	64*6, 98, 132, 166, 200, 234, 268-tool (matrix system)	In-machine chip discharge (coil) △	Table left/right
Special pull studs △	MAS1, JIS, CAT, DIN	Off-machine chip discharge (lift-up chip conveyor) △	With reference to recommended chip conveyors on p. 14, right side discharge (rear discharge also possible)
Attachment preps	Accelerator attachment		
	Anglehead attachment	Chip bucket for above △	
	Oil hole supply	Dust collector	
AbsoScale	X-Y or X-Y-Z axes	Tool breakage detection / Auto tool length compensation	Touch sensor (Metrol)
Die/mold & fine-feed specs △	Rapid traverse X, Y, Z: 20 m/min		
Thru-Spindle Coolant*7	Specify 1.5 MPa or 7.0 MPa	Auto zero offset / Auto gauging	Touch probe (Renishaw)
	35,000 min^{-1} specs for HSK-F63 only	5-Axis Auto Tuning SystemⅡ	Gauging compensation of geometric error
Suction of excess coolant in spindle	Available when using Thru-Spindle Coolant	NC Gage	
Work lamp	LED left side mount (MU-400V Ⅲ)	Chemical anchor specs	
Chip air blower (adapter)		Hydraulic fixture preps	Hydraulic: 2 ports, air: 2 ports

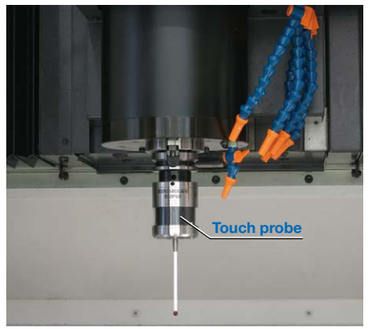
△ Corresponding standard specifications are deleted.
*1. Standard on MU-400V Ⅲ
*2. Spindle taper accepts 7/24 No. 40 (BT40, BIG-PLUS®, CAT40, DIN40) or HSK-A63.
*3. Spindle taper accepts BIG-PLUS® or HSK-A63.
*4. Be sure to select this specification when BIG-PLUS® holder is used.
*5. Compatible with MU-500V Ⅲ
*6. Compatible with MU-400V Ⅲ
*7. Okuma pull studs required. (End-face grinding, O-ring, and through-hole diameter differ from those of commercial pull studs.)
Note: HSK holders with coolant supply pipes are required.

Major options

- Shower coolant
  Coolant nozzle

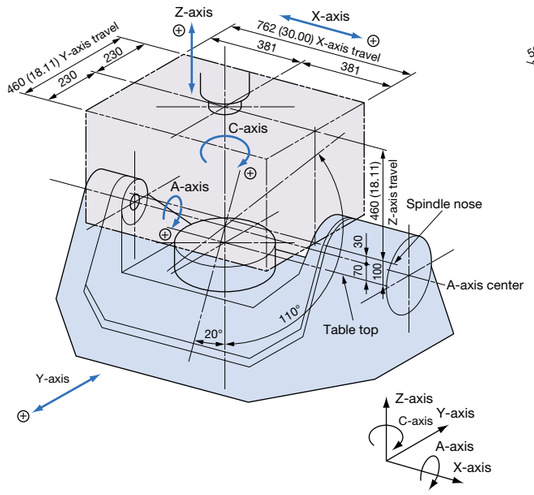
- Tool breakage detection
  Auto tool length compensation

- Auto zero offset / Auto gauging (wireless touch probe)

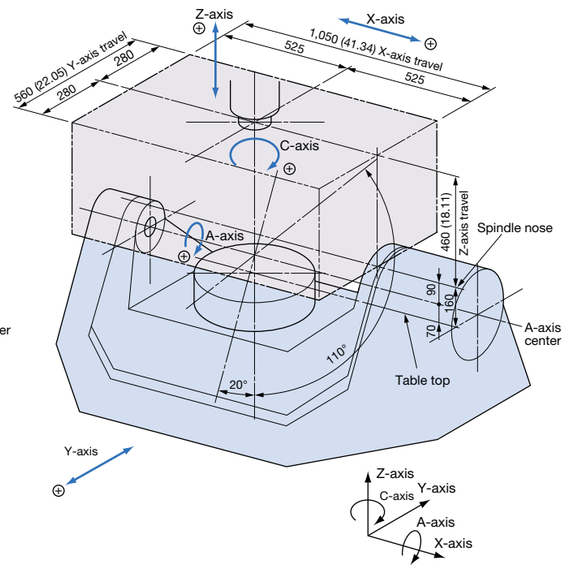


Working ranges

MU-400V Ⅲ



MU-500V Ⅲ

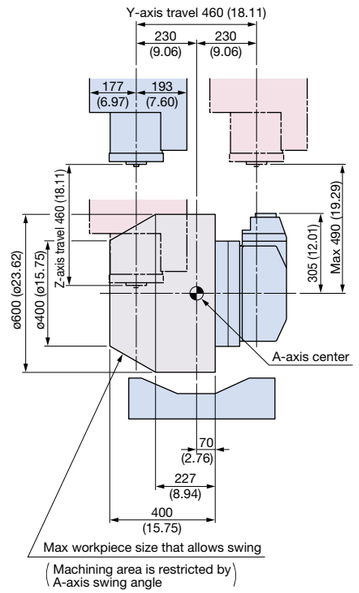


Unit: mm (in)

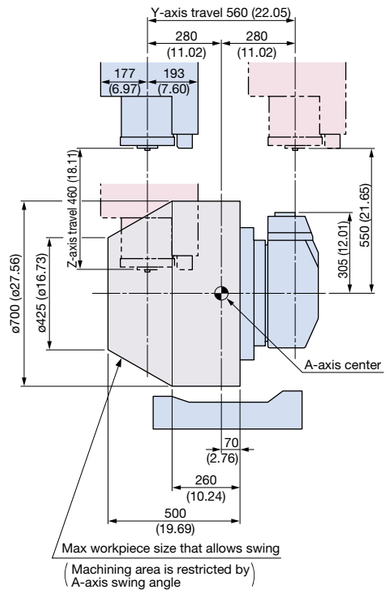
Max workpiece dimensions

(A-axis at –90° swing)

MU-400V Ⅲ



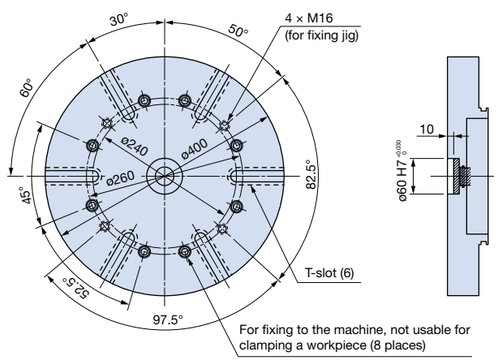
MU-500V Ⅲ

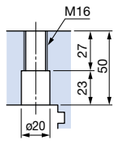


Unit: mm (in)

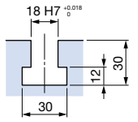
Table dimensions

MU-400V Ⅲ



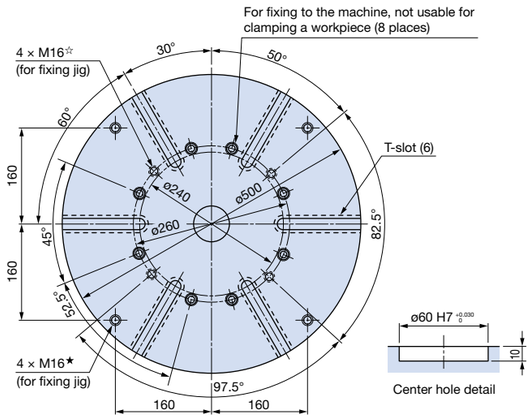


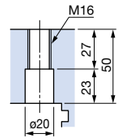
Jig fixing hole detailes (4 places)



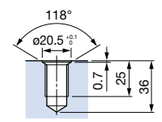
T-slot detail (6)

MU-500V Ⅲ

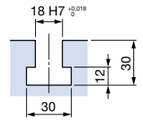




Jig fixing hole details
(4 locations marked with ☆)



Jig fixing hole details
(4 locations marked with ★)



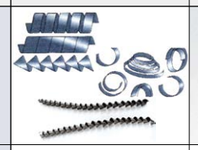
T-slot detail (6)

Unit: mm

Recommended chip conveyors

(Please contact an Okuma sales representative for details.)

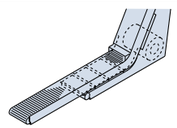
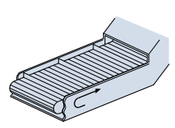
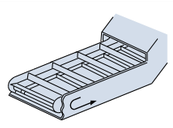
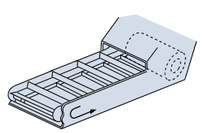
○: recommended
△: conditionally recommended

Workpiece material		Steel	Cast iron	Aluminum Non-ferrous metal	Mixed (general use)
Chip shape					
In-machine chip discharge	Chip flusher type (standard)	—	○ (Wet)	○	—
	Coil type (option)	○	○ (Dry/Wet)	—	○
Off-machine chip discharge (option)	Hinge + scraper with drum filter	○	○	○	○
	Hinge type	○	—	—	△ *1
	Scraper type	—	○ (Dry)	—	—
	Scraper type with drum filter	—	○ (Wet) with magnet	△ *2	—

*1. When there are few fine chips *2. When chips are shorter than 100 mm

Note: Use of oil-based coolant may cause fires; fire prevention measures are necessary.

Off-machine lift-up chip conveyors

Name	Hinge + scraper (with drum filter)	Hinge	Scraper	Scraper with drum filter
Shape				

Note: It is necessary to select a chip conveyor with hinges + scraper (with drum filter) if the Sludgeless Tank is chosen.

A next-generation CNC that makes manufacturing DX (digital transformation) a reality

OSP-P500

Improved productivity and stable production

As Your Single Source for M-E-I-K (Mechanics - Electronics - IT - Knowledge) merging technology, Okuma offers this CNC to build an advanced “digital twin” that faithfully reproduces machine control and machining operations and creats new value. In addition, Okuma offers productivity improvement and stable production with ease of use that allows customers to use their machining know-how, an energy-saving solutions that achieve both high accuracy/productivity and eco-friendly products, with robust security protection against increasing threats of cyber attacks.

15-inch operation panel

Faithful reproduction of machines and processing — Digital support for shop floor work

Digital Twin (option)

“Okuma’s two digital twins” made possible by an office PC and a next-generation CNC reduce machine downtime and improve machine utilization

Simulation using the latest machine information can be achieved with an office PC and OSP-P500 installed on the physical machine. This enables preparation for machining in advance in the office environment (front loading). Preparing machining for the next part while continuing machining can reduce the preparation time for the physical machine. When a problem occurs on the shop floor, it can be solved quickly on site without going back to the office.

1 Digital Twin On PC*

Simulate shop machines in the office

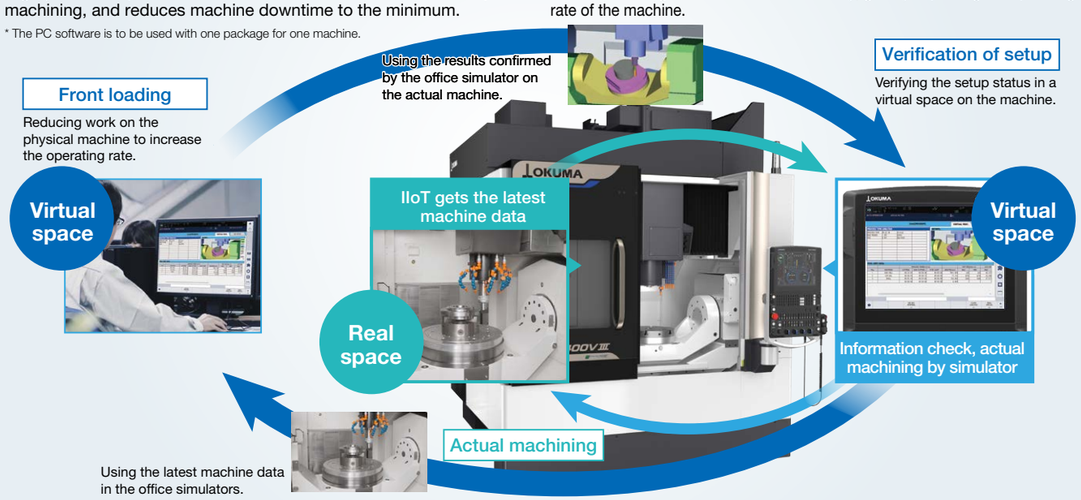
Front loading is performed with the actual status matched with the data on the office PC to further improve productivity.
Highly accurate pre-verification minimizes trial and error in first part machining, and reduces machine downtime to the minimum.

* The PC software is to be used with one package for one machine.

2 Digital Twin On Machine

Simulating the CNC of a real machine

Super-fast and super-accurate machining simulations are performed with the CNC of a real machine on-site to minimize machining preparation work.
Actual machining can be started immediately, greatly improving the operating rate of the machine.

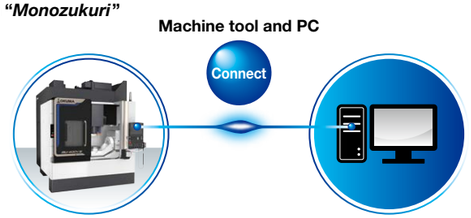


Connect Plan

Get Connected, Get Started, and Get Innovative with Okuma “*Monozukuri*”

Connect, Visualize, Improve

Okuma’s Connect Plan is a system that provides analytics for improved utilization by connecting machine tools and visual control of factory operation results and machining records. Simply connect the OSP and a PC and install Connect Plan on the PC to see the machine operation status from the shop floor, from an office, from anywhere. The Connect Plan is an ideal solution for customers trying to raise their machine utilization.



OSP-P500M standard specifications

Basic spec	Control	X, Y, Z, A, C simultaneous 5-axis, spindle control (1 axis)
	Position feedback	OSP full range absolute position feedback (zero point return not required)
	Coordinate functions	Machine coordinate system (1 set), work coordinate system (20 sets)
	Min/max command	±99999.999 mm, ±9999.9999° 8-digit decimal, command units: 0.001 mm, 0.01 mm, 1 mm, 0.0001°, 0.001°, 1°
	Feed	Override: 0 to 200%
	Spindle control	Direct spindle speed commands, override 30 to 300%, multi-point indexing
	Tool compensation	No. of registered tools: max 999 sets, tool length/radius compensation: 3 sets per tool
	Display	15-inch color LCD + multi-touch panel operations
	Security	Operator authentication, lock screen, OSP-VPSⅡ-STD (Virus Protection System)
Programming	Program capacity	Program storage capacity: 4 GB; operation buffer: 2 MB
	Program operations	Scheduled program, fixed cycle, G/M code macros, arithmetic, logic statements, math functions, variables, branch commands, Coordinate calculate, area machining, coordinate convert, programming help, user task, keyway cycle, fixture offset Ⅱ
Operation	OSP suite	“suite apps” to graphically visualize and digitize information needed on the shop floor, “suite operation” enable one-touch access to “suite apps”.
	Easy Operation	“Single-mode operation” to complete a series of operations. Advanced operation panel/graphics facilitate smooth machine control
	MacMan plus	Machining management: aggregation and display of machining records, operating records and problem information, Visualization of power consumption, file output
	Machine operations	Operation help, load meter, alarm help, sequence return, manual interrupt/auto return, pulse handle overlap, parameter I/O, PLC monitor, auto power shut-off
Communication / Networking		USB (2 ports), Ethernet, DNC-T1, Smart I/F
High speed/accuracy spec		Thermo Active Stabilizer – Spindle (TAS-S), Thermo Active Stabilizer – Construction (TAS-C), Hi-Cut Pro, pitch error compensation, Hi-G control, SERVONAVI, cycle time reduction (operation time reduction, machining time shortening, easy parameter setting)
Energy-saving function	ECO suite plus	ECO Idling Stop, ECO Operation, oil temperature controller auto control, ECO Power Monitor
	Power Regeneration System	Regenerative power is used when the spindle and feed axes decelerate to reduce energy waste.

OSP-P500M kit/optional specifications

Item	Kit specs	NML E	NML D	AOT E	AOT D	DT E	DT D	DT AOT E	DT AOT D
Digital Twin									
Virtual Machining						● (VE)	● (VD)	● (VE)	● (VD)
Quick Modeling						● (VE)	● (VD)	● (VE)	● (VD)
OPC UA for Machine Tools						●	●	●	●
OSP API KIT						●	●	●	●
Interactive functions									
Advanced One-Touch IGF-M (w/ Real 3-D Simulation)				●	●			●	●
Interactive MAP (I-MAP)						●	●		
Smart OSP Operation				●	●	●	●	●	●
Programming									
Operation buffer 10 MB		●	●	●	●	●	●	●	●
Program notes (MSG)		●	●	●	●	●	●	●	●
Auto scheduled program update		●	●	●	●	●	●	●	●
Block skip; 9 sets									
Program branch; 9 sets									
Coordinate system select (std: 20 sets)	100 sets	●		●		●		●	
	200 sets		●		●		●		●
	400 sets								
Helical cutting		●	●	●	●	●	●	●	●
3-D circular interpolation									
Synchronized Tapping Ⅱ		●	●	●	●	●	●	●	●
Arbitrary angle chamfering		●	●	●	●	●	●	●	●
Cylindrical side facing									
Tool max rotational speed setting									
F1-digit feed	External switch type, parameter type								
Programmable travel limits (G22, G23)		●	●	●	●	●	●	●	●
Inverse time feed									
Slope machining	Type Ⅰ, Type Ⅱ								
Dynamic fixture offset									
Dynamic Tool Load Control									
3-D tool compensation									
Drawing conversion	Programmable mirror image (G62)		●		●		●		●
	Enlarge/reduce (G50, G51)		●		●		●		●
User task	Common variables 1,000, 2,000 pcs								
	G code macros: 80 sets added								
	I/O variables (16 each)								
Sequence stop		●	●	●	●	●	●	●	●
Sequence return	Mid-block sequence return		●		●		●		●
Tool wear compensation	Includes input restriction	●	●	●	●	●	●	●	●
Tool life management	Includes warning	●	●	●	●	●	●	●	●
External I/O communication									
RS-232C connector									
DNC connection	DNC-T3, DNC-B, DNC-DT								
	DNC-C/Ethernet								
Gauging									
Auto tool length offset / Breakage detection									
In-magazine tool breakage detection									
Auto workpiece gauging / Auto zero offset									
Manual gauging		●	●	●	●	●	●	●	●
Interactive gauging									
NC Gage									

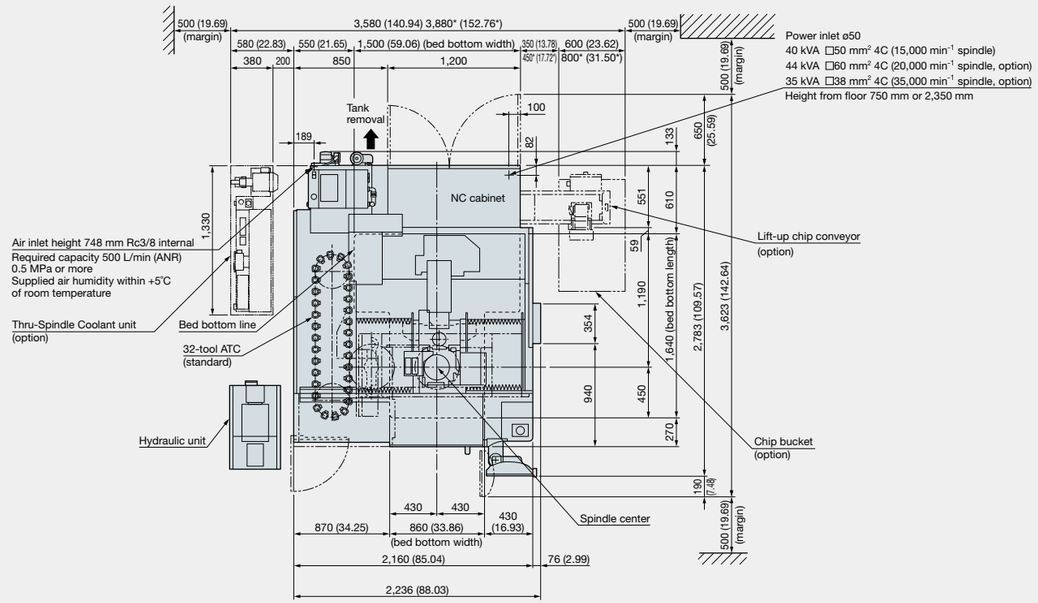
Item	Kit specs	NML E	NML D	AOT E	AOT D	DT E	DT D	DT AOT E	DT AOT D
Monitoring									
One-Touch Spreadsheet									
Collision Avoidance System									
Real 3-D Simulation				●	●	●	●	●	●
Simple load monitor	Spindle overload monitor	●	●	●	●	●	●	●	●
NC operation monitor	Hour meter, workpiece counter	●	●	●	●	●	●	●	●
Status indicator									
Tool breakage no-load detection			●		●		●		●
MOP-TOOL	Adaptive control, overload monitor								
AI machine diagnostics*1	Spindle+feed axes, or feed axes only								
Machine Status Logger									
Cutting Status Monitor									
Machining Navi M-*i*, M-*g*Ⅱ+ (cutting condition search)									
Feed axis retraction									
Tool retract cycle									
Automation / Unattended operation									
Warm-up (calendar timer)									
External program	Button, rotary switch								
	Digital switch, BCD (2-digit, 4-digit)								
Connection with automated devices	Robot, loader I/F								
	Stacker crane I/F								
	FMS link I/F								
High-speed, high-precision									
AbsoScale detection	X-Y-Z axes								
5-Axis Auto Tuning SystemⅡ									
Dynamic displacement compensation		●	●	●	●	●	●	●	●
0.1 µm control (linear axis commands)									
Hyper-SurfaceⅡ	3 linear axes, 3 linear axes + 2 rotary axes								
5-axis machining									
Tool center point control Ⅱ (w/ tool tilt comp)									
Tool tilt command									
Cutting point command									
Tool side machining									
Leading edge offset									
Tool side offset									
Tool-axial tool length comp									
Manual feed	Manual tool feed (tool-axial), manual tool feed (right angle)								
	Table origin coordinate system manual feed								
	Tool center point manual feed								
ECO suite plus									
ECO Power Monitor	On-machine wattmeter								
Spindle Power Peak Limiter									
External output interface of consumed electricity									
Other									
Simultaneous 5-axis kit*2									
Circuit breaker									
OSP-VPSⅡ (Virus Protection System)									
External M codes [4 sets, 8 sets]									

Notes. NML: Normal kit, AOT: Advanced One-Touch IGF-M kit, DT: Digital Twin kit,
DT AOT: Digital Twin Advanced One-Touch IGF-M, E: Economy, D: Deluxe
VE and VD kits are also equipped with the Digital Twin on PC function, allowing running from a PC.
*1. With AbsoScale detection specs, ball-screw wear detection is possible.
*2. Standard on MU-400V Ⅲ. See details on page 11.

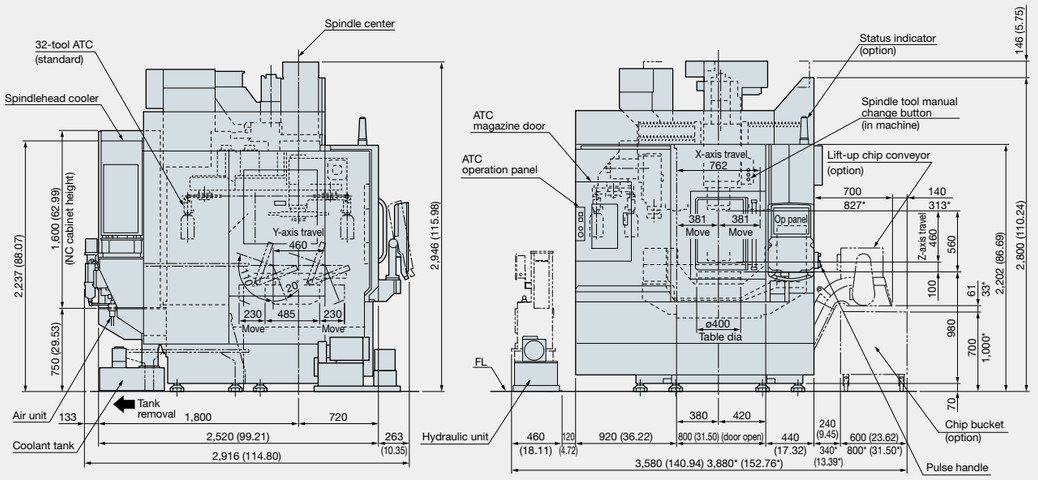
Dimensional / Installation Drawings

Unit: mm (in)

MU-400V Ⅲ

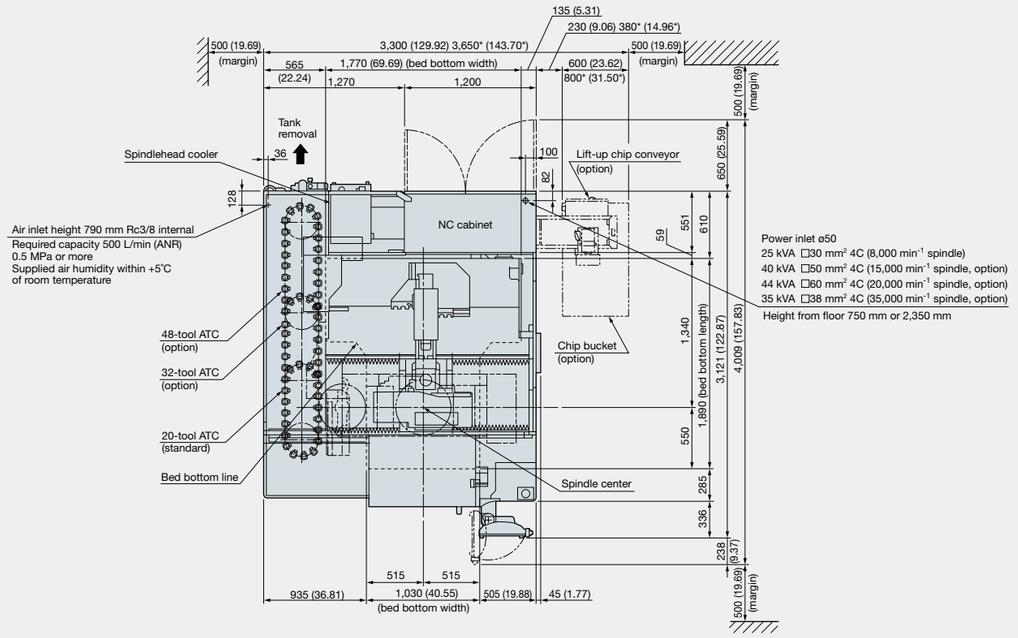


Notes: lift-up chip conveyor: height 750 mm
* Height 1,000 mm
Thru-Spindle Coolant: 1.5 MPa

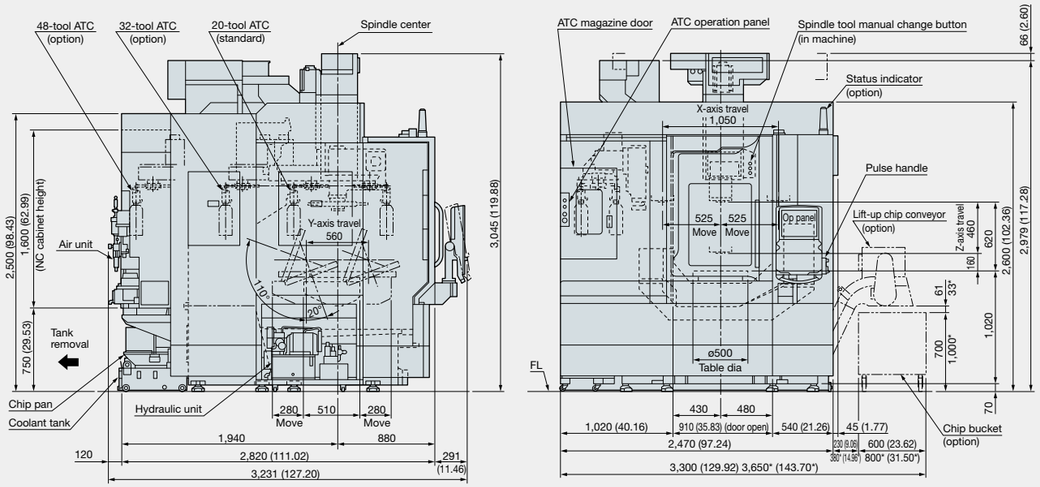


Unit: mm (in)

MU-500V Ⅲ



Note: lift-up chip conveyor: height 750 mm
* Height 1,000 mm



MU-400V III
MU-500V III

When using Okuma products, always read the safety precautions mentioned in the instruction manual and attached to the product.

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