

Vertical Machining Centers with 2-APC

ACE CENTER MF-46VA/B





Thermo-Friendly
Concept



Collision Avoidance
System



Machining
Navi



Photographs used in this brochure may show optional equipment.

Sharp vertical machining centers
with smart 2-pallet rotary-shuttle APCs—
designed for easy production-line applications

ACE CENTER MF-46VA/B

Line Applications

- Easy system configuration and automation
- Maintenance free on both sides, enabling parallel installation.
- Space saving machine width of **2,100 mm** (83 in.)

High Accuracies

- Thermo-Friendly Concept
- Machining dimensional change over time: less than **8 μm** (0.00032 in.)
- Tapered-cone positioning enables highly accurate APC

High Speeds

- High-speed 2-APC APC time: 9 sec
- Acceleration: **Max 0.7 G**
- Rapid traverse: **40 m/min** (1,575 ipm) (X-Y)

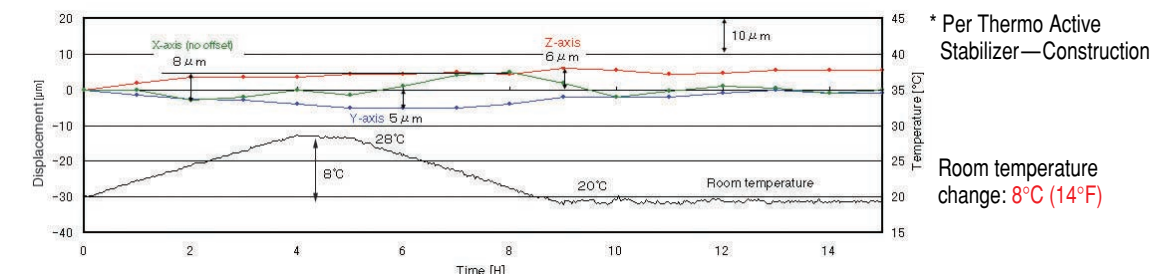
High Accuracies

Introducing Okuma's

Thermo-Friendly Concept

For incredibly low **Machining dimensional change over time:**

Less than 8 μm* (0.00032 in.) (actual)

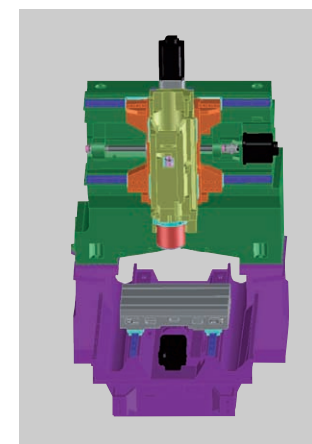


* Per Thermo Active
Stabilizer—Construction

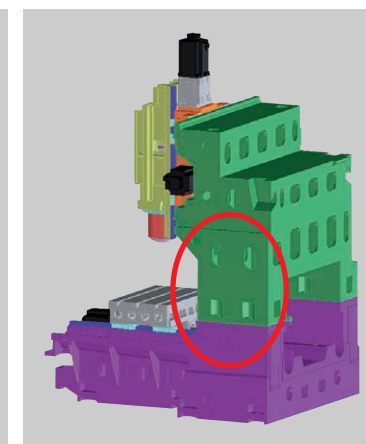
Room temperature
change: 8°C (14°F)

Thermo-Friendly Construction (TFC)

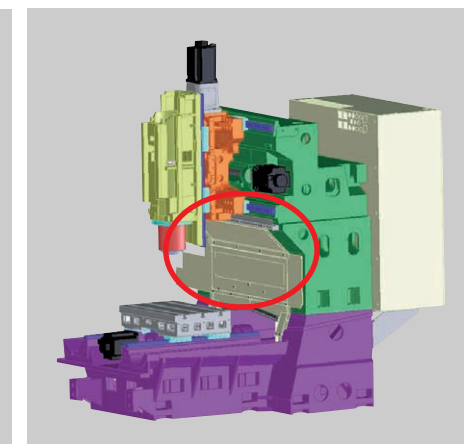
- Thermally symmetric and "box-build" structure
- Thermally balanced structure
- Cooling unit and NC control box designed to dissipate heat
- Structure that isolates heat from coolant and chips



Thermally symmetric

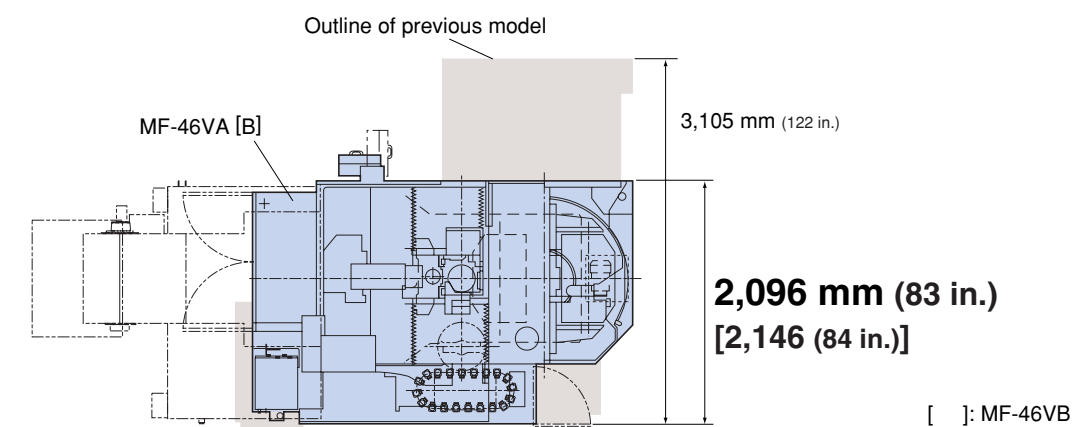


"Box-build"



Thermally balanced

Production line length reduced by 30%



[]: MF-46VB

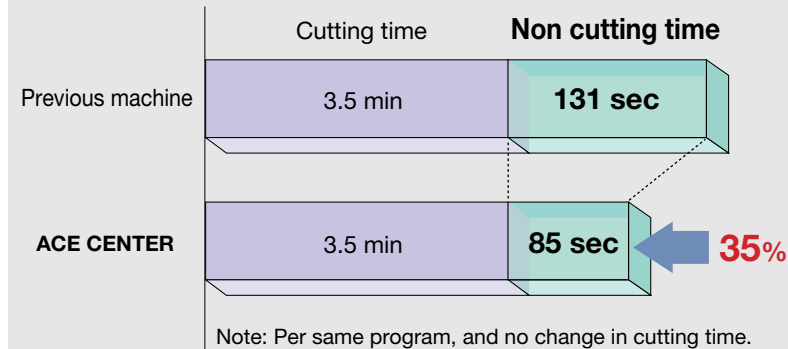
Faster operation

35% less non-cutting time

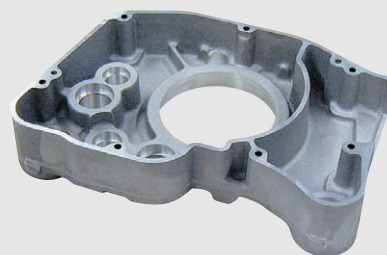
■ 2-APC	APC time (workpiece load/unload time) : 9 sec
■ Acceleration	Max 0.7 G
■ Rapid traverse	40 m/min (1,575 ipm) (X-Y)
■ ATC time* (T-T)	1.2 sec
(C-C)	3.2 sec
■ Spindle accel/decel	1.2 sec (0↔8,000 min ⁻¹)
*MF-46VA	

Process time comparison

35% less



Sample workpiece



- No. of tools used: 4 tools in 1st operation
6 tools in 2nd operation
- Workpiece size: 350 x 200 x 60 mm
(13.78 x 7.87 x 2.36 in.)

Machining capacity

Cutting capacities [Actual data*]

504 cm³/min (ø80-mm face mill, matl: S45C)

672 cm³/min (ø20-mm roughing end mill, matl: S45C)

15,000 min⁻¹ (No. 40) wide-range spindle (Optional)

15,000 min⁻¹ (No. 40) wide-range spindle (optional)

Tool	Spindle min ⁻¹	Cutting m/min	Feedrate mm/min	Width mm	Depth mm	Chips 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	720	142	108	—	—	—
Tap M30P3.5	318	30	1,113	—	—	66% (Spindle load)

(Workpiece material: S45C)

8,000 min⁻¹ (No. 40) / 6,000 min⁻¹ (No. 50) high power spindle (standard)

Tool	Spindle min ⁻¹	Cutting m/min	Feedrate mm/min	Width mm	Depth mm	Chips cm ³ /min
ø80 face mill 8 blades (cermet)	895	225	2,600	56	2.5	364
ø20 roughing end mill 7 flutes (carbide)	3,660	230	4,300	4	20	344
ø50 insert drill	1,000	157	150	—	—	—
Tap M30P3.5	318	30	1,113	—	—	60% (Spindle load)

(Workpiece material: S45C)

12,000 min⁻¹ (No. 50) wide-range spindle (optional)

Tool	Spindle min ⁻¹	Cutting m/min	Feedrate mm/min	Width mm	Depth mm	Chips 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	2,800	12	20	672
ø63 insert drill	909	180	137	—	—	—
Tap M36P4	106	12	424	—	—	—

(Workpiece material: S45C)

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

Powerful and highly rigid

Powerful, fast spindles

MF-46VA (No. 40)

Various spindles available

Standard: 8,000 min⁻¹, 11/7.5 kW (15/10 hp)

Wide-range: 15,000 min⁻¹, 22/18.5 kW (30/25 hp)

High-speed: 20,000 min⁻¹, 30/20 kW (40/27 hp)

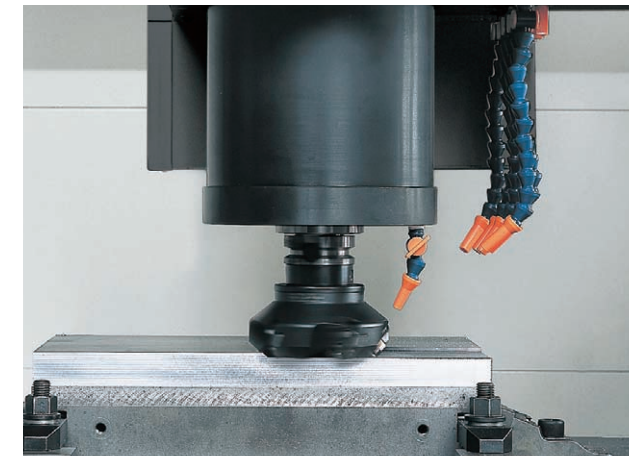
25,000 min⁻¹, 15/11 kW (20/15 hp)

35,000 min⁻¹, 15 kW (20 hp)

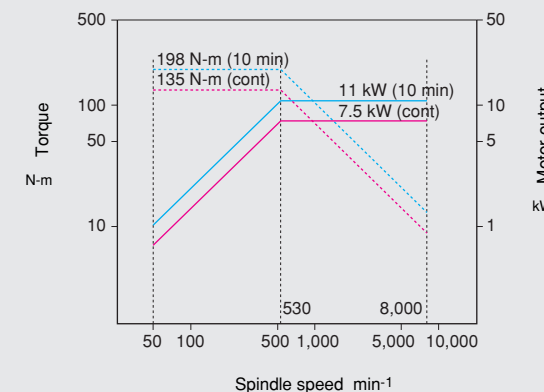
MF-46VB (No. 50)

Standard: 6,000 min⁻¹, 11/7.5 kW (15/10 hp)

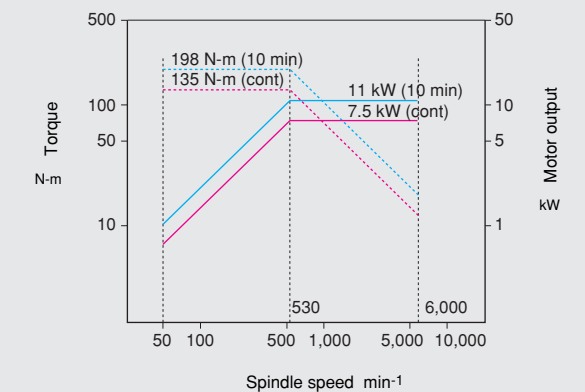
Wide-range: 12,000 min⁻¹, 26/18.5 kW (35/25 hp)



MF-46VA Standard spindle: 8,000 min⁻¹



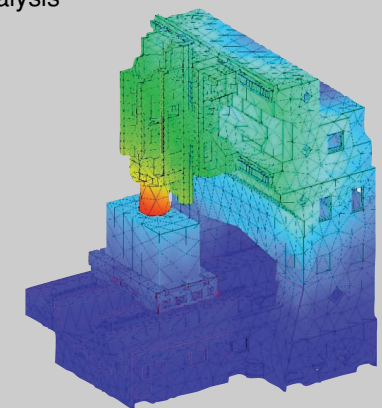
MF-46VB Standard spindle: 6,000 min⁻¹



Rugged machine construction

- Rugged machine structure developed using 3D-CAD and FEM analysis
- Same rugged column structure as used in our proven column machining centers
- Feed axis bearing brackets now part of the machine casting (not bolted on)

FEM analysis



Machine specifications

	Item	Unit	MF-46VA	MF-46VB
Travels	X-axis (saddle left/right)	mm (in.)	762 (30)	
	Y-axis (pallet front/back)	mm (in.)	560 <460+APC stroke 100> (22.04 <18.11+APC stroke 3.94>)	
	Z-axis (spindle up/down)	mm (in.)	460 (18.11)	
	Pallet surface to spindle nose	mm (in.)	Tap pallet: 180 to 640 [T-slot pallet: 150 to 610] (7.09 to 25.2 [T-slot pallet: 5.91 to 24.02])	
Pallet	Pallet size	mm (in.)	760 x 460 (29.92 x 18.11)	
	Floor to pallet top	mm (in.)	Tap pallet: 970 [T-slot pallet: 1,000] (38.19 [T-slot pallet: 39.37])	
	Max load capacity	kg	400 [T-slot pallet: 345]	
Spindle	Spindle speed	min ⁻¹	8,000 [15,000, 20,000, 25,000, 35,000]	6,000 [12,000]
	No. of spindle ranges		Infinitely variable	
	Tapered bore		7/24 taper No.40 [7/24 taper No. 40, HSK-A63, HSK-F63]	7/24 taper No.50 [7/24 taper No.50]
	Bearing dia	mm (in.)	ø70 [ø70, ø60] (ø2.76 [ø2.76, ø2.36])	ø90 [ø90] (ø3.54 [ø3.54])
Feed	Rapid traverse (X-Y-Z)	m/min (ipm)	X-Y: 40 (1,575) Z: 32 (1,260)	
	Cutting feedrate (X-Y-Z)	m/min (ipm)	X-Y-Z: 32 (1,260)	
Motors	Spindle (10 min/cont)	kW (hp)	11/7.5 [22/18.5, 30/22, 15/11, 15] (15/10 [30/25, 40/30, 20/15, 20])	11/7.5 [26/18.5] (15/10 [35/25])
	Feed axes (X-Y-Z)	kW (hp)	X-Y-Z: 4.0 (5.3)	
ATC	Tool shank type		MAS BT40 [HSK]	MAS BT50
	Retention knob type		MAS 2 [—]	
	Tool capacity	tools	20 [32, 48]	20 [32]
	Max tool dia (w/ adjacent tool)	mm (in.)	ø90 (ø3.54)	ø100 (ø3.94)
	Max tool dia (w/o adjacent tool)	mm (in.)	ø125 (ø4.92)	ø152 (ø5.98)
	Max tool length	mm (in.)	300 (11.81)	
	Max tool weight	kg (lb)	8 (18)	12 (26)
	Max tool moment	N·m (ft·lb)	7.8 {8 kg x 100 mm} (5.7 {17.6 lb x 3.94 in.})	15.3 {12 kg x 130 mm} (11.3 {26.4 lb x 5.12 in.})
	Tool selection		Memory random	
Machine	Height	mm (in.)	2,946 (115.98)	
	Floor space W x D	mm (in.)	2,406 x 3,270 (94.72 x 128.74)	2,456 x 3,270 (96.69 x 128.74)
	Weight	kg (lb)	9,700 (21,340)	9,900 (389.76)
	Control system		OSP-P300M	

[] : Optional

Standard specifications / accessories

Item	Remarks	Item	Remarks
Spindle speed 50 to 8,000 min ⁻¹	No. 40, 11/7.5 kW (15/10 hp) (-46VA)	Chip air blower	Nozzle type
Spindle speed 50 to 6,000 min ⁻¹	No. 50, 11/7.5 kW (15/10 hp) (-46VB)	Work lamp	LED
Rapids X-Y: 40, Z: 32 m/min		Chip flusher system *2	Table left/right, pump 1.1/1.5 kW (50/60 Hz)
Spindlehead cooling system	Oil controller	Chip pan	Effective: 70 L
Air cleaner (filter)	Including regulator	Foundation blocks	(with jack bolts) 10 pcs
Spindle oil-air lubricator		3-lamp status indicator	Type C (LED signal tower)
Color LCD operation panel			Red - alarm, yellow - end, green - running
Pulse handle			
Tapered bore cleaning bar		ATC	20-tool magazine
Hand tools		ATC magazine shutter	
Tool box		Tool unclamp package	
APC hydraulic unit		2-pallet rotary-shuttle APC	
Coolant system	5-nozzle, 440 L tank (220 L effective), pump 250 W *1	Pallets for above	Metric tap, 2 pcs
ATC air blower	Spindle hole only	2-pallet rotary-shuttle APC cover	W/o hydraulic/pneumatic lines
		Full enclosure shielding	With ceiling (fully enclosed)

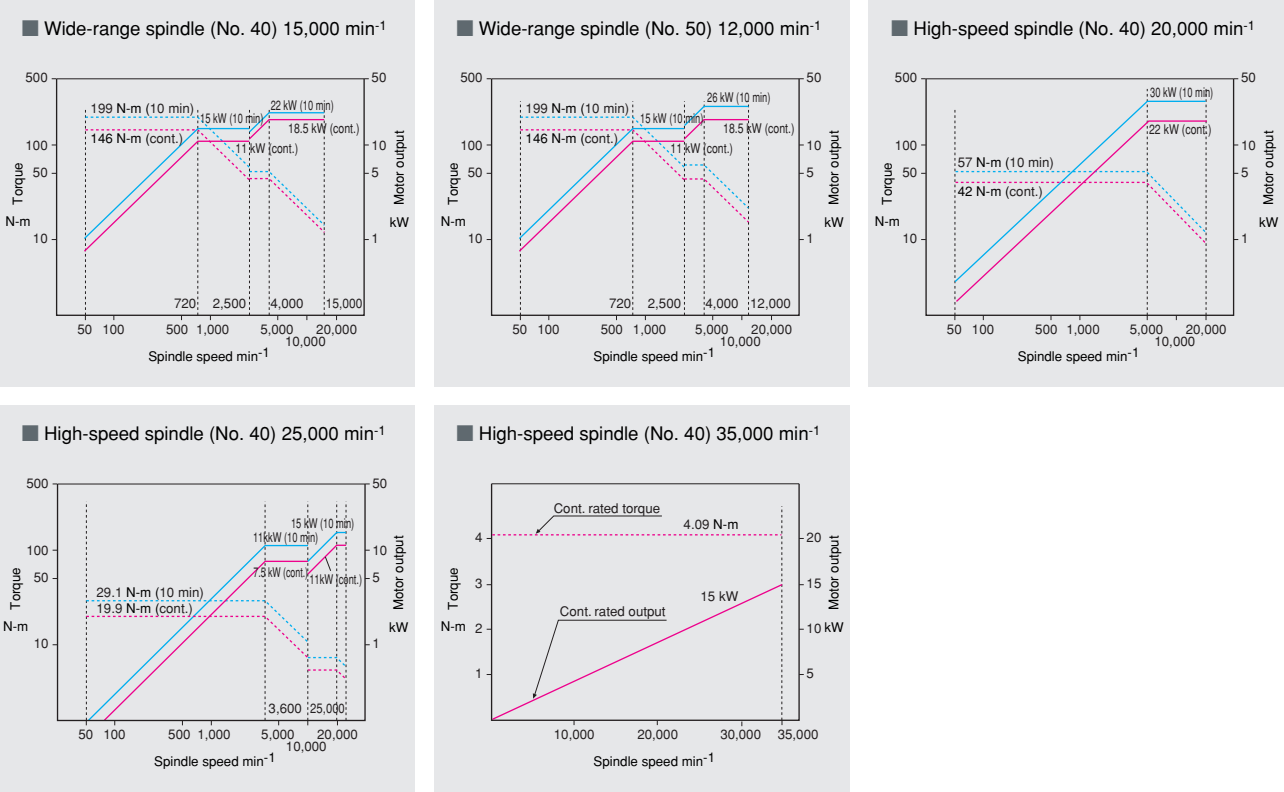
*1. Pump capacity may need increasing when using an oil-based coolant.
*2. Use an in-machine coil type chip conveyor when using an oil-based coolant.
Note: Oil-based coolants are highly flammable, so fire prevention measures must always be taken when using these coolants. Do not operate unattended.

Optional specifications / accessories

Item	Remarks	Item	Remarks
Spindles available:		Index table	
Wide-range 50 to 15,000 min ⁻¹ △	VAC 22/18.5 kW, No. 40, HSK-A63	Thru-spindle coolant	* Specify 1.5 or 7.0 MPa 25,000 min ⁻¹ specs for HSK-A63 only
High-speed 50 to 20,000 min ⁻¹ △	VAC 30/22 kW, HSK-A63, BIG-PLUS® (No. 40)	Chip air blower (adapter)	Not available with thru-spindle coolant specs
High-speed 50 to 25,000 min ⁻¹ △	VAC 15/11 kW, HSK-A63, BIG-PLUS® (No. 40)	Oil mist unit	
High-speed 35,000 min ⁻¹ △	VAC 15 kW (20 hp), No. 40, HSK-F63	Mist collector	
Wide-speed 50 to 12,000 min ⁻¹ △	VAC 26/18.5 kW (35/25 hp), No. 50		
Dual contact spindle △	HSK, BIG-PLUS®, SuperBT	Semidry machining	
Die/mold & find-feed specs△	X-Y-Z rapids: 20 m/min	Shower coolant	
Die/mold kits	Die/mold & find-feed specs	Workpiece wash gun	
	AbsoScale	In-machine chip conveyor (coil) △	Table L/R
	Super-NURBS	Lift-up chip conveyors △	Hinge, scraper, drum filter
	0.1 μm feedback	Chip bucket for above △	
	DNC-DT (additional option)	Dust collector	
ATC magazine capacities△	32-tool (48-tool available for MF46VA)	Tool breakage detection & auto tool length compensation	Based on touch sensor
Pull stud specs △	MAS1 * JIS * CAT * DIN	Auto zero offset & auto gauging	Based on touch probe (Renishaw)
Attachment preps	Accelerator attachment	Setup station auto door O/C	
	Angle-head attachment	Pallet top setup hydraulic piping	Requires consultation
	Oil-hole supplier		
AbsoScale	X-Y-Z axes	Chemica anchors	
Pallet top: T-slot type	T-slot type	Work lamp	Added to right side
NC rotary table	Specify chuck, tailstock requirements, rotarty table type		
Install work for above			

△ : Corresponding standard specification is deleted.
* : Okuma pull studs required.

Output / Torque diagrams



Maximum tool dimensions

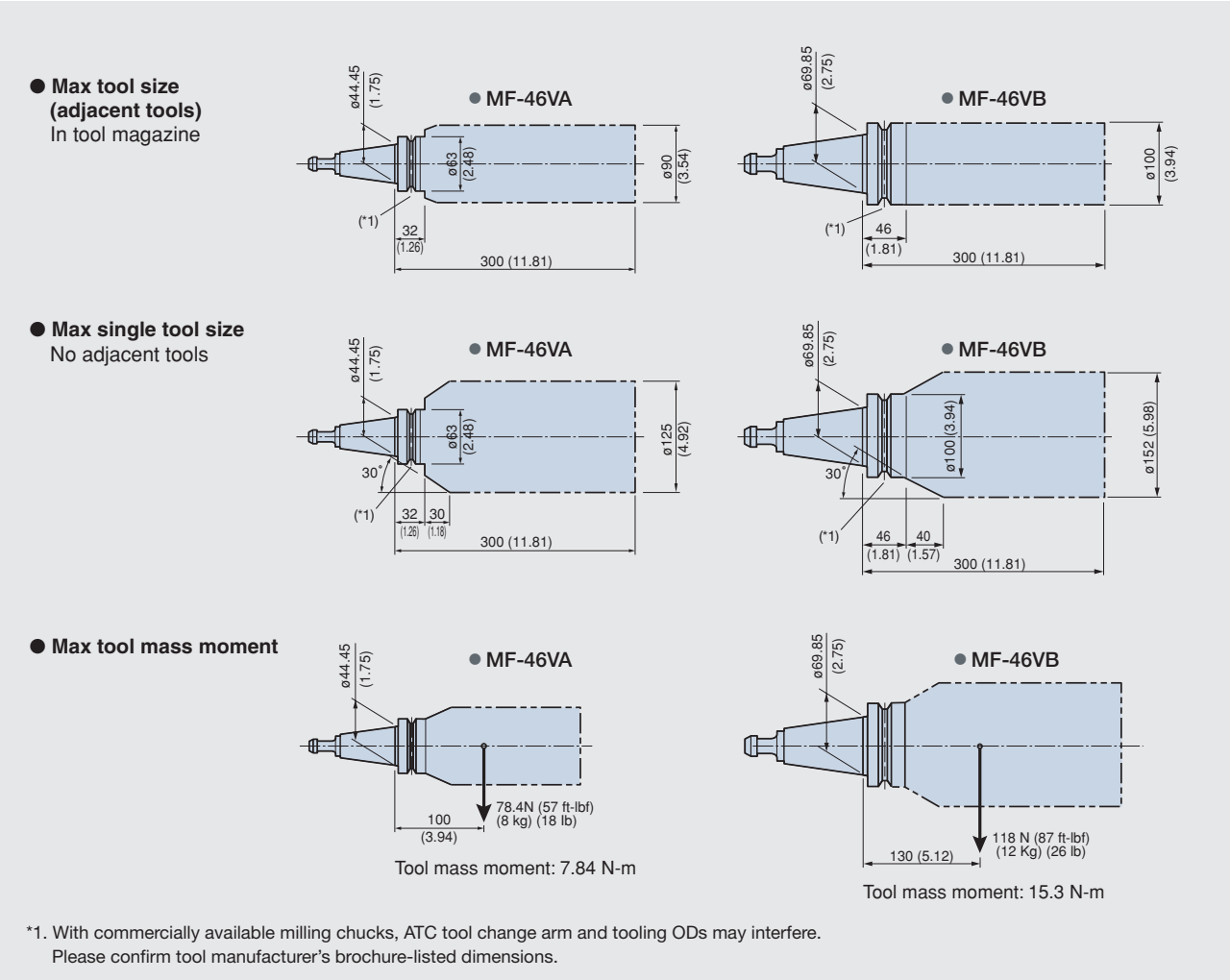
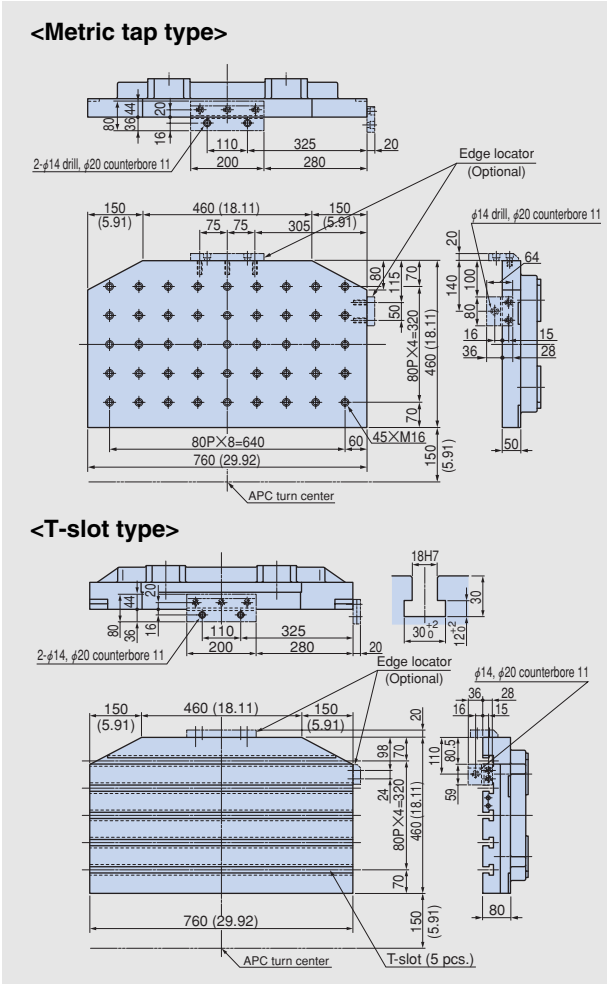
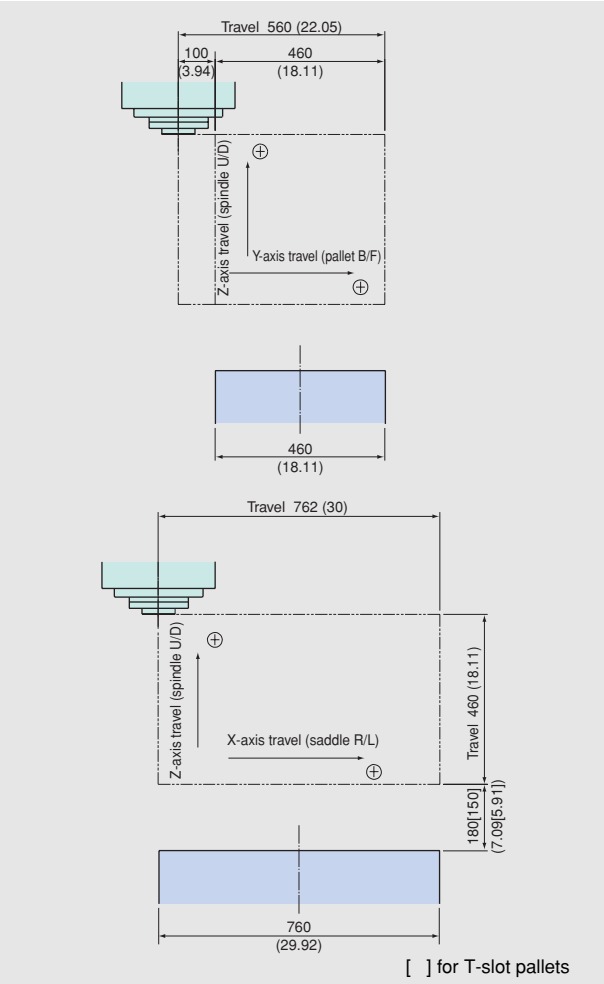


Table dimensions



Working ranges



Recommended chip conveyors (Please contact an Okuma sales representative for details) ○: Standard △: Selectable

Material		Steel	FC	AL/Nonferrous metal	Mixed (general use)
Chip shape					
In-machine chip disposal	Chip flusher (Std)	—	○(wet)	○	—
	Coil (Opt)	○	○(dry/wet)	—	○
Off-machine chip disposal (optional)	Hinge	○	—	—	△ (*4)
	Scraper	—	○(dry)	—	—
	Scraper (drum filter)	—	○(wet) with magnet	△ (*3)	—
Hinge + Scraper (drum filter)		△ (*1)	△(wet) (*2)	○	○

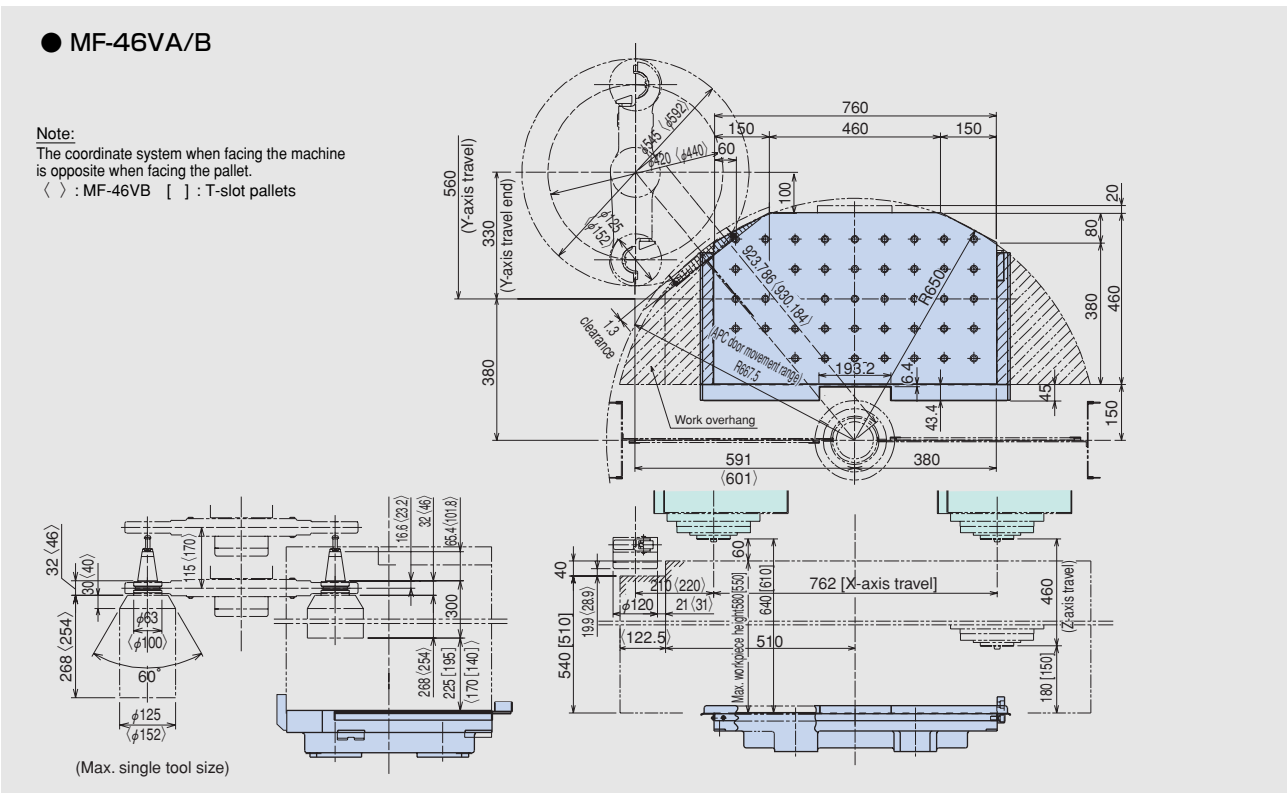
*1. When there are many fine chips *2. When chips are longer than 100 mm *3. When chips are not longer than 100 mm *4. When there are few fine chips

Typical off-machine chip discharge (lift-up conveyors)

Type	Hinge	Scraper	Scraper (drum filter)	Hinge + Scraper (drum filter)
Shape				

Note: The machine may need to be raised (platform) depending on the type of chip conveyor.

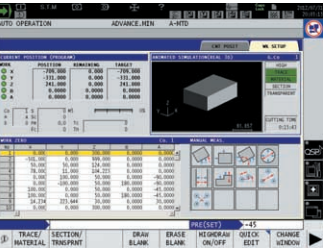
Max fixture/workpiece dimensions



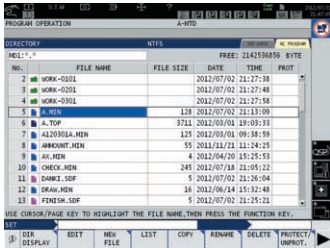
Satisfaction from complete control of a machine tool

As a “machine & control” builder, Okuma makes further strides in machine tool manufacturing with this superb Control featuring "Easy Operation." Okuma took a close look at the way machinists actually operate machine tools, to help them create smoother and more effective ways of producing parts. Novice operators as well as professional machinists get complete control—and satisfaction. Moreover, what you want to see and do conveniently come together in a “single-mode operation.” First, select one of three operation screens. Then simply touch the screen or press a function key to see and do your job.

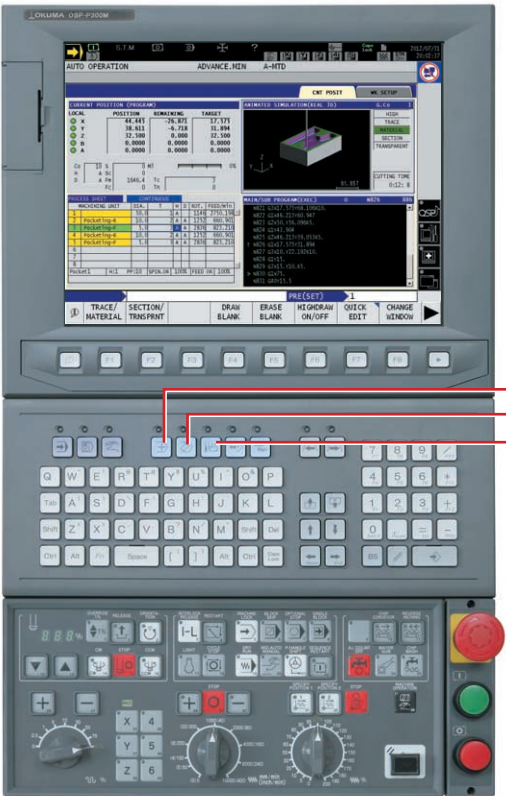
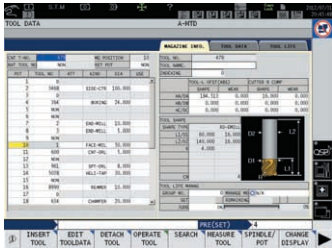
■ Setup operations
■ Trial/continuous cuts



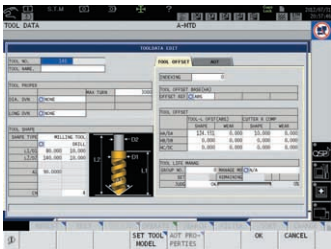
■ Programming



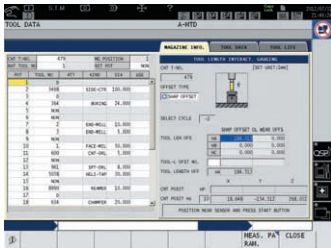
■ Tool preparations



Easy tool registration



With spreadsheet simplicity —tool offsets, tilt, shape, life, etc—all the tool data required to cut a part can be registered here. Since the registered tool data is also used by Okuma auto programming (Advanced One-Touch IGF) and a collision check function (Collision Avoidance System), this screen will complete the entire registering process.



The touch sensor screen pops up from the tool registration screen. Tool compensation values are set while looking at a guidance message.

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 inputs	8-digit decimal, ±99999.999 to 0.001 mm (3937.0078 to 0.0001 in.), 0.001° Decimals as: 1 μm, 10 μm, 1 mm (0.0001, 1 in.) (1°, 0.01°, 0.001°)
	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 + touch panel operations
	Self-diagnostics	Automatic diagnostics and display of program, operation, machine, and NC system faults
	Program capacity	Program storage capacity: 4 GB; operation backup capacity: 2 MB
Programming	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
	Easy Operation	“Single-mode operation” to complete a series of operations Comprehensive management of tool shape and tool compensation information for each tool number Tool data shared between machining, Advanced One-Touch IGF (optional), and Collision Avoidance System (optional) Advanced operation panel/graphics facilitate smooth machine control
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, PLC monitor
	MacMan	Machining management: machining results, machine utilization, fault data compile & report, external output
Communications / Networking		USB (2 ports), Ethernet, RS-232-C interface (1 channel)
High speed/accuracy specs		Hi-G Control, Hi-Cut Pro, pitch error compensation

Optional Specifications

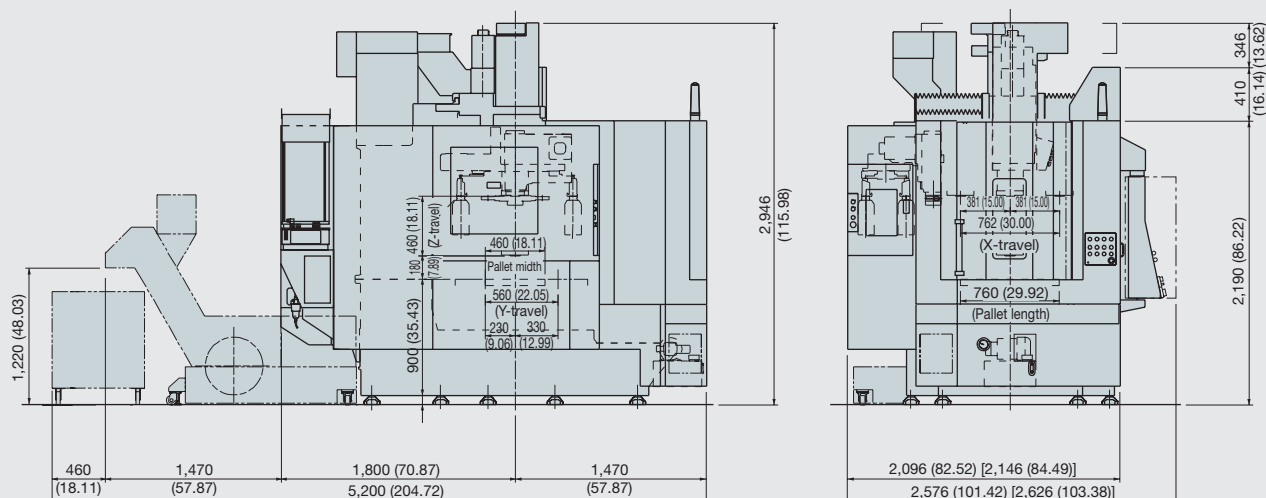
Item		Kit Specs*1		NML		3D		AOT	
		E	D	E	D	E	D	E	D
Interactive functions									
Advanced One-Touch IGF-M (Real 3-D simulation included)									
I-MAP									
Programming									
Auto scheduled program update									
Common variables	1,000 sets								
	(Std: 200 sets) 2,000 sets								
Program branch; 2 sets									
Program notes (MSG)									
Coordinate system select	100 sets								
	200 sets								
(Std: 20 sets) 400 sets									
Helical cutting (within 360°)									
3-D circular interpolation									
Synchronized Tapping II									
Arbitrary angle chamfering									
Cylindrical side facing									
Slope machining									
Tool grooving (flat-tool free-shaped grooving)									
Tool max rotational speed setting									
F1-digit feed 4 sets, 8 sets, parameter									
Programmable travel limits (G22, G23)									
Skip (G31)									
Axis naming (G14)									
G/M-code macros									
3-D tool compensation									
Tool wear compensation									
Drawing conversion	Programmable mirror image (G62)								
	Enlarge/reduce (G50, G51)								
User task 2 I/O variables (16 each)									
Tape conversion*2									
Monitoring									
Real 3-D simulation									
Simple load monitor									
NC operation monitor									
Hour meters									
Operation end buzzer									
Work counter									
MOP-TOOL									
Tool life management									
Gauging									
Auto gauging									
Auto zero offset									
Tool breakage detection									
Gauging data printout									
Manual gauging (w/o sensor)									
Interactive gauging (touch sensor, touch probe required)									
External I/O communication									
Additional RS-232-C channel (Std specs include 1 channel)									
DNC-T3									
DNC-B (232C-Ethernet transducer used on OSP side)									
DNC-DT									
DNC-C/Ethernet									
Additional USB (Additional 2 ports, Std: 2 ports)									
Automation / untended operation									
Auto power shut-off									
M02 and END alarms, work preps done									
Warm-up (calendar timer)									
External program selection									
Button, rotary switch, digital switch, BCD (2-digit, 4-digit)									
Cycle time reduction (Ignores certain commands)									
Robot, loader I/F									
High-speed, high-precision									
AbsoScale detection									
X-, Y-, Z-axis									
Super-NURBS									
0.1 μm control (linear axis commands)									
TAS-S									
Thermo Active Stabilizer—Spindle									
TAS-C									
Thermo Active Stabilizer—Construction									
Other									
Control cabinet lamp (inside)									
Circuit breaker									
Sequence operation									
Sequence stop									
Upgraded sequence restart									
Mid-block return									
Pulse handles									
2 pcs, 3 pcs (Std: 1 pc)									
External M signals									
4, 8 signals									
Collision Avoidance System									
Machining Navi M-g, M-i (cutting condition search)									
One-Touch Spreadsheet									
Block skip; 3 sets									
Additional axes									
A, B, C axes [preps, specs]									
OSP-VPS									
Virus Protection System									

*1. NML: Normal, 3D: Real 3D simulation, E: Economy, D: Deluxe, AOT: Advanced One-Touch IGF-M
*2. *Requires technical consultation.

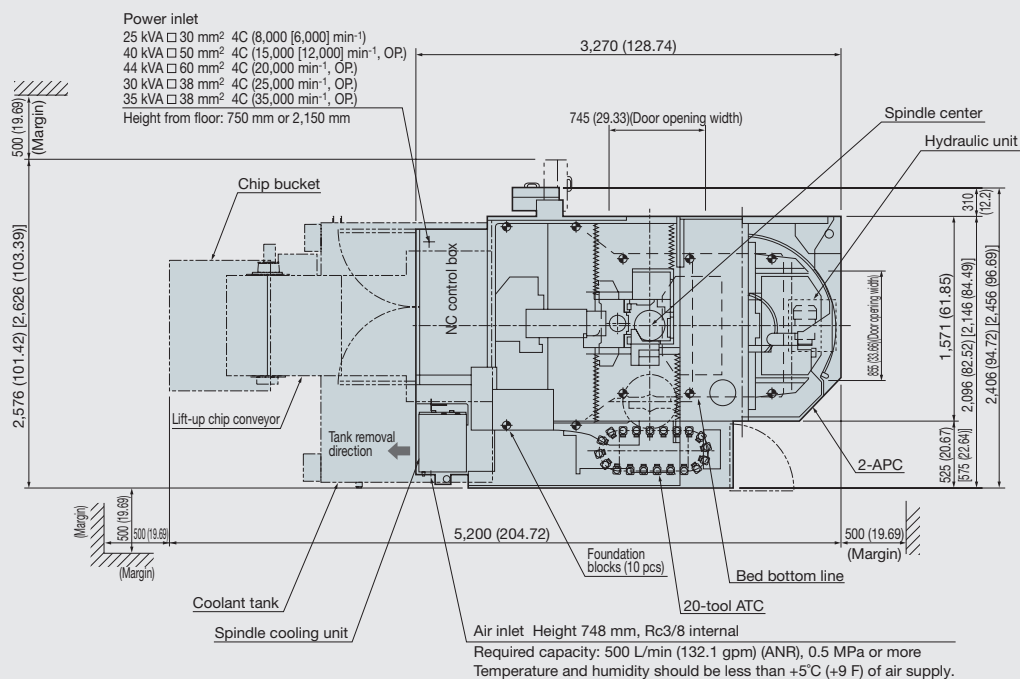
When using Okuma products, always read the safety precautions mentioned in the instruction manual and attached to the product.

● The specifications, illustrations, and descriptions in this brochure vary in different markets and are subject to change without notice.
Pub No. MF-46VA-E-(7a)-250 (Jun 2013)

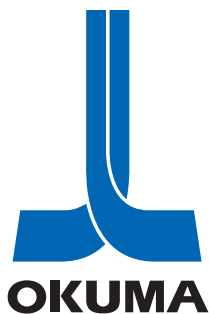
Dimensional drawing



Installation drawing



[]: MF-46VB



This product is subject to the Japanese government Foreign Exchange and Foreign Trade Control Act with regard to security controlled items; whereby Okuma Corporation should be notified prior to its shipment to another country.