

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-41 14-5060)		★	★	★	★
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)		-	-	★	★

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Hartford

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We manufacture intelligent machines only

Hartford
EXCLUSIV
HartrolPlus APP

5-Axis Intelligent Machining Center



▲ 5A-40R

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

Facebook



Website



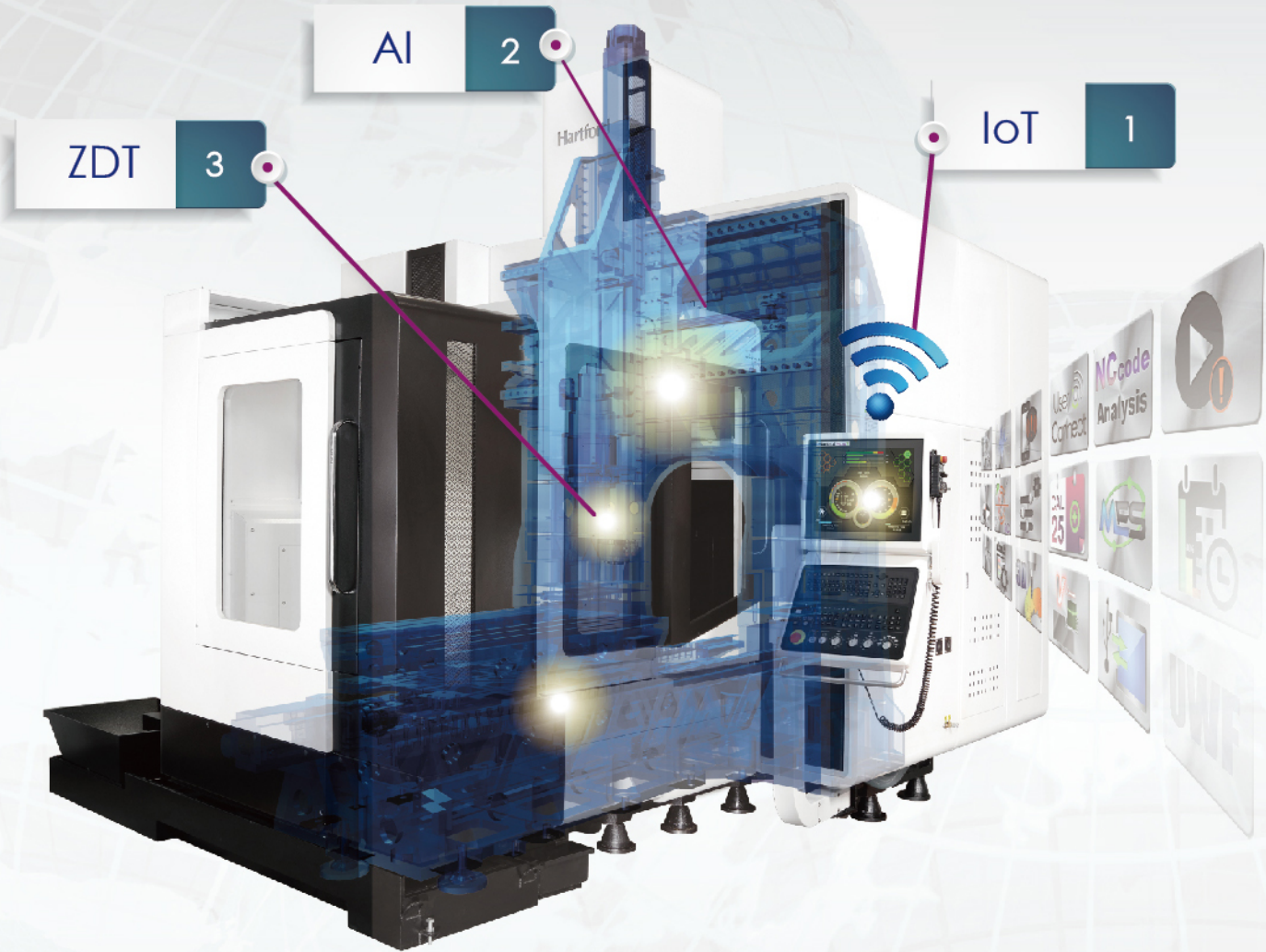
A.I. Applications inside, Hartrol Plus is the control which provides machining status with advanced features.

Imagine what future machines ought to be outlined.

AiSmartcontrol



Hartford
redefine the future



IoT 1

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

AI 2

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

ZDT 3

- + 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

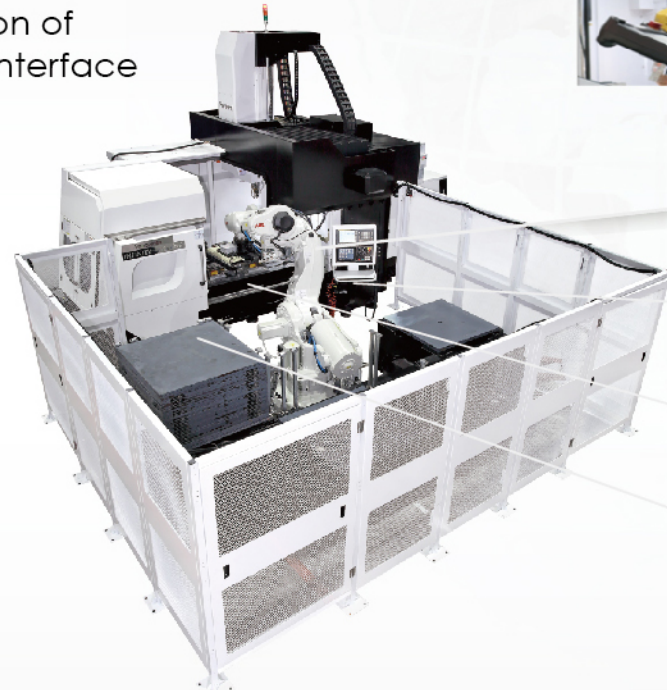
Quality control monitoring

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.

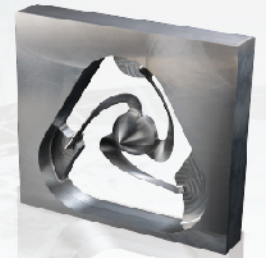
Hartford 5A series is specially designed for simple and complex parts in small lot production, which require high precision 5-axis machining.



1. Tire (for 5-axis controller)



2. Bullet blade (for 5-axis controller)



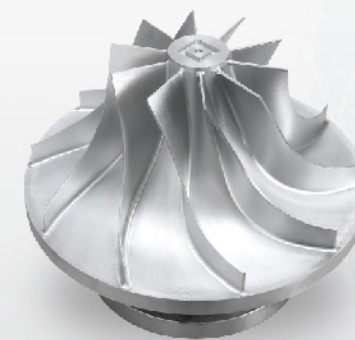
3. Hollow fan (for 5-axis controller)



Generator Blades

- Work piece Size: $\phi 160$ cylinder
- 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



Turbine Blade

- Work piece Size: $\phi 450$ cylinder
- 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

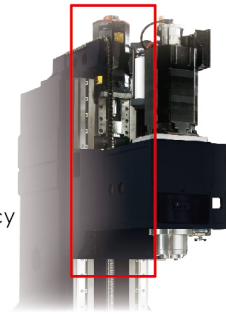
High rigidity structure design on 5A-65E



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

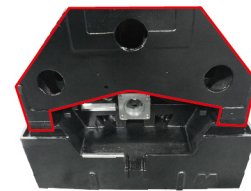
Z-axis servo motor coupled directly to ballscrew

- 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.



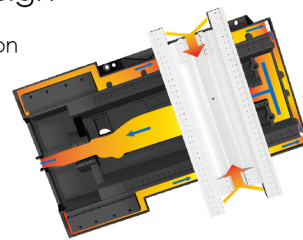
Overized column & widest base design

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



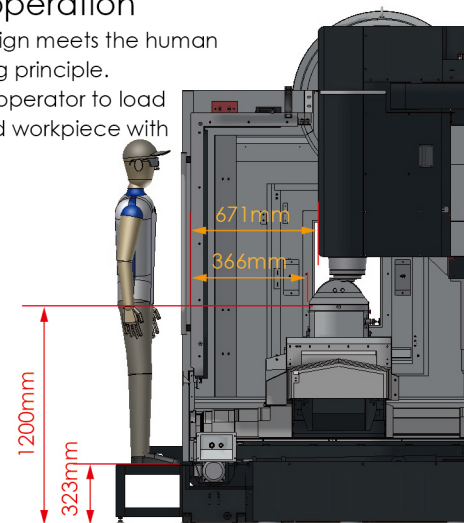
One-piece bed design

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

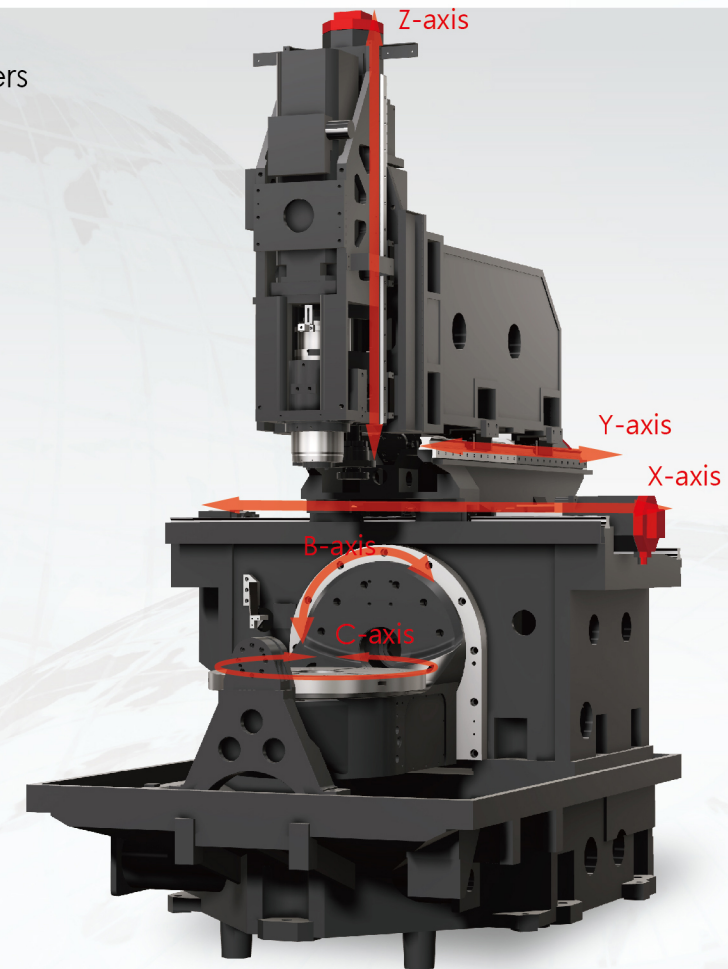


Easy for operation

- 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 conditions
1. Improper operation (collision)
 2. Lack of regular cleaning of accumulated debris causing damage to the linear rails & carriages.



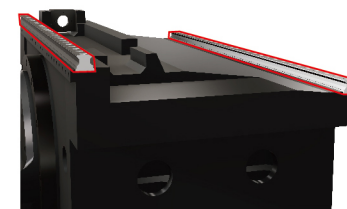
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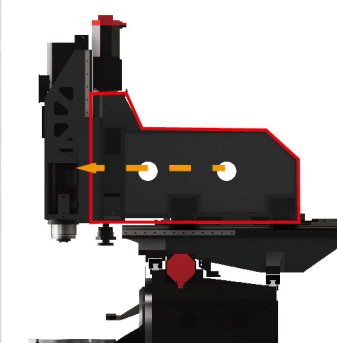
X-axis guide ways are set on stepped bed

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



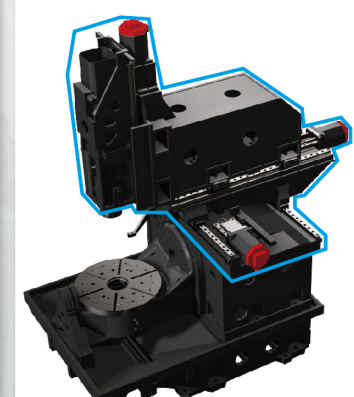
Full-support design on Y-axis

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



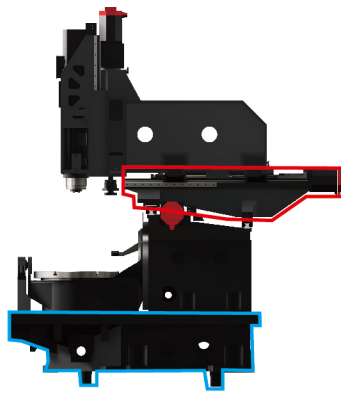
Overlap design on 3-axis

- 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.



Spindles Manufactured by Hartford Offer Quality Assurance

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).

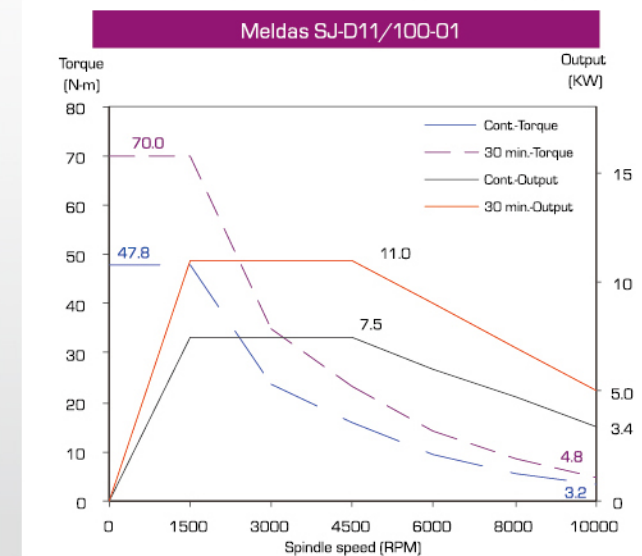
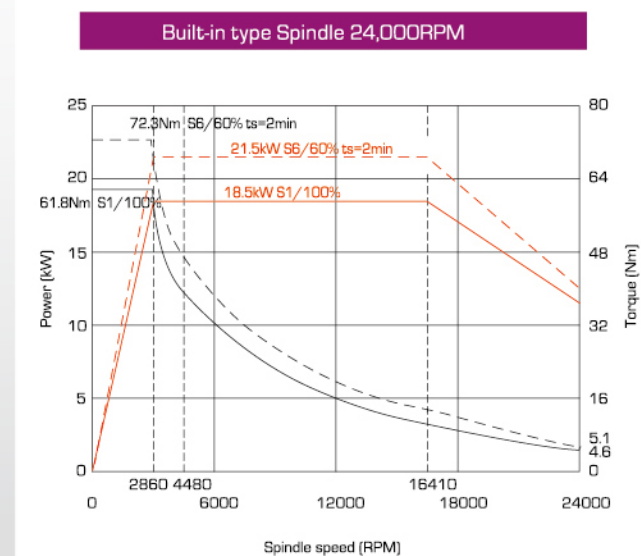
Built-in type spindle 24K #40 Built-in spindle

Max. speed: 24,000 rpm

i-Tech:

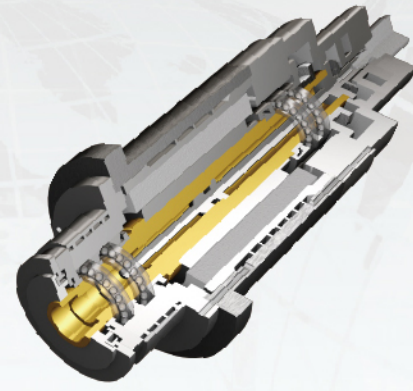
- i-Compensation: Spindle thermal extension can be adjusted to within 0.02mm.
- i-Diagnosis: This technique can help you predict the life of spindle bearing in advance.
- i-Balance: Spindle shaft design with coolant system so that the spindle temperature evaluated problem can be reduced 50%.
- i-Protection: 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



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



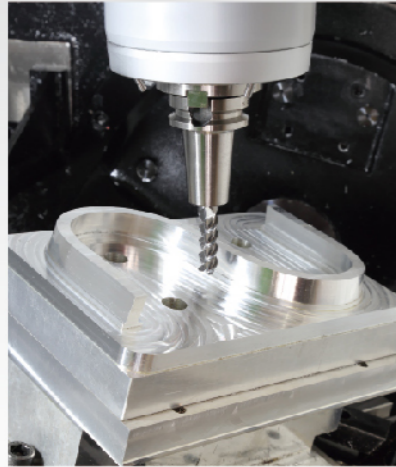
By the high accuracy of contour.

Tool center point check



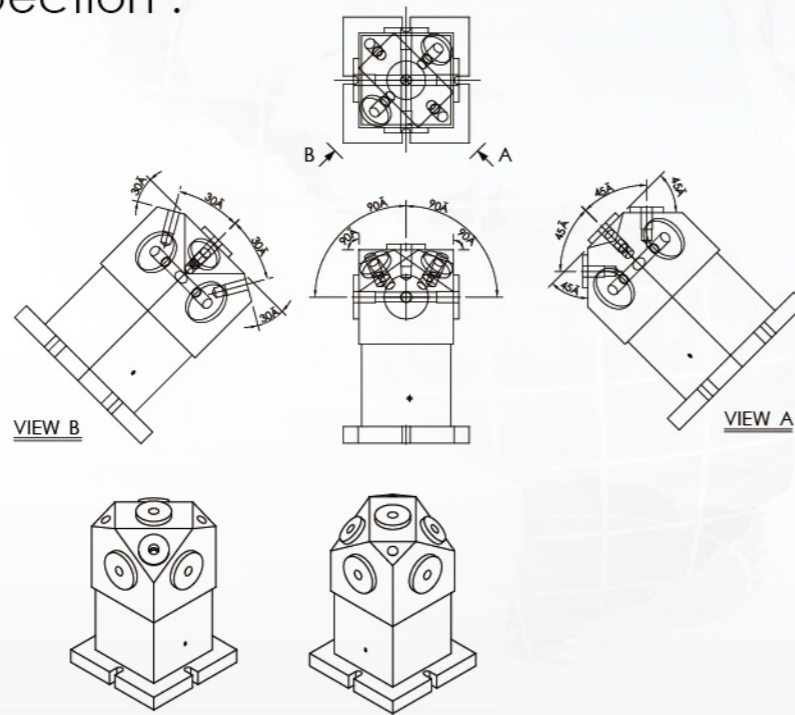
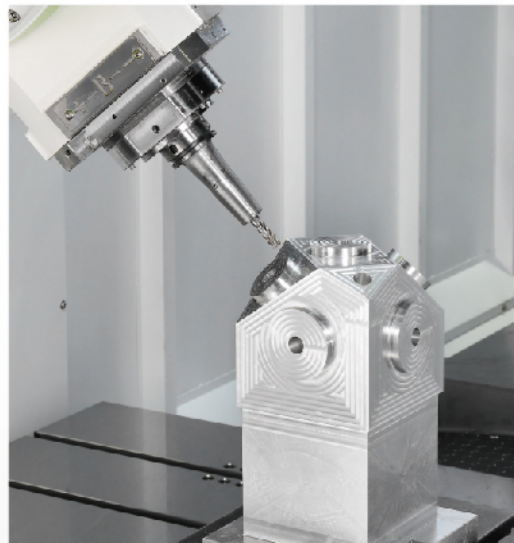
Tool center point in 5-axis (X,Y,Z,B,C) positions accurately.

5-axis accuracy test : S-CUT



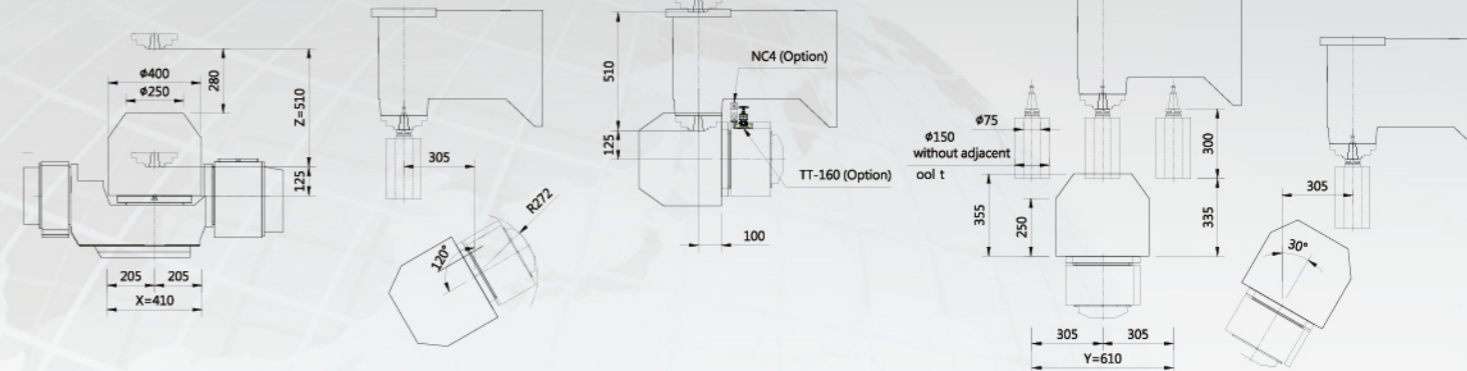
Item	Test Item	Tolerance	Test Results
1	Multi-faces simultaneous (Finish/smooth)	RA3.2 Rmax12.5	RA2.0 Rmax12.5
2	Profile accuracy	±0.1mm	0.085mm
3	Thickness accuracy of 5-axis simultaneous	±0.1mm	0.063mm
4	commutation grain	No cutting stepping grain	No cutting stepping grain

Five axis accuracy inspection : 9 faces measurement.

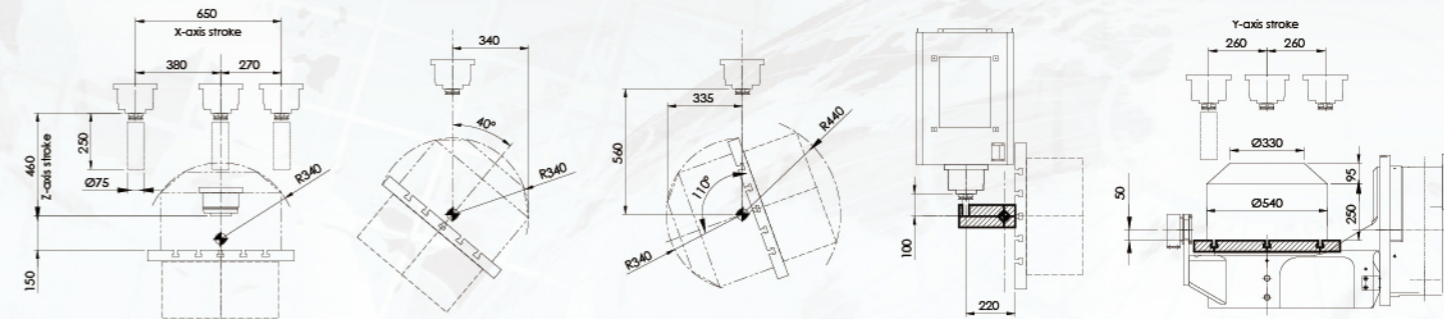


Item	Test Item	Tolerance	Test Results
1	Reference surface P relative face A, B, C, D (90 degree) of angle error.	±0.1mm	0.0036
2	Reference surface P relative face E, F (45 degree) of angle error.		0.0036
3	Reference surface P relative face G, H (30 degree) of angle error.		0.0044
4	Reference hole P relative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

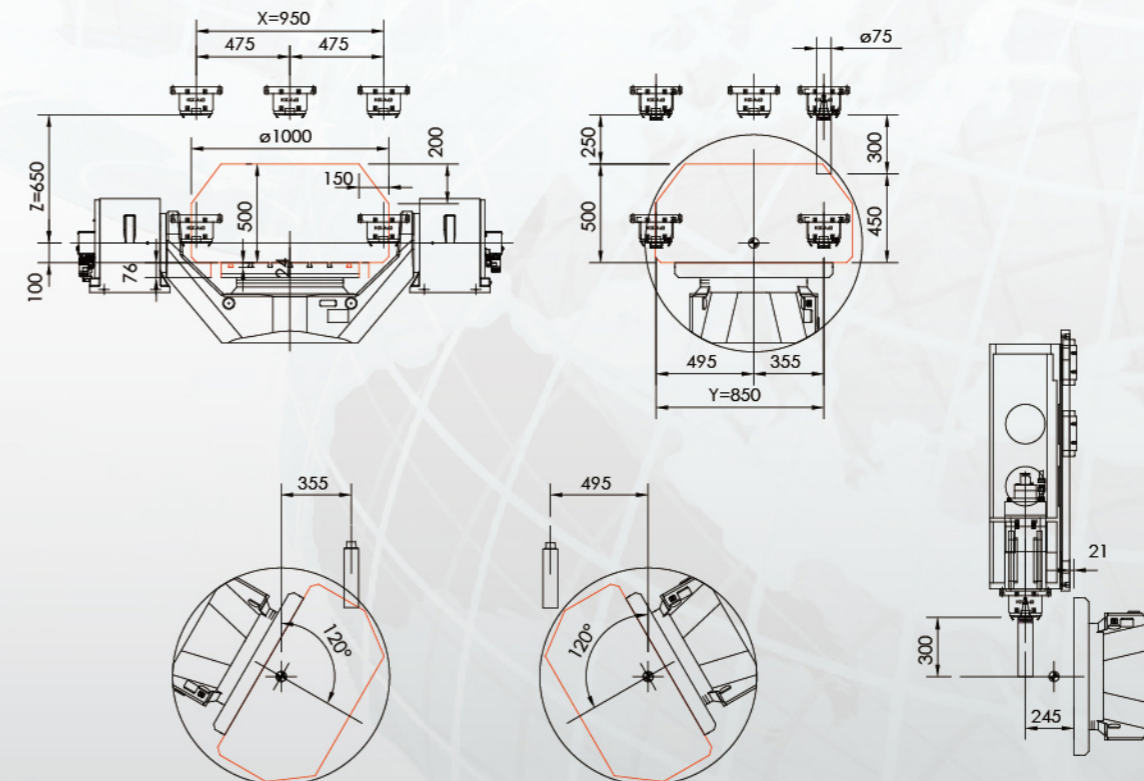
5A-40R



5A-65E



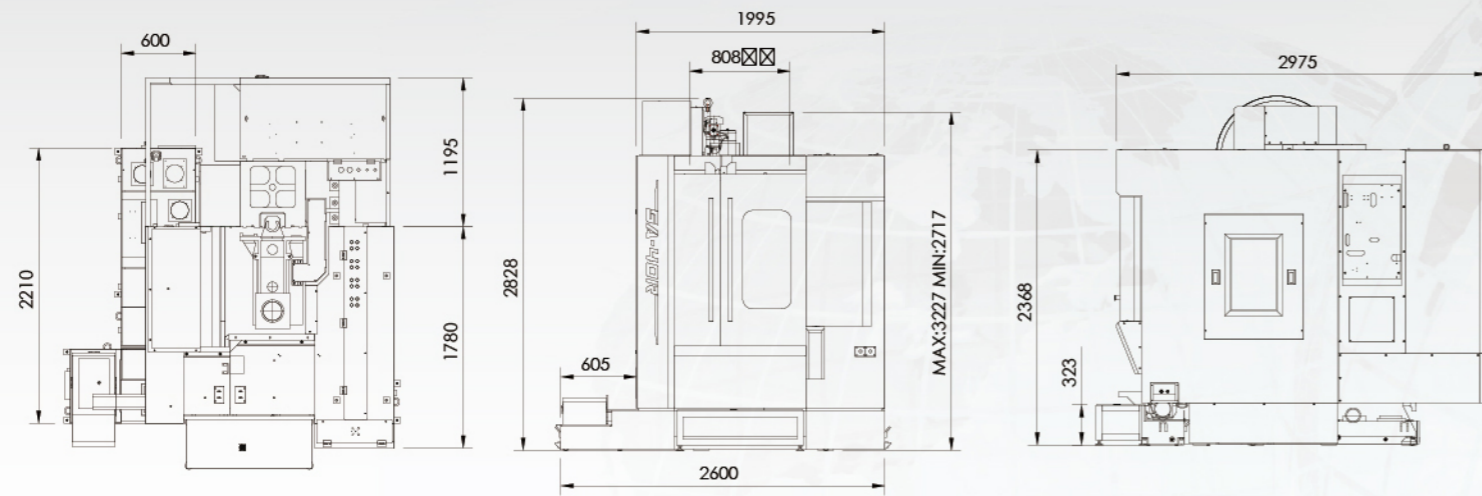
5A-95Q/5X



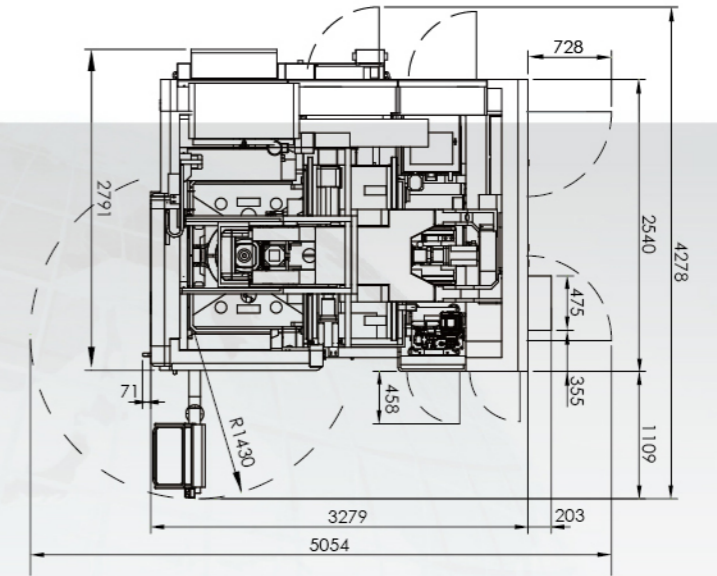
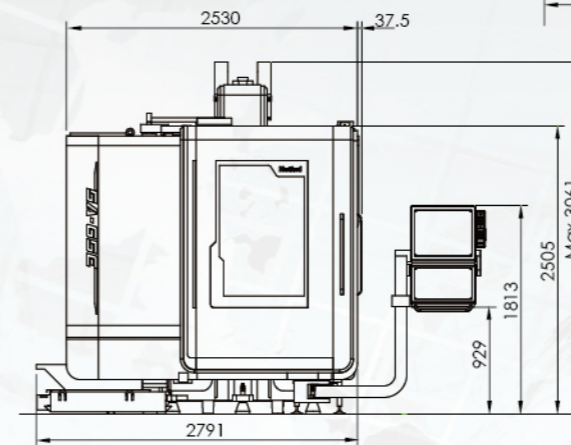
UNIT : mm

Machine Dimension

5A-40R

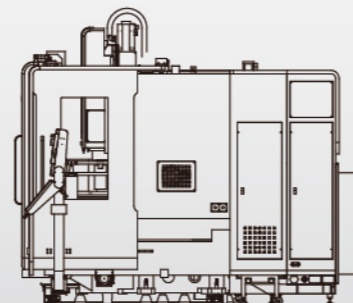
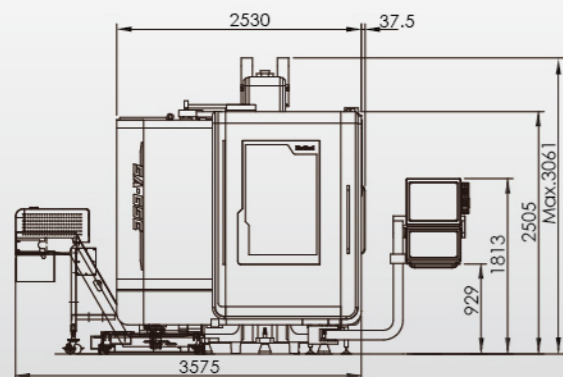
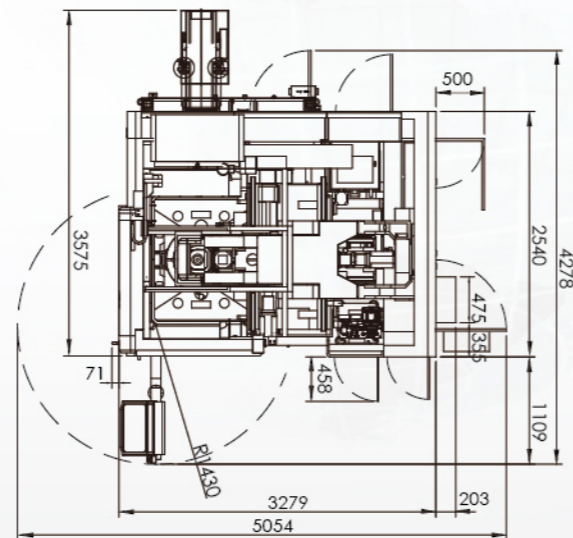


5A-65E

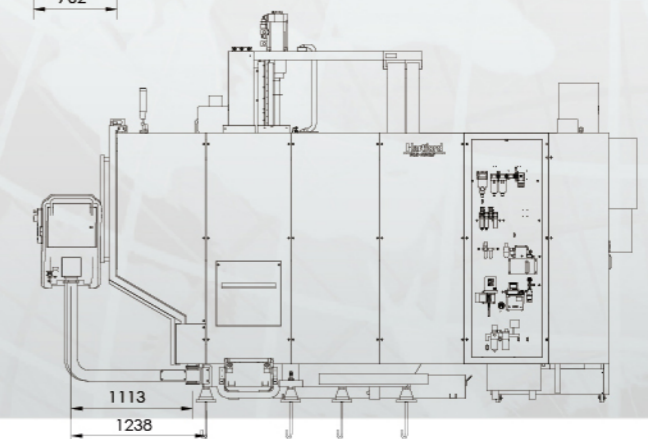
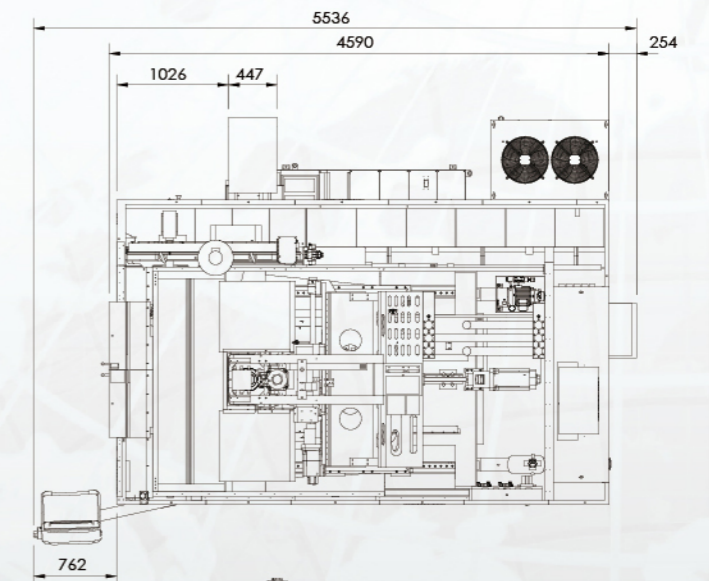
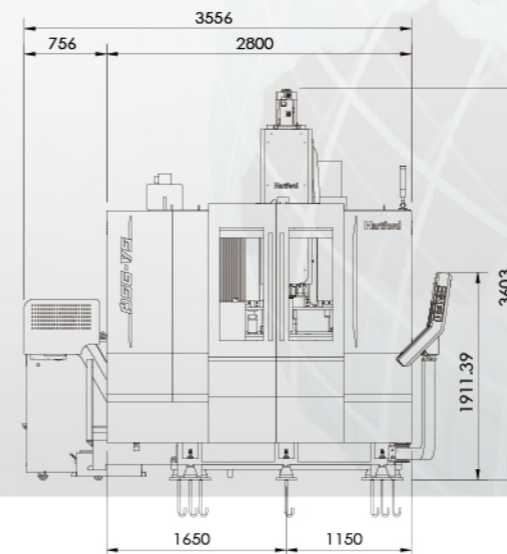


5A-65E

* Machine with link type chip conveyor



5A-95Q/5X



Specification

Model	Unit	5A-40R	5A-65E	5A-65EF	5A-95Q/5X		
Table	Working Surface	mm	Ø320	Ø650	Ø800		
	T-slot (Size x Number x Pitch)	mm	12H7	18x6x60°	18x6x60°	14x7x100	
	Max Table Load	kg	Horizontal : 200 Tilting : 100	500	500	850	
Travel	Longitudinal Travel (X-axis)	mm	410	650	650	950	
	Gross Travel (Y-axis)	mm	610	520	520	850	
	Vertical Travel (Z-axis)	mm	510	460	460	650	
	Tilting travel (A-axis)	mm	+30° ~ -120°	-	-	±120°	
	Corss travel (B-axis)	mm	-	+110°~-40°	+110°~-40°	-	
	Vertical travel (C-axis)	mm	±360°	360°	360°	360°	
	Distance From Spindle End to Table Center	mm	125~635	150~610	150~610	100~750	
Spindle	Spindle Nose Tape		ISO40	ISO40, HSK-A63(24K only)	ISO40, HSK-A63		
	Spindle Speed (DDS)	rpm	12000 (10000/15000 opt.)	#40 10000 (12000/15000 opt.)	#40 10000 (12000/15000 opt.)	#40 10000 10000(15000/20000opt.)	
	Spindle Speed (Built-in)	rpm	-	#40 opt. 24000	#40 opt. 24000	opt. 20000	
Feed	Cutting feedrate(X/Y/Z Axes)	m/min	20 / 20 / 20	20 / 20 / 20	20 / 20 / 20	20 / 20 / 20	
	Cutting feedrate(A/B/C Axes)	m/min	25 / - / 25	- / 25 / 25	- / 25 / 25	60 / - / 100	
	Rapid Traverse feedrate (X/Y/Z Axes)	m/min	36 / 36 / 30	36 / 36 / 36	36 / 36 / 36	36 / 36 / 36	
	Rapid Traverse feedrate (A/B/C Axes)	m/min	25 / - / 25	- / 25 / 25	- / 25 / 25	60 / - / 100	
ATC	Tool Storage Capacity	pcs	24(30/40 opt.)	24/30/40/60	24/30/40/60	40(60/80/120 opt.)	
	Max. Tool Weight	kg	7	7	7	7	
	Max. Tool Size (Diameter x Length)	mm	Ø75x300L	Ø75x250L Ø60x250L(24k)	Ø75x250L Ø60x250L(24k)	Ø75x300L	
	Tool Shank		BT40(BBT40/CAT40/DIN69871)	ISO40/HSK-A63	ISO40/HSK-A63	ISO40/HSK-A63	
	Pull Stud Bolt		MAS-P40T-1/CAT40/DIN69872	#40 MAS-P40-1/ CAT-40/DIN69872	#40 MAS-P40-1/ CAT-40/DIN69872		
Motor	Spindle Drive Motor(30min)	Mitsubishi	kW	11/18.5	-	-	
		Fanuc	kW	11/18.5	-	-	
		Heidenhain TNC 640	kW	12.5/20	12.5	12.5	12.5/23.5
	X/Y/Z axis drive motor	Mitsubishi	kW	2/3.5/4.5	-	3.5/ 3.5/ 3.5	-
		Fanuc	kW	3/4/7	-	4 / 4 / 4	-
		Heidenhain TNC 640	kW	3.1/4.5/5.4	5.1 / 4.5 / 5.4	5.1 / 4.5 / 5.4	6.5/8.9/8.6
	A/C axis drive motor	Mitsubishi	kW	2.2/1	-	-	-
		Fanuc	kW	1.8/1.2	-	-	-
		Heidenhain TNC 640	kW	2.38/1.67	-	-	19.2/4.5
	B/C axis drive motor	Mitsubishi	kW	-	-	7 / 3.5	-
		Fanuc	kW	-	-	6 / 3	-
		Heidenhain TNC 640	kW	-	8.6 / 4.5	8.6 / 4.5	-
Positioning Accuracy	3 axes laser positioning accuracy (JIS B6338)						
	Positioning accuracy/Full travel	mm	±0.006	±0.006	±0.006	±0.006	
	Repetitive positioning accuracy	mm	±0.002	±0.002	±0.002	±0.002	
	3 axes laser positioning accuracy (VDI 3441)/Repeated 5 times						
	Positioning accuracy	mm	0.01	0.008	0.008	0.012	
Repetitive positioning accuracy	mm	0.006	0.006	0.006	0.010		
Accuracy	Positioning (with angle encoder)	A axis	sec	15	-	12	
		B axis	sec	-	15	15	
		C axis	sec	15	15	15	
	Repeatability (with angle encoder)	A axis	sec	10	-	6	
		B axis	sec	-	8	8	
		C axis	sec	10	8	8	
Other	Required Air Pressure	kg/cm ²	6.5	6.5	6.5	6.5	
	Electric Power Consumption	KVA	30~45	25~55	25~55	55~85	
	Floor Space(Full Guarding)	mm	1995x2975	2530x3553	2530x3553	2800x5536	
	Net Weight	kg	7000	9000	9000	15000	
	Coolant capacity(Standard)	L	290	210	210	300	

Model Identification
F Four (4+1-axis control function)