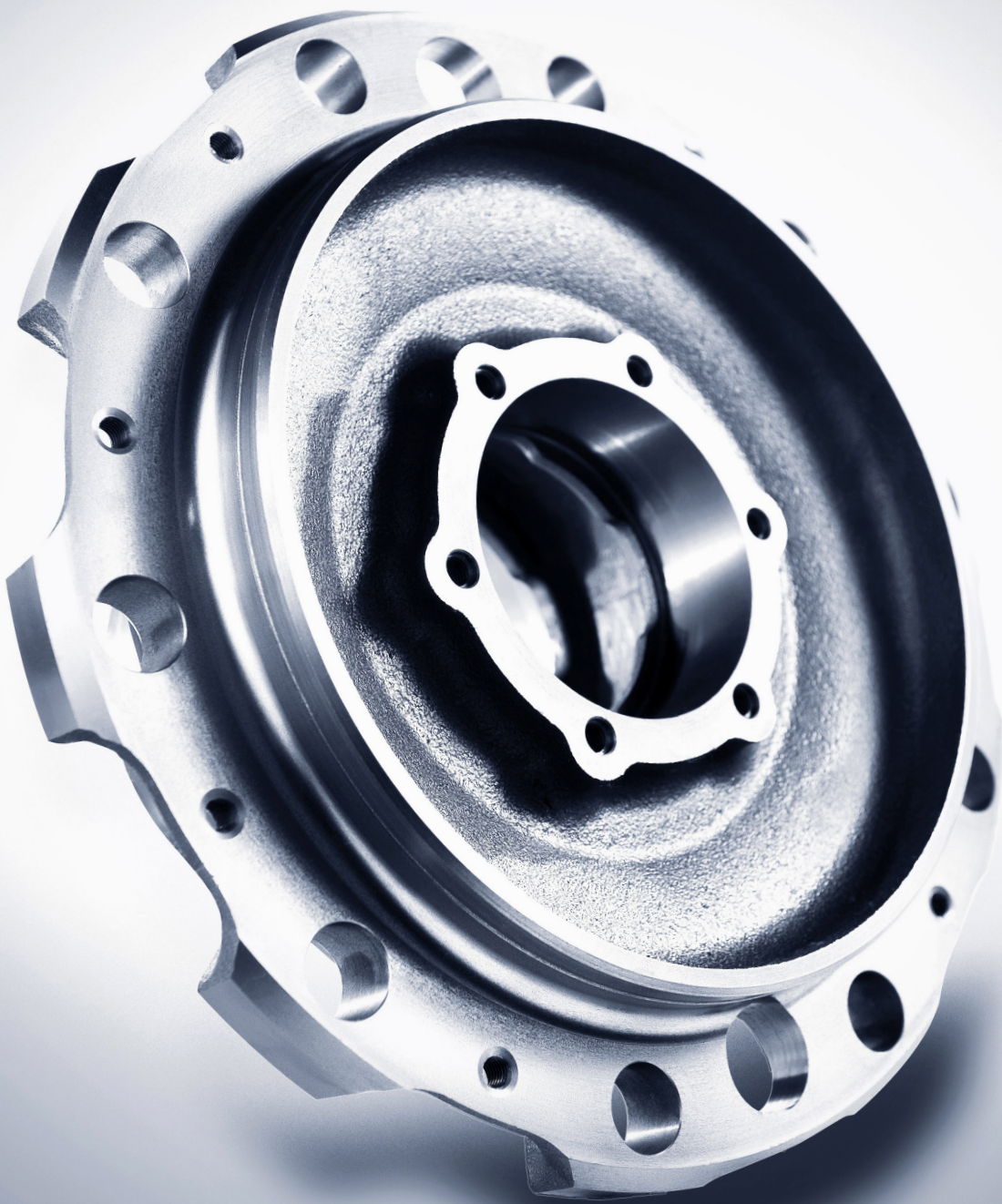


# VESTA-610D

Dual-Table Vertical Machining Center











# DUAL-TABLE VERTICAL MACHINING CENTER

**A dual-table vertical machining center for efficient mass production.**

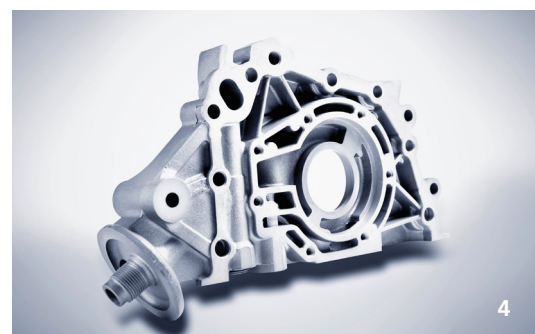
The high speed dual tables maximizes machining time; and the powerful clamping force of the tables curvic coupling allows for stability during hard cutting, which translates to consistent product quality and precision.

1 Rear Hub - 8TG / Automobile / Cast Iron

2 Transmission Case / Automobile / Aluminum

3 Transmission Cover / Automobile / Aluminum

4 Oil Pump Case / Automobile / Aluminum





# BUILT TOUGH FOR MASS PRODUCTION

**The high-speed dual tables in VESTA-610D take only six seconds for the table index. One table can be loaded with a workpiece while the other is at work.**

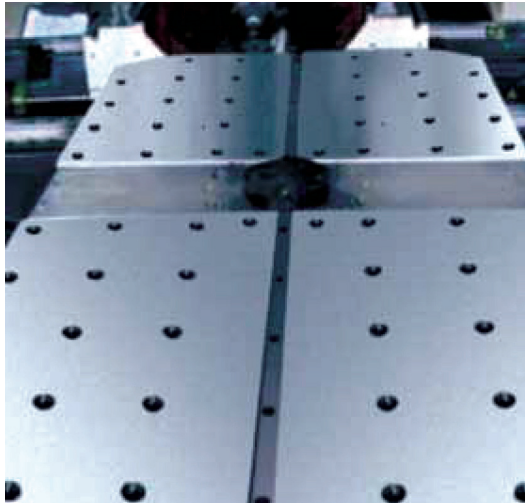
The high-power clamping and the rigid frame guarantee continued precision after repeated operations to give you consistent product quality every time. The tables are designed with ports hydraulic or air tubing so that the machine can be fitted with robotics to incorporate into a production automation system.

Hwacheon's software components assist the machine for increased efficiency. For example, HTDC, short for Hwacheon Thermal Displacement Control system, helps the machine maintain precision by controlling heat generated after prolonged operation.

The slide covers wrap the machine vertically along with an effective cooling system to control thermal distortion and remove chips quickly.







### Quick Pallet Index Table

$\pm 1.5$ sec degree of positioning accuracy means limited deviation when manufacturing the same product in mass quantities, which makes 610D an ideal solution for mass production and the 4.8 tons of clamping force generated by 610D's hydraulic clamps provides added stability even for the toughest roughing jobs.

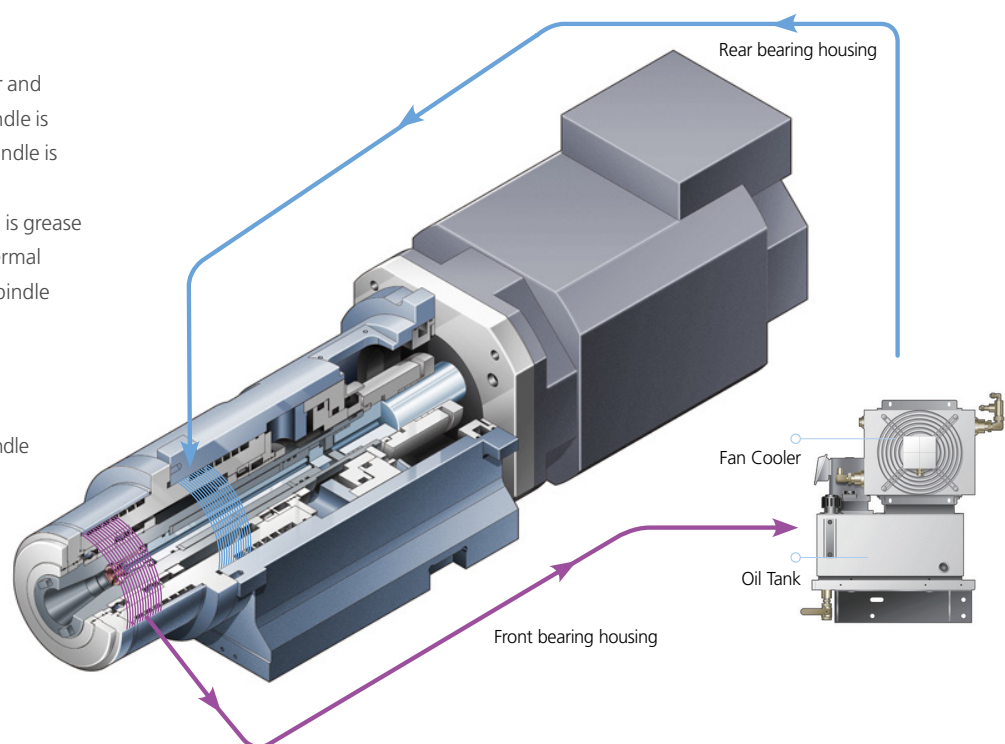
A workpiece can be loaded and unloaded during a process to save cutting time; and as an option, the tables are designed with hydraulic or air tubing for the fitting of robotics to easily incorporate a VESTA-610D into your automated production line.

### High quality spindle performance

The spindle is the heart of a machining center and Hwacheon's technical know-how for the spindle is unrivaled. Hwacheon's high-performance spindle is integrated directly into the motor for stable, high-speed cutting; and is grease-lubricated and jacket cooled to minimize thermal displacement and to increase the life of the spindle assembly.

### Jacket cooling system

The oil cooling system for Hwacheon's main spindle provides a jacket of oil circulating over the frame construction, which supports the motor and the bearing housing.















# MACHINING SOFTWARE

## The Hwacheon Machining Software Components

The Hwacheon developed machining software monitors different variables related to the work environment and machining conditions and makes adjustments for best quality results and optimum work efficiency.

## + RELIABILITY

### HTDC (HSDC + HFDC) Hwacheon Thermal Displacement Control System (HSDC + HFDC)

HTDC integrates the Hwacheon Spindle Displacement Control system and the Frame Displacement Control System.



### HFDC Hwacheon Frame Displacement Control System

HFDC is equipped with highly sensitive thermal sensors in the casting region where thermal activity is suspected; monitoring and correcting displacement.



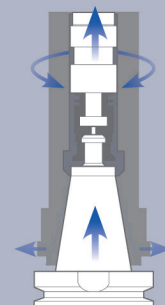
### HSDC Hwacheon Spindle Displacement Control System

When the spindle rotates at high speed, the centrifugal force drives the taper to expand, causing errors in Z axis. HSDC constantly monitors the temperature at each spindle region and makes optimal prediction for thermal displacement. The system then makes necessary adjustments and effectively minimizing thermal displacement.



#### Static displacement compensation

The HSDC system corrects the Z-axis error occurring from the taper expansion during the spindle's high speed rotation.







## PRECISION +



### HTLD

#### Hwacheon Tool Load Detect

HTLD constantly monitors the tool wear to prevent accidents, which may occur from a damaged tool and stops tool wear from deteriorating the work piece.  
(The load is measured every 8 msecs to ensure accuracy)

**HTLD™**  
Hwacheon  
Tool Load Detect



### HECC

#### Hwacheon High-Efficiency Contour Control System

HECC offers an easy-to-use programming interface for different work pieces and different processing modes. The system provides a precise, custom contour control for the selected work piece, while prolonging the life of the machine and decreasing process time. The customizable display provides real-time monitoring and quick access.

- Program offers different options for different cutting speed and accuracy; and for roughness and shapes.
- The customizable display provides real-time monitoring and quick, easy access.
- The program is executable on an existing NC DATA system and works with the G Code system.

**HECC™**  
Hwacheon Efficiency  
Contour Control

### OPTIMA

#### Cutting Feed Optimization System

OPTIMA utilizes an adaptive control method to regulate the feed rate in real time, to sustain the cutting load during a machining process. As a result the tools are less prone to damage and the machining time is reduced.

**OPTIMA®**  
Cutting Feed  
Optimization



## SPEED +





# USER FRIENDLY DESIGN, WIDE UPGRADE OPTIONS

The double body covers minimize the machining space inside, so the chips can be flushed with only a small amount of lubricant. The vertical slide cover separates the machine operations from the cutting area completely, so the chips don't penetrate inside. The chip flushing nozzels shoot out from each side of the inner compartment to discharge the chips effectively.

## 1 Automatic tool changer

Hwacheon's unique compact magazine design allows for quick tool changing and minimizes machine down time.

## 2,3 Utility maintenance system

The hydraulic and air systems are placed together on the side of the machine for easy maintenance.





## Product View

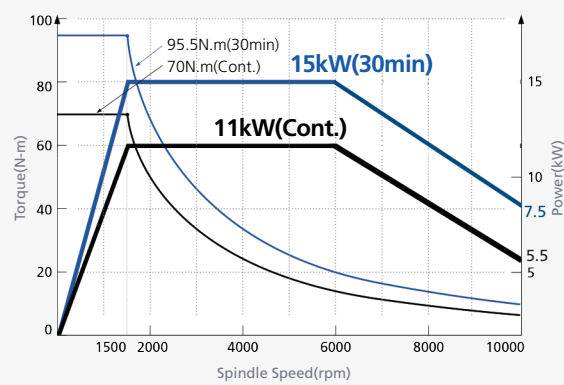
■ VESTA-610D

\* Unit: mm(inch)

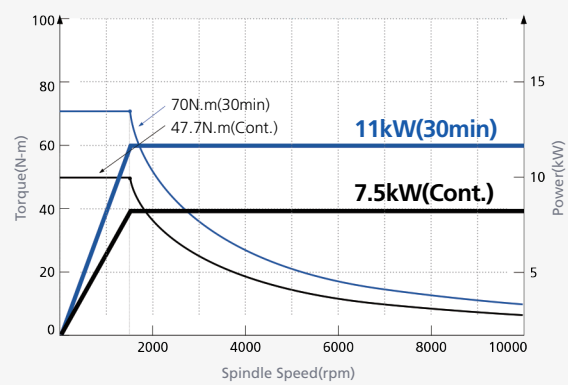


## Spindle torque vs. spindle speed

VESTA-610D



VESTA-610D (Through-spindle)

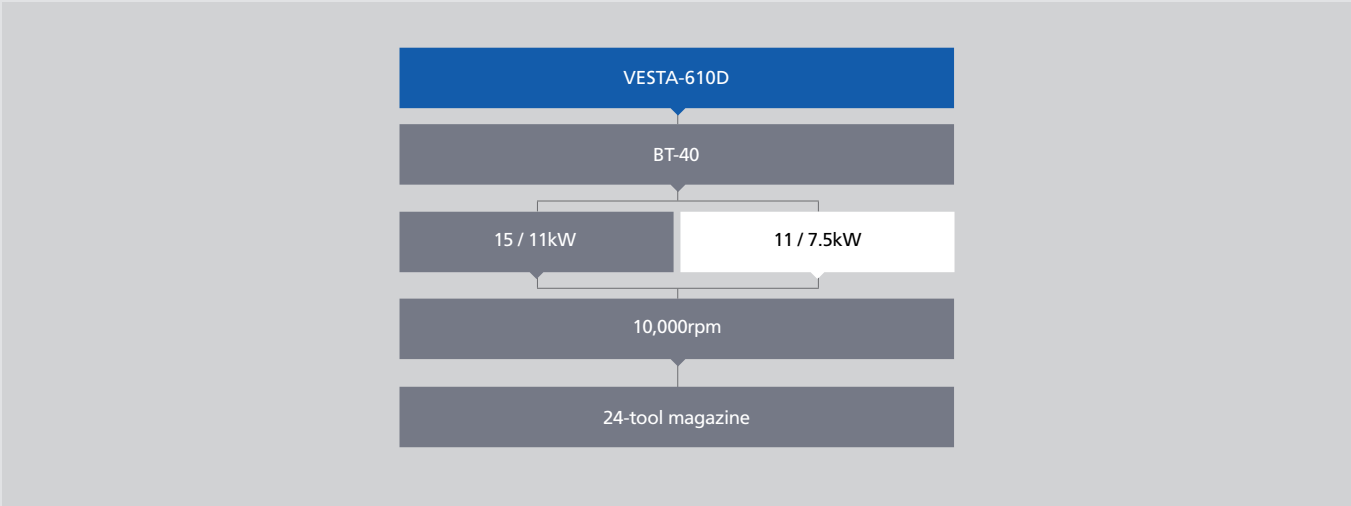






Product Configuration

Each product can be configured to fit your application. ■ Standard □ Optional



Machine Specifications

ITEM		VESTA-610D / 10K
Travel		
Stroke (X / Y / Z)	mm(inch)	610 (24.02") / 430 (16.93") / 570 (22.44")
Distance from table surface to spindle gauge plane	mm(inch)	150 (5.91") ~ 720 (28.35")
Distance between columns to spindle Center	mm(inch)	530 (20.87")
Table		
Working surface	mm(inch)	2ea - 650 (25.59") x 450 (17.72")
Table loading capacity	kgf(lbf)	2ea - 300 (661)
Table surface configuration (T slots WxP -No. of slots)	mm(inch)	2ea-18 (0.71") x 150 (5.91") - 3ea
APC Index Time (180°)	sec	6
Spindle		
Max. spindle Speed	rpm	10,000
Spindle Motor	kW(HP)	15 / 11 (20 / 15) [Opt.:11 / 7.5 (15 / 10)]
Type of Spindle Taper Hole	-	ISO#40, 7/24 Taper (BT 40)
Spindle Bearing Inner Diameter	mm(inch)	Ø70 (2.76")
Method of Spindle Lubrication & Cooling	-	Grease Lub. + Jacket Cooling
Feedrate		
Rapid Speed (X / Y / Z)	m/min(ipm)	40 (1,575) / 40 (1,575) / 40 (1,575)
Feedrate (X / Y / Z)	mm/min(ipm)	1 ~ 24,000 (945)
ATC		
Type of tool shank	-	MAS-403 BT40 (Opt.:CAT40)
Type of pull stud	-	MAS P40T-1 (45°)
Tool storage capacity	ea	24
Max. tool diameter [Without adjacent tools]	mm(inch)	Ø90 (3.54") / Ø150 (5.91")
Max. tool length	mm(inch)	300 (11.81")
Max. tool weight	kgf(lbf)	8 (17.64)
Method of tool selection	-	Memory Random
Method of operation (Magazine / Swing arm)	-	Geared Motor / Geared Motor
Motor		
Servo motor (X / Y / Z)	kW(HP)	7 (9.4) / 7 (9.4) / 7 (9.4)
Coolant motor (Spindle / Chip Flushing)	kW(HP)	0.4 (0.54) / 0.9 (1.2)
Spindle cooler / Hydraulic motor	kW(HP)	0.18 (0.24) / 2.2 (2.95)
Power source		
Electric power supply	kVA	50
Compressed air supply (Pressure x Consumption)	-	0.5 ~ 0.7MPa x 690N ℓ/min
Tank capacity		
Spindle cooling / Lubrication / Coolant / Hydraulic	ℓ (gal)	20 (5.28) / 6 (1.59) / 395 (104.35) / 15 (3.96)
Machine size		
Height (Standard / Spindle through)	mm(inch)	2,691 (105.94") / 2,938 (115.67")
Floor space (length x width)	mm(inch)	3,980 (156.69") x 2,135 (84.06")
Weight	kgf(lbf)	7,500 (16,535)
NC controller		Fanuc-0i MF





## Standard and Optional product components

Standard Accessories		Optional Accessories	
• Adjust Bolt, Block & Plate	• Tool Kit & Box	• Additional Fluid line 6ports & 10ports on the Table(Jig & Fixture)	• MPG Handle (3ea)
• Air Blower	• Work Light	• Air Dryer	• NC Cooler
• Base around splash guard	• Workpiece Coordinate System 48 pairs	• Air Gun	• Oil Mist(Semi Dry Cutting System, Eco Booster)
• Coolant system	• 10.4" Color LCD	• Auto Door	• Oil Skimmer
• Door Interlock	• Cutting Feed Optimization System(OPTIMA)	• Coil Conveyor 2ea	• Signal Lamp (R/G/Y, 3Color)
• Dual Table with T slot type	• Hwacheon Artificial Intelligence Control System(HAI)-40 block	• Coolant Gun	• Spindle through coolant(30 bar, 70 bar)
• Ethernet Interface	• Hwacheon Efficient Contour Control System(HECC)	• Data server(256MB/1,024MB)	• Tool Life Management
• Lub. Oil separation tank	• Hwacheon Tool Load Detect System(HTLD)	• Data server interface	• Tool measuring system-Renishaw/Blum (Touch type, Laser type)
• Lubrication system	• Hwacheon Thermal Displacement Control System(HTDC)	• Dual table with Tap type	• Transfomer
• MPG Handle (1ea)	• Hwacheon Thermal Displacement Control System(HTDC)	• High pressure coolant 6bar	• Workpiece Measuring System -Renishaw/Blum(Touch type)
• Operation manual & parts list	= Hwacheon Spindle Displacement Control System(HSDC)	• Lift up chip conveyor (Hinge type, Scraper type)	• 15" Color LCD (only FANUC)
• Part program storage length 1,280m(512kB)	+ Hwacheon Frame Displacement Control System(HFDC)	• Linear scale(X/Y/Z)	• Hwacheon Artificial Intelligence Control System(HAI) 200 / 400 block buffer
• Pneumatics System		• Manual Guide i	
• Rigid Tapping		• Mist Collector	
• Signal Lamp (R/G, 2Color)			
• Spindle cooler(Jacket Cooling)			

## NC Specifications [Fanuc 0i-MF]

※ — : Not available S : Standard O : Option

Controlled axis			Feedrate clamp based on arc radius			S
Controlled axis (Cs axis)	3 - Axes	S	Scaling			S
Controlled axis (Cs axis)	5 - Axes (Max.)	O	Polar Coordinate System			S
Simultaneously controlled axes	3 - Axes	S	Coordinate system rotation			S
Simultaneously controlled axes	4 - Axes (Max.)	O	Programmable mirror image			S
Least input increment	0.001mm, 0.001deg, 0.0001inch	S	Tape format for Fanuc series 10 / 11			S
Least input increment 1 / 10	0.0001mm, 0.0001deg, 0.00001inch	O	Manual Guide i			O
inch/metric conversion	G20, G21	S	Spindle speed function			
Stored stroke check 1 / 2		S	Spindle serial output			S
Mirror Image		S	Spindle override	50 - 120%		S
Stored pitch error compensation		S	Spindle orientation			S
Backlash compensation		S	Rigid tapping			S
Operation			Tool function / compensation			
Automatic & MDI operation		S	Tool function	T4 - digits		S
DNC operation by memory card	PCMCIA card is required	S	Tool offset pairs	±6 - digits / 400ea		S
Program number search		S	Tool offset memory C			S
Sequence number search		S	Tool length compensation			S
Dry Run, Single Block		S	Cutter compensation C			S
Manual handle feed / feed rate	1Unit / x1, x10, x100	S	Tool life management			O
Handle interruption		S	Tool length measurement			S
Interpolation function			Editing operation			
Positioning / Linear interpolation / Circular interpolation / Dwell (Per seconds)	G00 / G01 / G02,G03 / G04	S	Part program storage length	1,280m (512kB)		S
Cylindrical interpolation	4-axis interface option is required	S	Number of register able programs	400ea		S
Helical interpolation	Circular interpolation plus max.2axes linear interpolation	S	Background editing			S
Reference position return check / return	G27 / G28, G29	S	Extended part program editing / Play Back			S
2nd reference position return	G30	S	Setting and display			
Skip	G31	S	Dynamic graphic display			O
Feed function			Clock function			S
Rapid traverse override	F0, F25, F50, F100	S	Self-diagnosis function / Alarm history display			S
Feedrate (mm/min)		S	Help function / Graphic function			S
Feedrate override	0 ~ 150%	S	Run hour and parts count display			S
Jog feed override	0 ~ 4000mm/min	S	Multi-language display			
Override cancel	M48, M49	S		English, German, French, Italian, Chinese, Spanish,Korean, Portuguese, Polish, Hungarian, Swedish, Russian		S
Program input			Data input / output			
Tape code	EIA / ISO	S	Reader / Puncher interface CH1	RS232C		S
Optional block skip	9ea	S	Reader / Puncher interface CH2	RS232C		S
Program number	O4 - Digit	S	Data server	256MB / 1,024MB		O
Sequence number	N8 - Digit	S	Data server Interface			O
Decimal point programming		S	Ethernet Interface			S
Coordinate system setting	G92	S	Memory / USB card interface			S
Workpiece coordinate system	G54 ~ G59	S	4-Axis interface function Option			
Work piece coordinate system preset		S	Controlled axes	included 4-axis interface option		O
Additional workpiece coordinate pairs	48ea	S	Simultaneously controlled axes	included 4-axis interface option		O
Extend program edit function	Copy / Move / etc..	S	Control axis detach	included 4-axis interface option		O
Manual absolute on and off		S	Others			
Chamfering / corner R		S	Display unit	10.4" color LCD		S
Programmable data input	G10	S	HWACHEON Artificial Intelligence			
Sub program call	10 folds nested	S	Hwacheon Artificial Intelligence Control System (HAI): 40 Block			S
Custom macro B		S	Hwacheon Artificial Intelligence Control System (HAI): 200 / 400 Block			O
Addition of custom macro common variables	#100-#199, #500-#999	S	HECC (Hwacheon Efficient Contour Control System)			S
Canned cycles for drilling		S	HTLD (Hwacheon Tool Load Detect)			S
Automatic corner override		S	OPTIMA (Cutting Feed Optimization Sustum)			S
			HTDC (Hwacheon Thermal Displacement System) - HSDC (Hwacheon Spindle Displacement Control System) + - HFDC (Hwacheon Frame Displacement Control System) (OPTIMA)(OPTIMA)			S





## Hwacheon Global Network

 Hwacheon Headquarters  Hwacheon Europe  Hwacheon Asia  Hwacheon America



**HWACHEON**

Please call us for product inquiries.

**[www.hwacheon.com](http://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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