OKUMA

OPEN POSSIBILITIES

Vertical Machining Centers

GENOS M series

GENOS M460-VE-e GENOS M560-V-e
GENOS M660-V-e

Vertical Machining Centers

GENOS M series

GENOS M460-VE-e GENOS M560-V-e GENOS M660-V-e

Intelligent Technology

Thermo-Friendly Concept

Machining Navi

GENOS technology carries Okuma's genetic heritage and takes you to the leading edge of global competition.

Machining accuracy and productivity that exceed expectations; ease of use with a thorough understanding of the user's perspective. Machine shops around the world long for machines like this. Okuma has faced this challenge head on, resulting in the high quality GENOS global machine. Okuma's technical genes are found in cutting edge manufacturing that seeks to balance high quality and low cost.

GENOS M460-VE-e

GENOS M560-V-e

GENOS M660-V-e

Photos used in this brochure include optional equipment.

Highly rigid construction for productivity that exceeds expectations

Same double column structure as on the best-selling MB-V series

Maximum performance is achieved by limiting the options with the same high-rigidity structure.

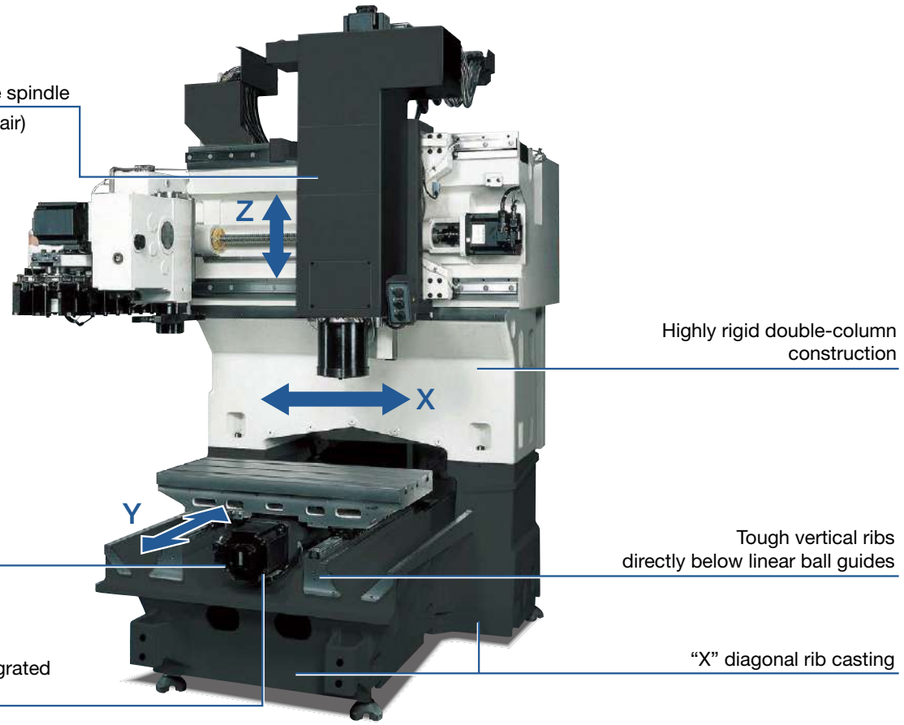
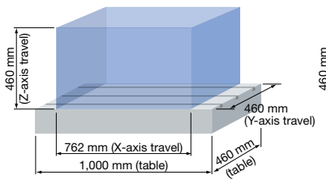
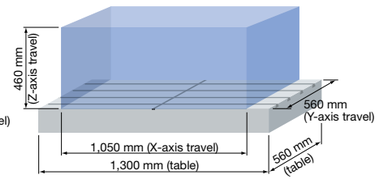


Table size / machining area

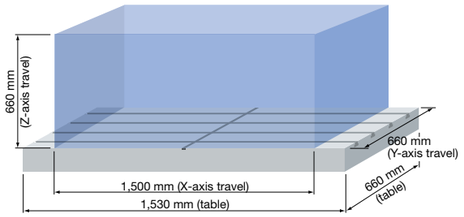
GENOS M460-VE-e



GENOS M560-V-e



GENOS M660-V-e



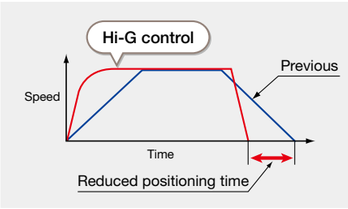
Fast machine movements reduce non-cutting time

Non-cutting time reduced 30% from previous machine with maximum acceleration/deceleration speeds of 0.7 G and high-speed rapid traverse.

- Non-cutting time
  35% less
  (Compared with previous machine.)
- Rapid traverse
  X,Y: 40 m/min, Z: 32 m/min
- ATC time (T-T)
  1.2 sec (M460-VE-e, M560-V-e)
  1.5 sec (M660-V-e: No.40)
  2.6 sec (M660-V-e: No.50)

Hi-G Control (standard)

Acceleration/deceleration during positioning is controlled by math functions linked to motor speed/torque characteristics, to provideboth machine accel/decel and vibration control.

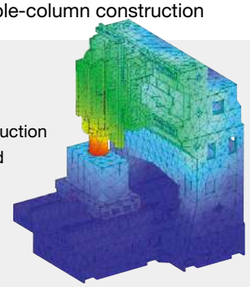


Highly rigid structure supports powerful cutting

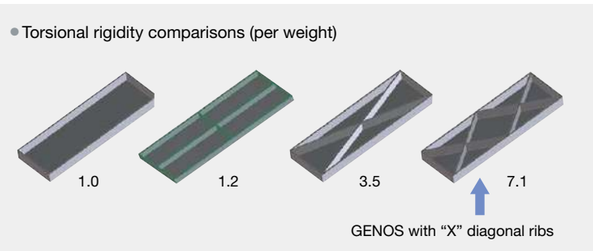
In addition to the highly rigid double-column structure and the diagonal rib casting base section, Okuma’s original design makes this a robust machine capable of stable, powerful cutting even with high-speed movement.

Highly rigid double-column construction

Highly rigid construction using 3D-CAD and FEM analysis

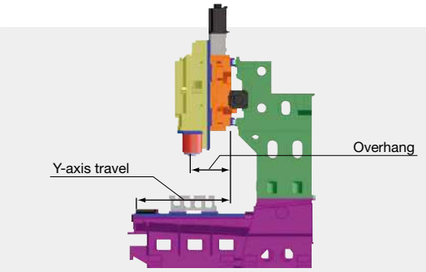


“X” diagonal rib casting



Small overhang for more efficient machining

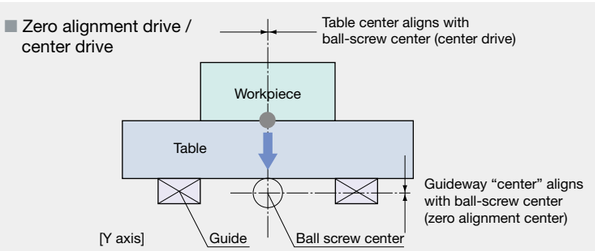
The overhang from the machining point to slideway is small, enabling efficient machining. For table movement, the Y-axis overhang also remains small regardless of the machining position.



Highly accurate drive system

The ball screw is set at the center of the table. By aligning the positions of the center of the ball screw and the guideway, highly accurate drive and positioning are achieved with no collisions.

Zero alignment drive / center drive



High dimensional stability

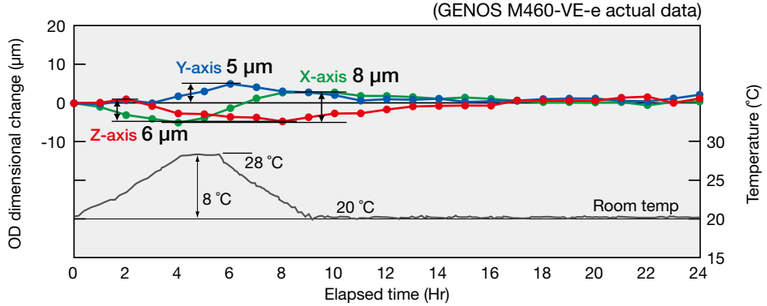
Manageable Deformation—Accurately Controlled

Thermo-Friendly Concept

Eliminate waste with the Thermo-Friendly Concept

In addition to maintaining high dimensional accuracy when room temperature changes, Okuma's Thermo— Friendly Concept provides high dimensional accuracy during machine startup and machining restart. To stabilize thermal deformation, warming-up time is shortened and the burden of dimensional correction during machining restart is reduced.

Machining dimensional change over time: Less than 8 µm
(GENOS M460-VE-e actual data)



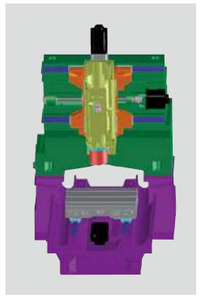
TAS-C: Thermo Active Stabilizer—Construction
"Proactively" keeps the machine [construction]in optimum, stable condition during shop environment temperature change resulting in superb (stable) machining accuracies.

TAS-S: Thermo Active Stabilizer—Spindle
Accurate compensation during spindle start/stops, and speed changes.

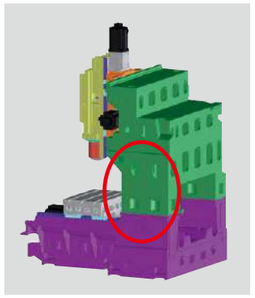
Spindle speed: 8,000 min^{-1}
Coolant use: Yes
Tool: ø6 end mill

Simplified structure for thermal deformation / Design technology for uniform dissemination of heat

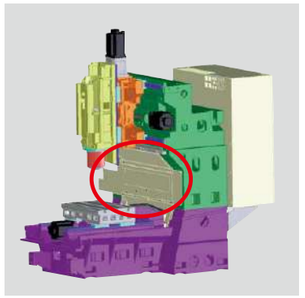
The machine expands and contracts in predictable directions, and manageable deformation is achieved with a machine structure that evenly transmits the temperature.



Thermally symmetric structure
Equal left-right construction permits straightforward thermal distortion



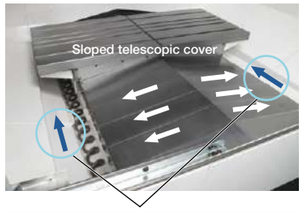
"Box-build" structure
Column structure built up of simple blocks is used to permit straightforward thermal distortion

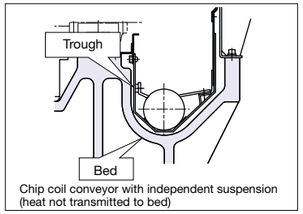


Thermally balanced structure
A cover is set on the front of the column and the control cabinet on the back for even conduction of temperature.

Insulation measures from coolant, chips

Chips with heat produced by machining are quickly removed before heat is transferred to machine.





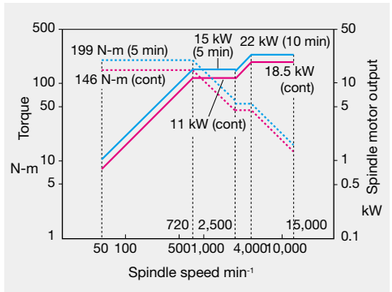
Chip coil conveyor with independent suspension (heat not transmitted to bed)

Improved productivity with powerful machining

Spindle

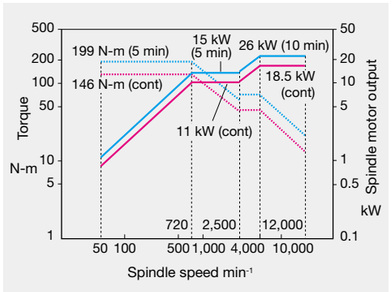
Wide-range spindle specifications 15,000 min^{-1}

Spindle motor output: 22/18.5 kW (10 min/cont)
Torque: 199 N-m
Tapered bore: 7/24 taper No. 40



Wide-range spindle specifications 12,000 min^{-1} (GENOS M660-V-e No. 50) (Optional)

Spindle motor output: 26/18.5 kW (10 min/cont)
Torque: 199 N-m
Tapered bore: 7/24 taper No. 50



15,000 min^{-1} wide-range spindle (Workpiece: S45C)

Tool	Spindle min^{-1}	Cutting m/min	Feedrate mm/min	Width mm	Depth mm	Amount 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	4,800	7	20	672
ø63 insert drill (carbide)	720	142	108	—	—	—
M30 x 3.5 tap	318	30	1,113	—	—	—

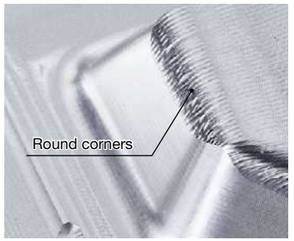
Note: The "actual data" referred to above for this brochure represent examples, and may not be obtained due to differences in specifications, tooling, cutting, and other conditions.

Shorter cutting times and highly accurate machining

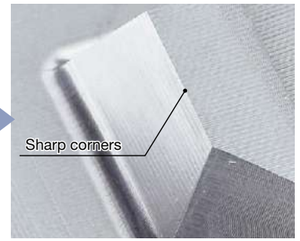
Hi-Cut Pro

A speed and acceleration controller to make sharper corners and smoother arcs—ideal for the extra accurate and quicker cycle time jobs.

Hi-Cut Pro Off



Hi-Cut Pro On



Truly machinist oriented, superb ease-of-use machine operation

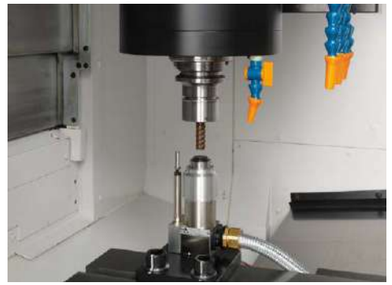
For smooth machining preparations

- Loading/unloading tools to/from the magazine can be performed from the front of the machine

- Tool load/unload button on spindlehead

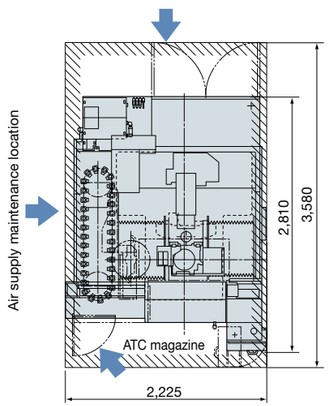
- Simple and accurate zero setting with auto gauging (Optional)

- Simple and accurate tool information input with auto tool length compensation (Optional)

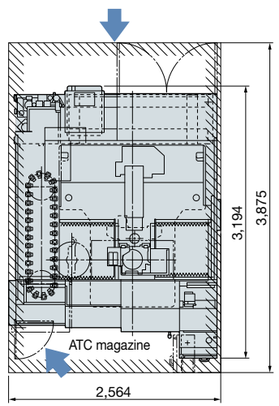


Actual required footprint

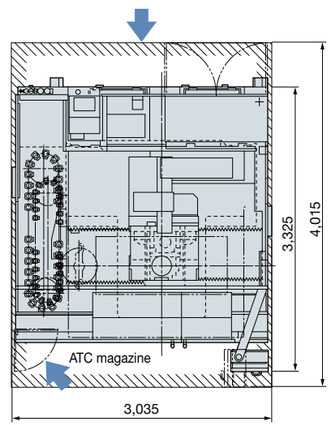
M460-VE-e **8.0 m²**



M560-V-e **10 m²**



M660-V-e **13 m²**



Unit: mm

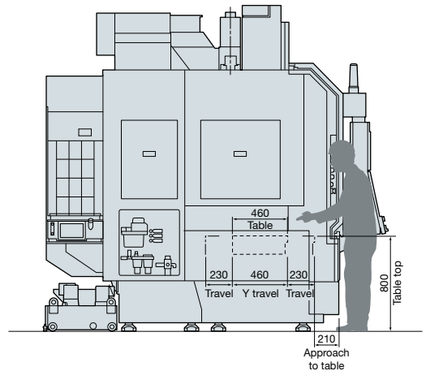
With wide door opening for easy workpiece access and setup changes

Outstanding ease of use

- Wide door opening : 850 mm (1,323 mm/1,510 mm)
- Approach to table : 210 mm (215 mm/235 mm)
- Table height : 800 mm (800 mm/850 mm)

( ) for M560-V-e/M660-V-e

Photo shows a M560-V-e



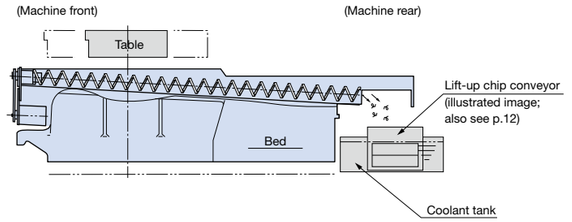
Unit: mm

	M460	M560	M660
Table	460	560	660
Table top	800	800	850
Y travel	460	560	660
Travel	230	280	330
Approach to table	210	215	235

Drawing shows GENOS M460-V-e

Chip discharge

In-machine chip conveyor (coil)



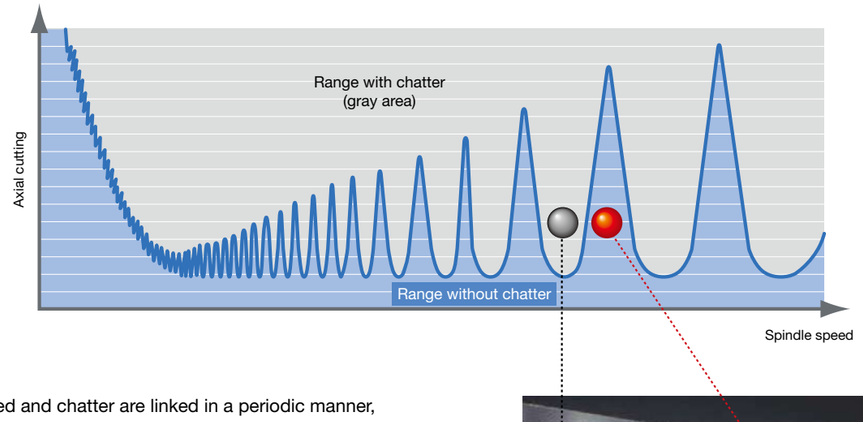
Hi-tech Okuma mechatronics for advanced machining applications

Cutting condition search for milling

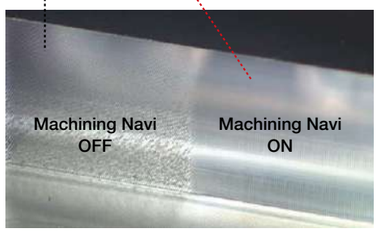
Machining Navi M-$g\mathrm{II}$+ (Optional)

Push cutting conditions higher to increase profit

Machining Navi instantly determines the optimal cutting conditions for highly efficient machining.

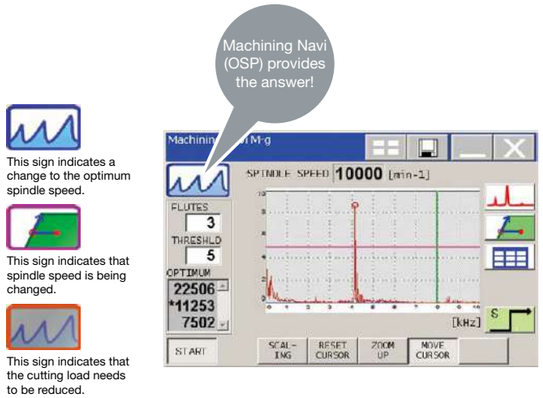


Spindle speed and chatter are linked in a periodic manner, manifesting as alternating ranges with and without chatter.
This means that there will be cases in which chatter cannot be suppressed with a reduction in spindle speed, and other cases where increasing the spindle speed will eliminate the chatter.
Machining Navi navigates the extremely difficult process of finding the optimal spindle speed value by analyzing chatter and instantly determining (powerful computing) the best spindle speed.



Cutting conditions can be changed while looking at analysis results

Based on the chatter noise captured by the microphone, Machining Navi displays a number of optimal spindle speed possibilities on the screen. The operator can change to the indicated spindle speed with a single touch and immediately confirm the result.



With a variety of eco-friendly features

Next-Generation Energy-Saving System

ECO suite

A suite of energy saving applications for machine tools

■ Accuracy ensured, cooler off ECO Idling Stop

Intelligent energy-saving function with the Thermo-Friendly Concept.
The machine itself determines whether or not cooling is needed and cooler idling is stopped with no loss to accuracy. Electricity consumption during non-machining time greatly reduced with “ECO Idling Stop”, which shuts down each piece of auxiliary equipment not in use.
(Standard application on machines with Thermo-Active Stabilizer—Spindle)

■ On-the-spot check of energy savings ECO Power Monitor

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

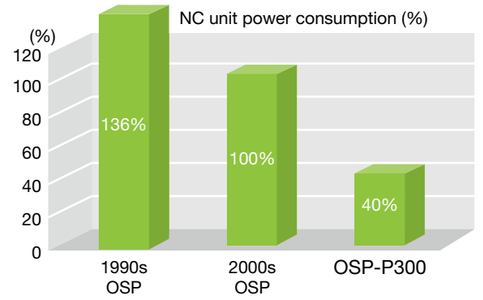
■ Intermittent/continuous operation of chip conveyor and mist collector during operation

ECO Operation (Optional)

Energy-saving technology

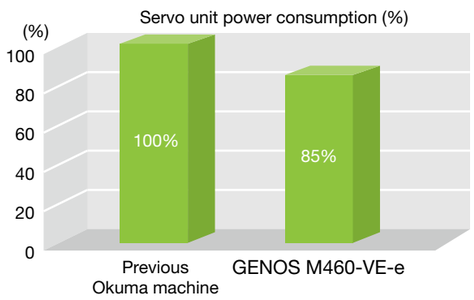
■ Energy-saving NC unit
- Computer in a flat panel with a high-performance CPU
- Power-saving design
- LCD (Liquid Crystal Display) used

Power consumption
Reduced 60% (compared to previous Okuma machine)



■ Energy-saving drive unit
- Low-loss power transistor used
- Power regeneration system used

Power consumption
Reduced 15% (compared to previous Okuma machine)



Machine Specifications

Model			GENOS M460-VE-e	GENOS M560-V-e	GENOS M660-V-e	
			No.40	No.40	No.40	No.50*1
Travels	X axis (ram saddle horizontal)	mm	762	1,050	1,500	
	Y axis (table front/back)	mm	460	560	660	
	Z axis (spindle vertical)	mm	460		660	
	Table top to spindle nose	mm	150 to 610		150 to 810	
Table	Max work dimension	mm	1,000 x 460	1,300 x 560	1,530 x 660	
	Floor to table top	mm	800		850	
	Max load capacity	kg	700	900	1,500	
Spindle	Max spindle speed	min^{-1}	15,000			12,000
	Speed ranges		Stepless			
	Tapered bore		7/24 taper No. 40			7/24 taper No. 50
	Bearing dia	mm	ø70		ø70	ø90
Feedrate	Rapid traverse	m/min	X-Y: 40, Z: 32			
	Cutting feedrate	m/min	X-Y-Z: 32			
Motors	Spindle	kW	22/18.5			26/18.5
	Feed axes	kW	X-Y-Z: 3.5		X-Y-Z: 4.6	
ATC	Tool shank		MAS BT40			MAS BT50
	Pull stud		JIS (thru)			
	Tool capacity	tool	32			
	Max tool dia (w/adjacent tool)	mm	ø90			ø100
	Max tool dia (w/o adjacent tool)	mm	ø125			ø152
	Max tool length	mm	300		400	
	Max tool weight	kg	8			12
	Max tool moment	N-m	7.8 [8 kg x 100 mm]		15.3 [12 kg x 130 mm]	
	Tool selection		Memory random			
Machine Size	Height	mm	2,746		3,295	
	Floor space	mm	2,225 x 2,810	2,564 x 3,194	3,035 x 3,325	
	Weight	kg	7,000	8,300	11,200	11,800
Control			OSP-P300MA-e			

*1. No.50 spindle is optional.

Standard Specifications and Accessories

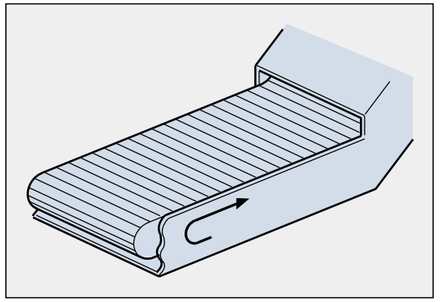
Item	Description	Item	Description
Spindle speed 50 to 15,000 min^{-1}	7/24 taper No. 40, 22/18.5 kW	Coolant nozzle	Flexible nozzles (5)
Rapid traverse X-Y: 40 m/min, Z: 32 m/min		In-machine chip conveyor (coil)	Table both sides
Spindle cooling system	Oil controller	Coolant tank	Tank with chip pan
Air cleaner (filter)	Including regulator	ATC air blower (blast)	
Spindle oil-air lubrication system		Chip air blower (blast)	Nozzle type
Spindle thermal deformation control (TAS-S)		Foundation washers (with jack bolts)	8 pcs
Thermo active stabilizer construction (TAS-C)		2-lamp status indicator	CE compliant (LED signal tower)
Automatic tool changer	32-tool magazine	Work lamp	
ATC magazine shutter		Full enclosure shielding	With ceiling
Tool unclamp package		Tapered bore cleaning bar	
Coolant supply systems tank capacities*1	M460-VE-e: 190 L (100 L effective), 250-W pump	Hand tools	
	M560-V-e: 230 L (120 L effective), 250-W pump	Tool box	
	M660-V-e: 460 L (270 L effective), 250-W pump	Operation panel with color LCD	
Thru-spindle coolant*2	1.5 MPa (medium pressure, large volume)	Pulse handle	

*1. Use water-based coolant. *2. Okuma pull studs required.

GENOS M460-VE-e & M560-V-e, M660-V-e "Package" Specifications (Europe Package Specs)

Item	Description
15,000 min^{-1} spindle	
32-tool ATC	
Shower coolant supply	
In-machine chip conveyor (coil)	Table both sides
1.5 MPa thru-spindle coolant	Large volume
Air blow during spindle rotation	Thru-spindle
Transformer	

Lift-up chip conveyor (Optional)



For reliable and efficient handling of chips from machine tools.

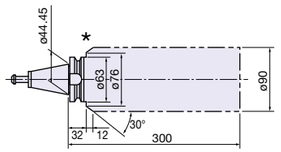
Conveyor Type	Remarks
Hinge A hinged steel belt conveyor suitable for steel chips in various shapes and lengths (coils/curls, short/medium/long)	To easily handle hot, wet or dry chips, or other scrap material from milling, boring, drilling and other machining center operations.

ATC tool dimensions

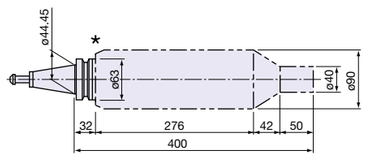
Max tool size
In tool magazine (with adjacent tools)

Unit: mm

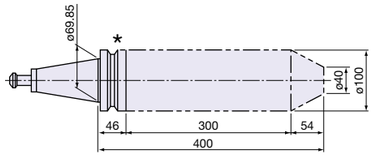
● **GENOS M460-VE-e / M560-V-e**



● **GENOS M660-V-e (No. 40)**

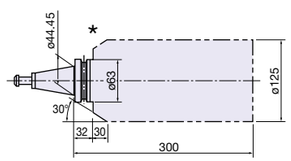


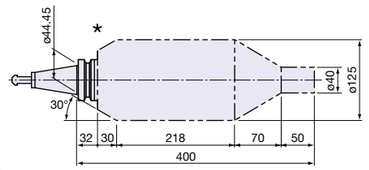
● **GENOS M660-V-e (No. 50)**

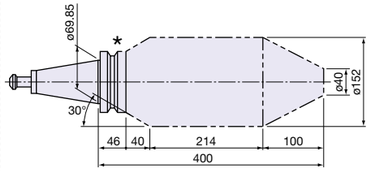


Max single tool size
(Without adjacent tools)

Unit: mm



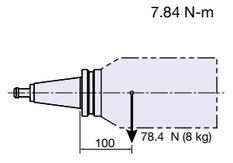




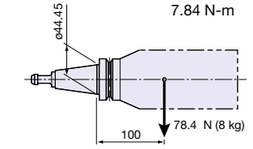
* Commercially available milling chucks may interfere with the ATC tool change arm and tooling outer portions. Please check dimensions with tool manufacturer documentation before use.

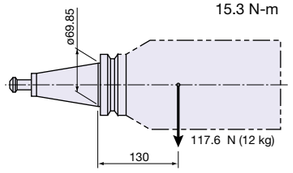
Max tool mass moment

Unit: mm



Mass including shank may be up to 78.4 N (8 kg), and the position of center of gravity at that time may be up to 100 mm from the datum diameter (ø44.45).





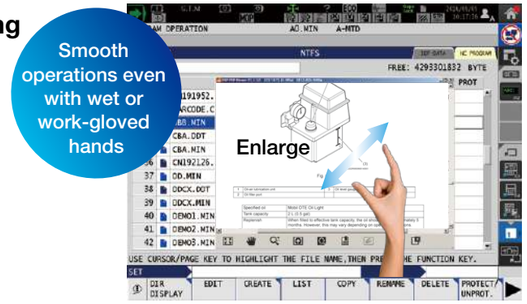
Mass including shank may be up to 117.6 N (12 kg), and the position of center of gravity at that time may be up to 130 mm from the datum diameter (ø69.85).

With revamped operation and responsiveness— ease of use for machine shops first!

Smart factories implement advanced digitization and networking (IoT) in manufacturing to achieve enhanced productivity and added value. The OSP has evolved tremendously as a CNC suited to advanced intelligent technology. Okuma's new control uses the latest CPUs for a tremendous boost in operability, rendering performance, and processing speed. The OSP suite also features a full range of useful apps that could only come from a machine tool manufacturer, making smart manufacturing a reality.

Smooth, comfortable operation with the feeling of using a smart phone

Improved rendering performance and use of a multi-touch panel achieve intuitive graphical operation. Moving, enlarging, reducing, and rotating 3D models, as well as list views of tool data, programs, and other information can be accomplished through smooth, speedy operations with the same feel as using a smart phone. The screen display layout on the operation screen can also be changed to suit operator preferences and customized for the novice and/or veteran machinists.

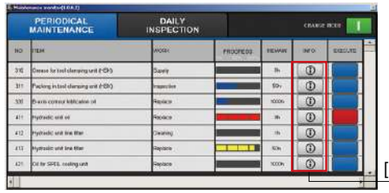


"Just what we wanted."— Refreshed OSP suite apps

This became possible through the addition of Okuma's machining expertise based on requests we heard from real, machine-shop customers. The brain power packed into the CNC, built by a machine tool manufacturer, will "empower shop floor" management.

Routine inspection support
Maintenance Monitor

The Maintenance Monitor displays items for inspections before starting daily operation and regular inspections and the rough estimate of inspection timing. Touching the [INFO] button displays the PDF instruction manual file of relevant maintenance items.



[INFO] button

Increased productivity through visualization of motor power reserve
Spindle Output Monitor

Monitoring operating status even when away from the machine
E-mail Notification

Comment display for greater ease of use and faster work
Common Variable Monitor

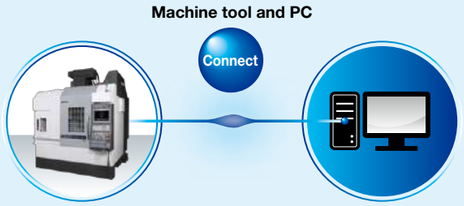
Automatic saving of recorded alarms
Screen Capture

Easy programing without keying in code
Scheduled Program Editor

Get Connected, Get Started, and Get Innovative with Okuma "*Monozukuri*"
Connect Plan

Connect, Visualize, Improve

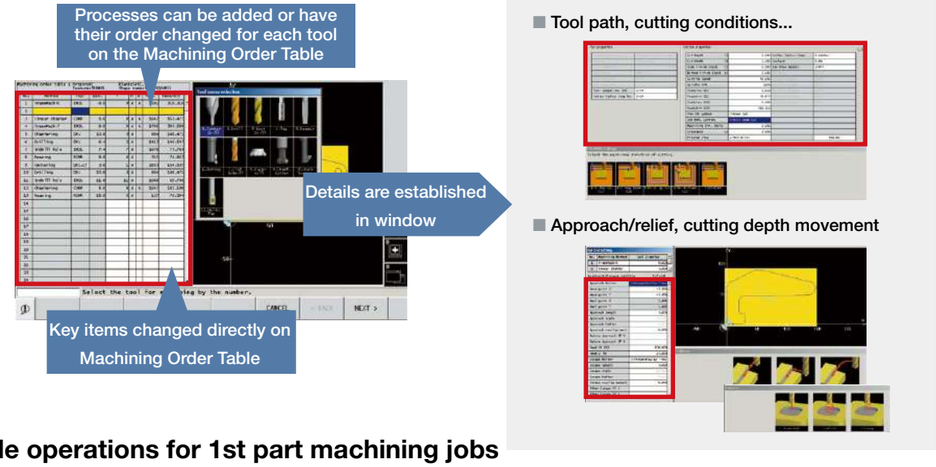
Okuma's Connect Plan is a system that provides analytics for improved utilization by connecting machine tools and visual control of factory operation results and machining records. Simply connect the OSP and a PC and install Connect Plan on the PC to see the machine operation status from the shop floor,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



Interactive operations
Advanced One-Touch IGF-M (Optional)

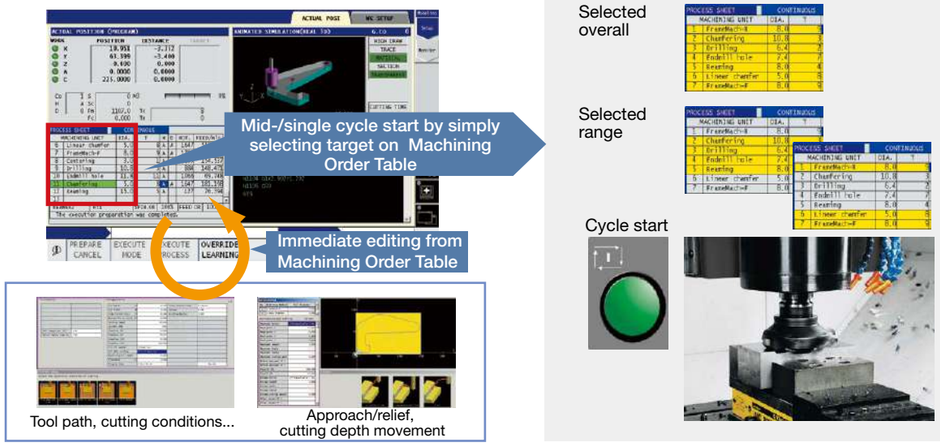
The objective: simple programming

Machining processes can be newly added or revised on the Machining Order Table.
Each process can be set freely with tool units, and knowhow can be input with the edit function with a high degree of freedom.
The recommended value is automatically set when new additions are made.



Simple operations for 1st part machining jobs

Can be operated directly from Machining Order Table.
When a problem is detected it can be quickly corrected and checked, speeding up first part machining.



Standard Specifications

Basic Specs	Control	X, Y, Z simultaneous 3-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 unit: 0.001 mm, 0.01 mm, 1 mm, 0.0001˚, 0.001˚, 1˚
	Feed	Cutting feed override 0 to 200%, rapid traverse override 0 to 100%
	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
	Self-diagnostics	Automatic diagnostics and display of program, operation, machine, and NC system faults
Programming	Program capacity	Program storage: 4 GB, operation buffer: 2 MB
	Program operations	Program management, editing, multitasking, scheduled program, fixed cycle, G-/M-code macros, arithmetic, logic statements, math functions, variables, branch commands, coordinate calculate, area calculate, coordinate convert, programming help
Operations	“suite apps”	Applications to graphically visualize and digitize information needed on the shop floor
	“suite operation”	Highly reliable touch panel suited to shop floors. One-touch access to suite apps.
	Easy Operation	One series of operations completed with a single screen (single mode operation) Comprehensive management of tool shape and tool compensation information for each tool number Tool data shared between machining and Advanced One-Touch IGF (optional) Machine operating panel achieves sure machine operations
	Machine operations	MDI, manual (rapid traverse, manual cutting feed, pulse handle), load meter, operation help, alarm help, sequence return, manual interrupt/auto return, pulse handle overlap, parameter I/O, self-diagnostics, PLC monitor, Easy Setting of Cycle Time Reduction
	MacMan	Machining management: machining results, machine utilization, fault data compile & report, external output
Communications / Networking		USB (2 ports), Ethernet
High speed/accuracy specs		TAS-S (Thermo Active Stabilizer—Spindle), TAS-C (Thermo Active Stabilizer—Construction), Hi-G Control, Hi-Cut Pro
Energy-saving function	ECO suite	ECO Idling Stop*1, ECO Power Monitor*2

*1. Spindle cooler Idling Stop is used on TAS-S machines.
*2. The power display shows estimated values. When precise electrical values are needed, select the wattmeter option.

3D-E Kit Specifications (Europe Package Specs)

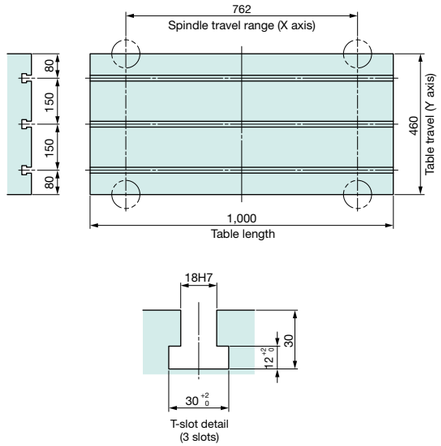
OSP-P300MA-e

Item	Description
Auto program schedule update	To change a part program during a scheduled run
Coordinate system selection	100 sets (Std: 20 sets)
Helical cutting	To machine large-diameter screws with angular cutters
Synchronized Tapping Ⅱ	Fast & accurate rigid tapping (synchronized spindle speed, angle, feed axis position)
Programmable travel limits	Per G22, G23
Arbitrary angle chamfering	Easy any-angle chamfering (C, R)
Tool life management	Tools automatically replaced per No. of workpieces or cycle times
Auto power shut-off	At auto run end or preset times
Sequence stop	Machining stopped at designated sequence No.
Real 3-D simulation	Real time simulation of all machining modes (auto, MDI, manual)
I-MAP	Easy part program editing per guide maps (with drawing calculate)
Simple load monitor	Spindle load (stops machining at overload)
NC operation monitor	Time totals (cutting, operation, spindle rotation, external input, etc) and 4 workpiece counters
Cycle time reduction	Reduces/shortcuts operation procedures
Tool breakage detection (touch sensor)	Includes auto tool offset
Auto gauging (preps)	Includes auto zero offset
Mulitiple languages	15 languages available

Optional Specifications

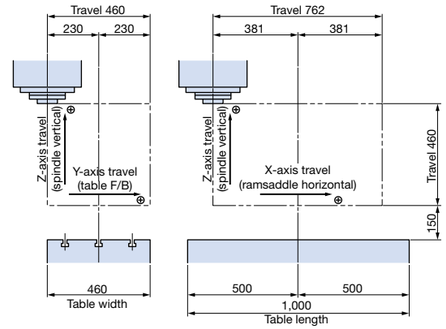
Interactive functions		**External I/O communication**	
Advanced One-Touch IGF-M	Conversational programming and machine operations	DNC-DT	
		DNC-T3	
Programming		**High-speed, high-precision**	
Program notes (MSG)	Message displayed on screen by part program	Hyper-Surface	Fast, high-precision applications (shape comp, adaptive control)
Coordinate system selection	200 sets (Std: 20 sets)	**ECO suite (energy saving functions)**	
3-D circular interpolation		ECO Operation	
Cylindrical side facing	Easier to execute	ECO Power Monitor	On-machine wattmeter
Slope machining		**Operations**	
Skip function	G31	Sequence operation	Sequence restart (Std)
Drawing conversion	Programmable mirror image		Mid-block restart
	Enlarge/reduce	Block skip	3 sets
Program branch; 2 sets		External M signals	4 signals, 8 signals
F1-digit feed	Parameter	**Other**	
User task 2	I/O variables (16 each)	Additional axis for rotary table	1 additional axis
Monitoring		OSP-VPS (Virus Protection System)	
Machining Navi M-gⅡ+ (cutting condition search)	From chatter to optimum spindle speed		
Manual gauging (w/o sensor)			
Interactive gauging	Touch-sensor, touch-probe required		

Table size

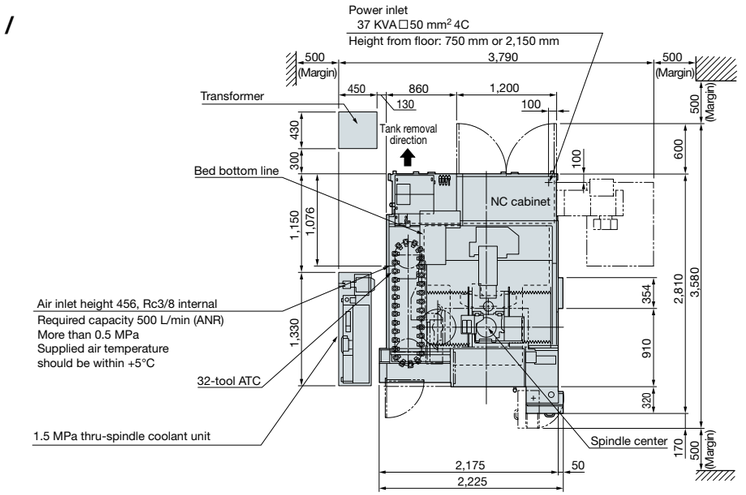


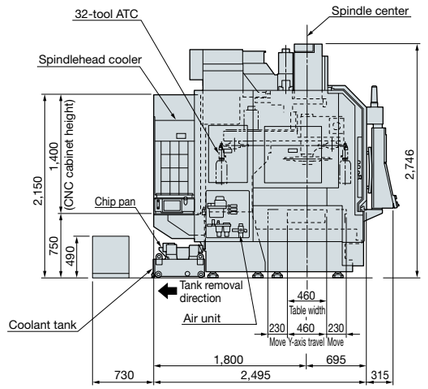
Working ranges

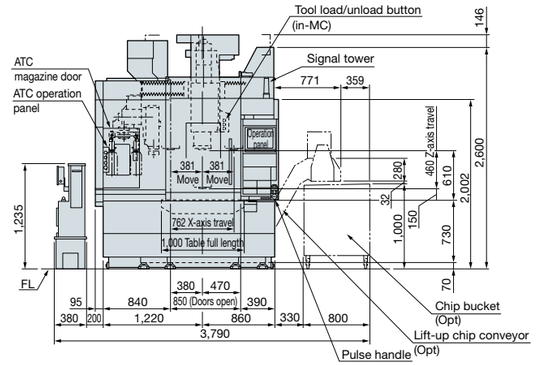
Unit: mm



Dimensional drawing / Installation drawing







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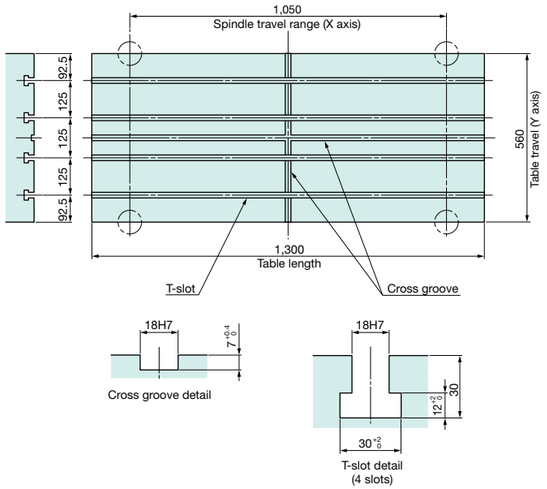

Working ranges

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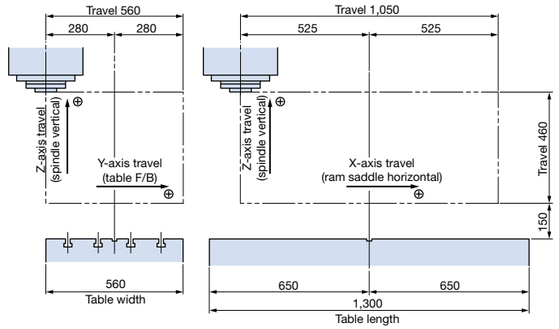
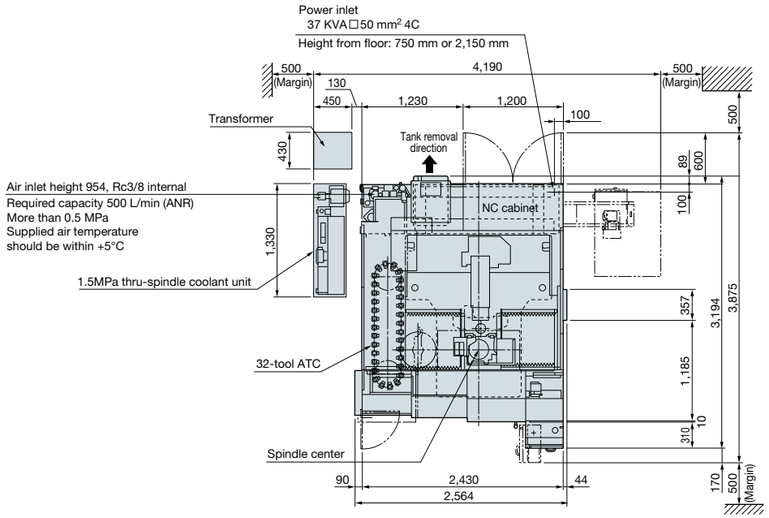
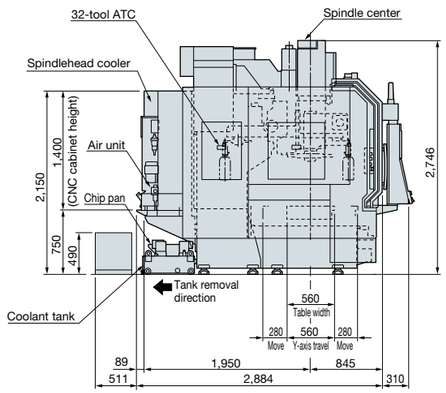
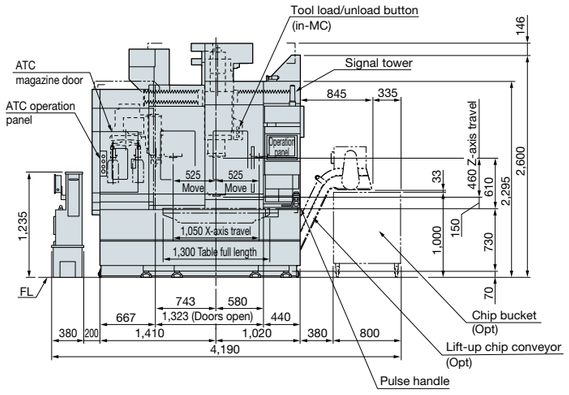


Dimensional drawing / Installation drawing







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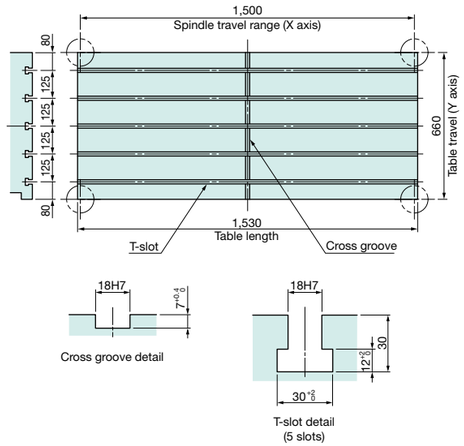

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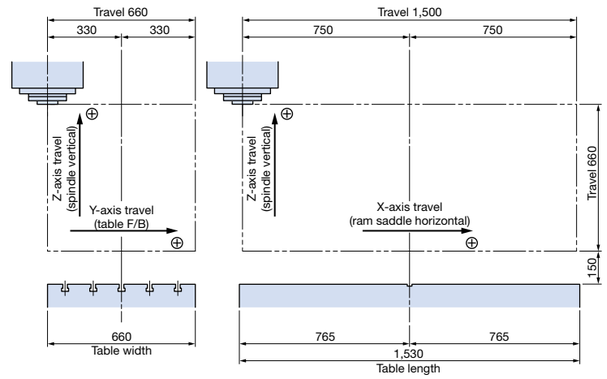
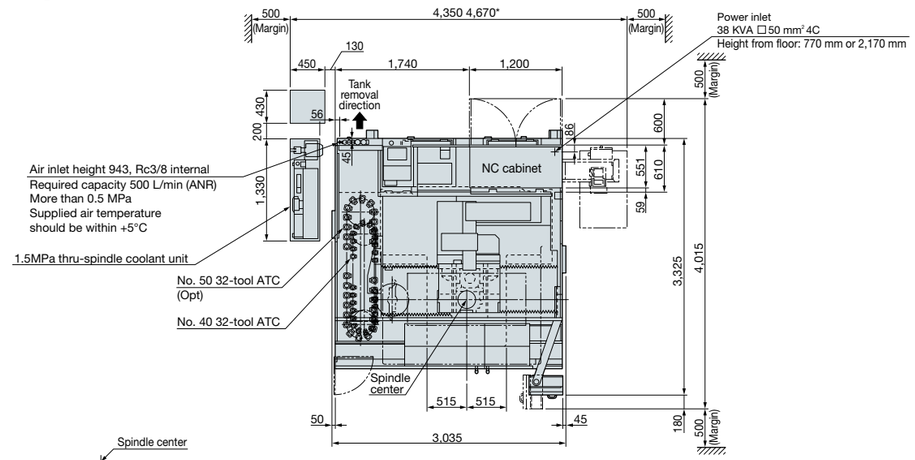
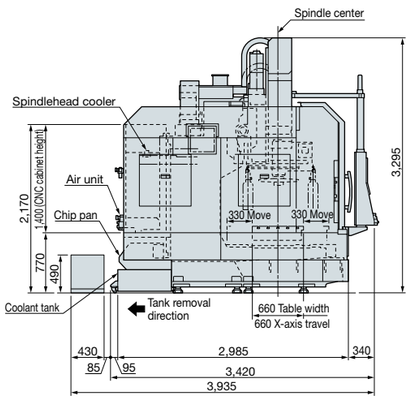
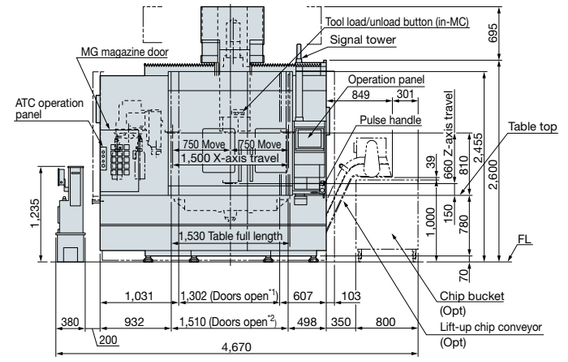


Dimensional drawing / Installation drawing







*1. Door opening operation
*2. Maximum door open width

GENOS M series

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

● The specifications, illustrations, and descriptions in this brochure vary in different markets and are subject to change without notice.
Pub.No.GENOS-M-e-E-(15a)-300 (Aug 2019)

GENOS

The origin of gene, from Greek *genos*
meaning race, offspring, origin
(pronounced "*γένος*" as in "generous")

Global
Efficient
No.1
Standard

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