

F660M

HYUNDAI WIA Vertical Machining Center for Mold Machining



Technical Leader

The Vertical Machining Center F660M, designed by Hyundai WIA with years of expertise and the latest technology, provides the high performance necessary for machining high quality molds.

F660M

[SIEMENS]

Table Size	mm(in)	1,600×650 (63"×25.6")
Max. Load Capacity	kg(lb)	1,300 (2,866)
Spindle Taper	-	BBT40 [HSK-A63]
Spindle Speed	r/min	15,000 [20,000] [15,000]
Spindle Output	kW(HP)	25/22 (33.5/29.5) [22/18.5 (29.5/24.8)] [26/26 (34.9/34.9)]
No. of Tools	EA	24 [30]
Travel(X/Y/Z)	mm(in)	1,400/660/635 (55.1"/26"/25")
Rapid Traverse Rate	m/min (ipm)	36/36/30 (1,417/1,417/1,181)



High speed, wide range vertical machining center
for high quality mold machining

F660M

- Main spindle with high precision angular contact bearing
- Built-in main spindle for processing high quality mold products
- Semi servo ATC for the quickest tool change time
- An enhanced 4 guideway Y-axis system
- Roller guideway on all axes for maximum feed power
- Hynudai WIA mold package for optimal mold product machining
- SIEMENS 828D controller with wide range of supporting software





Basic Features

High Speed & Productivity Vertical Machining Center



02



Roller Type LM Guide

For processing the highest quality mold products, the F660M is designed with roller LM guideways for high rigidity and enhanced acc/deceleration.

01 4 Slideways Y-axis

4 Slideways on the Y-axis to minimize sagging of X-axis, enabling manufacture of high precision products.

03

Double Anchored Ball Screw

In order to eliminate thermal growth and increase accuracy, all axes are driven by high precision double anchored ballscrews.

The double anchored and pretensioned design provides outstanding positioning and repeatability with virtually no thermal growth.



04 Directly Coupled Servo Motor

The ballscrews are directly coupled to the servo motor. This eliminates the need for any transmission parts, which may impact machine accuracy and efficiency.

04

Table & Machining Area

◎ Table Size (X/Y axis) : 1,600/650 mm (63"/25.6")



Basic Features



Solid Body High Column **OPTION**

High column of 300mm(11.8") is provided.

High Precision & High Speed Vertical Machining Center

- **Rapid Traverse Rate** (X/Y/Z axis) : 36/36/30 m/min (1,417/1,417/1,181 ipm)
- **Travel** (X/Y/Z axis) : 1,400/660/635 mm (55.1"/26"/25")
- **Spindle Speed** : 15,000 [20,000] [15,000] rpm ● **Spindle Driving Method** : Built-In
- **Spindle Output** (Max./Cont.) :
25/22 [22/18.5] [26/26] kW (33.5/29.5 [29.5/24.8] [34.9/34.9] HP)
- **Spindle Torque** (Max./Cont.) :
167/95 [53/37] [113/75] N·m (123.2/70 [39.1/27.3] [83.3/55.3] lbf·ft)

n2
F660M

High Precision Spindle

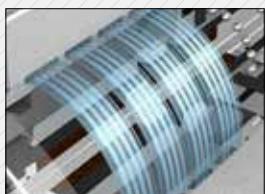
High Accuracy & Excellent Performance
Vertical Machining Center



Built-in Spindle

Maximum spindle speed up to 20,000rpm(opt.) is possible due to the installation of ultra precision Angular Ball Bearings.

The spindle head is designed to minimize the heat displacement of main spindle, and with the use of a hydraulic tool lock system the machining stability is increased.



Spindle Cooling

The spindle cooling system minimizes thermal displacement which can happen during lengthy machining operations, and offers reliable machining based on the thermal stability.



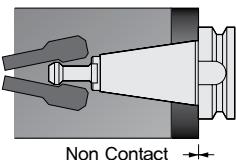
Spindle

Dual Contact Spindle

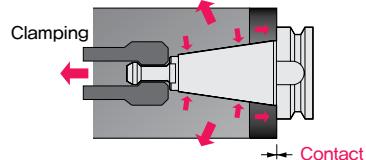
The Big Plus spindle system (BBT40) provides dual contact between the spindle face and the flange face of the tool holder. This greatly increases tool rigidity, reduces run out and adds significant productivity to machining applications

- ❖ The increase in standard diameter improves rigidity and ATC interactive precision, and Z-axis displacement prevention further extends tool life.

Before Clamping



After Clamping



Through Spindle Coolant **OPTION**

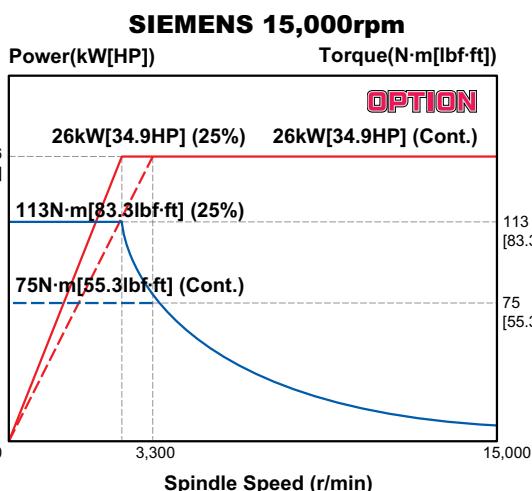
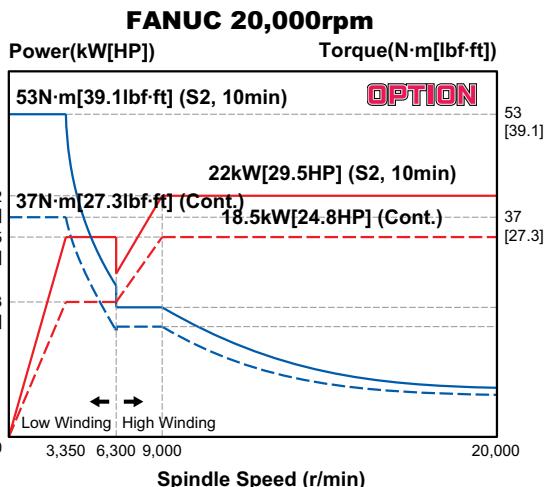
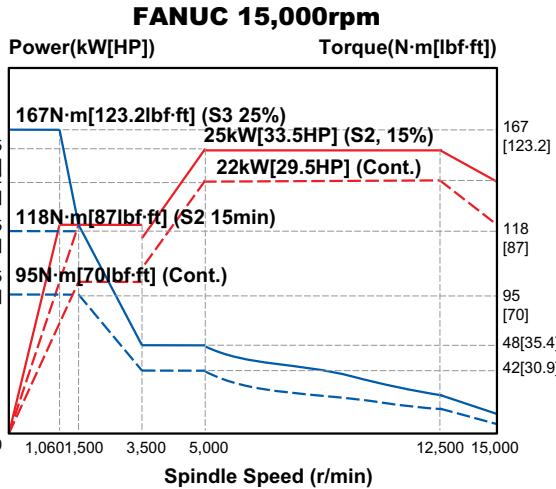
Through Spindle Coolant is exceedingly useful when drilling deep holes. It helps increase the lifetime of the tool, while decreasing cycle time.



20 bar / 30 bar / 70 bar
(290 psi / 435 psi / 1,015 psi)

Tool Holders

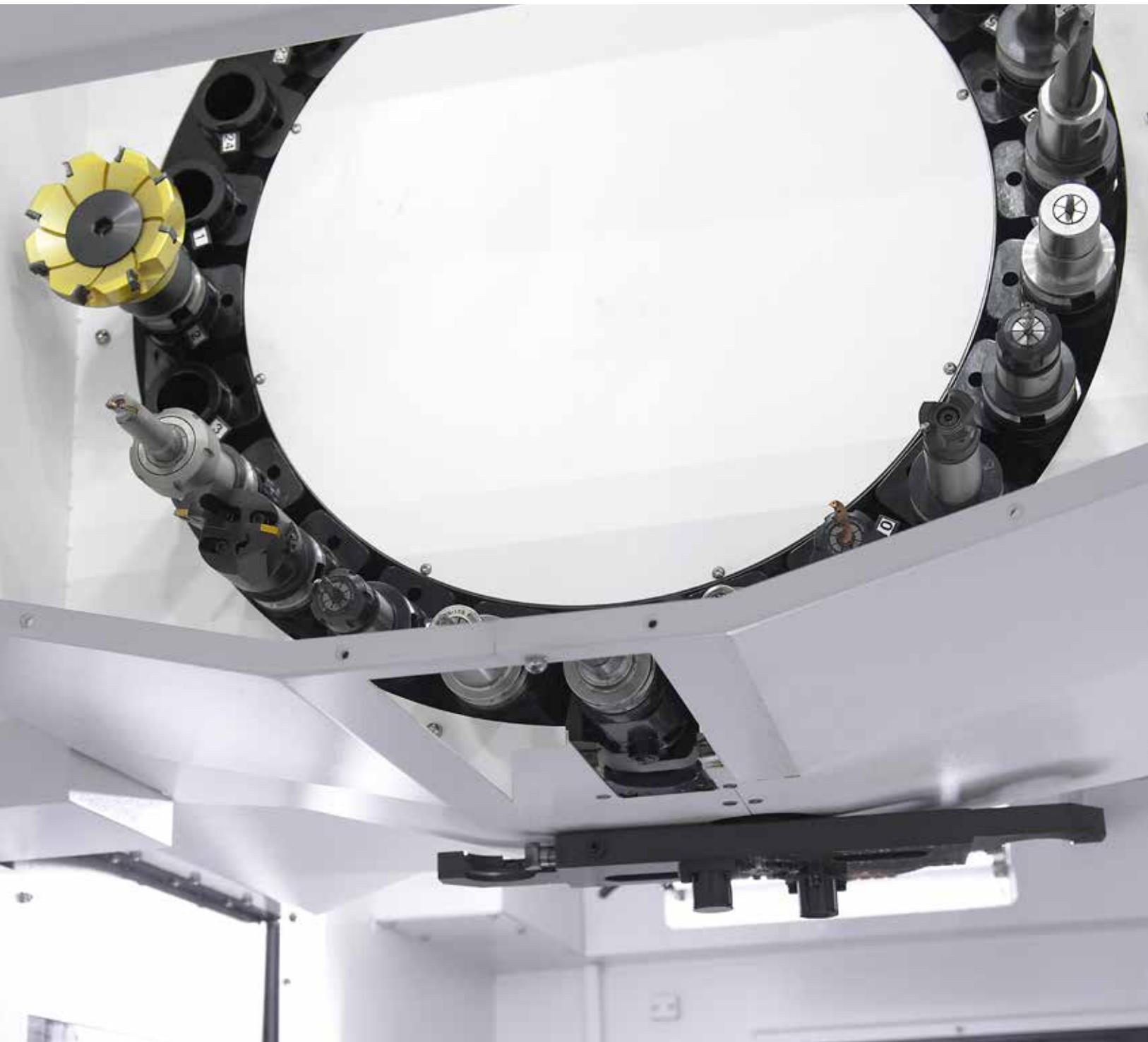
CAT **OPTION**



n3
F660M

ATC & Magazine

High Productivity Achieved with High Rigidity,
Accuracy Machining



Peripheral Device

Servo ATC

Position control on the Twin Arm ATC using Servo Motors has improved drastically. The twin arm ATC enables faster tool change and increased productivity.

● ATC Speed Improvement

F660M (Tool to Tool)

Before	1.9 sec
After	1.5 sec
	21% reduction



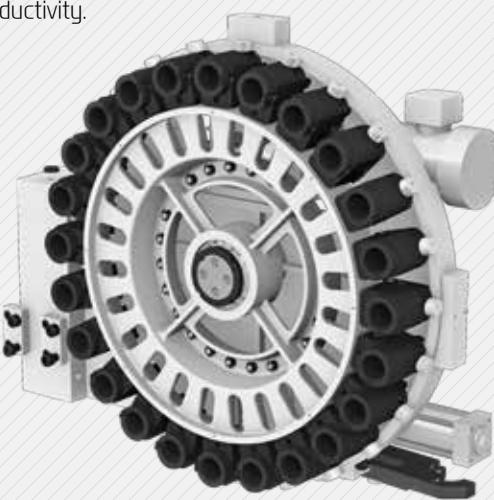
F660M (Chip to Chip)

Before	4.1 sec
After	3.9 sec
	9.5% reduction

Magazine

The tool magazine holds 24 tools as standard and 30 tools as an option.

Random access allows faster tool change and increase in productivity.



24 Tool Magazine



30 Tool Magazine



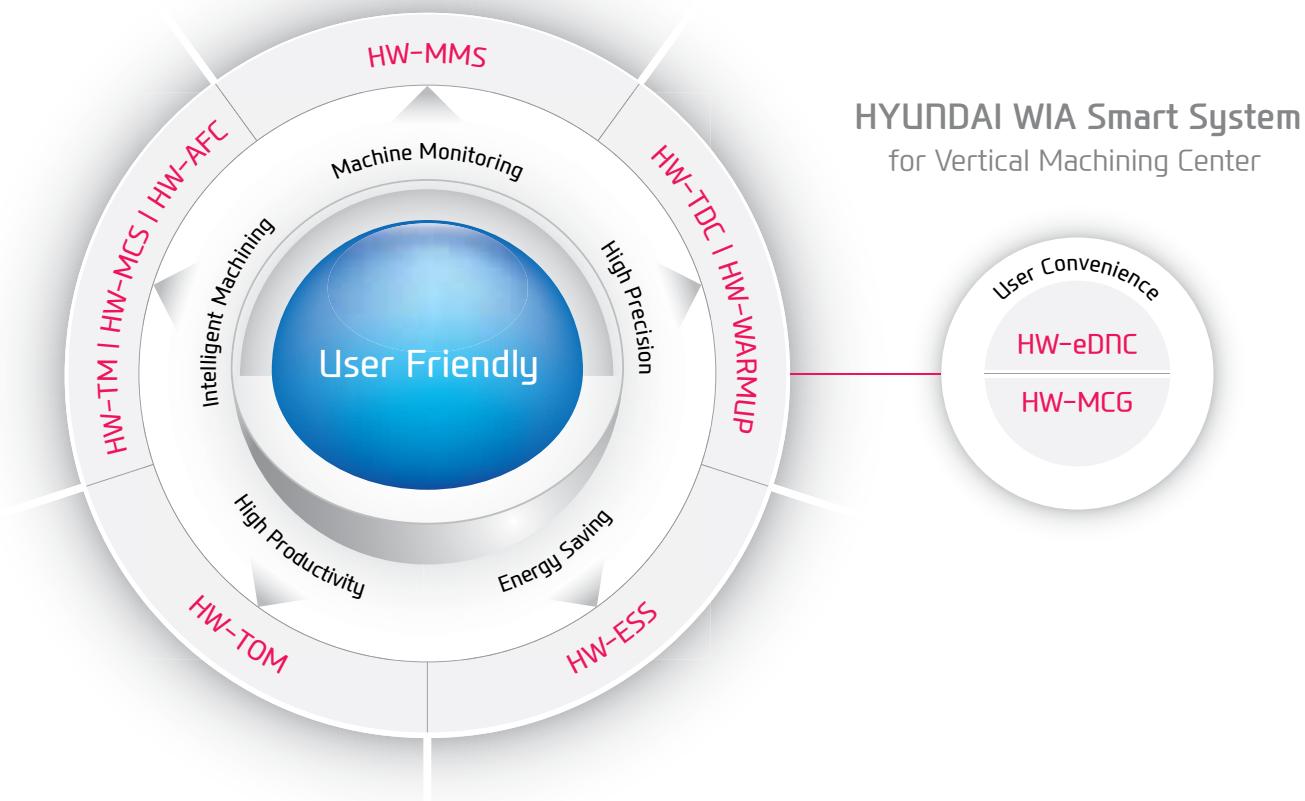
- No. of Tools : **24 [30]** EA ● Max. Tool Dia. (W.T/W.O) : **Ø90/Ø150 (Ø3.5"/Ø5.9")**
- Tool Shank : **BBT40 [HSK-A63]** ● Max. Tool Length : **300 mm (11.8")**
- Max. Tool Weight : **8 kg (17.6 lb)** ● Tool Selection Method : **Random**



Smart System

Software for Smart Operating
and Machining

Faster processing and enhanced accuracy are possible through the **HYUNDAI WIA Smart System**. The user friendly software and equipment monitoring of the Smart System maximizes productivity.



Mold-related Software



HW-AFC

HYUNDAI WIA
Adaptive Feed Control

(FANUC)



HW-MCS

HYUNDAI WIA
Machining Condition Selection

(FANUC)

Software that controls the feed automatically to maintain a certain working load to extend tool life as well as productivity.

Software that automatically sets cutting and feeding parameters according to the machining types (speed, degree, quality)

Smart Factory HW-MMS (HYUNDAI WIA-Machine Monitoring System) **OPTION**

A brand new manufacturing machine by HYUNDAI WIA, HW-MMS is a unique software capable of monitoring the operation status of manufacturing machines in factories, a smart solution to improve manufacturing conditions of customers.



- 01** Real-time monitoring of machine operation status (Cloud)
- 02** History and statistics of machine operation (Cloud)
- 03** History and statistics of alarm occurrence (Cloud)
- 04** History and statistics of work count (Cloud)
- 05** Remote diagnosis (Remote)



HW-MCG
HYUNDAI WIA
Machine Guidance

Software that offers operation, maintenance, management monitoring and various user friendly features.



HW-WARMUP
HYUNDAI WIA
WARMing Up

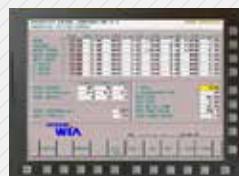
Warm-up software that measures main spindle halt and offers system warm-up time automatically.



HW-TOM
HYUNDAI WIA
Tool Offset Measurement

User friendly GUI software that indicates tool length, diameter, and damage (H/W excluded)

(FANUC)



HW-TDC
HYUNDAI WIA Thermal
Displacement Compensation

Software that measures the changes in the external environment as well as heat emission during processing to help reduce thermal displacement.



HW-ESS
HYUNDAI WIA
Energy Saving System

An environmental friendly software that reduces the unnecessarily wasted standby power waiting for an operation.



OPTION
HW-TM
HYUNDAI WIA
Tool Monitoring

A tool monitoring software which analyzes the load of the spindle motor to determine and monitor possible damage of tools.

05
F660M

SIEMENS Controller

The Powerful CNC Platform for Machine Tools



SIEMENS

DIFFERENTIATED CAPABILITIES,
INTEGRATED ENGINEERING PERFECTLY INTERLINKED

SIEMENS 828D is a latest model CNC.

It is designed for horizontal/vertical all-purpose equipment.

Its 80-bit control reduces processing time and increases productivity.

The 828D is easy to maintain and run, with its easy setup functions.



SIEMENS Technology

Shop Mill

- Dialogue-type programming, simple and convenient
- Effective specifications for small quantity batch production
- Step-by-step operation possible without knowledge of the DIN/ISO code

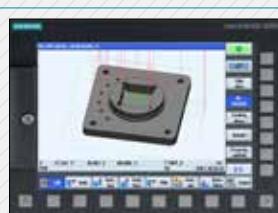
OPTION



3D Simulation

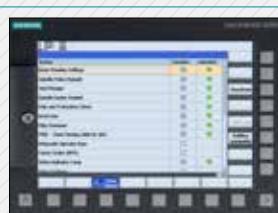
- 3D confirmation of the completed processing configuration of the NC program is possible.
- Offers standards for 2D simulation.
- Possible to confirm the simulation of the NC program during processing.

OPTION



Easy Extend

- Easy to install/uninstall an option (Ex : barfeeder and chip conveyor, etc.)
- Possible to install in one motion without revision of individual perimeters.
- A spate list is unnecessary as option items are indicated with letters.



SIEMENS Communication

Variable Communication Port

RJ 45 Ethernet

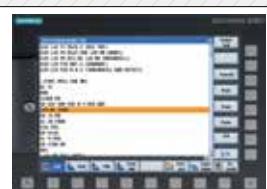
USB 2.0

Compact Flash Card



Easy input/output of a program is possible as a USB memory card, a CF memory card and LAN can all be used.

ISO Code Programming



If the ISO Dialect (G291) is ordered, JIS-based G-code programs can be used. (Standard)

06

F660M

Mold Package

Powerful Mold Package,
HYUNDAI-WIA Mold All in One



HWM ALL-IN-ONE

To enhance mold machining, the "HWM ALL-IN-ONE" is provided as a standard feature for F660M machines.

This ensures accurate and high quality surface finishing and contouring.



Mold Package Specification (FANUC 31i Series / SIEMENS 828D)

HWM ALL IN ONE	1 Package (FANUC)	2 Package (FANUC)	3 Package (FANUC)	4 Package (FANUC)	S Package (SIEMENS)
AICCI Package	200 block	●	●		
	600 block		●		
	1,000 block			●	
Mdynamic (Advanced surface)					●
S/W : HW-MCS, HW-AFC	●	●	●	●	
Auto Power Off	●	●	●	●	●
Spindle Heat Distortion Compensation Device (8 Channels)	●	●	●	●	●
Cutting Air Blow	●	●	●	●	●
Auto Tool Measuring Device	●	●	●	●	●
Roller Type LM Guideway	●	●	●	●	●
Data Server 1GB		●	●	●	

1 Package / S Package : Standard 2, 3, 4 Package : Option

Mold Package



① High Speed Contouring Control (AICC II : 200 Block)
Recognizes NC Data prior to the current processing phase

② Optimal S/w (FANUC 31i Series Models)
HW-MCS (Selectable Process Conditions)
HW-AFC (Adaptive Feed Control)

③ Automatic Power Off

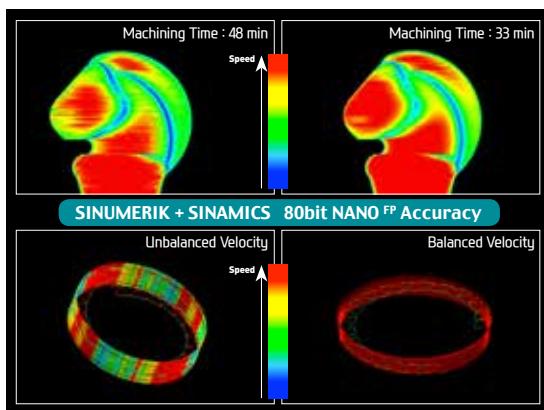


④ Main Spindle Cooling Device (8 Channels)
Maintains temperature on the main spindle from the thermal displacement. (heat sensor)

⑤ Cutting Air Blow
No need for cutting oil during mold processing

⑥ Auto Tool Measuring Device (RENISHAW TS27R or LTS)
Detects and sets tool length, and attrition (Graphic User Interface included)

SIEMENS Advanced Surface



- Advanced Surface software for high speed, high accuracy mold processing
- 80-bit floating point calculation enables calculation of numbers less than a nanometer
- A brand new filter for speed and acceleration control - Improvements upon the problems of intensity of illumination due to irregular CAM data
- Standard jerk restriction function to ease deceleration impact
 - Minimized vibration and high speed deceleration
- Standard feed forward function for speed control - Improves contouring accuracy by correcting the following error before setting point output



User Convenience



Various Devices for User Convenience

Measuring Device

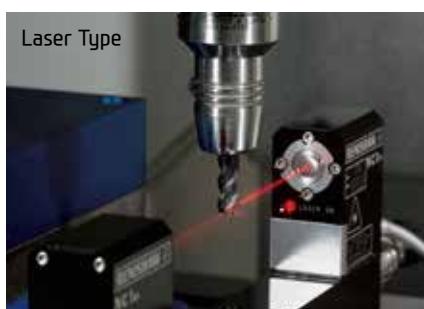
Touch Sensor

Workpiece coordinate values can be set automatically using the optional spindle probe.



TLM - Laser & Touch

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



Touch Type



Precision Device

NC Rotary Table

The NCRT makes it possible to machine up to 5-axis. Various types of products can be machined.



U-Center

With U-center, both external and internal diameter turning become possible, allowing for a wide range of variety in products.



Hydraulic Device

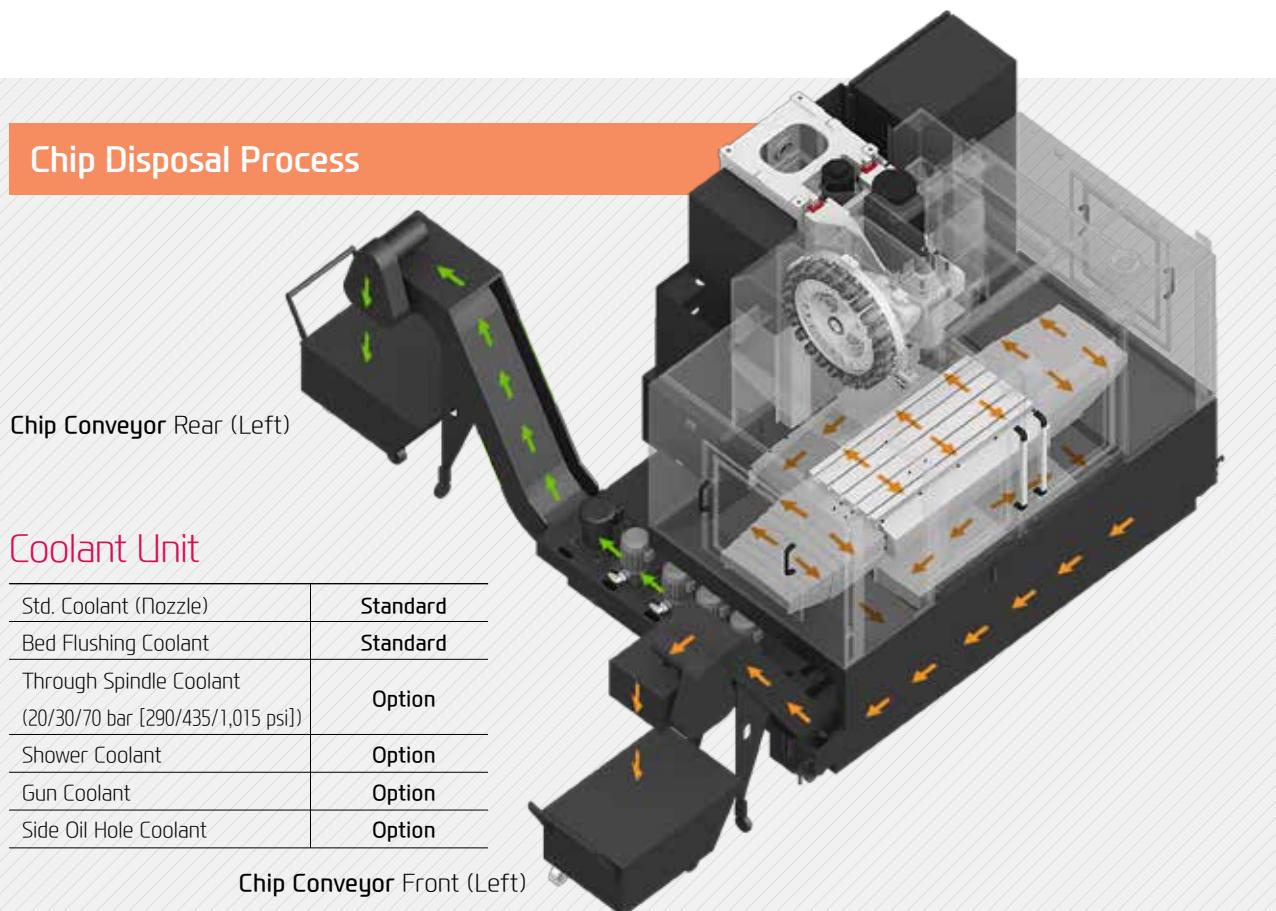
Hydraulic Supply Unit

Instead of the standard hydraulic supply unit, an optional fixture unit can bring the pressure up to 100 bar (1,450 psi), maximizing the clamping force on the fixture.



Optional

Chip Disposal Process



Coolant Unit

Std. Coolant (Nozzle)	Standard
Bed Flushing Coolant	Standard
Through Spindle Coolant (20/30/70 bar [290/435/1,015 psi])	Option
Shower Coolant	Option
Gun Coolant	Option
Side Oil Hole Coolant	Option

Chip Conveyor

Timely and effective disposal of chips will enhance productivity as well as the working environment.

- **Hinge Belt Type** : Highly efficient when disposing a lot of chips. Capable of handling stringy chips. (**Long Chip**)
- **Scraper Type** : Convenient for shortly cut chips.. (**Short Chip**)
- **Drum Filter Type** : Advantageous in precision, as the chips do not flow in to the coolant nozzle. (**AL Chip**)



SPECIFICATIONS

Standard & Optional

Spindle		F660M
15,000rpm (25/22kW [33.5/29.5 HP])	FANUC	●
20,000rpm (22/18.5kW [29.5/24.8 HP])	FANUC	○
15,000rpm (26/26kW [34.9/34.9 HP])	SIEMENS	○
Spindle Cooling System		●
ATC		
ATC Extension	24 30	● ○
	BT40	○
Tool Shank Type	BBT40 CAT40	● ○
	HSK-A63	○
U-Center	D'andrea	○
	45°	●
Pull Stud	60° 90°	○ ○
Table & Column		
APC		-
Tap Type Table		-
T-Slot Table		●
NC Rotary Table		☆
High Column	300mm (11.8")	○
Coolant System		
Std. Coolant (Nozzle)		●
Bed Flushing Coolant		●
	20bar (290 psi) 30bar (435 psi), 20 l (5.3 gal)	○ ○
Through Spindle Coolant*	70bar (1,015 psi), 15 l (4 gal)	○
	70bar (1,015 psi), 30 l (7.9 gal)	○
Top Cover		●
Shower Coolant		○
Gun Coolant		○
Side Oil Hole Coolant		○
Air Gun		○
Cutting Air Blow		○
Tool Measuring Air Blow (Only for TLM)		○
Air Blow for Automation		☆
Thru MQL Device (Without MQL)		☆
Coolant Chiller		☆
Power Coolant System (For Automation)		☆
Chip Disposal		
Coolant Tank	600 l (158.5 gal)	●
Chip Conveyor	Left(Left) (Hinge/Scraper)	○ ○
Special Chip Conveyor (Drum Filter)		☆
	Standard (180 l [47.5 gal])	○
Chip Wagon	Swing (200 l [52.8 gal])	○
	Large Swing (290 l [76.6 gal])	○
	Large Size (330 l [87.2 gal])	☆
	Customized	☆
S/W		
Machine Guidance (HW-MCG)	FANUC (☆)/SIEMENS (-)	
Tool Monitoring (HW-TM)		○
DNC Software (HW-eDNC)		○
Spindle Heat Distortion Compensation (HW-TDC)		●
Spindle Warm up Function (HW-WARMUP)	FANUC (●)/SIEMENS (-)	
Energy Saving System (HW-ESS)	FANUC (●)/SIEMENS (-)	

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

S/W		F660M
Machine Monitoring System (HW-MMS)		○
Tool Offset Measurement (HW-TOM)		●
Machining Condition Selection (HW-MCS)	FANUC (●)/SIEMENS (-)	
Adaptive Feed Control (HW-AFC)	FANUC (●)/SIEMENS (-)	
Conversational Program (HW-DPRO)		○
Electric Device		
Call Light	1 Color : ● 2 Color : ●, ● 3 Color : ●, ●, ● 3 Color : ●, ●, ●, B	● ○ ○ ○
Work Light		●
Electric Cabinet Light		○
Remote MPG	FANUC SIEMENS	○ -
3 Axis MPG		○
Work Counter	Digital	○
Total Counter	Digital	○
Tool Counter	Digital	○
Multi Tool Counter	6 EA 9 EA	○ ○
Electric Circuit Breaker		○
AVR (Auto Voltage Regulator)		☆
Transformer	25kVA	○
Auto Power Off		●
Back up Module for Black out		○
Measuring Device		
Air Zero	TACO SMC	○ ○
Work Measuring Device		○
TLM (Marposs/Renishaw/Blum)	Touch(Mold Package) Touch/Laser	● ○
Tool Broken Detective Device		☆
Linear Scale	X/Y/Z Axis	○
Coolant Level Sensor (Only for Chip Conveyor, Bladder Type)		☆
Environment		
Air Conditioner		○
Dehumidifier		○
Oil Mist Collector		☆
Oil Skimmer (Only for Chip Conveyor)		○
MQL (Minimal Quantity Lubrication)		☆
Fixture & Automation		
Auto Door	Std. High Speed	○ ☆
Auto Shutter (Only for Automatic System)		☆
Sub O/P		☆
NC Rotary Table/F	Single Channel	○ ☆
Control of Additional Axis	1Axis 2Axis	○ ☆
External M Code 4ea		○
Automation Interface		☆
I/O Extension (In & Out)	16 Contact 32 Contact	○ ○
Hyd. Device		
Std. Hyd. Unit	70bar (1,015 psi) / 14 l (3.7 gal)	●
Center Hyd. Supply Device	2x3(l port) 2x5(10 port)	☆ ☆
	45bar (652.7 psi) 70bar (1,015 psi) 100bar (1,450 psi)	- ○ ○
Fixture Hyd. Unit	Customized	☆
ETC		
Tool Box		●
Customized Color	Need for Munsel No.	☆
CAD&CAM Software		☆

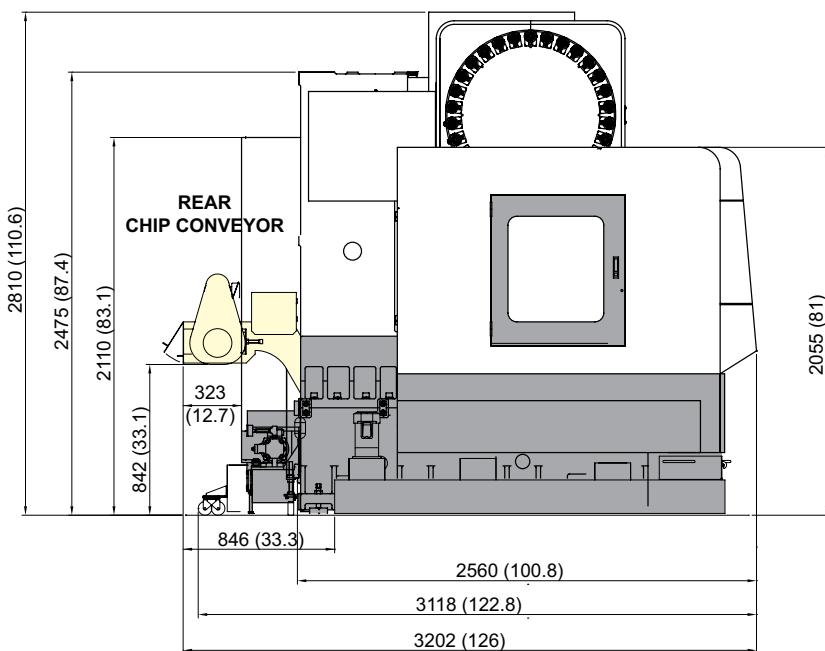
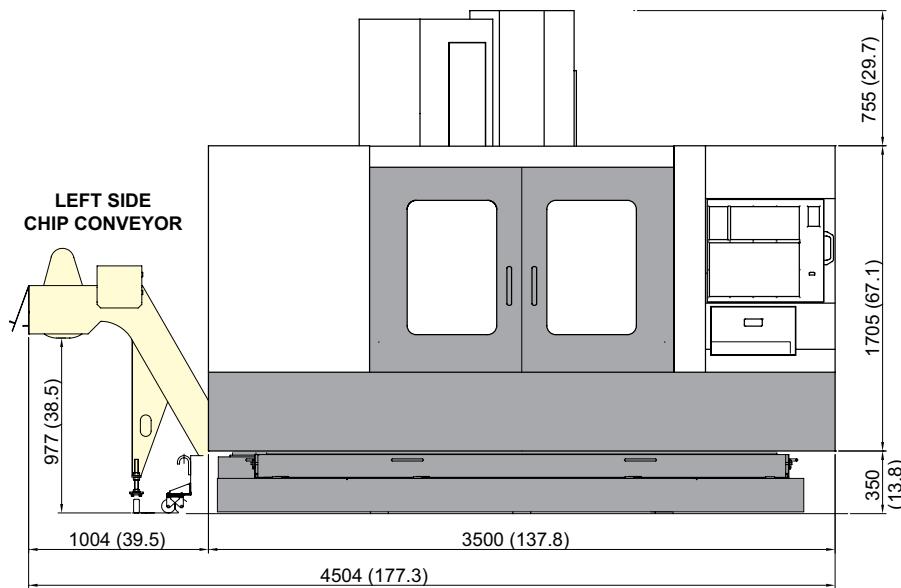
Through Spindle Coolant* : Please check the filter types with sales representative.
Specifications are subject to change without notice for improvement.

SPECIFICATIONS

External Dimensions

unit : mm(in)

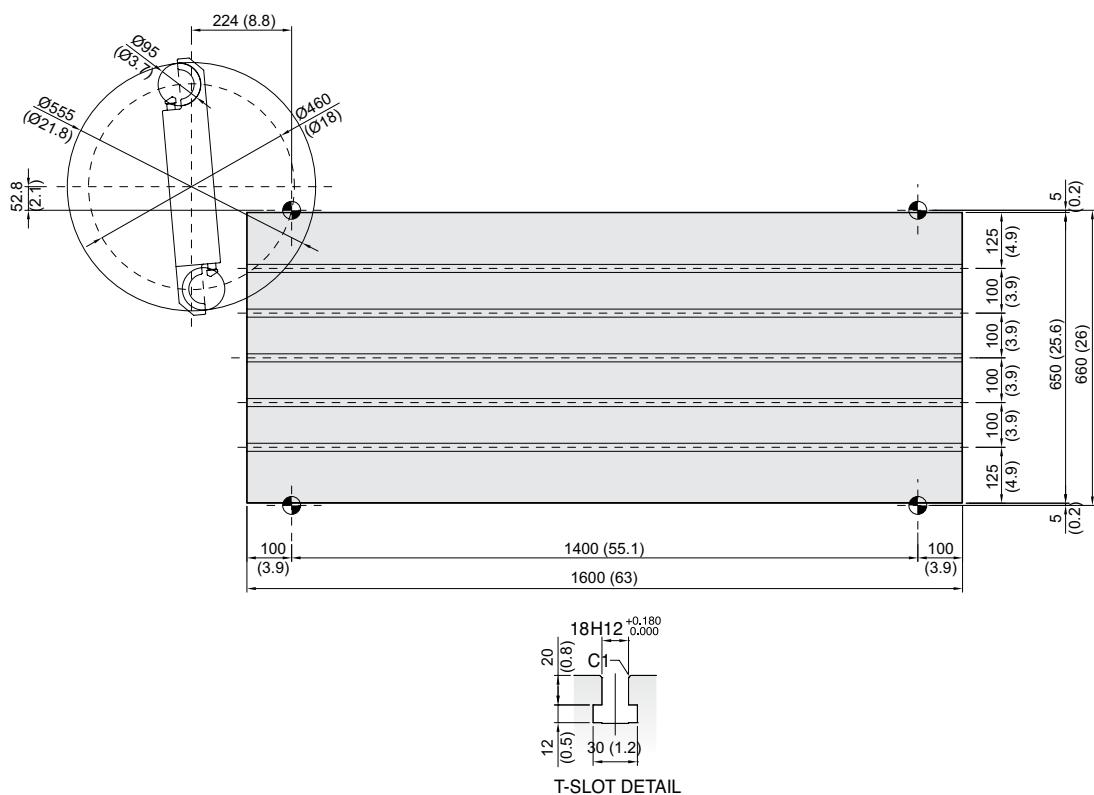
F660M



SPECIFICATIONS

External Dimensions

unit : mm(in)

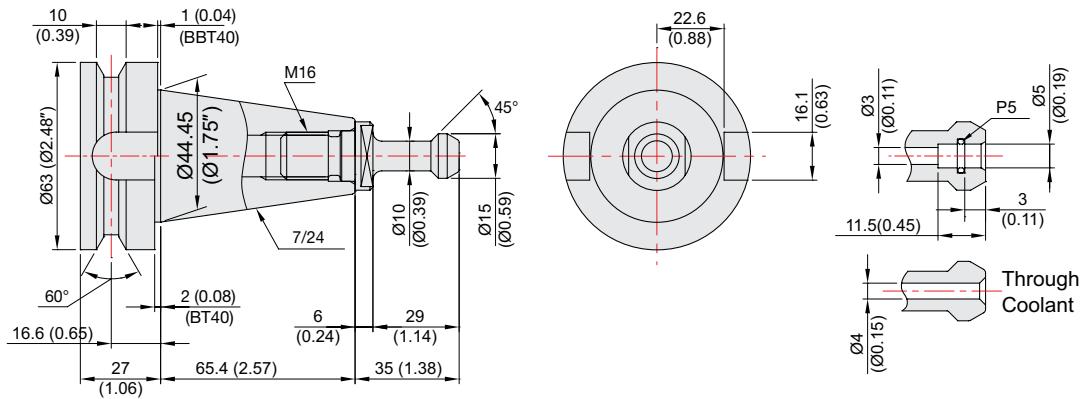


SPECIFICATIONS

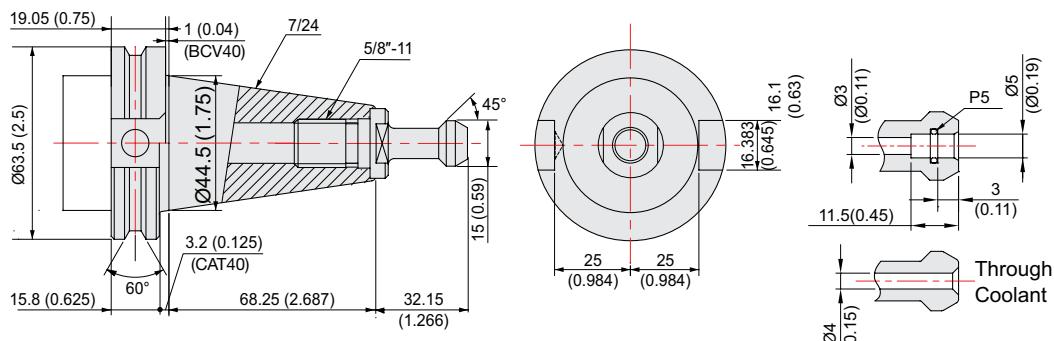
Table Dimensions

unit : mm(in)

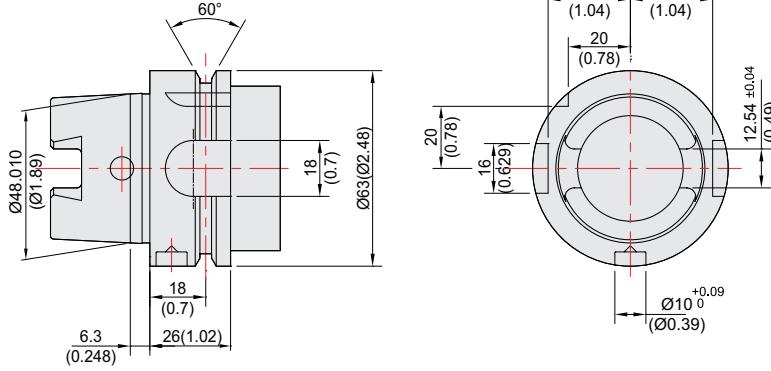
BT40/BBT40, BIG PLUS



CAT40/BCV40



HSK A-63



SPECIFICATIONS

Specifications

[] : Option

ITEM			F660M	
TABLE	Table Size	mm(in)	1,600×650 (63"×25.6")	
	Maximum Load Capacity	kg(lb)	1,300 (2,866)	
	Table Change Time	sec	-	
	Change Method	-	-	
	Table Driving Method	-	-	
SPINDLE	Spindle Taper	-	BIG PLUS #40 [HSK-A63]	
	Spindle RPM	r/min	15,000 [20,000] [15,000]	
	Spindle Power Output (Max./Cont.)	kW(HP)	25/22 (33.5/29.5) [22/18.5 (29.5/24.8)] [26/26 (34.9/34.9)]	
	Spindle Torque (Max./Cont.)	N·m(lbf·ft)	167/95 (123.2/70) [53/37 (39.1/27.3)] [113/75 (83.3/55.3)]	
	Spindle Driving Method	-	BUILT-IN [BUILT-IN]	
FEED	Travel (X/Y/Z)	mm(in)	1,400/660/635 (55.1"/26"/25")	
	Distance from Table Surface to SP	mm(in)	150~785 (5.9"~30.9")	
	Distance from Column to SP. center	mm(in)	615 (24.2")	
	Rapid Traverse Rate (X/Y/Z)	m/min(ipm)	36/36/30 (1,417/1,417/1,181)	
	Slide Type	-	LM GUIDE [ROLLER GUIDE]	
ATC	Number of Tools	EA	24 [30]	
	Tool Shank	-	BBT40 [CAT40] [HSK-A63]	
	Max. Tool Dia. (W.T / W.O)	mm(in)	Ø90/Ø150 (3.5"/5.9")	
	Max. Tool Length	mm(in)	300 (11.8")	
	Max. Tool Weight	kg(lb)	8 (17.6)	
	Tool Selection Method	-	RANDOM	
	Tool Change Time	T-T	sec	1.5
		C-C	sec	3.9
TANK CAPACITY	Coolant Tank	ℓ (gal)	600 (158.5)	
	Lubricating Tank	ℓ (gal)	2 (0.5)	
	Hydraulic Tank	ℓ (gal)	11 (2.9)	
POWER SUPPLY	Air Consumption (0.5MPa)	ℓ /min(gal)	110 (29.1)	
	Electric Power Supply	kVA	28	
	Thickness of Power Cable	Sq	OVER 50	
	Voltage	V/Hz	220/60 (200/50*)	
MACHINE	Floor Space (L×W)	mm(in)	3,500×2,560 (137.8"×100.8")	
	Height	mm(in)	2,810 (110.6")	
	Weight	kg(lb)	9,500 (20,944)	
NC	Controller	-	HYUNDAI WIA FANUC i Series [FANUC 31i-B] [SIEMENS 828D si]	

❖ Roller guideway is included as standard when the Mold Package is selected.

CONTROLLER

HYUNDAI WIA FANUC i Series

Controlled axis / Display / Accuracy Compensation	
Control axes	3 axes (X, Y, Z)
	4 axes (X, Y, Z, B)
Simultaneously controlled axes	3 axes [Max. 4 axes]
Least setting Unit	X, Y, Z axes : 0.001 mm (0.0001 inch) B axes : 1 deg [0.001] deg
Least input increment	X, Y, Z axes : 0.001 mm (0.0001 inch) B axes : 1 deg [0.001] deg
Inch / Metric conversion	G20 / G21
High response vector control	
Interlock	All axes / Each axis
Machine lock	All axes
Backlash compensation	± 0 ~ 9999 pulses (Rapid traverse / Cutting feed)
Position switch	
LCD / MDI	10.4 inch color LCD
Feedback	Absolute motor feedback
Stored stroke check 1	Over travel
Stored pitch error compensation	
Operation	
Automatic operation (Memory)	
MDI operation	
DNC operation	Needed DNC software / CF card
Program restart	
Wrong operation prevention	
Program check function	Dry run, Program check, Z axe Machine lock Stored limit check before move
Single block	
Search function	Program Number / Sequence Number
Handle interruption	
Interpolation functions	
Demo interpolation	
Positioning	G00
Linear interpolation	G01
Circular interpolation	G02, G03
Exact stop mode	Single : G09, Continuous : G61
Dwell	G04, 0 ~ 9999.9999 sec
Skip	G31
	1st reference : G28
Reference position return	2nd reference : G30 Ref. position check : G27
Single direction positioning	G60
Thread synchronous cutting	G33
Helical interpolation	Circular + Linear 2 axes (Max.)
Feed function / Acc. & Dec. control	
Manual feed	Rapid traverse Jog : 0 ~ 5,000mm/min (197 ipm) Manual handle : x1, x10, x100 pulses Reference position return
Cutting Feed command	Direct input F code
Feedrate override	0 ~ 200% (10% Unit)
Rapid traverse override	F0% (F1%), F25%, F50%, F100%
Override cancel	
Feed per minute	G94
Feed per revolution	G95
Cylindrical interpolation	G07.1
Inverse time feed	G93
Look-ahead block	20 blocks (AI APC)
Program input	
Tape Code	EIA / ISO
Optional block skip	1 ea
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 / Z-X : G18 / Y-Z : G19
Workpiece coordinate system	G52, G53, 48 pairs (G54.1 P1 ~ 48)
Manual absolute	Fixed ON
Programmable data input	G10
Sub program call	10 folds nested
Custom macro	#100 ~ #149, #500 ~ #549
G code system	A
[] : Option ★ Needed technical consultation	
Program input	
Programmable mirror image	G51.1, G50.1
G code preventing buffering	G4.1
Optional chamfering corner R	
Polar coordinate command	G15, G16
Scaling	G50, G51
Coordinate system rotation	G68, G69
Auxiliary function / Spindle speed function	
Auxiliary function	M & 4 digit
Level-up M Code	Multi / Bypass M code
Spindle speed function	S & 5 digit, Binary output
Spindle override	0% ~ 150% (10% Unit)
Spindle orientation	M19
Retraction for rigid tapping	
FSSB high speed rigid tapping	
Tool function / Tool compensation	
Tool function	Max. T8 digit
Tool life management	
Tool offset pairs	400 pairs
Tool nose / radius compensation	G40, G41, G42
Tool length offset	G43, G44, G49
Tool offset memory C	Tool geometry and wear (Cutter and tool length)
Tool length measurement	Z axe Input C
Editing function	
Part program storage size	1248m (512KB)
No. of registerable programs	400 ea
Program protect	
Background editing	
Extended part program editing	Copy, move and change of NC program
Memory card program edit	
Data input / output & Interface	
I/O interface	RS 232C serial port, CF card, USB memory Embedded Ethernet interface
Screen hard copy	
External message	
External key input	
External workpiece number search	
Automatic data backup	
Setting, display and diagnosis	
Self-diagnosis function	
History display & Operation	Alarm & Operator message & Operation
Run hour / Parts count display	
Maintenance information	
Actual cutting feedrate display	
Display of spindle speed / T code	
Graphic display	
Operating monitor screen	Spindle / Servo load etc.
Power consumption monitoring	Spindle & Servo
Spindle / Servo setting screen	
Multi language display	Support 20 languages
Display language switching	Selection of 5 optional Languages
LCD Screen Saver	Screen saver
Option	
Additional optional block skip	9 ea ★
Fast ethernet	Needed option board
Data server	Needed option board
Protection of data at 8 levels	
Additional Axis	
MANUAL GUIDE i	Conversational auto program
Manual handle feed	2/3 units
Addition of custom macro	#100 ~ #199, #500 ~ #999, #98000 ~ #98499
Tool management function	
Part program storage size	5120m (2MB)
No. registerable programs	Max. 1000 EA
Add. Workpiece	Max. 300 pairs (G54.1 P1 ~ P300)
	40 blocks
AICC II	200 blocks
	400 blocks ★

Figures in inch are converted from metric values.

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

CONTROLLER

FANUC 31i-B

Controlled axis / Display / Accuracy Compensation	
Control axes	3 axes (X, Y, Z) 4 axes (X, Y, Z, B)
Simultaneously controlled axes	3 axes [Max. 4 axes]
Least setting Unit	X, Y, Z axes : 0.001 mm (0.0001 inch) B axes : 1 deg [0.001] deg
Least input increment	X, Y, Z axes : 0.001 mm (0.0001 inch) B axes : 1 deg [0.001] deg
Inch / Metric conversion	G20 / G21
High response vector control	
Interlock	All axes / Each axis
Machine lock	All axes
Backlash compensation	± 0 ~ 9999 pulses (Rapid traverse / Cutting feed)
Position switch	
LCD / MDI	10.4 inch color LCD
Feedback	Absolute motor feedback
Stored stroke check 1	Over travel
Stored pitch error compensation	
Operation	
Automatic operation (Memory)	
MDI operation	
DNC operation	Needed DNC software / CF card
Program restart	
Wrong operation prevention	
Program check function	Dry run, Program check Z axes Machine lock, Stroek check before move
Single block	
Search function	Program Number / Sequence Number
Interpolation functions	
Nano interpolation	
Positioning	G00
Linear interpolation	G01
Cylindrical interpolation	G02, G03
Exact stop mode	Single : G09, Continuous : G61
Dwell	G04, 0 ~ 9999.9999 sec
Skip	G31
Reference position return	1st reference : G28 2nd reference : G27 Ref. position check : G30
Thread synchronous cutting	G33
Helical interpolation	Circular + Linear interpolation 2 axes(max.)
Feed function / Acc. & Dec. control	
Manual feed	Rapid traverse Jog : 0~5,000mm/min (197 ipm) Manual handle : x1, x10, x100 pulses Reference position return
Cutting Feed command	Direct input F code
Feedrate override	0 ~ 200% (10% Unit)
Rapid traverse override	F0% (F1%), F25%, F50%, F100%
Override cancel	
Feed per minute	G94
Feed per revolution	G95
Look-ahead block	40 Block 200 Block (Mold)
Program input	
Tape Code	EIA / ISO
Optional block skip	1 ea
Absolute / Incremental program	G90 / G91
Program stop / end	M00, M01 / M02, M30
Maximum command unit	± 999,999,999 mm (± 99,999,999 inch)
Plane selection	X-Y : G17 / Z-X : G18 / Y-Z : G19
Workpiece coordinate system	G52, G53, 6 pairs (G54 ~ G59)
Manual absolute	Fixed ON
Programmable data input	G10
Sub program call	10 folds nested
Custom macro	#100 ~ #149, #500 ~ #549
G code system	A
Programmable mirror image	G51.1, G50.1
G code preventing buffering	G4.1
Including Chamfering / Corner R	
Canned cycle	G73, G74, G76, G80 ~ G89
Coordinate rotation	G68, G69

[] : Option ☆ Needed technical consultation

Auxiliary function / Spindle speed function	
Auxiliary function	M & 4 digit
Level-up M Code	Multi / Bypass M code
Spindle speed command	S & 5 digit, Binary output
Spindle override	0% ~ 150% (10% Unit)
Spindle orientation	M19
FSSB high speed rigid tapping	
Tool function / Tool compensation	
Tool function	Max. T 8 digit
Tool life management	256 pairs ☆
Tool offset pairs	64 pairs
Tool nose radius compensation	G40, G41, G42
Tool nose length compensation	G43, G44, G49
Tool offset memory C	Tool length, diameter, abrasion(length, diameter)
Tool length measurement	Z axes Input C
Editing function	
Part program storage size	640m (256KB)
No. of registerable programs	500 ea
Program protect	
Background editing	
Extended part program editing	Copy, move and change of NC program
Memory card program edit	
Data input / output & Interface	
I/O interface	RS 232C serial port, CF card, USB memory Embedded Ethernet interface
Screen hard copy	
External message	
External key input	
External workpiece number search	
Automatic data backup	
Setting, display and diagnosis	
Self-diagnosis function	
History display	Alarm & Operator message & Operation
Run hour / Parts count display	
Maintenance information	
Actual cutting feedrate display	
Display of spindle speed / T code	
Graphic display	
Operating monitor screen	Spindle / Servo load etc.
Power consumption monitoring	Spindle & Servo
Spindle / Servo setting screen	
Multi language display	Support 20 languages
Display language switching	Selection of 5 optional Languages
LCD Screen Saver	Screen saver
Processing select	Speed/rigidity setting
Option	
Additional optional block skip	9 ea ☆
Fast ethernet	Needed option board
Data server	Needed option board
Protection of data at 8 levels	
Sub Spindle control	
Polar coordinate command	G15, G16
Polar coordinate interpolation	G12.1, G13.1
Cylindrical interpolation	G07.1
One-way positioning	G60
Stored stroke check 2, 3	
Inverse-time feed	G93
Scaling	G50, G51
Manual guide i	Conversational auto program
Handle interrupt	
Manual handle feed	2/3 units
Additional custom macro variables	#100~#199, #500~#999 #100~#199, #500~#999, #98000~#98499
Retraction for rigid tapping	
Tool management function	
Tool offset number	Max. 2000 pair ☆
Program storage capacity	512KB ~ 8MB ☆
Program registration number	Max. 4000 ea ☆
Additional work coordinate	48 pair (G54.1 P1 ~ P48)
AICC II	200 block 400 / 600 / 1000 block ☆

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

CONTROLLER

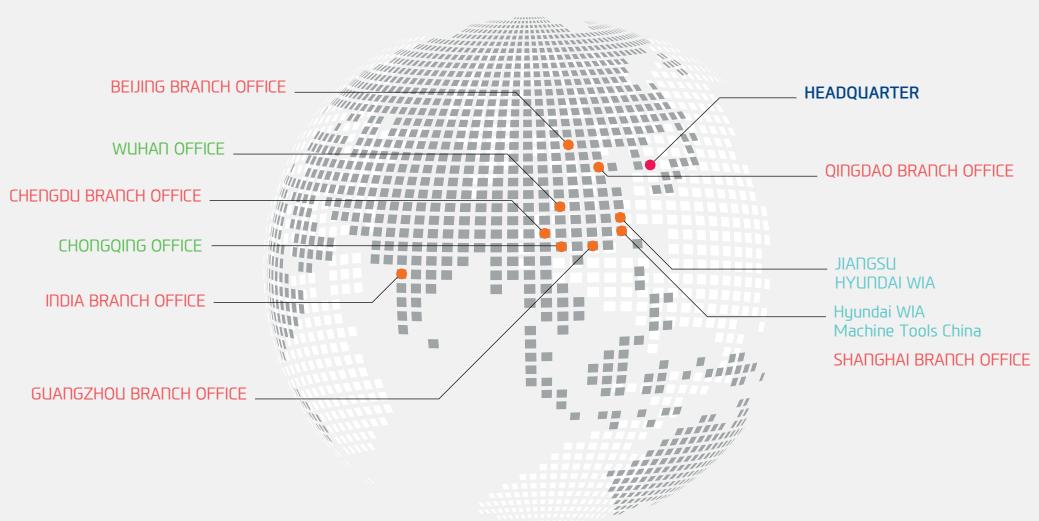
SIEMENS 828D sl

Control Function		Programming Function	
Max. configuration of axis	5 axis	Part Program Storage Length	5MB
Max. configuration of axis and spindle	6 axis (axis + spindle)	Program Name	23 digits
Least Command/Input	0.0001mm / 0.00001inch	Subroutine Call	Protection Level
Feed Function		Absolute/Incremental Command	G90 - G91
Feedrate Override	0 - 120%	Scaling, ROT	
Rapid Traverse Override	F0, 5, 25/50, 100%	Inch / Metric Conversion	
Acceleration with jerk limitation		Conversational Cycle Program	
Programmable acceleration		Block Search	
Follow-up mode		Variable Program (Macro)	
Measuring system 1 and 2, selectable		Read / Write System Variable	
Separate path feed for corners and chamfers		BackGround Editing	
Travel to fixed stop		Miscellaneous Functions	M - Code
Spindle Functions		Lable Skip	
Spindle Override	50% - 120%	Program Stop / End	M00, M01, M02, M30
Spindle Orientation		Lookahead , Jerk Limitation Feed & Forward Control	150 Block
Spindle Speed Limitation		SIEMENS Program.exe.	
Rigid Tapping		Maximum number of tools/cuttings	256/512
Interpolations		Number of levels for skip blocks 1	
Linear interpolation axis	Max 4 axis	Protection Function	
Circle via center point and end point		Emergency Stop	
Circle via interpolation point		Over Travel	Soft Limit
Helical interpolation		Contour Monitoring	
Universal interpolator NURBS (non-uniform rational B splines)		Program Protection	
Advanced Surface	High Speed, High Rigidity Function	Automation Support Fun.	
Compressor for 3-axis machining		Actual Speed Display(Monitor)	
Tool Function		Tool Life Management	(Time, Parts)
Tool Radius Comp.		Work Count Function	(Internal)
Zero Offset (G54, G55, G56, G57, G58, G59)	100 EA	Language Function	
Programmable Zero Offset			(6EA)
Tool management			Chinese Traditional, Czech, Danish, Dutch, Finnish, Hungarian, Japanese, Korean, Polish, Russian, Swedish, Portuguese, Turkish
Display		Data Transfer	
CRT / MDI	10.4" Color LCD	RS 232C I/F / Ethernet	
Screen saver		Ethernet	
Manual Operation		USB Memory Stick & CF Card	
Manual Handle/Jog Feed		Option	
Reposition		DRF offset	
Reference Approach	Ref 1, 2 Approach	Load and save of MDI	
Spindle Control	Start, Stop, Rev, Jog, Ort.	Teach-in	
Auto Operation		Number of levels for skip blocks 8	
Single Block		Simulation in 3D display	
Feed Hold		Shop Turn	Conversational Program
Optional Block Skip		TRACYL	
Machine Lock		TRANSMIT	
Dry Run			
Simulation	2D		
Diagnosis Function			
Alarm display			
Spindle Load Meter/RPM Meter (monitor)			
PLC status/LAD display			

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

GLOBAL NETWORK



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F660M Movie



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