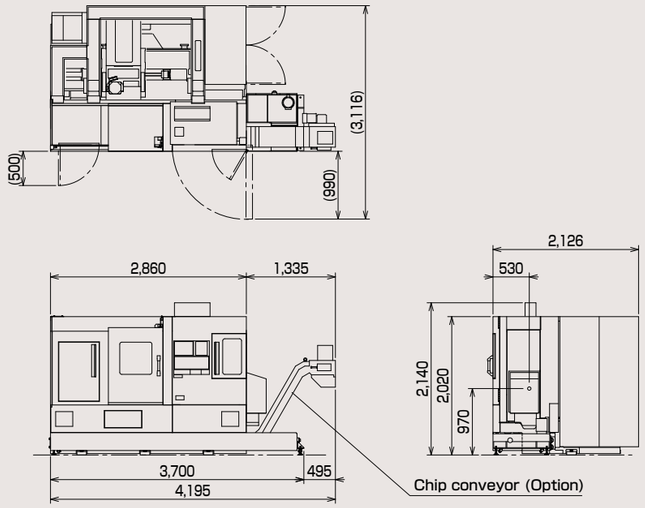
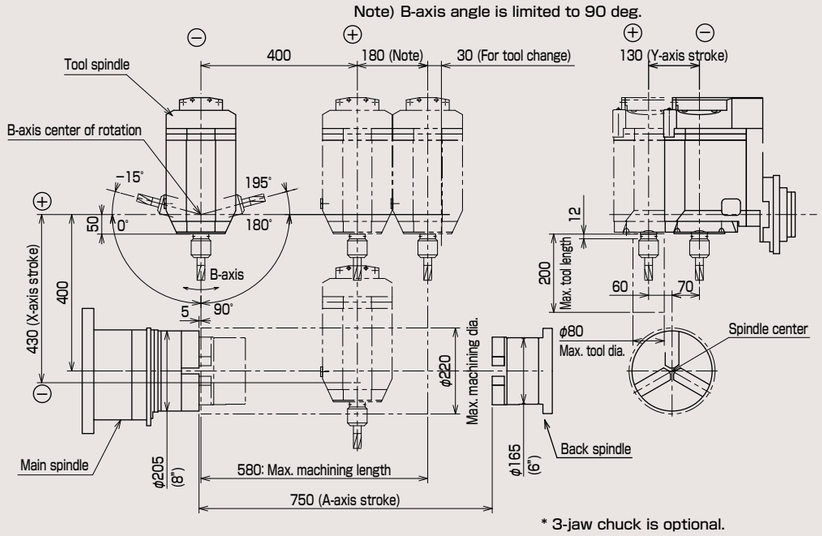
Layout



Tooling zone



* 3-jaw chuck is optional.

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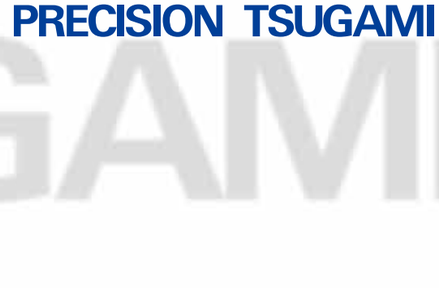
PRECISION TSUGAMI

TSUGAMI

Turning Center

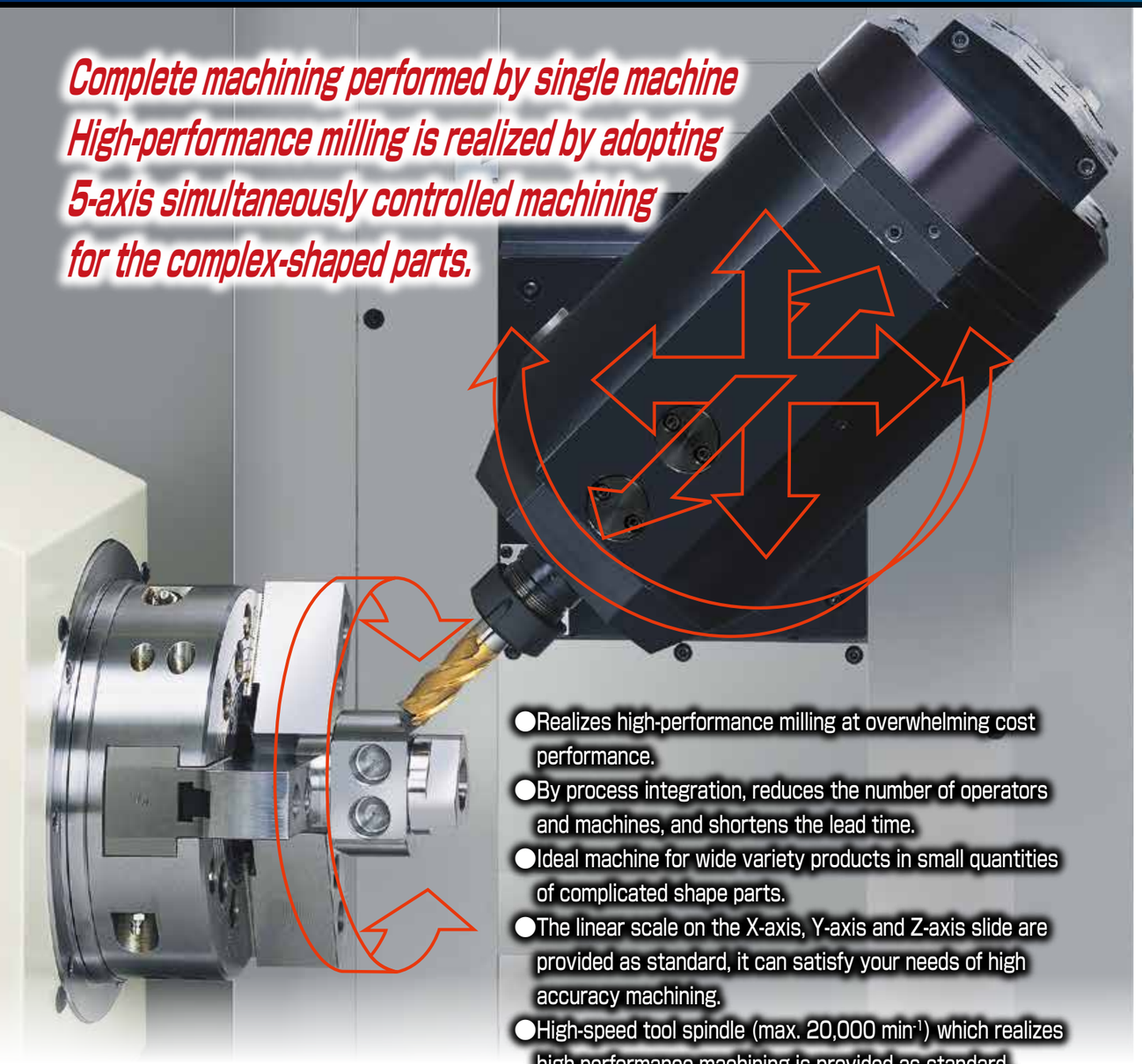
TMA8F



Complete machining performed
by the all-in-one flexible machine

Productive machine by the unification of lathe
functions and machining center functions

- 20,000 min^{-1} max. spindle speed
- 60-tool magazine is standard
- Tool interface is equipped with CAPTO C4



Complete machining performed by single machine
High-performance milling is realized by adopting 5-axis simultaneously controlled machining for the complex-shaped parts.

- Realizes high-performance milling at overwhelming cost performance.
- By process integration, reduces the number of operators and machines, and shortens the lead time.
- Ideal machine for wide variety products in small quantities of complicated shape parts.
- The linear scale on the X-axis, Y-axis and Z-axis slide are provided as standard, it can satisfy your needs of high accuracy machining.
- High-speed tool spindle (max. 20,000 min^{-1}) which realizes high-performance machining is provided as standard.

Basic structure enables complex machining

■Orthogonal slide structure

The X-, Y-, and Z-axes slide orthogonally to reflect high-precision machine structure into machining accuracy.

■Compact structure: mechanical, electric, hydraulic and pneumatic equipment stored in the main body

This space saving structure improves productivity per floor area.

■Spindle capable of powerful cutting

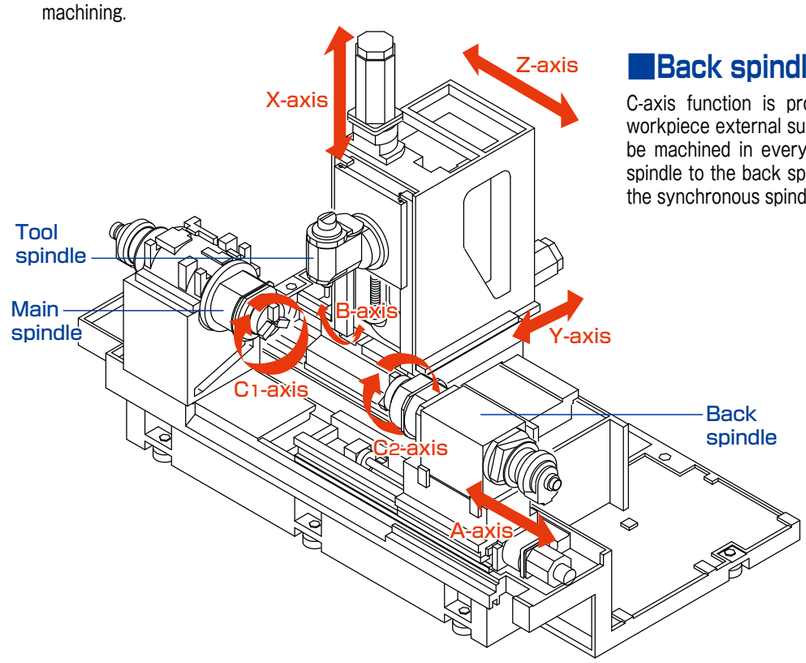
The temperature of spindle unit is controlled by cooling oil for prevention of heat generation from the bearings and the built-in motor.
The thermally symmetrical structure also minimizes thermal displacement to ensure high-accuracy machining in long term.

■Tool spindle with B-axis swiveling mechanism

Single tool spindle structure that allows turning tools and milling tools to fit in the same tool spindle. Machining such as angular processing or contouring with simultaneous control is realized by high-precision B-axis swiveling mechanism with direct drive.
The dual contact tool holder held by bore taper and end face of the tool spindle can perform powerful and accurate machining.
11kW powerful built-in motor tool spindle can run max. 20,000 min^{-1}, and performs milling as powerful as a machining center from low speed to high speed.

■Correspond to high accuracy machining by equipping linear scale

The linear scale on the X-axis slide, Y-axis slide and Z-axis slide is provided as standard, it can satisfy your needs of high accuracy machining.



■High-speed tool change unit

The cam driven tool change unit performs the tool-to-tool change at 0.8 sec.

■Tool magazine settable from the machine front

The standard 60-tool magazine is located on the machine front so that operator can easily change and monitor tools.


Automatic tool change unit


Tool magazine

■Tool spindle indexing function

The unique 90° indexable tool spindle can reduce the number of tools and shorten the tool change time by using a multi turning holder with four turning tools or can turn back and front faces by a same tool.

Back/front machining by a same turning tool

Multi turning holder to index in 4 positions

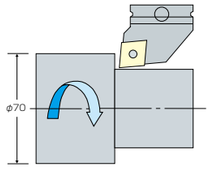

The tool can be indexed at fixed positions in 90 deg steps (4 positions) and tools can be used efficiently.

■Back spindle achieves 6-face machining.

C-axis function is provided as standard to the back spindle, and workpiece external surface and end face of the back spindle side can be machined in every 0.001 deg. Workpiece transfer from the main spindle to the back spindle during rotation is accurately performed by the synchronous spindle control.

■ Machining capability

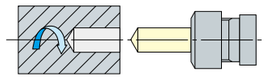
Turning



	Cutting section area (mm²)
Main spindle	2.5
Back spindle	1.5

Workpiece material: S45C

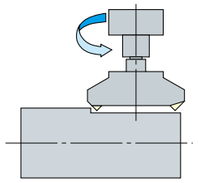
Drilling



	Drilling dia. (mm)	Feedrate (mm/rev)	Spindle speed (min⁻¹)
Main spindle	ϕ30	0.25	1,060
Back spindle	ϕ20	0.25	1,600

Workpiece material: S45C

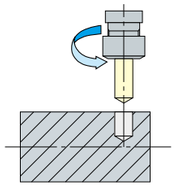
Milling (tool spindle)



Cutter dia. (mm)	Width of cut (mm)	Depth of cut (mm)	Feedrate (mm/rev)	Spindle speed (min⁻¹)
ϕ50 (4-brade cutter)	40	3	0.6	800

Workpiece material: S45C

Drilling (tool spindle)



Drilling dia. (mm)	Feedrate (mm/rev)	Spindle speed (min⁻¹)
ϕ20	0.2	1,600

Workpiece material: S45C

■ Options

■Collet chuck unit

Various collet chuck units appropriate for holding bar workpieces are prepared.

■Workpiece catcher A

Machined workpieces up to ϕ65 mm x 250 mm are discharged into a receiving box in front of the machine body.

■Oil mist collector

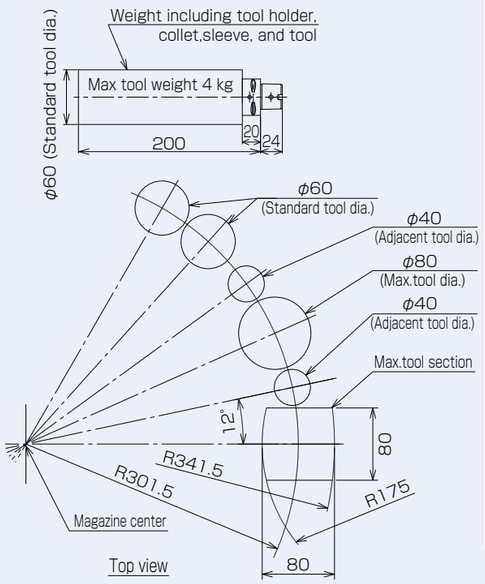
The oil mist collector collects oil mist to prevent your factory environment from deteriorating.

■Coolant through tool spindle

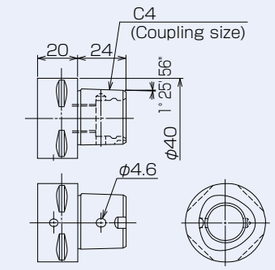
Maximum 7MPa high-pressure coolant can be discharged to a tool nose from optional high-pressure coolant system.

■ Tooling system

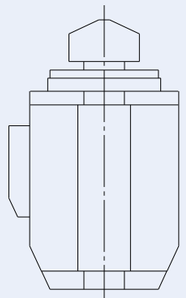
Tool size

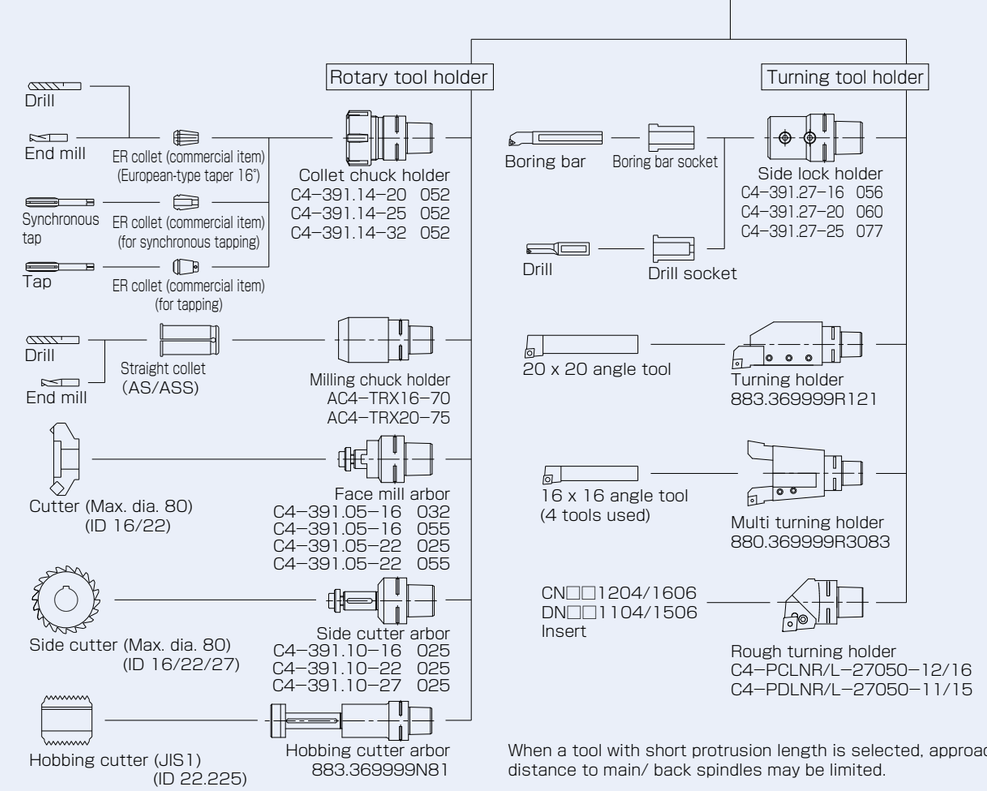


Shank size



Tool spindle





When a tool with short protrusion length is selected, approaching distance to main/ back spindles may be limited.

Machine specifications

Item		TMA8F
Capability	Max. machining diameter	220 mm
	Max. barstock diameter	65 mm Note 1)
	Max. machining length	580 mm
Stroke	X-axis stroke	430 mm
	Y-axis stroke	130 mm (+60/-70 mm)
	Z-axis stroke	580 mm + 30 mm Note2)
	A-axis stroke	750 mm
Main spindle	Max. spindle speed	5,000 min-1
	Spindle end face	JIS A2-6
	C1-axis least index angle	0.001°
	Chuck size	8 inch Note 3)
	Motor output	15/11 kW
Back spindle	Max. spindle speed	5,000 min-1
	Spindle end face	φ140 mm flat
	C2-axis least index angle	0.001°
	Chuck size	6 inch Note 3)
	Motor output	11/5.5 kW
Tool spindle	Type of tool spindle	Single tool spindle with ATC
	Motor output	11/5.5 kW
	B-axis index angle	-15° to 195°
	B-axis least index angle	0.001° (Continuous control)
	Tool spindle indexing angle/position	90°/4 positions
	Max. tool spindle speed	20,000 min-1 Note 4)
Automatic tool changer	Tool shank configuration	CAPTO C4
	Tool storage capacity	60
Rapid traverse rate	X-axis rapid traverse rate	30 m/min
	Y-axis rapid traverse rate	24 m/min
	Z-axis rapid traverse rate	40 m/min
	A-axis rapid traverse rate	30 m/min
	C-axis rapid traverse rate	300 min-1
	B-axis rapid traverse rate	150 min-1
Machine size	Machine height	2,140 mm
	Floor requirements	3,700 mm x 2,126 mm x 2,250 mm
	Machine weight	8,500 kg

Note 1) Bar stock operation capability may be limited depending on the chuck or the related devices.
Note 2) 30 mm is the stroke for changing tools. Among 580 mm of Z-axis stroke, the last 180 mm is limited with 90° of B-axis angle.
Note 3) 3-jaw: hydraulic chuck is optional.
Note 4) The rated speed of tool spindle is 15,000min-1, The excess speeds should be in short period.

Options

■High-performance system	0.1μm specification	
■Automation & unmanned operation system	Tool checker	
	Ber feeder interface	
	Work catcher	
	Worpiece ejector	
■Chip disposal system	Chip conveyor	Selectable form two types (hinge type or scraper type)
	Chip carrier	
■Coolant system	Spindle-through coolant	
	High pressure pump with elementless filter	(exclusively for water soluble coolant)
	High-pressure coolant system(2MPa)	
	High-pressure coolant system(7MPa)	
	Tool-spindle-bottom coolant (2MPa)	
■Workpiece chucking	3-jaw chuck unit	For the mein and back spindles
	Collet chuck unit	For the mein and back spindles
	Chucking pressure change (two automatic shifts)	Available for the main and back spindles.
	Chuck foot switch	
■Safety	Automatic fire extinguisher	
	Automatic power shutdown	
■Machine maintenance and monitoring functions	Signal indicator	
	Touch probe	
	Tool load monitor	
	Tool clamp miss detection	
	Tool breakages detection in tool magazine	

NC specifications

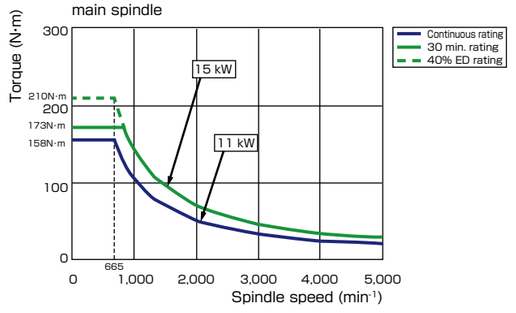
Item	Specifications
Display unit	10.4" color LCD
Controllable axes	7 axes (Simultaneously controllable axes: 5 axes)
Interpolation function	Linear interpolation, circular interpolation, polar coordinate interpolation, cylindrical interpolation, threading
Part program storage size	1 Mbyte
Number of registerable programs	1,000
Edit function	Background editing, programmable data input
Operation control	Run time & parts number display
Tape code	Automatic recognition of EIA/ISO
Command method	Standard: G code system A
Least input increment	0.001 mm 0.001°
Program command	Workpiece coordinate system (G52 to G59), machine coordinate system, 3-dimensional coordinate conversion
Canned cycle	Canned cycle, multiple repetitive cycle, canned cycle for drilling
Spindle control	Direct command of S 5-digit, 0 - 120% override per 10%, constant surface speed control, main/back-spindle synchronization, Cs contour control, rigid tapping
Tool offset	Tool geometry offset and tool wear offset, cutter and tool nose radius compensation
Number of tool offsets	200
Tool function	T 5-digit (Upper 2 digits: Tool number, Lower 3 digits: Offset number)

Functions for high-speed and accurate machining with 5 axes

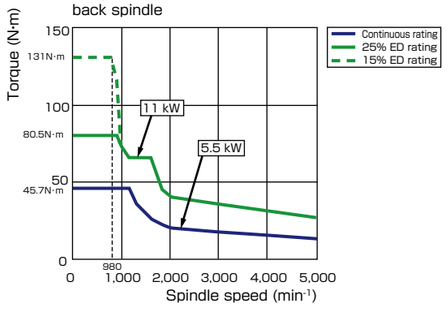
Interpolation function	Nano smoothing G5.1
Feed function	AI contour control Ⅱ
Program input	Tilted working plane command
	Cutting point command
Tool function/Tool compensation	Tool center control
	Tool offset for Milling and Turning function
Input/output function & device	Data server function

Torque characteristics

Torque characteristics of main spindle



Torque characteristics of back spindle



Torque characteristics of tool spindle