

SIRIUS-UM/UL⁺/UX

High Speed Vertical Machining Center for
Die and Mold



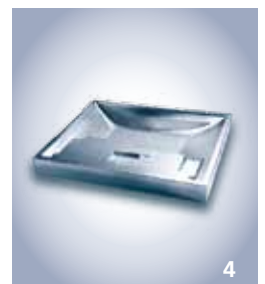
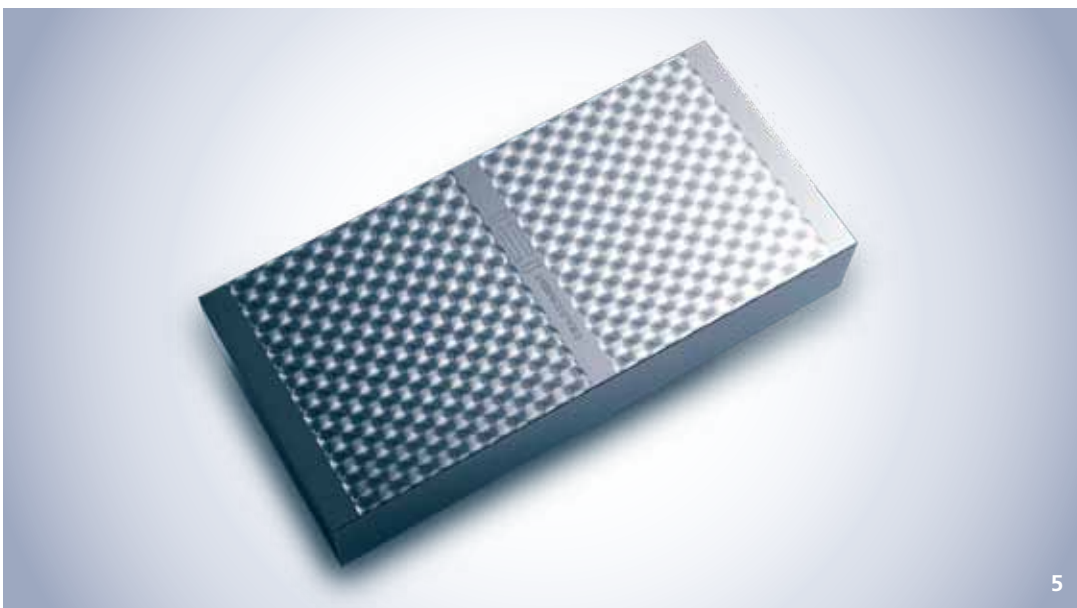
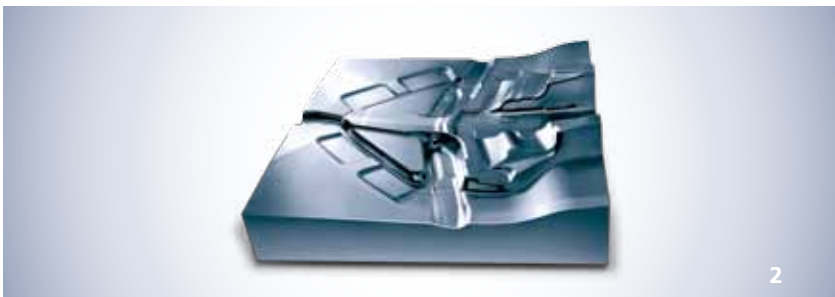


HIGH SPEED VERTICAL MACHINING CENTER FOR DIE AND MOLD

This is the perfect Die and Mold solution you've been looking for.

SIRIUS-UM/UL+/UX is a vertical die and mold center whose performance is world-leading- it provides your company with a total one stop production solution, from tool selection to final product.

1 Die Casting / Automobile / SKD61(HRC 60) 2 Automobile transmission cover (AL) 3 43-inch LCD TV back cover (KP4M)
4 LCD Back Cover(Cavity) / Home appliances / NAK80 5 Surface Finishing / Automobile / NAK80



“HWACHEON PERFORMANCE LEAVES COMPETITION IN THE DUST- THIS IS THE BEST DIE AND MOLD CENTER YOU CAN GET, PERIOD.”

Each SIRIUS-UM/UL+/UX machining center is manufactured to perfection with Hwacheon's workmanship that is the quality recognized and envied by everyone in the industry; and it guarantees to give you a perfect result every time.

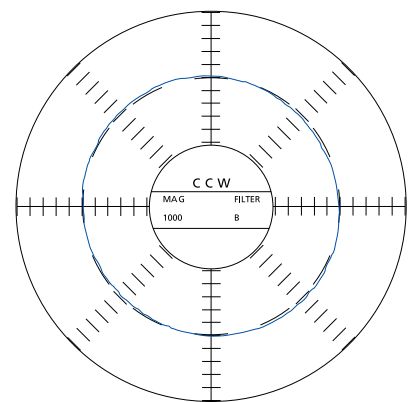
The high performance spindle which integrates Hwacheon's Oil-jet Cooling technology ensures consistent quality result after hours and hours of operation, while the machine's Optimal Machining system gives you a total production solution, from tool selection to final product. SIRIUS-UM/UL+/UX is designed using 3D simulations and the FEM analysis to achieve structural rigidity which can translate to quality product results; while the Hwacheon-designed machining software components enhance safety and the work efficiency in your organization. The SIRIUS-UM/UL+/UX is configurable with many different options so that it can integrate better in your work environment and application.



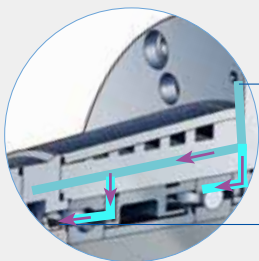


Rigid bilateral gate structure machine frame

The gate structure firmly supports the x-axis drive and diverts the load, vibration, and heat from the upper section of the machine evenly throughout the frame-the feature which helps too keep the feed drive stable after hours of operation. Also, the short distance between the X-axis drive and the tool's contact point is a plus for maintaining the rigidity and for enhancing the machining precision.



Out-of-roundness of 4µm (DBB measurement)
 Positioning accuracy of 2µm
 Repetition accuracy of 1.5µm



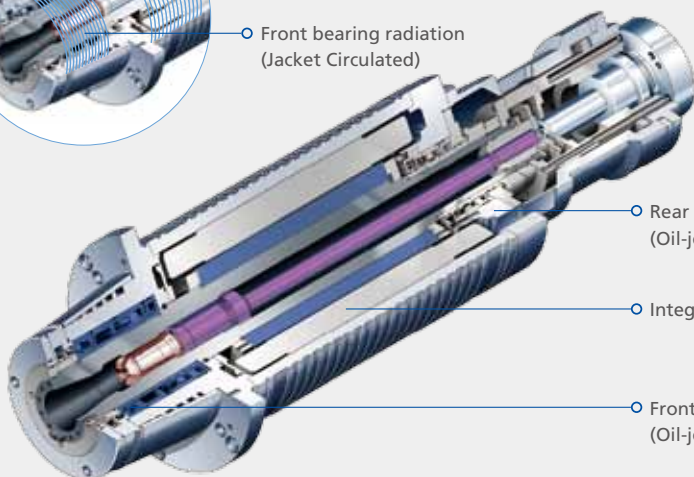
○ Cooling oil in

○ Cooling oil out



○ Motor housing radiation (Jacket Circulated)

○ Front bearing radiation (Jacket Circulated)



○ Rear bearing cooling (Oil-jet)

○ Integrated motor

○ Front bearing cooling (Oil-jet)

Spindle assembly

The Hwacheon clean room assembly facility, where the super-precision, super-speed spindle built inside SIRIUS-UM/UL+/UX is manufactured, maintains optimal temperature and humidity, and is kept free of any foreign substances. Only the most skilled master engineers are allowed in the assembly facility, in the production of only the best equipment to comply with the toughest quality standard in the industry.

Oil-jet Cooling System

The jet of oil is injected directly onto the spindle bearing for effective cooling, and the motor and the spindle assembly are jacket-cooled to limit the displacement caused by heat.





MACHINING SOFTWARE

The Hwacheon Machining Software Components

The Hwacheon's 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

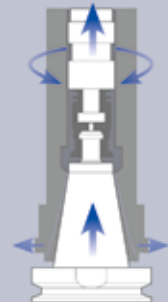
Hwacheon Spindle Displacement Control System

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 System

HTLD constantly monitors the tool wear to prevent accidents, which may occur from a damaged tool and help to stop tool wear from deteriorating the workpiece.
(The load is measured every 8 msec to ensure accuracy)



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 workpiece, 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 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.



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.



SPEED +

USER FRIENDLY DESIGN, A WIDE RANGE OF OPTIONAL FEATURES

SIRIUS-UM/UL+/UX offers user friendly design and a wide variety of useful options for practical applications, so you can concentrate on what you do best: creating quality products-without losing your valuable time to the worries of machine failure and safety. A wide variety of performance upgrade options are available for faster, more precise machining.

Index Table (Option)

Hwacheon's index table can be operated with ease without the need for additional 4-axis interface, and its 4.3 tons of clamping force and 5 degrees of division angle are ideal for hard turning.

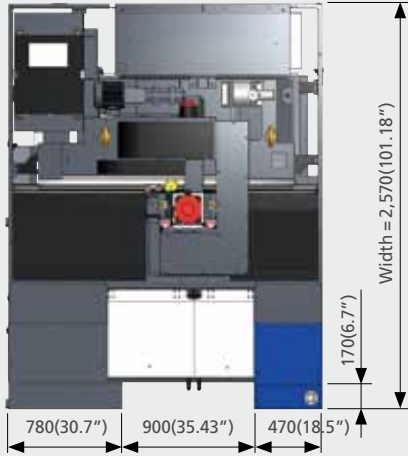
Auto measurement system (Option)

When the machine begins to work, the measurement system automatically measures the workpiece reference and the tool, and makes necessary adjustment. This system saves machining time and guarantees high quality result every time regardless of the machinist's skill and because the system constantly monitors the tools and the work-piece for any abnormality, potential machine-related accidents can be prevented. The system integrates perfectly with other equipment to make your automated production line more productive and efficient.

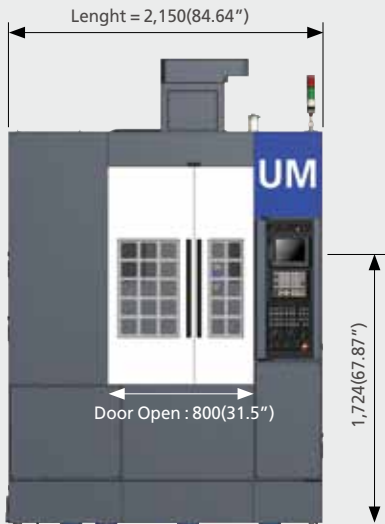


Product Data : SIRIUS-UM

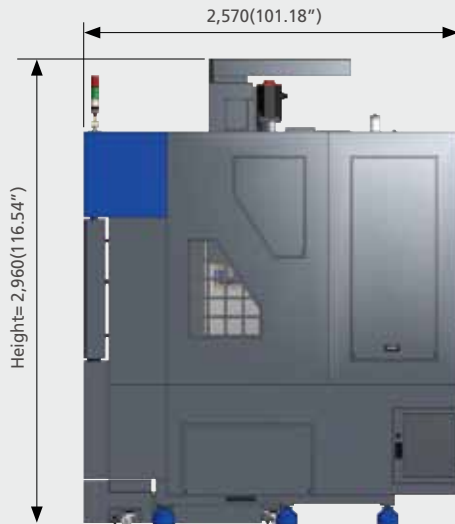
* Unit: mm(inch)



Top



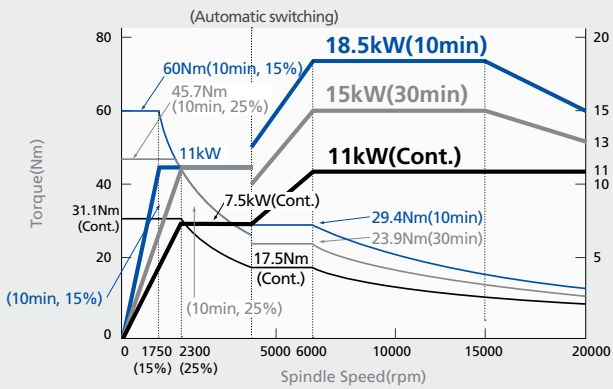
Front



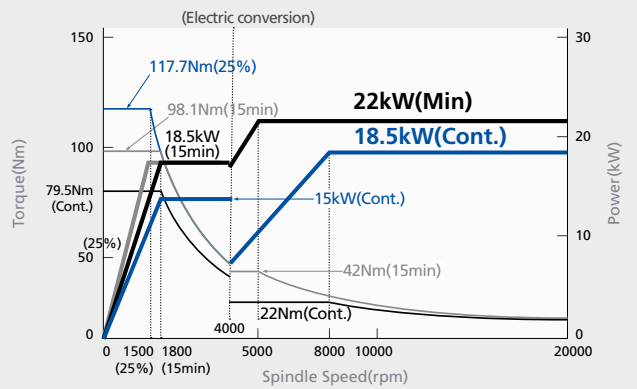
Right side

Spindle Power – Torque Diagram

Standard (20,000rpm)

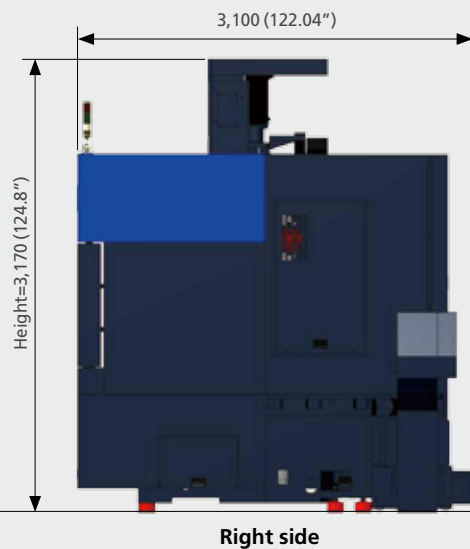
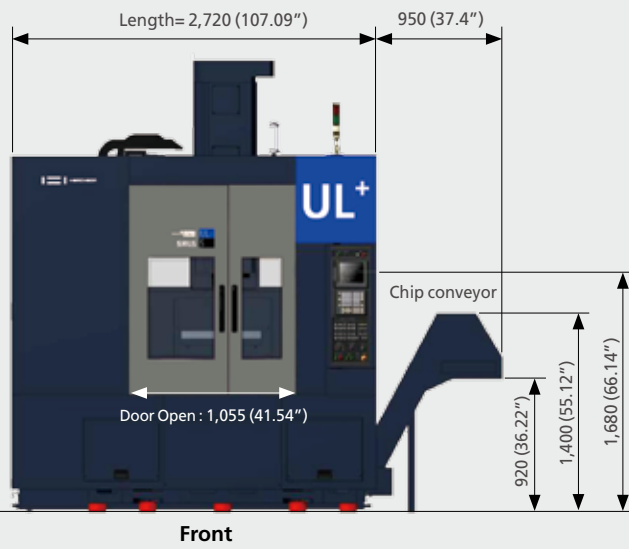
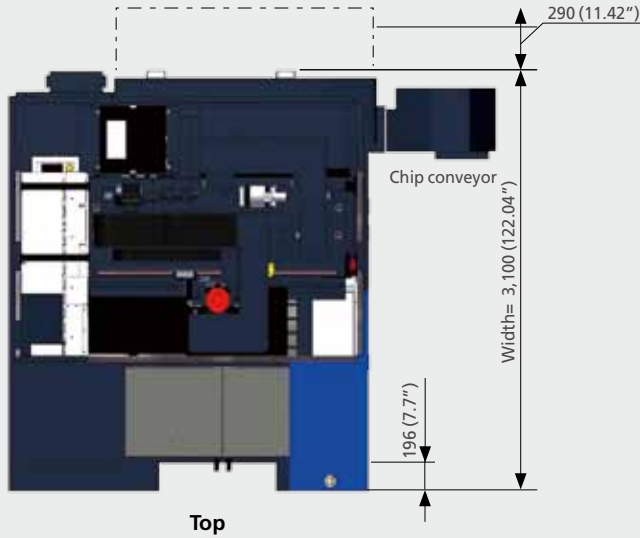


Option (20,000rpm)



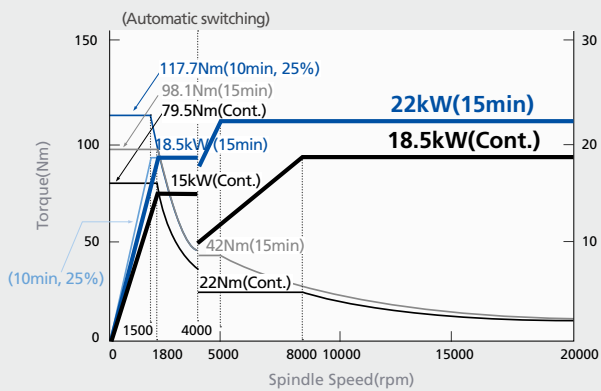
Product Data : SIRIUS-UL+

* Unit: mm(inch)

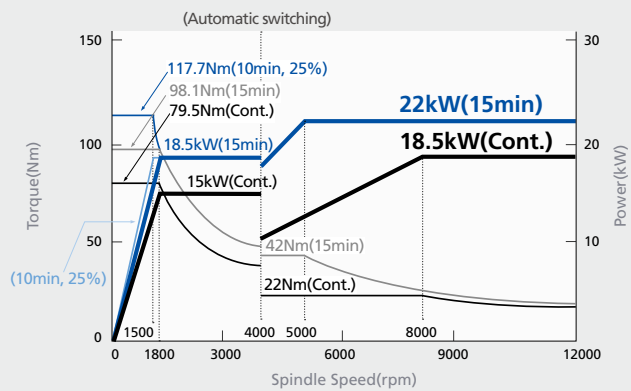


Spindle Power – Torque Diagram

Standard (20,000rpm)

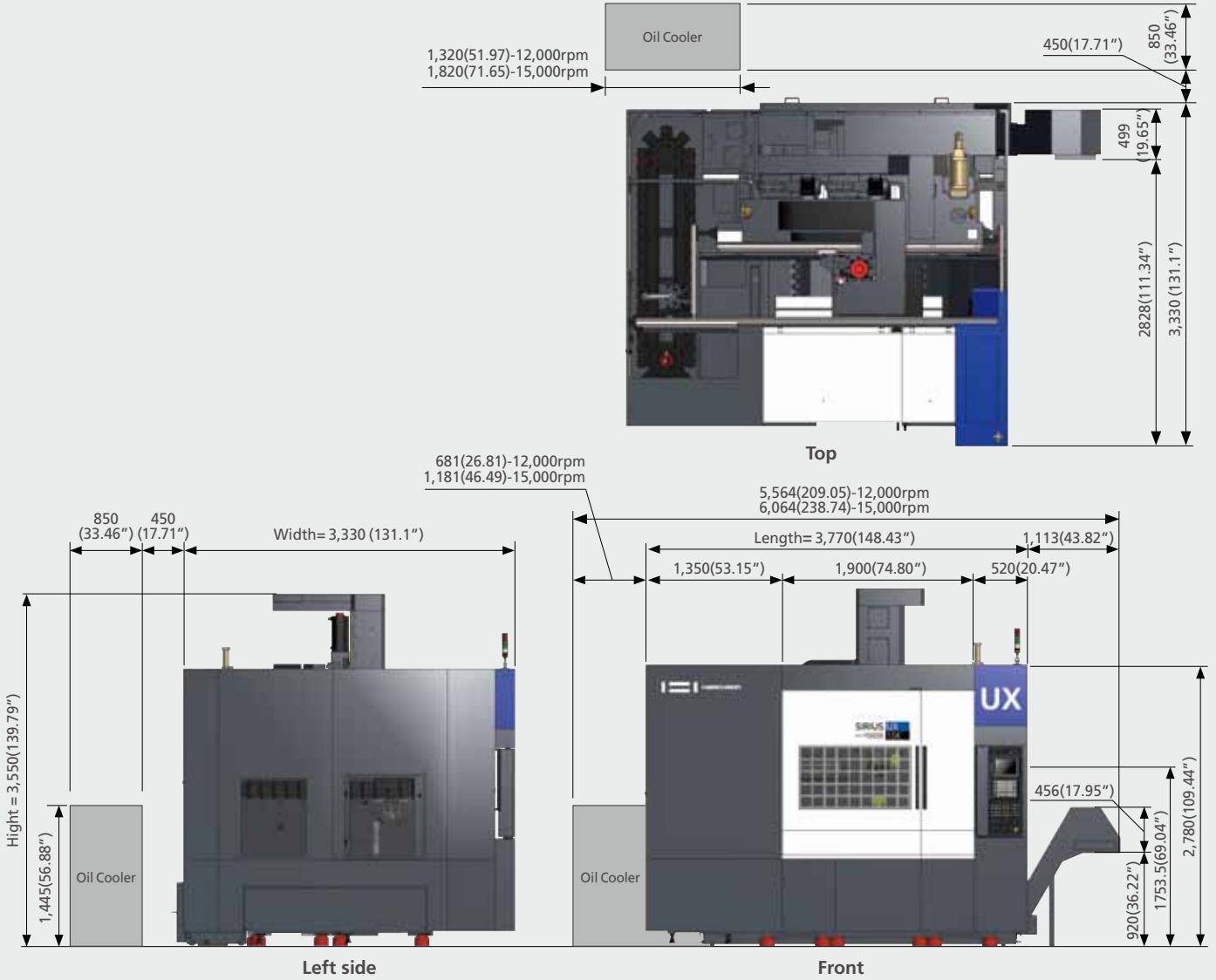


Option (12,000rpm)



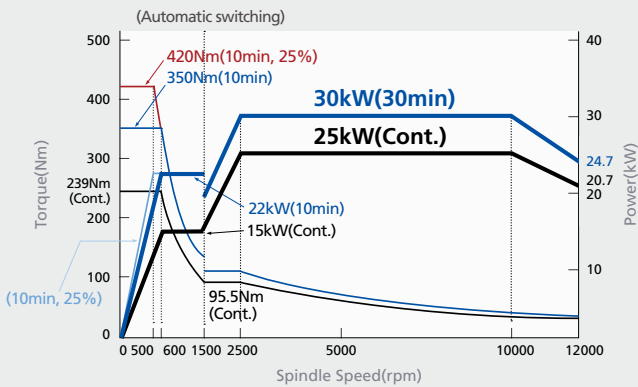
Product Data : SIRIUS-UX

* Unit: mm(inch)

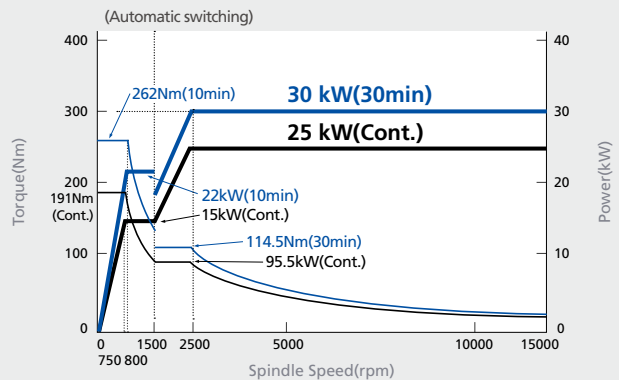


Spindle Power – Torque Diagram

Standard (12,000rpm)

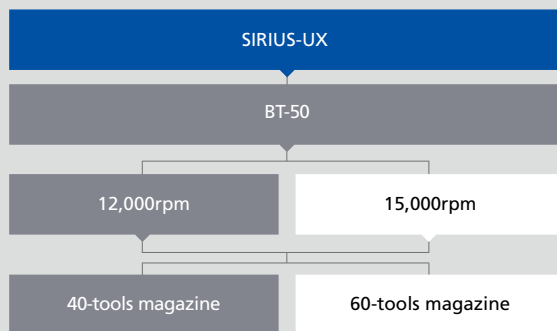
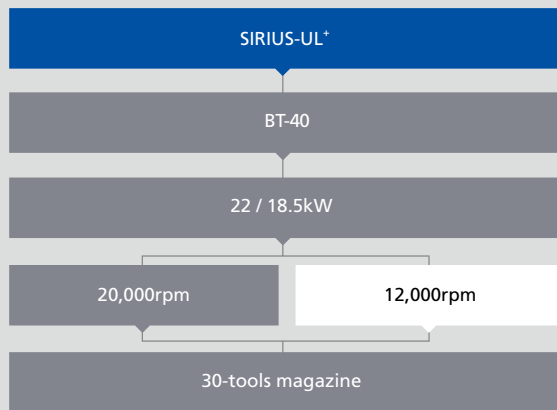


Option (15,000rpm)



Product Configuration

Each product can be configured to fit your application.



Standard and Optional product components : SIRIUS-UM

Standard Accessories		Optional Accessories	
• Adjust bolt, block & plate	• 10.4" LCD Color screen	• Air dryer	• Tool Life Management
• Air blower	• Hwacheon AI Nano Contour Control System(HAI) 200 block buffer	• Air gun	• Tool measuring system-Renishaw / Blum (Touch type, Laser type)
• Base around splash guard	• Hwacheon Efficient Contour Control System (HECC)	• Auto door	• Transformer
• Coil conveyor (2ea)	• Hwacheon Tool Load Detect System (HTLD)	• Coolant gun	• Workpiece measuring system -Renishaw / Blum (Touch type)
• Coolant system	• Hwacheon Thermal Displacement Control System (HTDC)	• Data server (1,024MB)	• 4-axis interface
• Data server (256MB)	- Hwacheon Spindle Displacement Control System (HSDC) +	• Data server interface	• Hwacheon AI Nano Contour Control System (HAI) 600/1000 block buffer
• Door interlock	- Hwacheon Frame Displacement Control System (HFDC)	• Lift up chip conveyor (Hinge type, Scraper type)	
• Lubrication system	• Cutting Feed Optimization System (OPTIMA)	• Linear scale (X / Y / Z)	
• MPG Handle (1ea)		• Manual Guide i	
• Operation manual & parts list		• MPG Handle (3ea)	
• Pneumatics system		• Nano Smoothing Interpolation	
• Rigid tapping		• NURBS Interpolation	
• Signal lamp (R / G, 2 color)		• Oil mist (Semi dry cutting system, Eco booster)	
• Spindle cooler		• Oil skimmer	
• Tool kit & box		• Signal lamp (R / G / Y, 3 color)	
• Work light		• Spindle through coolant (30bar, 70bar)	
• Workpiece coordinate system (48ea)			

Standard and Optional product components: SIRIUS-UL+

Standard Accessories		Optional Accessories	
• Adjust bolt, block & plate	• 8.4" LCD Color screen	• Air dryer	• Tool Life Management
• Air blower	• Hwacheon AI Nano Contour Control System(HAI) 200 block buffer	• Air gun	• Tool measuring system-Renishaw / Blum (Touch type, Laser type)
• Base around splash guard	• Hwacheon Efficient Contour Control System (HECC)	• Auto door	• Transformer
• Coil conveyor (2ea)	• Hwacheon Tool Load Detect System (HTLD)	• Coolant gun	• Workpiece measuring system -Renishaw / Blum (Touch type)
• Coolant system	• Hwacheon Thermal Displacement Control System (HTDC)	• Data server (1,024MB)	• 4-axis interface
• Data server (256MB)	- Hwacheon Spindle Displacement Control System (HSDC) +	• Data server interface	• Hwacheon AI Nano Contour Control System (HAI) 600/1000 block buffer
• Door interlock	- Hwacheon Frame Displacement Control System (HFDC)	• Lift up chip conveyor (Hinge type, Scraper type)	
• Lubrication system	• Cutting Feed Optimization System (OPTIMA)	• Linear scale (X / Y / Z)	
• MPG Handle (1ea)		• Manual Guide i	
• Operation manual & parts list		• MPG Handle (3ea)	
• Pneumatics system		• Nano Smoothing Interpolation	
• Rigid tapping		• NURBS Interpolation	
• Signal lamp (R / G, 2 color)		• Oil mist (Semi dry cutting system, Eco booster)	
• Spindle cooler		• Oil skimmer	
• Tool kit & box		• Signal lamp (R / G / Y, 3 color)	
• Work light		• Spindle through coolant (30bar, 70bar)	
• Workpiece coordinate system (48ea)			

Standard and Optional product components : SIRIUS-UX

Standard Accessories		Optional Accessories	
• Adjust bolt, block & plate	• Work light	• Additional Tool Storage Capacity - 60ea	• NURBS interpolation
• Air blower	• 10.4" Color LCD display	• Air dryer	• Oil skimmer
• Base around splash guard	• Workpiece coordinate system (48ea)	• Air gun	• Oil mist
• Coil conveyor (2ea)	• Cutting Feed Optimization System (OPTIMA)	• Auto door	• (Semi dry cutting system, Eco booster)
• Coolant system	• Hwacheon Efficient Contour Control System (HECC)	• Coolant gun	• Signal lamp (R / G / Y, 3 color)
• Data server (256MB)	• Hwacheon Tool Load Detect System (HTLD)	• Coolant through spindle (30bar, 70bar)	• Tool life management
• Door interlock	• Hwacheon Thermal Displacement Control System (HTDC)	• Data server interface	• Tool measuring system-Renishaw / Blum
• Lubrication system	- Hwacheon Spindle Displacement Control System (HSDC) +	• Data server (1,024MB)	• Transformer
• MPG handle (1ea)	- Hwacheon Frame Displacement Control System (HFDC)	• Lift up chip conveyor (Hinge type, Scraper type)	• (Touch type, Laser type)
• Operation manual & parts list		• Linear scale (X / Y / Z)	• Workpiece measuring system-Renishaw / Blum (Touch type)
• Pneumatics system		• Manual guide i	• 4-axis interface
• Rigid tapping		• Mist collector	• Hwacheon AI Nano Contour Control System (HAI) 600/1000 block buffer
• Signal lamp (R / G, 2 color)	• Hwacheon AI Nano Contour Control System (HAI) 200 block buffer	• MPG handle (3ea)	
• Spindle cooler		• Nano smoothing interpolation	
• Tool kit & box			

Machine Specifications

ITEM	SIRIUS-UM			SIRIUS-UL+		SIRIUS-UX	
	20,000	20,000	32,000	20,000	12,000	12,000	15,000
Travel							
Stroke (X / Y / Z)	mm(inch)	750 (29.53") / 500 (19.70") / 450 (17.72")		1,050 (41.34") / 600 (23.62") / 550 (21.65")		1,500 (59.06") / 750 (29.53") / 650 (25.59")	
Distance from table surface to spindle gauge plane	mm(inch)	150 (5.91") ~ 600 (23.62")		150 (5.91") ~ 700 (27.56")		175 (6.89") ~ 825 (32.48")	
Distance between columns to spindle Center	mm(inch)	182 (7.17")		272 (10.7")		437 (17.21")	
Distance between columns	mm(inch)	950 (37.4")		1,460 (57.48")		1,800 (70.87")	
Table							
Working surface	mm(inch)	850 (33.46") x 500 (19.70")		1,200 (47.24") x 600 (23.62")		1,650 (64.96") x 750 (29.53")	
Table loading capacity	kg(lb)	800 (1,764)		800 (1,764)		2,500 (5,512)	
Table surface configuration (T slots WxP – No. of slots)	mm(inch)	18 x 100 (0.71" x 3.94") - 5ea		18 x 100 (0.71" x 3.94") - 5ea		18 x 125 (0.71" x 4.92") - 5ea	
Spindle							
Max. Spindle speed	rpm	20,000		32,000		20,000 12,000	
Spindle motor	kW(HP)	18.5/11 (25/15) 22/18.5 (30/25) 18.5/13 (25/17)		22 / 18.5 (30 / 25)		30 (41) / 25 (34)	
Type of spindle taper hole	-	ISO#40, 7 / 24 Taper		HSK-E40		ISO#40, 7 / 24 Taper	
Spindle bearing inner diameter	mm(inch)	Ø70 (2.76")		Ø70 (2.76")		Ø100 (3.94")	
Max Spindle speed	rpm	20,000		32,000		20,000 12,000	
Method of spindle lubrication	-	Air Oil Oil Jet		Oil Jet		Oil Jet	
Method of spindle cooling	-	Jacket Cooling		Jacket Cooling		Jacket Cooling	
Feedrate							
Rapid speed (X / Y / Z)	m/min(ipm)	24 (944.88) / 24 (944.88) / 24 (944.88)		40 (1,575) / 40 (1,575) / 40 (1,575)		20 (787.40) / 20 (787.40) / 20 (787.40)	
Feedrate (X / Y / Z)	mm/min(ipm)	1 ~ 24,000 (0.04 ~ 945)		1 ~ 24,000 (0.04 ~ 945)		10,000 (393.70)	
ATC							
Type of tool shank	-	MAS-403 BT-40 (Opt.: BBT-40, CAT-40)		HSK-E40		MAS-403 BT-40 (Opt.: BBT-40, CAT-40)	
Type of pull stud	-	MAS P40T-1 (45°)		-		MAS P40T-1 (45°)	
[Without adjacent tools]	ea	24		30		40 (Opt.: 60)	
Max. Tool diameter [Without adjacent tools]	mm(inch)	Ø90 (3.54") / Ø127 (5.0")		Ø90 (3.54") / Ø170 (6.69")		Ø120 (4.72") / Ø200 (7.87")	
Max. Tool length	mm(inch)	300 (11.81")		300 (11.81")		400 (15.75")	
Max. Tool weight	kg(lb)	8 (17.64)		8 (17.64)		20 (44.09)	
Method of Tool selection	-	Fixed Address		Memory random		Fixed Address	
Method of operation (Magazine / Swing arm)	-	Servo Motor / -		Servo Motor / Servo Motor		Servo Motor / Servo Motor	
Tool changing time (T to T / C to C)	sec	2.5 / 10		2 / 5		5 / 10	
Motor							
Feed motor (X / Y / Z)	kW(HP)	1.6 (2.1) / 1.6 (2.1) / 3.0 (4.0)		4.0 (5.36) / 4.0 (5.36) / 7.0 (9.39)		7.0 (9.39) / 7.0 (9.39) / 7.0 (9.39)	
Coolant motor (Spindle / Chip Flushing)	kW(HP)	0.4 (0.54) / 0.4 (0.54)		0.4 (0.54) / 0.4 (0.54)		0.4 (0.54) / 0.4 (0.54)	
Spindle cooler (50 / 60Hz) – inverter type	kW(HP)	2.8 / 3.2 (3.8 / 4.3)		5.0 / 5.6 (7 / 7.5) 2.8 / 3.2 (3.8 / 4.3)		8.0 (10.73) / 8.9 (11.94) 5.0 (6.71) / 5.6 (7.51) + 8.0 (10.73) / 8.9 (11.94)	
Power Source							
Electric power supply	kVA	55		55		70	
Compressed air supply (Pressure x Consumption)	-	0.5 ~ 0.7MPa x 690N ℓ/min		0.5 ~ 0.7MPa x 690N ℓ/min		0.5 ~ 0.7MPa x 690N ℓ/min	
Tank Capacity							
Spindle cooling / Lubrication	ℓ (gal)	40 (10.57) / 12(3.17)		40 (10.57) / 12(3.17)		40 (10.57) / 12 (3.17)	
Coolant	ℓ (gal)	210 (55.48)		270 (71.33)		290 (76.61)	
Machine Size							
Height	mm(inch)	2,960 (116.54")		3,170 (124.8")		3,550 (139.76")	
Floor space (Length x Width)	mm(inch)	2,150 (84.64") x 2,570 (101.18")		2,720 (107.09") x 3,100 (122.04")		3,770 (148.43") x 3,330 (131.1")	
Weight	kg(lb)	8,000(17.638")		9,500 (20,944) 9,450 (20,834)		15,000 (33,069)	
NC Controller	Fanuc 31i-A						

NC Specifications [Fanuc 31i-A]

※ — : Not available S : Standard O : Option

ITEM	SPECIFICATION	
Controlled axis		
Controlled axis	3-Axes	S
Controlled axis	5-Axes (Max.)	O
Simultaneously controlled axes	3-Axes	S
Simultaneously controlled axes	4-Axes (Max.)	O
Least input increment	0.001mm, 0.001deg, 0.0001inch	S
Least input increment 1 / 10	0.0001mm, 0.0001deg, 0.00001inch	O
inch / metric conversion	G20, G21	S
Store stroke check 1 / 2		S
Mirror image		S
Store pitch error compensation		S
Backlash compensation		S
Operation		
Automatic & MDI operation		S
DNC operation by memory card PCMCIA card is required	PCMCIA card is required	S
Program number search / Sequence number search		S
Dry run, single block		S
Manual handle feed / Feed rate	1 Unit / x1, x10, x100	S
Interpolation function		
Positioning / Linear interpolation / Circular interpolation / Dwell (Per seconds)	G00 / G01 / G02,G03 / G04	S
Helical interpolation	Circular interpolation plus Max.2axes linear interpolation	S
Nano smoothing		O
Reference position return check / Return	G27 / G28, G29	S
2nd reference position return	G30	S
Skip	G31	S
NURBS interpolation		O
Feed function		
Rapid traverse override	F0, F25, F50, F100	S
Feedrate (mm / min)		S
Feedrate override	0 ~ 150%	S
Jog feed override	0 ~ 4,000mm/min	S
Override cancel	M48, M49	S
Program input		
Tape code	EIA RS244 / ISO840	S
Optional block skip	1ea	S
Program number	O4-Digits	S
Sequence number	N8-Digits	S
Decimal point programming		S
Coordinate system setting	G92	S
Workpiece coordinate system	G54 ~ G59	S
Workpiece coordinate system preset		O
Addition of workpiece coordinate pair	48ea	S
Addition of workpiece coordinate pair	300ea	O
Extend program edit function	Copy / move/..	S
Manual absolute on and off		S
Chamfering / Corner R		S
Sub program call	10 folds nested	S
Custom macro B		S
Addition of custom macro common variables	#100 ~ #199, #500 ~ #999	O
Canned cycle for drilling		S
Small-hole peck drilling cycle		O
Automatic corner override		O
Feedrate clamp based on arc radius		S
Scaling		O
Programmable data input	G10	S
Coordinate system rotation		S

ITEM	SPECIFICATION	
Programmable mirror Image		O
Tape format for fanuc series 15		O
Manual guide i		O
Spindle speed function		
Spindle serial output		S
Spindle override	50 - 120%	S
Spindle orientation		S
Rigid tapping		S
Tool function / compensation		
Tool function	T4 - digits	S
Tool offset pairs	±6 - digits 200ea	S
Tool offset pairs	±6 - digits 400ea, 999ea	O
Tool offset memory C		S
Tool length compensation		S
Cutter compensation C		S
Tool life management		O
Tool length measurement		S
Editing operation		
Part program storage length / Number of register able programs	128kB / 250ea	S
Part program storage length / Number of register able programs	256kB / 500ea, 512kB / 1,000ea 1MB / 1,000ea, 2MB / 1,000ea	O
Background editing		S
Extended editing functions		S
Play Back		O
Setting and display		
Clock function		S
Self-diagnosis function / Alarm history display Help function / Graphic function		S
Run hour and parts count display		S
Multi-language display	English, German, French, Italian, Chinese, Spanish, Korean, Portuguese, Polish, Hungarian, Swedish, Russian	S
Data input / output		
Reader / Puncher interface CH1	RS232C	S
Data server	SIRIUS-UM : 256MB	S
	SIRIUS-UL+ : 256MB	S
	SIRIUS-UX : 256MB	S
Data server	1,024MB	O
Ethernet interface / Memory card interface		S
Others		
Display unit	SIRIUS-UM : 10.4" Color LCD SIRIUS-UL+ : 8.4" Color LCD SIRIUS-UX : 10.4" Color LCD	S
HWACHEON Artificial Intelligence		
AI Nano Contour Control System (HAI) 200 Block Buffer		S
AI Nano Contour Control System (HAI) 600/1000 Block Buffer		O
Hwacheon Efficient Contour Control System (HECC)		S
Hwacheon Tool Load Detect (HTLD)		S
Cutting Feed Optimization System (OPTIMA)		S
Hwacheon Thermal Displacement Control System (HTDC) - Hwacheon Spindle Displacement Control System (HSDC) - Hwacheon Frame Displacement Control System (HFDC)		S
4- Axis interface function Option		
Controlled axes / Simultaneously Controlled axes / Control axis detach	included 4-axis interface option	O

Hwacheon Global Network

 Hwacheon Headquarters  Hwacheon Europe  Hwacheon Asia  Hwacheon America



HWACHEON

Please call 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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