



# Hi-M G1/G2+

Vertical Machining Center for Graphite

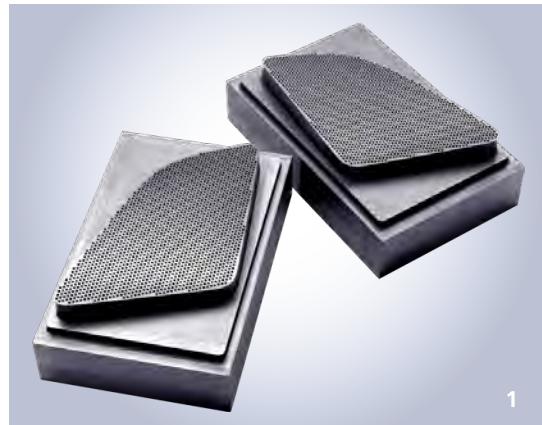
# Contents

Introduction ————— • 03

Basic Information ————— • 04

    Basic structure

    Machine construction



1

Hwacheon Software ————— • 08

Machine Details ————— • 09

    Machine Size / Torque Diagram

    Machine Specifications

    Accessories

    NC Specifications



2



3

1. Speaker

2. Auto Valve Body

3. Micro Pin

# Vertical Machining Center for Graphite

Hi-M G1/G2+ delivers high-speed, high-precision machining for dry cutting of graphite electrodes used in aluminum die casting process. It delivers quality machining by applying the highly dustproof and waterproof spindle and the optimum dust reduction system. This system blocks the dust scattering and entry of fine dust created during the machining process. Hi-M G1/G2+ is easy to use due to its various add-on functions and enhanced user convenience.



Hi-M G1

## Compact Machine Design

- ① Compact machine size
- ② Simple and High-Rigid Design
- ③ Small size & high performance dust collector

## High Speed & High Precision Machining Process

- ① Optimal design structure by 3D / FEM Analysis
- ② Wide LM guide for 3-axis(X/Y/Z)
- ③ Spindle coolant system

## Dry Graphite Machining Center with Optimal Design for Dust Removal

- ① Optimal application for graphite
- ② Optimal design for dust collect
- ③ Sealed roof design for dust collector
- ④ Convenient door design for cleaning

## • Basic Information

### Basic Structure

#### "Medium and Large size Carbon Graphite Machining Center"

- High stable double column structure
- High rigid roller type linear guideways on all axes
- Minimized noise and vibration impacts
- High transmission efficiency for increased productivity
- High quality surface finish

Rapid Traverse **25 / 25 / 20 m/min**

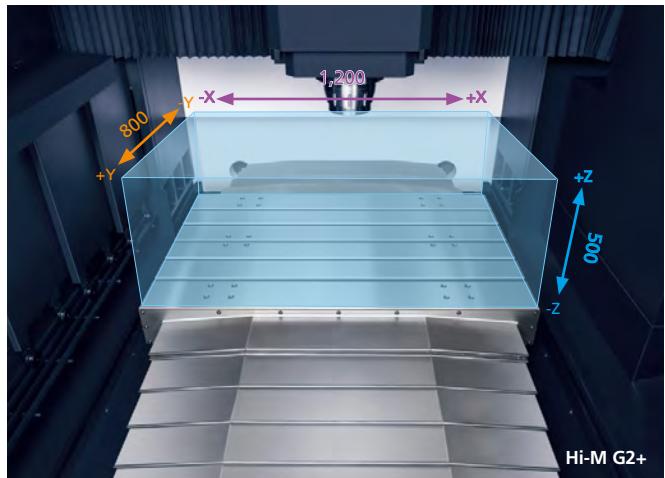
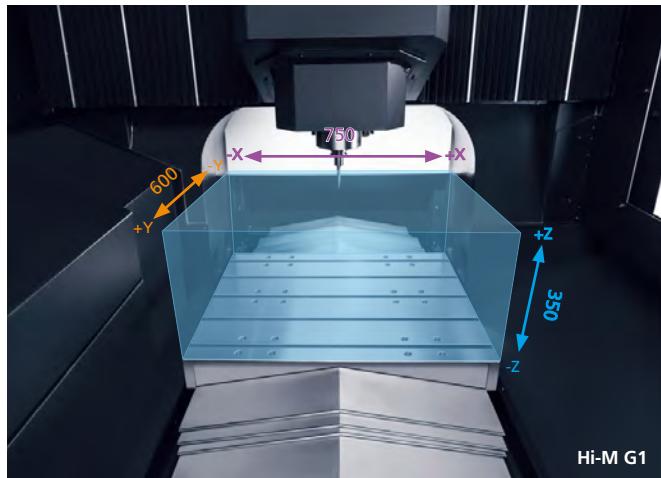
Cutting Feedrate **1 ~ 10,000 mm/min**



**Hi-M G2+**

	Axis Travel mm			Rapid Traverse m/min			Cutting Feedrate mm/min
	X-axis	Y-axis	Z-axis	X-axis	Y-axis	Z-axis	
Hi-M G1	750	600	350	25	25	20	1 ~ 10,000
Hi-M G2+	1,200	800	500	25	25	20	1 ~ 10,000

**Table**



#### "Table with convenient accessibility"

T-Slot table provides continuous mounting locations for fixtures.

	Table Size (W x L) mm	T-slot mm	Max. Loading Capacity kg <sub>f</sub>
Hi-M G1	750 x 620	16 x 125 - 5ea	400
Hi-M G2+	1,300 x 800	16 x 125 - 5ea	800

## Spindle

### "Spindle with Built-In Motor(High Frequency Spindle)"

- Method of Spindle Cooling : Oil-cooled
- Type of Bearing Lubrication : Grease

	Type of Spindle Taper Hole	Max. Spindle Speed rpm	Spindle Power kW
Hi-M G1	HSK-E40 (OPT. BT-30)	24,000	9.5
Hi-M G2+	BT-40 (7/24 Taper)	20,000	20



## Magazine

### "Fixed address, rotational ATC"

Various specifications are available based on users' tool types.

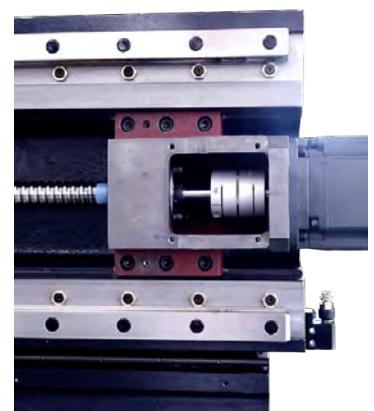
	Hi-M G1	Hi-M G2+
Type of Tool Shank	HSK-E40 (OPT. BT-30)	BT-40
Tool Storage Capacity	16ea	16ea (OPT. 24ea)
Max. Tool Length	200mm	200mm
Max. Tool Weight	3kg <sub>f</sub>	8kg <sub>f</sub>
Method of Tool Selection	Fixed Address	Fixed Address
Method of Operation [Magazine / Swing Arm]	Servo Motor (Magazine)	Servo Motor (Magazine)



## Feed Drive System

### "High-Precision Feed System"

The feed axis-driven system is a direct-coupled servo motor with high-precision ball screws and 3-axis wide LM Guide.



## • Basic Information

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"

- 10.4" display as standard
- Enhanced operability by optimizing the layout and improving the touch feeling of control buttons
- Separately mounting MPG for workpiece setting convenience
- Long time continuous DNC operation with the CF memory card(OPT) even without the data server.

Convenient Function



### Convenient Maintenance

Improved the manageability of machine through the integration of peripheral devices for required maintenance.

### Tool Length Compensator (OPT)

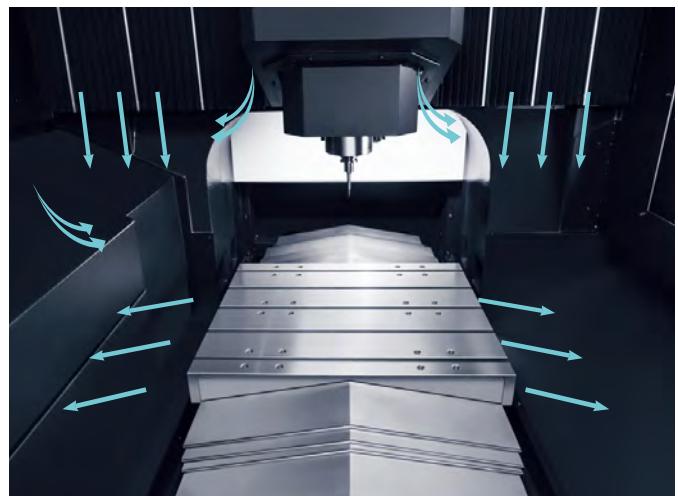
Tool length and diameter are measured and compensated automatically during the operation, minimizing non-cutting time and allowing any operator to reproduce high-precision results regardless of their work proficiency. Also, it detects any faults in the tools and prevents accidents before they happen.



## Dust Collection System

### "Dry Process Graphite Machining"

- Sealed roof design for dust collector
- Convenient door design for cleaning
- Optimal design for dust collect



## Dust Collector

### "Perfect Dust Collection System"

Sealed roof design collects dust generated from dry processing and prevents contamination due to fine dust. The door design that makes it easy to clean and discharge slideway lubricant maximizes user convenience.

Power	380V, 60Hz / 220V, 50Hz
Motor	3.7 kW (5HP)
Air Volume	5.5 HP
	Blower-1: 5HP, 60 CMM, 230mmAq
Filter	Size (Dia. x L) Ø165 x 800 x 65 (Cartridge Type)
	Quantity 12 ea
Filtering area	49.9 m <sup>2</sup>
	Standard: PE (Polyester tetron) Option: Flame retardant felt, elimination of static electricity, nonflammable felt
Dust removal type	Automatic air pulse type
Inlet	Ø148



### Dust Proof (Air Curtain System)

- Air curtain system prevents dust inflow into each axis.
- Air Volume : 2bar

### Dust Collector

- The scatter prevention system against the source of graphite dust has been implemented.

#### → Hwacheon Software

Hwacheon Software



# Hwacheon Efficient Contour Control System

"Roughing quickly, finishing is precisely"

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



## Hwacheon Thermal Displacement Control System(OPT)

## "Hwacheon Spindle Displacement Control System + Hwacheon Frame Displacement Control System"



## Hwacheon Spindle Displacement Control System(OPT)

"Real-time correction for the displacement in the spindle"



## Hwacheon Frame Displacement Control System(OPT)

"System for maintaining processing accuracy for a long period of machining"

HTDC integrates the Hwacheon Spindle Displacement Control system and the Frame Displacement Control System. (Hi-M G1)

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. (Hi-M G1)

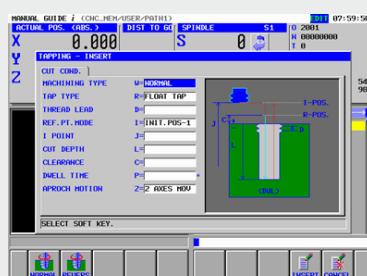
HFDC is equipped with highly sensitive thermal sensors in the casting region where thermal activity is suspected; monitoring and correcting displacement. (Hi-M G1)

Manual Guide i (Fanuc OPT)

With the Manual Guide i, the operator is able to create a machining program for the desired geometry including the pattern simply if he / she enters numeric values for the basic machining geometry.



: Programming in convenient functions and rich machining cycles.



The screenshot shows a CNC machine control interface. At the top, it displays 'MANUAL GUIDE' and 'CNC (HEMISFER/PARTH)'. The 'ACTUAL POS. (ABS.)' section shows coordinates X: 0.000, Y: 0.000, Z: 0.000. The 'DIST 10 GE' section shows 'SPHOLE' selected. The 'S' page lists speeds S1 (2001), S2 (999999999), S3 (0), S4 (0), S5 (0), S6 (0). The 'FEED' page lists feeds F1 (0.001), F2 (0.001), F3 (0.001), F4 (0.001), F5 (0.001), F6 (0.001). The 'GCODE' page shows the following G-code list:

GCODE	LINE
1	02001 (CHANGINGHEAD) :
2	61926 0200, 0200, M00, 1100,
3	0100, C3, ;
4	649 649 0000 ;
5	690 690 X0 Y0 Z300 ;
6	102 102 0000 ;
7	91 91 1000, 2100, ;
8	03 03 0000 ;
9	03100 030, L16, H0, 1 F00, 000,
10	E50, U2, C3, C2, Z2, A1, ;

At the bottom, there are icons for various functions: HEMISFER, PARTH, SPOT, FEED, COPY, MOVE, MOVEF, PIND, PINDF, PINDT, and PINDFT.

- It displays the machine status and the tools in use while machining.

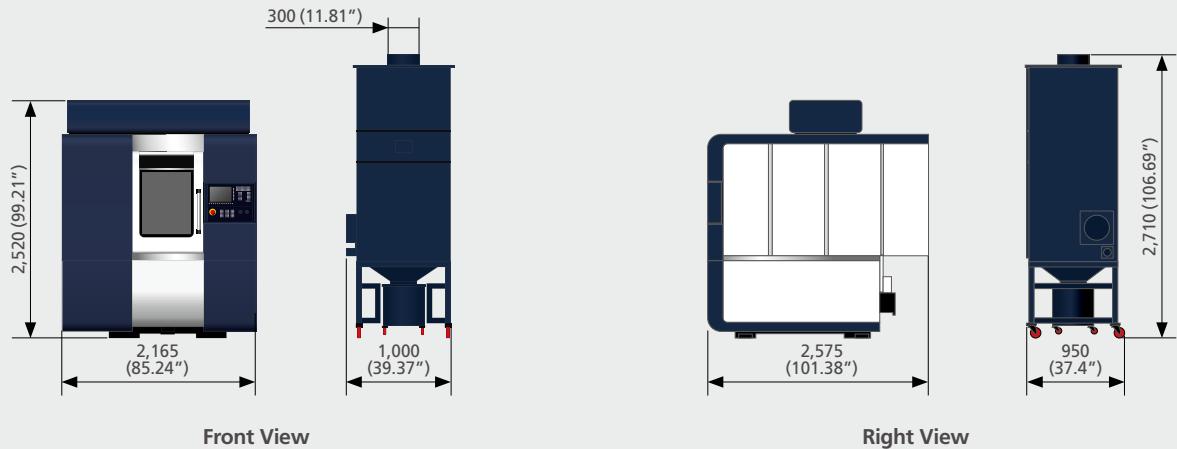


- The realistic machining simulation checks the program.

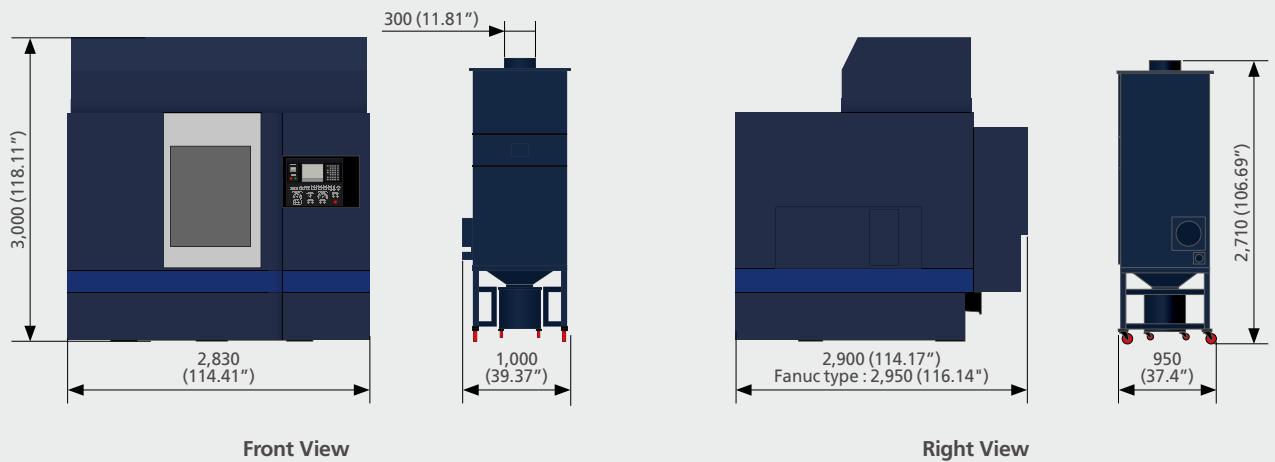
## Machine Size

\* Unit: mm(inch)

### Hi-M G1



### Hi-M G2+

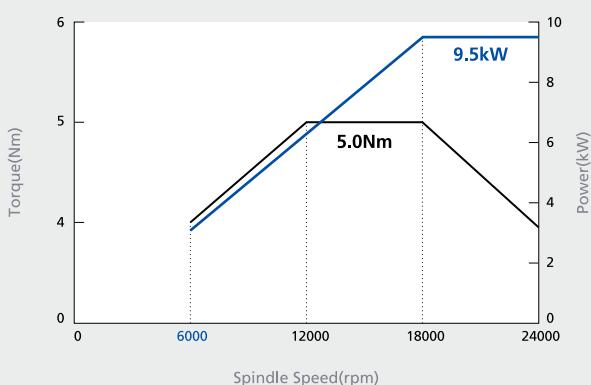


## Spindle Power Torque Diagram

\* It is recommended to run the spindle within the range shown in the chart below.

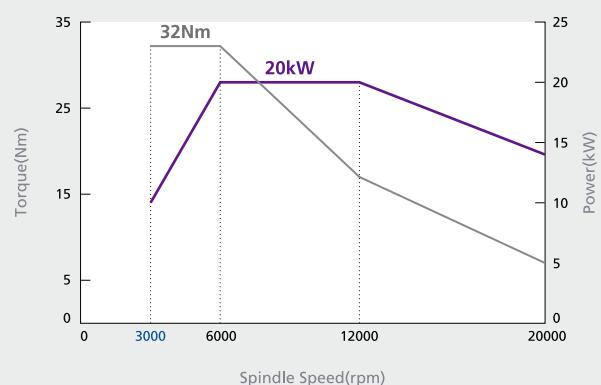
### Hi-M G1 (24,000rpm)

- Spindle Power : 9.5 kW / Torque : 5 Nm



### Hi-M G2+ (20,000rpm)

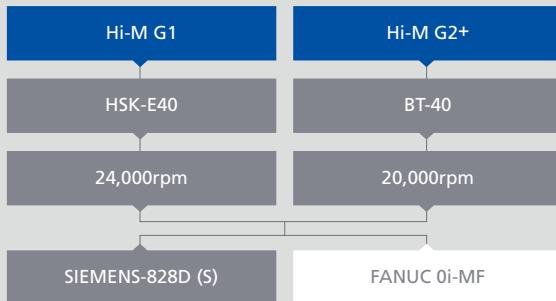
- Spindle Power : 20 kW / Torque : 32 Nm



## • Machine Detail

### Product Configuration

Each product can be configured to fit your application



### Machine Specifications

S : SIEMENS F : FANUC

ITEM		Hi-M G1	Hi-M G2+
<b>Travel</b>			
Axis Travel (X / Y / Z)	mm(inch)	750 / 600 / 350 (29.53" / 23.62" / 13.78")	1,200 / 800 / 500 (47.24" / 31.5" / 19.69")
Distance from Table Surface to Spindle Gauge Plane	mm(inch)	100 ~ 450 (3.94" ~ 17.72")	80 ~ 580 (3.15" ~ 22.83")
Distance between Column to Spindle Center	mm(inch)	300 (11.81")	380 (14.96")
<b>Table</b>			
Table Size (W x L)	mm(inch)	750 x 620 (29.53" x 24.41")	1,300 x 800 (51.18" x 31.5")
Max. Loading Capacity	kg(lb)	400 (882)	800 (1,764)
T-Slot (Size x Space - ea)	mm(inch)	16 x 125 (0.63" x 4.92") - 5ea	16 x 125 (0.63" x 4.92") - 5ea
<b>Spindle</b>			
Max. Spindle Speed	rpm	24,000	20,000
Spindle Motor	kW(HP)	9.5 (12.7)	20 (26.8)
Coolant Motor (Spindle)	kW(HP)	0.4 (0.5)	1.5 (2)
Type of Spindle Taper Hole	-	HSK-E40 (Opt. BT-30)	BT-40 (7/24 Taper)
Method of Spindle Lubrication & Cooling	-	Grease Lubricate, Oil-cooled	Grease Lubricate, Oil-cooled
<b>Feedrate</b>			
Rapid Traverse (X / Y / Z)	m/min(ipm)	25 / 25 / 20 (984.25" / 984.25" / 787.4")	25 / 25 / 20 (984.2" / 984.2" / 787.4")
Cutting Feedrate (X / Y / Z)	mm/min(ipm)	1 ~ 10,000 (0.04" ~ 393.7")	1 ~ 10,000 (0.04" ~ 393.7")
<b>ATC</b>			
Type of Tool Shank	-	HSK-E40 (Opt. BT-30)	BT-40
Tool Storage Capacity	ea	16	16 (Opt. 24)
Max. Tool Dia.	mm(inch)	Ø63 (Ø2.48")	Ø80 (Ø3.15")
Max. Tool Length	mm(inch)	200 (7.87")	200 (7.87")
Max. Tool Weight	kg(lb)	3 (7)	8 (18)
Tool Change Time (T to T / C to C)	sec	15 / 20	15 / 20
Type of Pull Stud	-	-	MAS 403-1982-BT/PT1 (45°)
Method of Tool Selection	-	Fixed Address	Fixed Address
Method of Operation [Magazine / Swing Arm]	-	Servo Motor (Magazine)	Servo Motor
<b>Motor</b>			
Servo Motor (X / Y / Z / Q)	kW(HP)	S : 1.86 / 1.86 / 1.86 / 1.48 (2.5 / 2.5 / 2.5 / 2), F : 1.6 / 1.6 / 1.6 / 1.4 (2.3 / 2.3 / 2.3 / 1.9)	S : 3.14 / 3.14 / 3.14 / 1.48 (4.2 / 4.2 / 4.2 / 2) F : 4.0 / 4.0 / 4.0 / 1.8 (5.4 / 5.4 / 5.4 / 2.4)
<b>Power Source</b>			
Power Capacity	kVA	35	50
Power Specification	-	S : 380V, 60Hz / F : 220V, 60Hz	S : 380V, 60Hz / F : 220V, 60Hz
Compress Air Supply (Pressure x Consumption)	kgf/cm <sup>2</sup>	6~7	6~7
<b>Machine Size</b>			
Height	mm(inch)	2,520 (99.21")	3,000 (118.11")
Floor Space (L x W)	mm(inch)	2,165 x 2,575 (85.24" x 101.38")	S : 2,830 x 2,900 (111.41" x 114.17") F : 2,830 x 2,950 (111.41" x 116.14")
Weight	kg(lb)	4,800 (10,582)	9,500 (20,944)
<b>NC Controller</b>			
Model	-	SIEMENS-828D (Opt. FANUC 0i-MF)	SIEMENS-828D (Opt. FANUC 0i-MF)
Screen Size	-	10.4" LCD	10.4" LCD
Memory Capacity	-	S : 5MB, F : 512kB	S : 5MB, F : 512kB

## Accessories

Standard Accessories (Hi-M G1)	Optional Accessories (Hi-M G1)	Standard Accessories (Hi-M G2+)	Optional Accessories (Hi-M G2+)
• ATC : 16ea	• Air Dryer	• ATC : 16ea	• Air Dryer
• Automatic Grease Lubricate System	• CF Memory Card (2GB, FANUC)	• Automatic Grease Lubricate System	• ATC : 24ea
• CNC System : SIEMENS-828D	• CF Memory Card (16GB, SIEMENS)	• CNC System : SIEMENS-828D	• CF Memory Card (2GB, FANUC)
• Door Interlock	• CNC System : FANUC 0i-MF	• Door Interlock	• CF Memory Card (16GB, SIEMENS)
• Dust Collector System	• Hwacheon Software System	• Dust Collector System	• CNC System : FANUC 0i-MF
• Full Cover	- Hwacheon Thermal Displacement	• Full Cover	• Touch Probe
• High Frequency Spindle (9.5kW, 24,000rpm)	Control System (HTDC)	• High Frequency Spindle (20kW, 20,000rpm)	• Transformer (50kVA)
• Hwacheon Software System	• Manual Guide i (for FANUC system)	• Hwacheon Software System	• Work Light (1ea)
- Hwacheon Efficient Contour Control System (HECC)	• Touch Probe	- Hwacheon Efficient Contour Control	
• Leveling Block Set	• Transformer (35kVA)	• Leveling Block Set	
• MPG Handle (1ea / Portable)	• Robot Interface (for FANUC system)	• MPG Handle (1ea / Portable)	
• NC Cooler	• Work Light (1ea)	• NC Cooler	
• Oil Cooler	• X / Y / Z axis Scale	• Oil Cooler	
• Operation Manual & Parts List		• Operation Manual & Parts List	
• Signal Lamp (R, G, Y / 3-Color)		• Signal Lamp (R, G, Y / 3-Color)	
• Toolbox & Kits		• Toolbox & Kits	
• Work Light		• Work Light	
		• Z-axis Linear Scale	

## NC Specifications [SIEMENS-828D & FANUC 0i-MF]

CNC system			
NC Controller	Siemens-828D	Fanuc-0i-MF	
Display	10.4" Color LCD	10.4" Color LCD	
Controlled axis			
Linear Interpolation Axis	3-Axis	3-Axis	
Linear Interpolation Axis (Opt.)	5-Axis (최대)	5-Axis (최대)	
Simultaneously Controlled Axis	3-Axis	3-Axis	
Simultaneously Controlled Axis (Opt.)	4-Axis (최대)	4-Axis (최대)	
Least Input Increment	0.001mm, 0.001deg, 0.0001inch	0.001mm, 0.001deg, 0.0001inch	
Least Input Increment 1 / 10 (Opt.)	0.0001mm, 0.0001deg, 0.00001inch	0.0001mm, 0.0001deg, 0.00001inch	
Operation			
Automatic & MDI Operation	Basic	Basic	
Number Of Channels	1 Channel	1 Channel	
Inch / Metric Conversion	G70, G71	G20, 21	
Manual Handle Feed Rate	1UNIT (X1, X10, X100)	1UNIT (X1, X10, X100)	
Language	Multi-Language	Multi-Language	
Interpolation Functions			
Positioning	G00	G00	
Linear Interpolation	G01	G01	
Circular Interpolation	G02, G03	G02, G03	
Dwell (Per Seconds)	G04	G04	
Reference Position Approach	G74	G28, G29	
Tool Function			
Tool Function	M6, T-number	T2-digits	
Tool Offset Pairs	512 / 1,024ea	400pairs	
Program Input			
NC Memory	8MB	512Kbyte	
Sub Program Call	11 Levels	10 Folds Nested	
User Parameter	R-Parameter(300ea)	#100~#199, #500~#999	
Work Piece Coordinate System	G54~G59	G54~G59	
Work Offset Pair	100ea	-	
Addition of Work Piece Coordinate Pair	-	48ea	
Look Ahead, Block	450 Block	200 Block	
Data Input / Output			
Interface Device	USB, CF CARD, LAN	USB, CF CARD, LAN	

## Hwacheon Global Network

■ Hwacheon Headquarters ■ Hwacheon Europe ■ Hwacheon Asia ■ Hwacheon America



Please contact us for product inquiries.

### [www.hwacheon.com](http://www.hwacheon.com)

The product design and specifications may change without prior notice.

The specifications in this catalogue are based on standard voltage requirements.

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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