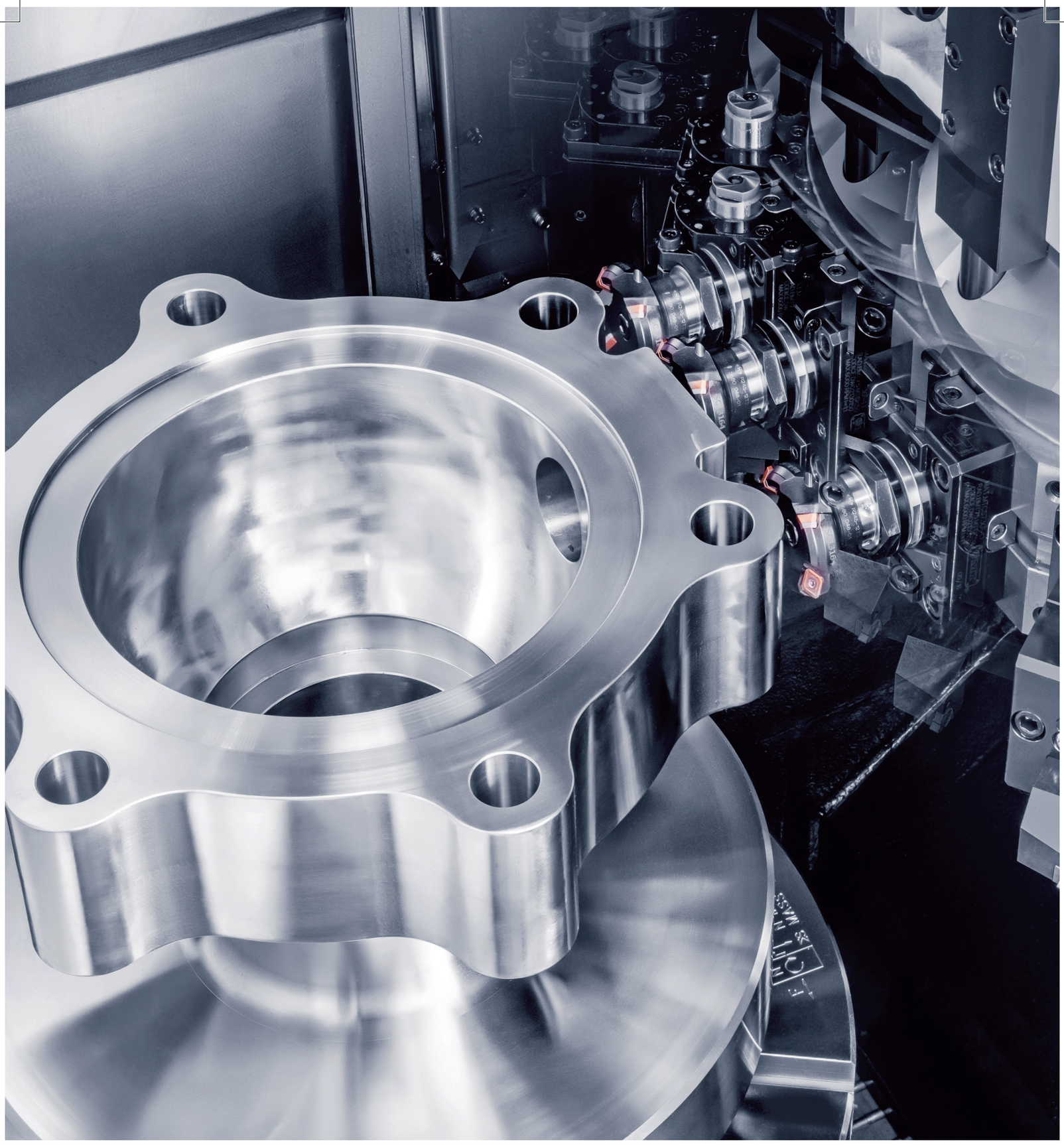
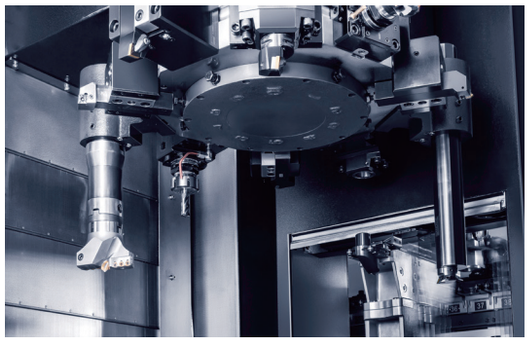


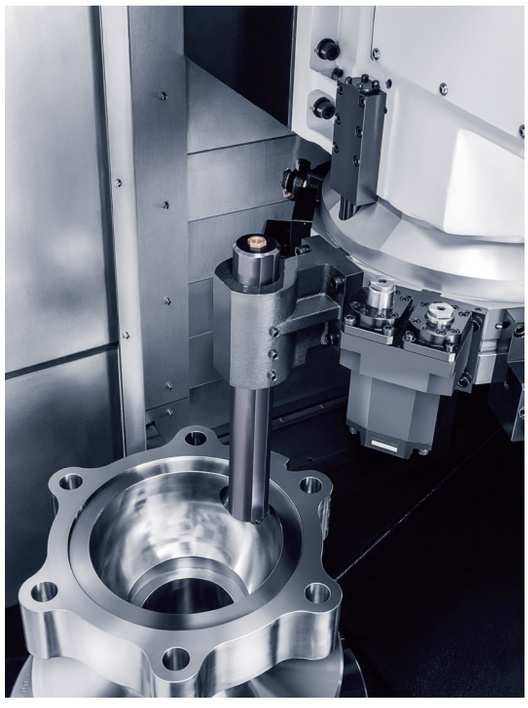
VT-650 YMC

Vertical Turning Center with Y-Axis Machining
15”- 24” Chuck

HWACHEON

Contents





One-chucking machining process can be achieved

The VT-650YMC can produce various parts such as casings, housings, and piping materials, and the Y-axis enables hole/tap and face machining in areas outside the center of the workpiece that cannot be processed on conventional vertical turning centers. Only one chucking allows high-precision, high-quality finished processing, which leads to fast production and fast delivery.

Easy Maintenance

1. Coolant tank placed at the rear and easy to remove
2. Coolant level sensor applied as standard
3. Use of external coolant block prevents the leakage of turret inside

Enhanced User Convenience

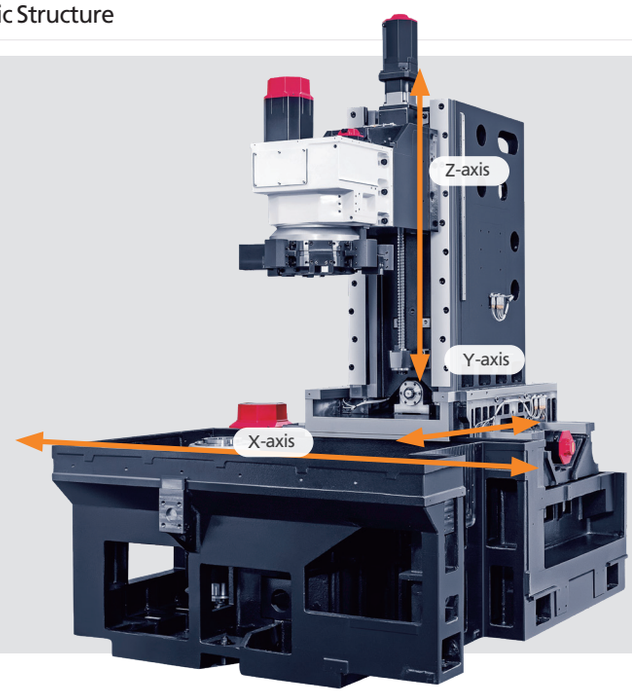
1. Structure to prevent chip accumulation in the door bottom
2. Reduced machining process through Y-axis
3. Optional software for user convenience

Upgrades for Enhanced Machining Performance

1. Medium or Large Size Coolant Tank Available
2. Stable machine structure
3. Powerful Turnmill Motor
4. Cutting Range without Interference
5. 16T or 48T Magazine

Basic Information

Basic Structure



Increased Structural Rigidity of the Machine via FEM Analysis

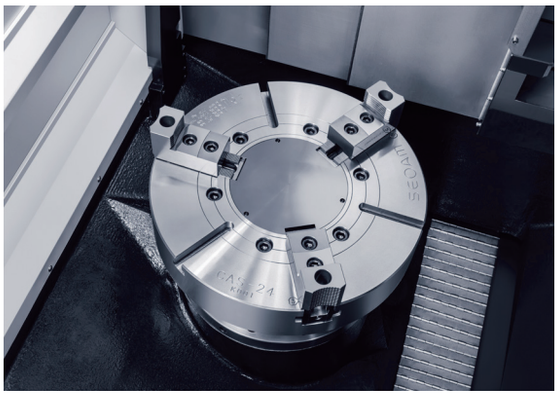
The cutting area and the feed zone are separated to **Minimize Thermal Displacement of the Frame** caused by hot chips and coolant

"The Largest Cutting Area in its Class"

- Max Cutting Dia **Ø800 mm (Ø31.5 inch)**
- Max Cutting Length **750 mm (29.53 inch)**

Type	Chuck Size inch	Stroke mm (inch)			Rapid Speed m/min (ipm)		
		X-axis	Z-axis	Y-axis	X-axis	Z-axis	Y-axis
VT-650 YMC	18(OPT : 15, 21, 24)	430 (16.93)	790 (31.1)	±125 (±4.92)	20 (787)	16 (630)	16 (630)

Main Spindle



Powerful chucking and high-speed machining
"Enhanced Cutting Performance and Productivity"

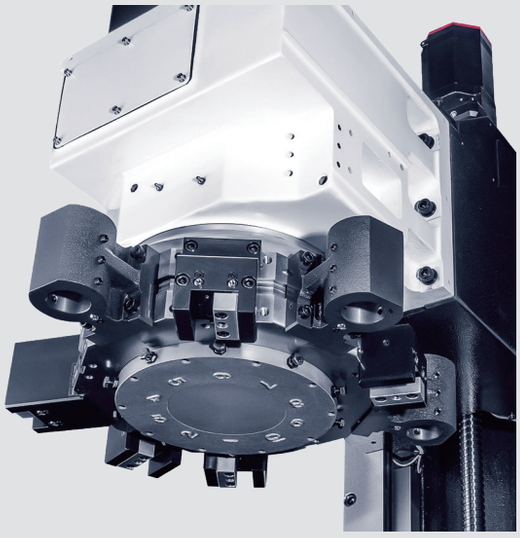
- Max Spindle Speed **1,500 rpm**
- Spindle Motor **22 kW**

Meeting the customer's machining purposes
"Various Specifications Spindles"

	Standard Spindle	High Speed Spindle	High Torque Spindle
Motor (Fanuc)	αp40	α40	α40
Type of Gear Box	-	-	Gear Box
Method of Speed Change	Electric Conversion	-	Gear Change
Max Spindle Speed (rpm)	1,500	15"&18": 2000 21"&24": 1,500	15"&18": 2000 21"&24": 1,500
Max Torque (Nm)	1,578	859	2,863

Type	Max Spindle Speed rpm	Spindle Motor kW (HP)	Spindle Torque Nm	Max Bar Size mm (inch)	Type of Spindle Nose ASA
VT-650 YMC	1,500(Opt.1&2: 2000)	22/18.5 (30/25)	1,578	800 (31.5)	A2-11

Turret



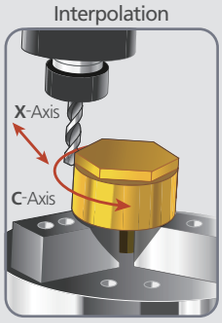
"Best Specification & Power"
in its class

1. Its external coolant block prevents leakage (cause of failure) of turret inside from the source.
2. Powerful clamping force of **13,850kg$_f$**
3. **BMT75** applied
4. Highly intensive process with spindle indexing (0.0001°)

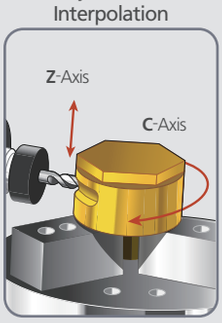
Type	Number of Tool Stations	Tool Size mm (inch)	Turret Indexing Time sec/step	Max Speed of Rotating Tool rpm
YMC	12	O.D: □32 (□1.26) I.D: Ø60 (Ø2.36)	0.2	3,000
MG/YMC	10			3,000

* The turret indexing time is the individual time based on 12 stations.

Polar Coordinate Interpolation



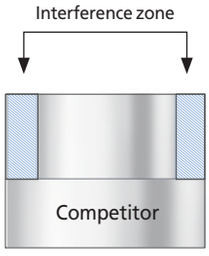
Cylindrical Interpolation

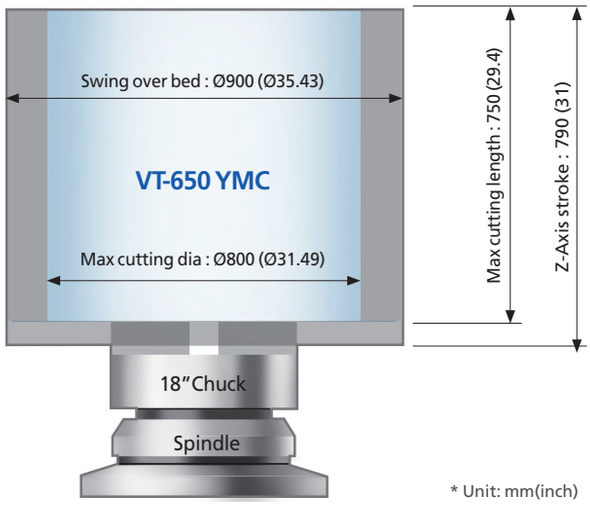


Cutting Capacity	Drilling		Ø26mm(Ø1")
	End milling		Ø26mm(Ø1")
	Tapping		M24

Interference Free Operation

The max. turning diameter zone is designed to provide interference free operations.
Providing same max. diameter at full length even on larger work pieces.

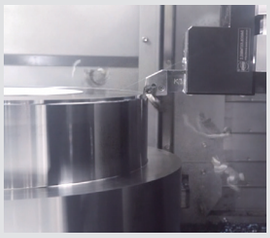




* Unit: mm(inch)

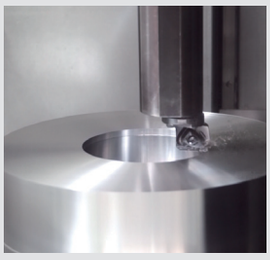
Cutting Performance

Main Spindle Type : Standard Spindle Material : Carbon Steel (SM45C)



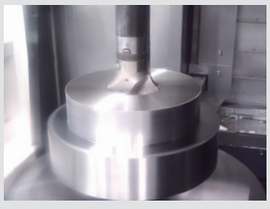
External Turning

Material Diameter mm	Cutting Speed m/min	Feed mm/rev	Spindle Speed rpm	Cutting Depth mm	Material Removal Rate cm^3/min
440	500	0.4	362	5	1000
346	200	0.3	183	9	540



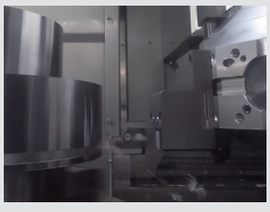
Internal Turning

Process	Material Diameter mm	Cutting Speed m/min	Feed mm/rev	Spindle Speed rpm	Cutting Depth mm
Finishing	130.4	230	0.1	560	0.1
Roughing	130.8	230	0.34	561	1



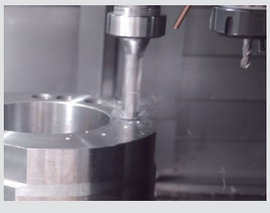
U-Drill

Tool Diameter mm	Cutting Speed m/min	Feed mm/rev	Spindle Speed rpm	Cutting Depth mm	Material Removal Rate cm^3/min
120	100	0.125	265	30	374.6



Groove

Material Diameter mm	Cutting Speed m/min	Insert Width mm	Spindle Speed rpm	Material Removal Rate cm^3/min
440	192	10	139	345.6



Turnmill Drill

Tool Diameter mm	Cutting Speed m/min	Feed mm/rev	Spindle Speed rpm	Cutting Depth mm	Material Removal Rate cm^3/min
21	49.5	0.35	750 (Base rpm)	50	90.9

Turnmill Tap

Process	Tap Size	Cutting Speed m/min	Feed mm/rev	Spindle Speed rpm	Tapping Depth mm
Axial (Z-axis)	M24 x P3.0	55.8	3.0	750 (Base rpm)	35

Face Cutter

Tool Diameter mm	Cutting Speed m/min	Feed mm/min	Spindle Speed rpm	Cutting Depth mm	Material Removal Rate cm^3/min
63	235	792	1,187	4	249.5

* The machining results above are examples based on the factory test standards, and are subjected to the changes in conditions.

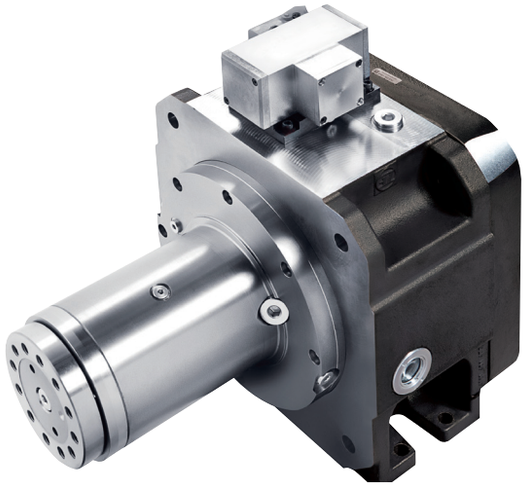
Standard / Optional Accessories Status

S : Standard O : Option X : Not available

NO.	Item	Description	YMC	MG / YMC
1	Chuck	18 inch	S	S
2		15 / 21 / 24 inch	O	O
3	Jaw	Soft Jaw	S	S
4		Hard Jaw	O	O
5	Chucking	Chucking Pressure Check Switch	O	O
6		Hydraulic Chuck & Cylinder (18" Closed Center)	S	S
7		Dual Pressure (C-axis brake)	S	S
8		Dual Pressure (Chuck)	O	O
9		Chuck Pressure Compensation	O	O
10		Chuck Clamp / Unclamp Switch	O	O
11	Turret	BMT75 Turnmill (Turret with turnmill)	S	S
12		Axial Turnmill Holder (BMT75)	O	O
13		Radial Turnmill Holder (BMT75)	O	O
14	Coolant Pump	0.6 MPa	S	S
15		1.5 MPa	O	O
16	Coolant Options	Coolant Gun	O	O
17		Coolant Blow	O	O
18		Coolant Level Sensor	O	O
19		Coolant Chiller	O	O
20		Oil Skimmer	O	O
21		Large Capacity Coolant Tank	O	O
22	Chip Disposal	Air Blower	O	O
23		Air Curtain (Head, ATC)	O	O
24		Air Gun	O	O
25		Side / Back Type Chip Conveyor (Hinge / Scraper Type)	O	O
26		Mist Collector (Interface)	O	O
27	Measurment & Automation	Tool Presetter (Automation)	O	O
28		Robot Interface	O	O
29		Tool & Work Counter (Internal / External)	O	O
30	Software	Lathe Tool Load Detect (L-HTLD)	S	S
31		Arbitrary Speed Threading	O	O
32		Tool Life Management	S	S
33		Automatic Tool Offset (Tool Presetter option is required)	S	S
34		Lathe Calculator Function (L-CAL)	S	S
35		Lathe Work / Tool Management (L-COUNT)	S	S
36		Lathe Workpiece Clamp of Chuck (L-WCMP)	O	O
37		Hwacheon Lathe Vibration Control System (HLVC)	S	S
38		Monitoring Solution of Real-time Operational Status (M-VISION Pro)	O	O
39		M-Code & G-Code List Help	S	S
40	ETC	Linear Scale (X / Z / Y)	O	O
41		NC Cooler	O	O
42		Signal Lamp with 3 Color (R / G / Y)	S	S
43		Transformer	O	O
44		Manual Guide i	S	S
45		15" Non Touch Display (Fanuc)	S	S
46		15" Touch Type Display (Fanuc i-HMI)	O	O
47		Foot Switch	S	S
48		Side Door Interlock	S	S
49		Auto Door	O	O
50		Leveling Bolt & Plate	S	S
51		Work Light	S	S

Powerful Spindle with Gear Box (OPT)

Power is delivered to the spindle through two speed transmission allowing high spindle speed as well as powerful high torque.



Max Torque: 2,863.6Nm (with Gear Box)

Type		Speed Range	Programmable Gear Change
Gear Box	Low Speed	0~600(rpm)	M41
	High Speed	15", 18" Chuck 2000	M42
		21", 24" Chuck 1,500	

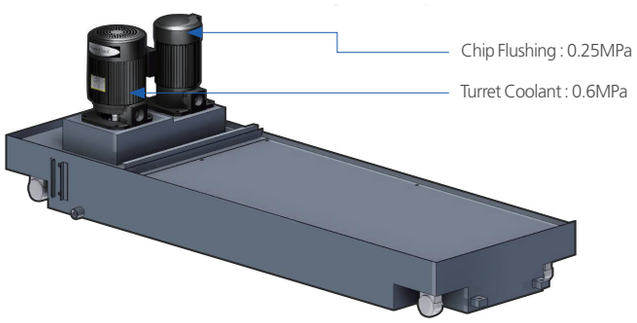
16T / 48T Magazine (OPT)

Various tools mounted on the magazine and it is possible to realize several cutting processes without interruption.

Mounted the long boring bar on the magazine, it is possible to work for large workpieces without interference.

Type	No. of Tool Station	Tool Type	Tool Storage Specification				Method of Operation
			Weight	Capacity	Diameter	Length	
16T	10ea	CAPTO C5	20kg (44.09lb)	16ea	Ø75mm(2.95inch)	400mm(15.75inch)	Servo motor
48T	10ea	CAPTO C5	20kg (44.09lb)	48ea	Ø75mm(2.95inch)	400mm(15.75inch)	Servo motor

Automatic Coolant System (STD)



	Coolant Tank
Standard Type	200ℓ (52.83gal)
Large Type (OPT)	300ℓ (79.25gal)

	Coolant Pump
Standard Type	0.6MPa
High pressure Type (OPT)	1.5MPa

External Coolant Tank

The coolant tank and chip conveyor are separated from the machine bed to prevent heat transfer and contamination.
With wheeled coolant tank, convenient maintenance for chip disposal and coolant refill or exchange.

Various Options

Oil Skimmer (OPT)
Lift-up Chip Conveyor (OPT)
- Hinge / Scraper Type

ONE CHUCKING TO FINISH

"Complete Processing of Complex Workpieces with Only One VT-650 YMC"

Conventional Machining

Machine #1

Turnmill vertical lathe
without Y-axis

Process #1

1. Int / Extturning
2. Drilling
3. Endmilling (polar interpolation)

Machine #2

Machining Center

Process #2

4. Facemilling
5. Drilling & Tapping (off-center)

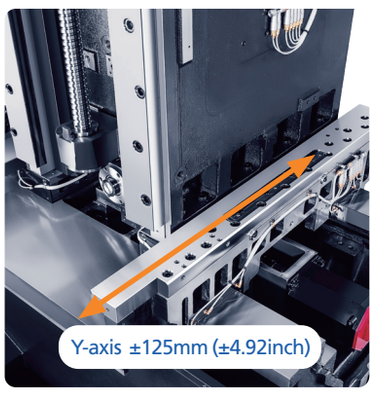
VT-650 YMC

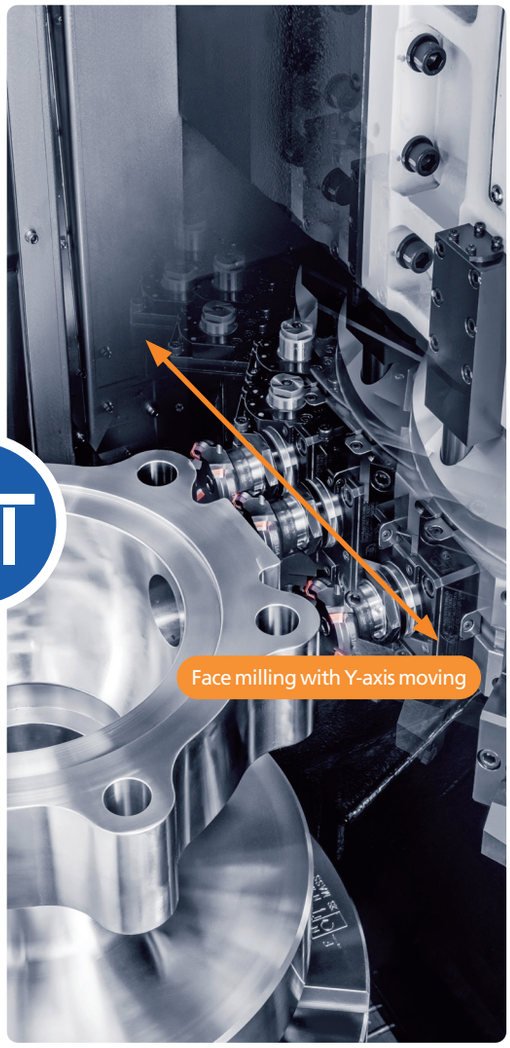
Machine

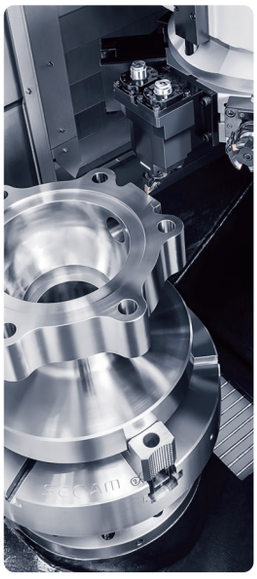
Up to 57 tools
with 48T magazine option

Process

1. Int / Extturning
2. Drilling
3. Endmilling
4. Facemilling
5.Drilling & Tapping (off-center)







Convenient Operator Panel

90˚ Rotating Operator Panel (STD)

The operator panel is newly designed from the operator's viewpoint and thus enhances the operator's convenience

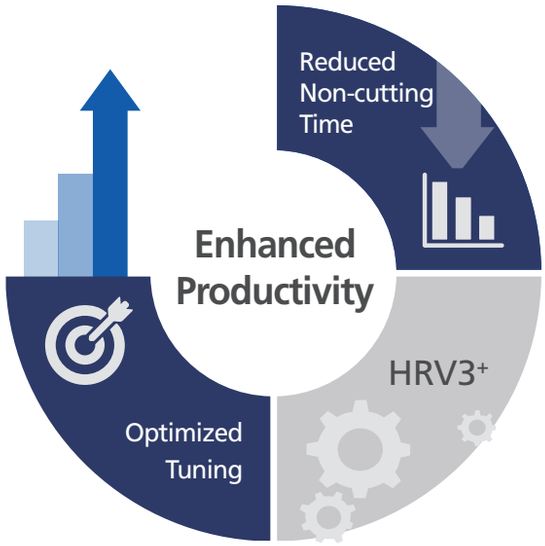
"User Friendly Design"

- 15" display as standard (Non-touch Type Display)
- QWERTY Key MDI
- Part Program Storage Length : 2MB
- Number of Register Able Programs : Max 1,000ea
- Enhanced operability by optimizing the layout and improving the touch feeling of control buttons.
- Long time continuous DNC operation with the CF card even without the data server.

Machine Optimization (STD)

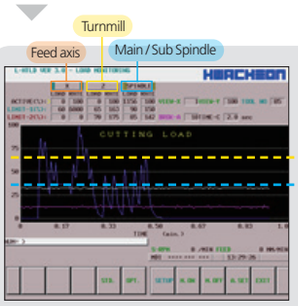
- The cycle machining as well as the operating time and the acceleration / deceleration speed of feed system are optimized.
- Dramatically reduced non-cutting time during machining ensures optimal productivity.
- High precision, speed and smoothness are realized using the cutting-edge machining technology.
- Machining surface quality enhanced by HRV3+ control. (HRV3+: effectively prevents machine oscillation by controlling the servo current to enhance the machining surface quality.)

"Enhanced Productivity"



Hwacheon Software

Lathe Hwacheon Tool Load Detect System (STD)



It monitors the load factors of spindles and each axis during lathe (turnmill) machining and provides the following benefits to customers.

1. Tool life management

Generates an alarm for excessive insert wear (overload)

2. Optimized process

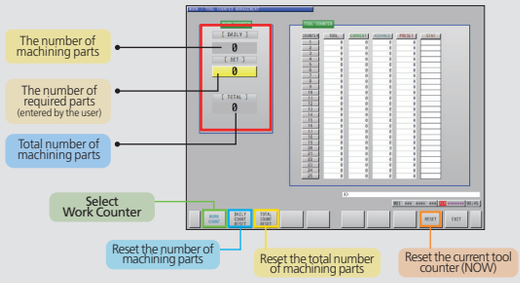
Able to control individual machining conditions per insert wear

3. Able to quickly respond to wear and damage of tools

Generates a replacement alarm in the event of an insert damage

Lathe Work / Tool Counter Management (STD)

You can monitor the daily / total production quantity and tool usages.

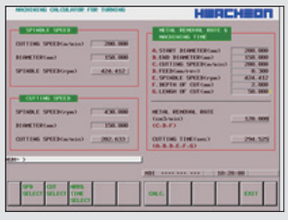


Tool Count Management : 25 tools

- Counter number display (COUNTER)
- Select tool number (TOOL)
- Display current tool counter (CURRENT)
- TOOL replacement forecast through message (ADVANCE)
- Tool replacement notification through alarm (PRESET)
- Display current tool counter status (STAT)

Lathe Calculator Function (STD)

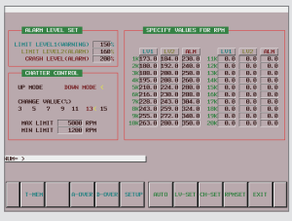
You can enter values required for machining directly from the display operator panel for an easy calculation without a calculator.



- The number of optimal main spindle speed
- The cutting speed
- Material removal rate (MRR)
- The cutting time

Lathe Vibration Control System (STD)

It is possible to monitor the vibrations, and to remove chattering during the machining process in real-time.



- Real-time vibration monitoring
- Check for Chatter Occurrence
- Alarm on Chatter Found
- Automatic reduction control in chatter

Monitoring Solution of Real-time Operational Status Plus/Pro (OPT)

Real-time operational status monitoring system for the User's factory machine management.

M-VISION Plus

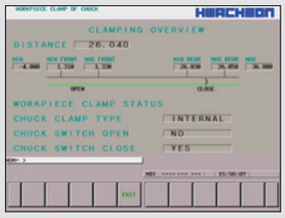
- Monitoring of real-time operational status
- Mobile app supported
- Machining history saving, retrieving and statistics
- Statistics on operational efficiency and history by equipment

M-VISION Pro

- Real-time machine operation status monitoring
- Mobile app supported
- Saving machining/alarm history, retrieving and statistics
- Statistics on operational efficiency and history by equipment/by equipment in total , operator, and arbitrary set period
- Machining Management

Lathe Workpiece Clamp of Chuck (OPT)

To complement the drawback of the proximity switch of which the position should be adjusted according to the material diameter, the analog sensor (0-10V) is used to set the distances of the open and close zones from the operating screen for enhanced user convenience.
(However, it is necessary to discuss with factory in advance whether it is possible to mount the analog sensor.)



- View the chuck open / close state
- Change the driving condition according to the chuck type (inner and outer diameters)
- Set the chuck open / close zone
- An alarm is generated if the chuck function fails

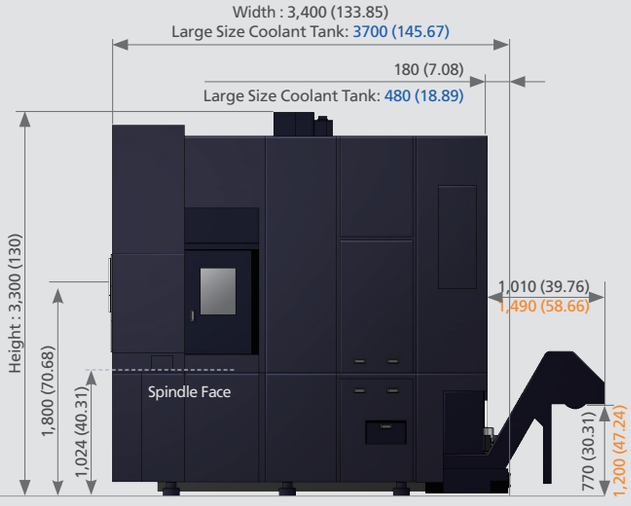
Machine Size

* Unit : mm (inch)

VT-650 YMC

Chip Conveyor (Side Type) with Coil

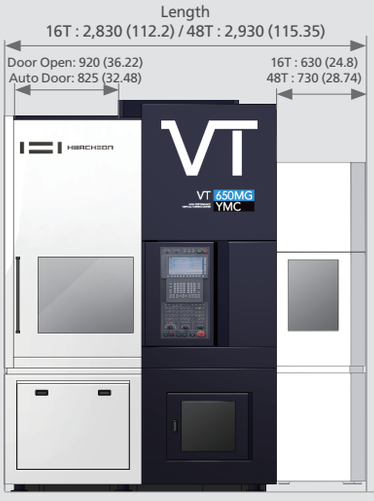
Front



Chip Conveyor (Back Type) with Coil
Chip Conveyor (Back Type) Hinge Type / Scraper Type

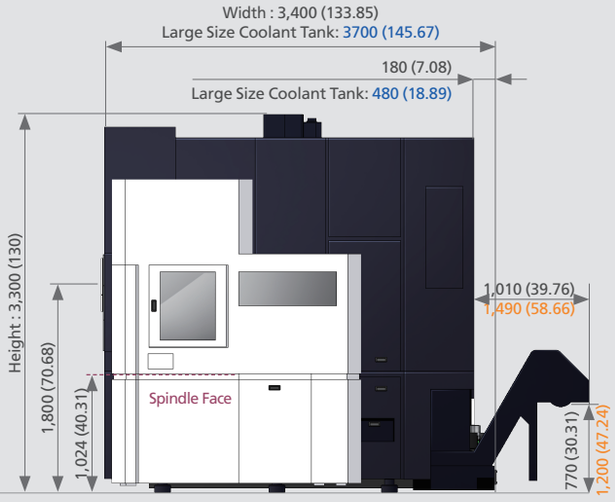
Side

VT-650 MG / YMC



Chip Conveyor (Side Type) with Coil

Front



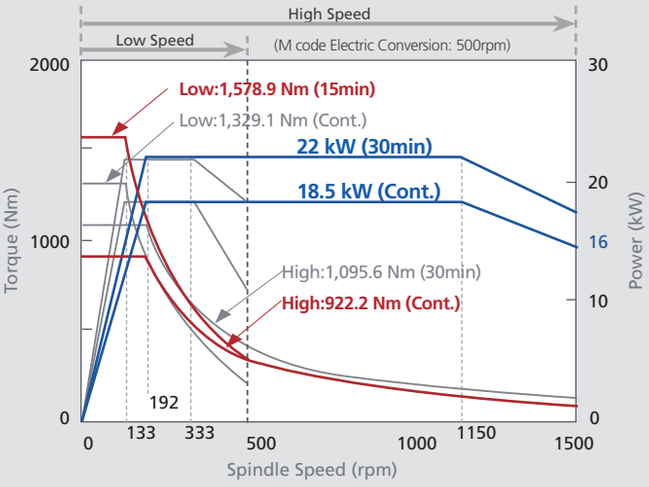
Chip Conveyor (Back Type) with Coil
Chip Conveyor (Back Type) Hinge Type / Scraper Type

Side

Spindle Power – Torque Diagram

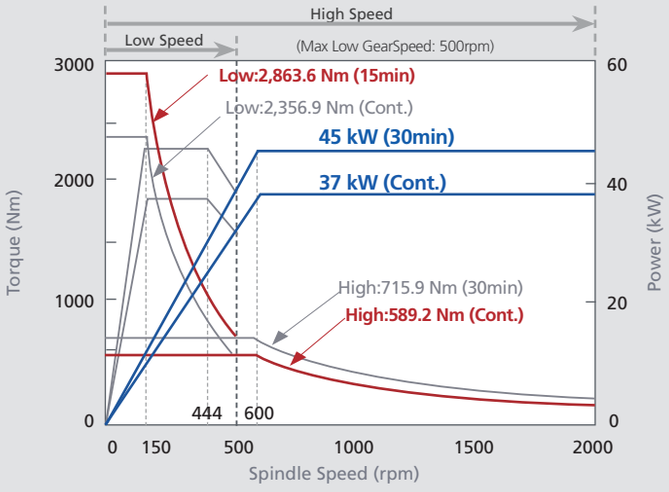
1,500 rpm (STD)

Max Power : 22 kW (30HP) / Max Torque : 1,578.9 Nm



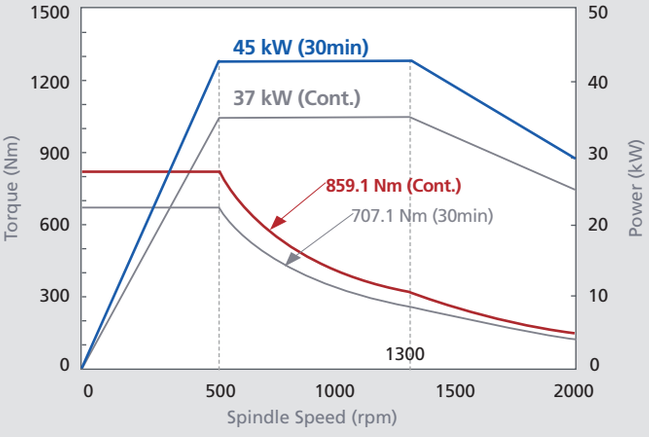
2,000 rpm (High-torque)

Max Power : 45 kW (60HP) / Max Torque : 2,863.6 Nm



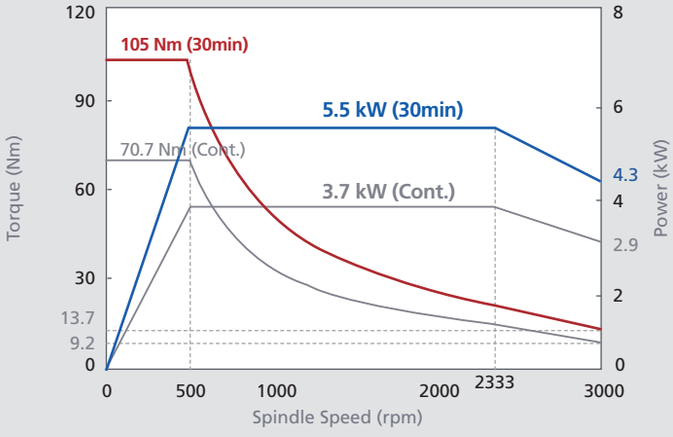
2,000 rpm (High-speed)

Max Power : 45 kW (60HP) / Max Torque : 859.1 Nm



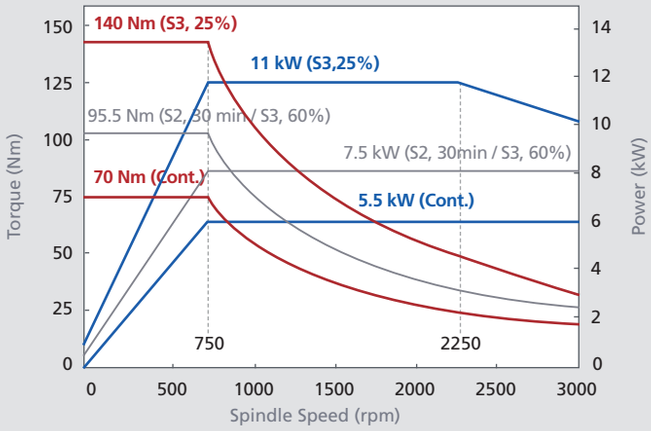
3,000 rpm [Turnmill (STD)]

Max Power : 5.5 kW (7.4HP) / Max Torque : 105 Nm



3,000 rpm [Turnmill (OPT)]

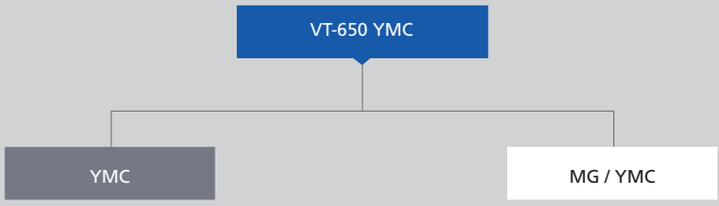
Max Power : 11 kW (15HP) / Max Torque : 140 Nm



Product Configuration

Ref

1) MC: Turnmill
   [C-axis (0.0001°)]
2) Y: Y-axis
3) MG: Magazine



Machine Specifications

ITEM			VT-650 YMC	
			YMC	MG / YMC
Capacity				
Guideway Type		-	Box	
Swing Over Bed		mm(inch)	Ø900 (Ø35.43)	
Max Cutting Diameter		mm(inch)	Ø800 (Ø31.49)	
Std Cutting Diameter		mm(inch)	Ø320 (Ø12.6)	
Max Cutting Length		mm(inch)	750 (29.53)	
Chuck Size		inch	18 (OPT: 15 , 21, 24)	
Spindle				
Type of Spindle Nose		ASA	A2-11	
Max Spindle Speed		rpm	1,500 (OPT 1&2 : 2,000)	
Bearing Inner Dia(front)		mm(inch)	Ø160 (Ø6.3)	
Spindle Motor		kW(HP)	22 / 18.5 (30 / 25)	
Turret				
No. of Tool Station		ea	12	10
Tool Size (External×Boring)		mm(inch)	□32 × Ø60 (□1.25 × Ø2.5)	
Turret Indexing Time		sec/step	0.2	
Axes				
Rapid Speed (X / Z / Y)		m/min	20 / 16 / 16	
Max Stroke (X / Z / Y)		mm(inch)	430 / 790 / ±125 (16.92 / 31.1 / ±4.92)	
Feed Motor (X / Z / Y)		kW(HP)	4.0 / 4.0 / 3.0 (5.5 / 5.5 / 4)	
Turnmill (Option)				
Spindle Motor		kW(HP)	5.5 / 3.7 (7.4 / 5) [OPT: 11 / 5.5 (15 / 7.5)]	
Max Spindle Speed		rpm	3,000	
Max Drill / Tap Size		mm(inch)	Ø26 (Ø1.2) / M20	
C-Axis Index Angle		deg.	0.0001	
Magazine (Option)				
Tool Holder Type		Shank	-	CAPTO C5
No. of Tools		ea	-	16 / 48
Max Tool Diameter		mm(inch)	-	Ø75 (Ø2.95)
Max Tool Length		mm(inch)	-	400 (15.74)
Max Tool Mass		$kg_f(lb_f)$	-	20 (44.1)
Tank				
Lubrication		ℓ(gal)	12 (3.17)	
Hydraulic		ℓ(gal)	50 (13)	
Coolant		ℓ(gal)	195 (52)	
Power Sources				
Electrical Power Supply		kVA	45	
Dimension				
Height		mm(inch)	3,300 (129.92)	
Floor Space	Length	mm(inch)	2,200 (86.61)	2,930 (115.35)
	Width	mm(inch)	3,400 (133.85)	
Weight		$kg_f(lb_f)$	13,000 (28,660)	14,000 (30,864)
NC Controller			Fanuc 0i-TF Plus	

NC Specifications [Fanuc 0i-TF Plus]

※ - : Not available S : Standard O : Option

ITEM	SPECIFICATION	YMC
Controlled Axis		
Controlled Axis (Cs Axis)	2-Axes	4-Axes
Simultaneously Controlled Axes	2-Axes	4-Axes
Least Input Increment	0.001mm, 0.0001deg, 0.0001inch	S
Least Input Increment 1 / 10	0.0001mm, 0.00001inch	O
Inch / Metric Conversion	G20, G21	S
Store Stroke Check 1		S
Store Stroke Check 2, 3		S
Chamfering on / off		S
Backlash Compensation		S
Operation		
Automatic & MDI Operation		S
Program Number Search		S
Sequence Number Search		S
Dry Run, Single Block		S
Manual Handle Feed	1Unit	S
Manual Handle Feed Rate	x1, x10, x100	S
Interpolation Function		
Positioning	G00	S
Linear Interpolation	G01	S
Circular Interpolation	G02, G03	S
Dwell (Per Seconds)	G04	S
Polar Coordinate Interpolation	G12.1/G13.1	S
Cylindrical Interpolation	G7.1	S
Threading	G32	S
Arbitrary Speed Threading		O
Helical Interpolation		S
Threading Retract		S
Variable Lead Threading	G34	S
Ref Position Return 1st	G28	S
Ref Position Return Check	G27	S
2 / 3 / 4th Ref Position Return	G30	S
Feed Function		
Rapid Traverse Override	F0, F25, F50, F100	S
Feed Per Minute (mm/min)	G98	S
Feed Per Revolution (mm/rev)	G99	S
Rapid Traverse Bell-shaped Acceleration / Deceleration		S
Feedrate Override	0-150 %	S
Jog Feed Override	0-1,260 mm/min	S
Tool Function / Compensation		
Tool Function	T4-Digits	S
Tool Offset Pairs	128 pairs	S
Tool Nose Radius Compensation		S
Tool Geometry / Wear Compensation		S
Tool Life Management		S
Automatic Tool Offset	Tool presetter option is required	S
Direct Input Tool Offset Value Measured B		S
Program Input		
Tape Code	EIA / ISO	S
Optional Block Skip	9ea	S
Program Number	O4-Digits(1–9999)	S
Sequence Number	N8-Digits	S

ITEM	SPECIFICATION	YMC
Program Input		
Decimal Point Programming		S
Coordinate System Setting	G50	S
Coordinate System Shift		S
Workpiece Coordinate System	G52-G59	S
Workpiece Coordinate System Preset	G92.1	S
Direct Drawing Dimension Programming		S
G Code System	A	S
Programmable Data Input	G10	S
Sub Program Call	10 Folds Nested	S
Custom Macro B		S
Addition of Custom Macro -common Variables	#100-#199, #500-#999	S
Canned Cycles		S
Multiple Repetitive Cycle		S
Multiple Repetitive Cycle II		S
Canned Cycles for Drilling		S
Manual Guide i		S
Spindle Speed Function		
Constant Surface Speed Control	G96 / G97	S
Spindle Override	0-150%	S
Spindle Orientation		S
Rigid Tapping		S
Spindle Synchronous Control		-
Editing Operation		
Part Program Storage Length	5,120m (2MB)	S
Number of Register Able Programs	Max 1,000ea	S
Background Editing		S
Extended Part Program Editing		S
Play Back		S
Operation / Display		
Clock Function		S
Self-diagnosis Function		S
Alarm History Display		S
Help Functio		S
Run Hour and Parts Count Display		S
Graphic Function		S
Multi-language Display	Korean, English, German, French, Italian, Chinese, Spanish, Portuguese, Polish, Hungarian, Swedish, Russian	S
Data Input / Output		
Ethernet Interface		S
USB / Memory Card Interface		S
Others		
Display Unit	15" Non touch display	S
Fanuc i-HMI	15" Touch type display	O
HWACHEON Software		
Lathe Hwacheon Tool Load Detect System (L-HTLD)		S
Lathe Calculator Function (L-CAL)		S
Lathe Work / Tool Counter Management (L-COUNT)		S
Hwacheon Lathe Vibration Control (HLVC)		S
Operation Managing and Monitoring Solution of real-time operational status (M-VISION Pro)		O

Hwacheon Global Network

Hwacheon Headquarters Hwacheon Europe Hwacheon Asia Hwacheon America

HWACHEON

Please contact us for product inquiries.

www.hwacheon.com

The product design and specifications may change without prior notice.
Read the operation manual carefully and thoroughly before operating the product,
and always follow the safety instructions and warnings labels attached on the surfaces of the machines.

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