

# FM Series

FM63 | FM85

SG WIA 5-Axis Vertical Machining Center

# Cutting Edge Technology

ITEM		FM63	FM85
Table size	mm(in)	Ø630 (Ø24.8")	Ø850 (Ø33.5")
Max. load capacity	kg (lb)	600 (1,323)	1,000 (2,205)
Spindle speed	rpm	15,000 [24,000/40,000]	15,000 [9,000/24,000/30,000]
Spindle power (Max/Cont.)	kW (HP)	31/25 (41.6/33.5) [26/20 (35/27)] [26/18 (35/24)]	31/25 (41.6/33.5) [42/31 (56.3/41.6)] [26/20 (35/27)] [120/80 (160.9/107.3)]
No. of tools	ea	34 [68, 102]	
Travel (X/Y/Z)	mm(in)	650/600/500 (25.6"/23.6"/19.7")	850/920/600 (33.5"/36.2"/23.6")
Rapid traverse rate (X/Y/Z)	m/min (ipm)	60/60/60 (2,362/2,362/2,362)	45/45/45 (1,772/1,772/1,772)



FM63

FM85

# Applications & Parts

VACUUM PUMP  
ROTOR



IMPELLER



MOUNTING  
SHELL



HOUSING,  
GEAR BOX



HOUSING,  
ELECTRIC MOTOR



BLADE,  
COMPRESSOR



HOUSING,  
ENGINE

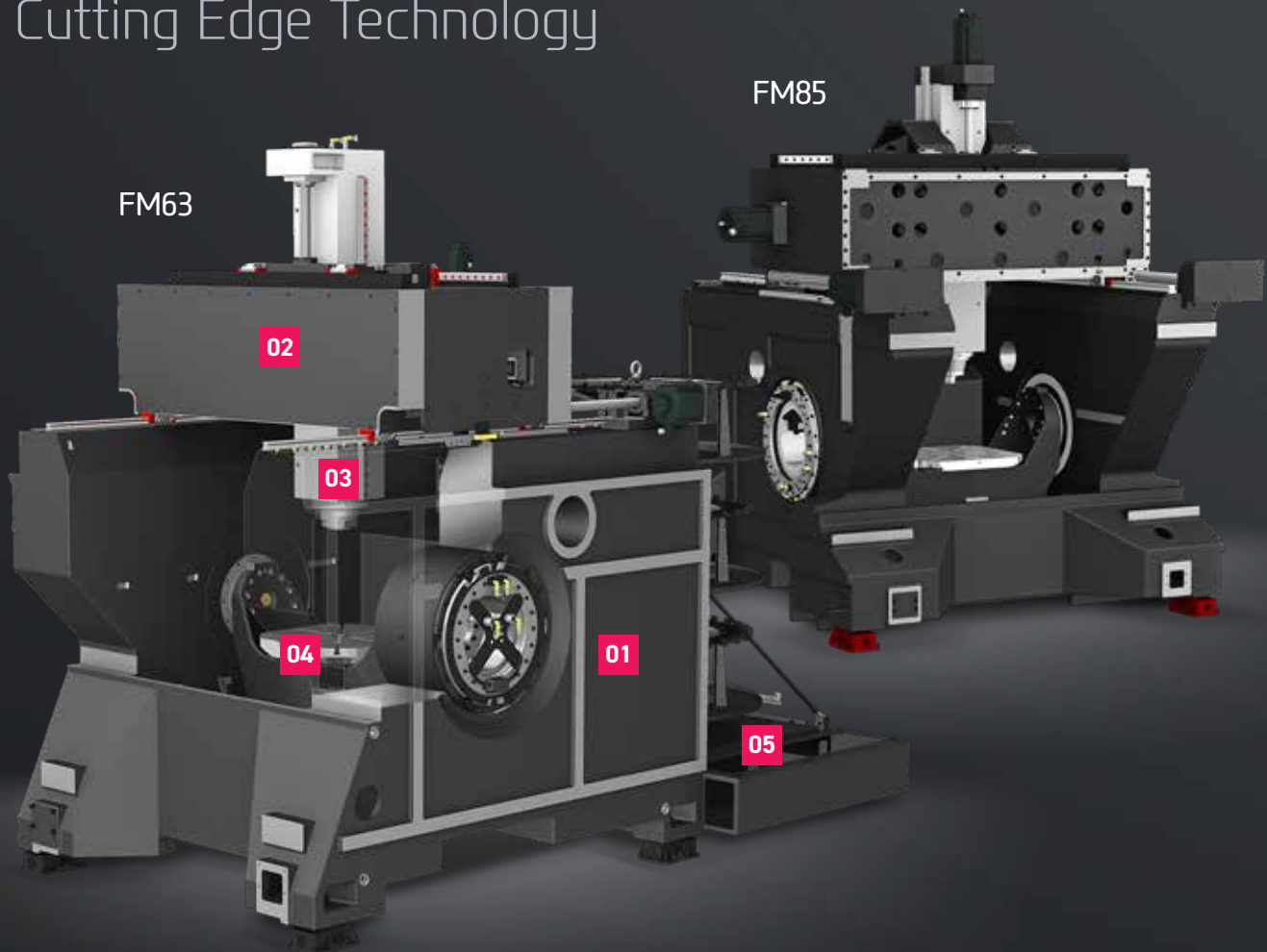


TIRE MOLD



# FM SERIES

Cutting Edge Technology



## FM63

❖ HEIDENHAIN TNC640 Rapid traverse rate (X/Y/Z) : 50/50/50 m/min (1,967/1,967/1,967 ipm)

**60/60/60** m/min (2,362/2,362/2,362 ipm)  
Rapid traverse rate (X/Y/Z-axis)

**70/110** r/min  
Rapid traverse rate (A/C-axis)

**650/600/500** mm (25.6"/23.6"/19.7")  
Travel (X/Y/Z-axis)

**150/360** deg  
Travel (A/C-axis)

## FM85

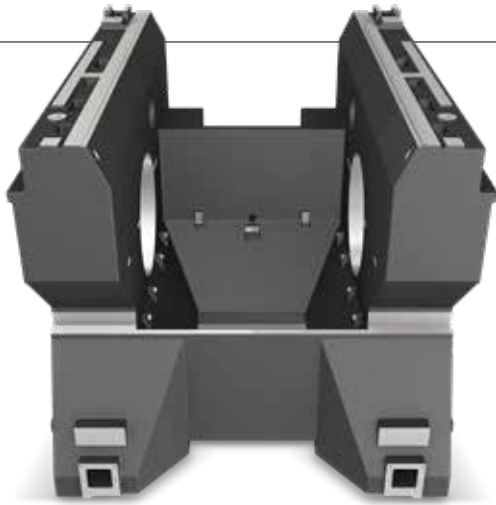
**45/45/45** m/min (1,772/1,772/1,772 ipm)  
Rapid traverse rate (X/Y/Z-axis)

**50/100** r/min  
Rapid traverse rate (A/C-axis)

**850/920/600** mm (33.4"/36.2"/23.6")  
Travel (X/Y/Z-axis)

**150/360** deg  
Travel (A/C-axis)

# Basic Features

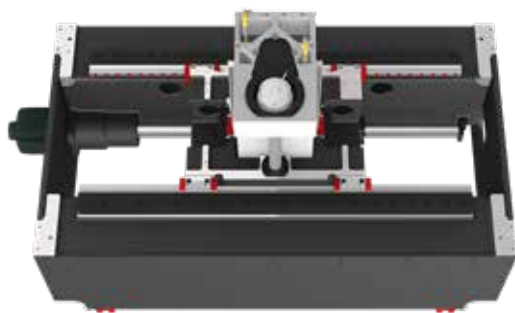


01

## Column/Bed All-in-One Structure

FM series are designed with an integrated one piece column-bed structure provides superior stability when compared with separate structures. The All-in-One structure delivers high rigidity and excellent vibration absorption providing exceptional performance and superior surface finishes.

<Monoblock Structure>



02

## Box-in-Box Structure (X/Z Axis)

The pusher(head body) in the saddle of X-axis, which surrounds the spindle cartridge, is designed with box-in-box type. This thermal equilibrium structure helps minimize thermal deformation.

## Built-In Spindle

03

The built-in spindle minimizes spindle vibration, enabling outstanding performance in a high-precision cutting environment such as mold products.



## DDM Tilting Rotary Table

04

The DDM rotary table is designed to embody highly accurate high speed simultaneous 5-axis motion which allows for the machining of complex prismatic parts with superior accuracy and surface finishes.



## Rack Type Magazine

05

A single step rack type magazine of 34 tools is provided as a standard. 2 step 68 tools and 3 step 102 tools featured as an option.

FM63 :  
Twin Arm ATC

FM85 :  
Pickup Type ATC [Opt. Twin Arm]



01  
FM Series

# Body Structure

High-Precision & Speed 5-Axis Vertical Machining Center

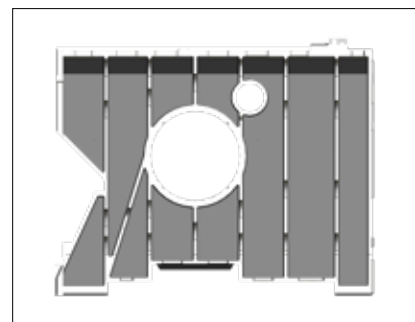
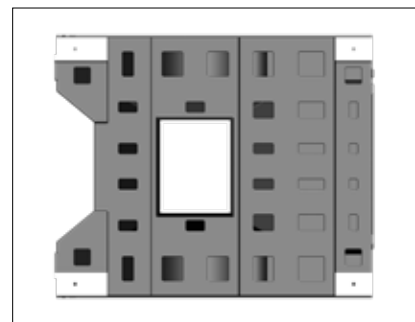
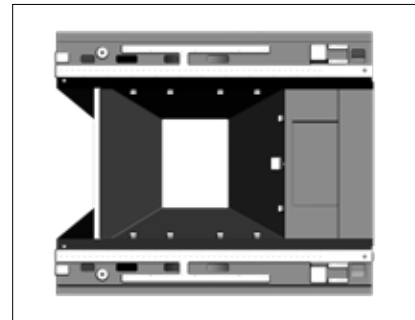
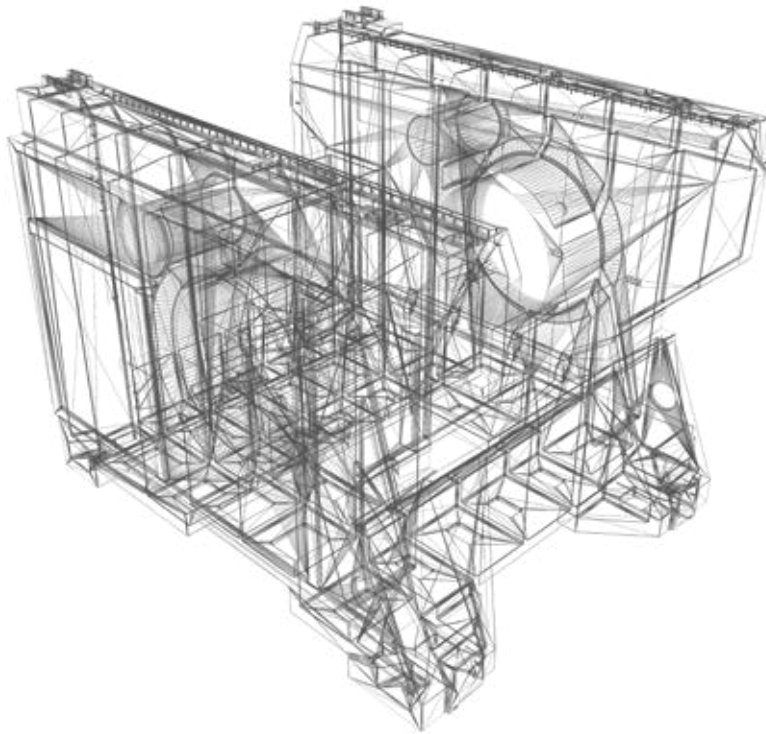


The strength and rigidity of the base body structure is a direct link to the precision of a machine tool.

SG WIA's advanced body design coupled with an integrated bed/column structure is the foundation of machining perfection.

The advantages of SG WIA's body design is not limited only to extreme cutting speeds.

The integrated body remarkably reduces the minute vibration during machining ensuring high precision and superior surface finishes. The SG WIA FM series will exceed all of your expectations.



## Optimal Structural Analysis (FEM)

The FM series are designed to be the optimum structure through SG WIA's exclusive structural analysis.

## Column / Bed All-in-One Structure (Rigidity has improved by 130%)

The FM series are designed with an integrated one piece column-bed structure providing superior stability when compared with separate structures. The All-in-One structure delivers high rigidity and excellent vibration absorption providing exceptional performance and superior surface finishes.

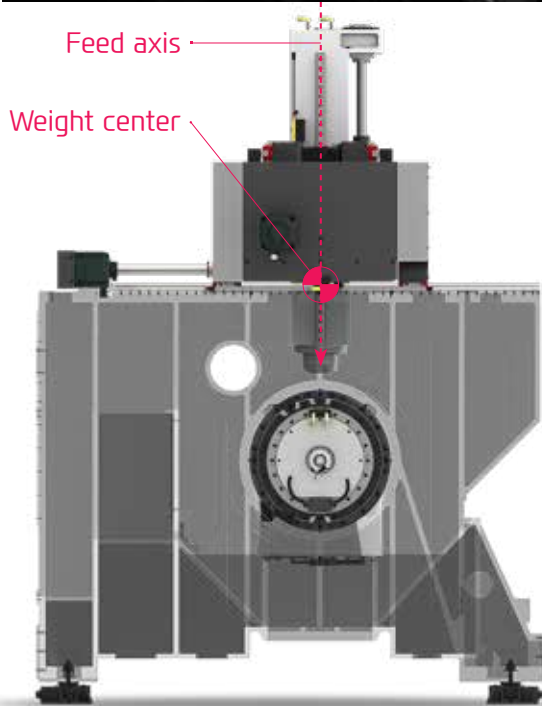
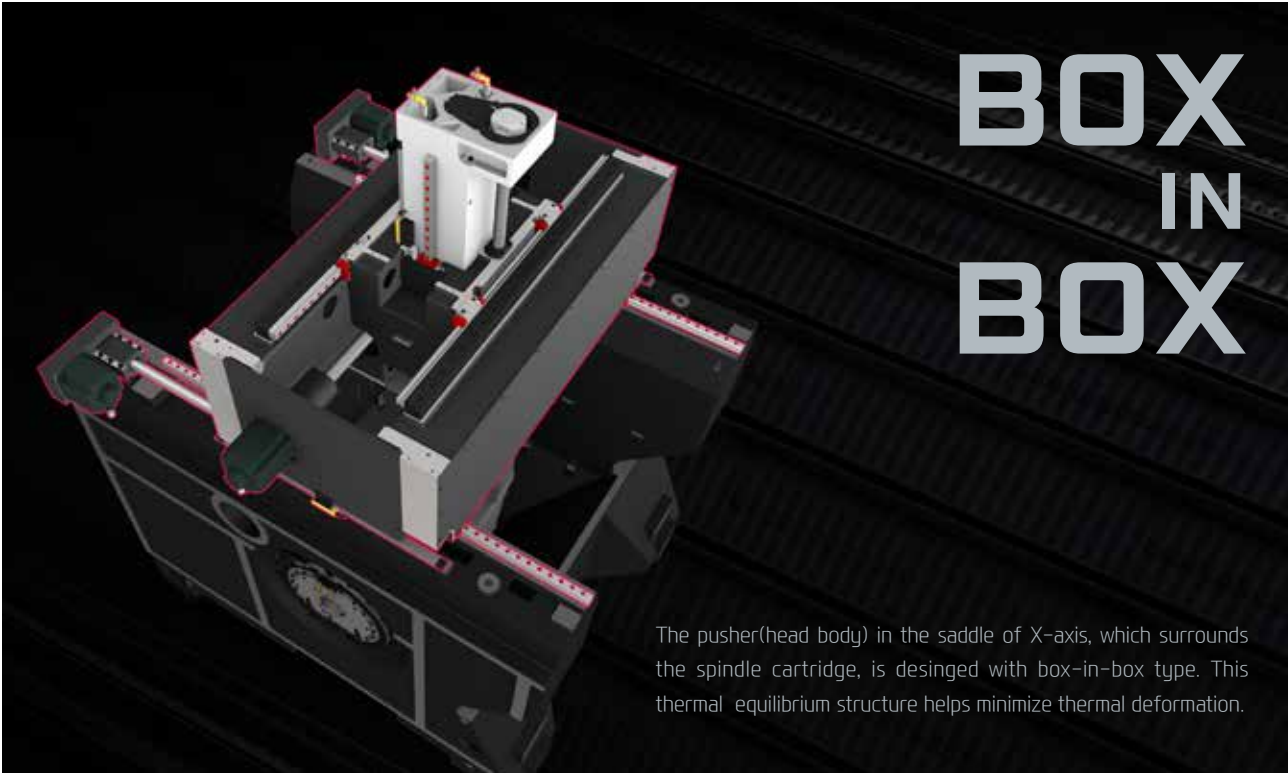
- > The monoblock design and integrated bed/column structure provides high rigidity ensuring outstanding dynamic characteristics
- > Highly rigid structure without holes on the side wall and a minimal number holes are required on the top and bottom top area
- > Casting rib structure optimized for high rigidity
- > The integrated rotary table A-axis/column structure ensures high rigidity and superior precision
- > The bed structure's agronomical design allows for easy access to the work area

# 02

FM Series

## Slideway Features

High-Precision & Speed 5-Axis Vertical Machining Center



### Symmetric Structure of Z-axis

Vibration and thermal displacement during travel can be minimized by symmetric structure of Z-axis where travel axis is aligned with the weight center of spindle.

### Y-axis Double Ballscrew Structure

The Y-axis is driven by two ball screws and feed motors to provide unprecedented speed, accuracy, stability, and acceleration than general purpose machines.

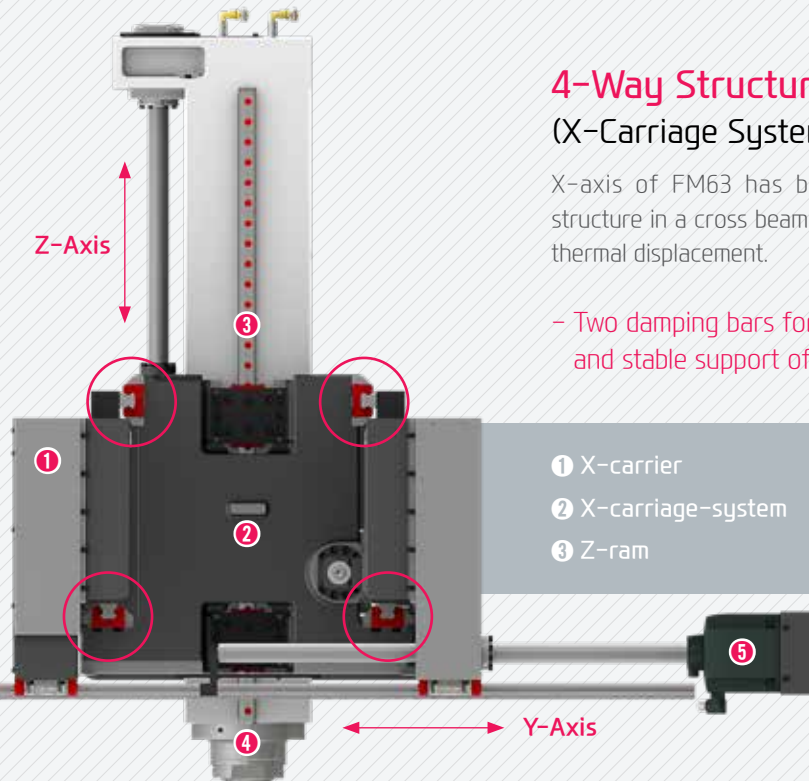
FM63

**650/600/500** mm (25.6"/23.6"/19.7")  
Travel (X/Y/Z)

FM85

**850/920/600** mm (33.4"/36.2"/23.6")  
Travel (X/Y/Z)





## 4-Way Structure on X Axis (X-Carriage System)

X-axis of FM63 has box-type saddle design with 4-way structure in a cross beam to realize improved strength and minimal thermal displacement.

- Two damping bars for the X and Z axis slide providing rigid and stable support of the ram

- |                     |                               |
|---------------------|-------------------------------|
| ① X-carrier         | ④ Spindle                     |
| ② X-carriage-system | ⑤ Drive for Y-carriage-system |
| ③ Z-ram             |                               |



### High-Speed Roller LM Guideway

The FM series features roller type LM guideway to reduce non-cut time with faster acceleration while providing high rigidity.

### ⦿ Feed Axis Acceleration/Deceleration (X/Y/Z axis)

**FM63 - 1.0G/0.8G/1.0G    FM85 - 0.6G/0.6G/0.8G**

❖ Acceleration/deceleration is slightly different when you choose HEIDENHAIN PLC.



### High-Precision Linear Scale (Standard)

The FM series are equipped with linear scales on all axis providing high precision positioning accuracy and compensates for ball screw thermal displacement ensuring extremely precise machining.

In addition, the absolute type linear scale is installed in close proximity to the ball screw of each axis. During operation an added benefit is not being require to home the machine.

03  
FM Series

## Built-in Spindle

Long Lasting High Accuracy & Excellent Performance  
5-Axis Vertical Machining Center



# Built-in Spindle

## Built-in Spindle

The built-in spindle minimizes spindle vibration, enabling outstanding performance in a high-precision cutting environment such as mold products.

## Spindle Cooling

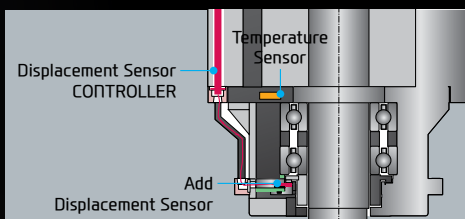
Spindle temperature is controlled by the use of a spindle oil chiller. This ensures consistent spindle temperature which minimizes thermal displacement.



## HSK Tool Holder

HSK tool holder is utilized for precise positioning with less expansion in the spindle taper during high speed rotation. This ensures an excellent level of precision for die mold machining.

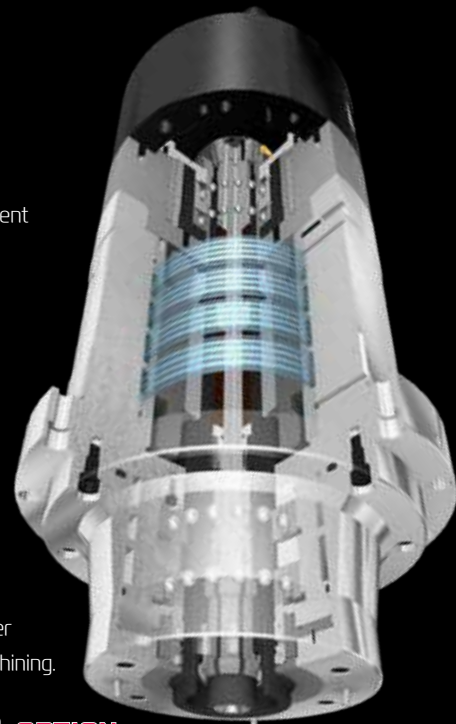
## Through Spindle Coolant {20/30/70 bar (290/435/1,015 psi)} **OPTION**



## Spindle Heat Displacement Sensor

By attaching a hardware heat displacement sensor to the spindle cartridge, the amount of thermal displacement generated during machining is directly recognized and corrected by the displacement amount.

Heat Displacement Sensor Calibration + Displacement Sensor Calibration



## Spindle

ITEM	Speed r/min	Power (Max./Cont.) kW (HP)	Torque (Max./Cont.) N·m (lbf·ft)	Tool Holder
FM85	9,000	42/31 (56.3/41.6)	175/130 (129/95.9)	HSK-A63
FM63   FM85	15,000	31/25 (41.6/33.5)	153/123 (112.8/91)	HSK-A63
FM63   FM85	24,000	26/20 (35/27)	85.9/66.5 (63.4/49)	HSK-A63
FM85	30,000	120/80 (160.9/107.3)	38.2/25.5 (28.2/18.8)	HSK-E40
FM63	40,000	26/18 (35/24)	9.9/6.9 (7.3/5)	HSK-E40

# 04

FM Series

## Tilting Rotary Table

Super Quality & Productivity  
5 Axis Vertical Machining Center



### Mill-Turn Table

Unlike turning centers, where the spindle rotates, on machining centers the tool rotates and machining takes place. Hence, even for high performance 5-axis machining centers turning operation has to be separated. However, by utilizing the table turning function on FM Series, both turning & machining center operations can be implemented.

You can experience complete turning of tough materials from rough cutting to finish cutting with max 800rpm high torque DDM high speed table.



FM63

**500** kg (1,102 lb)  
Max. Load Capacity

**800** r/min  
C-axis Speed

FM85

**700** kg (1,543 lb)  
Max. Load Capacity

**600** r/min  
C-axis Speed

# Tilting Rotary Table

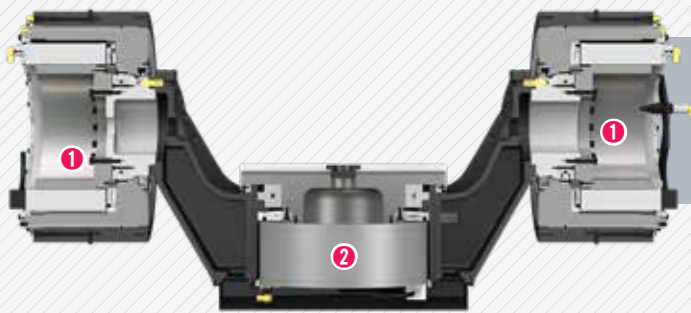
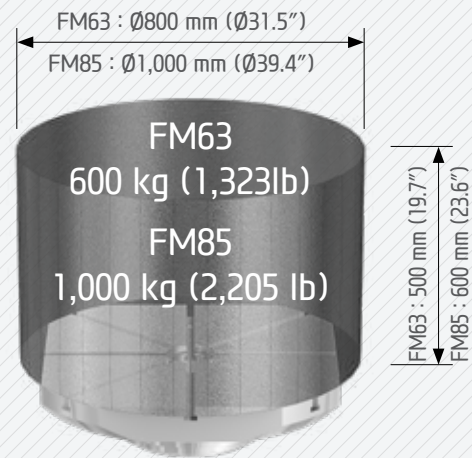


## DDM Tilting Rotary Table

The FM series has a **tilting rotary table** is designed to embody highly accurate high speed simultaneous 5-axis motion which allows for the machining of complex prismatic parts with superior accuracy and surface finishes.

The direct drive system utilizes **direct drive motor (DDM)** delivering high precision and high speed for improved productivity. The integrated **A-axis housing/column** design ensures high rigidity.

❖ The FM series may cause some interference in the machining area. Please check the interference area chart on page 36 of the catalog.



### DDM TABLE (Simultaneous 5-Axis)

- ① A-axis built-in motor (tandem type)
- ② C-axis built-in motor

- ⊙ A/C indexing angle : **+30°~-120°/360°**
- ⊙ FM63 A/C indexing speed : **70/110 rpm**
- ⊙ FM85 A/C indexing speed : **50/100 rpm**



## A/C-Axis Rotary Scales Standard

Scale integrated YRTM bearing is assembled directly to the C-axis rotary table providing high precision positioning accuracy and repeatability

- ⊙ **A-axis** : **Rotary Scales** (5 sec. precision)
- ⊙ **C-axis** : **YRTM Bearing** (Scale embedded bearing)

# 05

FM Series

## ATC & Magazine

High-Precision & Speed 5-Axis Vertical Machining Center



### ATC & Tool Magazine

Tool change time (chip-to-chip) of 4.5 seconds is the best in its class. The rack type tool change mechanism was developed to add unprecedented extra-large capacity tool for vastly complex 5 axis machining applications.

A single step rack magazine of 34 tools is provided standard. 68 and 102 tool capacity are optional.

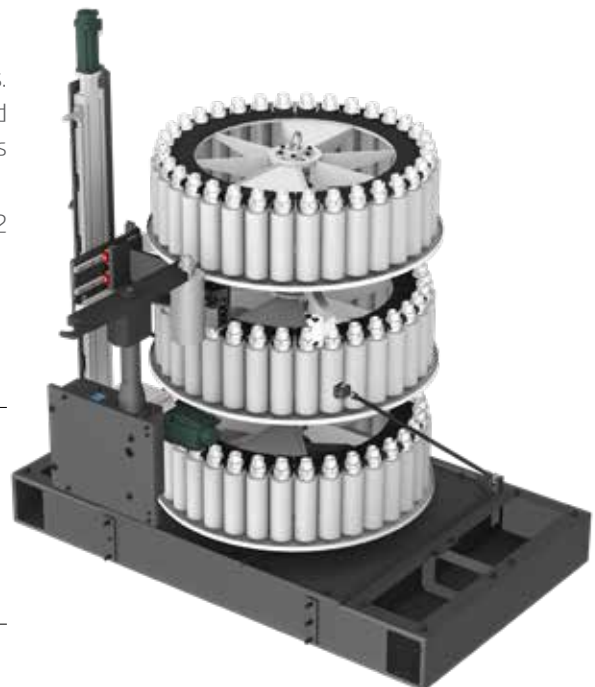
<FM85 : Multi Step Rack Type Magazine & TWIN ARM ATC - Option>

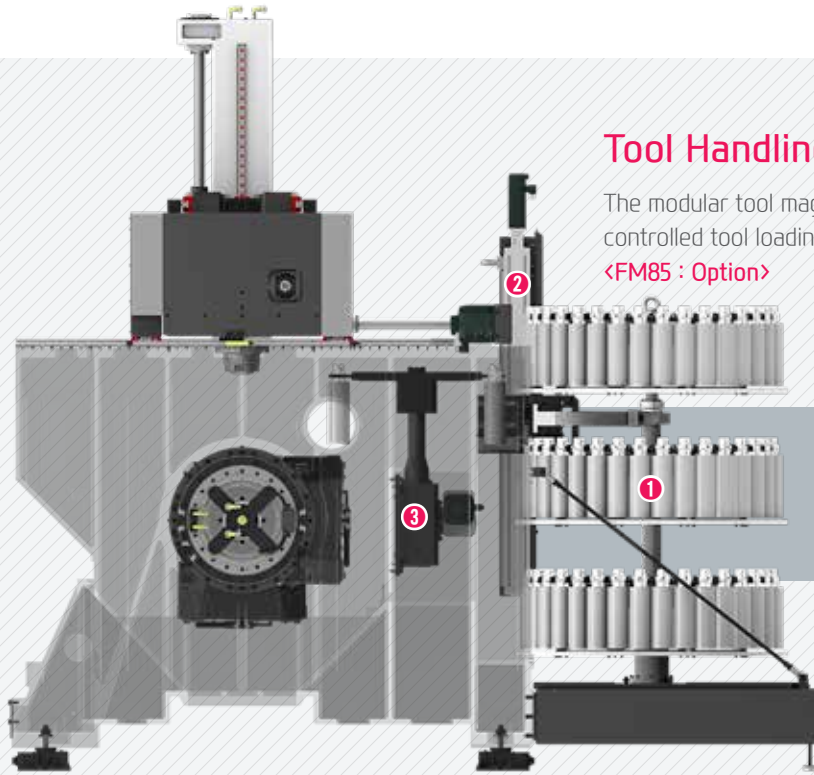
### Rack Type Magazine

**34 [68, 102]** ea  
No. of tools

**4.5** sec  
Tool change time (C-C)

❖ C-C : FM63 - 3kg (6.6lb) tool base





## Tool Handling System (2-Axis Loading)

The modular tool magazine of FM63 is designed as a 2-axis controlled tool loading system for quick tool change.

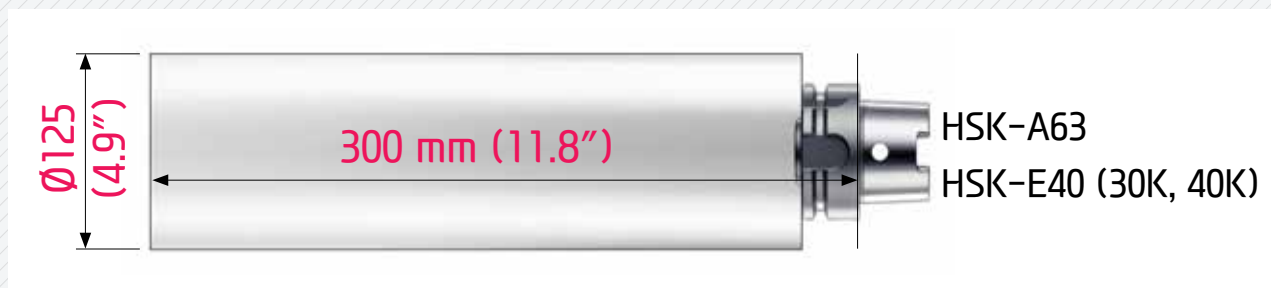
<FM85 : Option>

- ① Rack Type Tool Magazine
- ② Tool Handling System
- ③ ATC (Twin Arm)

## Magazine

The tool magazine and machining area are completely separated by a shutter door to prevent coolant and chip contamination out of the tool storage area maintaining high precision and cleanliness. Minimal tool change distance between the tool changer and work area permits for a rapid tool change.

In addition, collision is avoided regardless of A-axis position eliminating the need for homing of A-axis.



- ⊙ Max. Tool Dia. (W/T Adjacent Tool) :  $\varnothing 90 / \varnothing 125$  ( $\varnothing 3.5'' / \varnothing 4.9''$ )
- ⊙ Max. Tool Length : 300 mm (11.8'')
- ⊙ Max. Tool Weight : 8 kg (17.6 lb) [40K : 1.5 kg (3.3 lb)]





# FAST & DYNAMICS & CONVENIENCE

- Highest level of acceleration and deceleration (FAST): Acc./Dec. time-1G
- High performance built-in 15,000 rpm spindle (DYNAMIC) supplying 153 N·m (113 lbf·ft) of torque : Breaking the mold regarding high speed spindle and high torque
- The 22" monitor allows for easy viewing and accessibility through its ergonomic design (CONVENIENCE)

Those are just some of the values that the FM series pursues



# 06

FM Series

# SIEMENS Controller

The Powerful CNC Platform for Machine Tools



**SINUMERIK ONE**  
The CNC for highest productivity

## SINUMERIK ONE

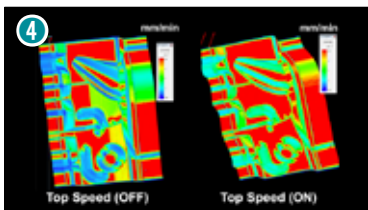
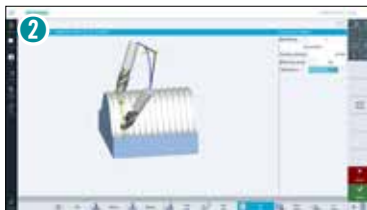
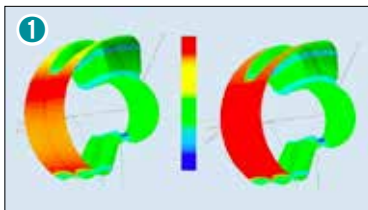
SINUMERIK ONE is the latest SIEMENS controller with enhanced machining quality and productivity.

ITEMS	SINUMERIK 840D	SINUMERIK ONE	REMARKS
5-axis Machineing Time	202 sec	192 sec (5% dec.)	Siemens internal evaluation
3-axis Machineing Time	934 sec	840 sec (10% dec.)	Siemens internal evaluation
NC Performance (CPU)	100%	150 % (50% inc.)	Block cycle time (NCU 730 vs 1760)
PLC Performance (Logic)	20 ~ 40 ms	5 ~ 7 ms (75% inc.)	Logic bit program type (NCU 730 vs 1760)

## Various Software

Compared to SINUMERIK840D SL, SINUMERIK ONE provides various software as standard which helps to enhance high quality machining and user convenience.

ITEMS	840D SL	SINUMERIK ONE	REMARKS
① Advanced Surface	Std.	Std.	Machining accuracy assistance
② Top Surface	Opt.	Std.	Compsurf (Cycle832)
③ Top Speed Plus	Π/A	Std.	Machining accuracy enhance, cycle time decrease
④ DXF Reader (P56)	Opt.	Std.	DXF cad file run on cnc
⑤ EES (Execution external storage)	Opt.	Std.	External program usage without executing extcall



## High Performance External Storage

Compared to SINUMERIK840D SL, SINUMERIK ONE can utilize high performance external storage, which able fast program in/output. Furthermore, data storage is possible without the use of buffer battery, which prevents data loss due to buffer battery discharge.

ITEMS	840D SL	SINUMERIK ONE	REMARKS
Program Memory (10 MB)	Std.	Std.	Program size
Buffer Battery	Std.	Unnecessary	Battery change unnecessary
USB 2.0 (2ea)	Std.	-	
USB 3.0 (2ea)	Π/A	Std.	Speed upgrade from USB 2.0

# 07

FM Series

# HEIDENHAIN

TNC Contouring Control with Drive System



## HEIDENHAIN

The TNC 640 is compact and easy to read.

The TNC 640 is a versatile contouring control system that can control a 19-inch screen and up to 18 axis.

Its flexible workshop-friendly programming functions, Heidenhain interactive programming and offline programming, allow the user to create the optimal machining environment.

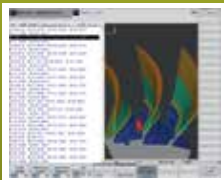
**dynamic** + **precision**

Portable Handwheel >>



### Perfect 5-Axis Machining

- Powerful motion control shows its strength in 5-axis machining
- ADP (Advanced Dynamic Prediction) for high surface quality and contour accuracy
- Interpolation turning / hobbing of external gears



### Detailed Simulation

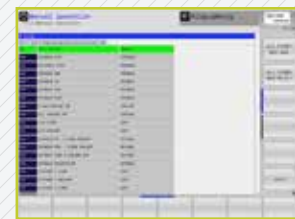
- PDF files, drawings, etc. can be opened directly on the control
- high resolution, finely detailed 3D simulation function
- 0.5ms block processing time / 21G of storage
- Calculates the geometry ahead of time in order to adjust the feed rate (5,000 blocks).

## HW-MCG (Machine Guidance)

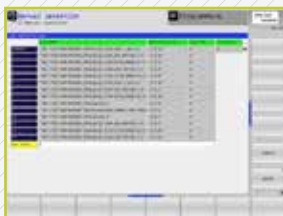
PC S/W for various user conveniences such as machine control, maintenance, monitoring and etc.

### Common Function

M-code List | Operation Status | Work Count | Working ratio |  
 I/O Monitor | Cycle Time Monitoring | Working Time |  
 Machine Option List | Macro Guide |



**M-code List**  
 M code search & guide function



**Operation Status**  
 Program history  
 managing function



**Work Count**  
 Managing work count & lifespan



**Working ratio**  
 Power/Running/Machining/  
 Spindle/Alarm Time



**I/O Monitor**  
 Sensor & sol. valve status  
 monitoring



**Working Time**  
 Particular program block  
 analysis



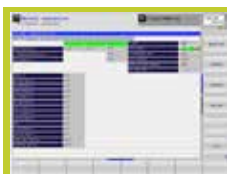
**Cycle Time Monitoring**  
 Alarm function according to C/T



**Macro Guide**  
 Macro manual for  
 SG WIA S/W



**Machine Option List**  
 Machine option list searching &  
 setting



**HW-TDC**  
 SG WIA Thermal  
 Displacement Compensation

- Thermal displacement compensation designed to minimize machining deviations caused by changes in the external.
- Overcooling control when the main spindle stops.
- Direct compensation by the displacement sensor.
- Same HMI structure as FANUC/SIEMENS for operational convenience.



**HW-WARMUP**  
 SG WIA  
 Tool Monitoring

- Main spindle stop time check → automatic setting of warm-up time.
- Interlock disables the machining cycle if warm-up is not performed.
- Customer machining program in the warm-up auto mode.
- Automatic warm-up logic when the cycle start begins.
- Same HMI structure as FANUC/SIEMENS for operational convenience.

# 08

FM Series

## User Convenience

Various Devices for User Friendly

### Large 22" Touch-type Monitor

The FM series adopts a 22" monitor for improved visibility of SIEMENS's main NC functions including shop mill and 3D simulation.

**22 inch** Monitor size      **120 deg** Indexing angle

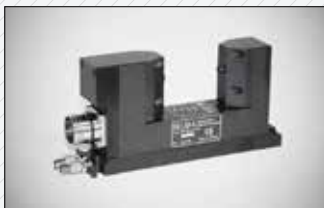
**1,450 mm (57")** Height From the screen center



### Ergonomic Operation Panel

The FM series are designed to be 1,450mm (57") high for ease of operation while setting up and running a workpiece. In addition, the PC keyboard ensures user convenience.

## Precision System



### Auto Tool Measuring Device

Renishaw (PC4) / BLUM (Laser Control Micro Compact)

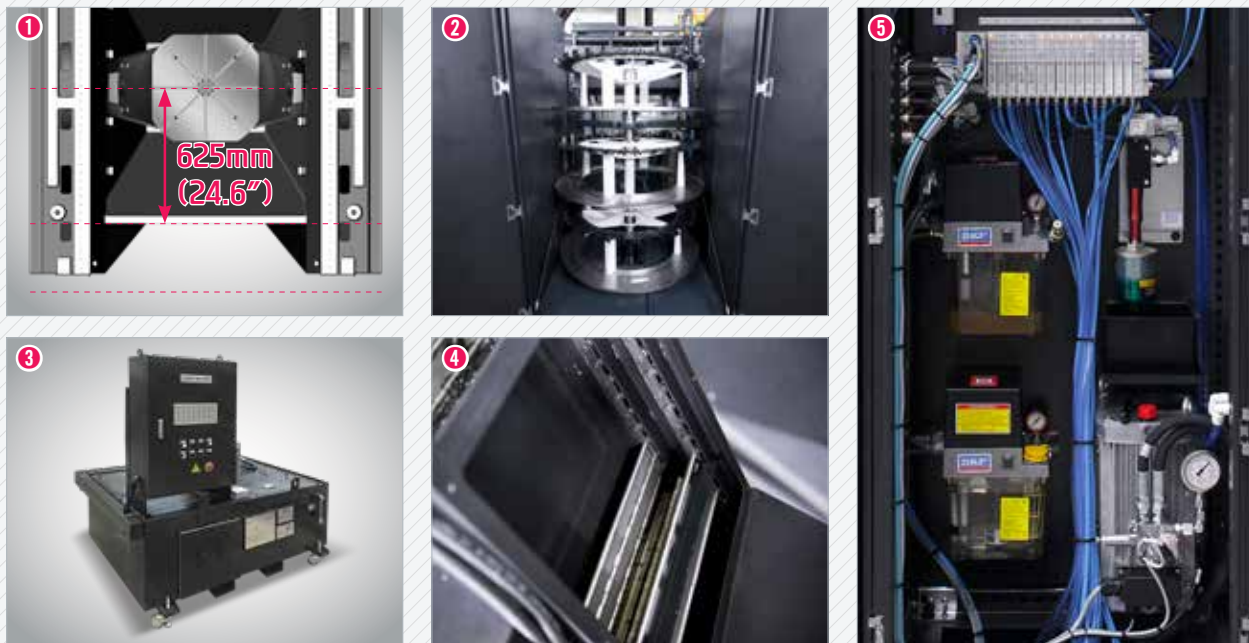
Tool lengths and diameters can be set automatically using the optional tool setter. This can also be used to monitor attrition and detect broken tools.



### Auto Pivot Compensation

It can be easily self-calibrate the A-axis and C-axis displacement due to processing conditions and surroundings are always able to maintain a high accuracy.

<Pivot Compensation software (HW-TPC) : Std. Probe & Datumball : Opt.>



## 1 Improved Accessibility to Table

The short distance (FM63 : 625mm [24.6"], FM85 : 805mm [31.7"]) between the front of bed and the center of table facilitates easy workpiece and fixture setup.

## 2 Convenient Tool Change

The magazine cabinet located at the rear of the machine simplifies tool change.

## 3 Separate Coolant Tank

A coolant tank holding up to 1,200 l [317 gal] (optimal capacity: 800 l [211 gal]) is provided.

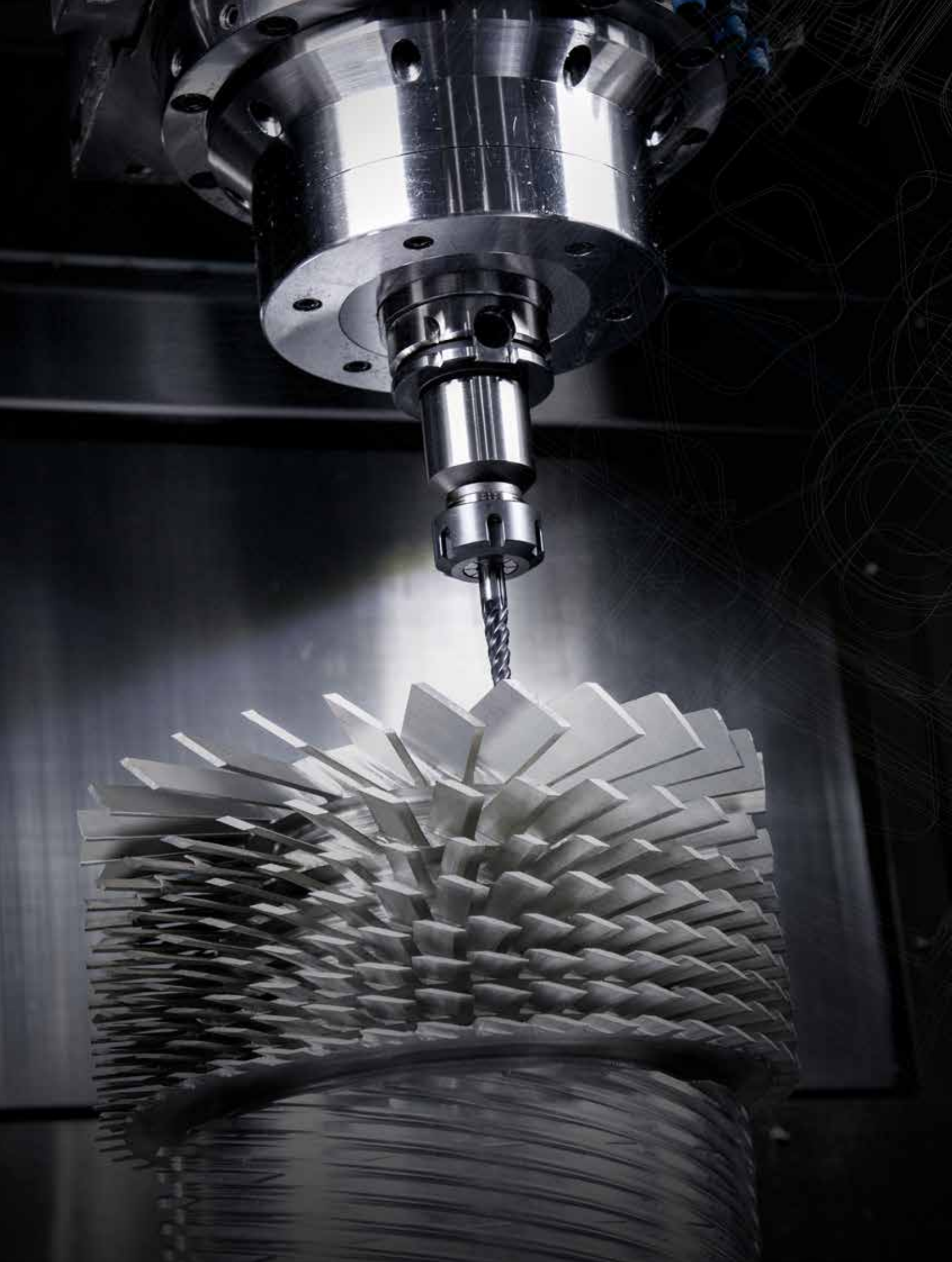
The coolant tank is a separated from the heat source not allowing heat to be transferred to the machine, resulting in precision improvement.

## 4 Wedge Wire Chip Conveyor (Integrated **Scraper and Hinge Type**) **OPTION**

A combined structure of a scraper type chip conveyor and hinge type rail allows general chips and fine chips to be disposed of at all times.

## 5 Devices Centralization

The design of centralized air and lubrication devices makes maintenance convenient.





# THE PRECISION

How precise should an exceptional machine tool be?

The FM Series is the best in the world. It's ultra-precision is also the best in the world. What's stopping you benefitting from ultra-precision machining using the SG Wia FM Series?

FM Series  
5-axis Vertical Machining Center

28  
+  
29

CREATING VALUE  
IN SEAMLESS MOBILITY

# SPECIFICATIONS

## Standard & Optional

● : Standard ○ : Option ☆ : Prior Consultation - : Non Applicable

Spindle		FM63	FM85
9,000 rpm	Built-in	-	○
15,000 rpm	Built-in	●	●
24,000 rpm	Built-in	○	○
30,000 rpm	Built-in	-	○
40,000 rpm	Built-in	○	-
Spindle cooling system		●	●
<b>ATC</b>			
ATC extension	34	●	●
	68	○	○
	102	○	○
Tool shank type	HSK A63	●	●
	HSK T63	○	○
	HSK E40 (30K, 40K)	●	●
U-center	D'andrea	☆	☆
<b>Table &amp; Column</b>			
Tap type table		☆	☆
T-slot table		●	●
DDM NC rotary table (simultaneous 5 axis)		●	●
Gear NC rotary table (3+2 axis machining suggest)		○	-
* Mill-turn table		○	○
<b>Coolant System</b>			
Std. coolant (flood coolant)		●	●
Bed flushing coolant		●	●
Through spindle coolant (25 l (6.6 gal))	20bar (290 psi)	○	○
	30bar (435 psi)	○	○
	70bar (1,015 psi)	○	○
Shower coolant		☆	☆
Gun coolant		○	○
Air gun		○	○
Cutting air blow		●	●
Tool measuring air blow		●	●
Air blow for automation		☆	☆
Thru MQL device (without MQL)		☆	☆
Coolant chiller (Sub tank)		☆	☆
Power coolant system (for automation)		☆	☆
<b>Chip Disposal</b>			
Coolant tank	Embedded (470 l)	○	○
	Separate Type (1,200 l (317 gal))	●	●
Chip conveyor (Wedge wire type)	Left	○	○
	Right	☆	☆
Special chip conveyor (Drum filter)		☆	☆
Chip wagon	Standard (180 l [47.5 gal])	○	○
	Swing (200 l [52.8 gal])	○	○
	Large Swing (290 l [76.6 gal])	○	○
	Large Size (330 l [87.2 gal])	○	○
	Customized	○	○
<b>Electric Device</b>			
Call light & buzzer		3color : ●●● B	●
Work light		●	●
Electric cabinet light		○	○
Remote MPG		●	●
3 axis MPG		○	○
Electric circuit breaker		○	○
AVR (Auto voltage regulator)		☆	☆
Transformer (220V/380V)	70/10KVA	●	●
Auto power off		●	●
<b>ETC</b>			
Tool box		●	●
Customized color	Need for Munsel No.	☆	☆
CAD & CAM software		☆	☆

Safety Device		FM63	FM85
Collision avoidance Protect MyMachine		●	●
Total Splash Guard		●	●
Door Interlock		●	●
<b>Controller</b>			
SIEMENS SINUMERIK ONE		●	●
HEIDENHAIN TNC640		○	○
<b>S/W - SIEMENS</b>			
Dialogue Program (HW-DPRO)		○ (Only for 3+2 axis)	
DNC software (HW-eDNC)		○	○
Machine Monitoring System (HW-MMS Cloud)		☆	☆
Machine Monitoring System (Customer Installation : HW-MMS Edge)		☆	☆
Smart S/W		☆	☆
<b>S/W - HEIDENHAIN</b>			
Advanced function set 1		●	●
Advanced function set 2		●	●
DCM collision		●	●
KinematicOpt		●	●
Display step		○	○
DXF converter		○	○
AFC : Adaptive Feed Control		○	○
KinematicComp		○	○
CTC : Cross Talk Compensation		○	○
PAC : Position Adaptive Control		○	○
LAC : Load Adaptive Control		○	○
ACC : Active Chatter Control		○	○
AVD : Active Vibration Damping		○	○
<b>Measuring Device</b>			
Auto work measuring device		○	○
Tool monitoring (OMARTIVE/MARPOSS)		○	○
Auto tool measuring device (Laser)	Renishaw	●	●
	BLUM	○	○
Linear scale	X/Y/Z axis	●	●
Rotary scale	A/C axis	●	●
Coolant level sensor (only for chip conveyor)		●	●
<b>Environment</b>			
Control air conditioner (SAMIK/RITTAL)		●	●
ECO energy (hydraulic device/chip conveyor shaving mode)		●	●
Dehumidifier (SAMIK)		○	○
Oil mist collector (MORE/YHB/YOUNGPOONG)		☆	○
MQL (minimal quantity lubrication)		☆	☆
<b>Fixture &amp; Automation</b>			
Auto door		○	○
Auto shutter (only for automatic system)		○	○
Sub operation pannel		☆	☆
External M code 4ea		○	○
Automation interface		☆	☆
I/O extension (In & out)	16 contact	○	○
	8 contact	○	○
<b>Hyd. Device</b>			
Std. hyd. unit	100bar (1,450 psi)/ 4 l (1 gal)	●	●
Center type hyd. supply unit	2x2(4 port)	○	○
Hyd. unit for fixture	50bar (725 psi)	☆	☆
	Customized	☆	☆

\* Basic components of mill turn table : 15,000rpm spindle only, HSK-T63 tool shank, TLM for turning, Safety window

Specifications are subject to change without notice for improvement.

※ Mold Package (HWM ALL IN ONE SIEMENS II) Std. - Mdynamics (SINUMERIK ONE)

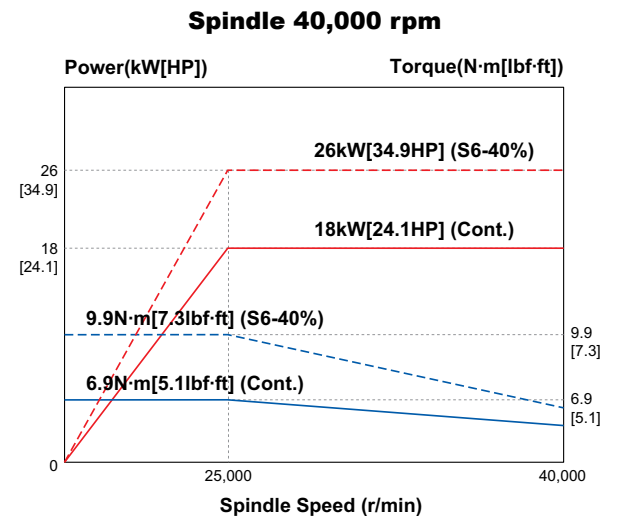
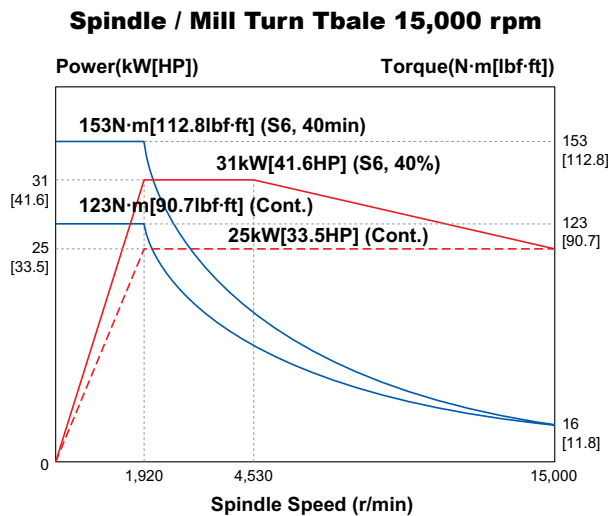
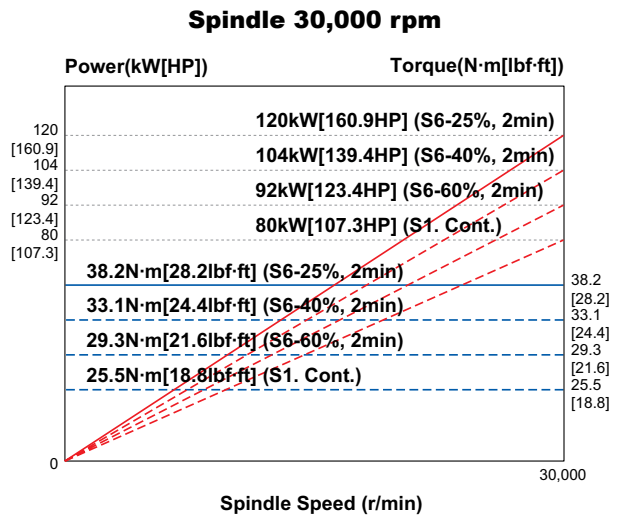
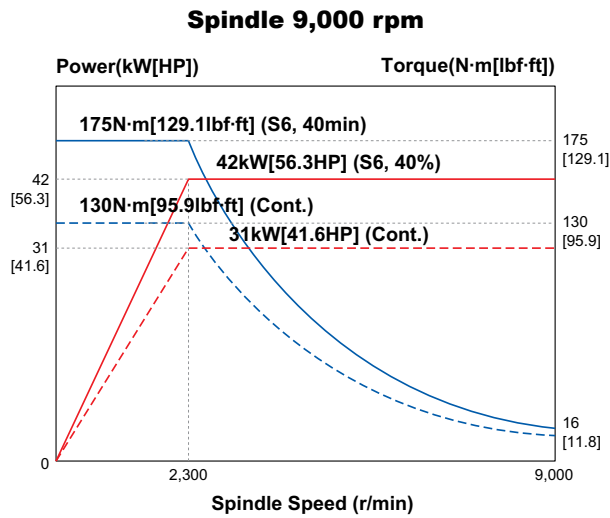
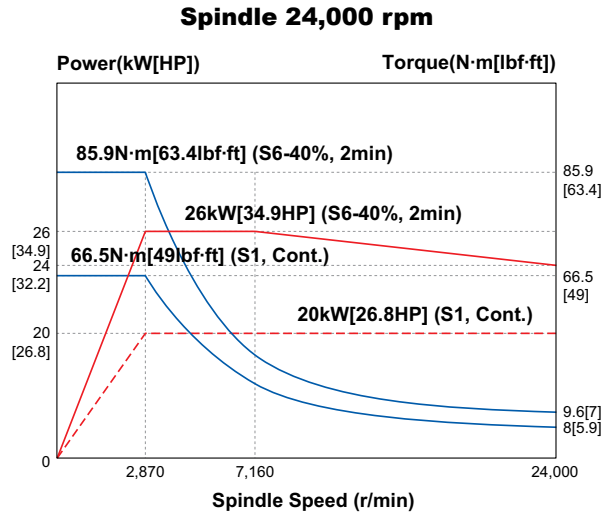
# SPECIFICATIONS

## Spindle Output/Torque Diagram

FM63 Spindle			
Std.	15,000 rpm	HSK-A63	
Opt.	24,000 rpm		
	40,000 rpm	HSK-E40	

FM85 Spindle			
Std.	15,000 rpm	HSK-A63	
Opt.	9,000 rpm		
	24,000 rpm	HSK-E40	
	30,000 rpm		



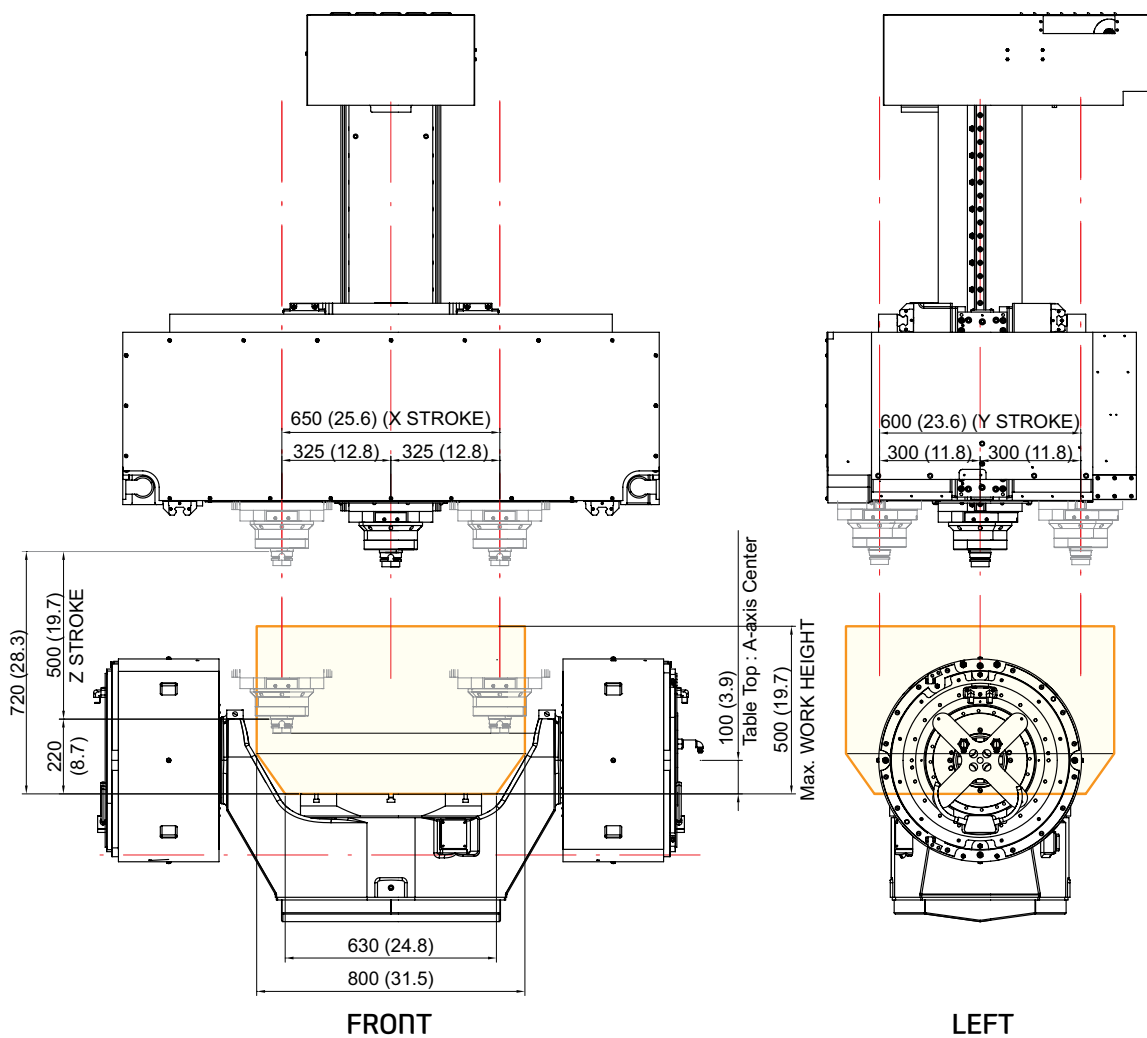
# SPECIFICATIONS

## Spindle & Table Travel Range

unit : mm (in)

### FM63

Tilting : A-axis 0°



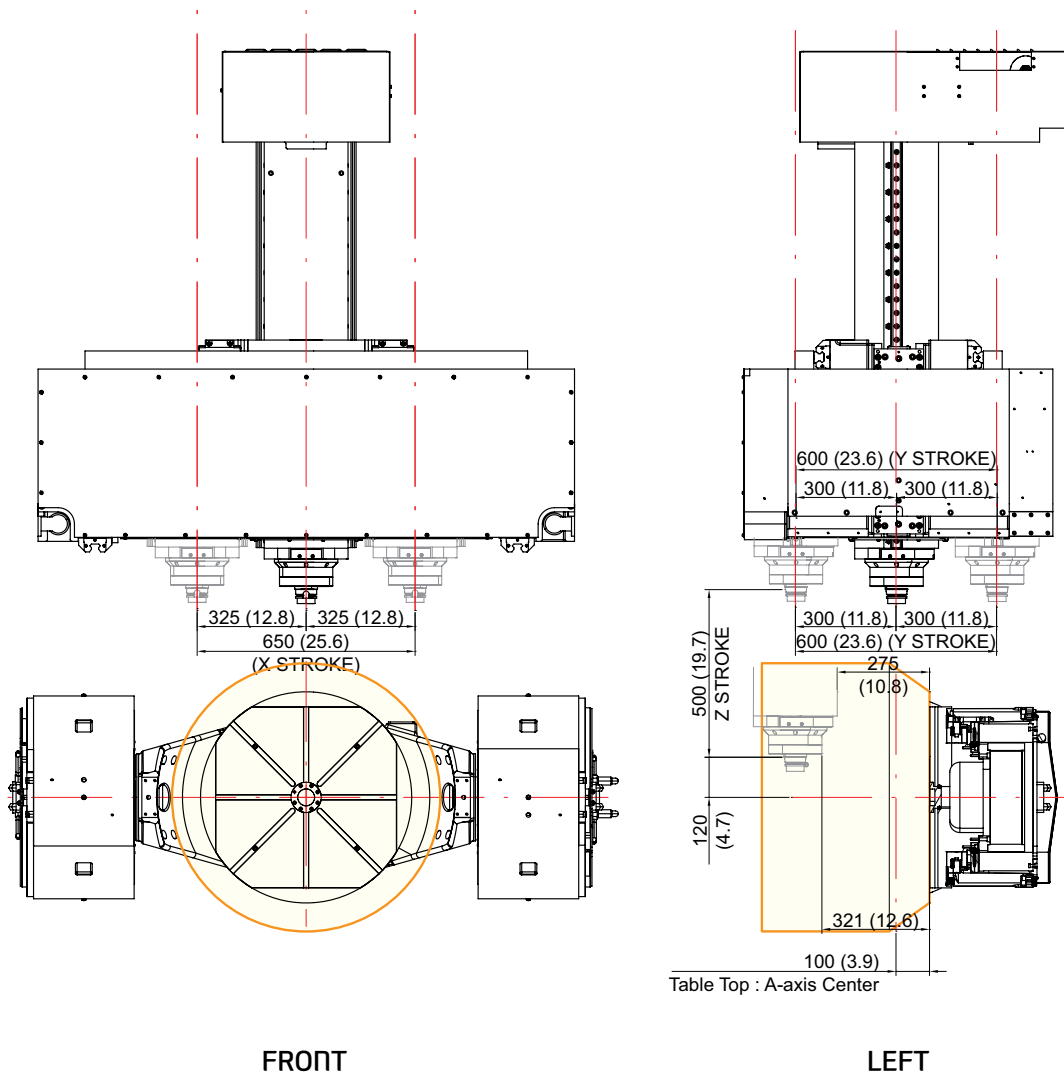
# SPECIFICATIONS

## Spindle & Table Travel Range

unit : mm (in)

### FM63

Tilting : A-axis -90°



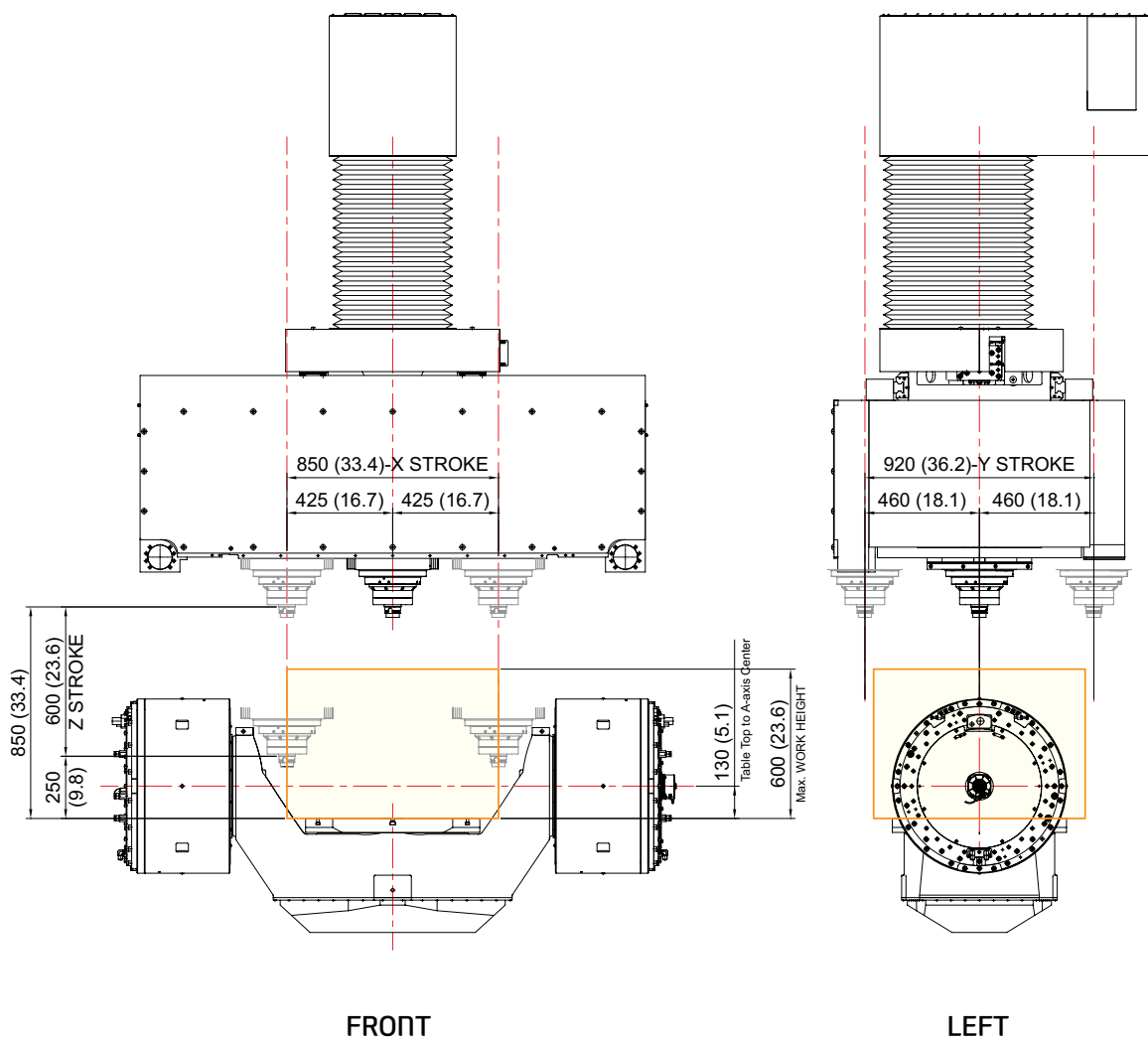
# SPECIFICATIONS

## Spindle & Table Travel Range

unit : mm (in)

### FM85

Tilting : A-axis 0°



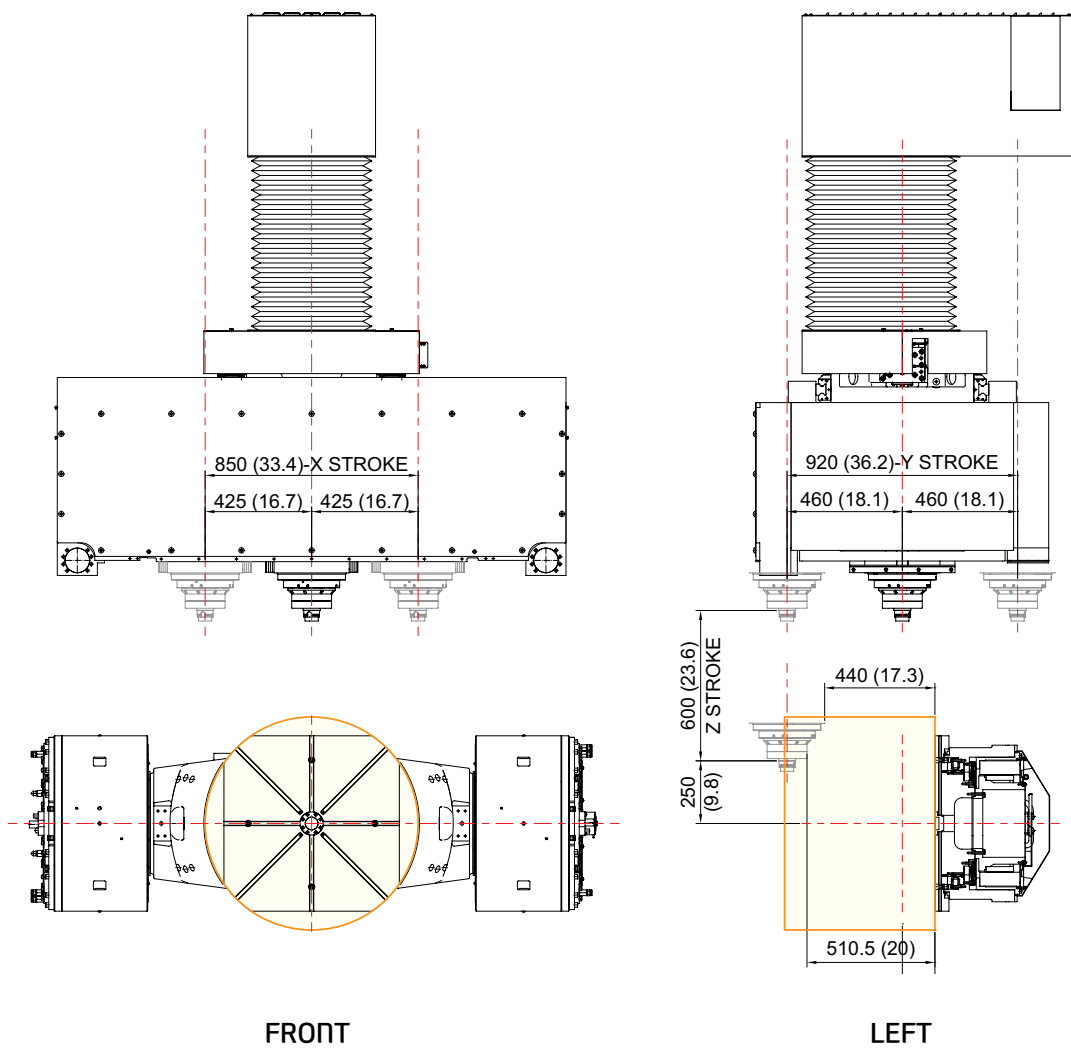
# SPECIFICATIONS

## Spindle & Table Travel Range

unit : mm (in)

### FM85

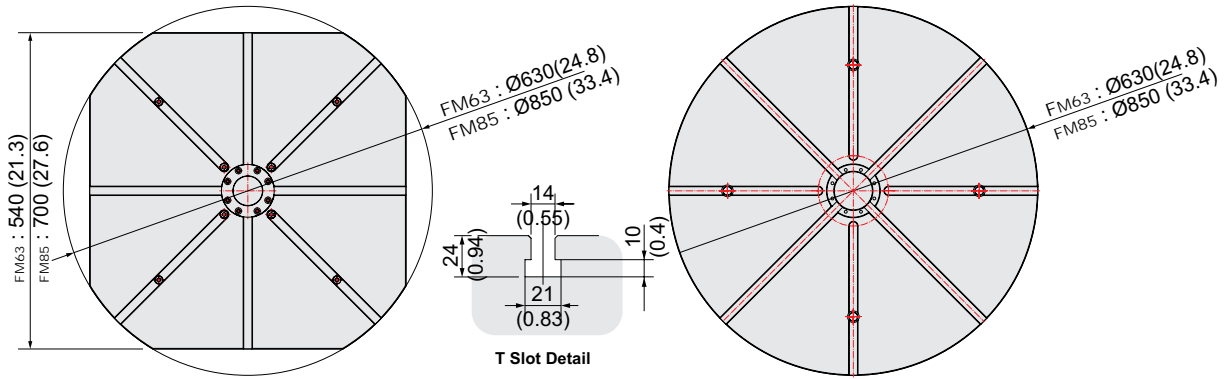
Tilting : A-axis  $-90^\circ$



# SPECIFICATIONS

## Table Dimensions

unit : mm (in)



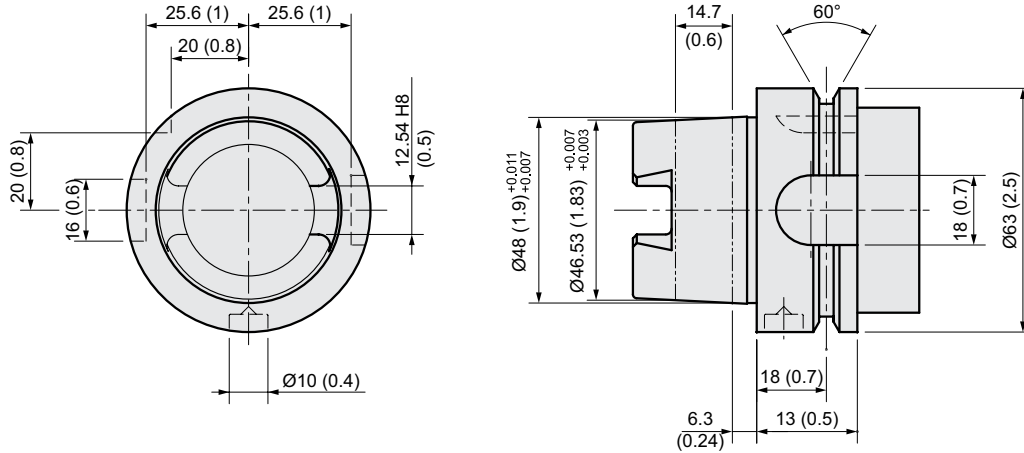
Std. Table

Mill-turn Table

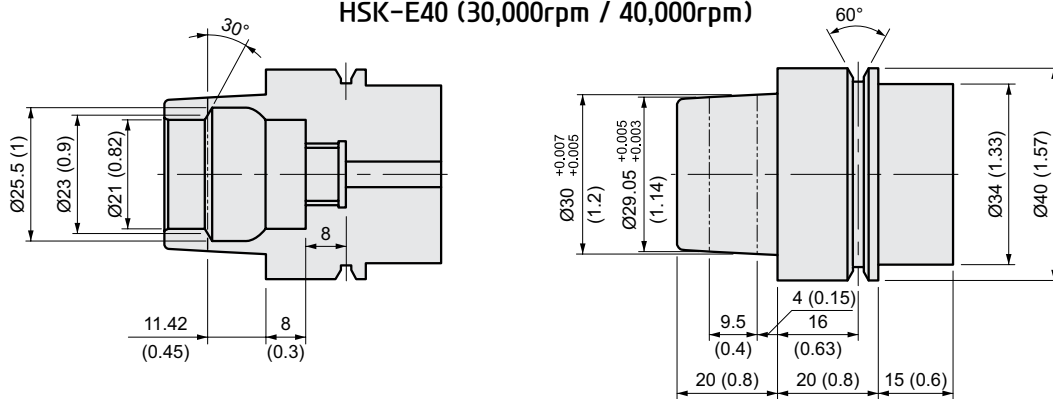
## Tool Shank

unit : mm (in)

### HSK-A63 (9,000rpm / 15,000rpm / 24,000rpm)



### HSK-E40 (30,000rpm / 40,000rpm)



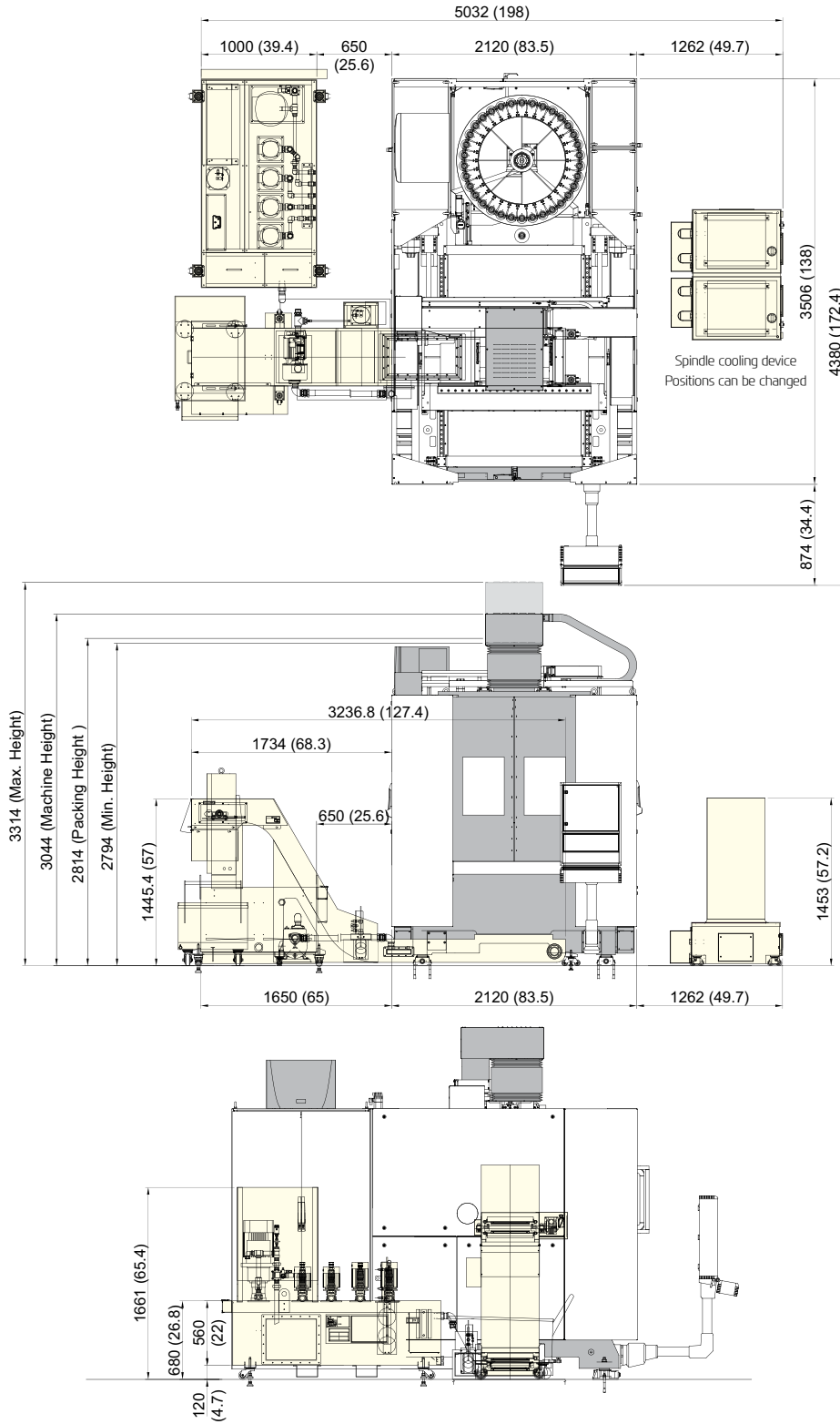


# SPECIFICATIONS

## External Dimensions

unit : mm (in)

### FM63

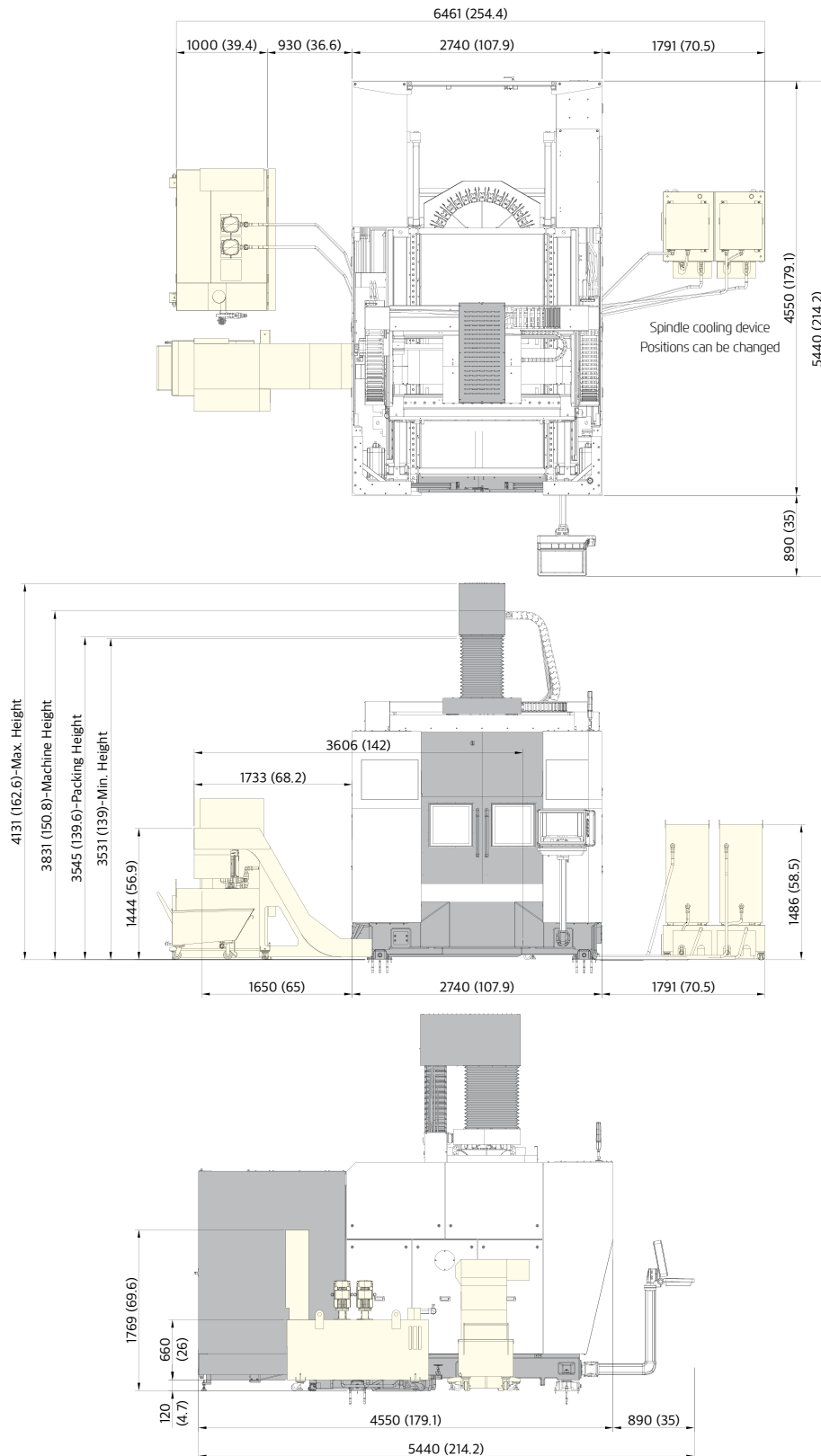


# SPECIFICATIONS

## External Dimensions

unit : mm (in)

### FM85



# SPECIFICATIONS

## Specifications

[ ] : Option

MODEL			FM63
TABLE	Table Size	mm(in)	Ø630 (Ø24.8")
	Maximum Load Capacity	kg(lb)	Max. 600 (1,323)
	※ Max. Machining Height(LxH)	mm(in)	Ø800×500 (Ø31.5"×19.7")
	Table Driving Method	mm(in)	DDM [GEAR]
MILL TURN TABLE (Opt.)	Table Size	mm(in)	Ø630 (Ø24.8")
	Maximum Load Capacity	kg(lb)	500 (1,102)
	Maximum Speed	A/C Axis r/min	70/800
	Table Driving Method	-	DDM
SPINDLE	Spindle Taper	-	HSK-A63 [40K : HSK-E40] [Turn Mill : HSK-T63]
	Spindle Speed	r/min	15,000 [24,000] [40,000]
	Spindle Power Output (Max./Cont.)	kW(HP)	31/25 (41.6/33.5) [26/20 (35/27)] [26/18 (35/24)]
	Spindle Torque (Max./Cont.)	N·m(lbf·ft)	153/123 (112.8/91) [85.9/66.5 (63.4/49)] [9.9/6.9 (7.3/5)]
	Spindle Driving Method	-	BUILT-IN
FEED	Travel	X/Y/Z Axis mm(in)	650/600/500 (25.6"/23.6"/19.7")
		A/C Axis deg	150° (-30°~+120°)/360°
	Distance from Table Top to SP. Nose	mm(in)	220 (8.7") ~ 720 (28.3")
	Rapid Traverse Rate	X/Y/Z Axis m/min(ipm)	SIEMENS SINUMERIK ONE : 60/60/60 (2,362/2,362/2,362) [HEIDENHAIN TNC640 : 50/50/50 (1,967/1,967/1,967)]
		A/C Axis r/min	DDM : 70/110 [Gear : 25/50]
Slide Type	-	ROLLER GUIDE	
ATC	Number of Tools	ea	34 [68, 102]
	Tool Shank	-	HSK-A63 [40K : HSK-E40] [HSK-T63]
	Max. Tool Dia. (W/T Adjacent Tool)	mm(in)	Ø90/Ø125 (Ø3.5"/Ø4.9")
	Max. Tool Length	mm(in)	300 (11.8)
	Max. Tool Weight	kg(lb)	8 (17.6) [40K : 1.5 (3.3)]
	Tool Change Time	C-C sec	4.5
TANK CAPACITY	Coolant Tank	ℓ (gal)	1,200 (317) {Propriety Capacity : 800 (211.3)}
	Lubricating Tank	ℓ (gal)	2 (0.5)
	Hydraulic Tank	ℓ (gal)	4 (1)
POWER SUPPLY	Electric Power Supply	KVA	73
	Thickness of Power Cable	mm <sup>2</sup>	AC 380V : OVER 50, AC 220V : OVER 70
	Voltage	V/Hz	380, 220/50, 60
MACHINE	Floor Space (L×W)	mm(in)	5,032×4,380 (198"×172.4")
	Machine Size (L×W)	mm(in)	2,120×4,380 (83.5"×172.4")
	Height	mm(in)	3,044 (119.8")
	Weight	kg(lb)	11,000 (24,251)
CNC	Controller	-	SIEMENS SINUMERIK ONE [HEIDENHAIN TNC640]

※ If the machining area exceeds Ø630 × 400(Ø248"×15.7"), some interference may occur. Please also check the interference area on page 36 of the catalog. Specifications are subject to change without notice for improvement.

# SPECIFICATIONS

## Specifications

[ ] : Option

MODEL			FM85
TABLE	Table Size	mm(in)	Ø850 (Ø33.4")
	Maximum Load Capacity	kg(lb)	1,000 (2,205)
	※ Max. Machining Height(LxH)	mm(in)	Ø1,000×600 (Ø39.4"×23.6")
	Table Driving Method	mm(in)	DDM
MILL TURN TABLE (Opt.)	Table Size	mm(in)	Ø850 (Ø33.4")
	Maximum Load Capacity	kg(lb)	700 (1,543)
	Maximum Speed	A/C Axis r/min	50/600
	Table Driving Method	-	DDM
SPINDLE	Spindle Taper	-	HSK-A63 [30K : HSK-E40] [HSK-T63]
	Spindle RPM	r/min	15,000 [9,000] [24,000] [30,000]
	Spindle Power Output (Max./Cont.)	kW(HP)	31/25 (41.6/33.5) [42/31(56.3/41.6)] [26/20 (35/27)] [120/80 (160.9/107.3)]
	Spindle Torque (Max./Cont.)	N·m(lbf·ft)	153/123 (112.8/91) [175/130 (129/95.9)] [85.9/66.5 (63.4/49)] [38.2/25.5 (28.2/18.8)]
	Spindle Driving Method	-	BUILT-IN
FEED	Travel	X/Y/Z Axis mm(in)	850/920/600 (33.4"/36.2"/23.6")
		A/C Axis deg	150° (+30°~-120°)/360°
	Distance from Table Top to SP. Nose	mm(in)	250~850 (9.8"~33.4")
	Rapid Traverse Rate	X/Y/Z Axis m/min(ipm)	45/45/45 (1,772/1,772/1,772)
		A/C Axis r/min	50/100 (DDM)
	Slide Type	-	ROLLER GUIDE
ATC	Number of Tools	ea	PICK UP : 34 [TWIN ARM : 68, 102]
	Tool Shank	-	HSK-A63 [30K : HSK-E40] [HSK-T63]
	Max. Tool Dia. (W/T Adjacent Tool)	mm(in)	Ø90/Ø125 (Ø3.5"/Ø4.9")
	Max. Tool Length	mm(in)	300 (11.8)
	Max. Tool Weight	kg(lb)	8 (17.6) [30K : 1.5 (3.3)]
	Tool Change Time	C-C sec	6.8
TANK CAPACITY	Coolant Tank	ℓ (gal)	1,200 (317) {Propriety Capacity : 800 (211.3)}
	Lubricating Tank	ℓ (gal)	2 (0.5)
	Hydraulic Tank	ℓ (gal)	4 (1)
POWER SUPPLY	Electric Power Supply	kVA	98
	Thickness of Power Cable	mm <sup>2</sup>	AC 380V : OVER 50, AC 220V : OVER 70
	Voltage	V/Hz	380, 220/50, 60
MACHINE	Floor Space (L×W)	mm(in)	4,907×5,440 (193.2"×214.2")
	Machine Size (L×W)	mm(in)	2,740×5,440 (107.9"×214.2")
	Height	mm(in)	3,831 (150.8)
	Weight	kg(lb)	21,000 (46,297)
CNC	Controller	-	SIEMENS SINUMERIK ONE [HEIDENHAIN TNC640]

※ If the machining area exceeds Ø850×600(Ø33.4"×23.6"), some interference may occur. Please also check the interference area on page 38 of the catalog. Specifications are subject to change without notice for improvement.

# CONTROLLER

## SIEMENS SINUMERIK ONE

[ ] : Option ☆ Needed technical consultation

Controlled axis / Display / Accuracy Compensation	
Control axis	8 axis (X1, Y1, Z1, A1, C1, WR, WD, WL)
Simultaneously controlled axis	Max. 5 axis
Least setting Unit	X, Y, Z axis : 0.001 mm (0.0001 inch), B, C, A axis : 0.001 deg
Least input increment	X, Y, Z axis : 0.001 mm (0.0001 inch), B, C, A axis : 0.001 deg
Inch / Metric changeover	G70 (inch) / G71 (metric)
Interlock	All axis / Each axis
Machine lock	All axis
Backlash compensation	
Pitch error compensation	
Feedforward control (Torque control)	
LCD / MDI	22 inch color LCD (With Touch panel)
Keyboard	QWERTY full keyboard
Stored stroke check	Over travel
Operation	
Automatic operation (Memory)	
MDI operation	
Program restart	
Program check function	Dry run / Program check / Machine lock
Single block	
Block search	Block search
Reposition	
Working area limit	Working area limitations
Interpolation functions	
Positioning	G00
Linear interpolation	G01
Circular interpolation	Circular interpolation CW (G02) Circular interpolation CCW (G03)
Exact position stop	Single block exact stop (G09) Exact stop G60 (G601, G602, G603)
Dwell	Dwell (G04)
Reference position return	Return to reference point Return to 2nd reference point
Helical interpolation	
Spline interpolation	Non-uniform rational B splines
Compressor (Improving machining quality)	Compcad / Compcurv (Cycle 832)
Feed function / Acc. & Dec. control	
Manual feed	Rapid traverse Jog Manual handle Reference position return
Cutting Feed command	Direct input F code
Feedrate override	0 ~ 120% (☆ 0 ~ 200%)
Rapid traverse override	1%, 25%, 50%, 100%
Feed per minute	G94
Feed per revolution	G95
Look-ahead block	3,000 block (With Mdynamics)
Program input	
ISO correspondence	G291(ISO)/G290 (SIEMENS) (ISO G Code system-A)
Optional block skip	8 ea (0~7)
Absolute / Incremental program	G90 / G91
Program stop / end	M00, M01 / M02, M30
Maximum command unit	± 999,999,999 mm, ± 99,999,9999 inch
Plane selection	X-Y : G17, X-Z : G18, Y-Z : G19 G54 ~ G57, G505~G549
Workpiece coordinate system	G500 (Basic frame - setable zero offset) G53 (Work offset non modal) G153 (basic frame non modal)
Sub program call	16 folds nested
G code preventing buffering	STOPRE
Drilling/Milling cycle	with programing support
☆ Turning Cycle	with programing support
User cycle	

Auxiliary function / Spindle speed function	
Auxiliary function	M Code 4 digit
Spindle speed function	S Code 5 digit
Spindle override	0% ~ 120%
Spindle orientation	SPOS
Rigid tapping	
Automatic mode Interchange	Spindle / Axis mode
Constant surface speed control	G96, G97
Spindle speed limitation	LIMS
Tool function / Tool compensation	
Tool function	Tool number & Tool name
Tool life management	
Tools in tool list	1,500 ea
Cutting Edges in tool list	3,000 ea
Tool radius compensation	ISO (G40, G41, G42)
Geometry / Wear compensation	
Measurement of tool length	
Tool management function	
Editing function	
Part program storage size	10MB
External Storage devices	USB
Background editing	
Extended part program editing	Copy, move and change of NC program
Memory card program edit	
Data input / output & Interface	
I/O interface	USB memory interface Embedded Ethernet memory interface
Screenshot	
Built-in PC	Industrial PC (IPC427E)
Setting, display and diagnosis	
Self-diagnosis function	
History display & Operation	Alarm & Operator message & Operation
Run hour / Parts count display	
Regular maintenance screen	
Actual speed display	
Display of spindle speed / T code	
Graphic display	
Operating monitor screen	Spindle / Servo load etc.
Multi language display	Support 7 languages Chinese, English, French, German, Italian, Korean, Spanish
LCD Screen Saver	Screen saver & Motion sensing
Function	
ShopMill	Machining step programming for milling
3D simulation	
Real time simulation	
Option	
Multi language display	☆ 20 Support languages : Inquiry need

Figures in inch are converted from metric values.  
The SIEMENS controller specifications are subject to change based on the policy of company CNC supplying.

# SPECIFICATIONS

## HEIDENHAIN TNC640 Standard

Axis	
Controlled axis	10 Axis (Max. 18 Axis)
Simultaneously controllable axis	5 Axis.
Rotary Controlled axis	3 Axis (Max. 3 Axis)
Least command increment	0.0001 mm / 0.0001 ° (Option : 0.00001 mm / 0.00001 °)]
Display unit	19-inch color TFT (Option : 15-inch color TFT)]
Program memory	21GB (SSDR solid state disk)
Block processing time	0.5 ms
Path interpolation time	3 ms
Fine interpolation time	0.2 ms
Position controller time	0.2 ms
Speed controller time	0.2 ms
Current controller time	100 us (5000 hz)
Encoder	Absolute EnDat 2.2
Commissioning and diagnostics	
Data interface	Ethernet 2x1000 BASE-T 4xUSB 3.0
Machine Function	
Look ahead	5,000 Block
HSC filters	
Switching the traverse ranges	
User Function	
Program input	HEIDENHAIN conversational DIN/ISO
Position entry	Nominal position for lines and arcs in Cartesian / Polar coordinates Incremental / absolute dimensions Display / entry in mm or inch
Tool compensation	Tool radius in th working plane and tool length Radius-compensated contour for up o 99 blocks (M120) 3-dimensional tool-radius compensation for changing tool data without having to recalculate an existing program
Tool tables	Multiple tool tables with any number tools
Cutting data	Automatic calculation of spindle speed, cutting speed, feed per tooth / revolution
Constant contour speed	Relative to the path of the tool center Relative to the tool's cutting edge
Parallel operation	Creating program with graphical support while another program is being run Motion control with smoothed jerk
3D machining	3D tool compensation through surface normal vectors Tool Center Point Management (TCPM) Keeping the tool normal to the contour Tool radius compensation normal to the tool direction Manual traverse in the active tool-axis
Rotary table machining	Programming of cylindrical contours as if in two axis Feed rate in distance per minute
Contour elements	Straight line Chamfer Circular path Circle center Circle radius Tangentially connecting circular arc Corner rounding
FK free contour programming	in HEIDENHAIN conversational format with graphic support for workpiece drawings not dimensioned for NC
Program jumps	Subprograms Program section repeats Calling any program as a subprogram
Coordinate transformation	Datum shift, rotation, mirror image, scaling factor (axis-specific)
Q parameters programming with variables	Mathematical functions Logical operations Calculating with parentheses
Q parameters programming with variables	Absolute value of a number, constant $\pi$ , negation, truncation of digits Functions for calculation of circles Functions for text processing

Figures in inch are converted from metric values.

The SIEMENS controller specifications are subject to change based on the policy of company CNC supplying.

# SPECIFICATIONS

## HEIDENHAIN TNC640 Standard

User Function	
Fixed cycle	Drilling, tapping, rigid tapping
	Peak drilling, reaming, boring, centering
	Milling internal and external threads
	Clearing level and oblique surfaces
	Multioperation machining of straight and circular slots
	Multioperation machining of rectangular and circular pockets
	Cartesian and polar point patterns
	Contour train, contour pocket
	Contour slot with trochoidal milling
	Engraving cycle
Programming aids	Calculator
	Complete list of all current error messages
	Context-sensitive help function for error
	TTCguide : The integrated help system
	Graphic support for programming cycles
CAD viewer	Display of CAD data formats on th TNC
Teach-In	Actual positions can be transferred directly into the NC program
Test graphics Display modes	Graphic simulation
	Plan view /projection in 3planes /3D view
	Magnification of details
3D line graphics	For verification of programs created offline
2D pencil-trace graphics	2D pencil-trace graphics
Program-run graphics display moded	Graphic simulation during real-time maching
	Plan view /projection in 3planes /3D view
Machining time	Calculation of machining time in the Test Run operating mode
Machining time	Display of the current machining time in the Program Run operating modes
Returning to the contour	
Datum management	One table for storing reference point
Datum tables	Multiple datum tables for storing workpiece-specific datums
Language	English / German / Korean / French / Italian / Spanish / Portuguese / Swedish / Danish / Finnish / Dutch /
	Polish / Hungarian / Russian / Chinese / Chinese_Trad /Slovenian / Norwegian / Czech / Romanian / Slovak / Turkish
Interpolation	
Linear	5 Axis
Circular	3 Axis
Spline	(Max. 5 Axis)
Helical	
Cylinder surface	
Rigid tapping	

### HEIDENHAIN S/W OPTION (As a standard)

Advanced function set 1	1. Rotary table machining / 2. Coordinate transformations / 3. Interpolation
Advanced function set 2	1. 3-D machining / 2. Interpolation
DCM : Dynamic Collision Monitoring	Manual / automatic collision monitoring for safety machining operation
Kinematic Opt	Easy calibration of rotary axis

### HEIDENHAIN S/W OPTION (Customer Option)

Display step (micron control)	Linear axis : 0.1 µm (std) → 0.01 µm (with option #23) / Angular axis : 0.0001° (std) → 0.00001° (with option #23)
DXF converter	Importing contours and machining options from DXF files
AFC : Adaptive Feed Control	Controls the feed rate depending on the machine situations
Kinematic comp (3-D spatial compensation)	Improves machine accuracy by compensation of geometry errors
CTC : Cross Talk Compensation	Compensation of position errors through axis coupling to improve quality and accuracy
PAC: Position Adaptive Control	Position-dependent adaptation of control parameters
LAC : Load Adaptive Control	Adjust the parameters of the feedforward control to the current mass of the workpiece
ACC : Active Chatter Control	Reduces chattering during heavy cutting to decrease tool mark and machine load
AVD : Active Vibration Damping	Vibration damping by adjusting of the jerk for better surfaces