

5A Series Smartcenter

Intelligent 5-axis high accuracy
machining center

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



Website



Facebook



Hartford has sold more than 50,000 machines to all over the world, accumulated more than 37,000 customers, who absolutely affirm Hartford's manufacturing experience and ingenious machine manufacture technology. We insist on providing customers with the best quality machining centers. We will devote more carefully, in order to continuously enhance the technical level of manufacture and applications.

She Hong INDUSTRIAL CO. LTD.

No.3, Jingke N. Rd., Nantung District, Taichung City, 40852 Taiwan(R.O.C)
www.hartford.com TEL : +886-4-23501980 FAX : +886-4-23581793

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Hartford

Hartrol • Smartcenter • Robocell

We manufacture intelligent machines only

What is Smartcenter?

Smartcenter is Smart machine center, an intelligent machine if put it in a simple way.

A Hartford Smartcenter has to include

1. Intelligent operating interface
2. Intelligent machining: Machining accuracy/ surface accuracy/ self learning / self optimizing
3. Intelligent quality control: Auto compensation for machining accuracy
4. Intelligent maintenance program : Active notification/ Active machine down time schedule also include other intelligent functions, help user reaching the target of Zero Down Time.

The benefits of Hartford smartcenter

- + Intelligent management : Fully aware of the machining status
- + Fully aware of the status of the machine key components.
- + Improving of the machine efficiency
- + Crash protection – Stop the machine immediately to prevent the further damage when alarm occurred .

Hartford Smartcenter will help you become an intelligent manager

The main technologies of Hartford smartcenter include intelligent managing system, status monitoring, alarm predicting, machine status diagnosis, crash preventing, 3D program simulation, machining efficiency improving...etc.

All the intelligent functions help you control the machine status and assure the job quality.



The Ultimate In Speed, Productivity And Versatility

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)

NCG-2005 5-axis Accuracy Testing

- Workpiece name NCG2005
- Workpiece material Necuron 1007
- Workpiece size 75x105x50 mm
- Workpiece fixed angle 0° & 30°
- Cycle time 12 min
- Tool Ø6 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.

Tool center point check



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

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.

NAS-979 Inspection Cutting report

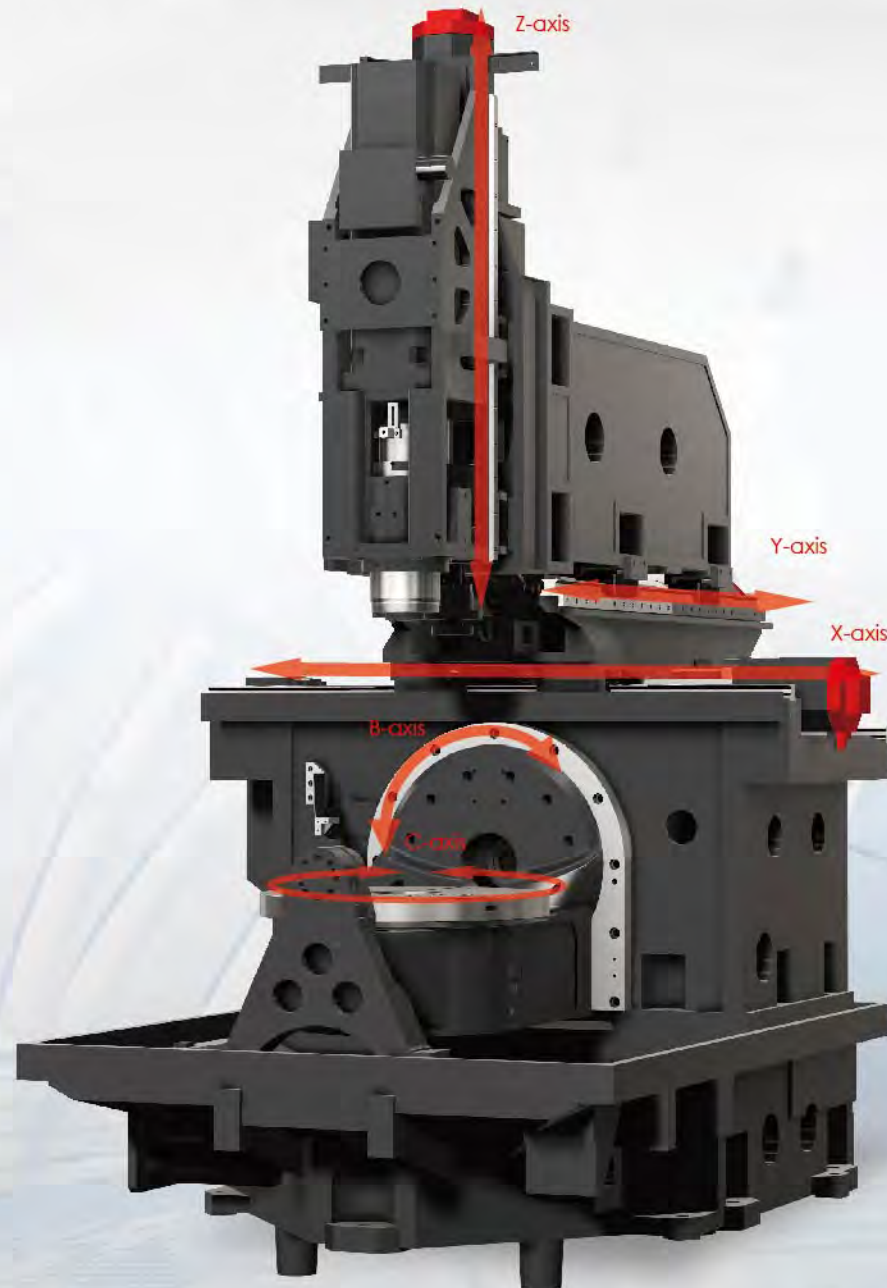
	Tolerance	Test results
Inclination angle	$\angle 15^\circ (\pm 1^\circ / 20'')$	15.0007°
Roundness	0.05	0.008

Unit: : mm



High rigidity structure design on 5A-65E

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



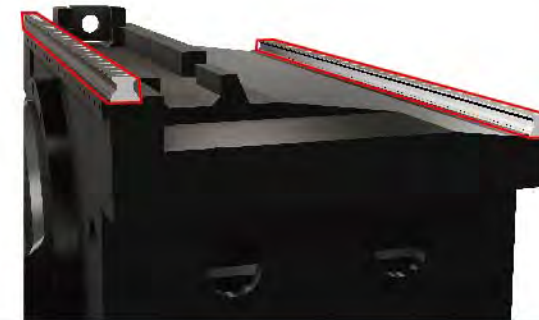
Full range of linear guideway five-year warranty:

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.

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



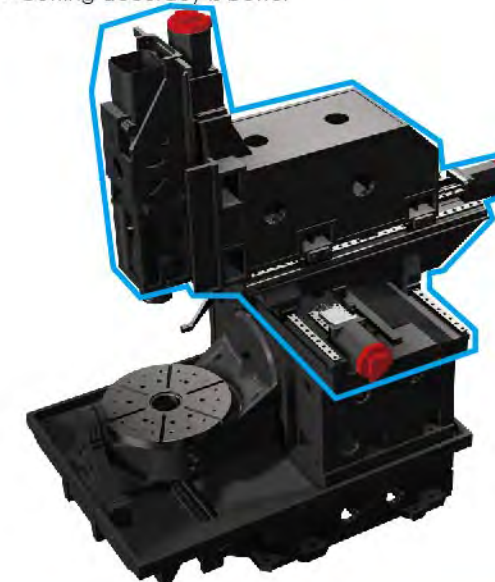
Full-support design on Y-axis

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



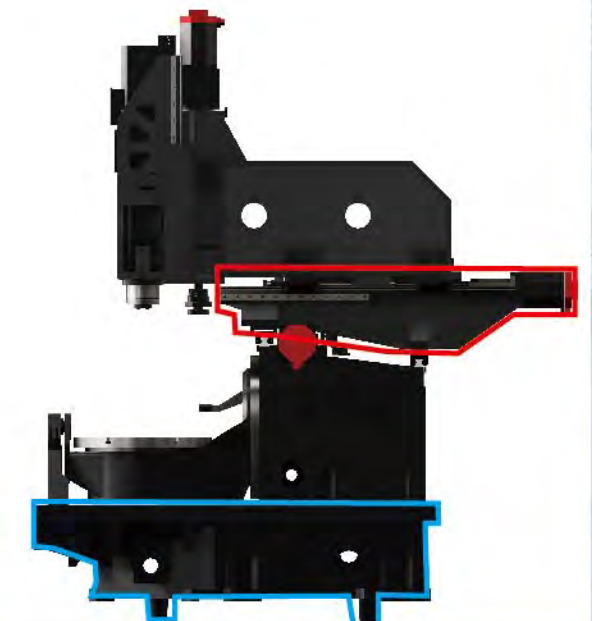
Overlap design on 3-axis

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



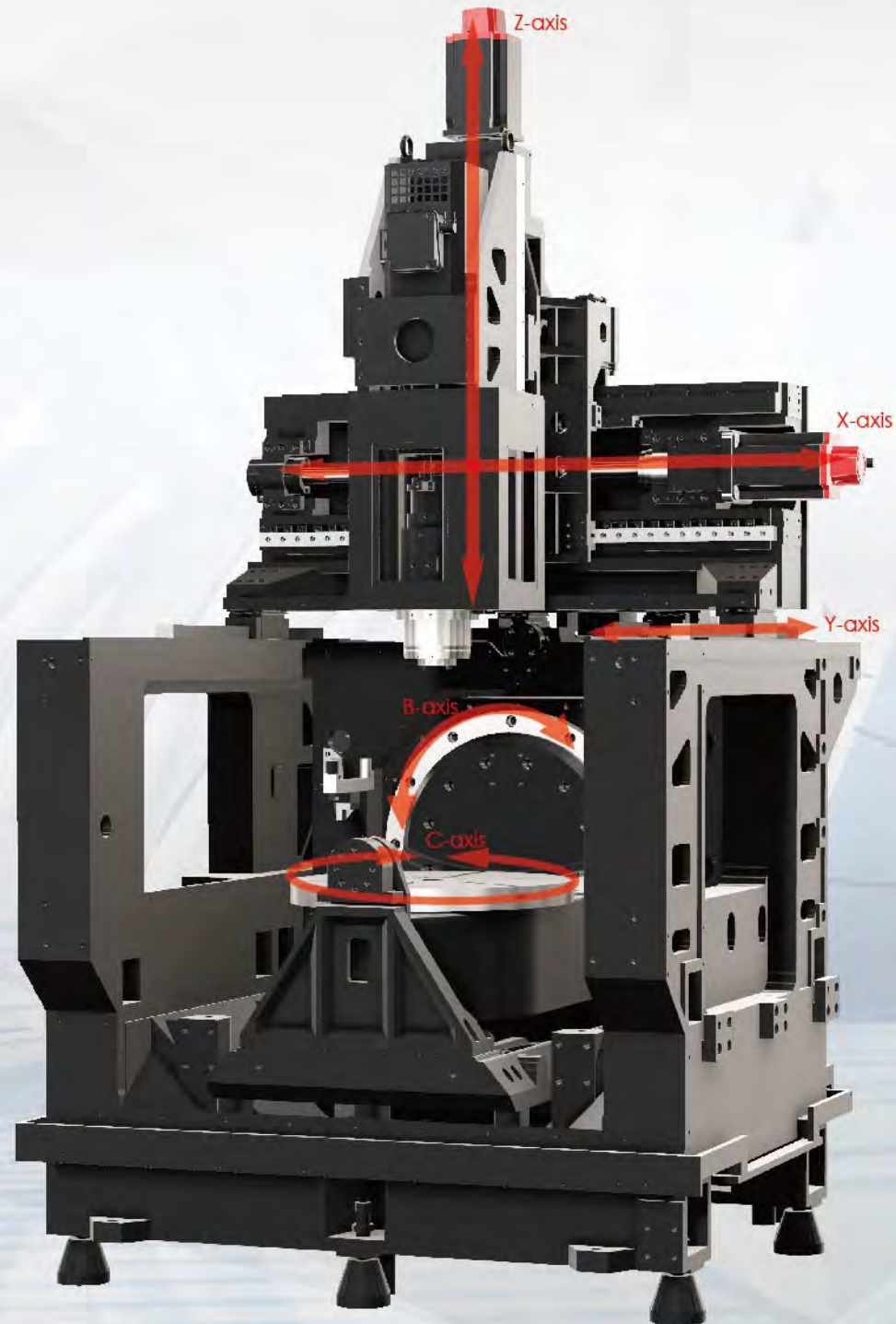
Oversized design on base

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



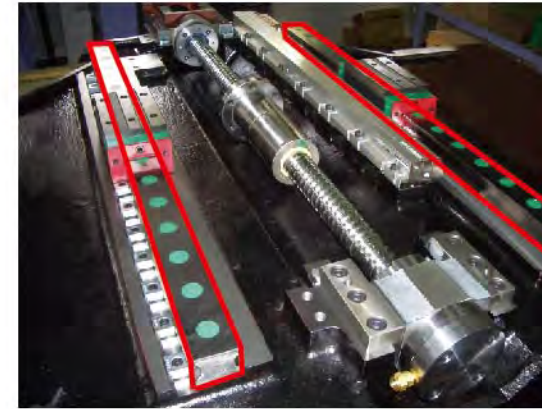
5A-650(F) Optimal Rigid Design Construction

The gantry type construction provides a solid support for 5A-650(F).



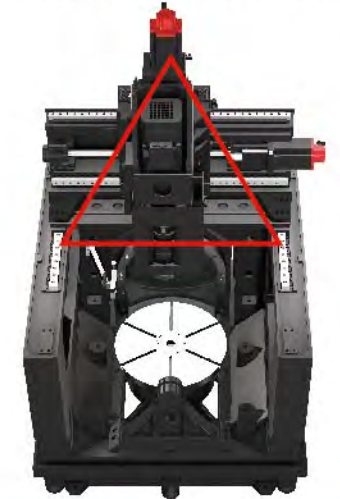
Roller type linear guideways on 3-axis

- This makes high accuracy, heavy load resistance and long lifespan possible.
- Average rigidity increased by **40%**
- Applicable on all 5A series.



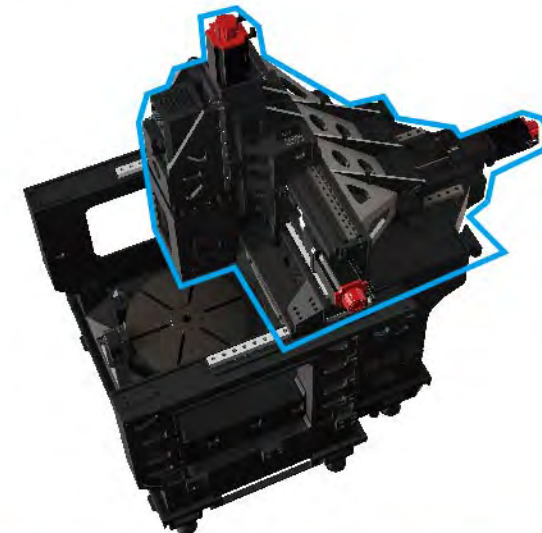
Four linear guideways on Y-axis with drive through gravity

- The crossbeam is supported by four linear guideways.
- Triangular gravity movement design on 3-axis overlap structure
- Enhances stable and dependable moving rigidity.



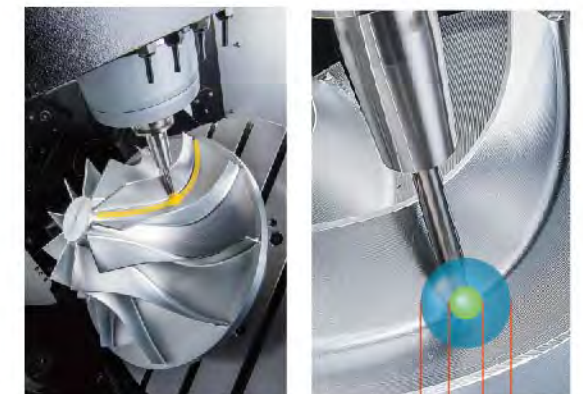
3-axis overlap design

- Workpiece does not move with three-axis (4th/5th axes are fixed at the base)
- The impact on 3-axis positioning accuracy is minimized.
- Short throat depth of spindle ensures stable cutting accuracy



5-axis dynamic accuracy

- During 5-axis simultaneous motions, any tool edge deviations will be within the tolerance range of **36 um**
- Competitors' deviation is within 100 um.
- Measuring equipment: R-test
- For 5-axis controller only



36um
>100um

5A-600T(F)/5A-800T(F) , Latest Advances In Structure Design

Gantry type construction delivers higher stability for 5A-600T(F) and 5A-800T(F).

Great span on Y-axis linear guideway

- Machine structural rigidity is increased.
- Average rigidity increased by **64%** on the three axes.

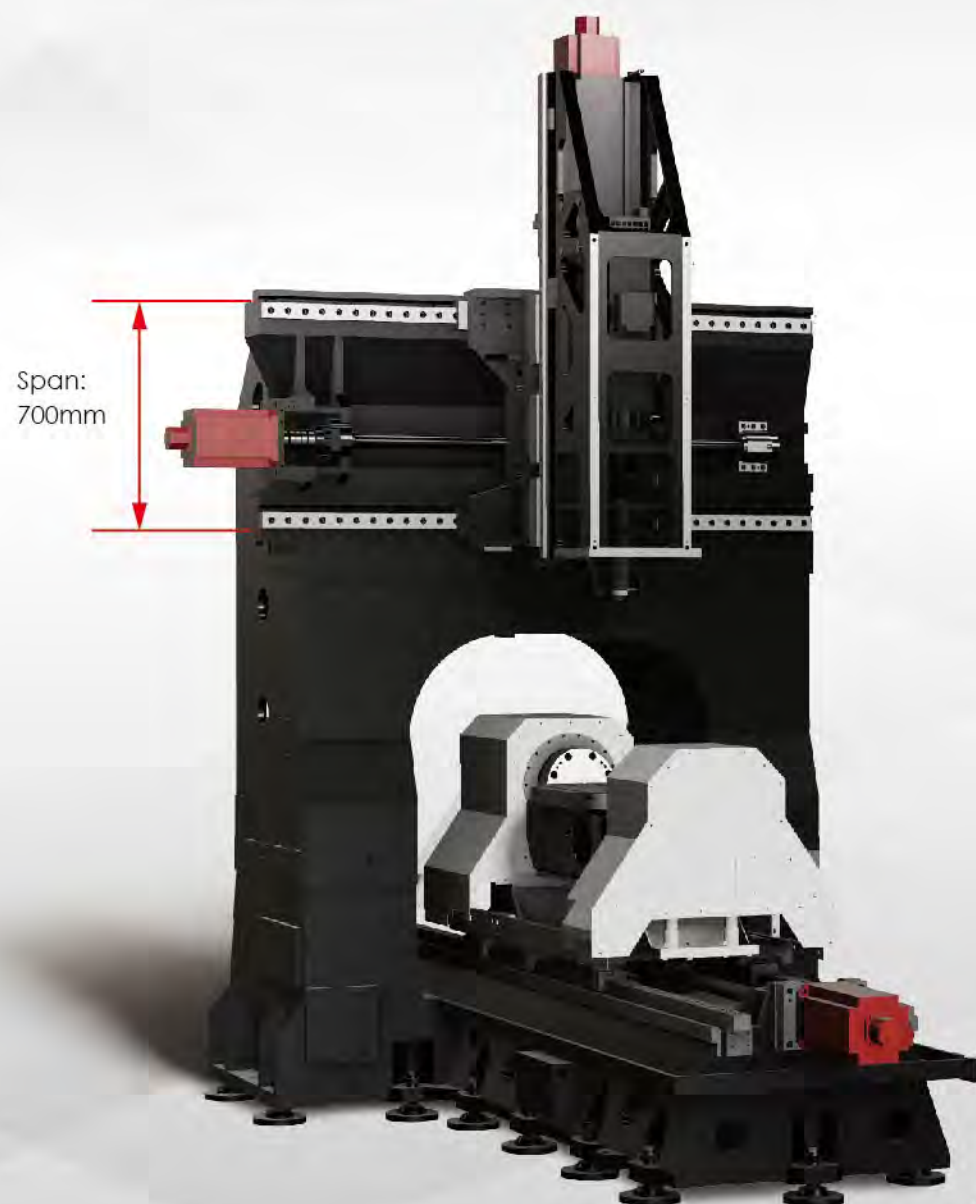
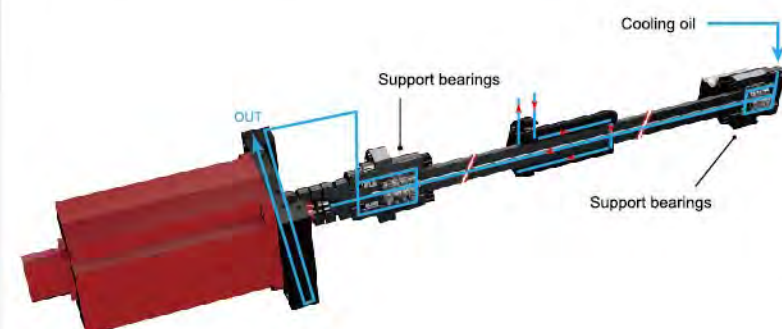


Photo shows 5A-600T



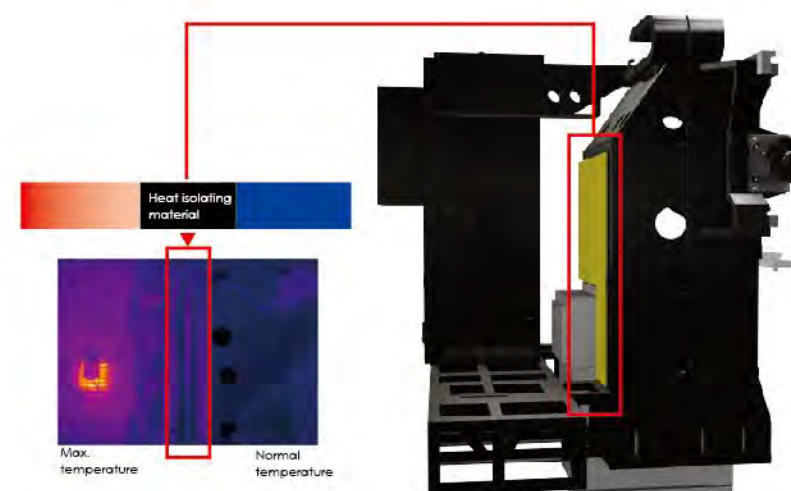
Bearing housing stop pin

- Bearing housing with stop pin design.
- Increases machine transmission rigidity.
- Axis rigidity is increased by **14%**



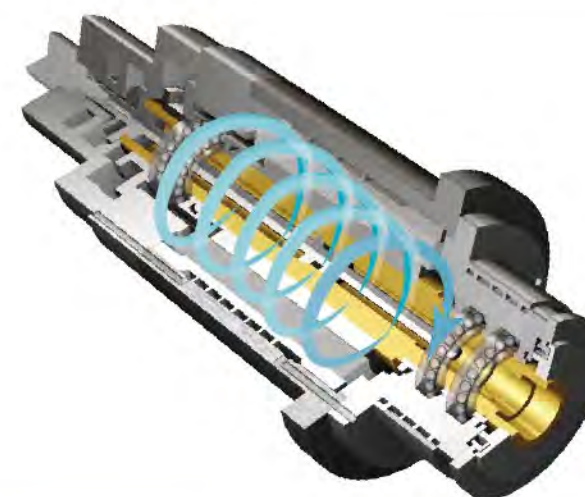
Thermal growth control on 3-axis (opt.)

- The parts in 3-axis feeds, such as the motor base, ballscrews, nuts and bearings are completely cooled.
- Removes thermal deformation while ensuring the positioning accuracy of the machine.
- Machine dynamic rigidity is increased.
- Axis accuracy increased by **15%**
- Features may vary by models, please check with sales window.



Thermal symmetry and heat isolation

- Heat isolating material is added between machine crossbeam and cabinet.
- Ensures machine accuracy.
- Thermal deformation problem can be prevented.
- Crossbeam thermal growth is reduced by **13%**



Built-in 24,000 spindle shaft with cooling system

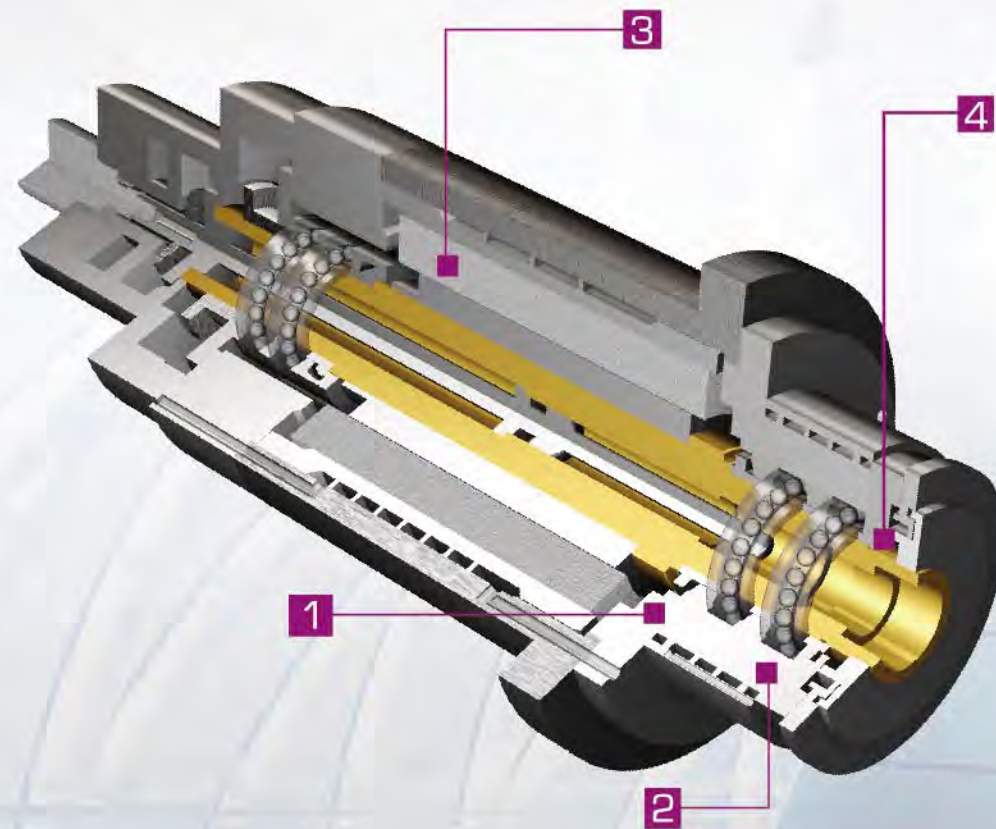
- It's small size, light, low noise and low vibration, available for all controllers.
- Intelligent spindle is optional.
- Spindle thermal deformation is decreased by **50%**

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.

Smart functions for high speed 24,000rpm spindle(opt.)

The spindle is available to integrate various smart functions such as i-Diagnosis, i-Compensation, i-Balance and i-Protection which provide safety protection of the spindle, increase the spindle accuracy and reduce down time.



1. i-Diagnosis

The spindle bearings may be accidentally damaged due to fatigue resulting from long time usage. With the use of early warning diagnosis technology, bearing life can be predicted. The function may avoid customer's loss due to accidental stopping.

2. i-Compensation

The high speed spindle may generate heat resulting in thermal displacement. A displacement tester can be applied for compensation of thermal elongation, so as to upgrade the spindle accuracy.

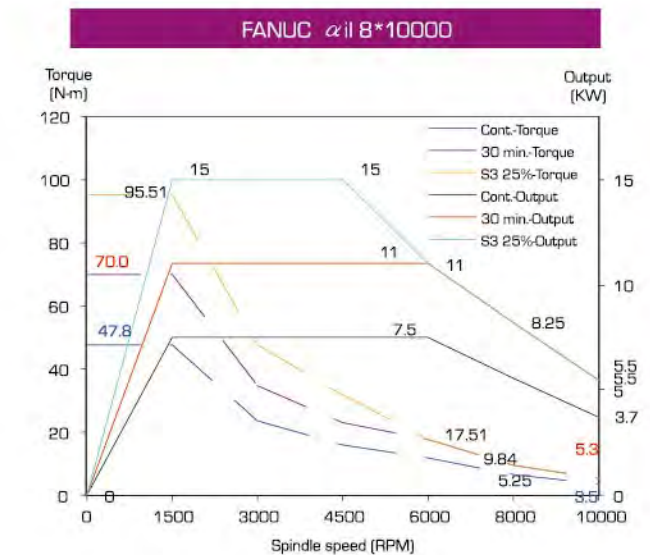
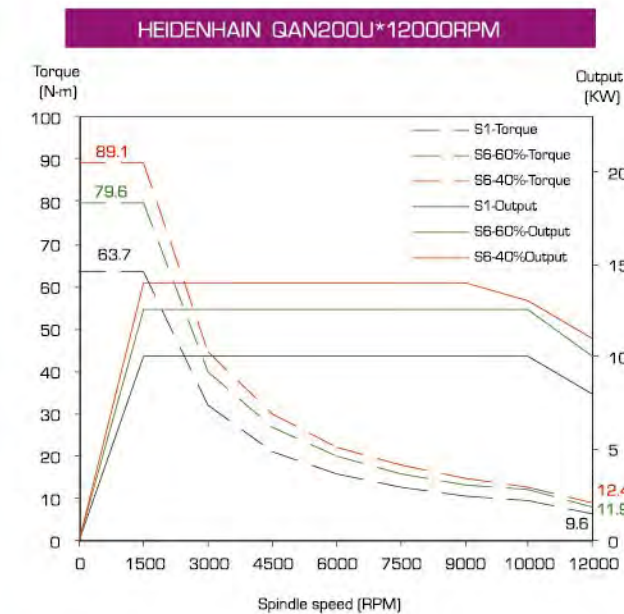
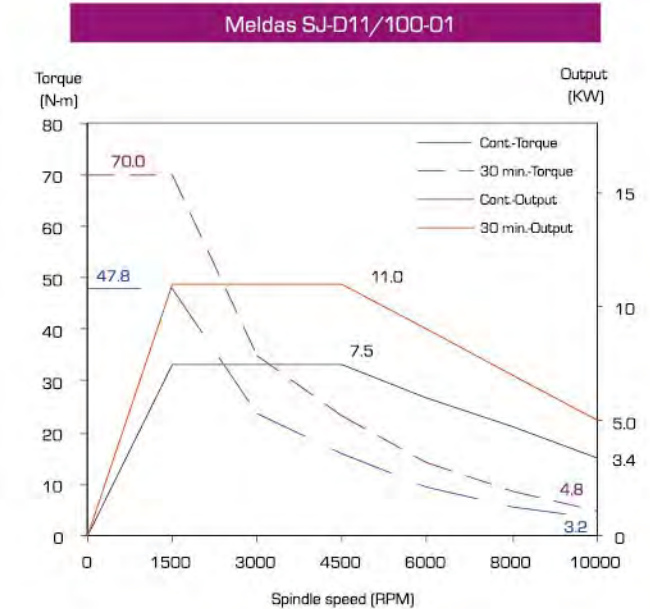
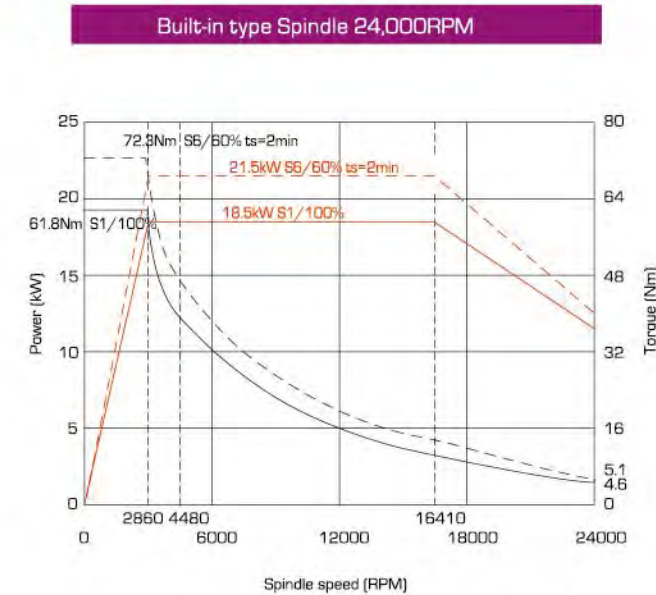
3. i-Balance

A conventional spindle is designed with only external circulated cooling, however the Hartford spindle is available to add internal spindle cooling for better thermal balance. This ensures high machining accuracy of the spindle at all time.

4. i-Protection

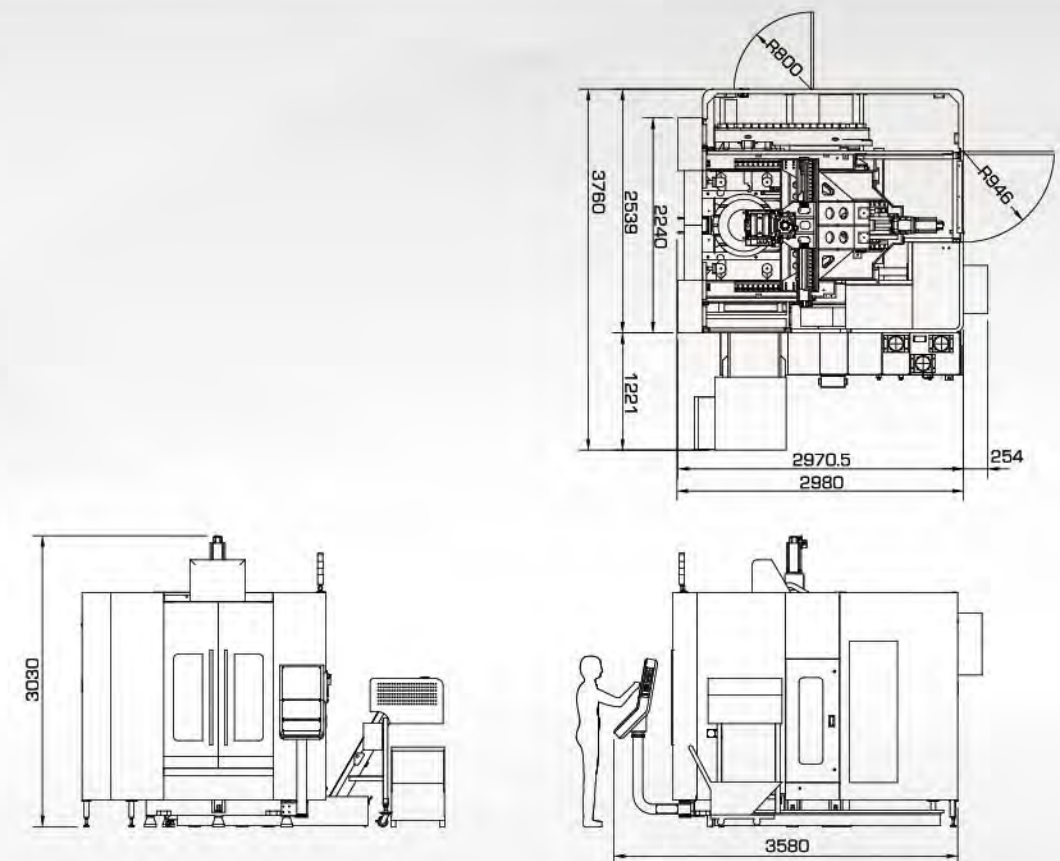
In case of spindle overload or cooling during cutting an alarm will display to alert the operator. This function gives safety protection for the spindle.

Spindle diagram

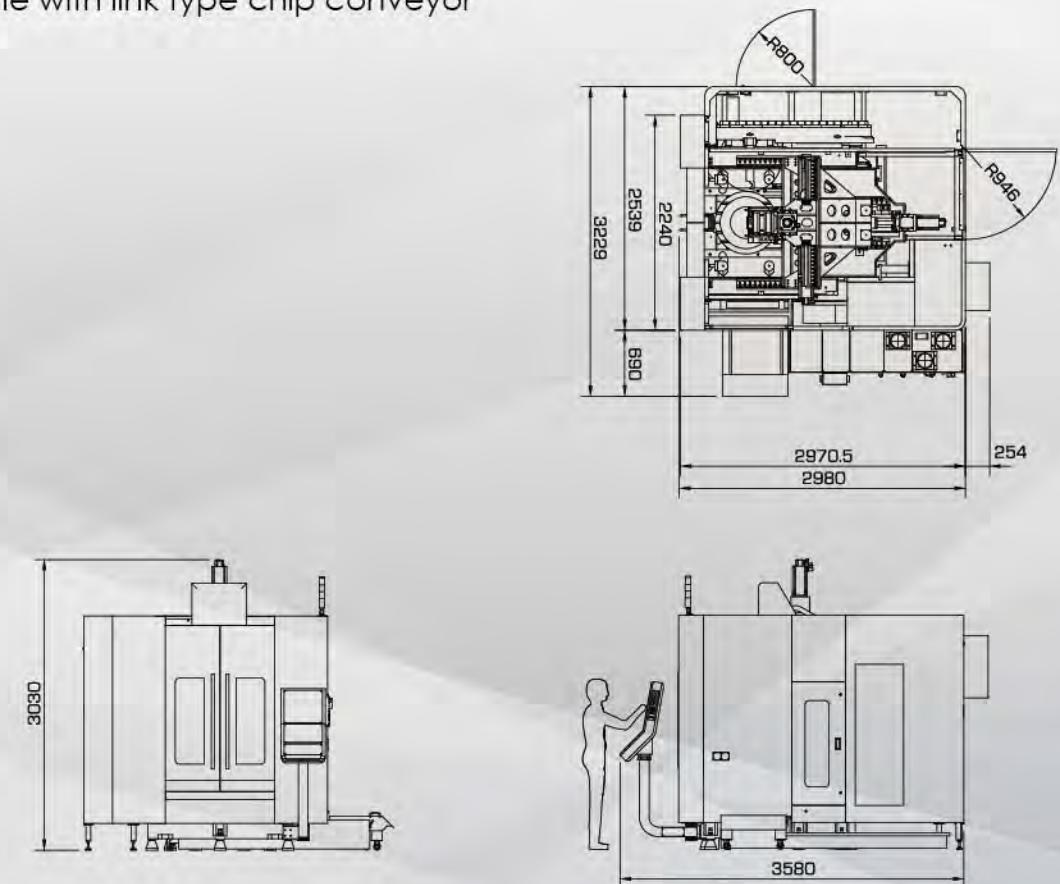


Machine Dimension

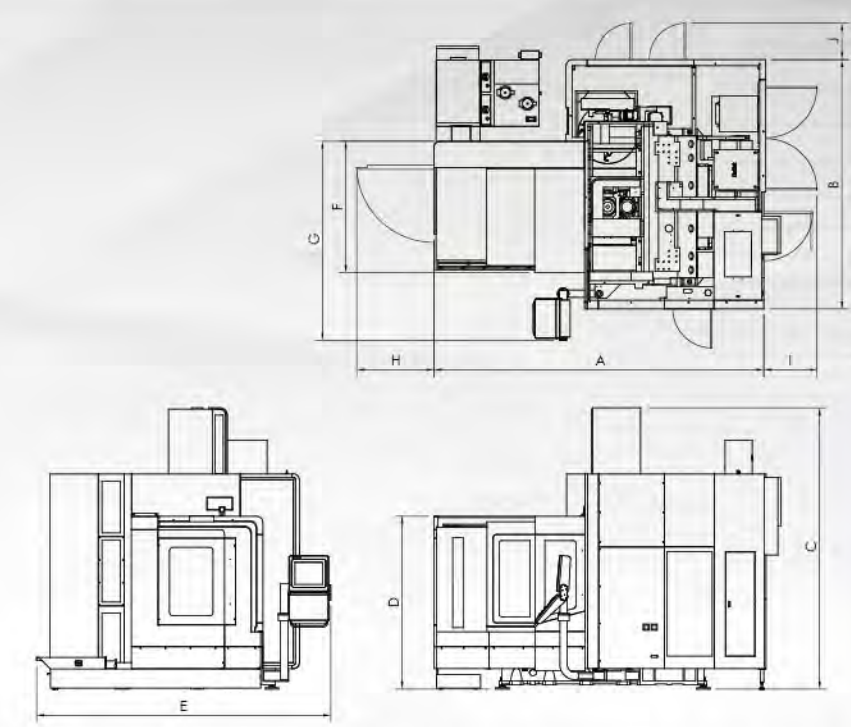
5A-650(F)



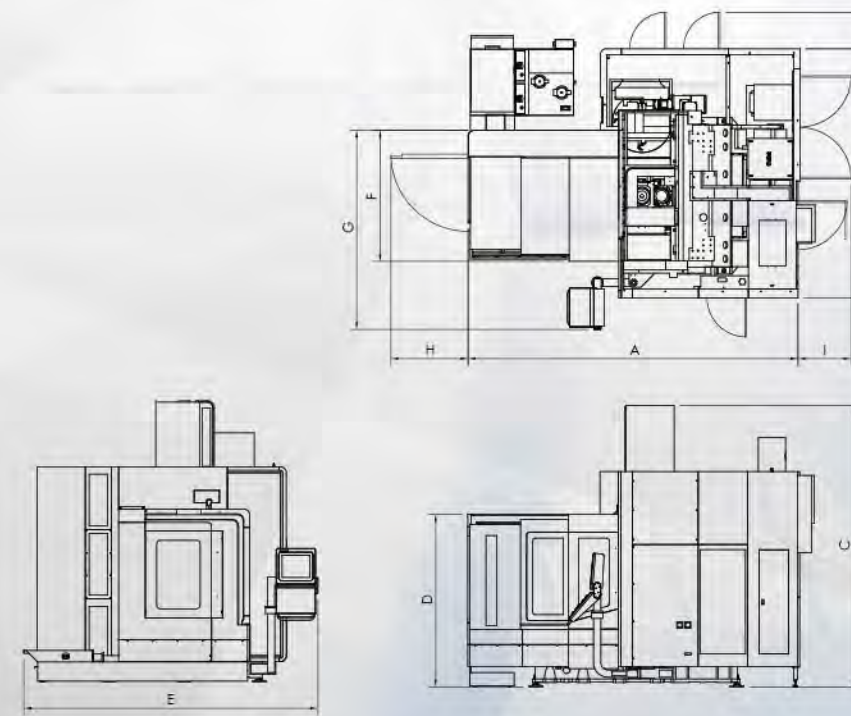
* Machine with link type chip conveyor



5A-600T(F)/800T(F)



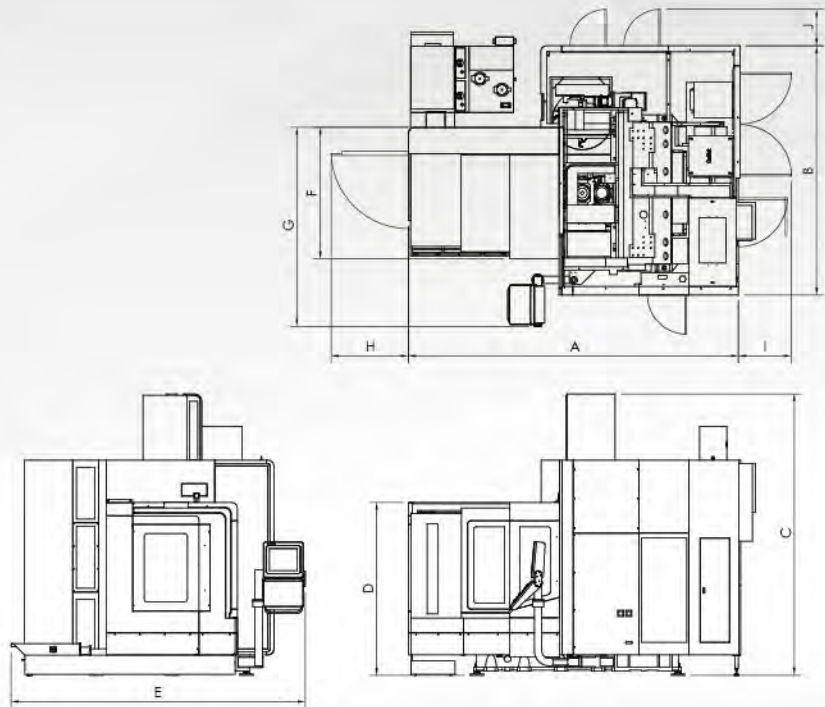
Model	A	B	C	D	E	F	G	H	I	J
5A-600T	4475	3380	3820	2345	3990	1680	2705	1045	720	495
5A-600TF										



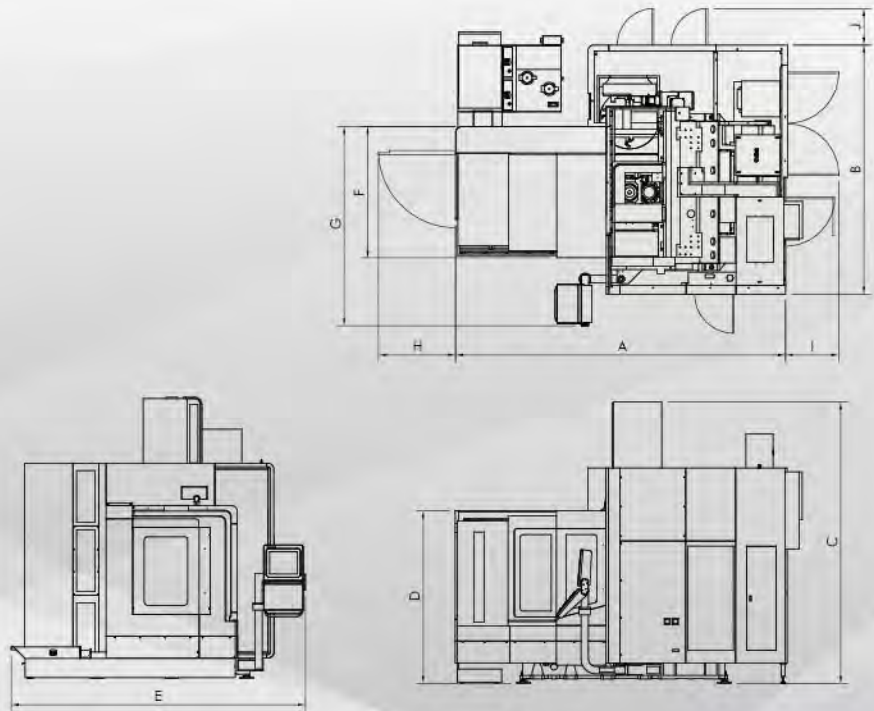
Model	A	B	C	D	E	F	G	H	I	J
5A-800T	5340	3710	4060	2575	4320	2000	3035	1120	975	940
5A-800TF										

Machine Dimension

5A-600T(F)/800T(F)



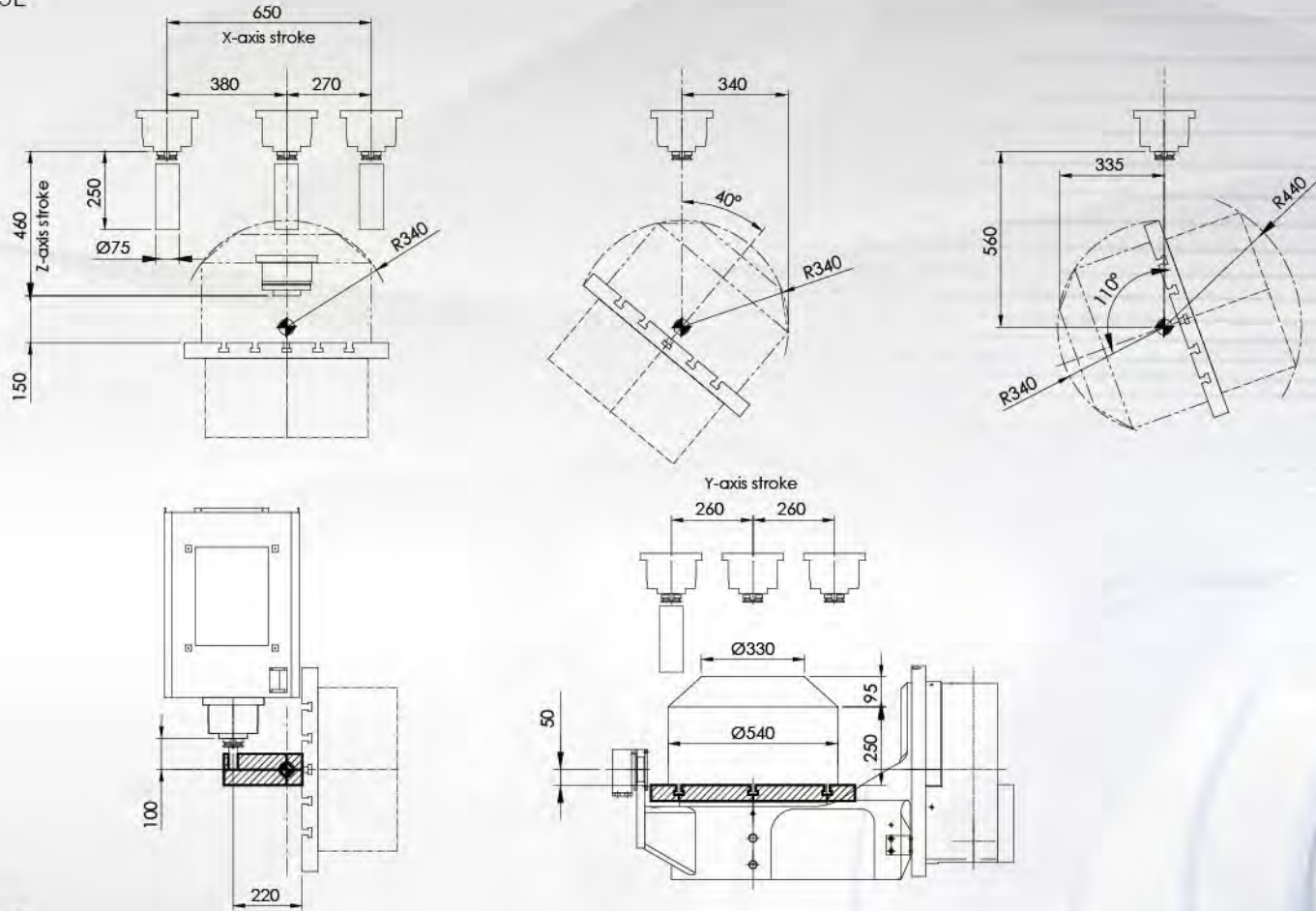
Model	A	B	C	D	E	F	G	H	I	J
5A-600T 5A-600TF	4475	3380	3820	2345	3990	1680	2705	1045	720	495



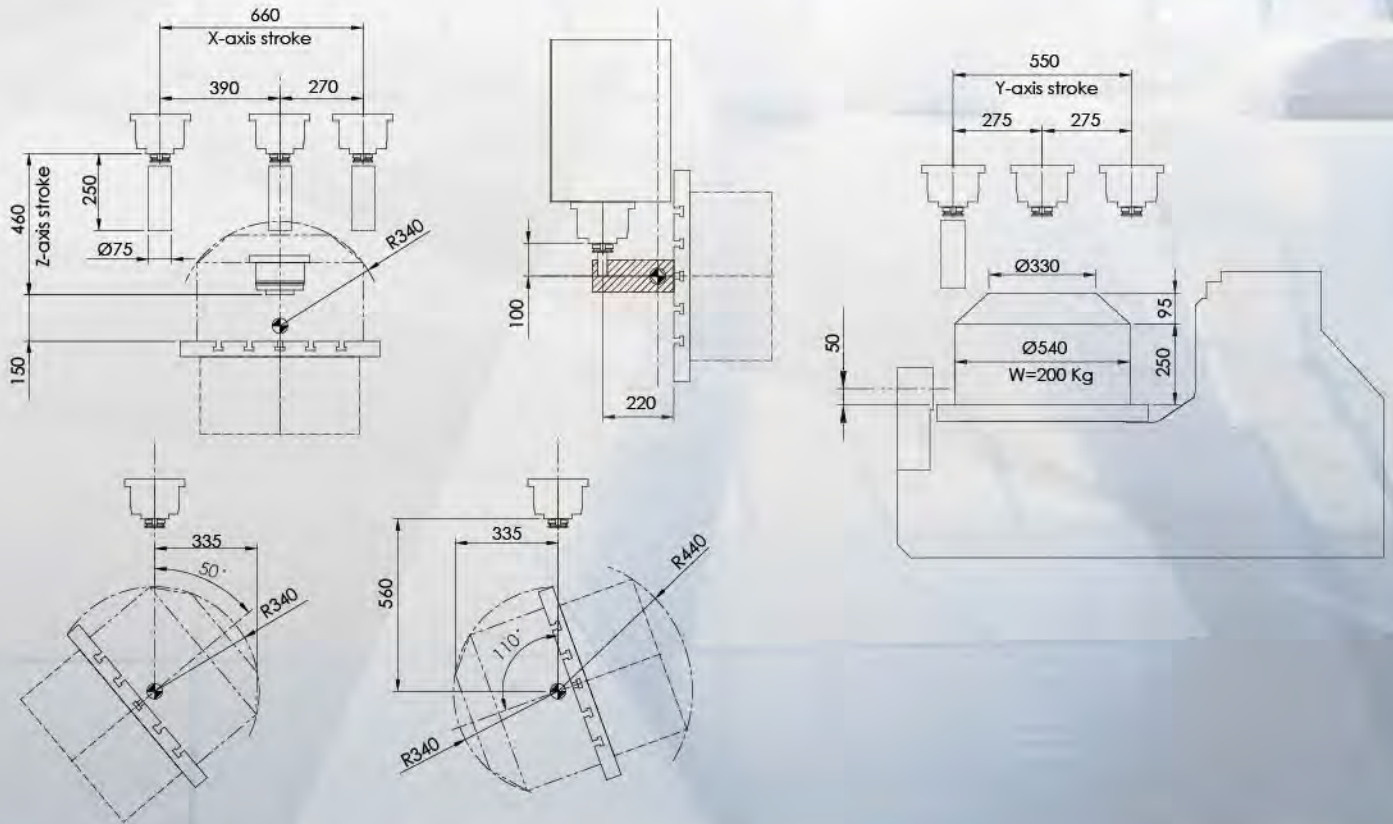
Model	A	B	C	D	E	F	G	H	I	J
5A-800T 5A-800TF	5340	3710	4060	2575	4320	2000	3035	1120	975	940

Cutting Range and Interference

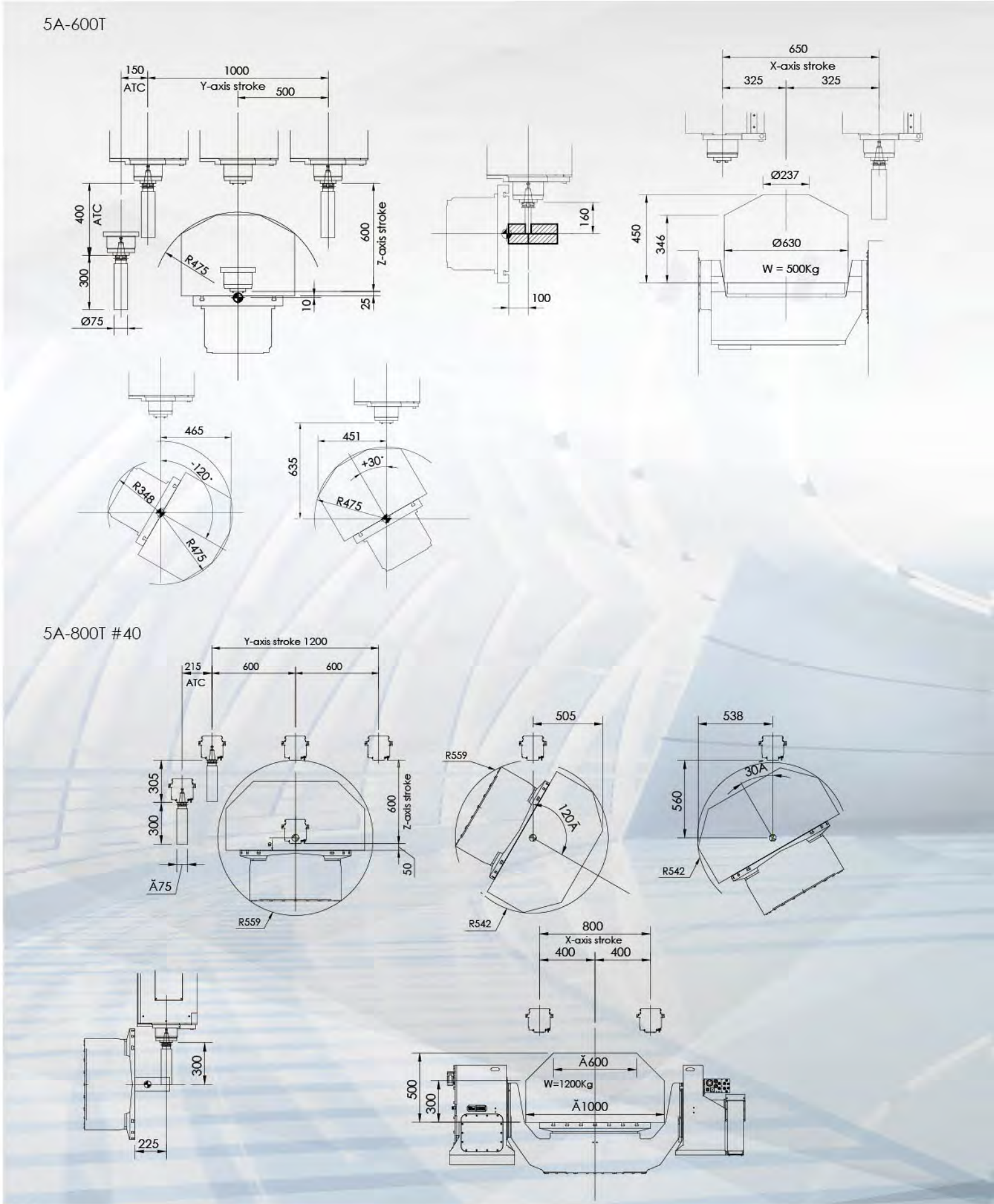
5A-65E



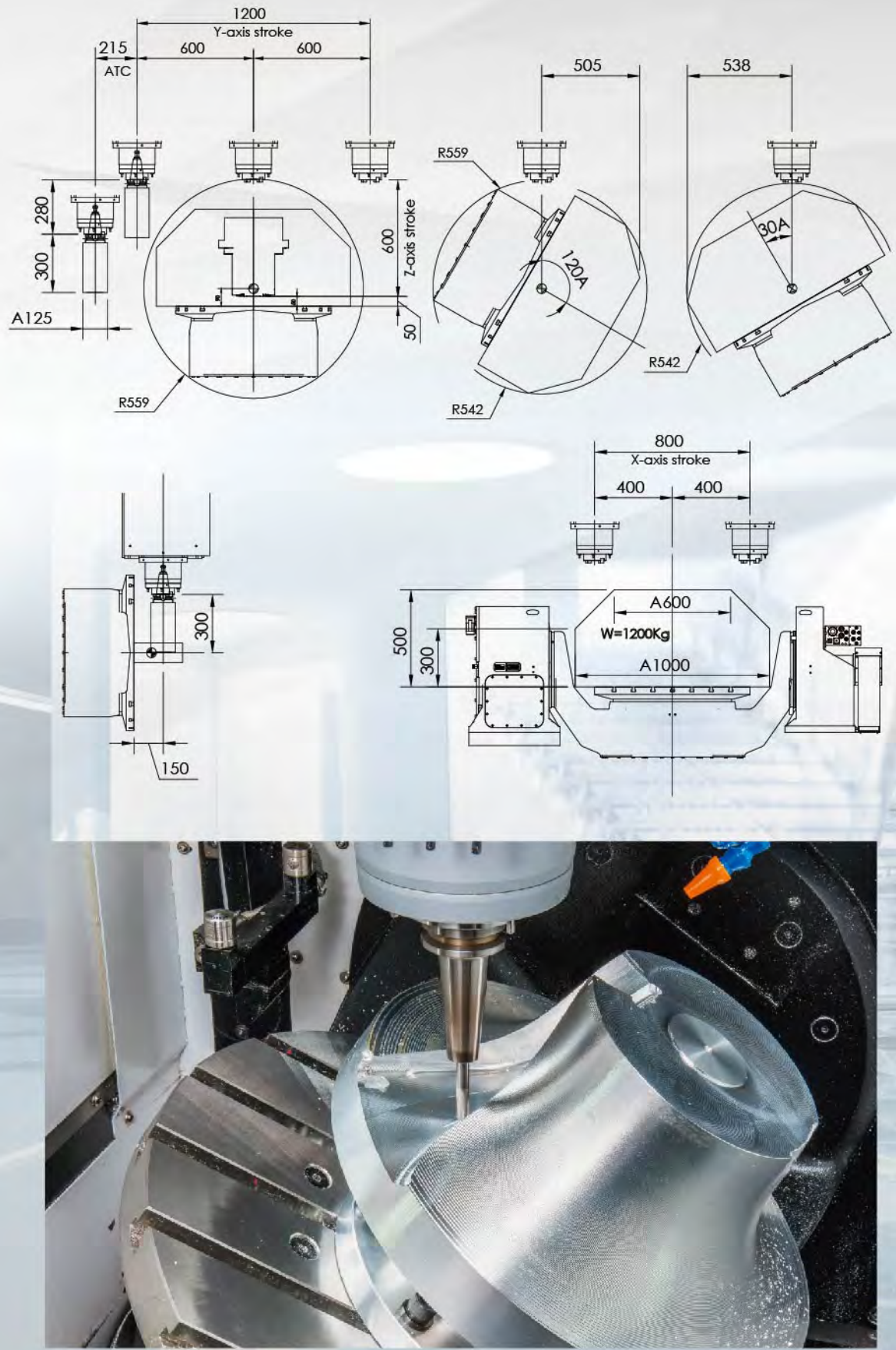
5A-650



Cutting Range and Interference



5A-800T #50



Specification

Model		5A-65E/F	5A-650	5A-650F (Hartrol Plus 1/Fanuc:4+1(31iMB))	5A-600T	5A-600TF (Hartrol Plus 1/Fanuc:4+1(31iMB))	5A-800T	5A-800TF (Hartrol Plus 1/Fanuc:4+1(31iMB))
Table	Unit							
Working Surface	mm	φ650	φ650	φ650	φ600xW500	φ600xW500	φ800	φ800
T-slot (Size x Number x Pitch)	mm	18x6x60°	18x6x60°	18x6x60°	14x5x100	14x5x100	14 x 7 x 100	14 x 7 x 100
Max Table Load	kg	300	300	300	500	500	600	1200
Travel								
Longitudinal Travel (X-axis)	mm	650	660	660	650	650	800	800
Gross Travel (Y-axis)	mm	520	550	550	1000	1000	1200	1200
Vertical Travel (Z-axis)	mm	460	460	460	600	600	600	600
Tilting travel (A-axis)	mm	-	-	-	-120°~+30°	-120°~+30°	-120°~+30°	-120°~+30°
Corss travel (B-axis)	mm	+110°~40°	+110°~50°	+110°~50°	-	-	-	-
Vertical travel (C-axis)	mm	360°	360°	360°	360°	360°	360°	360°
Distance From Spindle End to Table Center	mm	150~610	150~610	150~610	25~625	25~625	#40/#50:75~675	#40: 50~650 #50:25~625
Spindle								
Spindle Nose Tape		ISO40, HSK-A63(24K only)	ISO40, HSK-A63(24K only)	ISO40, HSK-A63(20K/24K only)	ISO40/HSK-A63	ISO40/HSK-A63	ISO40/HSK-A63 ISO50/HSK-A100	ISO40/HSK-A63 ISO50/HSK-A100
Spindle Speed (DDS)	rpm	#40 10000 (12000/15000 opt.)	#40 10000 (12000/15000 opt.)	#40 10000 (12000/15000/20000 opt.)	#40: 10000 (opt.15000)	#40 10000(15000 opt.)	#40 10000(15000 opt.) #50 10000 (12000 opt.)	#40 10000(15000/20000 opt.) #50 10000 (12000 opt.)
Spindle Speed (Built-in)	rpm	#40 opt. 24000	#40 opt. 24000	#40 opt. 24000	#40 opt. 24000	#40 opt. 24000	#40 opt. 24000 #50 opt. 12000	#40 opt. 24000 #50 opt. 12000
Feed								
Cutting Feedrate (X/Y/Z Axes)	m/min	20 / 20 / 20	20 / 20 / 20	20 / 20 / 20	20 / 20 / 20	20 / 20 / 20	20 / 20 / 20	20 / 20 / 20
Cutting Feedrate (A/B/C Axes)	rpm	- / 25 / 25	- / 25 / 25	- / 25 / 25	25 / - / 33	25 / - / 33	50 / - / 100	50 / - / 100
Rapid Traverse (X/Y/Z Axes)	m/min	36 / 36 / 36	36 / 36 / 36	36 / 36 / 36	30 / 30 / 30	30 / 30 / 30	30 / 30 / 30	30 / 30 / 30
Rapid Traverse (A/B/C Axes)	m/min	- / 25 / 25	- / 25 / 25	- / 25 / 25	25 / - / 33	25 / - / 33	50 / - / 100	50 / - / 100
ATC								
Tool Storage Capacity	pcs	16(24/30/40/60 opt.)	24(30/40/60 opt.)	24(30/40/60 opt.)	16 (24/30/40 opt.)	16 (24/30/40 opt.)	#40 16 (24/30/40 opt.) #50 20(32/40 opt.)	#40 16 (24/30/40 opt.) #50 20(32/40 opt.)
Max. Tool Weight	kg	7	7	7	7	7	7	7
Max. Tool Size (Diameter x Length)	mm	φ75x250L φ60x250L(24k)	φ75x250L φ60x250L(24k)	φ75x250L φ60x250L(24k)	φ75x300L φ60x300L(24K)	φ75x300L φ60x300L(24K)	#40 φ75x300L φ60x300L(24k) #50 φ125x300L	#40 φ75x300L φ60x300L(24k) #50 φ125x300L
Tool Shank		ISO40/HSK-A63	ISO40/HSK-A63	ISO40/HSK-A63	ISO40/HSK-A63	ISO40/HSK-A63	ISO40/HSK-A63 ISO50	ISO40/HSK-A63 ISO50
Pull Stud Bolt		#40 MAS-P40-1/ CAT-40/DIN69872	#40 MAS-P40-1/ CAT-40/DIN69872	#40 MAS-P40-1/ CAT-40/DIN69872	#40 MAS-P40T-1/ CAT-40/DIN69872	#40 MAS-P40T-1/CAT-40/DIN69872	#40 MAS-P40T-1/CAT-40/DIN69872 #50 MAS-P50T-1/CAT-50/DIN69872	#40 MAS-P40T-1/CAT-40/DIN69872 #50 MAS-P50T-1/CAT-50/DIN69872
Motor								
Spindle Drive Motor(30min)	Mitsubishi	kW	-	11	-	11	-	11
	Fanuc	kW	-	11	-	11	-	11
	Heidenhain TNC 640	kW	12.5	12.5	12.5	12.5	12.5	12.5
X/Y/Z axis drive motor	Mitsubishi	kW	-	3.5 / 3.5 / 3.5	-	3.5 / 3.5 / 7	-	7 / 3.5 / 7
	Fanuc	kW	-	4 / 4 / 4	-	4 / 4 / 9	-	7 / 4 / 9
	Heidenhain TNC 640	kW	5.1 / 4.5 / 5.4	4.5 / 5.1 / 5.4	4.5 / 5.1 / 5.4	8.6 / 8.6 / 8.9	8.6 / 8.6 / 8.9	8.6 / 8.6 / 8.9
A/C axis drive motor	Mitsubishi	kW	-	-	-	3.5/2	-	15 / 12.9
	Fanuc	kW	-	-	-	4/2.7	-	15 / 12.9
	Heidenhain TNC 640	kW	-	-	3.5/2.1	3.5 / 2.1	15 / 12.9	15 / 12.9
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	8.9 / 4.5	-	-	-
Positioning Accuracy								
3 axes laser positioning accuracy (JIS B6338)								
Positioning accuracy/Full travel	mm	±0.006	±0.006	±0.006	±0.008	±0.008	±0.010	±0.010
Repetitive positioning accuracy	mm	±0.002	±0.002	±0.002	±0.002	±0.002	±0.002	±0.002
3 axes laser positioning accuracy (VDI 3441)/Repeated 5 times								
Positioning accuracy	mm	0.008	0.008	0.008	0.010	0.010	0.012	0.012
Repetitive positioning accuracy	mm	0.006	0.006	0.006	0.008	0.008	0.010	0.010
Accuracy								
Positioning (with angle encoder)	A axis	sec	-	-	10	10	15	15
	B axis	sec	10	10	10	-	-	-
	C axis	sec	7	7	7	10	10	10
Repeatability (with angle encoder)	A axis	sec	-	-	4	4	6	6
	B axis	sec	5	5	5	-	-	-
	C axis	sec	5	5	5	4	4	4
Other								
Required Air Pressure	kg/cm ²	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Electric Power Consumption	kVA	50	50	50	40(65 opt.)	40(65 opt.)	40(65 opt.)	40(65 opt.)
Floor Space(Full Guarding)	mm	2530x3553	3230x2980	3230x2980	3990x4705	3990 x 4705	4320 x 5570	4320 x 5570
Net Weight	kg	9000	11000	11000	14000	14000	20000	20000
Coolant capacity(Standard)	L	210	320	320	300	300	300	300

Standard & Optioanl
Mechanical Accessories

Standard

- Full-enclosed splash guard
- Spray around spindle
- Lubrication system
- Tool package
- Foundation bolt, Concrete
- Encoders for 4/5 axis
- Spindle air curtain
- B,C-axis linear scale system_Heidenhain (5A-650)
- Fluorescent lamp X1
- Hartford manual X 1
- X,Y,Z-axis linear scale system_HEIDENHAIN
- Air blast through spindle_M53
- Auto power off
- Spindle oil cooler
- Operator Panel, Stand type
- Table side air blast M50 control

Optional

- Link type chip conveyor & portable chip bucket(1 EA)
- Spindle shaft with coolant system(Built-in 24,000rpm spindle)
- Fluorescent lamp X 2
- Coolant through spindle(20/25/40/70BAR)
- 3-axis ballscrew coolant system (Vary by model)
- Oil skimmer
- Auto tool length measurement
- Wash down hose
- Auto workpiece measurement
- Air gun
- Oil mist coolant system

Standard & Optioanl
Electrical Function

Standard

- Kinematics opt.(Auto length measurement, auto workpiece measurement and KKH-10 are necessary option for this function)
- DCM collision
- Software option 1: PLANE function
- Software option 2: TCPM

Optional

- Kinematics comp
- DXF converter
- AFC: Adaptive feed control
- CTC: Cross talk comp.
- PAC: Pos. adaptive control
- LAC: Load adaptive control
- MAC: Motion adaptive control
- ACC: Active chatter control
- AVD: Active vibration damping

Model Identification

- T Twin arm(Twin arm supported rotary table)
- F Four (4+1-axis control function)
- TF Twin arm+four