



# GS-6000 SERIES

Maximum Performance CNC Turning Centers

## MAXIMUM PERFORMANCE CNC TURNING CENTERS

With leading technologies and high quality components, the GS-6000 series maximum performance turning center combines a high rigidity box way bed with super large diameter servo indexing turret and 2-step gear spindle structure provide great horse power, high speed indexing, and heavy duty cutting capabilities. The L<sup>2</sup> model is available with up to 3,300 mm the length and the M model is available with live tooling turret and C-axis that enables the GS-6000 series with higher cutting flexibility and multi-tasking power to meet today and tomorrow's most of turning applications demanding.

- ▶ The first thing you'll notice inside the door of the GS-6000 series is the massive turret, which boasts a turret disk over 750 mm in diameter. Blazing fast indexing times of 0.5 seconds from station to station and 1.5 second for stations at 180 degrees are achieved with servo indexing technology.
- ▶ Under the covers, you'll find a 45 degrees true slant bed with super wide box ways, and an enormous 2-speed head stock driven by a 37 kW ( 30 min. ) Fanuc motor.
- ▶ Axes rapids are 20 m/min. on X and 24 m/min. on Z, which are 50 ~ 100 % faster than the competitors.
- ▶ Combined Industrial design, the perfect fully enclosed protection covers can isolates cutting chip and coolant inside the machine.



- ▶ Available live tooling and C-axis capabilities in the GS-6000 series allow the machine to perform multiple tasks on a work piece, such as turning, milling, drilling, and tapping. It cuts down manpower and cycle time, while reducing accuracy lost, which will occur if the part is moved from machine to machine. ( More on P9. )

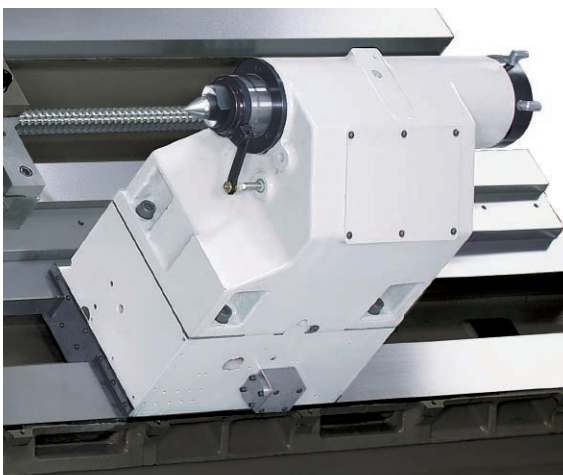
- 3 bed lengths and 2 spindle sizes offer a total of 6 basic models configurations.

SERIES		GS-6000 SERIES	GS-6600 SERIES	
Chuck Size		Ø 15" (18")	Ø 20"	Ø 22"*1
Bar Capacity		Ø 115 mm ( 4.52" )	Ø 180 mm ( 7.08" )	Ø 205 mm ( 8.07" )
Turning Length	950 mm ( 37.4" )	GS-6000 / M	GS-6600 / M	
	1,980 mm ( 77.95" )	GS-6000L / LM	GS-6600L / LM	
	3,300 mm ( 129.9" )	GS-6000L <sup>2</sup> / L <sup>2</sup> M	GS-6600L <sup>2</sup> / L <sup>2</sup> M	

「M」 model for optional live tooling turret function. \*1 Optional Air Chuck



( GS-6000L<sup>2</sup> model shown with optional accessories )

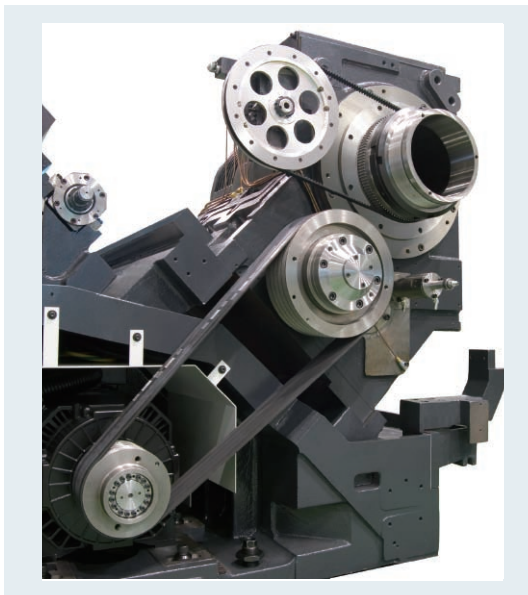


- Positioning of the programmable base tailstock has been simplified through use of custom software interface. The Z-axis carriage automatically locks on to the base of the tailstock and drags it to the desired position.
- The built-in bearing quill provide greater rigidity for heavyloads. The extension and retraction of the quill is programmable and thrust pressure adjustable.



## SUPER HEAVY-DUTY CONSTRUCTION

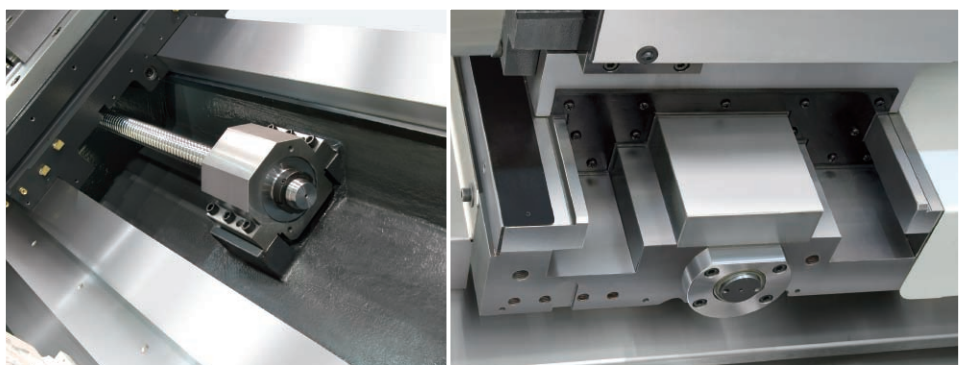
- ▶ Major structural components have been combined into one solid platform. The low center of gravity 45° slant bed design provides the most rigid foundation possible for the headstock, turret, and tailstock.
- ▶ By using Finite Element Methods ( FEM ), optimal reinforce ribbings are directly cast into the one-piece bed structure. Mechanical rigidity has been increased by more than 40 % when compared to conventional designs. The GS-6000 series is capable of performing super heavy-duty turning and maintain long-term super high-precision accuracy. More rigidity also means extended tool life.
- ▶ 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.



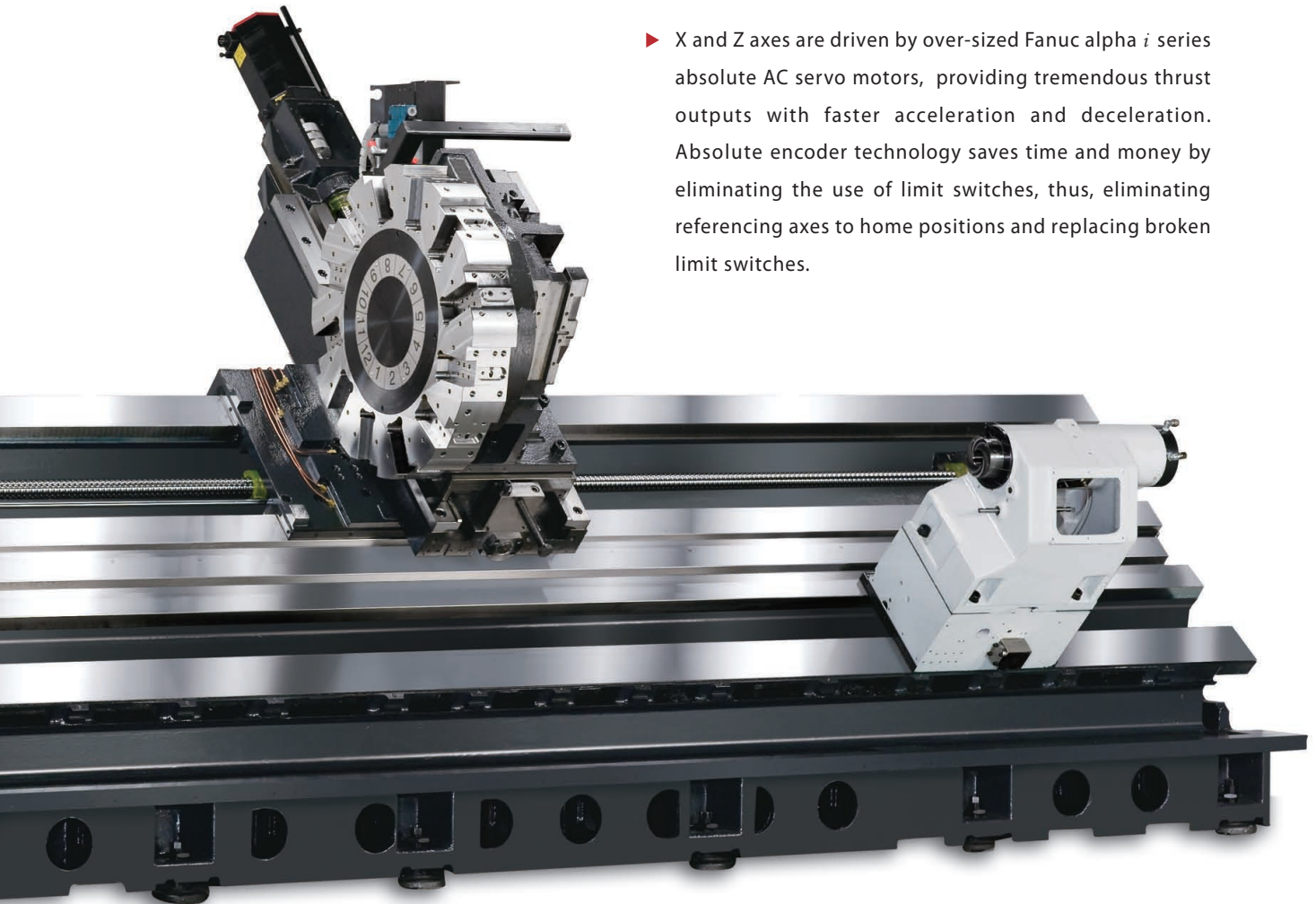
- ▶ The 2 - speed super heavy duty gear head incorporates advance mechanical designs. Mated with a 37 kW ( 30 min. ) motor to provide tremendous amount of low-end torque to handle heavy material removal on large diameter parts.

- ▶ Extra wide hardened and ground box ways are directly formed into the machine bed and saddle during the casting process. They are precision machined and widely spaced for maximum strength. The box way design also provides the rigidity needed for heavy duty and interrupted turning applications.

- ▶ C3 class hardened and precision ground ball screws ensure the highest accuracy and durability possible. Plus, pretension on all axes minimizes thermal distortion.



- ▶ All spindle and servo motors, including drives, are Fanuc alpha *i* series components to ensure peak machining performance and accuracy.



( Casting structure of GS-6000L<sup>2</sup> model shown )

- ▶ X and Z axes are driven by over-sized Fanuc alpha *i* series absolute AC servo motors, providing tremendous thrust outputs with faster acceleration and deceleration. Absolute encoder technology saves time and money by eliminating the use of limit switches, thus, eliminating referencing axes to home positions and replacing broken limit switches.



- ▶ The L<sup>2</sup> series Z-axis equipped with independent supporting mechanism prevents long-sized ball screws from deforming and ensures excellent performance for the axial feed and turning accuracy.

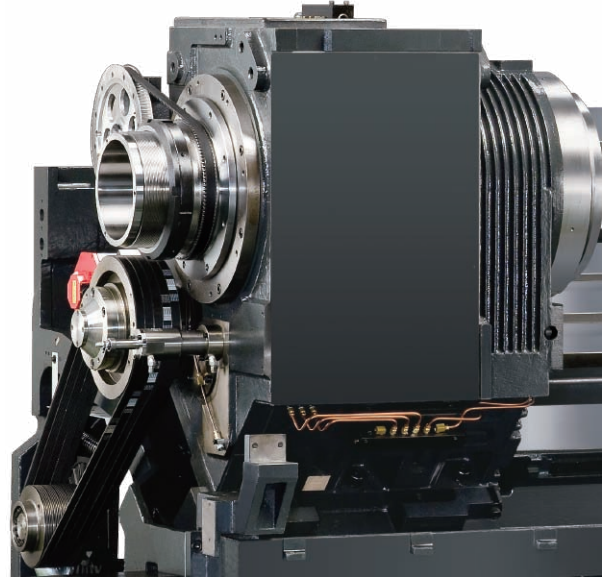
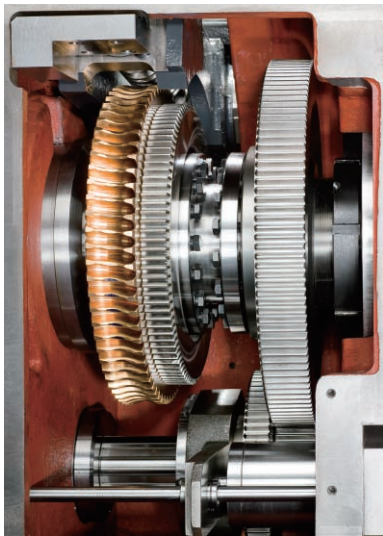
- ▶ Both gears and bearings are lubricated and cooled by an oil mist system, which evenly and efficiently lubricates the components. This system is much more advanced and environmental compared to the traditional oil bath system by eliminating the chance of oil contaminating the bearings and the use of a oil cooler.





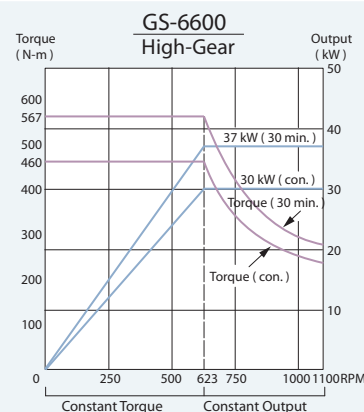
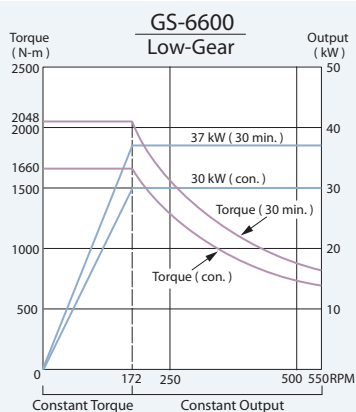
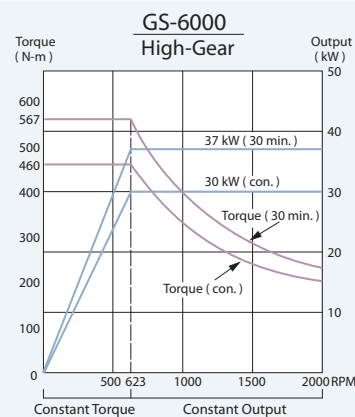
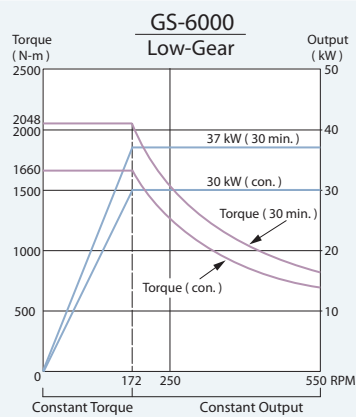
# ULTIMATE TURNING POWER

- ▶ P4 grade ( Class 7 ) super-high precision bearings are directly assembled for maximum level of support and precision. Bearing configuration is designed for heavy-duty cutting with ultra-smooth performance and long term durability with a higher level of accuracy.
- ▶ With over 2,048 N-m of torque available on the low speed of the 2-speed gear head, turning tough material with big diameter is now a simple task.

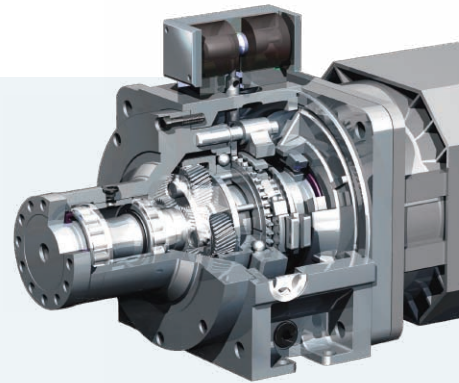


- ▶ Working with the live tooling turret, the Cf-axis and disk brake system enables the machine to perform multiple tasks, such as drilling, tapping and milling operations including cylindrical and polar coordinate interpolations, resembling a 4th-axis rotary table on a machining center.

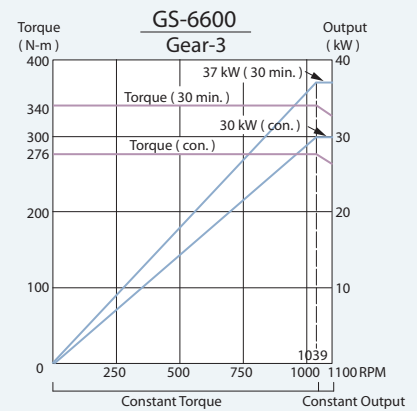
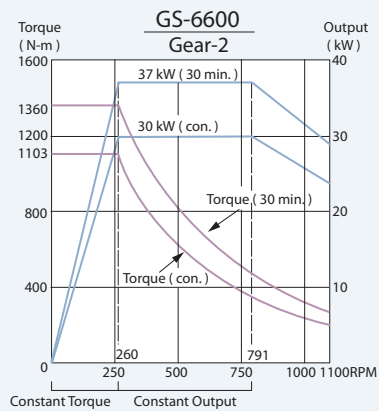
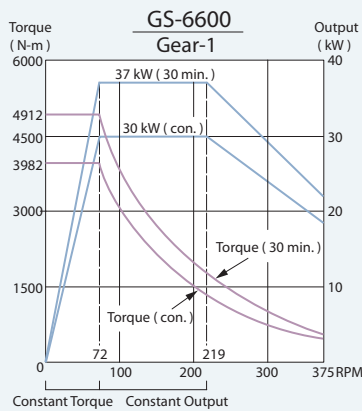
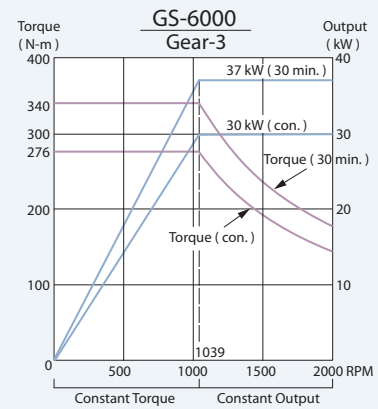
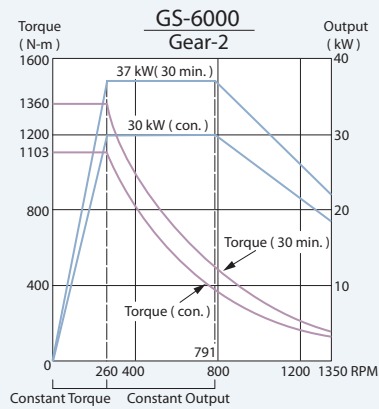
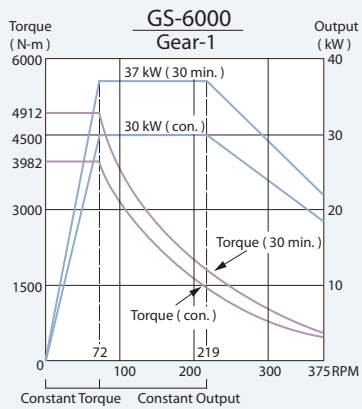
## Spindle Output



- ▶ The GS-6000 series is standard with a 2-step gear box and an optional oil bath German made ZF 3-step gear box is also available providing maximum torque up to 4,912 N-m.

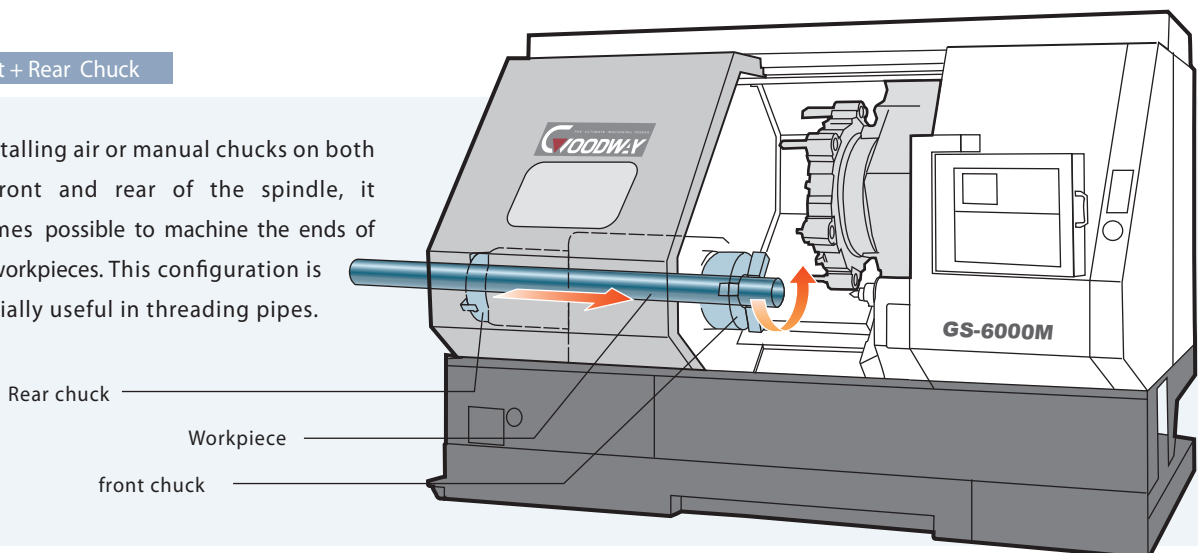


Optional ZF Gear Box Output



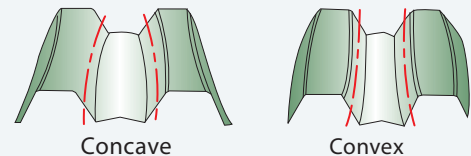
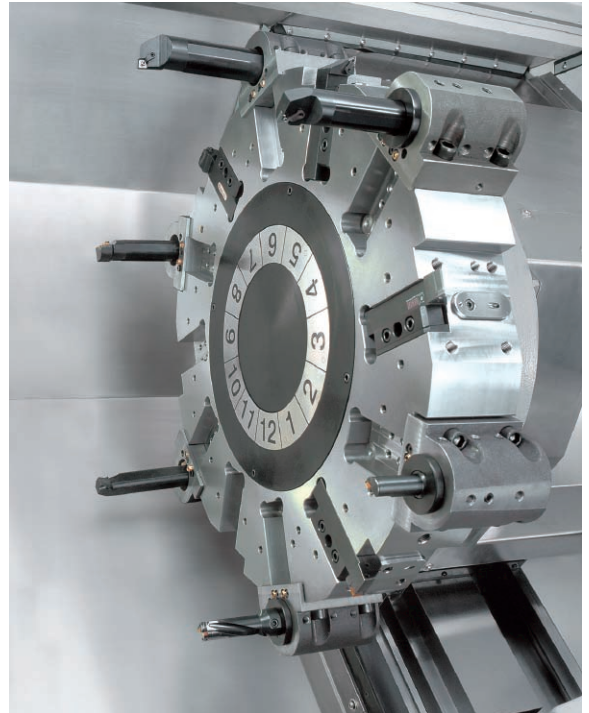
Front + Rear Chuck

By installing air or manual chucks on both the front and rear of the spindle, it becomes possible to machine the ends of long workpieces. This configuration is especially useful in threading pipes.



# ADVANCED TURRET TECHNOLOGY

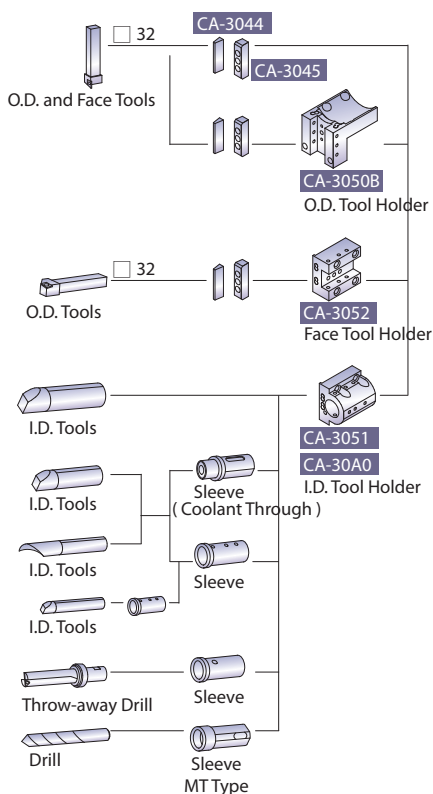
- ▶ While competitors are cutting cost by using straight couplings on their turrets, we insist on using the finest CURVIC couplings available. The curvature of the CURVIC teeth provides a very unique self-centering feature and wider uniform tooth contact throughout all the teeth, therefore, achieving very high accuracy and rigidity. The CURVIC teeth are hardened to HRC 58, which ensures the coupling retains its high accuracy characteristics over long periods of use.
- ▶ 450 mm ( 17.7" ) diameter super high precision CURVIC couplings accurately position the turret disk ( +/- 2 sec. of arc ) and 12,000 Kg ( 26,400 lbs. ) of clamping force ensures abundant turret rigidity for all cutting conditions.
- ▶ The 12-station heavy-duty servo indexing turret achieves 0.5 second indexing times for adjacent stations and 1.5 second times for stations at the opposite end of the disk turret. Index movements are continuous, without pauses, and is capable of turning 380 mm diameter work pieces without interference when using boring tools. The optional 8-station turret even clears up to 584 mm diameter.



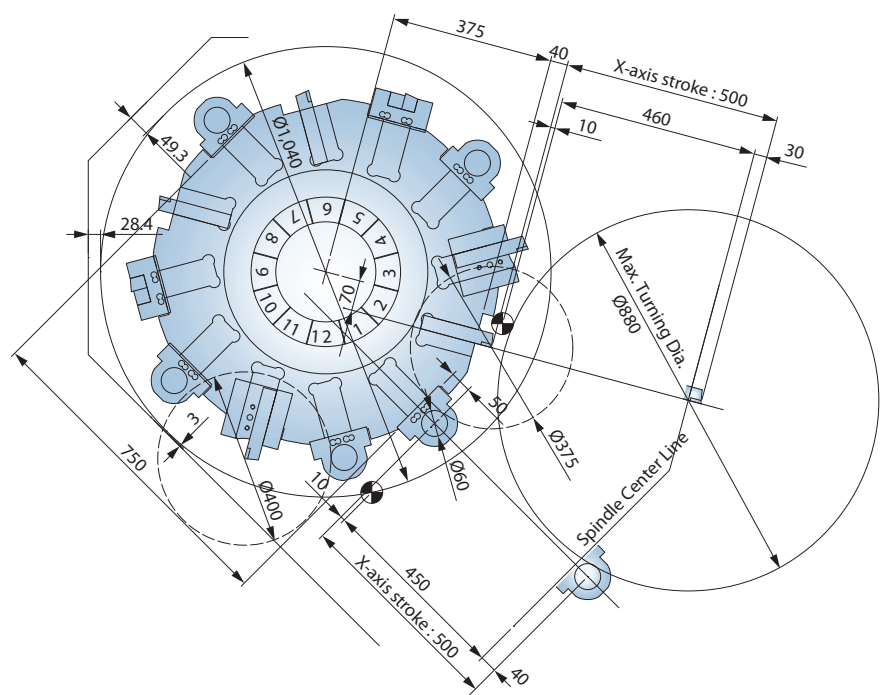
Curvic Coupling

## [ Standard 12-Stations Turret ]

### Tooling System



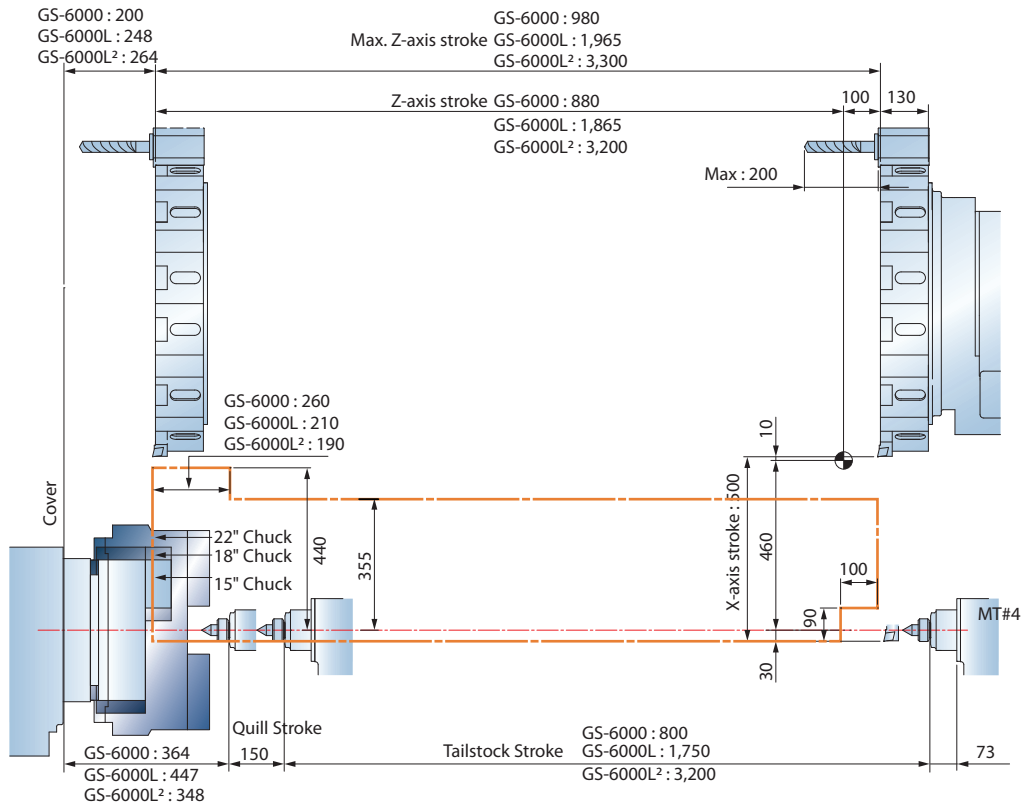
### Interference Diagram



Unit : mm

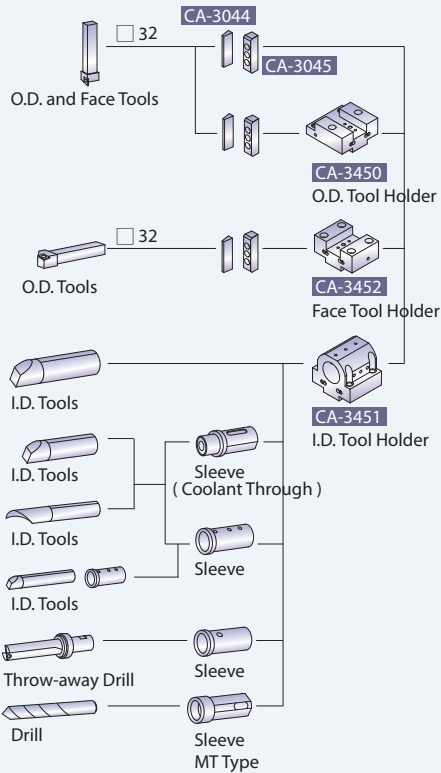


Work Range

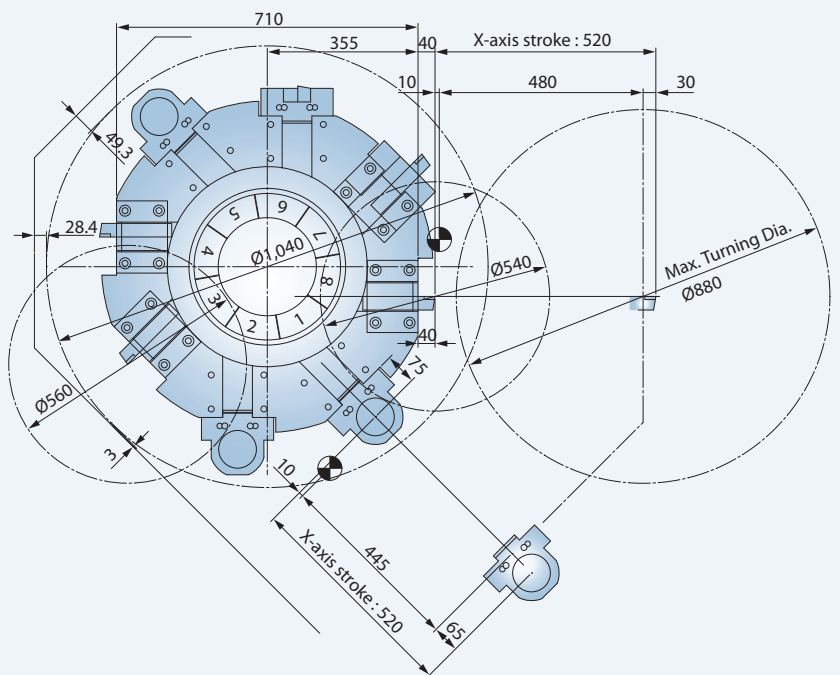


[ Optional 8-Stations Turret ]

Tooling System



Interference Diagram



\*1 Work range with 8-Stations Turret ,please contact Goodway.

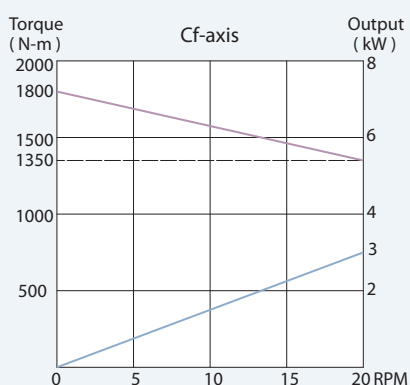
## LIVE TOOLING TURRETS

- ▶ Live tooling and C-axis control capabilities on the GS-6000 series allows the machine to perform multiple tasks on a work piece, 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.
- ▶ More powerful than a standard 40-taper machining center, the GS-6000 series live tooling turret is driven by a 9 kW ( 30 min. ) AC double wound high torque spindle motor to provide ample power, now, even the toughest of jobs may be tackled without a sweat. ( Please see page 12 for motor spec. )
- ▶ 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 0.5 second indexing times for adjacent stations and 1.5 second for stations at the opposite end of the disk.

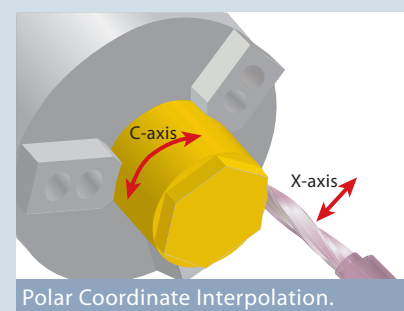
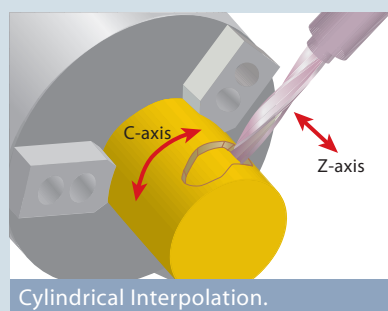
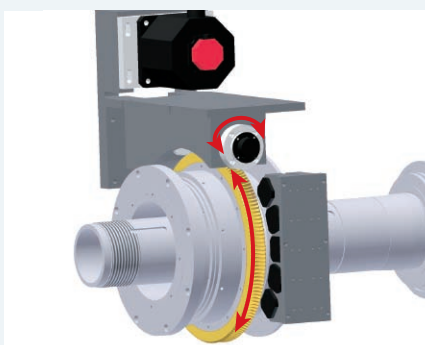


## ULTIMATE C-AXIS SPINDLE

- ▶ The Cf-axis and disk brake system available on the GS-6000 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.



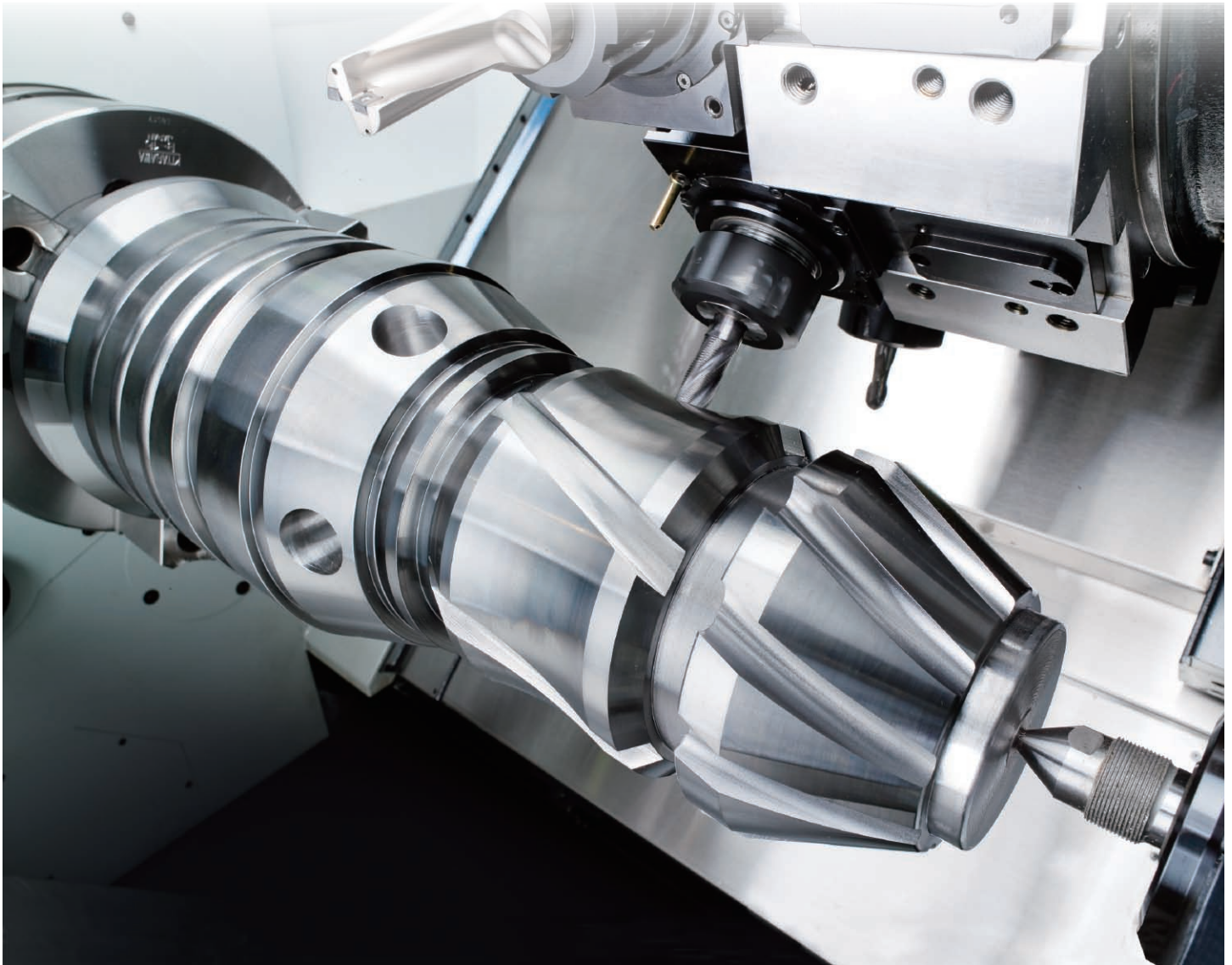
- ▶ Working with the live tooling turret, the Cf-axis and disk brake system enables the machine to perform multiple tasks, such as drilling, tapping, and milling operations, including cylindrical and polar coordinate interpolations, resembling a 4th-axis rotary table on a machining center.
- ▶ With the Fanuc servo motor generating an ultra high resolution of 1,000,000 pulses per spindle rotation and 1,800 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.



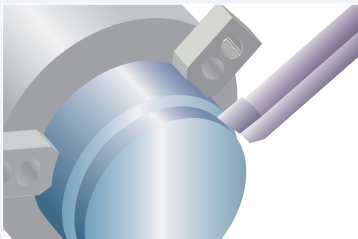




# MACHINING PERFORMANCE



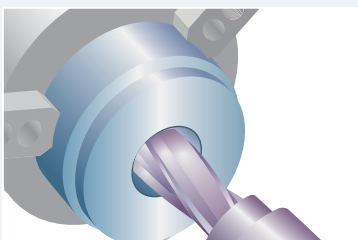
## OD Heavy Cutting Example



Tools	OD Before Cut	OD After Cut	Depth of Cut	Spindle Speed	F / Rev.	Spindle Load	Z-axis Load
( mm )	( mm )	( mm )	( mm )	( rpm )	( mm / rev )		
□ 32	Ø 215	Ø 195	10	195	0.8	97 %	60 %

Raw Material : S45C Model : GS-6000M

## Drill Example



Tools	ID Before Cut	ID After Cut	Spindle Speed	F / Rev.	Tap Diameter	Spindle Load	Z-axis Load
( mm )	( mm )	( mm )	( rpm )	( mm / rev )	( mm )		
Ø 58	-	-	878	0.3	-	123 %	110 %

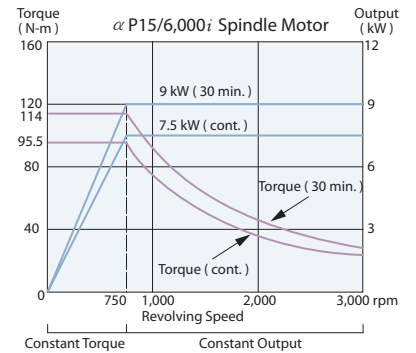
Raw Material : S45C Model : GS-6000M

Machining Capability

	Tools (mm)	Spindle Speed (rpm)	Feedrate (mm/min)	Cutting Speed (m/min)	Cutting Depth (mm)
Drill	Ø 40 HSS	200	48	25	N/A
End mill	Ø 32 HSS 4-flute Rough End mill	375	120	30	25
Tapping	M24 * P3.0	106	318	8	30

Raw Material : S45C Model : GS-6000M

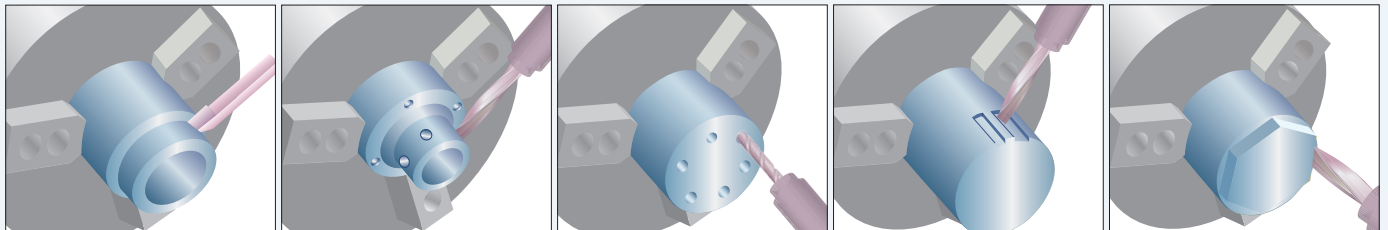
Live Tooling Turret



Specification of Live Tooling Turret

Drive Motor Power (cont.)	Drive Motor Power (30 min.)	Drive Motor	Max. tapping Capacity	Max. Milling Capacity	Gear Ratio
7.5 kW (10 HP)	9 kW (12 HP)	FANUC α P15 / 6,000 i	M 24 mm	Ø 40 mm	1 : 1

GOODWAY Multi-tasking machine can perform the functions below in one setup :



Turning

Side Drilling & Tapping

Face Drilling & Tapping

Keyway Milling

Contour Milling

Sample Work Pieces



# FEATURES

## 【 Standard Features 】



### Chip Conveyor

- ▶ The standard chip conveyor features adjustable timers that allow the operator to set operation intervals according to the amount of chips generated by the machine. Thus, reducing coolant loss to a minimum.

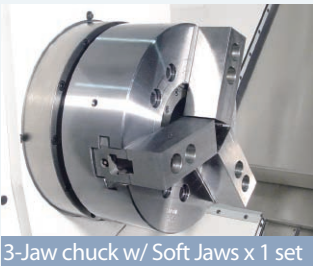
### Separate Coolant Tank



### Tri-color status light



## 【 Optional Features 】



3-Jaw chuck w/ Soft Jaws x 1 set



Air Chuck

- ▶ The air chuck can work with soft or thin materials to prevent from deforming rather than using a hydraulic chuck.

### Steady Rest ( Apply for Long Workpiece )

- ▶ The manual steady rest is adjusted manually which increases accuracy and requires less space than hydraulic steady rests.



Manual Steady Rest



Hydraulic Steady Rest

- ▶ The automatic steady rest is controlled by a program which increases working efficiency.

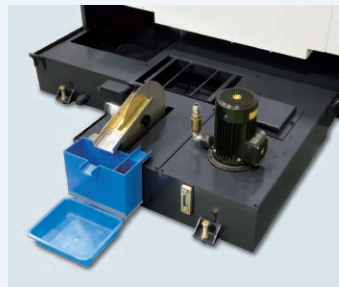
LOAD MONITOR SETTING		1/4		UNIT:%	
Code	AXIS	INITIAL	CURRENT	LIFE	BREAK
1	0000 SP	0	0	0	0
	Z	0	0	0	0
2	0000 SP	0	0	0	0
	Z	0	0	0	0
3	0000 SP	0	0	0	0
	Z	0	0	0	0

NUM-

{ TECH } { MON 1 } { CAN } { } { }

### Load Monitoring

- ▶ The load monitoring function is used to detect abnormal load of tools by monitoring the variation in spindle motor and servo motor loads during the cutting process. When abnormal loads are detected, the machine will stop at program end ( M30 ) or immediately ( feed hold status ) according to tool life value or tool break value respectively.



### Oil Skimmer

- ▶ The optional oil skimmer removes lubrication oil from the coolant tank, thus, keeping the coolant fresh and minimizes manual cleaning effort.

### Tool Setter

- ▶ The optional Renishaw HPR tool presetter simplifies machining setup.





S: Standard

O: Option

-: Not Available

C: Contact GOODWAY

		GS-6000	GS-6000
<b>SPINDLE</b>			
Main spindle configuration	2-Speed Gear	S	S
Rigid tapping & spindle orientation		S	S
Main spindle disk brake		O	O
Cs-axis & disk brake for main spindle*1		O	O
<b>WORK HOLDING</b>			
Hydraulic hollow cylinder for chuck	118 mm ID.	S	-
	180 mm ID.	-	O
Hollow 3-jaws chuck & 1 set soft jaws	15"	S	-
	18"	O	-
	20" ( 180 mm ID. )	-	O
	21"	O	-
	24"*2	O	O
	Air Chuck	O	O
Hard jaws		O	O
Special work holding chuck		C	C
In spindle work stopper		O	O
Spindle liner ( guide bushing )		O	O
Foot switch for chuck operation		S	S
Programmable base & quill hydraulic tailstock		S	S
MT#4 dead center quill		S	S
MT#5 live center quill		O	O
Foot switch for tailstock operation		O	O
Manual steady rest		O	O
Self-centering hydraulic steady rest		O	O
Foot switch for steady rest operation		O	O
Two-stage programmable pressure	Chuck clamping	O	O
	Tailstock thrust	O	O
<b>TURRET</b>			
8-station turret		O	O
12-station turret		S	S
12-station live tooling turret		O	O
Tool holder & sleeve package		S	S
Live tooling tool holders ( 0° x 2 , 90° x 2 )*1		O	O
<b>MEASUREMENT</b>			
Renishaw HPR A tool presetter	Removeable	O	O
<b>COOLANT</b>			
Coolant pump	3 Kg/cm <sup>2</sup>	O	O
	5 Kg/cm <sup>2</sup>	S	S
High-pressure coolant system	20 Kg/cm <sup>2</sup>	C	C
Roll-out coolant tank		S	S
Oil skimmer		O	O
Coolant flow switch		O	O
Coolant level switch		O	O
Coolant intercooler system		O	O
<b>CHIP DISPOSAL</b>			
Chip conveyor with auto timer	Right discharge	S	S
	Rear discharge	-	-
Chip cart with coolant drain		O	O
Chuck air blow		O	O
Tailstock air blow		O	O
Coolant gun		O	O
Oil mist collector		O	O
<b>AUTOMATIC OPERATION SUPPORT</b>			
Bar feeder		O	O
Bar feeder interface		O	O
Gantry-type loader / unloader		O	O
Auto door		O	O
External M-code output	4 sets ( 8 )	O	O
	8 sets ( 16 )	O	O

Specifications are subject to change without notice.

Above standard &amp; optional features also apply to L models.

\*1 Standard on M ( live tooling ) models.

\*2 Tool setter must be deleted.

\*3 10.4" color LCD option needed.

\*4 For servo motor driven power turret only.

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**SAFETY**

		GS-6000	GS-6000
Fully enclosed guarding		S	S
Door interlock ( incl. Mechanical lock )		S	S
Impact resistant viewing window		S	S
Tailstock stroke out - end check		S	S
Chuck cylinder stroke out - end check		S	S
Chuck cylinder check valve		S	S
Low hydraulic pressure detection switch		S	S
Over travel ( soft limit )		S	S
Load monitoring function		S	S

**OTHERS**

		GS-6000	GS-6000
Tri-color machine status light tower		S	S
Work light		S	S
External work light		O	O
Electrical cabinet	Heat exchanger	S	S
	A/C cooling system	O	O
Complete hydraulic system		S	S
Advanced auto lubrication system		S	S
Foundation leveling & maintenance tool kit		S	S
Emergency maintenance electrical part package		S	S
Operation & maintenance manuals		S	S

**CONTROL**

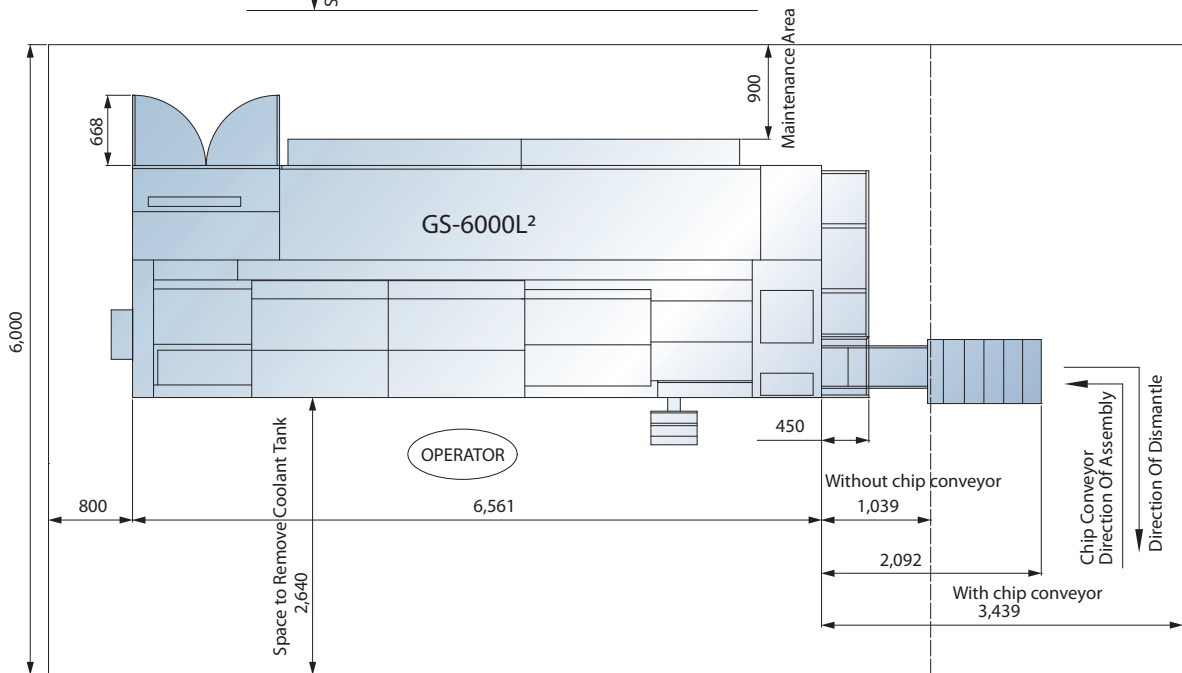
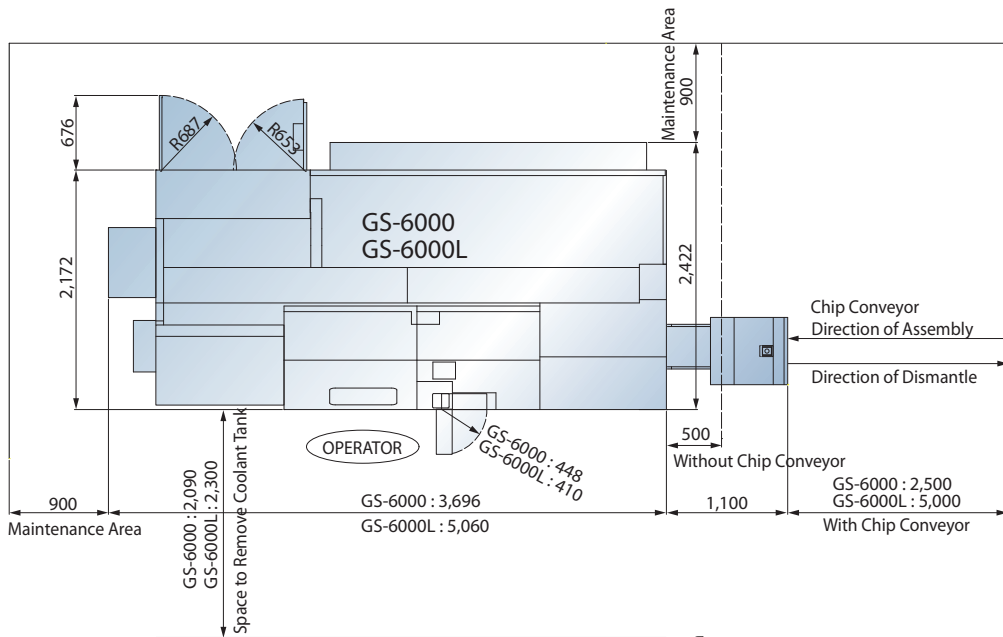
		GS-6000	GS-6000
Fanuc Oi-TD		S	S
Fanuc 31i		O	O

**FANUC CONTROL FUNCTIONS**

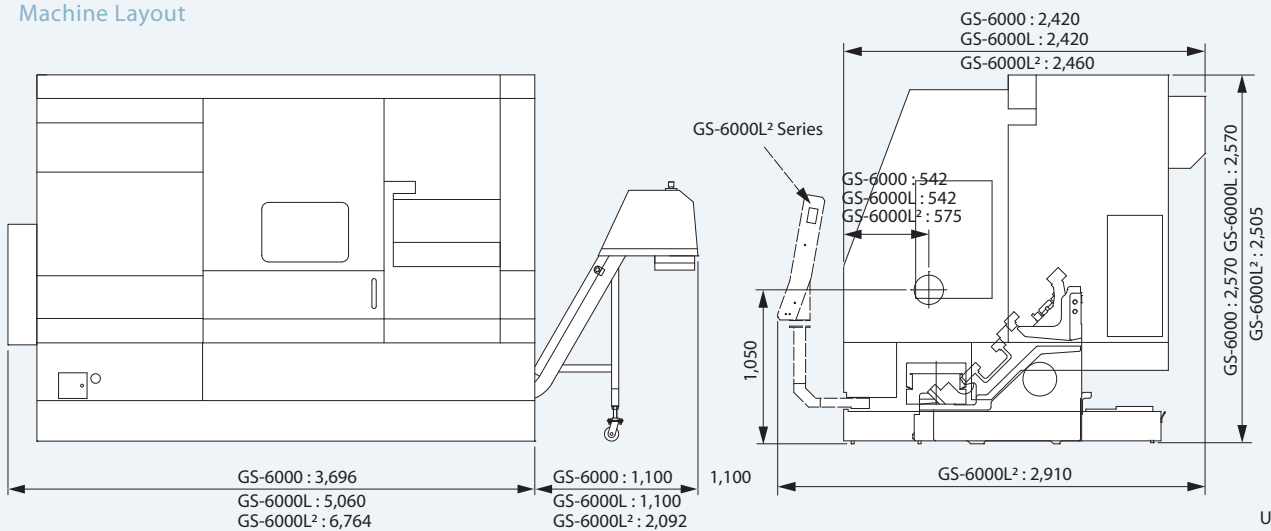
		Oi-TD	31i
PMC system	Oi D PMC 0.025 $\mu$ sec/step	S	-
	31i PMC 25 $\mu$ nsec/step	-	S
Display	8.4" color LCD	S	-
	10.4" color LCD	O	S
Graphic function	Standard	S	S
	Dynamic	O	O
Full keypad	Small - 44 keys	S	-
	Large - 56 keys	O	S
Part program storage length	512K byte	S	-
	1M byte	-	S
	2M byte	-	O
	4M byte	-	O
	8Mbyte	-	O
	400	S	-
Registerable programs	1,000	-	S
	4,000	-	O
	64	S	-
Tool offset pairs	99	O	S
	400	-	O
	499	-	O
	999	-	O
	2000	-	O
Servo control	HRV2 (3)	S	S
Conversational programming	Manual Guide Oi	S	-
	Manual Guide i	O	S
Servo motors	$\alpha$ i	S	S
Spindle motors	$\alpha$ i	S	S
Tool Life Management		S	S
Tool Nose Radius Compensation		S	S
Background editing		S	O
Variable Lead Thread Cutting		S	S
Polygon Turning		S	S*4
Unexpected disturbance torque detection function		S	S
Polar coordinate & cylindrical interpolation		-	O
Multiple Threading		S	S
Run hour & parts counter		S	S
Auto power off function		S	S
Custom macro B		S	S
RS-232 port		S	S
Memory card input /output		S	S
Ethernet		S	S
Fast ethernet		O	O

# GENERAL DIMENSION

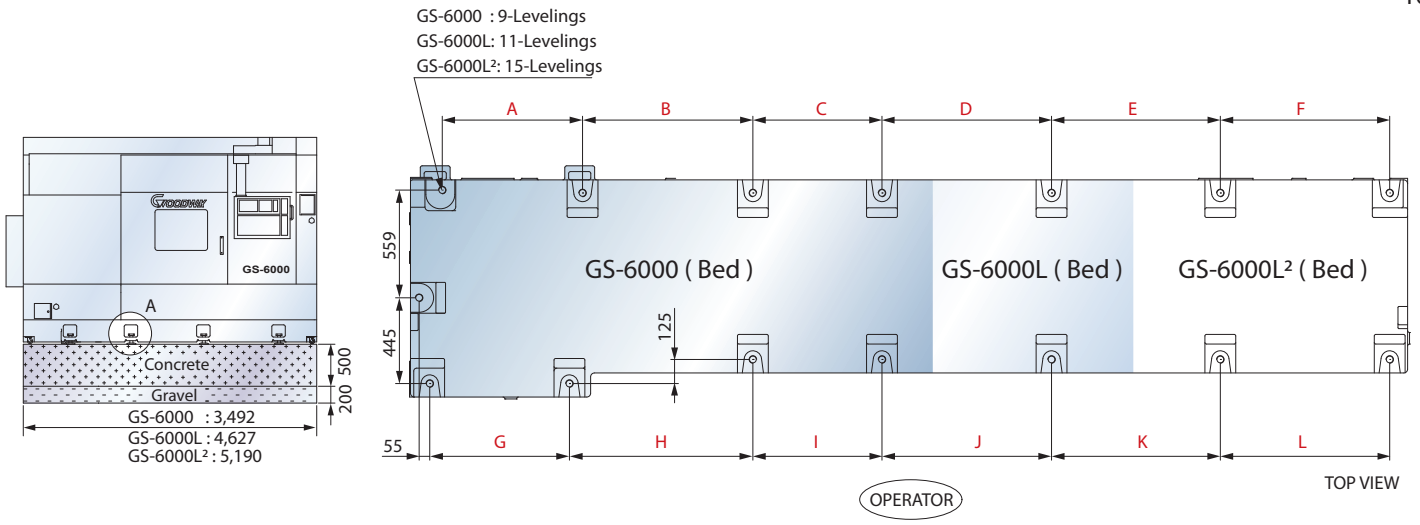
## Foot - Print



## Machine Layout

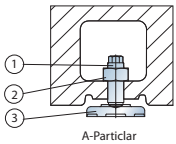


Foundation Requirement



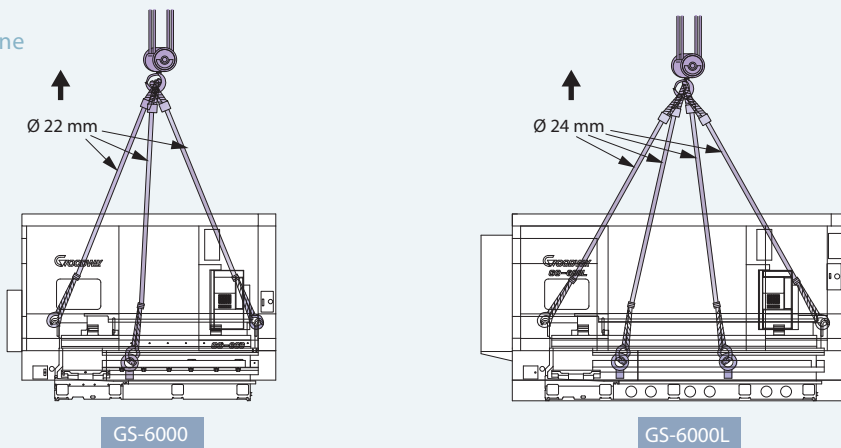
Unit : mm

Model	A	B	C	D	E	F	G	H	I	J	K	L
GS-6000	718	804	895	—	—	—	725	862	895	—	—	—
GS-6000L	718	884	976	879	—	—	725	942	976	879	—	—
GS-6000L²	718	884	770	880	776	879	725	942	770	880	786	879

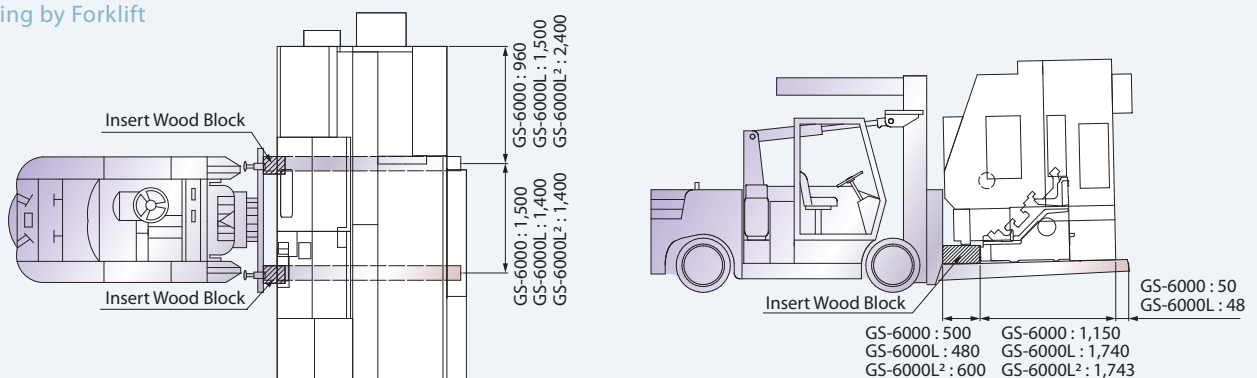


N.O.	Part NO	Part name
1	CA-1029	Levelling Bolt
2	NA3900BA	Hex. Nut M39
3	CA-1030	Levelling Block

Lifting by Overhead Crane



Lifting by Forklift





# MACHINE SPECIFICATIONS

CAPACITY		GS-6000 / 6000L / 6000L <sup>2</sup>	GS-6600 / 6600L / 6600L <sup>2</sup>
Max. swing diameter		Ø 980 mm ( 38.58" )	
Swing over saddle		Ø 710 mm ( 27.95" )	
Max. turning diameter		Ø 880 mm ( 34.64" )	
Max. turning length		950 / 1,980 / 3,300 mm ( 37.40" / 77.95" / 129.92" )	
Chuck size		15" ( Opt. 18" )	20" ( Opt. Hyd. Chuck ) 22" ( Opt. Air Chuck )
Bar capacity		Ø 115 mm ( 4.52" )	Ø 180 mm ( 7.09" ) Ø 205 mm ( 8.07" )
SPINDLE			
Hole through spindle		Ø 130 mm ( 5.11" )	Ø 205 mm ( 8.07" )
Spindle bearing diameter		Ø 180 mm ( 7.08" )	Ø 260 mm ( 10.23" )
Hydraulic cylinder		Ø 15"	Ø 20" —
Spindle nose		A2-11	A2-15
Spindle motor type		$\alpha$ 30 / 6,000 <i>i</i>	
Motor output ( Cont. )		30 kW ( 40 HP )	
Motor output ( 30 min. )		37 kW ( 50 HP )	
Motor full output speed		623 rpm	
Spindle drive system		V-Belt + Gear Box	
Spindle drive ratio	L	3 : 20	
	H	27 : 50	
Spindle speed range	L	550 rpm	550 rpm
	H	2,000 rpm	1,100 rpm
Spindle full output speed	L	2,048 N-m @ 172 rpm ( 30 min. )	
	H	567 N-m @ 623 rpm ( 30 min. )	
X & Z AXES			
Max. X-axis travel* <sup>1</sup>		500 mm ( 19.68" )	
Max. Z-axis travel* <sup>1</sup>		980 / 1,965 / 3,300 mm ( 38.58" / 77.36" / 129.92" )	
X axis rapids		20 m/min. ( 788 IPM )	
Z axis rapids		24 / 24 / 12 m/min. ( 945 / 945 / 473 IPM )	
Slide way type		Box Way	
Feed rates		1~ 4,800 mm / min.	
X-axis servo motor		AC 6 kW ( 8 HP , Fanuc $\alpha$ 40B / 3,000 <i>i</i> , Absolute encoder, 1,000,000 / rev. )	
Z-axis servo motor		AC 7 kW ( 9.4 HP , Fanuc $\alpha$ 30 / 3,000 <i>i</i> , Absolute encoder, 1,000,000 / rev. )	
X-axis ball screw Ø [ pitch ]		Ø 40 mm [ 8 mm ]	
Z-axis ball screw Ø [ pitch ]		Ø 45 mm [ 12 mm ] / Ø 50 mm [ 16 mm ] / Ø 63 mm [ 16 mm ]	
X / Z axes thrust ( Cont. )		3,046 / 1,603 Kg ( 6,715 / 3,543 lbs )	3,046 / 1,202 Kg ( 6,715 / 2,656 lbs )
TURRET			
Stations		12	
Indexing drive		Fanuc AC Servo motor $\beta$ 22 / 2,000 <i>i</i>	
Indexing speed		0.5 sec. ( Adjacent ) / 1.5 sec. 180° ( Single step )	
Accuracy		Positioning : $\pm$ 0.00069°, Repeatability : $\pm$ 0.00027°	
OD tool shank size		□ 32 mm ( 1-1/4" )	
ID tool shank size		Ø 60 mm ( 2-1/4" )	

<b>LIVE TOOLING TURRET ( OPTIONAL )</b>	<b>GS-6000 / 6000L / 6000L<sup>2</sup></b>	<b>GS-6600 / 6600L / 6600L<sup>2</sup></b>
Max. turning length	830 / 1,860 / 3,210 mm ( 32.67" / 73.22" / 126.37" )	
Max. turning diameter	Ø 880 mm ( 34.64" )	
Stations	12	
Live tooling stations	12 ( Live tooling tools rotate in working position only )	
Live tooling drive motor ( Cont. / 30 min. )	AC 7.5 / 9 kW ( 10 / 12 HP , Fanuc $\alpha$ P15 / 6,000 <i>i</i> , Absolute encoder , 1,000,000 / rev. )	
Live tooling torque	120 N-m @ 750 rpm [ 30 min. ]	
Indexing drive type	Fanuc AC Spindle motor	
Index speed	0.5 sec. ( Adjacent ) / 1.5 sec. 180 degrees ( Single step )	
OD tool shank size	□ 32 mm ( 1-1/4" )	
ID tool shank size	Ø 60 mm ( 2-1/4" )	
Live tooling shank size	ER 50 ( Ø 30 mm )	
Live tooling RPM range	10 ~ 3,000 rpm	
<b>Cf-AXIS SPINDLE ( OPTIONAL )</b>		
Cf-axis drive motor	$\alpha$ 12 / 3,000 <i>i</i> ,	
Cf-axis drive ratio	1 : 150	
Cf-axis rapid	20 rpm	
Cf-axis torque output ( Cont. )	1,800 N-m ; 183.6 kgf ; 1,327 ft-lbs	
Min. spindle indexing angle	0.001°	
Dynamic accuracy	± 0.02°	
<b>TAILSTOCK</b>		
Quill center taper	MT#4 ( Dead center ) / MT#5 ( Live center opt. )	
Quill diameter / travel	Ø 110 mm / 150 mm ( 4.33" / 5.90" )	
Tailstock base travel	800 / 1,750 / 3,200 mm ( 31.49" / 68.89" / 125.98" )	
Programmable quill / base	Yes / Yes	
Programmable base type	Position by Z-axis	
<b>GENERAL</b>		
Positioning accuracy ( X / Y / Z )	± 0.005 mm ( ± 0.0002" )	
Repeatability ( X / Y / Z )	± 0.003 mm ( ± 0.0001" )	
CNC control	Fanuc Oi-TD ( Opt. 31 <i>i</i> )	
Voltage / Power requirement	AC 200 / 220 +10% to -15% 3 phase / 64 KVA	
Air pressure	6 kgf / cm <sup>2</sup>	
Hydraulic tank capacity	15 L ( 3.3 gal. )	
Coolant tank capacity	240 / 320 / 680 L ( 52.8 / 70.4 / 149.5 gal. )	
Coolant pump	1 kW ( 1.5 HP , 60 Hz ) rated at 5 bar ( 72 PSI )	
Machine weight	12,000 / 14,000 / 18,000 Kg ( 26,450 / 30,865 / 39,683 lbs )	
Dimensions L × W × H	3,696 x 2,420 x 2,570 / 5,060 x 2,420 x 2,570 / 6,764 x 2,910 x 2,505 mm 145.66" x 95.27" x 101.18" / 199.21" x 95.27" x 101.18" / 266.29" x 114.56" x 98.62" )	

Specifications are subject to change without notice.

\*1 The specification of each model may be slightly different, please refer to the interference diagram.



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