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## FLAT-BED CNC TURNING CENTER

Together with the latest technology and high quality components, the Goodway Flat-bed CNC Turning Center, HA series, utilizes high rigidity four box way bed with 3-step gear spindle and servo indexing turret, to provide heavy-duty cutting capability for super large size workpiece applications. It is suitable for oil and energy industry, aerospace and shipbuilding industry, and metallurgy industry. The optional four-way toolpost, boring tooling, and high rigidity steady rest equipments provide a more efficient turning performance for large workpiece applications. Furthermore, the live tooling center and C-axis is also available which allows the machine to perform more complicated tasks such as turning, milling, and drilling to fulfill your needs for today and tomorrow.

- ▶ One-piece 4 box way and flat bed casting provides a large platform with a heavy-duty structure, suitable for super large size workpiece applications.
- ▶ 3-step gear spindle provides great torque output under low speed, to fulfill heavy cutting needs.
- ▶ Key components such as the X-axis saddle, turret and tailstock are designed with optimized configuration, to greatly increase structural rigidity and ensure both heavy-duty cutting and precision turning capabilities.
- ▶ Z-axis twin chip conveyor system with separated large coolant tank design provides high efficient chip disposal and stable turning accuracy.



HA-2000 Series

Max. swing diameter

**Ø 2,000 mm**

Max. turning diameter

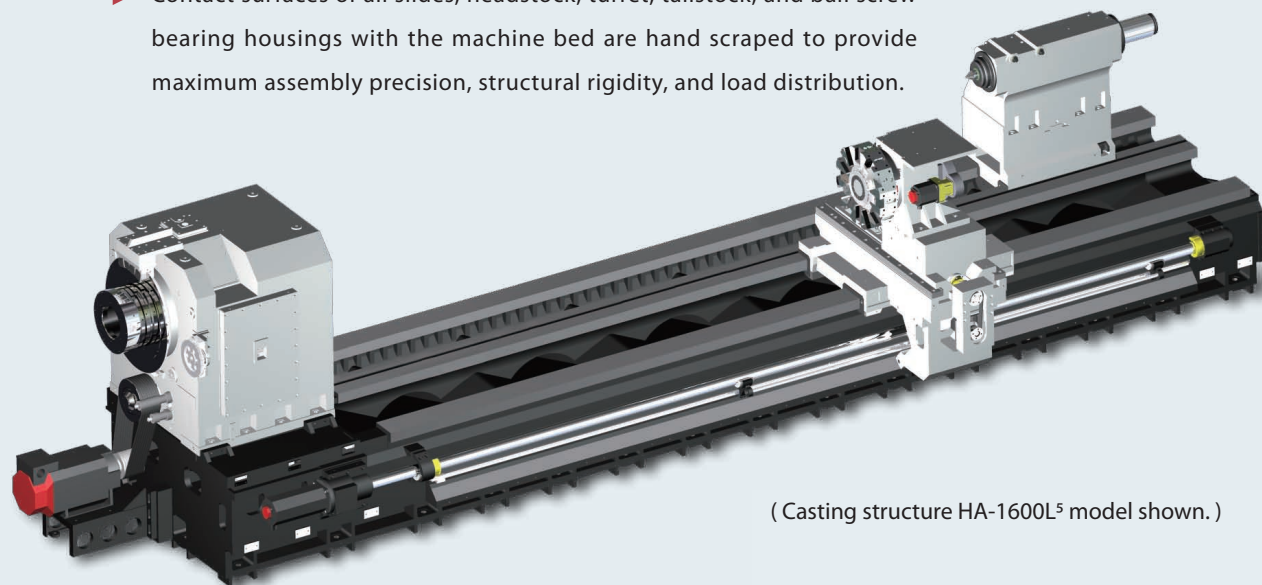
**Ø 1,700 mm**

( HA-1600L<sup>5</sup> model shown. )



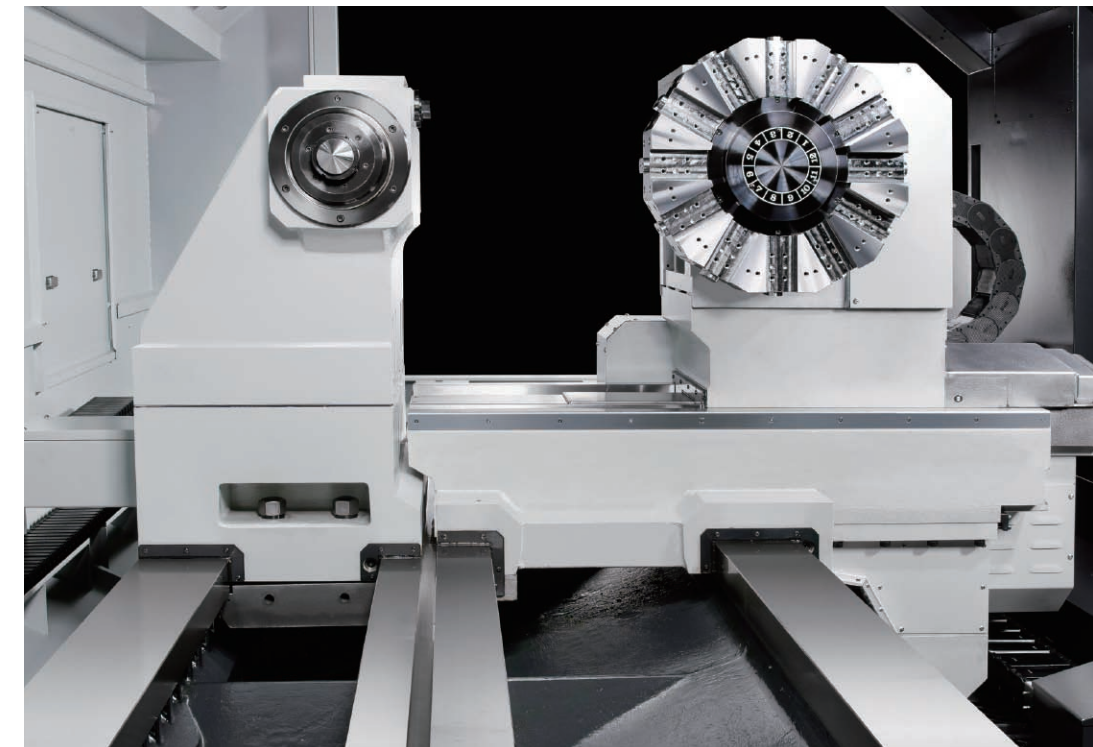
## HEAVY-DUTY CONSTRUCTION

- ▶ The flat-bed is designed with a low center of gravity, which allows the workpiece weight and turning pressure to be evenly distributed throughout the flat-bed. This can greatly increase machine's overall structure and heavy-duty cutting capability.
- ▶ Built to endure years and years of rigorous high production turning, the heavily ribbed, one-piece thermally balanced bed and casting components are of FC35-Meehanite casting ( industry standard is FC25~30 ). FC35 grade cast iron is capable of withstanding much greater stress without deforming and provides maximum vibration damping, which result in a machine that will outlast and outperform the competition.
- ▶ By using Finite Element Methods ( FEM ), optimal reinforce ribbings are directly cast into the one-piece bed structure. Mechanical rigidity has been increased by more than compared to conventional designs.
- ▶ Contact surfaces of all slides, headstock, turret, tailstock, and ball screw bearing housings with the machine bed are hand scraped to provide maximum assembly precision, structural rigidity, and load distribution.



( Casting structure HA-1600L<sup>5</sup> model shown. )

- ▶ C3 class hardened and precision ground ball screws ensure the highest accuracy and durability possible. Plus, pretension on all axes minimizes thermal distortion.
- ▶ The Z-axis ball screw of the HA-L<sup>4</sup> series and all other super-long models are equipped with supportive mechanism. This can reduce weight deformation of the super long ball screw and ensure stability for the axial feed and turning accuracy.



- ▶ The one-piece casting components of the box way, bed, and saddle are designed with large span to reach maximum strength and accuracy.
- ▶ The X-axis saddle and tailstock travel are designed separately, which allows the tailstock to support the workpiece without crossing the saddle. This prevents the tailstock from overhanging which can influence the rigidity.

- ▶ The tailstock is equipped with  $\varnothing 200$  mm rotary tailstock spindle, combining the MT#6 dead center quill and sufficient thrust power, to provide stable and accurate support for the workpiece.
- ▶ The tailstock spindle control panel is directly integrated in the tailstock base, which allows the operator to easily control the tailstock positioning.
- ▶ X-axis carriage locks onto the tailstock base manually and moves it to the desired position with precision accuracy.
- ▶ The tailstock is designed with an auxiliary retention which gives a firm support to prevent the tailstock from sliding backwards when working on heavy workpieces.

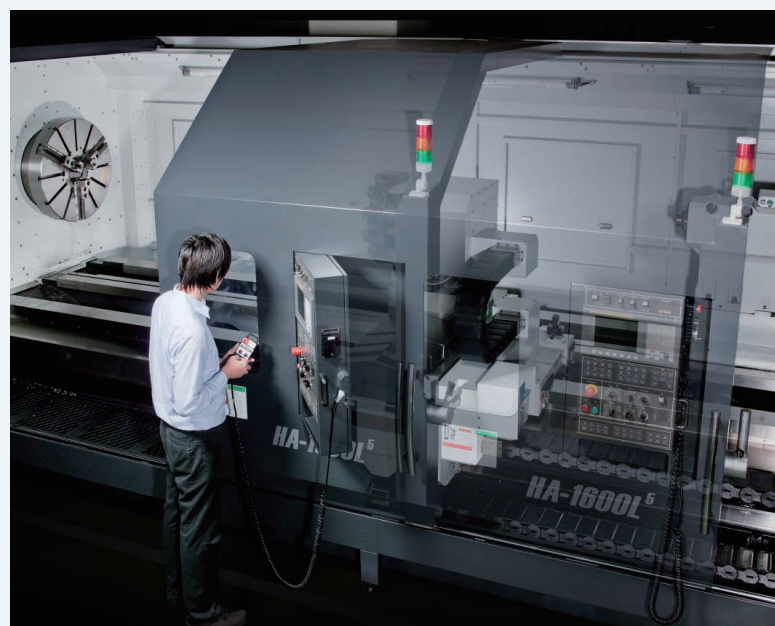






- ▶ High performance twin chip conveying system allows the chip to be quickly disposed on both sides of the Z-axis travel through the chip conveyor or screw type chip conveyor. This ensures the working area to maintain its temperature while increasing turning stability and accuracy.
- ▶ 700 L ( L<sup>5</sup> Series ) super large coolant tank allows optimal air circulation for faster heat dispersion and coolant temperature, which will help extend coolant life.

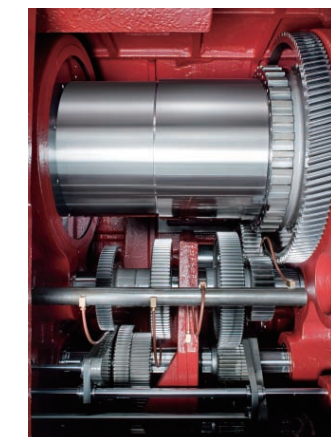
- ▶ The control panel is integrated onto the splash guard. The operator can easily move it to the desired position without safety problems.



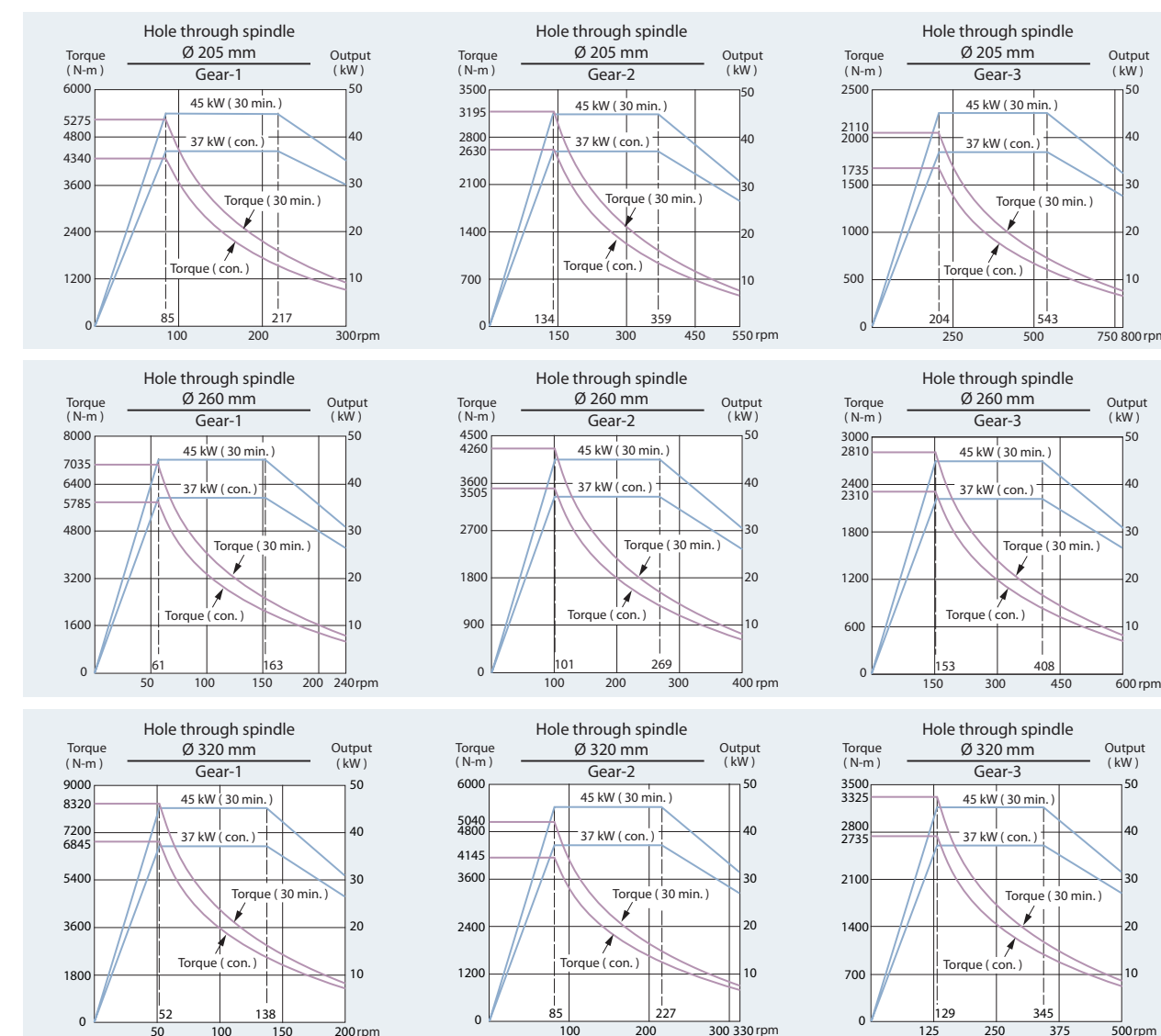
- ▶ The splash guard and saddle can be synchronized to move together manually during the working progress, which ensures safety for the operator.

## ULTIMATE TURNING POWER

- ▶ The one-piece casting headstock has a net weight over 4,000 kg, which gives outstanding rigidity and also provides an ideal balance for super heavy workpieces.
- ▶ The spindle is support by high rigidity bearings for maximum level of support and precision. Bearing configuration is designed for super heavy-duty cutting with ultra-smooth performance and long term durability with a higher level of accuracy.
- ▶ The 3-speed super heavy-duty gear head incorporates advance mechanical designs. Mated with a 45 kW ( 30 min. ) motor to provide tremendous amount of low-end torque to handle heavy material removal on large diameter parts. It provides 8,320 N-m torque under 52 rpm to easily overcome any working applications.
- ▶ The spindle uses a high performance lubrication system to efficiently and evenly lubricate the spindle bearings. Also, with a special maze protection design, it can prevent the gear box from contamination thus extending the life of the bearings.



### Spindle Output



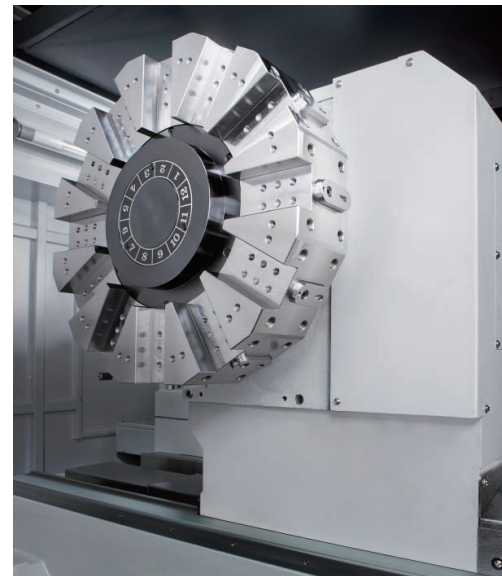
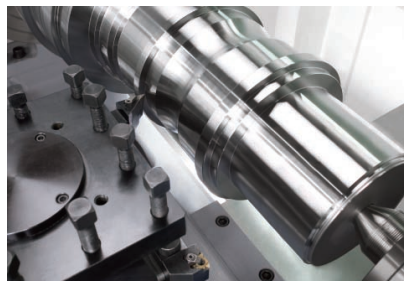


## ADVANCED TURRET TECHNOLOGY

▶  $\varnothing$  320 mm diameter 2-piece CURVIC couplings accurately position the turret disk (  $\pm 2$  sec. of arc ) and 10,000 Kg ( 26,400 lbs. ) of clamping force ensures abundant turret rigidity for all cutting conditions.

▶ The 12-station heavy-duty servo indexing turret achieves 0.3 second indexing times for adjacent stations and 0.8 second times for stations at the opposite end of the disk turret.

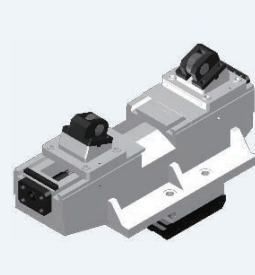
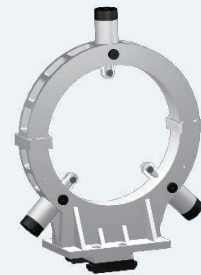
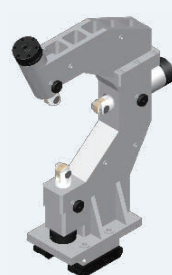
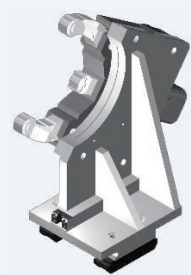
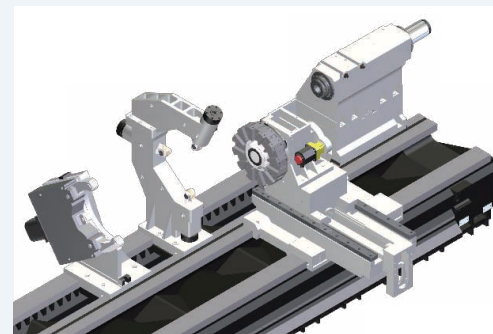
▶ The available 4-way toolpost can fulfill the needs for super heavy cutting or deep boring needs.



## HEAVY-DUTY STEADY REST

▶ The available heavy-duty steady rest can prevent the long workpieces from deflection during high speed rotation while ensuring precise concentricity of the workpiece.

▶ The structure of the steady rest is designed based on the actual working requirement. When the workpiece diameter is not more than  $\varnothing$  600 mm, the saddle and steady rest will not interfere each other during the progress. Thus the operator does not need to stop the machine to remove the steady rest, which greatly increases working efficiency.



( Hydraulic )  $\varnothing$ 125 ~ 460 mm\*1 ( Manual )  $\varnothing$ 300 ~ 600 mm\*1 ( Manual )  $\varnothing$ 500 ~ 800 mm ( Manual )  $\varnothing$ 800 ~ 1,000 mm

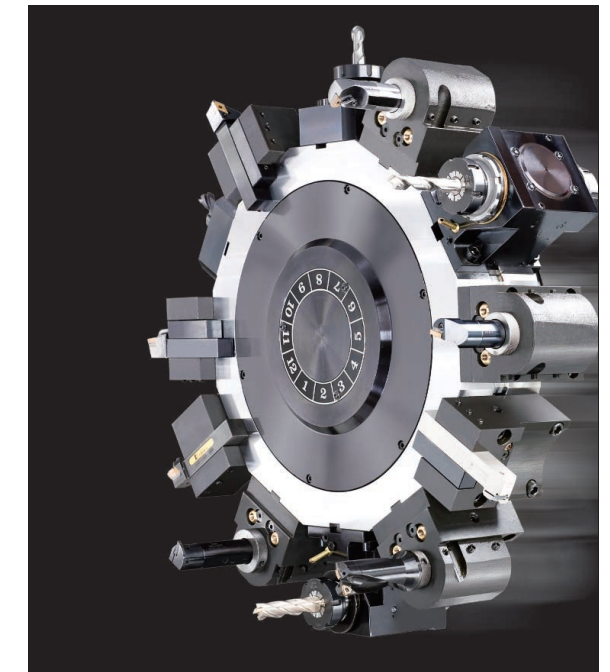
\*1 The steady rest does not need to be removed during the working progress.

## LIVE TOOLING TURRET

▶ Live tooling and C-axis control capabilities on the HA series allows the machine to perform multiple tasks on a workpiece, such as turning, milling, drilling and tapping. It eliminates manpower and cycle time, while reducing accuracy lost, which will occur if the part is moved from machine to machine.

▶ The 12-station GOODWAY live tooling turret offers 12 stations available for live tooling, live tools rotate in working position only to reduce power loss and heat.

▶ GOODWAY live tooling turret utilizes advance servo indexing technology to achieve 0.3 second indexing times for adjacent stations and 0.8 second for stations at the opposite end of the disk.

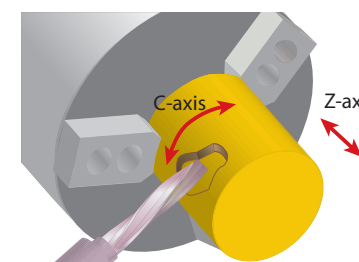


## ULTIMATE C-AXIS SPINDLE

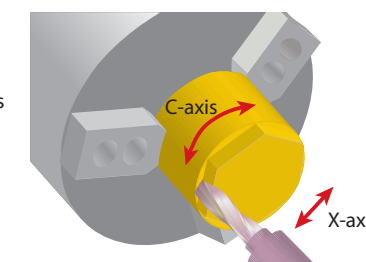
▶ The Cf-axis and disk brake system available on the HA series provide the most rigid and powerful type of C-axis on the market today. In Cf-axis mode, a servo motor is engaged and drives the rotation of the spindle; engagement time is approximately 1 second.

▶ Working with the live tooling turret, the Cf-axis and disk brake system enables the machine to perform multiple tasks, such as drilling, tapping, and milling operations, including cylindrical and polar coordinate interpolations, resembling a 4<sup>th</sup>-axis rotary table on a machining center.

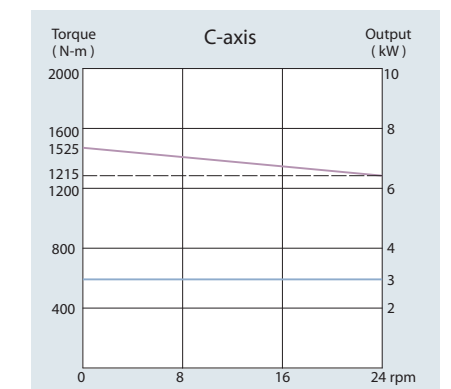
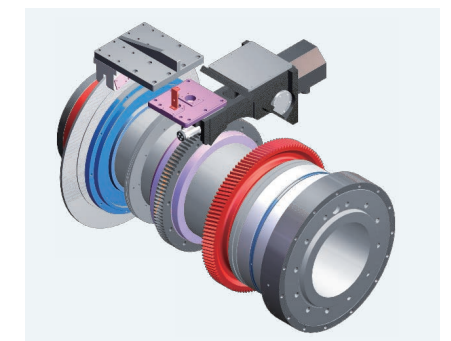
▶ With the Fanuc servo motor generating an ultra high resolution of 1,000,000 pulses per spindle rotation and 1,500 N-m of spindle torque ( Con. ), machined surface finishes are much superior than Cs-axis ( driven by spindle motor ) equipped machines. Plus, dynamic accuracy is within  $\pm 0.02^\circ$  even under heavy cutting loads.



Cylindrical Interpolation.



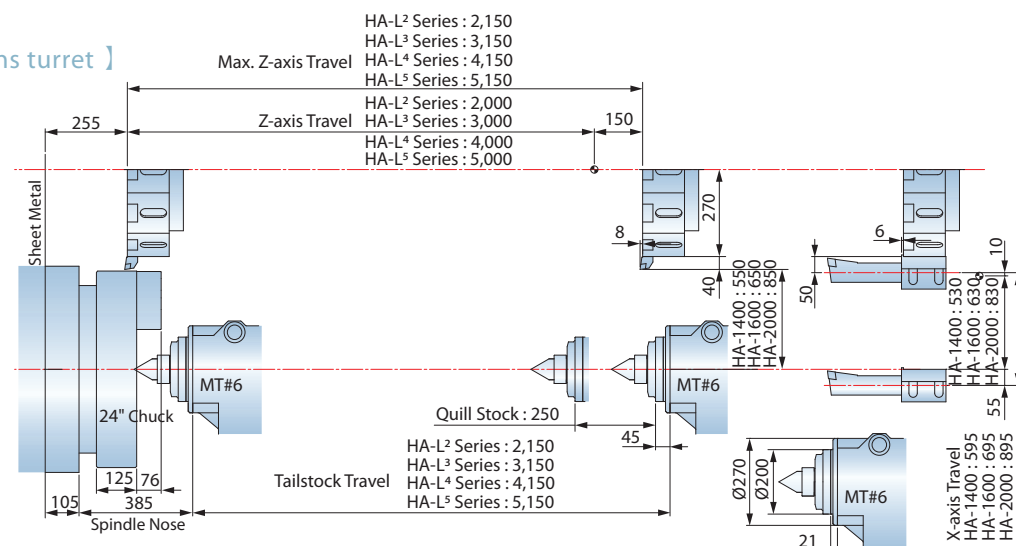
Polar Coordinate Interpolation.



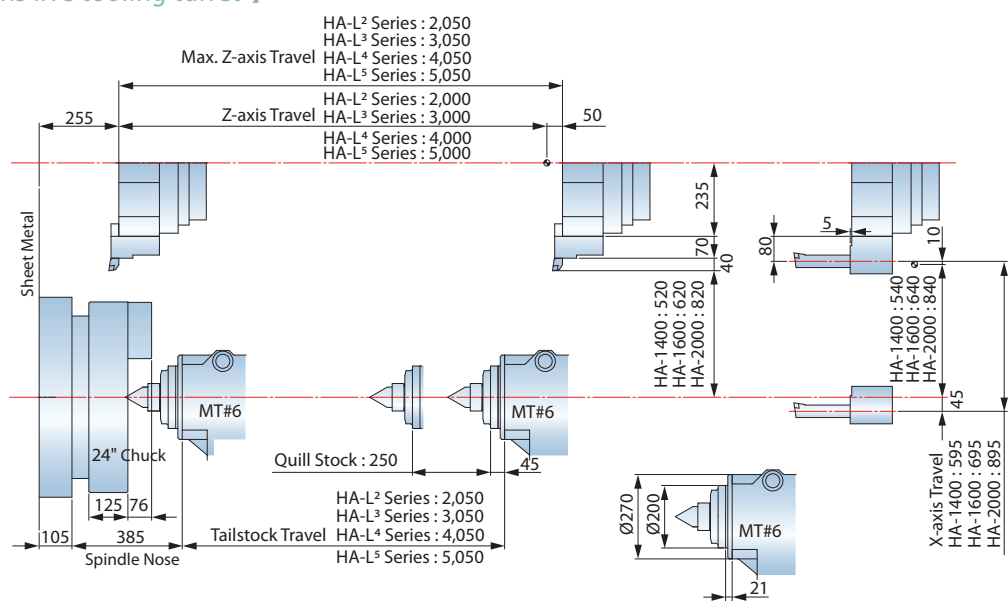
# GENERAL DIMENSION

## Work Range

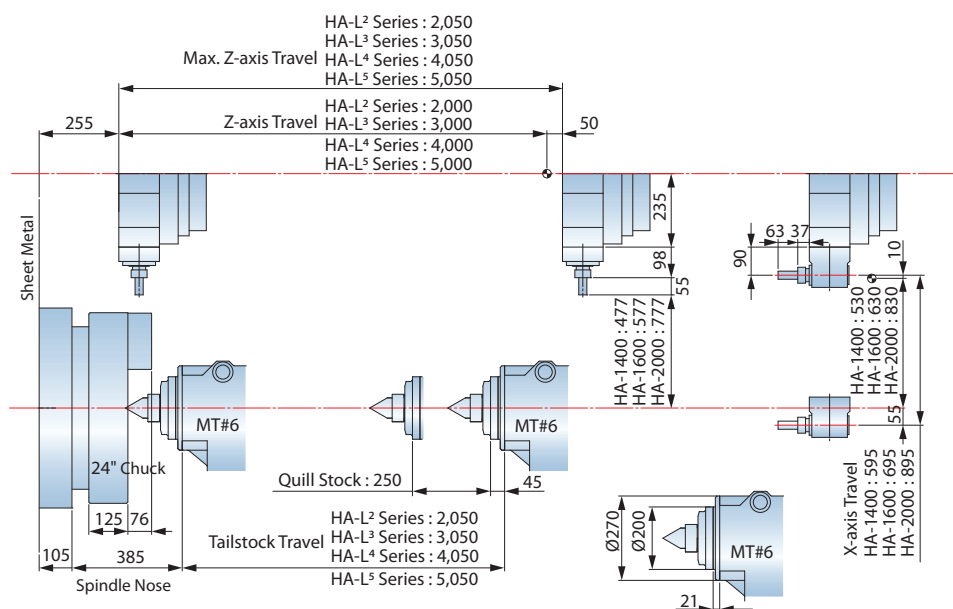
### 【 Standard 12-stations turret 】



### 【 Optional 12-stations live tooling turret 】



### MT#6 Dead Center (I.D. / O.D. Tools)

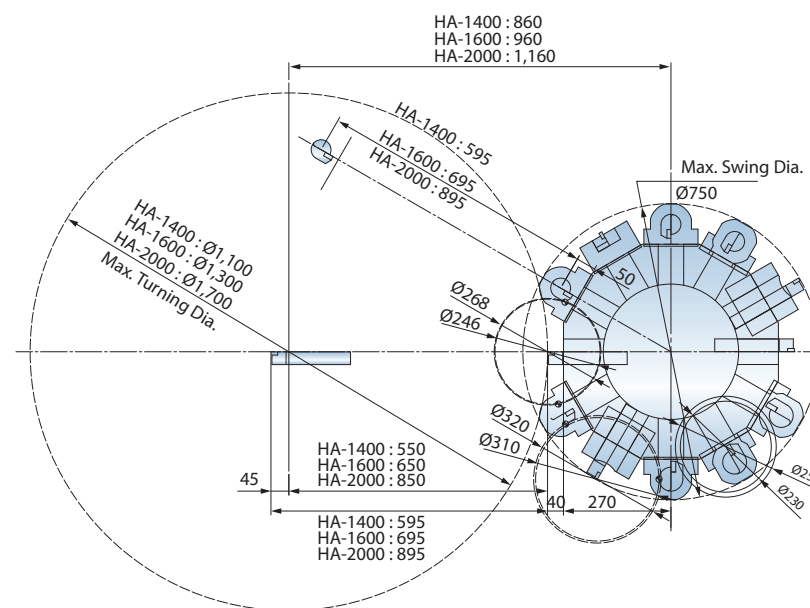


### MT#6 Live Center (Live Tooling)

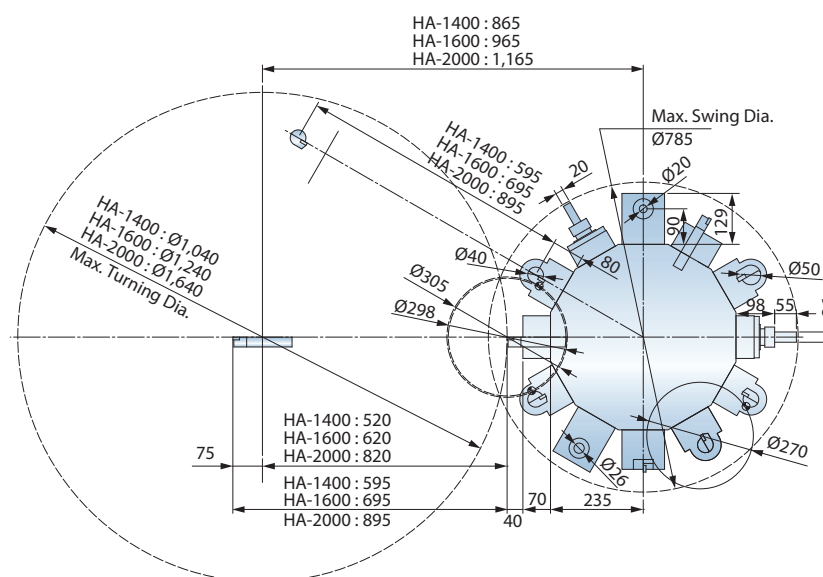
Unit : mm

## Interference Diagram

### 【 Standard 12-stations turret 】

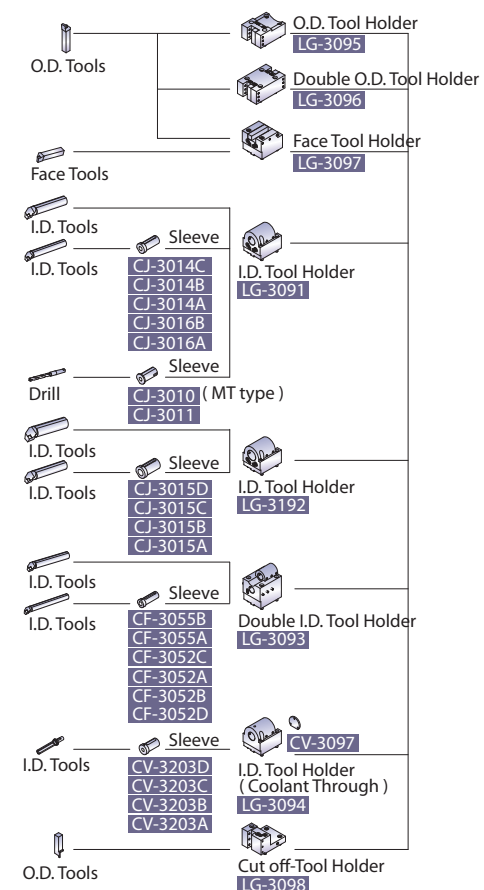
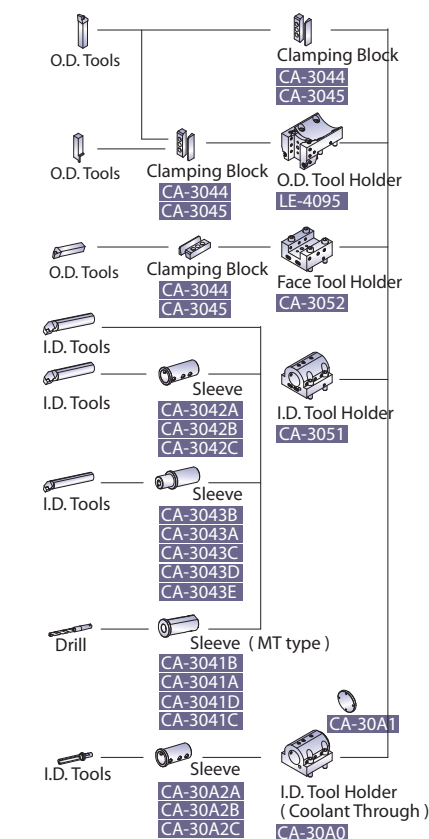


### 【 Optional 12-stations live tooling turret 】



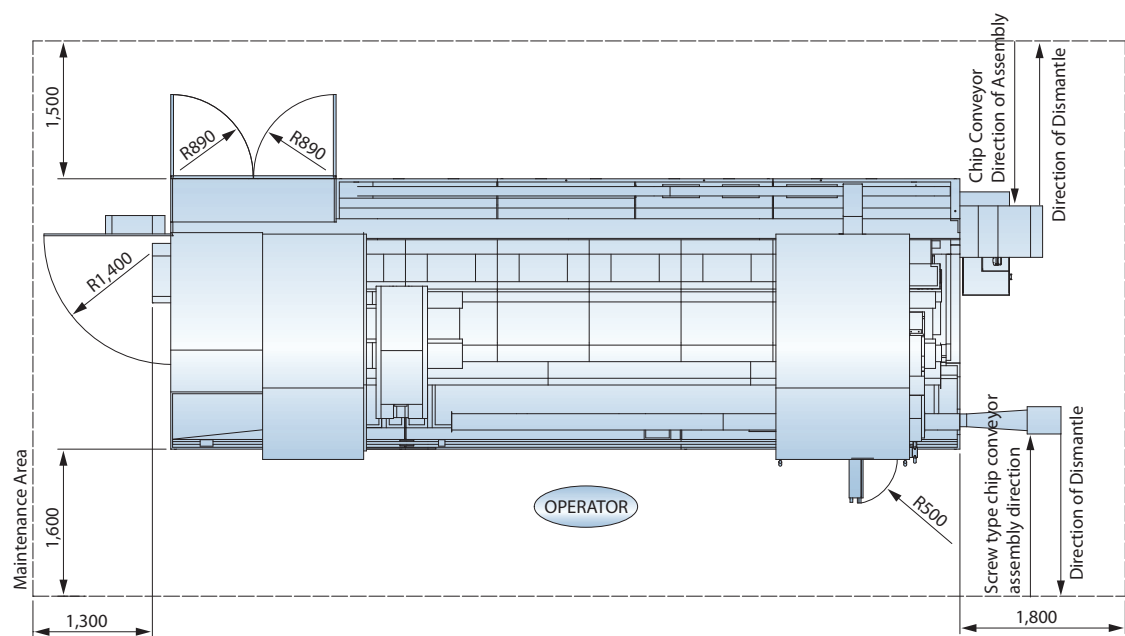
Unit : mm

## Tooling System

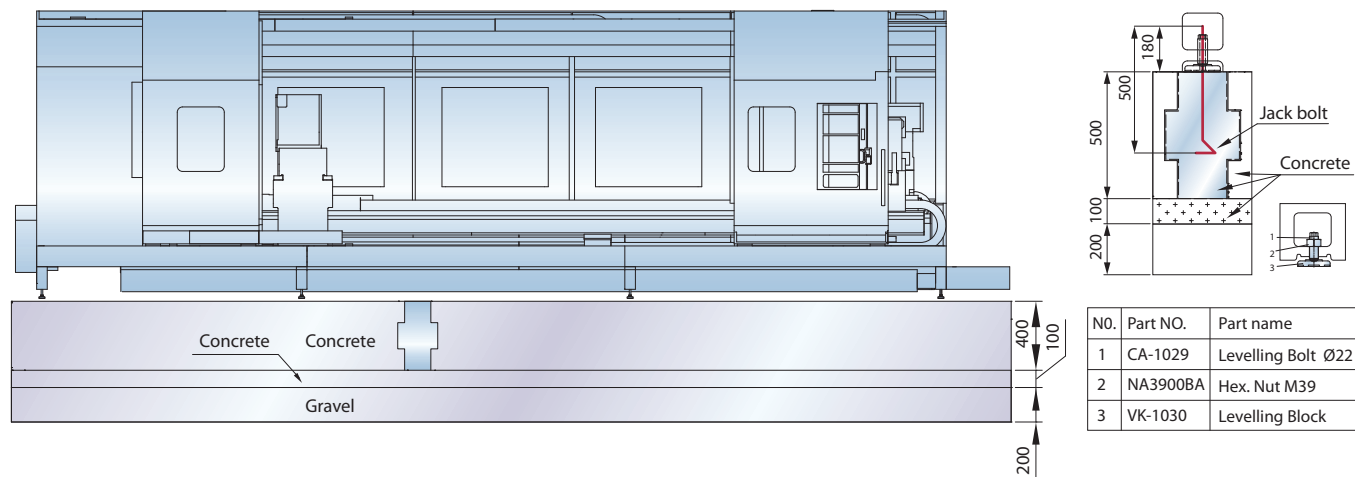
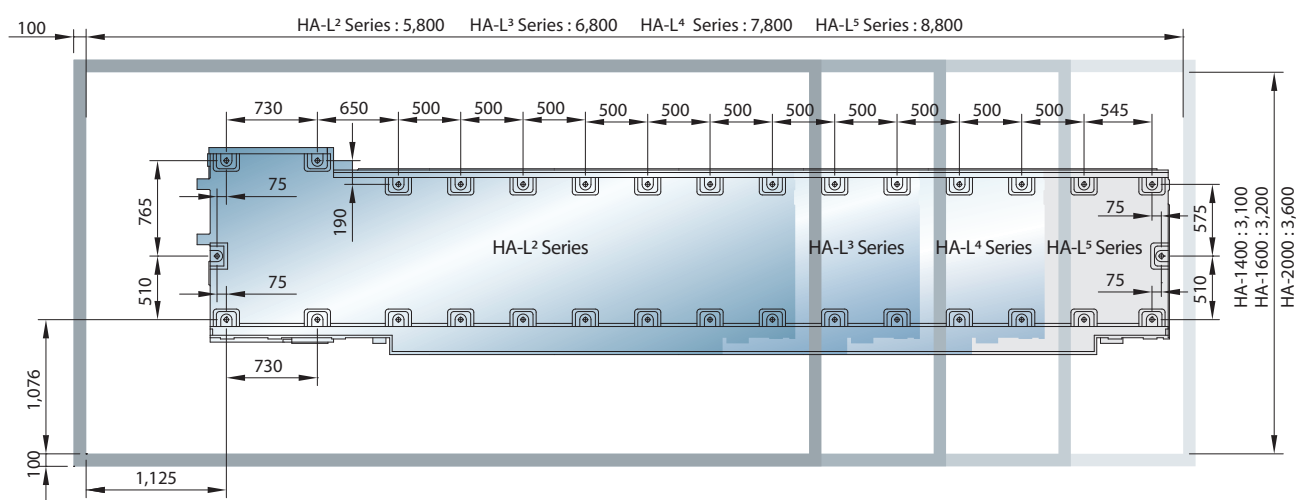


# GENERAL DIMENSION

## Foot - Print



## Foundation Requirement



NO.	Part NO.	Part name
1	CA-1029	Levelling Bolt Ø22
2	NA3900BA	Hex. Nut M39
3	VK-1030	Levelling Block

Unit : mm

# STANDARD & OPTIONAL FEATURES

S: Standard O: Option  
 -: Not Available C: Contact GOODWAY

		HA-1400	HA-1600	HA-2000
<b>SPINDLE</b>				
Main spindle configuration	3-Speed Gear	S	S	S
Rigid tapping & spindle orientation		S	S	S
Main spindle disk brake		O	O	O
<b>WORK HOLDING</b>				
	24"	O	O	O
	32"	O	O	O
Hollow 3-jaws chuck & 1 set soft jaws	40"	O	O	O
	50"	-	O	O
	63"	-	-	O
Foot switch for chuck operation		S	S	S
Quill hydraulic tailstock		S	S	S
MT#6 dead center quill		S	S	S
Manual steady rest		O	O	O
Self-centering hydraulic steady rest		O	O	O
Foot switch for steady rest operation		O	O	O
<b>TURRET</b>				
12-station turret		S	S	S
12-station live tooling turret		O	O	O
Hydraulic 4-way Toolpost		O	O	O
Tool holder & sleeve package		S	S	S
Live tooling tool holders (0° x 2, 90° x 2)		O	O	O
<b>COOLANT</b>				
Coolant pump	3 Kg/cm <sup>2</sup>	S	S	S
	5 Kg/cm <sup>2</sup>	O	O	O
High-pressure coolant system	20 Kg/cm <sup>2</sup>	C	C	C
Roll-out coolant tank		S	S	S
Oil skimmer		O	O	O
Coolant flow switch		O	O	O
Coolant level switch		O	O	O
Coolant intercooler system		O	O	O
<b>CHIP</b>				
Chip conveyor	Right discharge	S	S	S
Screw type chip conveyor		S	S	S
Chip cart with coolant drain		O	O	O
<b>SAFETY</b>				
Fully enclosed guarding		O	O	O
Impact resistant viewing window		S	S	S
Tailstock stroke out - end check		S	S	S
Chuck cylinder stroke out - end check		S	S	S
Low hydraulic pressure detection switch		S	S	S
Load monitoring function		O	O	O
<b>OTHERS</b>				
Tri-color machine status light tower		S	S	S
External work light		S	S	S
Electrical cabinet	Heat exchanger	S	S	S
	A/C cooling system	O	O	O
Complete hydraulic system		S	S	S
Advanced auto lubrication system		S	S	S
Tailstock manual lubrication system		S	S	S
Foundation leveling & maintenance tool kit		S	S	S
Emergency maintenance electrical part package		S	S	S
Operation & maintenance manuals		S	S	S

<b>FANUC CONTROL FUNCTIONS</b>		Oi-TD
PMC system	Oi-TD PMC : 25n sec/step	S
	31i PMC : 25n sec/step	-
Display	8.4" color LCD	S
	10.4" color LCD	O
Graphic function	Standard	S
	Dynamic	O
Full keypad	Small - 44 keys	S
	Large - 56 keys	O*1
Part program storage length	512 K byte	S
	1 M byte	-
	2 M byte	-
	4 M byte	-
Registerable programs	8 M byte	-
	400	S
	1,000	-
Tool offset pairs	4,000	-
	64	S
	99	O
	400	-
Servo control	499	-
	999	-
	2000	-
Conversational programming	HRV2 ( 3 )	S
	Manual Guide Oi	S
Spindle motors	Manual Guide i	O*1
	α i	S
Tool Life Management	α i	S
		S
Tool Nose Radius Compensation		S
Background editing		S
Variable Lead Thread Cutting		S
Polygon Turning		S
Unexpected disturbance torque detection function		S
Polar coordinate & cylindrical interpolation		-
Multiple Threading		S
Run hour & parts counter		S
Auto power off function		S
Custom macro B		S
RS-232 port		S
Memory card input / output		S
Ethernet		S
Fast ethernet		O

Specifications are subject to change without notice.  
 \*1 10.4" color LCD option needed.



## MACHINE SPECIFICATIONS

CAPACITY	HA-1400L <sup>2</sup> / L <sup>3</sup> / L <sup>4</sup> / L <sup>5</sup>	HA-1600L <sup>2</sup> / L <sup>3</sup> / L <sup>4</sup> / L <sup>5</sup>	HA-2000L <sup>2</sup> / L <sup>3</sup> / L <sup>4</sup> / L <sup>5</sup>
Max. swing diameter	Ø 1,400 mm	Ø 1,600 mm	Ø 2,000 mm
Swing over saddle	Ø 1,000 mm	Ø 1,100 mm	Ø 1,500 mm
Max. turning diameter	Ø 1,100 mm	Ø 1,300 mm	Ø 1,700 mm
Max. turning length	2,000 / 3,000 / 4,000 / 5,000* <sup>1</sup> mm		
Max. table load	10,000~15,000 Kg ( Need to be supported by steady rest )		
Spindle center height ( from ground )	1,525 mm	1,625 mm	1,825 mm
<b>FLAT BED</b>			
Flat bed width	1,350 mm		
Flat bed height	815 mm		
Slide way type	4 Box way		
<b>SPINDLE</b>			
Spindle drive system	3-Speed Gear box		
Spindle nose	A A2-15 B A2-15 C A2-20 D A2-28* <sup>2</sup> E A2-28* <sup>2</sup>		
Hole through spindle	A 205 B 260 C 320 D 420* <sup>2</sup> E 520* <sup>1*2</sup> mm		
Spindle bearing diameter	A 260 B 340 C 400 D 500* <sup>2</sup> E 600* <sup>2</sup> mm		
Spindle motor type	$\alpha$ 40 / 6,000i		
Motor output ( Cont. / 30 min. )	37 / 45 kW		
Spindle speed range	A 800 B 600 C 500 D 300* <sup>2</sup> E 250* <sup>2</sup> rpm		
<b>Cf-AXIS SPINDLE ( OPTIONAL )</b>			
Cf-axis drive motor	AC 3.0 kW ( Fanuc $\alpha$ 12 / 3,000i )		
Cf-axis rapid	24 rpm		
Cf-axis torque output ( Cont. )	1,524 N·m		
<b>X &amp; Z AXES</b>			
Max. X-axis travel	595 ( 45 + 550 ) mm	695 ( 45 + 650 ) mm	895 ( 45 + 850 ) mm
Max. Z-axis travel	2,150 / 3,150 / 4,150 / 5,150 mm		
X / Z axes rapids	10 / 8 m/min.		
Slide way type	Box Way		
Feed rates	1 ~ 2,000 mm/min		
X-axis servo motor	4 kW ( $\alpha$ 22 / 3,000i )		
Z-axis servo motor	6 kW ( $\alpha$ 40 / 3,000i )		
X-axis ball screw Ø / pitch	Ø 50 / pitch 10 mm		
Z-axis ball screw Ø / pitch	Ø 80 / pitch 10 mm		
X / Z axes thrust ( Cont. )	1,407 / 2,438 Kg		

Specifications are subject to change without notice.

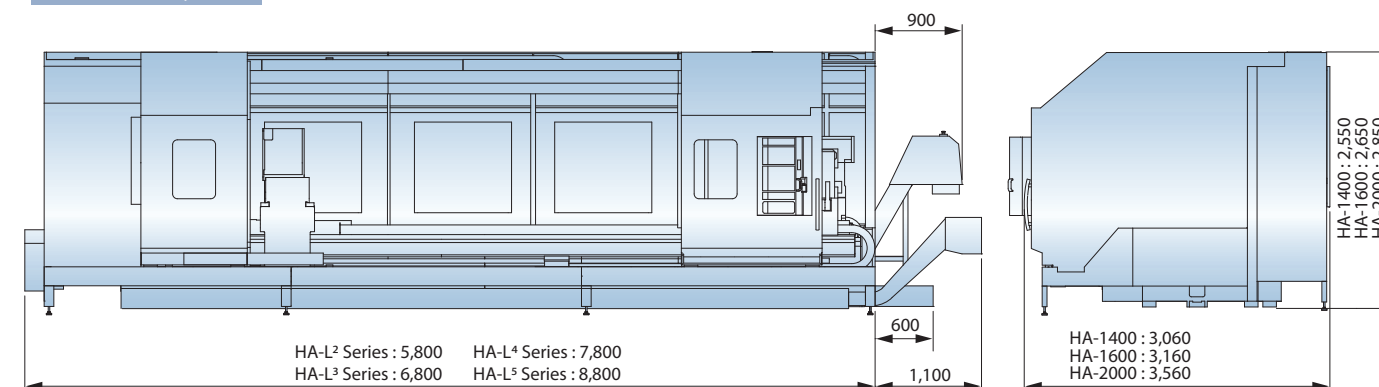
\*<sup>1</sup> Please contact Goodway Sales Dept. for larger size requirements

\*<sup>2</sup> Please contact Goodway Sales Dept. for further details.

TURRET	HA-1400L <sup>2</sup> / L <sup>3</sup> / L <sup>4</sup> / L <sup>5</sup>	HA-1600L <sup>2</sup> / L <sup>3</sup> / L <sup>4</sup> / L <sup>5</sup>	HA-2000L <sup>2</sup> / L <sup>3</sup> / L <sup>4</sup> / L <sup>5</sup>
Stations	12 ( Opt. 4 )		
Indexing drive	Fanuc AC Servo motor		
Indexing speed	0.3 sec. ( Adjacent ) / 0.8 sec. ( 180° Single step )		
OD tool shank size	□ 32 mm		
ID tool shank size	Ø 60 mm		
<b>LIVE TOOLING TURRET ( OPTIONAL )</b>			
Live tooling stations	12		
Indexing drive type	Spindle motor		
Index speed	0.3 sec. ( Adjacent ) / 0.8 sec. ( 180° Single step )		
OD tool shank size	□ 25 mm		
ID tool shank size	Ø 50 mm		
Live tooling shank size	ER 40 collets		
Live tooling RPM range	4,000 rpm		
<b>TAILSTOCK</b>			
Quill center taper	MT#6 Dead center		
Quill diameter	Ø 200 mm ( Rotary type )		
Quill travel	250 mm		
Tailstock base travel	2,150 / 3,150 / 4,150 / 5,150* <sup>1</sup> mm		
Programmable quill	Yes		
<b>GENERAL</b>			
CNC control	Fanuc Oi-TD		
Voltage / Power requirement	AC 220 V / 65 kVA		
Hydraulic tank capacity	40 L		
Coolant tank capacity	700 L ( L <sup>5</sup> )		
Coolant pump	0.7 kW rated at 3bar ( 40 PSI )		
Machine weight	20,000 / 22,000 / 24,000 / 26,000 Kg	21,500 / 23,500 / 25,500 / 27,500 Kg	23,500 / 25,500 / 27,500 / 29,500 Kg

Specifications are subject to change without notice.

## Machine Layout



Unit : mm





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