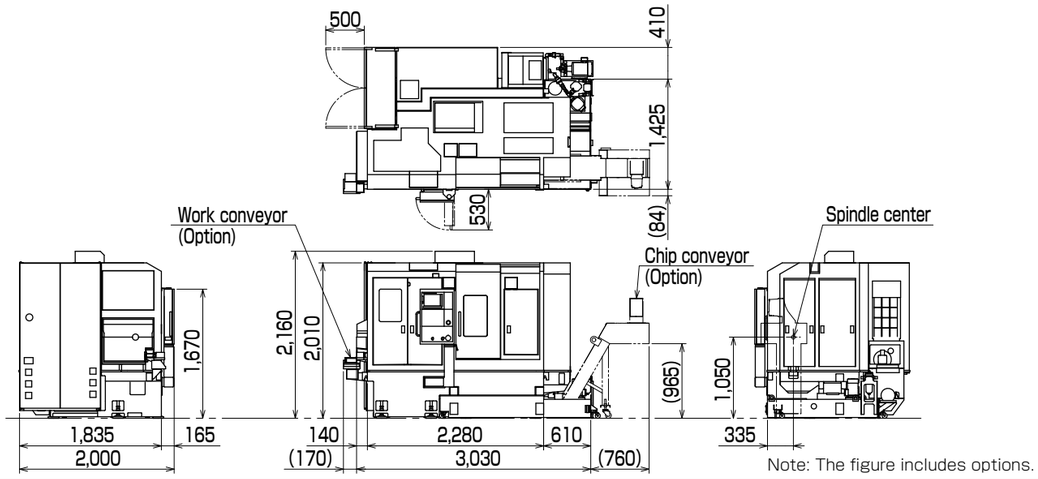
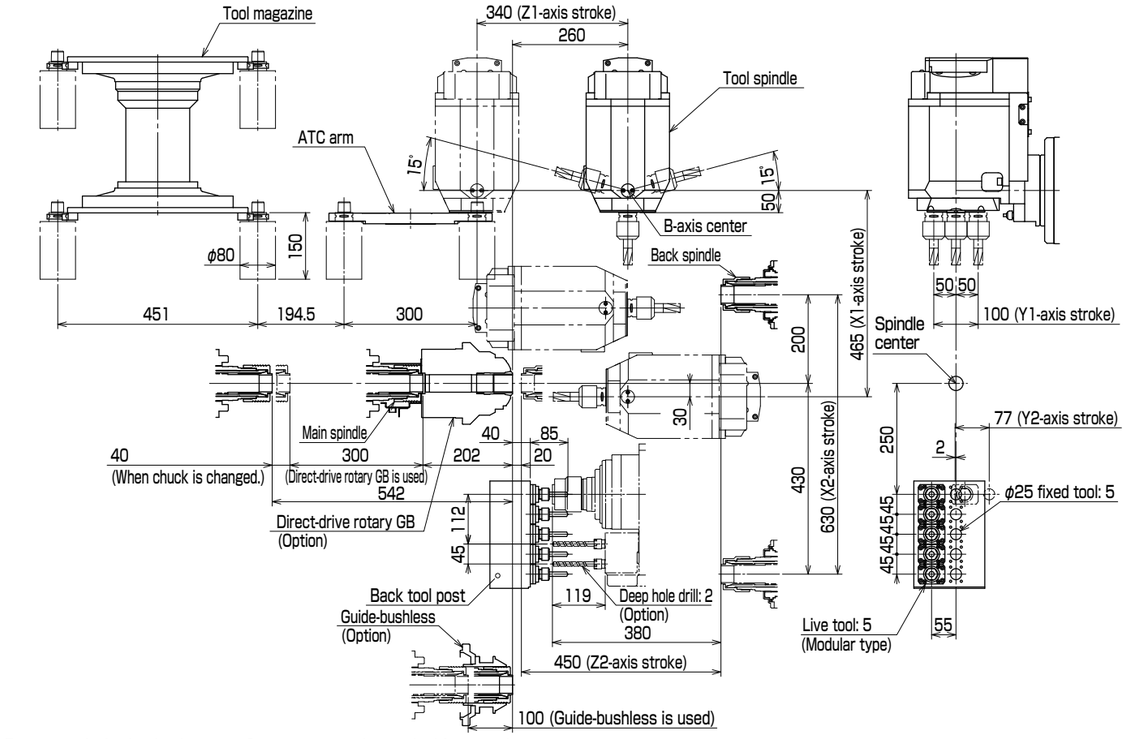
Layout



Note: The figure includes options.

Tooling zone



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The specifications of this catalogue are subject to change without prior notice.

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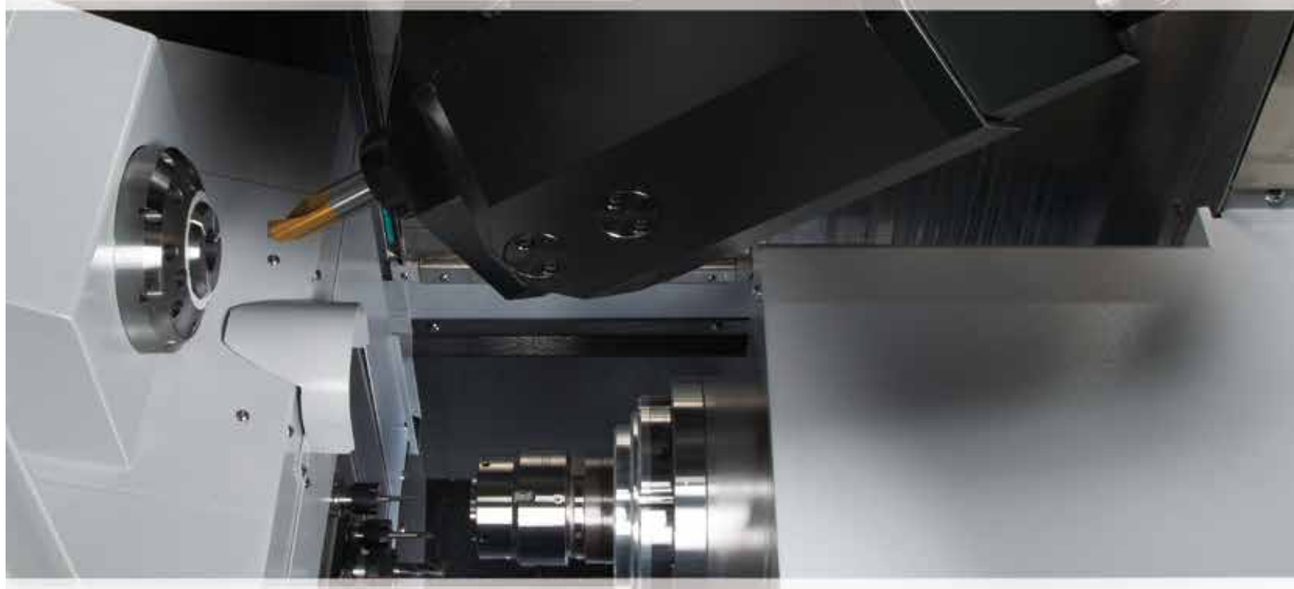
CAT.NO.E121894.SEP.1H(H)

PRECISION TSUGAMI

Turning Center

HS38MH
HS38MH-5AX



Productive combined machine by the integration of
Swiss type automatic lathe (sliding headstock type) and machining center

Optimum for mass production of complex-shaped workpieces from bar stock

High-speed tool spindle with max. 20,000 min^{-1} is provided as standard for efficient machining.

The tool spindle enables machining of complex-shaped workpieces beyond those of automatic lathes.
Enables 5-axis simultaneous controlled machining.(SS38MH-5AX)

Main spindle

Max. speed: 7,000 min^{-1}
Direct-drive rotary guide bushing type (option) or guide-bushless type (option) is selectable.

B axis
-15 deg to 195 deg

Improved productivity by simultaneous processing with the back spindle and the back tool post.

Tool spindle

Max. speed: 20,000 min^{-1}

Modular type live tools: 5 tools

Max. speed: 6,000 min^{-1}

Back spindle

Max. speed: 7,000 min^{-1}

HS38MH

High precision and high performance combined machine with linear scale

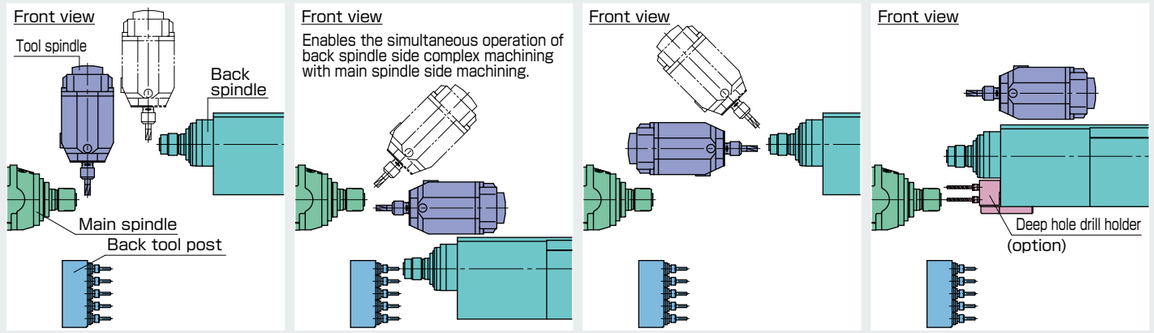
HS38MH-5AX

Fully- equipped machine with 5-axis simultaneously controlled machining for the complex-shaped parts

Mass-production type combined machine Efficient production of complex-shaped workpieces is realized by various machining patterns.

Processing patterns

The tool spindle enables machining of complex-shaped workpieces, which was not possible with conventional automatic lathes.



■ **The complete machining of complex-shaped workpieces from a bar is possible.**

■ **5-axis simultaneous controlled machining** (HS38MH-5AX)
- 5-axis simultaneous control is adopted for machining of complex-shaped workpieces.

■ **Guide-bush type or guide-bushless type is selectable according to the workpiece.** (Option)

■ **Long workpiece machining is possible by sliding headstock.** (Max. machining length: 300 mm)

■ **High-speed tool spindle with max. 20,000 min^{-1} for high efficiency machining**

■ **The linear scales are equipped as standard for X1, Y1, Z1 and X2-axis slides to support high accuracy machining.**

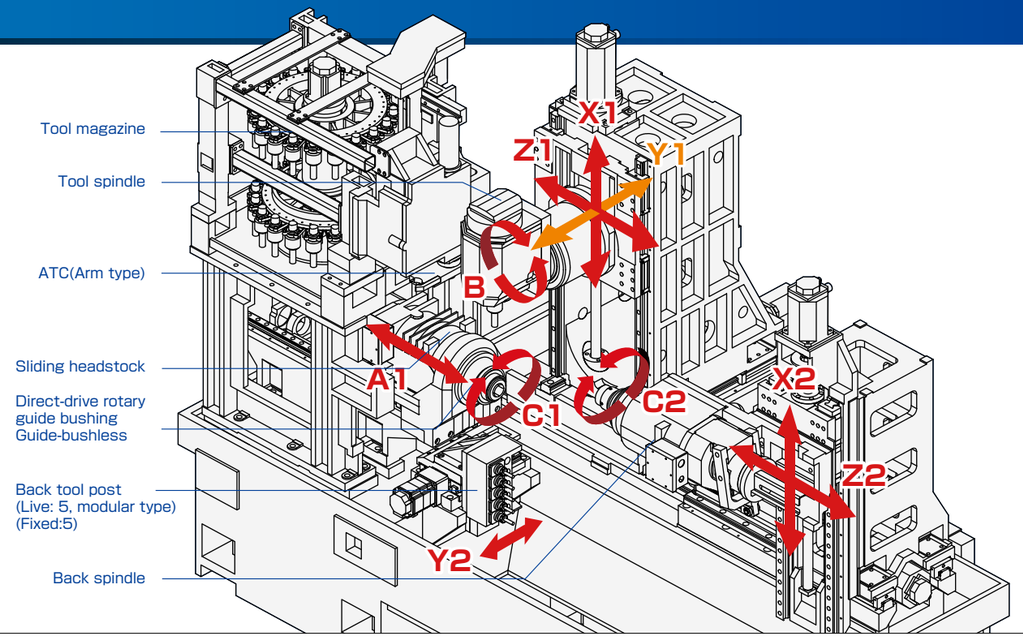
■ **The back tool post with Y axis enables the simultaneous operation of back spindle side complex machining with main spindle side machining.**

■ **Total 52 tools including 40 tools in the tool magazine, 10 tools on back tool post and 2 tools on deep hole drill holder** (option)
- Up to 5 modular type live tools can be mounted on back tool post, and optimum tool allocation is possible.
- By process integration, reduces the number of operators and machines, and shortens the lead time.

■ **Corresponds to heavy-duty machining by dual contact holder** (CAPTO C4).

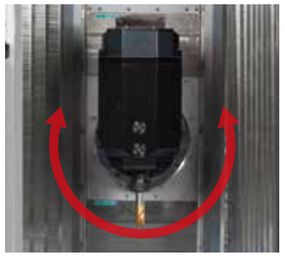
■ **NC functions** (provided as standard) **support the operator from the software side.**
- Cycle time reduction function
- Periodic maintenance screen
- Interference check function

Productive combined machine by the integration of Swiss type automatic lathe and machining center



■ Tool spindle with B-axis mechanism

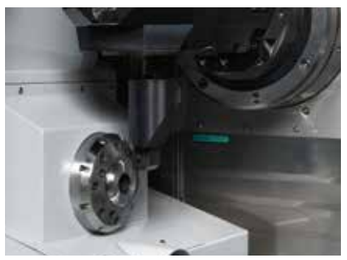
- B-axis mechanism with direct drive enables accurate inclined machining
- Dual contact holder makes accurate and rigid machining possible.
- 11kW high-output built-in motor achieves high-efficiency milling from low speed to the maximum speed of 20,000min^{-1}, equivalent to that of machining center



Max. speed: 20,000 min^{-1}
(Rated speed: 15,000 min^{-1})
B-axis least index angle: 0.001 deg
(HS38MH: Positioning)
(HS38MH-5AX:
Continuous control)
Swiveling range:
-15 deg to 195 deg

■ Main spindle

Max. speed: 7,000 min^{-1}
(Rated speed: 5,000 min^{-1})
C-axis control (0.001 deg)
(Continuous control)

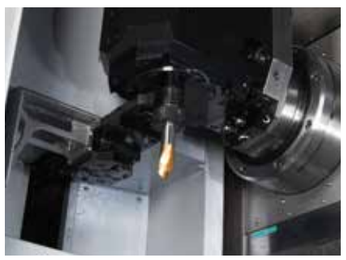


■ Back spindle

Max. speed: 7,000 min^{-1}
(Rated speed: 5,000 min^{-1})
Turning, milling and drilling on back side are possible.
C-axis control (0.001 deg)
(Continuous control)

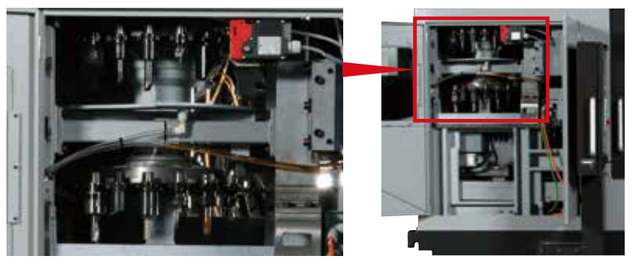
■ High-speed tool change unit (ATC)

Mechanical driven tool change unit with cam realizes high-speed tool change: tool to tool at 0.8 sec.



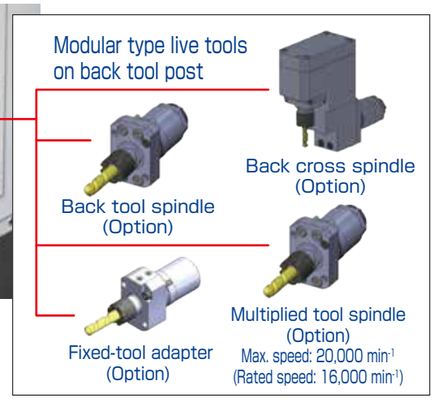
■ Tool magazine

- Tool storage capacity: 40 (Tool shank configuration: CAPTO C4)
- For easy tool holder change and maintenance, the tool magazine is located at the front of the machine



■ Back tool post

- With the dedicated back tool post, back side machining is possible while machining on main side
- Up to 5 modular type live tools can be mounted on back tool post, and optimum tool allocation is possible



■ Standardly equipped linear scales

Linear scales on X1, Y1, Z1 and X2 axes enable high accuracy machining

■ NC functions (provided as standard) support the operator from the software side.

● Cycle time reduction function

Outputting M code during axis movement. (Coolant can be discharged during axis movement.)
Axis start command during movement (Axis movement command can be executed at the appropriate coordinate during other axis movement.)

● Periodic maintenance screen

Tools and maintenance parts can be checked on the screen. The messages of timing for replacement or maintenance are displayed

● Interference check function

Prevents the interference between the tool spindle and the main or back spindle during tool setup.

■ Option

● Direct-drive rotary guide bushing, Guide-bushless

Guide-bushing type or guide-bushless type is selectable according to the workpiece (option).
Most suitable system for the workpiece length can be chosen.

● Work conveyor

The work conveyor carries the workpiece ejected from the back spindle to the machine left outside.

● Chip conveyor

Hinge type chip conveyor and scraper type chip conveyor are available.

● Tool counter

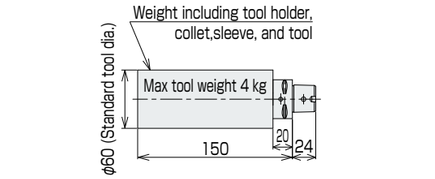
Life counter is prepared for each tool number.
By setting a forecast value, a message is displayed before the tool reaches the end of life.

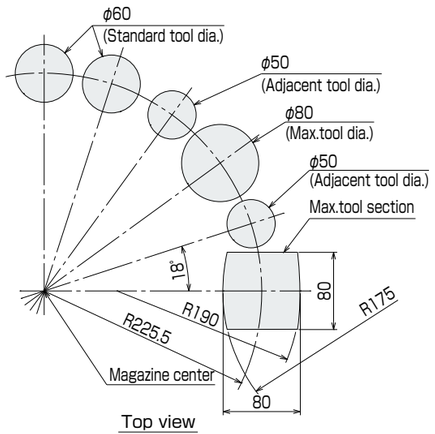
● Tool load monitor

Alarm levels can be set for each tool to detect abnormalities caused by tool wear or breakage

Tooling system

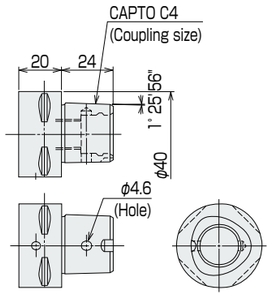
Tool size



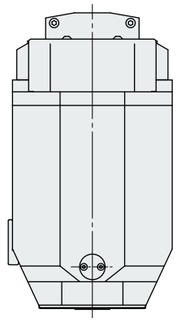


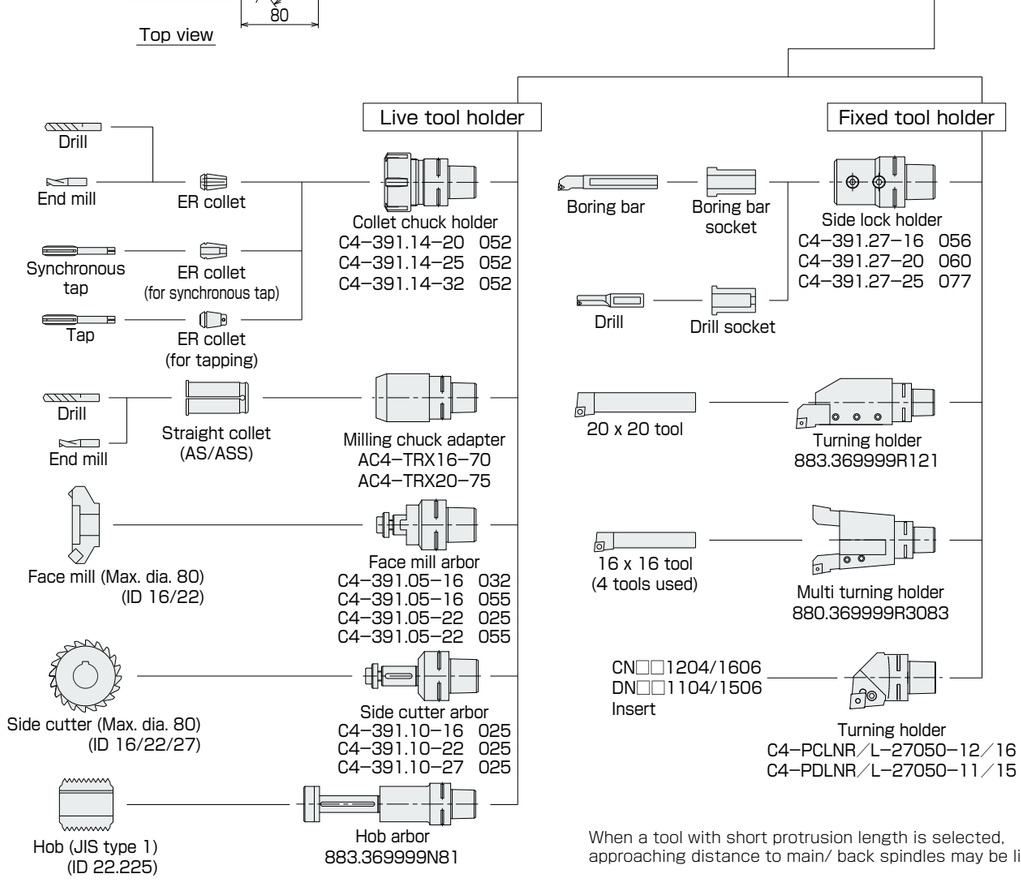
Top view

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	HS38MH	HS38MH-5AX
Machine capacity, Machining range		Bar stock chucking dia.	ϕ8 mm to ϕ38 mm	
		Max. back spindle chucking dia.	ϕ38 mm	
		Max. machining length	300 mm (Direct-drive rotary guide bushing) 100 mm (Guide-bushless)	
		Max. main spindle drilling dia.	ϕ16 mm	
		Max. main spindle tapping dia.	M12	
		Max. back spindle drilling dia.	ϕ12 mm	
		Max. back spindle tapping dia.	M12	
		Max. tool spindle drilling dia.	ϕ12 mm	
		Max. tool spindle tapping dia.	M12	
		Max. back tool post drilling dia.	ϕ10 mm	
		Max. back tool post tapping dia.	M8	
		Max. back live tool drilling dia.	ϕ8 mm	
		Max. back live tool tapping dia.	M6	
Machine	Main spindle	Rotation speed	Max. 7,000 min^{-1} (Rated speed: 5,000 min^{-1})*	
		C1-axis least index angle	0.001 deg (continuous)	
		Rotary guide bushing speed	Max. 7,000 min^{-1} (Rated speed: 5,000 min^{-1})*	
	Back spindle	Rotation speed	Max. 7,000 min^{-1} (Rated speed: 5,000 min^{-1})*	
		C2-axis least index angle	0.001 deg (continuous)	
	Tool spindle	Rotation speed	Max. 20,000 min^{-1} (Rated speed: 15,000 min^{-1})*	
		B-axis least index angle	0.001 deg (Positioning)	0.001 deg (continuous)
		B-axis index range	-15 deg to 195 deg	
		Tool spindle index angle/position	90 deg /4 positions	
	Back tool post	Live tool speed	Max. 6,000 min^{-1} (Rated speed: 4,200 min^{-1})*	
		Number of tools	5 tools: Live (Modular type), 5 tools: Fixed (ϕ25 mm)	
		Tool storage capacity	40	
		Tool shank configuration	CAPTO C4	
		Rapid traverse rate	32 m/min	
Motors		Main spindle	3.7/5.5 kW	
		Back spindle	3.7/5.5 kW	
		Tool spindle	5.5/11 kW	
		B axis	3.2 kW	
	Linear axes	X1	2.7 kW	
		Y1, X2, Z2	2.5 kW	
		Z1	3.0 kW	
		Y2	0.5 kW	
		A1	0.75 kW	
		Live tool of back tool post	1.0 kW	
		Coolant pump	0.75 kW	
		Lubricating oil pump	30 W	
Power supply and others		Weight	7,100 kg	
		Power source requirement	57 kVA	
		Compressed air requirement	0.4 MPa or above	
		Air discharge rate	280 NL/min	
		Coolant tank capacity	195 L	
		Width × Depth × Height	3,030 mm x 2,000 mm x 2,160 mm	

* The rotation more than the rated speed should be short period.

Options

Guide bushing	Direct-drive rotary guide bushing
	Guide-bushless
High accuracy functions	0.1 μm resolution
	Coolant temperature controller
Live tools (Back tool post)	Back tool spindle
	Multiplied tool spindle
	Back cross spindle
	Fixed-tool adapter
Coolant	Coolant-through spindle
	Cyclone type high-pressure pump (exclusive for water-miscible coolant)
Work discharge	Work conveyor
	Front discharge

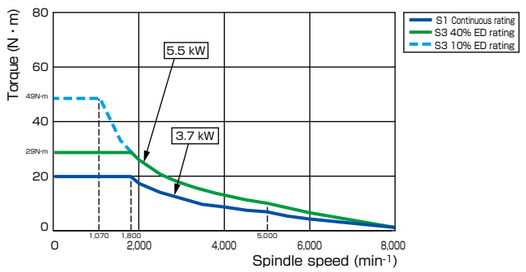
Work discharge	Rear discharge *
	Work tray
Chip disposal	Chip conveyor
	Chip carrier
Machine maintenance and Monitoring functions	Tool counter
	Tool load monitor (Main, Back and Tool spindle)
	Tool load monitor (linear axis)
	Tool breakage detector (for back tool post)
	Tool breakage detector (inside tool magazine)
	Signal indicator
	Tool checker
	Touch probe
	Tool clamp failure detection
Tooling	Drill holder
	Deep hole drill holder (ϕ25mm×2 holes)

NC functions	Part program storage size: 2Mbytes
	G code system B/C
	Helical interpolation
	Variable-lead thread cutting
	Thread cutting cycle retract
	AI contour control II (HS38MH)
	Data server function (HS38MH)
	Shift amount setting for spindle phase synchronization
	Automatic setting of pick-up position (G430-G431)
	Torque limit skip for Z2 axis (G432)
	Tool life management function
Safety and other	Bar feeder interface
	Rigid tap (Live tool of back tool post)

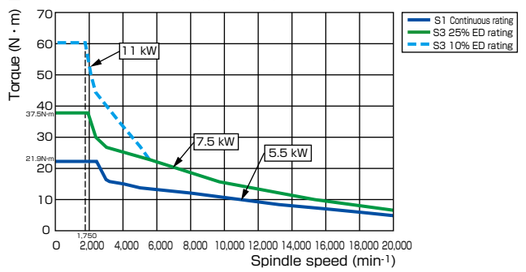
* When mounting together with the chip conveyor, the dedicated chip conveyor and the coolant tank are required.

Torque characteristics

■Torque characteristics of main/back spindle



■Torque characteristics of tool spindle



NC specifications

Item	Specifications
Controlled axes	X1, Z1, Y1, A1, X2, Z2, Y2, B, C1, C2
Least input increment	0.001 mm (X1/X2-axis in diameter)/0.001 deg
Max. programmable value	±8 digits
Interpolation method	Linear, Circular
Feedrate	1 to 6,000 mm/min
Feedrate override	0 to 150% in 10% increments
Dwell	G04 0 to 99999.99
Absolute/incremental command	X, Z, Y, A, B, C: Absolute U, W, V, H: Incremental
Number of tool offset	Main: 160, Back: 40
LCD/MDI	10.4" color LCD
Display language	Japanese/English
Part program storage size	1Mbyte (sum of main and back)
Number of registerable programs	1,000 (sum of main and back)
Miscellaneous functions	M5-digits
Spindle functions	S5-digits
Tool functions	T5-digits

Machine standard accessories

Main/back spindle adapter	C-axis control for main/back spindles
Door interlock (Tooling zone/Headstock area)	Air purge for main/back/tool spindle
Coolant flow switch	Back tool post air purge
Spindle cooling unit	High pressure pump
Standard tools	Periodic maintenance screen
Transit clamps	Automatic power shut off
	Shower coolant (on bellows cover)

NC standard accessories

Chasing function	Cut-off detection (Speed differential type)
Continuous thread cutting	Spindle speed fluctuation detection
Manual pulse generator	3-dimensional coordinate conversion
Memory card I/O interface	AI contour control II (HS38MH-5AX)
Background editing	Data server function (HS38MH-5AX)
Run time & parts number display	Quick response for fine block (HS38MH-5AX)
Custom macro	Tool center point control (HS38MH-5AX)
Constant surface speed control	HRV control
Spindle synchronous control (rotation/phase)	Manual handle retrace function
Tool geometry/Wear offset	Fixed data setting screen
Programmable data input	Direct drawing dimension programming
Chamfering & Corner R	Polar coordinate interpolation
Tool nose radius compensation	Cylindrical interpolation
Multiple repetitive cycle	Inch/metric conversion
Extended program editing	Abnormal load detection
Canned drilling cycle	RS232C input/output interface
Rigid tap (Main, Back and Tool spindle)	Interference check function