

Accessories

Standard : ●
Optional : ★

Item	Model	5A-40R	5A-65E	5A-65EF	5A-95Q/5X
1.Air blast through spindle_M53		●	●	●	●
2.Auto Power off		●	●	●	●
3.The axis linear scale system_Heidenhain		B/C ●	B/C ●	B/C ●	A/C ●
4.DCM collision.(#40)		●	●	-	-
5.Full-enclosed splash guard		●	●	●	●
6.Foundation bolt, Concrete		●	●	●	●
7.Fluorescent lamp x1		●	●	●	●
8.Hartford Manual x1		●	●	●	●
9.Lubrication system		●	●	●	●
10.Operator Panel, Stand type		●	●	●	●
11.Spindle air curtain		●	●	●	●
12.Spindle oil cooler		●	●	●	●
13.Spray around spindle		●	●	●	●
14.Software option 1 : Plane Function(#8)		●	●	●	●
15.Software option 2 : TCPM(#9)		●	●	●	●
16.Table side air blast M50 control		●	●	●	●
17.Tool package		●	●	●	●
18.X,Y,Z-axis linear scale system_Heidenhain		★	★	★	●
19.Auto tool length measurement		★	★	★	★
20.Auto workpiece measurement		★	★	★	★
21.Correction Ball(KKH250)		★	★	★	★
22.Coolant through spindle(20/25/40/75BAR)		★	★	★	★
23.Fluorescent lamp x2		★	★	★	★
24.Link type chip conveyor & portable chip bucket(1EA)		★	★	★	●
25.Oil mist coolant system		★	★	★	★
26.Spindle shaft with coolant system(Built-in 24,000rpm spindle)		-	★	★	-
27.Spindle shaft with coolant system(Built-in 20,000rpm spindle)		-	-	-	★
27.Spindle coolant (HBO-1000)		-	★	★	★
28.Three axis ballscrew coolant system(Vary by model)		★	★	★	●
29.Air conditioning for electrical cabinet		●	●	●	●
30.Spindle Thermo compensation		★	★	★	★
31.NC4S(Serial A-4114-5060)		-	★	★	★
32.DXF Converter OP_#42(HEIDENHAIN)		★	★	★	★
33.kinematicOpt #48		★	★	★	★
34.TNCREMOT SOFTWARE(HEIDENHAIN)		★	★	★	★
35.Tri-Lamp Device		★	★	★	★
36.Mode 4 (HEIDENHAIN)		★	★	★	★
37.Tilted working plane command G68.2		-	-	★	★
38.RENISHAW AXISET		-	-	★	★
39.Tool Center Point Control S677(F)		-	-	★	★
40.Rotary table dynamic fixture offset S728(F)		-	-	★	★

She Hong INDUSTRIAL CO. LTD.

No.3 Jingke N. Road, Taichung City, 408 Taiwan
www.hartford.com.tw Tel: 886-4-23501980 Fax: 886-4-23581793
CAT.No.: 20231113- E21
All Graphic and text on the catalog have been registered. Those who reprint will be held liable

Hartford

Hartrol · Smartcenter · Robocell

We manufacture intelligent machines only



5-Axis Intelligent
Machining Center

5A Series
Smartcenter

- 5-year warranty on guideways
- Thermal insulation solutions
- Built-in spindle shaft with cooling system
- 5-axis total error within 0.04mm



▲ 5A-65E



▲ 5A-95Q



▲ 5A-40R

Facebook

Website

A.I. Applications inside, Hartrol Premium is the control which provides machining status with advanced features.

Imagine what future machines ought to be outlined.



Hartford
redefine the future



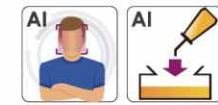
IoT

- + Remote Warm-up & Turn-on
- + Hartrol Plus Sync & Update
- + User Connect



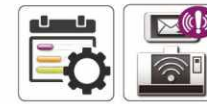
AI

- + Facial Recognition System
- + AI Efficient Lubrication Management
- + Smart Efficient Chip Collection



ZDT

- + Diagnosis Report on Spindle Operation
- + Alarm Report System



Major functions
of Hartford AI
controller



Facial
Recognition
system-Face ID



AI Efficient
Lubrication
Management



Broken Tool
Detection
System



AI Navi

How to quickly implement automation?

Hartford Robot Production Cell

Easy to get started

Hartford Robocell provides you a professional robot training and rich automation experience, to let you quickly learn and easily operate your automation systems

Quality control monitoring

Automation systems have to pass all the strict Quality Control tests at every stage like design, assembly, testing, final inspection and shipment, complete quality control processes for all the products.

Professional analysis

Robocell Machining optimization service, to let you be on the top by using professional machining methods

What definition of Automation interface only :



- 1. Automatic Door
- 2. Automatic Interface
- 3. Pneumatic/ Hydraulic Interface
- 4. Other options

1. Automatic Door

- Pneumatic/Automatic Door System_Operating Door
- Pneumatic/ Servo Automatic Door System_Right Side Door

2. Automatic Interface

- I/O Preparation
- Profibus Link Preparation
- CC-Link Preparation
- EtherNet/IP Link Preparation

3. Pneumatic/ Hydraulic Interface

- 1/2/3 Cell Automatic Pneumatic/ Hydraulic Interface in the machine

4. Other options

- High Pressure Spray Nozzle with Automatic Preparation
- HStainless Base
- High-volume chip-removal system comprising dual side augers

Superior Value in Mould Making

A perfect demonstration for machining accuracy and ability.

Hartford 5A series is specially designed for simple and complex parts in small lot production, which require high precision 5-axis machining.



1. Tire (for 5-axis controller)



2. Bullet blade(for 5-axis controller)



3. Hollow fan(for 5-axis controller)



Generator Blades



Turbine Blade

- Work piece Size:ø160 x H200mm
- Special features : Flake machining B,C axes machining.

Tool	Rpm	Feed rate	Machining Time
D8R4mm Aluminum Ball End Mill	10000	3000	02:58:56
D4R2mm Aluminum Ball End Mill	12000	2000	25:26:15
D4R1mm Aluminum Ball End Mill	12000	1000	02:08:38
Total time			36:33:49

- Work piece Size:ø450x H320mm
- Special features : 5 axes blade module application,5 axes machining with Table-Table type.

Tool	Rpm	Feed rate	Machining Time
D80 Rough Mill	2200	6000	03:28:35
D10R5mm Aluminum Ball End Mill	8000	3000	101:45:58
D10R5mm Aluminum Ball End Mill	10000	3000	01:55:32
D10R5mm Aluminum Ball End Mill	10000	3000	01:22:54
Total time			108:32:59

Tough, rugged and durable for 5A-40R

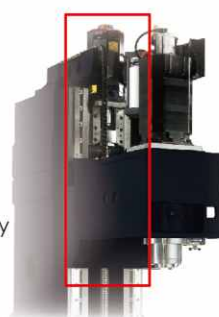
High rigidity structure design on 5A-65E



Optimal rigid design construction assures stability, deformation-free precision year after year.

Z-axis servo motor coupled directly to ballscrew

- No more timer belt, the motor is connect directly to the ballscrew.
- No risk of backlash or servo drag.
- Increase your machining efficiency and dependability.



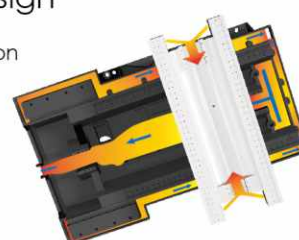
Oversized column & widest base design

- Increased width of interface between the column and base.
- Enhances machine stability.
- Increases machine rigidity and efficiency.



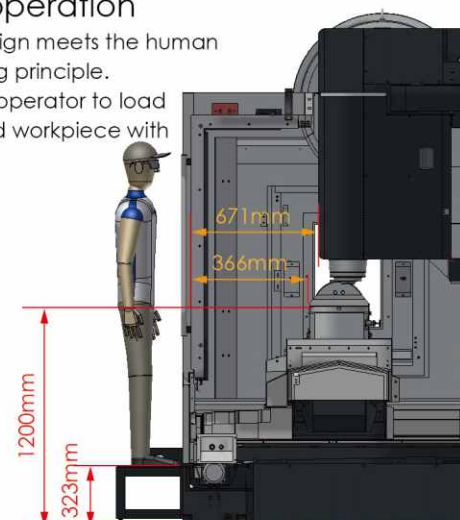
One-piece bed design

- Separates oil and coolant on the machine effectively.
- Prevents coolant contamination problems.

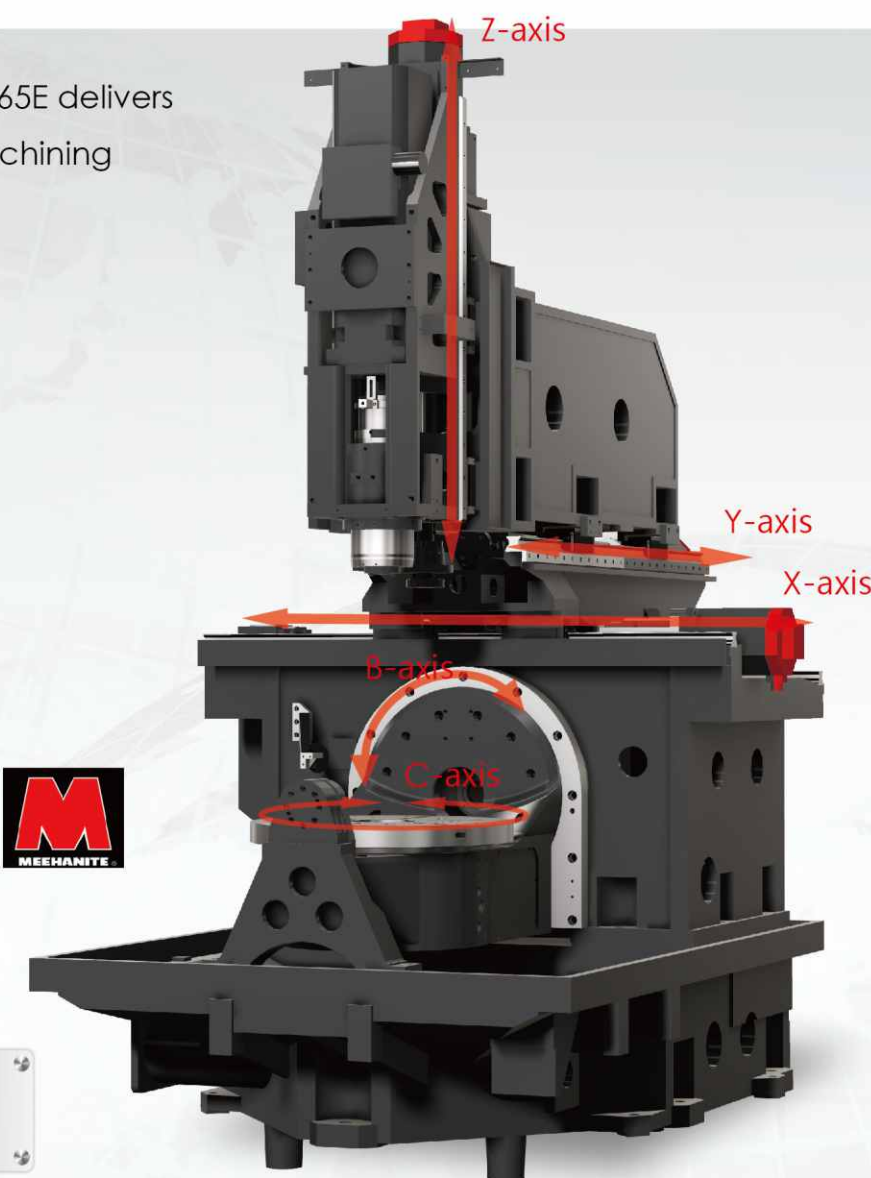


Easy for operation

- 5A-40R design meets the human engineering principle.
- Allows the operator to load and unload workpiece with ease.



The single arm structure design of 5A-65E delivers higher rigidity, support and better machining capability.

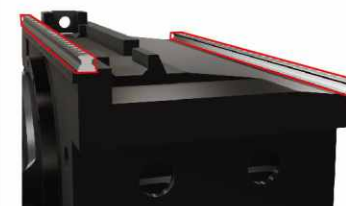


Full range of linear guideway five-year warranty

- Warranty coverage will not apply under following condition
1. Improper operation (collision)
 2. Lack of regular cleaning of accumulated debris causing damage to the linear rails & carriages.

X-axis guide ways are set on stepped bed

- This makes better support for machine.
- Machine rigidity is much better.
- Deformation is not an issue for machine



Full-support design on Y-axis

- Weight sagging problem is improved.
- Machining accuracy is enhanced.



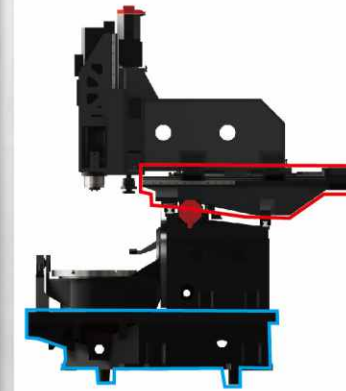
Overlap design on 3-axis

- Workpiece does not move with 3-axis.
- The impact on 3-axis positioning accuracy is minimized.
- Cutting accuracy is better



Enlarge design on base

- Movement cutting accuracy is improved.
- Delivers higher support for machine.



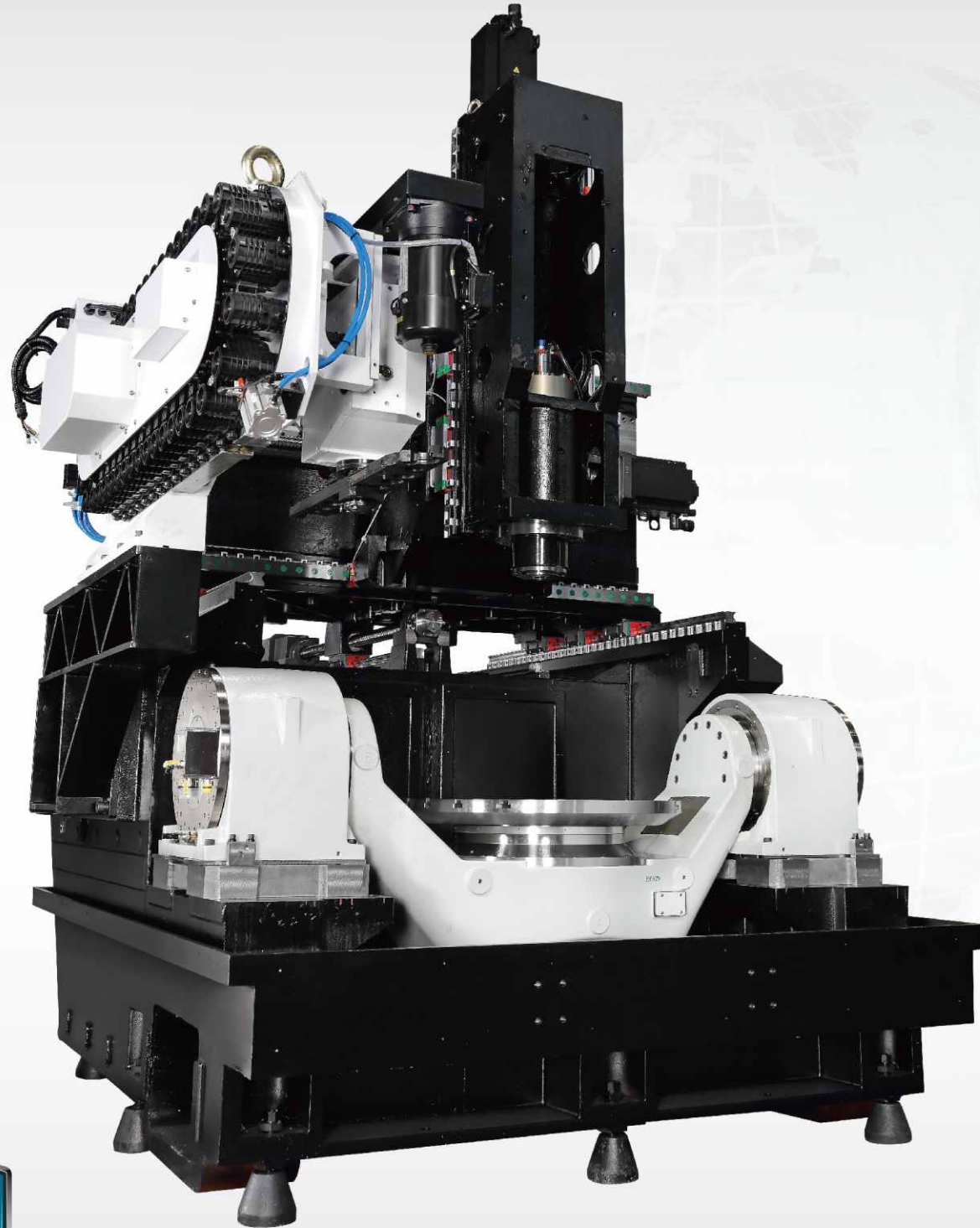
Full range of linear guideway five-year warranty

- Warranty coverage will not apply under following condition
1. Improper operation (collision)
 2. Lack of regular cleaning of accumulated debris causing damage to the linear rails & carriages.



5A-95Q Super stable cutting rigidity design

5A-95Q, innovative structural design, offers the highest cutting precision. It meets your needs for 5-axis machining applications.



Three-Axis Overlapping Design.

- Stable three-axis loading is unaffected by the weight of the workpiece. °
- **16%** improvement in three-axis positioning accuracy. °
- Achieve more stable cutting accuracy.

Design of A / C Axis

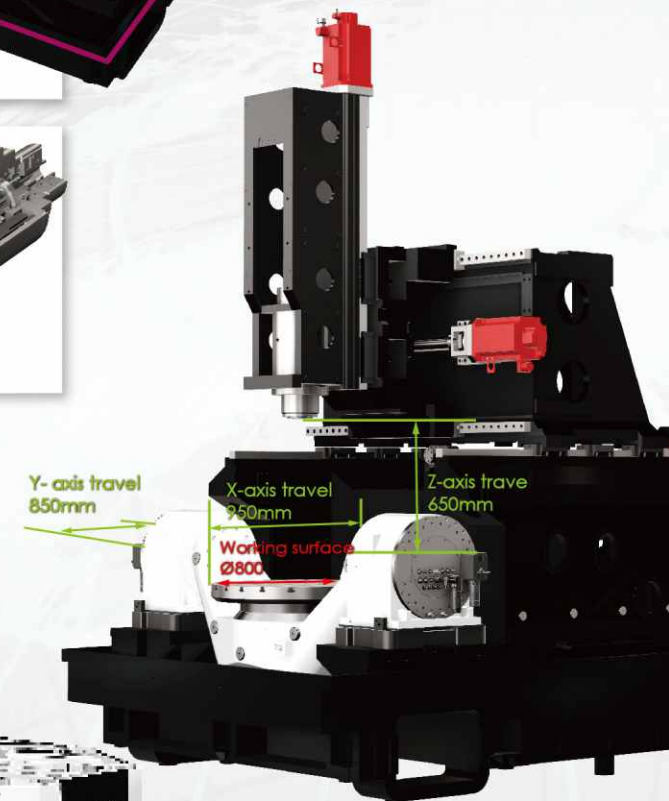
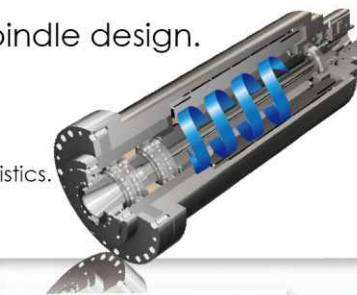
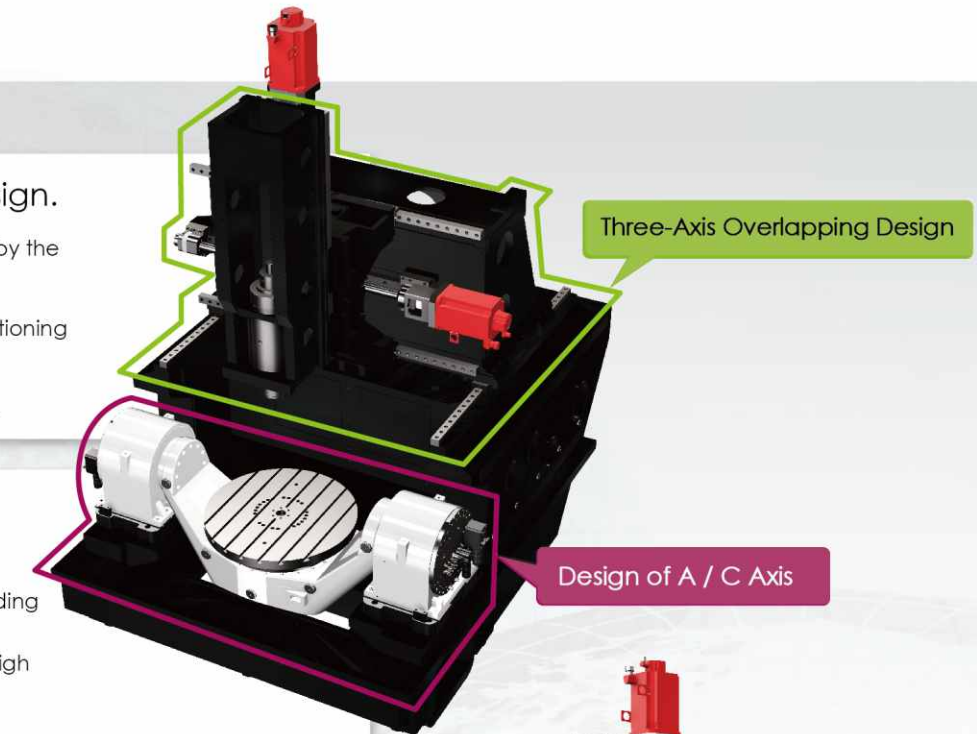
- Ensure the stability and processing performance of the loading and unloading system.
- Adopting DDM: featuring high speed, high precision, and high rigidity.

Equipped with an built-in spindle design.

- Built-in Spindle **20,000RPM**
- High-Speed and High-Torque characteristics.

Automation Design

Preparation for automation interface design, upgraded to ultra-fast speed.



Full range of linear guideway
five-year warranty

- Warranty coverage will not apply under following condition
- 1.Improper operation (collision)
 - 2.Lack of regular cleaning of accumulated debris causing damage to the linear rails & carriages.



Spindles Manufactured by Hartford Offer Quality Assurance

The self-designed and made built-in type 24,000rpm spindle guarantee the best quality for you and provide you instant solutions when you need.

ITEM	Transmission	Max. speed(rpm)	Tool shank
#40	Direct	10K~15K	BT/BBT/HSK-A63
	Direct	20K	HSK-A63
	Built-in	24K	HSK-A63

Direct type spindle

10~15K #40 Direct type spindle

Max.speed: 10,000~15,000 rpm
SKF high speed P4 precision ceramic bearing.
Bearing spring pre-load design increases spindle rigidity after thermal extension
Technical level equals to Japanese.

20K #40 Direct type spindle

Max. speed: 20,000 rpm
Max. bearing pre-load rigidity.
Spindle run out test: 0.002/300mm.
Spindle balance G0.4 (ISO1940:11.)
Temperature evaluated can be controled in 15°C under 20K high speed machining.
3D die and mold machining results can be reached up to 6000mm/min(MVP-10).

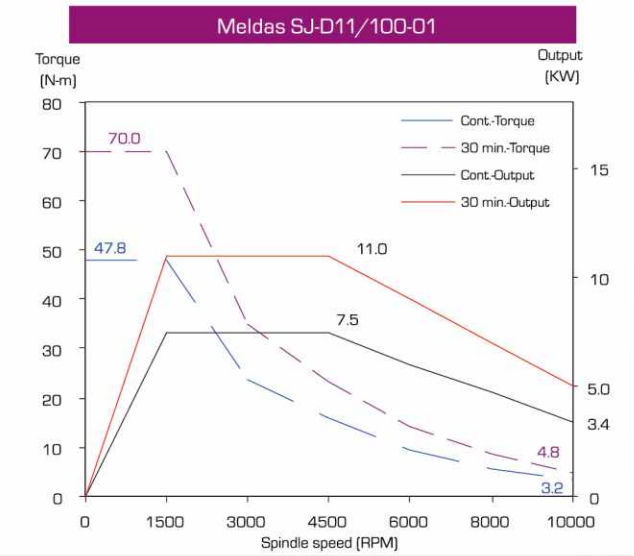
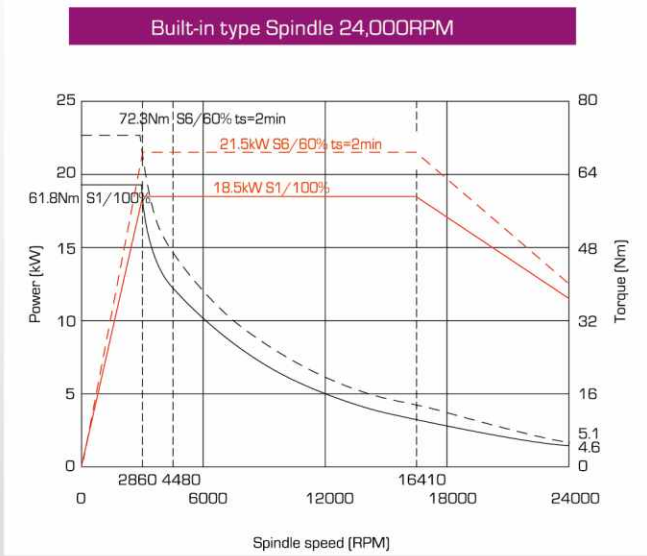
Built-in type spindle 24K #40 Built-in spindle

Max. speed: 24,000 rpm

i-Tech:

- i-Compensation: Spindle thermal extension can be adjusted to within 0.02mm.
- i-Diagnosis: This technique can help you predict the life of spindle bearing in advance.
- i-Balance: Spindle shaft design with coolant system so that the spindle temperature evaluated problem can be reduced 50%.
- i-Protection: Alarm appears when incorrect operation
Spindle shaft design with coolant system so that the spindle evaluated problem can be reduced 50%. Besides, cutting accuracy can be increased as well.
(Patent: M502528)
The average of surface roughness is within 0.2 um when making same cutting volume milling in different speed.
3D die and mold machining results can be reached up to 2800mm/min(MVP-10)

Spindle torque diagrams



Spindles Manufactured by Hartford Offer Quality Assurance

NCG-2005 5-axis Accuracy Testing

- Workpiece name NCG2005
- Workpiece material Necuron 1007
- Workpiece size Ø75x105x50 mm
- Workpiece fixed angle 0 ° & 30 °
- Cycle time 12 min
- Tool 6 mm end mill

Dimensional accuracy



Marginal lines(1 mm) in X, Y-axis are consistent.

N/C Thermal elongation check



Connection wall thickness down to 10 µm is not broken.

Angle accuracy deviation of rotating axes



High angle accuracy of B/C axes is easily recognized by surface finish and spacing symmetry.

Workpiece surface check



Accurate right angle between X & Y plane.

Axis accuracy check



In hole cutting, tool feeds in right and left direction are symmetrical.

Contour accuracy check



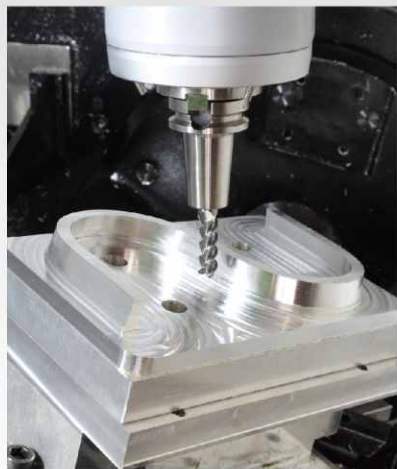
By the high accuracy of contour.

Tool center point check



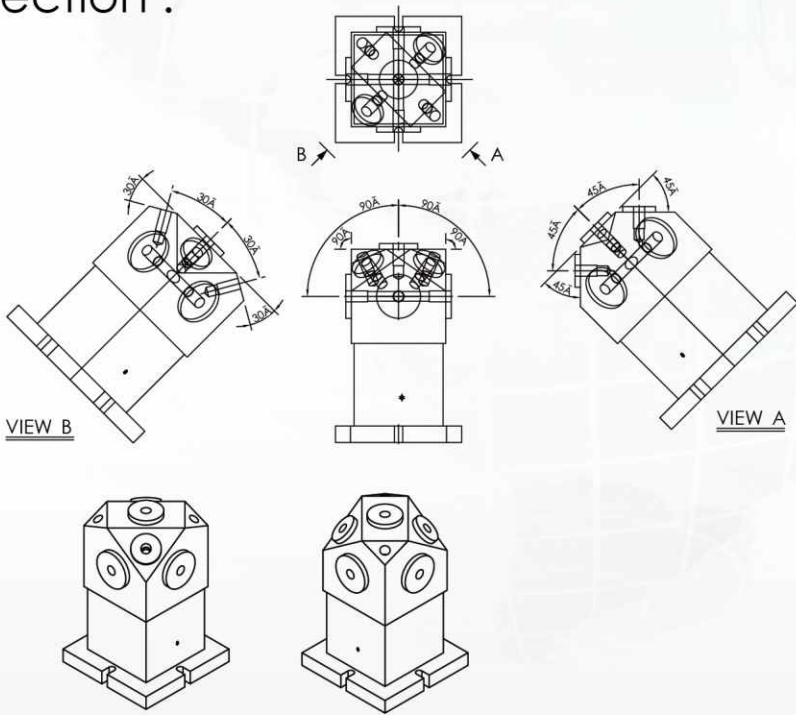
Tool center point in 5-axis (X,Y,Z,B,C) positions accurately.

5-axis accuracy test : S-CUT



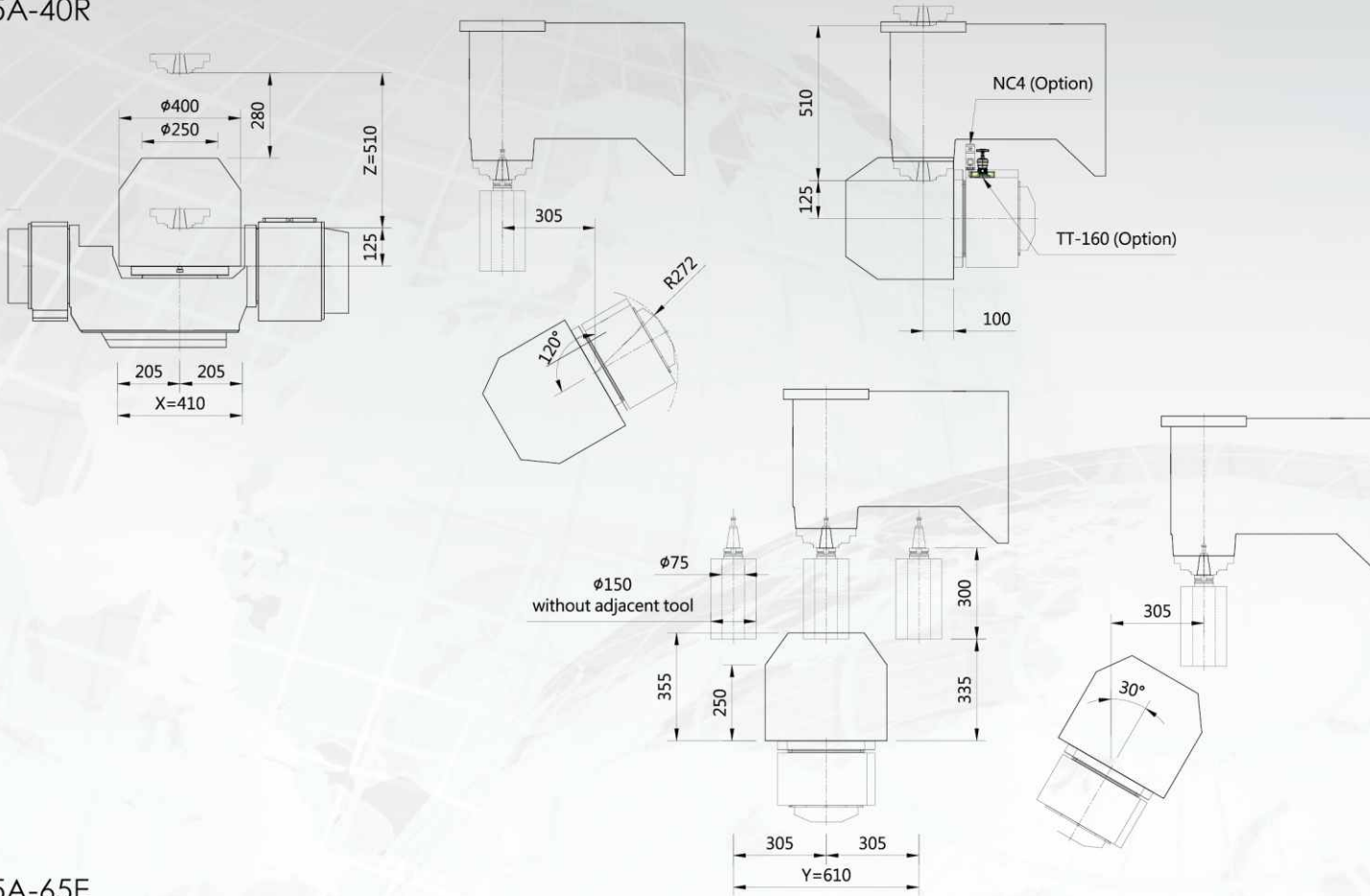
Item	Test Item	Tolerance	Test Results
1	Multi-faces simultaneous (Finish/smooth)	RA3.2 Rmax12.5	RA2.0 Rmax12.5
2	Profile accuracy	0.12mm	0.082mm

Five axis accuracy inspection :
9 faces measurement.

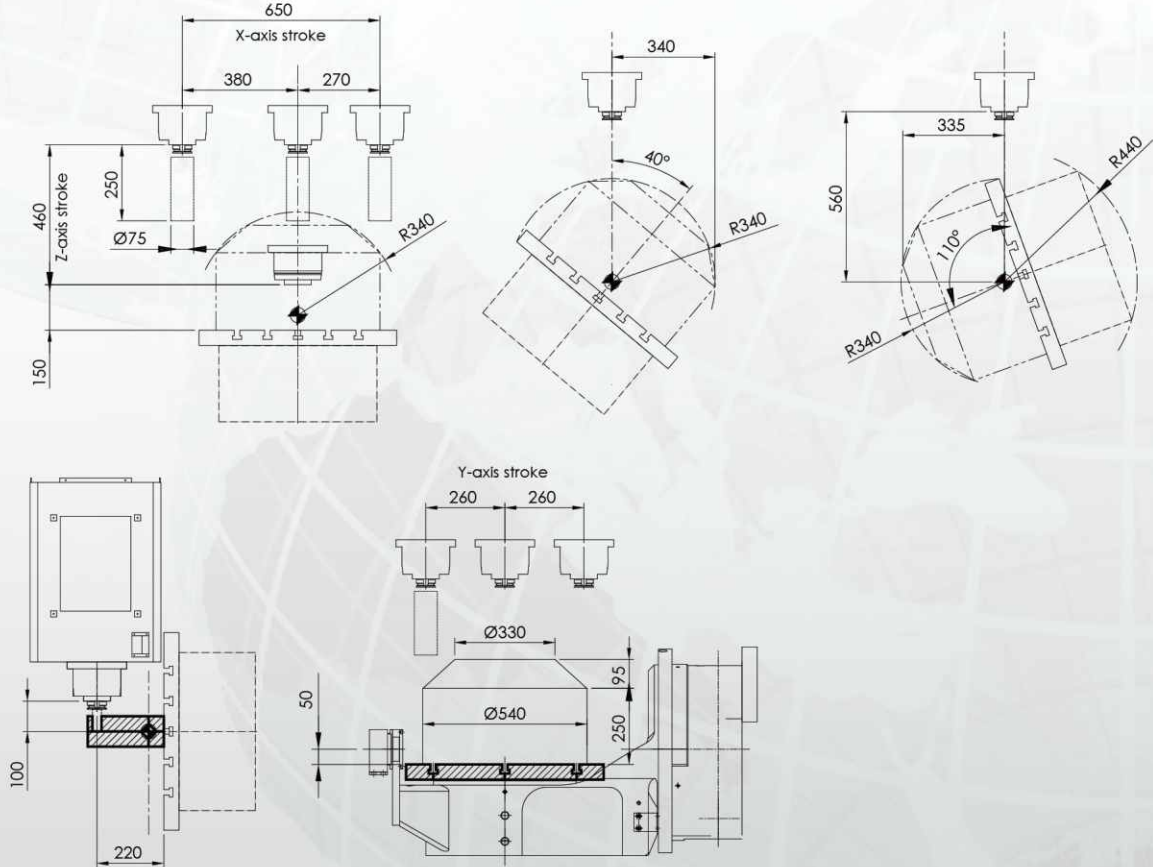


Item	Test Item	Tolerance	Test Results
1	Reference surface P relative face A, B, C, D (90 degree) of angle error.	±0.1mm	0.0036
2	Reference surface P relative face E, F (45 degree) of angle error.		0.0036
3	Reference surface P relative face G, H (30 degree) of angle error.		0.0044
4	Reference hole P relative axial hole A, B, C, D (90 degree) of angle error.		0.007
5	Reference hole P relative E,F axial hole (45 degree) of angle error.		0.0055
6	Reference axial hole P relative G, H axial hole (30 degree) of angle error.		0.001

5A-40R



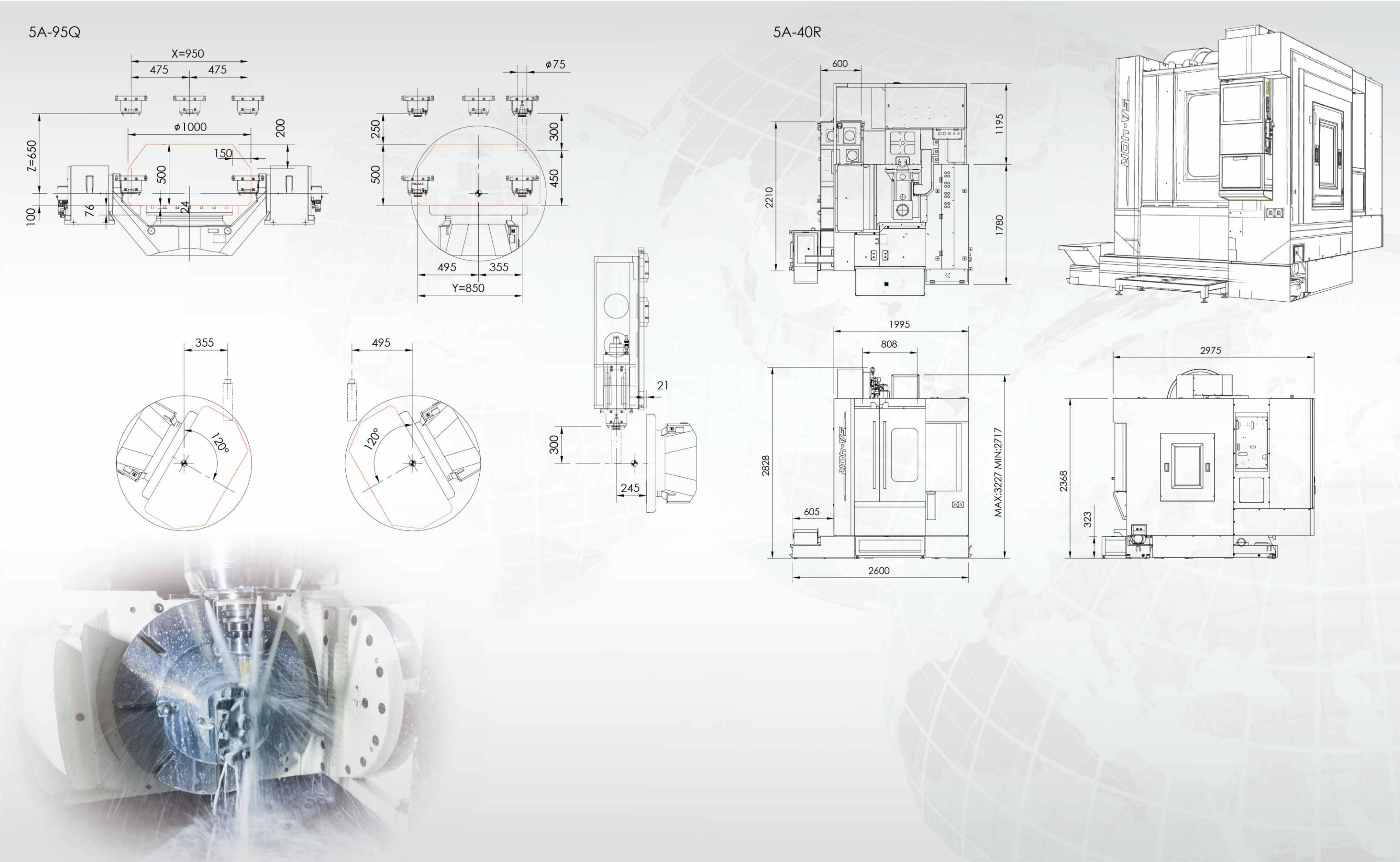
5A-65E



UNIT : mm

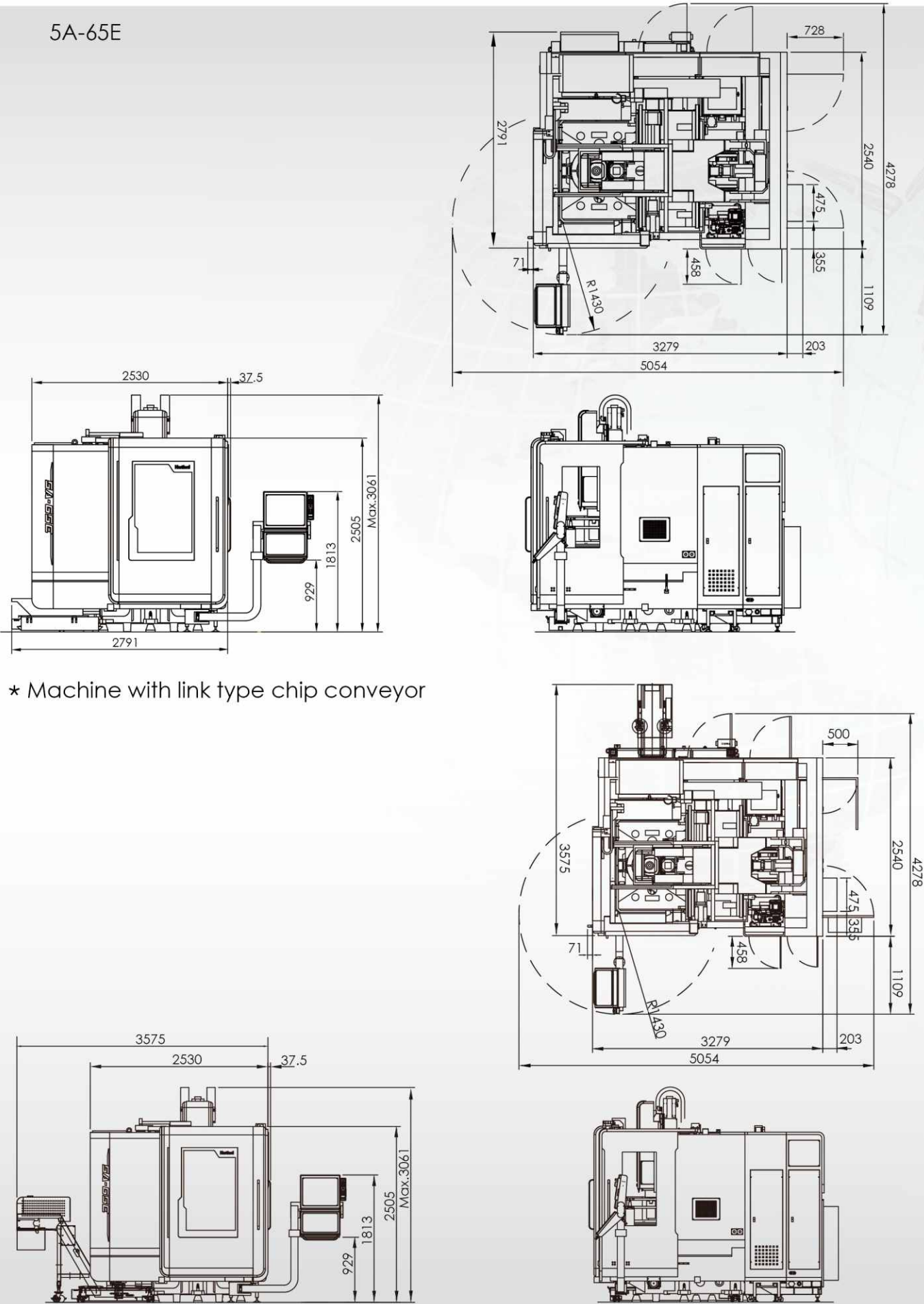
Cutting Range and Interference

Machine Dimension

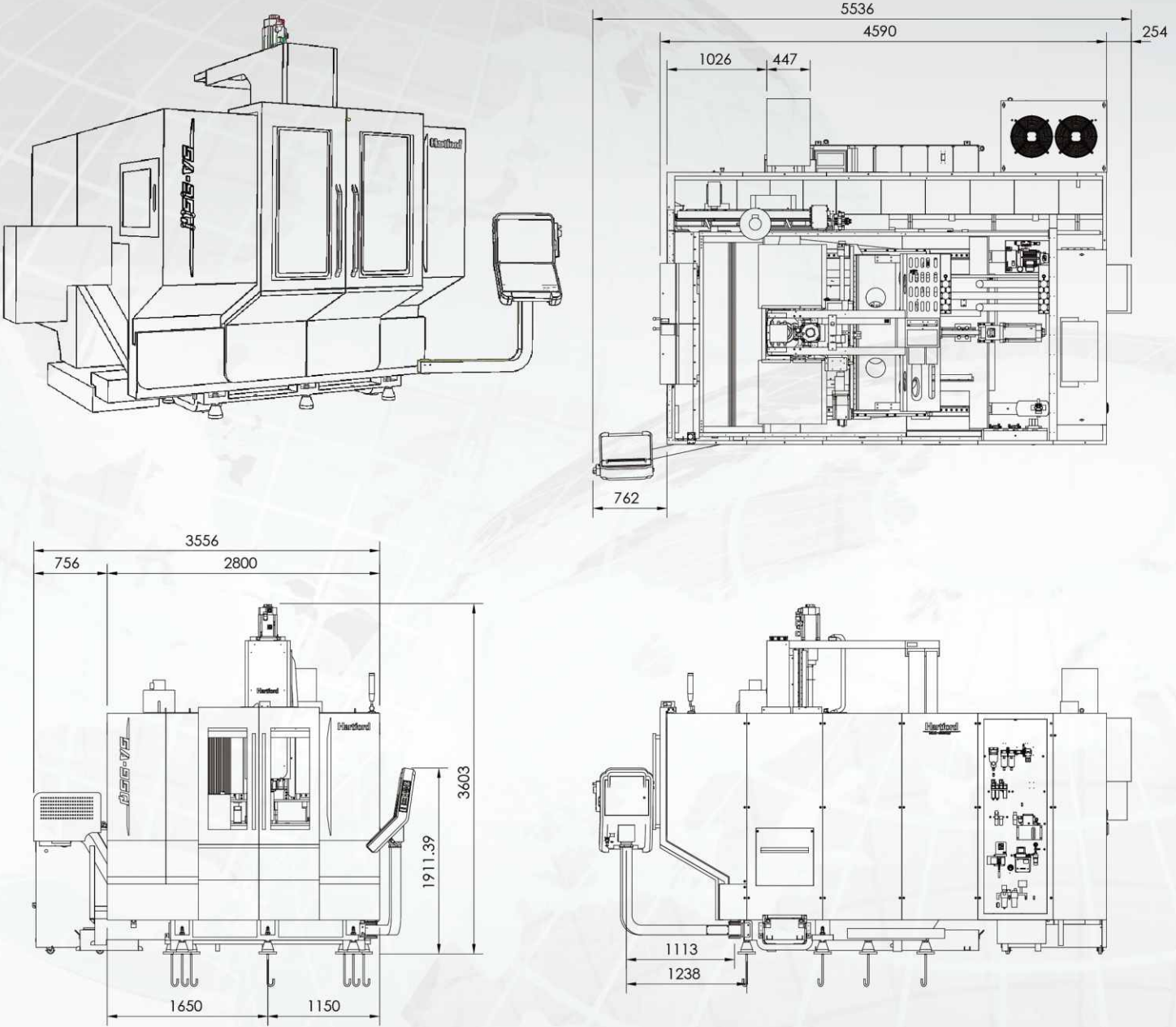


Machine Dimension

5A-65E



5A-95Q



Specification

MODLE		Unit	5A-40R	5A-65E	5A-65EF	5A-95Q	5A-95Q / 5X
Table	Working surface	mm	Ø320	Ø650	Ø650	Ø800	Ø800
	T-slot Width x pitch(number)	mm	12 x 90°(4)	18 x 60°(6)	18 x 60°(6)	14 x 100 (7)	14 x 100 (7)
	Max. load (Average)	kg	Horizontal : 200 Tilting : 100	500	500	850	850
Travel	X -axis travel	mm	410	650	650	950	950
	Y-axis travel	mm	610	520	520	850	850
	Z -axis travel	mm	510	460	460	650	650
	Tilting travel (A axis)	mm	+30° ~ -120°	-	-	±120	±120
	Tilting travel (B axis)	mm	-	+110° ~ -40°	+110° ~ -40°	-	-
	Rotary travel (C axis)	mm	±360°	360°	360°	360	360
	Distance from spindle to table	mm	125~635	150~610	150~610	100~750	100~750
Spindle	Spindle nose taper	rpm	#40	#40	#40	#40	#40
	Spindle speed(DDS)	rpm	10000/12000/15000	10000/12000/15000	10000/12000/15000	10000 /15000	10000 /15000
	Spindle speed(Built-in)	rpm	-	24000	24000	20000	20000
Feed	Cutting feedrate(X/Y/Z)	m/min	20/20/20	20/20/20	20/20/20	20/20/20	20/20/20
	Rapid traverse rate(X/Y/Z)	m/min	36/36/30	36/36/36	36/36/36	36/36/36	36/36/36
	Rapid traverse (B/C-axis)	m/min	25/25	25/25	25/25	-	-
	Rapid traverse (A/C-axis)	m/min	-	-	-	30/50 ; 60/100 (Heidenhain)	60/100
ATC	Capacity	pcs	A : 24 (30 / 40)	A : 24 (30 / 40 / 60)	A : 24 (30 / 40 / 60)	A : 40 (60 / 80 / 120)	A : 40 (60 / 80 / 120)
	Max. tool weight	kg	7	7	7	7	7
	Max. tool size(dia. x length)	mm	75 x 300L	75 x 250L	75 x 250L	75x300L	75x300L
	Tool shank		BT40(BBT40/CAT40/DIN69871)	BT40(BBT/CAT/DIN/HSK A63)	BT40(BBT40/CAT40/DIN) HSK-A63	BT40(BBT40/CAT40/DIN) HSK-A63	BT40(BBT40/CAT40/DIN) HSK-A63
	Pull stub bolt		MAS-P40T-1 (CAT40/DIN69872)	P40T-1 (CAT40 / DIN69872)	MAS-P40T-1/CAT40/DIN69872 HSK-A63	MAS-P40T-1/CAT40/DIN69872 HSK-A63	MAS-P40T-1/CAT40/DIN69872 HSK-A63
Motor	Spindle drive motor (cont./30 min)	kw	7.5/11 opt. 15/18.5	7.5/9.8 opt. 10/12.5 (S6-40%)	7.5/11 opt.15/18.5;7.5/9.8 opt. 10/12.5 (S6-40%,Heidenhain)	7.5/11 opt.15/18.5 7.5/9.8 opt.10/12.5 (S6-60%,Heidenhain)	7.5/9.8 opt.10/12.5 (S6-60%)
Positioning Accuracy	3-axis laser positioning accuracy /full travel, without linear scale(JIS B6330)	mm	±0.006	±0.006	±0.006	±0.006	±0.006
	3-axis repetitive positioning accuracy, without linear scale (JIS B6330)	mm	±0.002	±0.002	±0.002	±0.002	±0.002
	3-axis repetitive positioning accuracy, with linear scale (JIS B6330)	mm	±0.005	±0.005	±0.005	±0.006	±0.006
	3-axis laser positioning accuracy/ full travel, with linear scale(JIS B6330)	mm	±0.002	±0.002	±0.002	±0.002	±0.002
	Positioning accuracy (VDI 3441)	mm	0.01	0.008	0.008	0.012	0.012
Other	Repeatability (VDI 3441)	mm	0.006	0.006	0.006	0.01	0.01
	Required air pressure	kg/cm ²	6.5	6.5	6.5	6.5	6.5
	Electric power requirement	KVA	30~45	22~55	22~55	55~85	55~85
	Machine weight	kg	7000	9000	9000	15000	15000
	Floor space	mm	4114 x 4086	5060 x 5000	5060 x 5000	6340 x 6485	6340 x 6485
	Machine dimension(LxWxH)	mm	2975 x 1995 x 3227	3482 x 2540 x 3061	3482 x 2540 x 3061	4844 x 2800 x 3063	4844 x 2800 x 3063

VDI 3441 accuracy available upon order request

Specification & dimension are subject to change without notice. For actual weight, shipping doc. shall prevail.

Model Identification

F Four (4+1-axis control function)