Shibaura Machine

MPC-EII series

Double Column Type Machining Center

Shibaura Machine

View the Future with You

Crossrail-Elevated Double Column Type Machining Center MPC-EⅡ Series developed with Advanced Technologies

Crossrail elevation (1000mm) and ram travel (900mm) capable of machining in the range from a plate-like workpiece to a tall workpiece under the optimum conditions.

■ Wide range of machine size variations
◎The machine size can be variously changed by combining a distance between columns such as 2100mm, 2600mm, 3100mm, or 3600mm with various table sizes.

■ Spindle Variation
◎The attachment system including various types of attachments is adopted to be capable of a variety of machining.
Further, it is possible to machine multifaceted workpieces by using AAI (automatic attachment index) capable of indexing every 1° (option).

■ High Speed and High Torque Spindle
◎The spindle incorporated in the ram adopts maximum spindle speed of 4000min⁻¹ (standard) or 6000min⁻¹ (option). Each spindle having a large capacity of maximum torque of 1528 N-m exhibits excellent cutting performance.

■ Rapid feed performance
◎Rolling guides adopted for X, Y, and W axes
◎Rapid traverse (X, Y axis):
25 m/min (MPC-2140EII-3160E Ⅱ)

Crossrail-Elevated Double Column Type Machining Center
MPC-EⅡ series
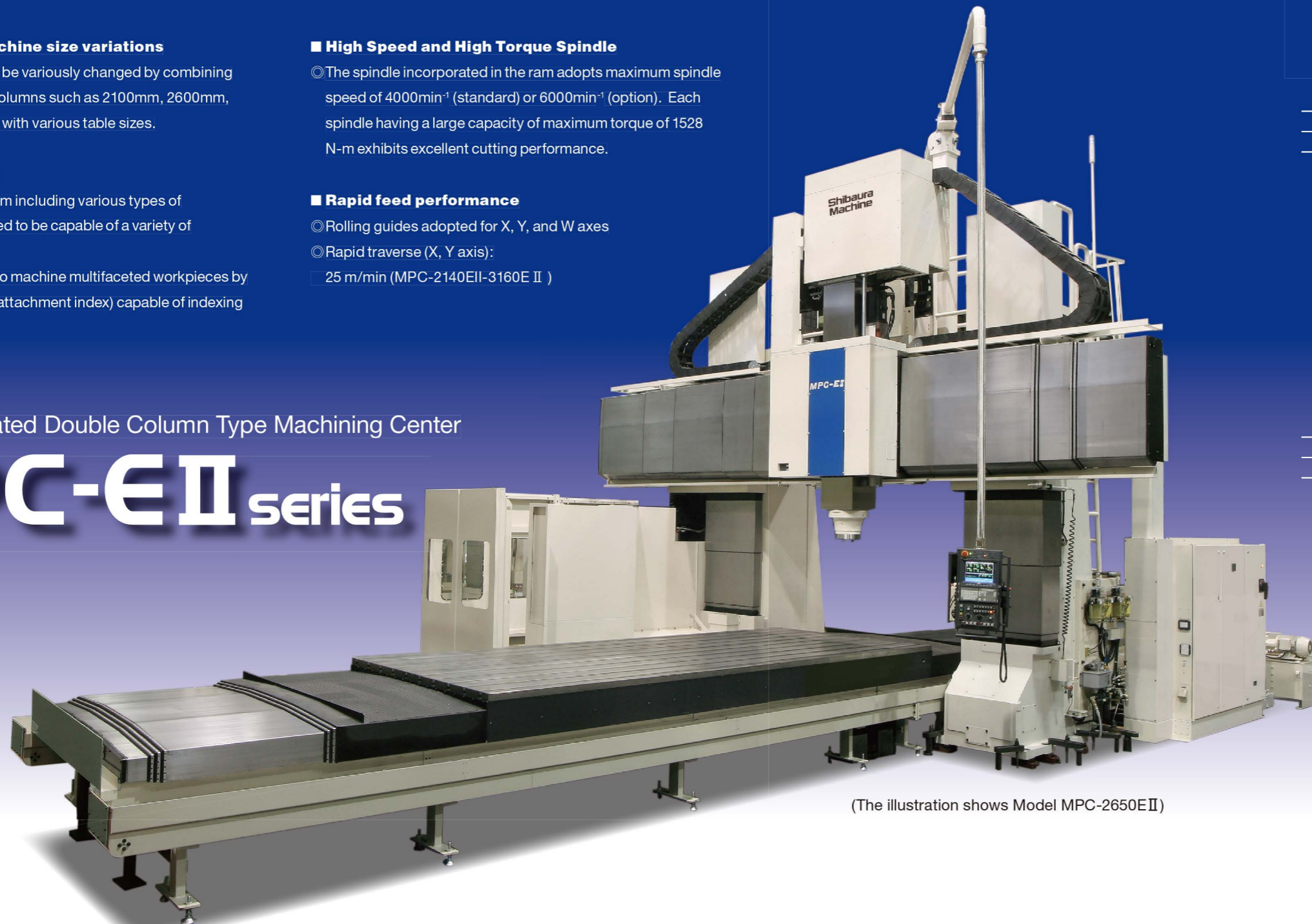
(The illustration shows Model MPC-2650EⅡ)

High speed and high torque spindle (option) further increases the machining variation.

Snout 240
(standard)

0.07N Angle Head
(option)

Snout 190
(option)

0.16N Angle Head
(option)

5-Face Cutter Head
(option)
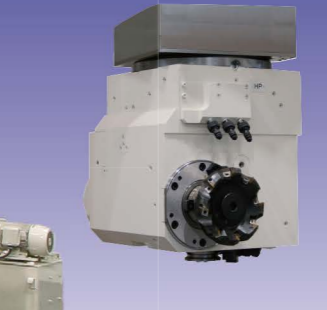
1° Indexing Head
(option)

We reserve the right to change the shape of each attachment and accessories provided with the attachment in this catalog without notice based on the uninterrupted technological improvements.

Highly rigid machine which exhibits stable accuracy of finishing and cutting performance

Scraping for ram guideways
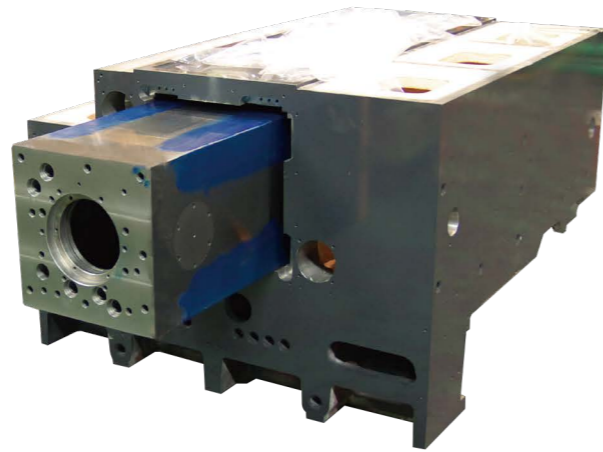
One-Piece Spindle Head Casting with Guideways for Ram

Snout 240

0.07N Angle Head (30 kW/430 min⁻¹)

Machining accuracy (guaranteed performance)

- ● Positioning accuracy (X, Y, Z)   ±0.007/1 000 mm
       Actual value ±0.002/1 000 mm
- ● Repeatability (X, Y, Z)   ±0.003 mm
       Actual value ±0.001 - ±0.002 mm
- ● Highly accurate straightness of table motion 0.005/1 000 mm

	Actual value	Guaranteed performance
In a vertical plane	0.003/1 000 mm	0.005/1 000 mm
In a horizontal plane	0.002/1 000 mm	

Circular interpolation cutting

Vertical spindle (X-Y plane)
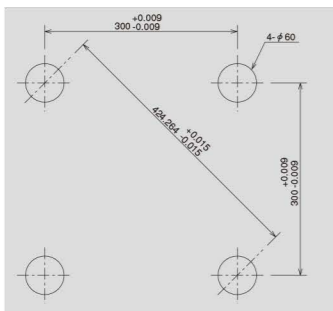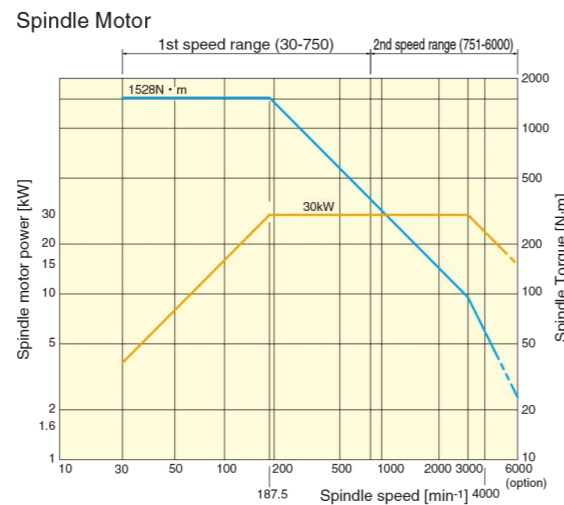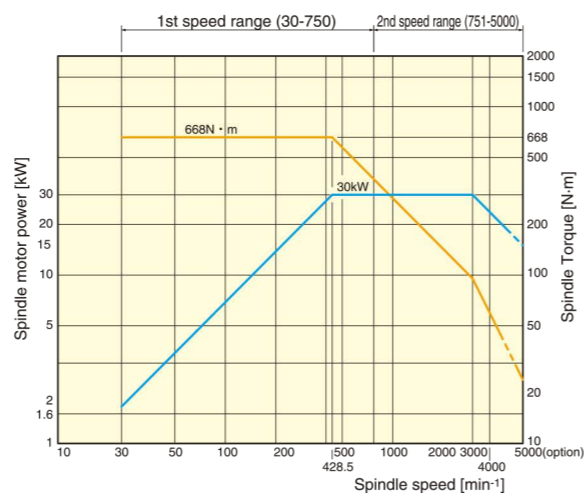Roundness 0.02 (tolerance)
Actual value 0.006

Horizontal spindle (Y-Z plane)
Roundness 0.02 (tolerance)
Actual value 0.006

Torque output diagram

Spindle Motor

1st speed range (30-750)   2nd speed range (751-6000)

1528N・m

30kW

0.07N Angle Head (430 min⁻¹/30 kW)

1st speed range (30-750)   2nd speed range (751-5000)

668N・m

30kW

Cutting capacity table

				Workpiece material AISI1055 (corbon steel)	
		Cutting capacity		Snout 240	0.07N Angle Head
Face milling cutter	Face milling cutter	Face mill cutter		φ 200 (φ 7.8), Z10	φ 125 (φ 4.9), Z6
		Cutting speed	m/min (ft/min)	150 (492)	180 (590)
		Width of cut (W)	mm (in)	140 (5.4)	100 (3.9)
		Depth of cut (T)	mm (in)	6 (0.2)	6 (0.2)
		Feedrate	mm/min (in/min)	1 040 (40.5)	1 374 (54.1)
		Required power	kW (HP)	29 (38.8)	31 (41.5)
		Cutting volume	cm³/min (cu.in/min)	874 (53.3)	824 (50.2)
		Cutting volume/kW	cm³/kW (cu.in/HP)	30 (0.30)	23 (0.23)
				*Ram extension: 800 mm (31.5 in)	*Ram extension: 800 mm (31.5 in)
End-mill cutter	End-mill cutter	End mill cutter		φ 63 (φ 2.4)	φ 63 (φ 2.4)
		Cutting speed	m/min (ft/min)	80 (262.4)	80 (262.4)
		Width of cut (W)	mm (in)	63 (2.4)	63 (2.4)
		Depth of cut (T)	mm (in)	50 (2.0)	50 (2.0)
		Feedrate	mm/min (in/min)	194 (7.5)	123 (4.8)
		Required power	kW (HP)	24 (32.1)	20 (26.8)
		Cutting volume	cm³/min (cu.in/min)	611 (37.2)	387 (23.6)
		Cutting volume/kW	cm³/kW (cu.in/HP)	25 (0.25)	19 (0.19)
				*Ram extension: 800 mm (31.5 in)	*Ram extension: 800 mm (31.5 in)
Boring	Boring	Boring diameter		φ 280 (φ 10.9)	φ 280 (φ 10.9)
		Cutting speed	m/min (ft/min)	110 (360.8)	110 (360.8)
		Depth of cut	mm (in)	10 (0.39)	5 (0.19)
		Feedrate	mm/rev (in/rev)	0.3 (0.01)	0.3 (0.01)
		Required power	kW (HP)	9.3 (12.4)	7 (9.3)
		Required torque	N・m (kgf・m)[ft-lbf]	809.7 (86.2)[591]	360 (38)[262.8]
Drilling	Drilling	Drill diameter		φ 69.5 (φ 2.7) high-speed steel drill	φ 69.5 (φ 2.7) high-speed steel drill
		Cutting speed	m/min (ft/min)	22 (72.1)	22 (72.1)
		Feedrate	mm/rev (in/rev)	0.33 (0.01)	0.33 (0.01)

Face milling cutter

End-mill cutter

Boring

Drilling

Highly efficient CNC system
TOSNUC999 makes the machine reach
its full capacity.

In machining, various capabilities of the machine are required at all times.

Not to mention the machining ability of the machine, the man-machine interface which controls the machine as the operator desires is also important.

TOSNUC999 is the easy-to-operate CNC system developed for high speed and high precision machining based on the unique NC technique being integrated both mechanically and electrically and accumulated for years.

TOSNUC999 has various functions supportive of operators.

Easily viewable display screen designed by considering from operator's point of view.

Simple and easy-to-use feed rate and spindle operation dials

Manual operation buttons capable of operating peripheral equipment such as conveyors or coolant units efficiently.

User media slots (compatible with Memory (USB-Type) and CF card)

Manual pulse generator in consideration of safety and operability

The machine operation panel is mounted on the balance type pendant operation box with a high motion degree of freedom.

The compact operation box enhances operation efficiency.

Outstanding operability derived from our experience

Display and status change-over independent keys

A display shown while machining or the contents of editing operation can be selected instantly by means of the independent keys without using the software menu.

Pop-up menu

When a function key is pressed for selecting the desired function, a window containing the menu corresponding to the function will appear or pop up.

Thus, any desire function can be selected without depending on a menu hierarchy or a complicated operation.

Pop-up menu for loading and dumping data

A full-fledged multi-tasking and multi-window system allows such operation as loading, dumping, comparing, deleting, and copying of programs or other data by opening a file window from any mode or screen.

For example, in automatic operation, while editing a program in a background, it is also possible to load another program into memory from the outside.
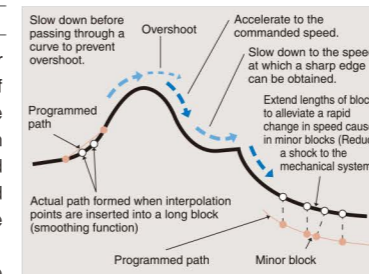
Multi-window and multi-editing

The display screen can be split in three to simultaneously display two programs and another data such as compensation values required for machining.

As it is possible to load or edit each data independently on these split screens, a new program can be created easily with reference to the already created program as if operating a word processor.
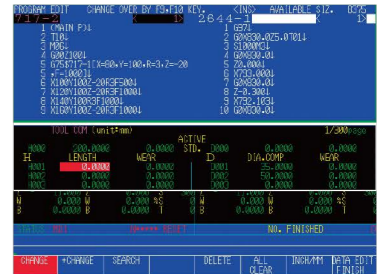
Function capable of high-speed and high-accuracy machining

Programming support function

Preview control function

Generally, a contouring error decreases along with the increase of the servo gain. However, when the gain is increased, an overshoot of an axial position and vibrations caused by the increased acceleration applied to the machine adversely affect the cutting surface.

To prevent these phenomena, the preview control function has been developed based on the optimal control theory thus minimizing the contouring error without increasing the gain.

Slow down before passing through a curve to prevent overshoot.

Overshoot

Accelerate to the commanded speed.

Slow down to the speed at which a sharp edge can be obtained.

Programmed path

Extend lengths of blocks to alleviate a rapid change in speed caused in minor blocks (Reduce a shock to the mechanical system).

Actual path formed when interpolation points are inserted into a long block (smoothing function)

Programmed path   Minor block

Plane conversion for 5-face machining

In machining the five faces of a box-like workpiece, an NC program on each face can be prepared based on the right-hand orthogonal coordinate system.

Further, each axis address (X, Y, and Z), sign (+/-) and offset (V and H spindle) are also changed automatically based on the indexing position of the attachment in use.

Graphic function for servo adjustments

In adjusting the servo system for the machine equipped with CNC system, no conventional measurement instrument is required.

Each axis speed and torque characteristics or the like can be checked using the graphic function for servo adjustments.

Further, with the use of this function, load fluctuations of the spindle can also be detected, and parameters used for tool breakage detection can be set appropriately.

Three-dimensional-coordinates conversion

Beside orthogonal five faces, programming is easy even when the attachment is inclined at any angle.

For the inclined surface, various functions such as canned cycle, circular interpolation, tool length offset and cutter compensation can be also used.

Machined surface
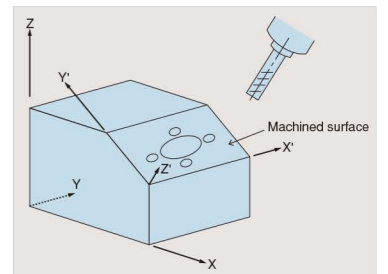
Machine Specifications

Machine Specifications		unit	MPC-2140	MPC-2150	MPC-2640	MPC-2650	MPC-2660	MPC-3140	MPC-3150	MPC-3160	MPC-3180	MPC-3650	MPC-3660	MPC-3680
Travel	X-axis travel (table longitudinal direction)	mm (in)	4 500 (175.5)	5 500 (214.5)	4 500 (175.5)	5 500 (214.5)	6 500 (253.5)	4 500 (175.5)	5 500 (214.5)	6 500 (253.5)	9 000 (354.3)	5 500 (214.5)	6 500 (253.5)	9 000 (351.0)
	Y-axis travel (spindle head crosswise direction)	mm (in)	2 900 (113.1)	2 900 (113.1)	3 400 (132.6)	3 400 (132.6)	3 400 (132.6)	3 900 (152.1)	3 900 (152.1)	3 900 (152.1)	3 900 (152.1)	4 400 (171.6)	4 400 (171.6)	4 400 (171.6)
	Z-axis travel (ram vertical direction)	mm (in)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)	900 (35.1)
	W-axis travel (crossrail elevation)	mm (in)	1000 (39.4) [5 positions available at 250mm (9.8in.) intervals] {1500 (59) [7 positions available at 250mm (9.8in.) intervals]}	←	←	←	1000 (39.4) [5 positions available at 250mm (9.8in.) intervals] {1500 (59) [7 positions available at 250mm (9.8in.) intervals]}	←	←	←	←	←	←	←
	Height (distance from table top face to vertical spindle nose)	mm (in)	1 750 [2 250] (68.2 [87.7])	←	←	←	1 750 [2250] (68.2 [87.7])	1 750 [2250] (68.2 [87.7])	1 750 [2250] (68.2 [87.7])	1 750 [2250] (68.2 [87.7])	1 750 [2250] {1695[2195] incaseof model 3180,3680} (68.2 [87.7] {66.1 [85.6]})	←	←	←
	Distance between column (Maximum traversable clearance for work-piece)	mm (in)	2 100 (81.9)	2 100 (81.9)	2 600 (101.4)	2 600 (101.4)	2 600 (101.4)	3 100 (120.9)	3 100 (120.9)	3 100 (120.9)	3 100 (120.9)	3 600 (140.4)	3 600 (140.4)	3 600 (140.4)
Table	Table working surface	mm (in)	1 800×4 000 (70.8×157.4)	1 800×5 000 (70.8×196.8)	2 000×4 000 (78.7×157.4)	2 000×5 000 (78.7×196.8)	2 000×6 000 (78.7×236.2)	2 500×4 000 (98.4×157.4)	2 500×5 000 (98.4×196.8)	2 500×6 000 (98.4×236.2)	2 700×8 000 (106.2×315)	3 100×5 000 (122×196.8)	3 100×6 000 (122×236.2)	3 100×8 000 (122×315)
	Table loading capacity — Plane table type	kg (lbs)	20 000 (44 000)	20 000 (44 000)	20 000 (44 000)	20 000 (44 000)	30 000 (66 000)	30 000 (66 000)	30 000 (66 000)	30 000 (66 000)	40 000 (88 000)	40 000 (88 000)	30 000 (66 000)	40 000 (88 000)
	Table loading capacity — AWC type	kg (lbs)	20 000 (44 000)	20 000 (44 000)	20 000 (44 000)	20 000 (44 000)	20 000 (44 000)	20 000(44 000)	20 000(44 000)	20 000(44 000)	20 000(44 000)	20 000(44 000)	30 000 (66 000)	40 000 (88 000)
	Table T-slot size	mm (in)	24mm [0.9in] width, provided at 200mm [7.8in] pitches, 9 slots	←	24mm [0.9in] width, provided at 200mm [7.8in] pitches, 10 slots	←	24mm [0.9in] width, provided at 200mm [7.8in] pitches, 10 slots	24mm [0.9in] width, provided at 200mm [7.8in] pitches, 13 slots	←	←	24mm [0.9in] width, provided at 250mm [7.8in] pitches, 11 slots	24mm [0.9in] width, provided at 250mm [7.8in] pitches, 13 slots	←	←
Spindle	Spindle Speed	min⁻¹	30~4 000 [6 000]	←	←	←	←	30~4 000 [6 000]	←	←	←	←	←	←
	Number of spindle speed ranges		2	←	←	←	←	2	←	←	←	←	←	←
	Spindle taper hole		7/24 taper No.50	←	←	←	←	7/24 taper No.50	←	←	←	←	←	←
	Maximum spindle torque	N·m{kgf·m} [ft-lbf]	1 528 (156) [1158]	←	←	←	←	1 528 (156) [1158]	←	←	←	←	←	←
	Spindle bearing inner diameter	mm (in)	100 (3.9)	←	←	←	←	100 (3.9)	←	←	←	←	←	←
Spindle ram	Type		Ram type	←	←	←	←	Ram type	←	←	←	←	←	←
	Guideways		Supported by 4 closed guideways	←	←	←	←	Supported by 4 closed guideways	←	←	←	←	←	←
	Cross section size	mm (in)	380×380 (14.9×14.9)	←	←	←	←	380×380 (14.9×14.9)	←	←	←	←	←	←
Feedrate	Rapid traverse X/Y	mm/min (in/min)	25 000 (984)	←	←	←	←	25 000 (984)	25 000 (984)	25 000 (984)	20 000 (787.4)	20 000 (787.4)	20 000 (787.4)	20 000 (787.4)
	Rapid traverse Z	mm/min (in/min)	10 000 (393.7)	←	←	←	←	10 000 (393.7)	←	←	←	←	←	←
	Rapid traverse W	mm/min (in/min)	1 000 (39.3)	←	←	←	←	1 000 (39.3)	←	←	←	←	←	←
	Feedrate X/Y	mm/min (in/min)	1~10 000 (0.03~393.7)	←	←	←	←	1~10 000 (0.03~393.7)	1~10 000 (0.03~393.7)	1~10 000 (0.03~393.7)	1~6 000 (0.03~236.2)	1~6 000 (0.03~236.2)	1~6 000 (0.03~236.2)	1~6 000 (0.03~236.2)
	Feedrate Z	mm/min (in/min)	1~10 000 (0.03~393.7) [Note1]	←	←	←	←	1~10 000 (0.03~393.7) [Note1]	←	←	←	←	←	←
ATC	Type of tool shank		MAS BT50	←	←	←	←	MAS BT50	←	←	←	←	←	←
	Type of retention knob		MAS P50T-1 (45°)	←	←	←	←	MAS P50T-1 (45°)	←	←	←	←	←	←
	Tool storage capacity	tools	36	←	←	←	←	36	←	←	←	←	←	←
Motors	Spindle motor	kW (HP)	AC30/22 (AC40/30)	←	←	←	←	AC30/22 (AC40/30)	←	←	←	←	←	←
	Feed motors X/Y	kW (HP)	AC 10.5 (AC14)	←	←	←	←	AC 10.5 (AC14)	←	←	←	←	←	←
	Feed motors Z	kW (HP)	AC 5.5 (AC7.5)	←	←	←	←	AC 5.5 (AC7.5)	←	←	←	←	←	←
	Feed motors W	kW (HP)	AC4.0×2 (AC5.4×2)	←	←	←	←	AC4.0×2 (AC5.4×2)	←	←	←	←	←	←
Power source	Electronic power supply		AC200/220V10% 50/60Hz±1Hz	←	←	←	←	AC200/220V10% 50/60Hz±1Hz	←	←	←	←	←	←
	Power source requirement (for the base machine and optional accessories)	KVA	110	←	←	←	←	110	←	←	←	←	←	←
Hydraulic unit tank capacity		L (gal)	160 (41.6)	←	←	←	←	160 (41.6)	←	←	←	←	←	←
Machine size	Machine height	mm (in)	6 490 [6 990] (255.5 [275.1])	←	←	←	←	6 490 [6 990] (255.5 [275.1])	←	←	←	←	←	←
	Floor space — Plane table type	mm (in)	6 800×11 000 (267.7×433)	6 800×13 100 (267.7×515.7)	7 300×11 100 (287.4×437)	7 300×13 100 (287.4×515.7)	7 300×15 100 (287.7×594.4)	7 800×11 100 (307×437)	7 800×13 100 (307×515.7)	7 800×15 100 (307×594.4)	7 800×19 900 (307×783.4)	8 300×13 100 (326.7×515.7)	8 300×15 100 (326.7×594.4)	8 300×19 900 (326.7×783.4)
	Floor space — AWC type	mm (in)	6 900×15 250 (271.6×600.3)	6 900×18 350 (271.6×722.4)	7 750×15 250 (305.1×600.3)	7 750×18 350 (305.1×722.4)	7 750×21 450 (305.1×844.4)	8 750×15 250 (344.4×600.3)	8 750×18 350 (344.4×722.4)	8 750×21 450 (344.4×844.4)	8 750×28 250 (344.4×1112.2)	9 800×18 350 (385.8×722.4)	9 800×21 450 (385.8×844.4)	9 800×28 250 (326.7×1112.2)
	Mass of machine — Plane table type	kg (lbs)	42 000 (92 400)	48 000 (105 600)	48 000 (105 600)	50 000 (110 000)	55 000 (121 000)	55 000 (121 000)	60 000 (132 000)	65 000 (143 000)	80 000 (176 000)	68 000 (149 600)	73 000 (160 600)	90 000 (198 000)
	Mass of machine — AWC type	kg (lbs)	60 000 (132 000)	68 000 (149 600)	68 000 (149 600)	74 000 (162 000)	85 000 (187 000)	76 000 (167 200)	85 000 (187 000)	94 000 (206 800)	108 000 (237 600)	102 000 (224 400)	114 000 (160 600)	120 000 (264 000)
CNC system			TOSNUC 999	←	←	←	←	TOSNUC 999	←	←	←	←	←	←
Accuracy	Positioning accuracy	mm (in)	±0.007/1 000 (±0.00027/39.4)	←	←	←	←	±0.007/1 000 (±0.00027/39.4)	←	←	←	←	←	←
	Repeatability	mm (in)	±0.003 (±0.00012)	←	←	←	←	±0.003 (±0.00012)	←	←	←	←	←	←
Machine exterior painting color / machine interior painting color			Munsell 5Y 8.4/0.5 (ivory white) Munsell 10YR8/4	←	←	←	←	Munsell 5Y 8.4/0.5 (ivory white) Munsell 10YR8/4	←	←	←	←	←	←

Note 1) In operating Z axis at the maximum feedrate of 10,000 mm/min, there is a limitation on the continuous operating time.

The vertical spindle described in Table above refers to "Snout 240" of a standard accessory.

Numerical values in braces show special specifications.

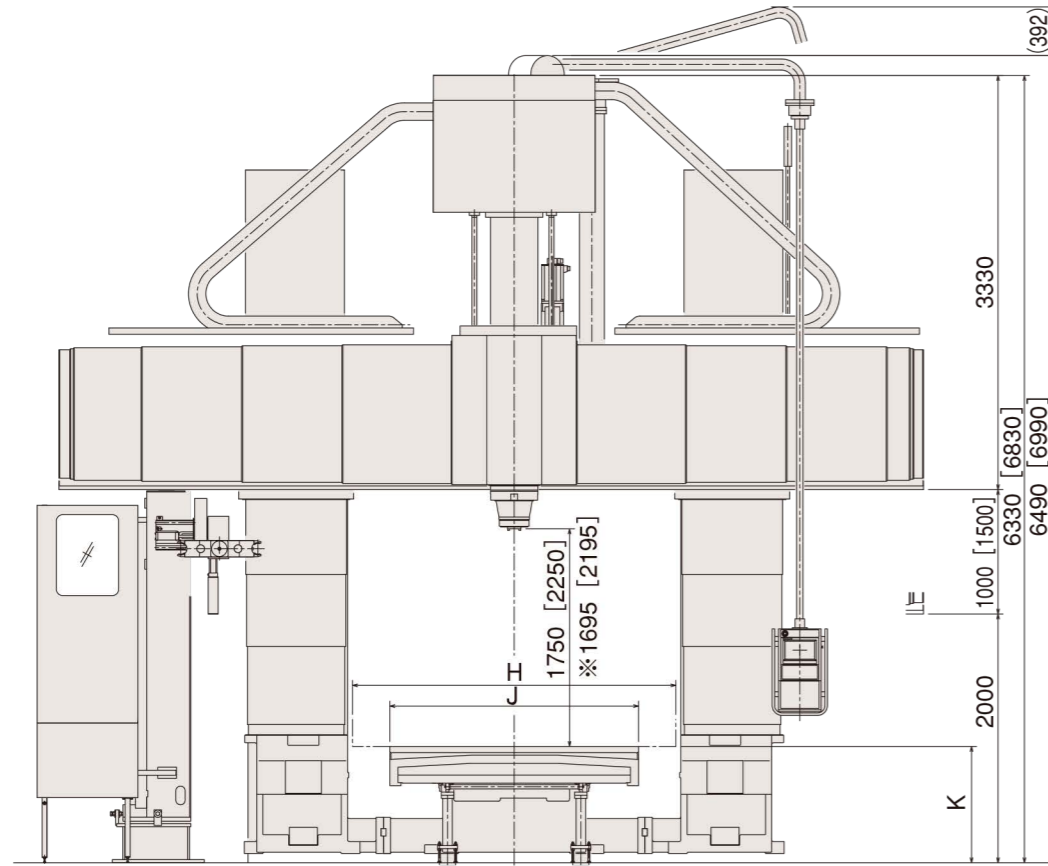We reserve the right to change any of specifications or numerical values without notice based on the uninterrupted technological improvements.

Special model MPC-36100 is available in addition to those above. Consult with us about detailed specifications.

General View and Floor Plan

(392)

3330

[6990]
[6830]
6490
6330

1000 [1500]

1750 [2250]
※ 1695 [2195]

2000

H
J
K

※In case of model 3180, 3680

■ Plane table type

ATC
AAC device
Control cabinet
A1
C
B
675
E1
F1
D1

■ AWC type

ATC
AAC device
AWC
Control cabinet
A2
G
G
C
B
675
E2
F2
D2

Machine Overall Dimensions
mm (in)

	2 140	2 150	2 640	2 650	2 660	3 140	3 150	3 160	3 180	3 650	3 660	3 680
A1	6 800 (267.7)	6 800 (267.7)	7 300 (287.4)	7 300 (287.4)	7 300 (287.4)	7 800 (307)	7 800 (307)	7 800 (307)	7 800 (307)	8 300 (326.7)	8 300 (326.7)	8 300 (326.7)
A2	6 300 (248)	6 300 (248)	7 500 (295.2)	7 500 (295.2)	7 500 (295.2)	9 000 (351)	9 000 (351)	9 000 (351)	9 200 (362.2)	10 600 (417.3)	10 600 (417.3)	10 600 (417.3)
B	2 450 (96.4)	2 450 (96.4)	2 700 (106.3)	2 700 (106.3)	2 700 (106.3)	2 950 (116.1)	2 950 (116.1)	2 950 (116.1)	2 950 (116.1)	3 200 (125.9)	3 200 (125.9)	3 200 (125.9)
C	3 750 (147.6)	3 750 (147.6)	4 000 (157.4)	4 000 (157.4)	4 000 (157.4)	4 250 (167.3)	4 250 (167.3)	4 250 (167.3)	4 250 (167.3)	4 250 (167.3)	4 250 (167.3)	4 250 (167.3)
D1	11 100 (433)	13 100 (515.7)	11 100 (433)	13 100 (515.7)	15 100 (594.4)	11 100 (433)	13 100 (515.7)	15 100 (594.4)	19 900 (783.4)	13 100 (515.7)	15 100 (594.4)	19 900 (783.4)
D2	15 250 (600.3)	18 350 (722.4)	15 250 (600.3)	18 350 (722.4)	21 450 (844.4)	15 250 (600.3)	18 350 (722.4)	21 450 (844.4)	28 250 (1112.2)	18 350 (722.4)	21 450 (844.4)	28 250 (1112.2)
E1	5 550 (218.5)	6 550 (257.8)	5 550 (218.5)	6 550 (257.8)	7 550 (297.2)	5 550 (218.5)	6 550 (257.8)	7 550 (297.2)	9 950 (391.7)	6 550 (257.8)	7 550 (297.2)	9 950 (391.7)
E2	9 200 (362.2)	11 300 (444.8)	9 200 (362.2)	11 300 (444.8)	13 400 (527.5)	9 200 (362.2)	11 300 (444.8)	13 400 (527.5)	17 800 (700.7)	11 300 (444.8)	13 400 (527.5)	17 800 (700.7)
F1	5 550 (218.5)	6 550 (257.8)	5 550 (218.5)	6 550 (257.8)	7 550 (297.2)	5 550 (218.5)	6 550 (257.8)	7 550 (297.2)	9 950 (391.7)	6 550 (257.8)	7 550 (297.2)	9 950 (391.7)
F2	6 050 (238.1)	7 050 (277.5)	6 050 (238.1)	7 050 (277.5)	8 050 (316.9)	6 050 (238.1)	7 050 (277.5)	8 050 (316.9)	10 450 (411.4)	7 050 (277.5)	8 050 (316.9)	10 450 (411.4)
G	3 150 (124)	3 150 (124)	3 750 (147.6)	3 750 (147.7)	3 750 (147.8)	4 500 (177.1)	4 500 (177.2)	4 500 (177.3)	4 600 (181.1)	5 300 (208.6)	5 300 (208.6)	5 300 (208.6)
H	2 100 (81.9)	2 100 (81.9)	2 600 (101.4)	2 600 (101.4)	2 600 (101.4)	3 100 (120.9)	3 100 (120.9)	3 100 (120.9)	3 100 (120.9)	3 600 (140.4)	3 600 (140.4)	3 600 (140.4)
J	1 800 (70.8)	1 800 (70.8)	2 000 (78.7)	2 000 (78.7)	2 000 (78.7)	2 500 (98.4)	2 500 (98.4)	2 500 (98.4)	2 700 (106.2)	3 100 (122)	3 100 (122)	3 100 (122)
K	935 (36.8)	935 (36.8)	935 (36.8)	935 (36.8)	935 (36.8)	935 (36.8)	935 (36.8)	935 (36.8)	990 (38.9)	935 (36.8)	935 (36.8)	990 (38.9)

We reserve the right to change any of specifications without notice based on the uninterrupted technological improvements.
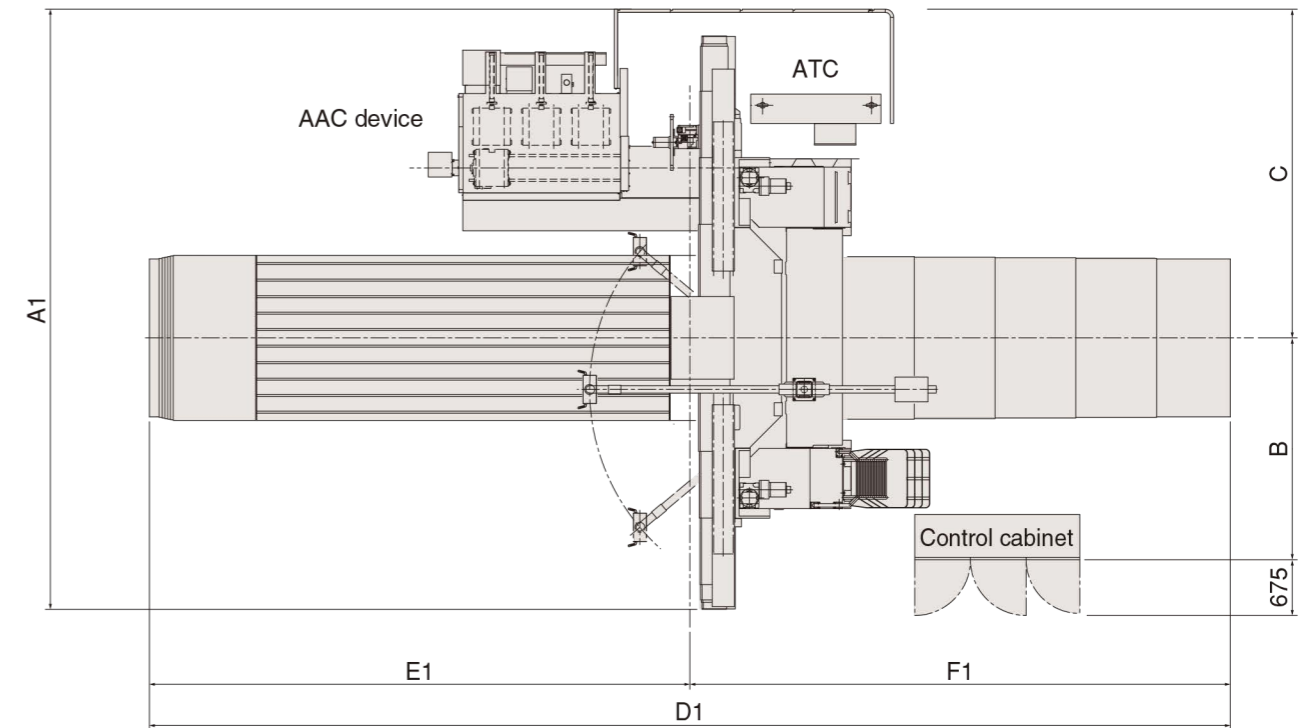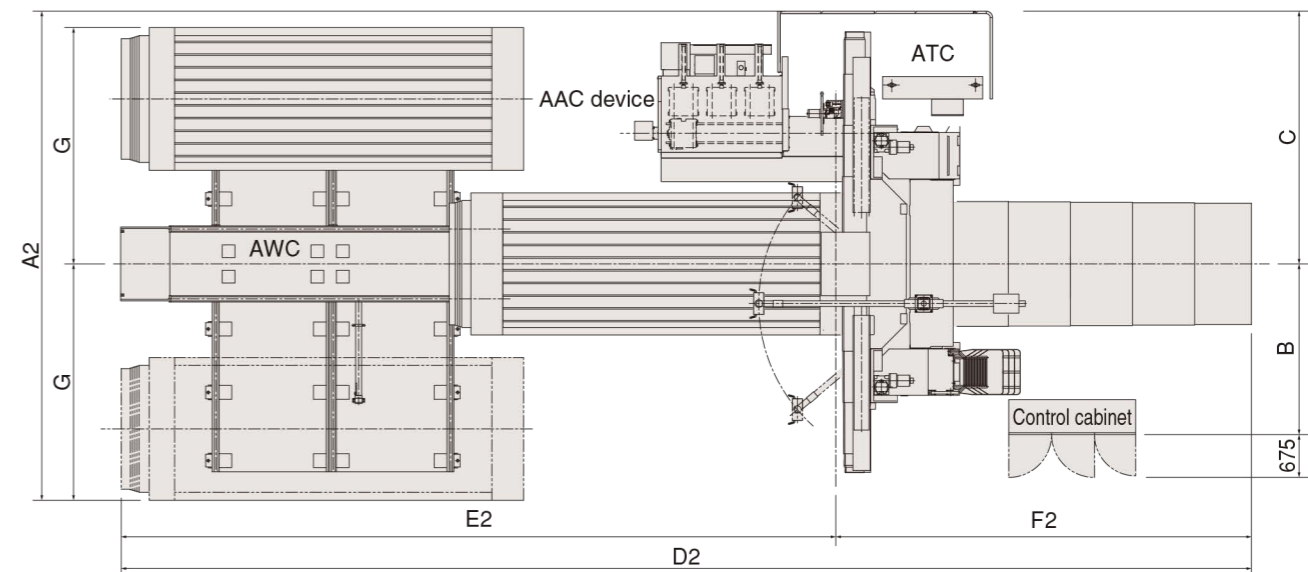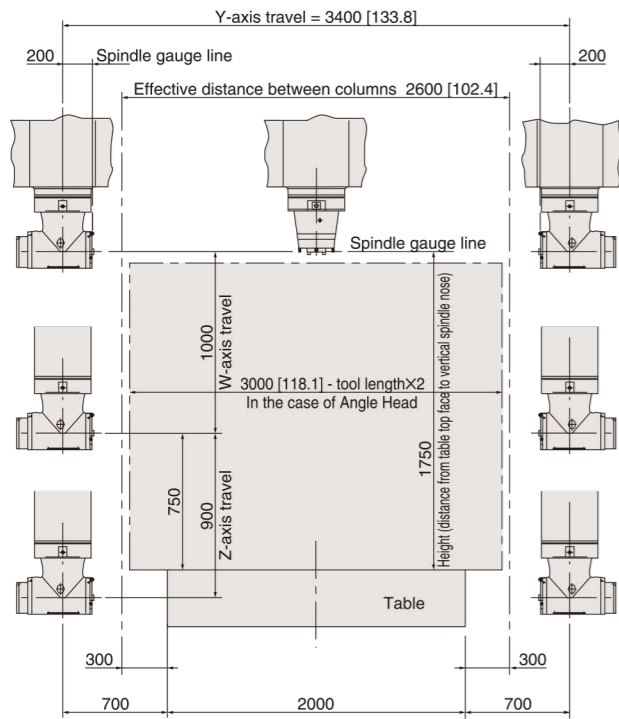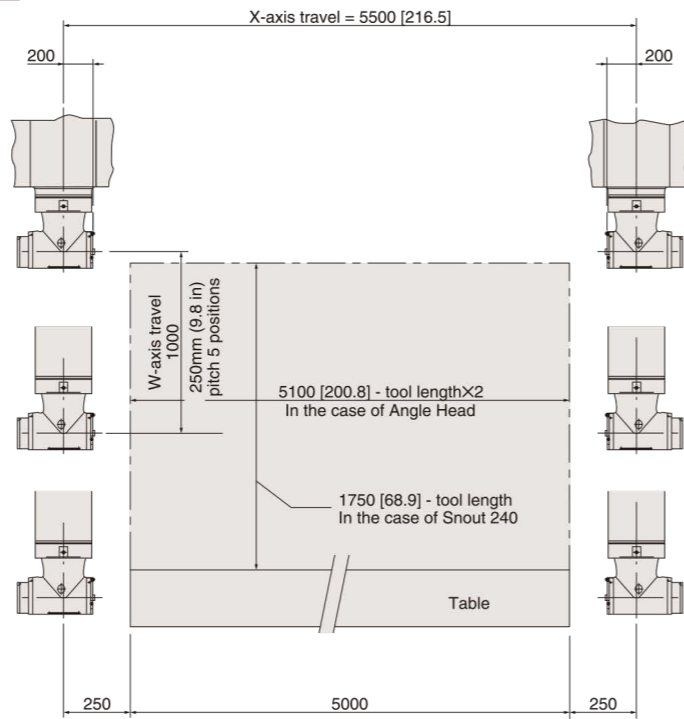
Machine specifications capable of wide range of operations

- ● X-axis travel: Table length + 500 mm [19.7 in.]
- ● Y-axis travel: effective distance between columns + 800 mm [31.5 in.]
- ● W-axis travel: 1000 mm [39.4 in.] (crossrail elevation: 5 positions available at 250 mm [9.8 in.] intervals)
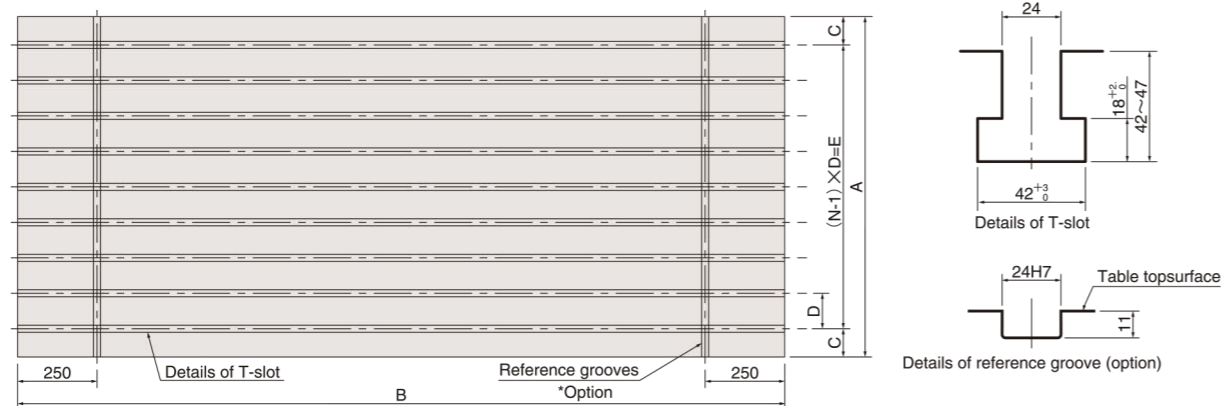
■ Y-axis direction

Y-axis travel = 3400 [133.8]
Spindle gauge line
Effective distance between columns 2600 [102.4]
Spindle gauge line
W-axis travel 1000
Z-axis travel 900
3000 [118.1] - tool length×2 In the case of Angle Head
1750 Height (distance from table top face to vertical spindle nose)
Table
300 · 700 · 2000 · 700 · 300

■ X-axis direction

X-axis travel = 5500 [216.5]
W-axis travel 1000
250mm (9.8 in) pitch 5 positions
5100 [200.8] - tool length×2 In the case of Angle Head
1750 [68.9] - tool length In the case of Snout 240
Table
250 · 5000 · 250

Note) The dimensions shown above are examples in the case of MPC-2650EIII.

■ Table dimensions

Details of T-slot
18^{+2}_{0} $42\sim47$
42^{+3}_{0}
24H7
Table topsurface
Details of reference groove (option)
250 · B · 250
(N-1)×D=E
A
Details of T-slot
Reference grooves *Option

mm (in)

Machine Model	A	B	C	D	E	Number of T-slots N
MPC-2140EII	1 800 (70.8)	4 000 (157.4)	100 (3.9)	200 (7.8)	1 600 (63)	9
MPC-2150EII	1 800 (70.8)	5 000 (196.8)	100 (3.9)	200 (7.8)	1 600 (63)	9
MPC-2640EII	2 000 (78.7)	4 000 (157.4)	100 (3.9)	200 (7.8)	1 800 (70.8)	10
MPC-2650EII	2 000 (78.7)	5 000 (196.8)	100 (3.9)	200 (7.8)	1 800 (70.8)	10
MPC-2660EII	2 000 (78.7)	6 000 (236.2)	100 (3.9)	200 (7.8)	1 800 (70.8)	10
MPC-3140EII	2 500 (98.4)	4 000 (157.4)	50 (1.9)	200 (7.8)	2 400 (94.4)	13
MPC-3150EII	2 500 (98.4)	5 000 (196.8)	50 (1.9)	200 (7.8)	2 400 (94.4)	13
MPC-3160EII	2 500 (98.4)	6 000 (236.2)	50 (1.9)	200 (7.8)	2 400 (94.4)	13
MPC-3180EII	2 700 (106.2)	8 000 (315)	100 (3.9)	250 (9.8)	2 500 (98.4)	11
MPC-3650EII	3 100 (122)	5 000 (196.8)	50 (1.9)	250 (9.8)	3 000 (118.1)	13
MPC-3660EII	3 100 (122)	6 000 (236.2)	50 (1.9)	250 (9.8)	3 000 (118.1)	13
MPC-3680EII	3 100 (122)	8 000 (315)	50 (1.9)	250 (9.8)	3 000 (118.1)	13

Attachments

■ Snout 240

End surface of Ram
Flood coolant nozzle (3 places)
G.L
ISO.NO50
⌀370
⌀360
⌀400
⌀120
⌀240
302
19
19.39
71
215
98
36
15[16.48]
25.4
18
45°
View Z
Stop Block for coolant through the tool (option)
Z

■ 5-face Cutter Head

190 · 190
380
190 · 190
380
⌀380
280 · 200
480
Flood coolant nozzle
ISO No.50
Stop Block for coolant through the tool (option)
⌀110
513
View A
Ram
495
375
120
103 · 125 · 180
418
45°
80
ISO No.50
Stop Block for coolant through the tool (option)
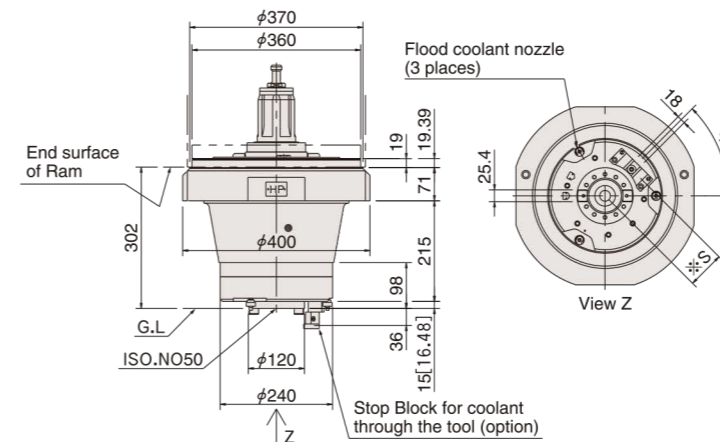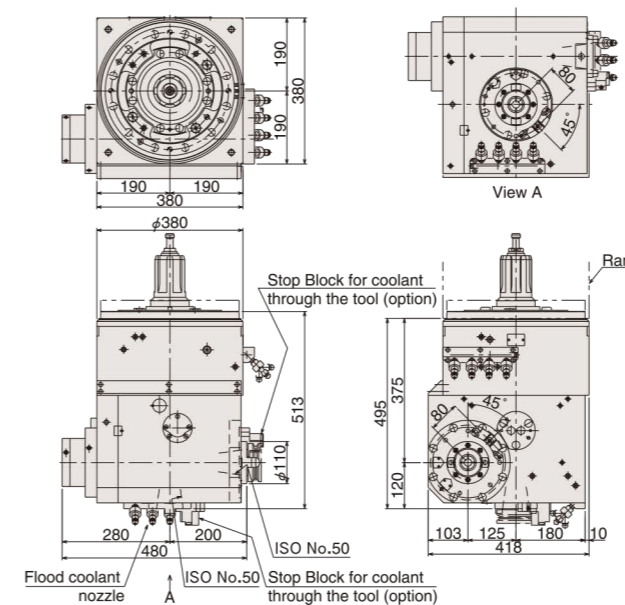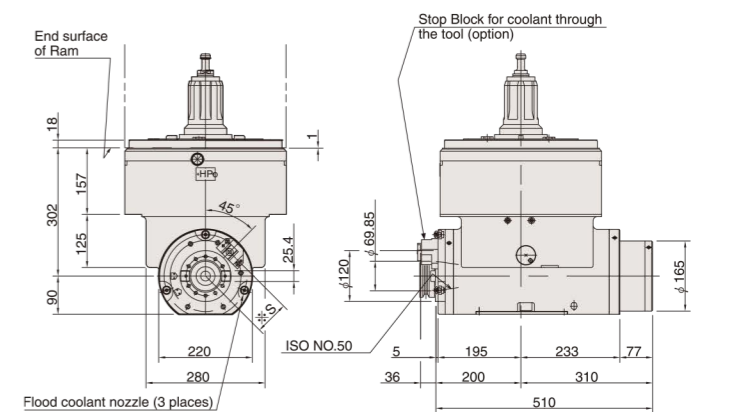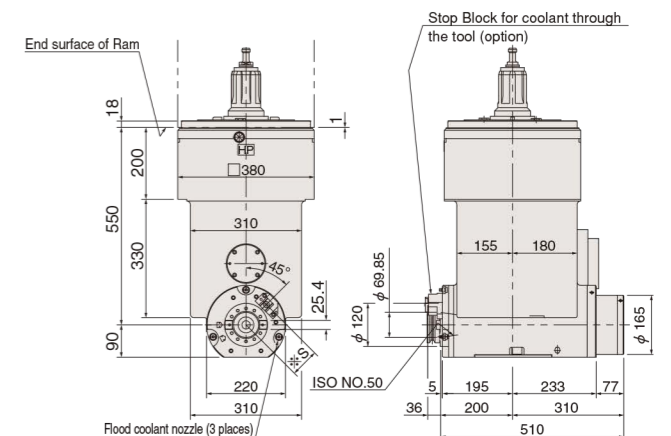
We reserve the right to change any of specifications or the shapes of attachments without notice based on the uninterrupted technological improvements.

■ 0.07N Angle Head (30 kw/430 min⁻¹)

End surface of Ram
Stop Block for coolant through the tool (option)
302
157
125
90
18
45°
25.4
⌀120
⌀69.85
⌀165
220
280
5 · 195 · 233 · 77
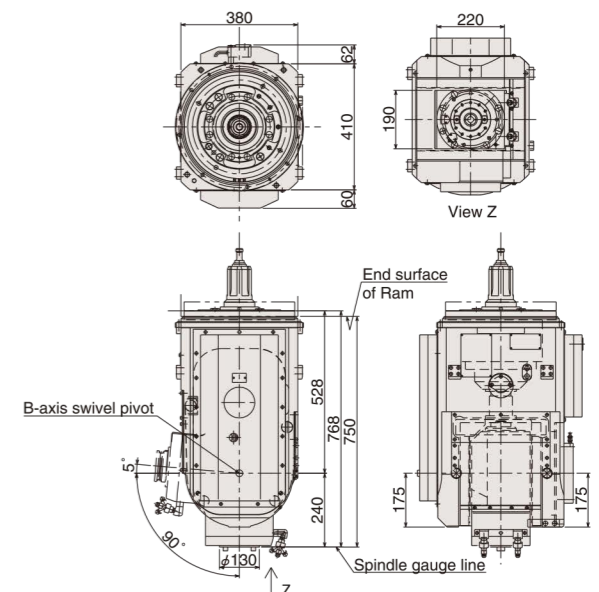36 · 200 · 310
510
ISO NO.50
Flood coolant nozzle (3 places)

1) Maximum power: 7 kW/100 min⁻¹
2) Maximum torque: 668 N·m (68 kgf·m)
3) Maximum spindle speed: 4000 min⁻¹(STD), 5000 min⁻¹(op)
4) *The dimension S is set to 80 mm unless otherwise specified.

■ 0.16N Angle Head (30kW/190min⁻¹)

End surface of Ram
Stop Block for coolant through the tool (option)
□380
310
550
330
200
18
90
45°
25.4
⌀120
⌀69.85
⌀165
220
310
155 · 180
5 · 195 · 233 · 77
36 · 200 · 310
510
ISO NO.50
Flood coolant nozzle (3 places)

1) Maximum power: 16 kW/100 min⁻¹
2) Maximum torque: 1528 N·m {156 kgf·m}
3) Maximum spindle speed: 4000 min⁻¹
4) *The dimension S is set to 80 mm unless otherwise specified.

■ 1° Indexing Head

380
410
60
220
190
92
View Z
End surface of Ram
B-axis swivel pivot
528
768
750
240
175
175
⌀130
Spindle gauge line
5°
90°
Z

Standard accessories/Optional accessories

Machine standard accessories

❶ Automatic attachment indexing device (AAI)
... 4 positions every 90 degrees.

❷ Snout 240

❸ Automatic tool changers (ATC)
... Tool storage capacity: 36 tools

❹ Telescopic steel cover for bed

❺ Telescopic steel cover for crossrail

❻ Telescopic steel cover for columns (only for lower side of the columns)

❼ Special tools for maintenance and operation

❽ Ram balancing mechanism with hydraulic system

❾ Tool clamping/unclamping device

❿ Oil-mist lubricating device (for gears)

⓫ Main oil-mist lubricating device (for bearings)

⓬ Hydraulic unit

⓭ Ram slideway (Z-axis) lubrication unit

⓮ Plug receptacle for external devices

⓯ Balance type pendant operation box

Optional accessories (Items marked with ☆ are included in the pack specification.)

☆❶ Automatic power OFF device
The primary main power is cut off after NC power is turned off, when M02 or M30 is executed while the "AUTO POWER OFF" switch on the control cabinet is turned on.

☆❷ Work Light
A waterproof fluorescent light of 40 W is equipped on the bottom face of crossrail.

☆❸ Operator call lamp (LED type)
This lamp is mounted on the right column as viewed from the machine front side.
Green: Illuminated during automatic operation
Yellow: Illuminated when M00, M01, M02, M30, or M52 has been executed.
Red: Illuminated in any alarm state

❹ Automatic Tool Changer (ATC)
Tool storage capacity 60, 90, 120, 180, or 240 tools
Maximum tool diameter
When Tools are continuously stored in every pots:
φ125 mm [4.9 in.]
When tools are successively stored in every two pots:
φ240 mm [9.4 in.]
Maximum tool length: 400 mm [15.7 in.]
Maximum tool mass: 30 kg [66 lbs]
Maximum allowable moment around gauge plane: 53 N.m
Method of Tool selection Pot address random short cut

❺ Small-sized tool breakage detection device for tapping/drilling tools or the like
The breakage of a small-sized tool is detected by comparing a tool length measured before changing the tool with a tool length measured after changing the tool, when T80＊＊＊ is commanded as a tool number.
*Automatic tool length measuring device is required with the use of this option.

❻ Type of Retention knob MAS P50T-2 (30°)

❼ Automatic workpiece changer (AWC)
Direct table changing system (DTC system)
Number of tables
Table changing direction
Changeable in the longitudinal direction of the bed.

❽ External program number search function
Automatic search of a NC program number (4-digits or 8-digits integer) and cycle start during AWC operation.

❾ Automatic attachment changer (AAC)
Various attachments can be attached to a ram end by executing NC commands. Attachment storage capacity: 2, 3, 4 or 5

❿ Various attachments and racks
0.07 N Angle Head (AATC, AAI compatible)
0.16 N Angle Head (AATC, AAI compatible)
5-face Cutter Head (AATC, AAI compatible)
1° Indexing Head
Snout 190

⓫ Automatic attachment indexing (AAI)
Either one of indexing angle of 5° (72 positions) or 1° (360 positions) is available.
The following two functions are included.
• Automatic indexing function M37C for indexing at 360 positions (72 positions) every 1°(5°)
• Three-dimensional-coordinates conversion function G137C (G14/G10)

⓬ Installation parts (leveling block system)
Note that, when not selected, the installation parts shall be prepared by customers.

⓭ Chip conveyors
The chip conveyors are arranged at both sides of Bed.
• Electric A: hinge-plate-type chip conveyors arranged only on the front sides of Columns, and troughs arranged on the rear sides of Columns.
• Electric B: hinge-plate-type chip conveyors arranged on both sides of Bed covering overall length of Bed.
*This option is not available simultaneously with the coolant chute described in Item 14.

⓮ Coolant chutes
The chutes are arranged on both sides of Bed covering overall length of Bed. This option is not available simultaneously with the chip conveyor described in Item 13.

⓯ Stop block for coolant through the tool
Note 1) The distance between a coolant delivery hole and a spindle center is set to 80 mm.
Note 2) When a spindle is equipped with the tool for the coolant through the tool, the coolant is not discharged from the external nozzle, but discharged through the tool.

⓰ Coolant through spindle
Note 1) The air-through-spindle function is not available.

⓱ Coolant unit
The coolant unit is provided with a hinge type chip conveyor integrated with a coolant tank.
• Coolant tank capacity:
800 L (1200 L for MPC-3180EII to MPC-3680EII)
• Coolant pump motor: AC2P1.5 kW
• Chip conveyor motor: AC4P0.4 kW
Coolant is delivered to the workpiece from external stationary nozzles by executing M08 command.
Note 1) Use a fire-resistant non-chlorine water soluble coolant.
Note 2) A splash cover is not included.
Note 3) Coolant nozzles are included.
(The coolant nozzles for each attachment are shown in the drawing of each attachment.)
Note 4) The discharge rate at the nozzle portion is approximately 10 L/min in total when using the water soluble coolant.

⓲ Chip bucket
A portable and translocatable type chip bucket, designed for coolant unit. Bucket capacity: 0.18 m³

⓳ Air blow function
Air is discharged from a coolant discharge port by executing M51 command.
Maximum discharge flow rate: approx. 800 NL/min
Note) Required air flow rate is 2000 NL/min which includes air flow rate of 1200 NL/min required for the base machine and above-mentioned discharge flow rate.

⓴ Mist coolant unit
Mist coolant generated in the mist coolant unit which is mounted on the front surface of Spindle Head is discharged from the coolant discharge port described in Item 17 by executing M07 command. (Tank capacity 2.7 L)

㉑ Automatic measuring system
A radio type touch probe manufactured by RENISHAW, standard measurement software designed by Toshiba Machine Machinery, and a calibration block for checking a compensation value of the touch probe are included.
A printer is not included.

㉒ Feedback system for full closed loop controls
(Scale feedback) X-axis, Y-axis, Z-axis, W-axis
Note) To include the W-axis conditions, selection of ㊱ is required.

㉓ Air compressor (a low noise type air compressor provided with an air dryer)
In the case of a screw type air compressor, the air compressor of 11 kW can be selected when the air blow function is not included. The air compressor of 15 kW shall be selected when the air blow function is included.
Note) The power supply for the air compressor shall be provided by customer.

㉔ Air dryer
Since the oil mist lubrication system is adopted, the air dryer shall be provided by the customer if there is no air dryer in the customer's plant.

㉕ Customer designated machine exterior painting color
Painting colors shall be specified by the customer as per the Munsell notation system and color samples.
Note) For the pendant control box, company name plate, parts purchased from subsuppliers, and machine interior, the painting color shall conform to each manufacturer's standard.

㉖ Free arm pendant
Note) This is not available simultaneously with ⓯

㉗ Roll-around NC operation box with casters
Note) this option is not available simultaneously with the free arm pendant described in Item 27.

㉘ Preheat timer
Either one of the following types of operations are available.
Type A ... operation until the hydraulic unit is started to run.
Type B ... operation until the program for warming up is executed after the hydraulic-unit is started to run.

㉙ Ball screw shaft core cooling system (X, Y and Z axes)
This system allows X and Y axes to operate continuously at a cutting feed rate of 10000 mm/min. This system also allows Z axis to operate continuously at a cutting feed rate of 6000 mm/min.

㉚ Spindle designed for "BIG PLUS" tool
Each attachment spindle is compatible with the BIG-PLUS tools.

㉛ Power transformer compatible with special power supply voltage

㉜ Machining of reference grooves on table top surface
Two reference grooves of 24^{H7} mm width are provided to the top surface of Table in the direction orthogonal to the T-slots. (See Page 12.)

㉝ Automatic tool length measurement system (Vertical Spindle)
The length of a tool is measured automatically.

㉞ ATC/AAC-side automatic opening and closing cover
A hydraulically-driven automatic opening-and-closing type cover is provided on the front side of the left Column.
M codes are available for opening and closing the cover.

㉟ Spindle high-speed specification
The maximum speed of the vertical spindle (Snout 240) is set to 6000 min^{-1}.
Note) In the case of 0.07 N Angle Head, the maximum speed is set to 5000 min^{-1}.

㊱ Numerically-controlled W axis
The crossrail elevation is continuously controlled by the CNC system.
A spindle head position-synchronized type crossrail hydraulic servo balance device is included.

㊲ Standard height +500 mm
W-axis travel: 1500 mm (Height: standard height +500 mm)

2

CNC System Specifications TOSNUC999

Standard Specifications including pack specifications
(Items marked with ☆ are included in the pack specifications.)

A. Controlled axes

☆Number of controlled axes   4 axes (X, Y, Z and W)
  Simultaneously controllable axes   3 axes for positioning (G00) and linear interpolation (G01)
    2 axes [X-Y, Y-Z (W), and Z (W)-X] for circular interpolation (G02, G03)
☆Synchronized operation   WM and WS axes

B. Programming Methods

Programming resolution   Linear axes: 0.001 mm
Maximum programmable dimension
    Linear axes ±99999.999 mm (±9999.9999 in.)
Data code   Automatic recognition of ISO/EIA
    JIS B6311 ISO 6983/1
    EIA RS-358-B EIA RS-244-B
Data format   Variable block with decimal point programming
    Word address format
Absolute/incremental programming   G90/G91
Decimal point input   Calculator type/programming resolution type

C. Interpolation

Positioning   A positioning operation is performed at a rapid traverse rate by executing G00 command.
Linear interpolation   A linear interpolation is performed by executing G01 command.
Circular interpolation   A circular interpolation is performed by executing G02/G03 command.

D. Feed

Rapid traverse rate   (See the section of machine specifications for numerical values)
Feedrate   F 5-digit direct programming in mm per minute
Dwell G04   Dwell time can be specified in the range of 0 to 999.99 seconds with F (or P) code.
Continuous jog feed
    A selected axis is continuously moved at a rapid traverse rate or cutting feedrate by manual operation.
Rapid traverse override
    Rapid traverse can be overridden in the range of 0 to 100 % in 10 % increments.
Feedrate override
    Specified feedrate can be overridden in the range of 0 to 200 % (stepless).
Automatic acceleration or deceleration
    Linear acceleration or deceleration can be effective on rapid traverse rate and jog feedrate.
Automatic acceleration or deceleration for cutting feed
    Linear acceleration or deceleration can be effected on feedrate by executing G08/G09 or G50/G51 command.
S-type acceleration or deceleration for rapid traverse
    S-type acceleration or deceleration can be effected on rapid traverse.
☆Thread cutting
    Thread cutting synchronized with spindle revolution can be performed by executing G33 command.
☆Feed per revolution/feed per minute
    Feed per minute or feed per revolution can be selected for the feedrate specified by F code by executing G94/G95 command.
☆Dwell per revolution   Dwell per revolution can be performed by executing G05 command.
☆Handwheel feed with portable type box   0.001, 0.01 or 0.1 mm/division
☆Thread-cutting initiation at optional angle
    Thread cutting is initiated at the optional angle of Spindle.

E. Part Program Storage and Edit

☆The part program storage capacity of 600 m [1970 ft/approx. 285 kB] (the numbers of registrable programs: 1512) (The customer's storage capacity is decreased by approximately 100 to 200 m which is used for the selected optional functions by manufacturer.)

Program edit (Background edit)
    Various editing operations are possible for programs memorized.
    Program delete, program copy, program rename, search, jump, cancel, deletion and copy by designating range, replace, program insertion, register in abbreviation, line mark designation, sequence number change, space insertion between words, program input in S. F. auto mode, simultaneous opening of two programs, editing of various data during program editing, undo of deleted program, English comment
Program name
    A program name is specified with the alphanumeric characters up to eight characters following address $ or O.
    Program comment of maximum 32 characters can be included.
Sequence number
    A sequence number is specified with a 5-digit number following address N.
Sequence number search
    A block containing specified sequence number can be searched.
Programs nesting list
    A list of program nesting is displayed.
Program offset list
    List of the following data is displayed after searching from the head of program.
    Fixture offset
Syntax check
    The format of a program is checked.

F. Operation and Display

☆Operation panel   10.4 in. color TFT liquid crystal display
    Keyboard with membrane switches (80 keys)
Customized key
    Registering a series of key-in operations to be performed very often into a key, the operation can be performed quickly, thus improving efficiency of the operation.
Tool file
    Tool data such as tool length, cutter diameter and tool offset can be collectively displayed in a unified manner and edited.
Display capabilities
    Commanded values, current positions, compensation values or the like are displayed on the main screen, window screen and sub screen respectively.
Screen erasing function
    A screen is erased when a key-in operation is not performed in specified time or more.
Operation   Automatic operation, MDI operation, and manual numerical command are possible.
SF manual setting
    S and F codes can be set in the manual mode.
SF automatic setting
    S and F codes are set automatically in the manual mode.
Spindle motor load display
    The power consumption of spindle drive motor is displayed.
Run hours display   The NC working time is displayed.
Machined workpiece counting
    The number of machined workpiece is counted when the M code specified in the parameter is executed.
Calendar timer
    A calendar and time are displayed on the run hour display screen.
    Program creation dates and time are displayed in the program list.
Machining record
    A history such as machining start time, actual machining time or the like which is recorded after operating a machine in the automatic mode by executing a program are displayed.
User name registration
    A user name is displayed at the time of a system startup.
Memory operation
    A program in the NC memory is executed in an automatic mode.
MDI operation
    In MDI mode, a program constituted of a plurality of blocks can be inputted and executed.

G. I/O Function and Device

RS232C interface port A
    NC programs, tool offset data or the like can be inputted and outputted via the EIA RS232C interface.
☆User media
    Various data such as NC programs or tool offset data can be input and output via a USB memory or a CF card slot. Memory slots are arranged on the right side of the pendant operation box.

H. S, T and M functions

Spindle-speed function (S function)
    Spindle speed can be specified with a five (5)-digits integer following address S.
Spindle speed override   50 to 200 % in 10 % increments.
Tool function (T function)
    Tool number can be specified with a six(6)-digits integer following address T.
Miscellaneous function (M function)
    Miscellaneous function can be specified with a four (4)-digits integer following address M.

I. Tool Offset

Tool length offset
    Tool length offset can be set to an axis perpendicular to the selected plane by executing G43/G44/(G49) command.
Tool offset
    Tool extension or contraction is effected on an axis in selected plane by executing G45/G46/G47/G48 command.
Cutter compensation type C
    Cutter compensation is effected on an axis in selected plane by executing G40/G41/G42 command.
☆Number of tool offsets   The number of tool length offsets: 899 sets
    The number of cutter compensations: 899 sets

J. Coordinate System

Automatic reference point return   G28: Automatic return to a reference point
    G29: Return from a reference point
    G20: Reference point return check
Coordinate system setting
    A coordinate system can be set so that the current positions of axes constitute commanded coordinate values by executing G92 command.
☆Fixture offset   99 sets (H901-H999)
    Fixture offset becomes effective by executing G53/G57 command.
Fixture offset 2
    Fixture offset becomes effective by executing G54/G55/G56 command.
2nd to 4th reference point return
    Axes are returned to the 2nd to 4th reference points automatically by executing G21 command.

K. Operation Support Function

Control in/out
    Information inserted in the section between control out and control in codes can be neglected.
Single block
    A program can be executed block by block during automatic or MDI operation.
Optional stop   M01
    A program is stopped at a block containing M01 code in a state that M01 push button switch is ON.
☆Optional block skip
    A block containing a slash (/) code at the top there of can be skipped.
    3 pcs
Dry run
    Axes moves at the feedrate set to the parameter in place of the programmed feedrate.
Machine lock
    Output of axis command pulse to the machine side is suspended.
Miscellaneous function lock
    M, S, and T commands are not outputted to the machine side.

Z-axis feed cancel
    Output of Z-axis command pulse to the machine side is suspended.
Manual absolute ON/OFF
    Whether a travel of an axis moved by manual operation is added to the current coordinate value is selected according to the status of the absolute ON/OFF switch.
Override cancel
    An override for a feedrate and spindle speed is ignored to clamp the feedrate and spindle speed at 100 % by executing M48 or M49 command.
All clear
    The NC internal memory can be initialized by pressing the ALL CLEAR push-button switch.
Reset   A command currently executed can be reset.
Feed hold
    Axis travel can be suspended by pressing the FEED HOLD push-button switch in automatic and MDI operation.
Cycle stop
    Axis travel and spindle rotation can be suspended by pressing CYCLE STOP push-button switch in automatic and MDI operation.
Restart
    When machining is interrupted in automatic operation, the operation can be resumed from the specified block after taking required steps such as tool changing.
Sequence number collation and stop
    Operation can be stopped after executing the block preceding a block with the specified sequence number.
Manual numerical command
    Data can be inputted and executed in manual-operation mode.
    Data that can be inputted : G00/01, F, M, S, T, axis data (incremental)
Single block cancel
    Single block ON or OFF in the single operating mode can be selected by executing G990/G991 command.
Feed hold cancel
    Feed hold ON or OFF can be selected by executing G992/G993 command.
Override cancel
    Feedrate override ON or OFF can be selected by executing G994/G995 command.
Handwheel feed interruption cancel
    Handwheel feed interruption ON or OFF can be selected by executing G996/G997 command.
Manual interruption and manual return
    A function for interposing manual operations in automatic operation. After each axis is moved in a manual interruption mode, the axis is automatically returned to the position before interrupting by pressing manual return push-button switch.
☆Handwheel feed interruption
    Interruption by means of a MPG handwheel is permitted in cutting feed operation.
☆Manual tool length and tool diameter measurement
    An offset value of a tool to be measured from the calibration tool is measured and memorized as the data of specified offset number.

L. Programming Support Function

Plane selection
    A machined plane can be selected by executing G17/G18/G19 command.
Circular interpolation by radius programming
    Radius of an arc can be specified directly by R command.
Circle cutting   G12, G22: Inner circle cutting CW
    G13, G23: Inner circle cutting CCW
    G222: Outer circle cutting CW
    G223: Outer circle cutting CCW
Machine coordinate system position command
    Axes can be moved to a position on the coordinates unique to the machine by executing G73 command.

Subprogram call
A subprogram stored in the memory can be called and executed by commanding G72. The subprogram name should be specified with eight (8) alphanumeric characters following address $ or O.

Arbitrary angle chamfering/corner R
Arbitrary angle chamfering or corner R can be inserted between two (2) consecutive blocks including cutting feed commands.

Canned cycle
A drilling canned cycle can be executed by commanding each of G77 to G89.

Automatic corner override
Automatic override for inside corner/Change of inside arc cutting speed

☆Programmable mirror image
Mirror image can be set for each axis by executing G62 or G66 command.

☆Plane conversion
A NC program based on G17 plane can be executed on the other planes by executing each of G35 to G39 commands.

☆Macro program
A macro program can be called and runs by executing a command such as G72, G74, G75 or G76.

☆Pattern cycle
Regularly arranged hole position pattern cycle and milling pattern cycle can be executed by commanding each of G109 to G119 or G121 to G132.

☆Coordinate conversion
A parallel shift and rotation of a coordinate system can be made by executing G10/G11 command.

☆Three-dimensional coordinate conversion
A parallel shift and rotation of a coordinate system can be made in three dimensions by executing G14 command.

☆Spindle C-Axis control
Rotational position control of Spindle can be performed using a hypothetical rotational-axis command.

M. Mechanical error compensation

Backlash compensation   Backlash of the machine is compensated.
Pitch error compensation   Pitch error of the machine is compensated.
Unidirectional positioning
Final positioning of axes can always be performed from one direction by executing G60 command.

☆Pitch-error gradient compensation
Pitch error of each axis feed screw of mechanical system can be compensated linearly by approximating with up to thirty (30) straight lines per axis.

☆Straightness compensation
Straightness of the mechanical system can be compensated linearly by approximating with up to nine (9) straight lines per axis.

N. Machine Control Support Function

Axis interlock
Feed of each axis can be prohibited or permitted in response to the external signal.

☆External feedrate-reduction function
Feedrate is slowed down in response to the external signal.

O. Safety and maintenance

Emergency stop
The machine comes to an emergency stop by pressing the EMERGENCY STOP push-button switch. Emergency stop can be canceled by pressing the EMG RESET push-button switch.

Overtravel check
The machine comes to an emergency stop in response to the external overtravel signal.

Stroke check
Axis travel exceeding the predetermined stroke is prohibited.

Interference check II
Axis travel into the predetermined interference zone is prohibited by executing G26/G27 command.

Self-diagnosis
A malfunction of NC program, NC system, servo and mechanical system can be monitored, and relevant alarm is processed.

☆Interference check I
Axis travel into the predetermined interference zone is prohibited by executing G26/G27 command.

☆Door interlock
An interlock function which shuts off the primary power supply when the control-cabinet door is opened.

P. Installation requirements

Power source   AC 200/220 V +10 % ～ -15 %
                                50/60 Hz±1 Hz, Three (3) phases
Environmental conditions   Temperature: 0 to 45 °C
                                Relative humidity: 75 % or less (no condensation)

Q. Servo system

Servo motor   AC servo motor
Position detector   X, Y, Z and W axis: Absolute encoders
                                (Absolute position detection)

Optional specifications

A. Controlled axes

Additional controlled axes
Select this function when using a NC rotary table to be controlled by TOSNUC999. Detailed specifications and scope of work shall be discussed as required.

B. Programming Methods

Inch/metric selection
Programming in inch or metric system can be selected by executing G70/G71 command.

C. Interpolation

Helical interpolation
The helical interpolation becomes effective by executing G02/G03 command and a linear interpolation command simultaneously.

Hypothetical axis interpolation
Setting and cancel of a hypothetical axis can be commanded by "G07a0/1" (a: axis address). An axis specified as the hypothetical axis does not move.

Cylindrical interpolation
When G67 command is executed, the cylindrical interpolation becomes effective by combining a linear axis with a rotation axis (additional axis) for operations such as grooving of a cylindrical cam.

Involute interpolation
The involute interpolation by means of orthogonal 2 axes becomes effective by executing G105 command.

Archimedes interpolation
The Archimedes interpolation (spiral interpolation) by means of orthogonal 2 axes or three (3) axes including orthogonal 2 axes and a normal axis becomes effective by executing G102/103 command.

Spindle normal direction control
Spindle normal direction control becomes effective for operation such as a grooving with the spring-necked turning tool by executing G140/G141/G142 command.

D. Feed

Synchronous tapping
Tapping can be performed by controlling a feed axis in synchronization with Spindle rotation.
M843/M844/M845 Spindle speed for synchronous tapping : 20 - 750 min^{-1}

Synchronous thread cutting
Large-diameter thread cutting can be performed by controlling a feed axis in synchronization with Spindle rotation.

E. Part program storage and edit

Part program storage capacity
Part program storage capacity of 1,200 m [3,900 ft] (approx. 538 KB)
                                (the number of registrable programs: 1,024)
Part program storage capacity of 3,000 m [9,800 ft] (approx. 1.3 MB)
                                (the number of registrable programs: 1,024)
Part program storage capacity of 5,400 m [17,700 ft] (approx. 2.2 MB)
                                (the number of registrable programs: 1,024)
Part program storage capacity of 7,800 m [25,500 ft] (approx. 3.3 MB)
                                (the number of registrable programs: 1,536)
Part program storage capacity of 10,200 m [33,400 ft] (approx. 4.2 MB)
                                (the number of registrable programs: 1,536)
(Part program storage capacity includes a capacity of 600 m as the pack specification.)
*Large capacity memory (CF card)   2GB

F. Operation and Display

Display language selection (standard: Japanese)   English or Chinese

G. I/O Function and Devices

**DNC I/F
DNC interface function compatible with EIA SP1292
Remote operation
Automatic operation is performed based on a NC program sent from the host computer in accordance with the transmission protocol.
                                Protocol A (handshaking system)
                                Protocol B (DC control-code system)
Binary operation
Automatic operation is performed based on the binary data sent from the host computer in accordance with the transmission protocol.
*High-speed LAN-LINKAGE
Host   FTP Server
Protocol   TCP/IP
LAN cable   10 base-T
Maximum capacity of internal memory
2GB (including a capacity of 30MB for storing the operation system)
Note) The following facilities shall be provided by the customer.
1) Construction and set-up for network
2) 10 base-T cables for connecting the LAN system with a machine

I. Tool Offset

Wear offset memory
The Wear offset memory can be added to the tool offset memory.
Three-dimensional tool compensation
A tool path can be offset in three dimensions by executing G30/G31 command.

K. Operation Support Function

Foreground plotting function
A tool path obtained from the active NC program can be plotted on the display screen. This function is not applicable to the program created for machining by using the horizontal spindle and AAI function.
Manual centering function
An offset of the coordinate system is automatically calculated by macro program after measuring a workpiece position.

L. Programming Support Function

Teaching
A program is automatically created based on a block executed by MDI operation, axis travel operated manually or the like.
Programmable data input
The data in the tool offset memory or the fixture offset memory can be updated by executing G58/G59 command.
Fixture offset data input
The programmed offset value for each axis can be added to the registered offset value by executing G158 command.

Programmable parameter input
Retrieving and rewriting of the data of setting parameter and system parameter can be performed by executing G58/G59 command. (To use this function, "programmable data input" is also required.)

Scaling
Reducing or enlarging of a profile based on a tool locus specified by a NC program can be performed by executing G64/G65 command.

Figure copy function
A subprogram can be entirely executed on the coordinate system which is rotated or shifted by executing G721/G722 command.

Circle cutting compensation
In executing the circle cutting command, the circle cutting is performed while compensating the roundness of machine motion by changing the radius of the circle in the longitudinal direction.

Machining time estimation and NC plotting function
Background processing such as program syntax check, machining time estimation, and plotting of a tool path can be performed in a state that the program is not executed.

Development of pattern cycle into NC statement
A hole-position pattern cycle command is developed into an NC statement showing each hole position.

M. Accuracy Compensation for Mechanical System

Z-axis thermal displacement compensation
The error of the mechanical system caused by thermal displacement of Spindle in the Z-axis direction is compensated.

O. Automation Support Function

Skip function
The processing of axis travel in execution is stopped and skipped to the following block in response to a skip signal inputted from the outside. (This function is automatically included in the specifications when the "automatic measuring system" and "automatic tool length measuring system" of machine optional accessories are selected.)

Tool breakage and tool wear detection
Cutting load condition can be monitored to detect tool breakage and tool wear.

Counting of tool working time
The tool working time is counted and an alarm is generated when the time has reached a specified tool life. (tool-life management)

Feedrate regulation
A feedrate is controlled so that a cutting load (load on the spindle motor) assumes a predetermined value.

Spare tool selection
The specified spare tool is selected in place of a tool that cannot be used due to tool life, breakage, or wear based on the result of tool breakage and tool wear detection.

Tool wear coefficient function
The tool-life time and the tool working time can be counted by multiplying the predetermined tool wear coefficient. (M-code output only)

Program check and tool list creation
In the program in execution, the syntax check of a program to be executed next is performed, or the list of tools to be used is created.

Interruptive macro
A macro program can be called and executed in response to an external signal.

Two (2) external M codes   M192, M193 (M-code output only)

Q. Servo system

Shape recognition preview control (including preview control)
When machining along the tool path programmed including the successive short line segment block at high speed, the impact at a corner or an error such as delay in the servo system can be prevented, thus performing highly accurate machining at high speed.

Note) Consult with us regarding the DNC interface marked with **.
Note) Marked with *, selectable between two options.