

HB50

Robust Machining Center with Revolutionary Productivity

SG WIA Horizontal Machining Center

Technical Leader

Horizontal Machining Center HB50 designed by SG WIA with years of expertise and the latest technology, features 2 Step geared spindle for highly rigid and accurate machining to maximize productivity.

HB50

Pallet Size (L×W)	mm(in)	2-500×500 (2-19.7"×19.7")
Max. Load Capacity	kg(lb)	2-800 (2-1,764)
Spindle Taper	-	BT50 [BBT50]
Spindle Speed	r/min	4,500 [4,500] [8,000] [8,000]
Spindle Output	kW(HP)	18.5 (25) [22 (30)]
No. of Tools	EA	40 [60, 90, 120]
Travel (X/Y/Z)	mm(in)	760/705/650 (29.9"/27.8"/25.6")
Rapid Traverse Rate (X/Y/Z)	m/min(ipm)	20/20/20 (787/787/787 ipm)

[] : Option

- 2 Step Gear on Main Spindle for Heavy Duty Cutting
- Standard Oil Cooling System for High Precision
- Shuttle Type APC
- Box Guides on All Axis for Ultra Rigidity
- Air Semi-Rising Slideway on Z-axis
- 8-Face Contact Y-axis Guideway
- Specially Designed Columns that Minimizes Thermal Displacement
- Tool Magazine Capacity of up to 120 Tools (Opt.)



01 BASIC STRUCTURE

Revolutionized Productivity & High Performance – Horizontal Machining Center

ATC & Magazine

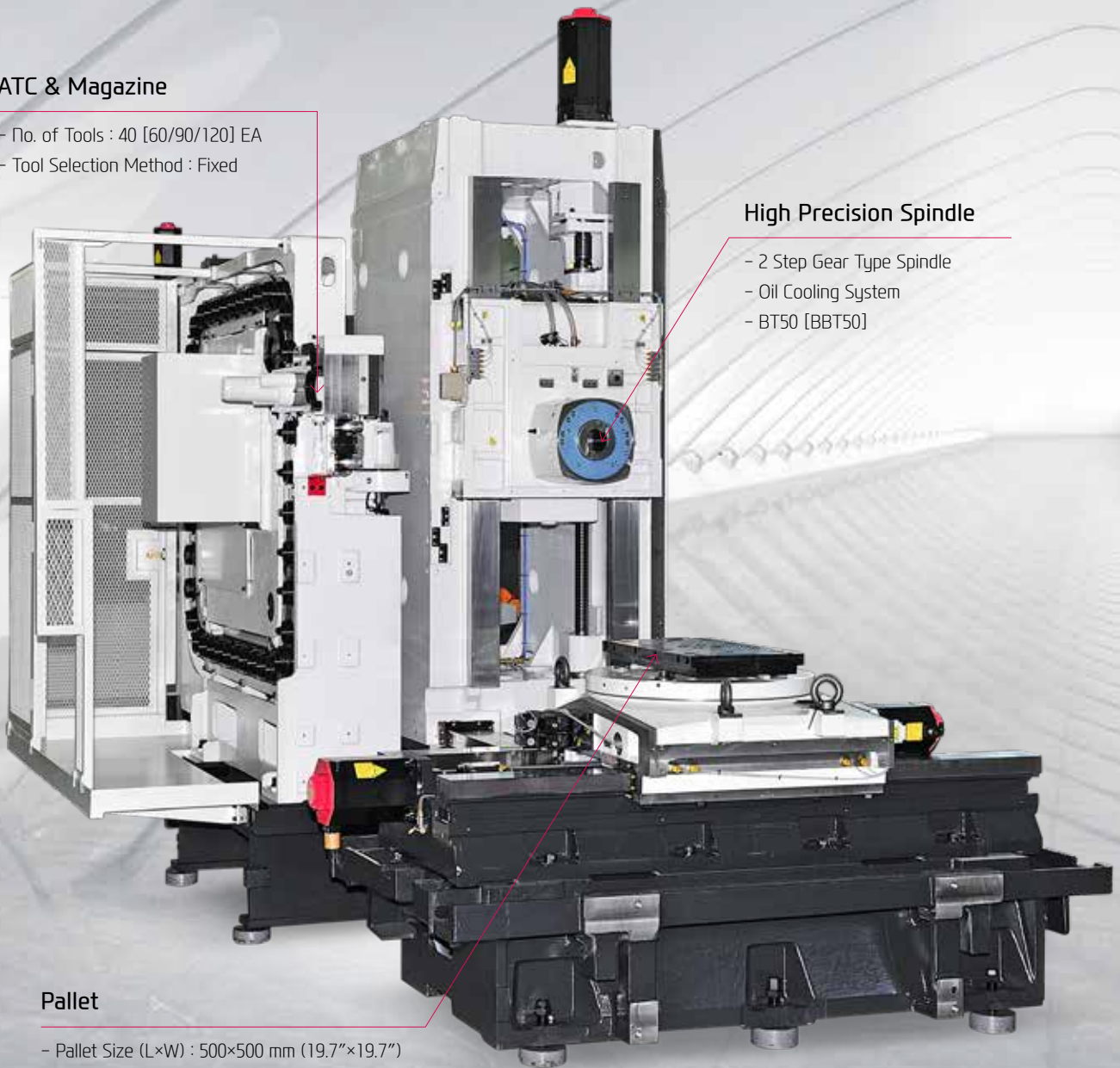
- No. of Tools : 40 [60/90/120] EA
- Tool Selection Method : Fixed

High Precision Spindle

- 2 Step Gear Type Spindle
- Oil Cooling System
- BT50 [BBT50]

Pallet

- Pallet Size (L×W) : 500×500 mm (19.7"×19.7")
- APC Type : Shuttle



HIGH RIGIDITY, HIGH PERFORMANCE

HIGH RIGIDITY STRUCTURE

“T” Type Bed

The ‘T’ structure of the bed is designed with ample bed height and casting thickness to ensure the optimal level of rigidity.

Column Moving Structure

The Z-axis of the machine is designed with a moving column to prevent table sag. The moving column structure increases rigidity and reduces heat generation. Hence, it shows excellent performance in heavy duty cutting where accuracy and repeatability are maintained.



GUIDE WAY

Box Guideway for All Axis

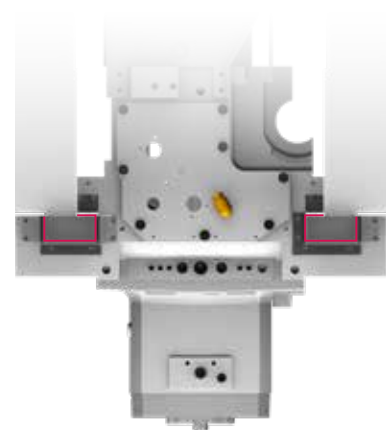
HB50 is designed with box guideways which show great performance in offsetting vibration. Therefore, it is possible to efficiently machine difficult to cut materials into high precision products.

Air Semi-Rising Slide Way

By applying the air semi-rising slideways, the load on the Z-axis slideway is decreased. Therefore, positioning and repeatability accuracy can be maintained for a long time.

8-face Contact Y-axis Guideway

Spindle head contacts 8 faces of Y-axis guideway. This new method allows cutting forces generated by the spindle head to be absorbed by the Y-axis box guideways which improves heavy duty cutting ability, accuracy, and surface finish.



Travel (X/Y/Z)

760/705/650 mm (29.9"/27.8"/25.6")

Rapid Traverse Rate (X/Y/Z)

20/20/20 m/min (787/787/787 ipm)

02 HIGH PRECISION SPINDLE

Excellent machining performance with high-precision spindle

Spindle Specifications

[] : Option

Speed (rpm)	Motor (Max./Cont.)	Torque (Max./Cont.)
4,500 r/min	18.5/15 kW (25/20 HP)	901/730 N·m (664.5/538.4 lbf·ft)
[4,500 r/min]	[22/15 kW (30/20 HP)]	[1,071/730 N·m (789.9/538.4 lbf·ft)]
[8,000 r/min]	[18.5/15 kW (25/20 HP)]	[657/532 N·m (484.6/392.4 lbf·ft)]
[8,000 r/min]	[22/15 kW (30/20 HP)]	[781/532 N·m (576/392.4 lbf·ft)]

HIGH-PERFORMANCE, HIGH-PRECISION SPINDLE

SPINDLE

High Precision & High Rigidity Spindle

By using ultra precision class cylindrical roller-bearings, fast acceleration and deceleration of the main spindle is achieved. The spindle head is designed to minimize thermal displacement of the main spindle, and with the use of a hydraulic tool lock system the machining stability has been increased.

2-Step Geared Spindle

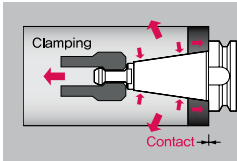
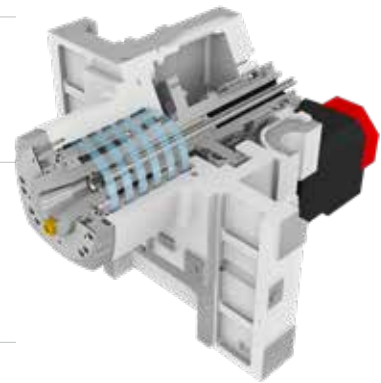
HB50 is designed with a 2-step gear drive, which provides high torque at low rpm and stability at high rpm.

Spindle Cooling

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

8 Nozzles Directing Coolant

8 nozzles on the spindle improve precision by providing coolant on the machining area where direction of injection can be adjusted.



Dual Contact Spindle

The Big Plus spindle system (BBT50) provides dual contact between the spindle face and the flange face of the tool holder.

- ❖ The increase in standard diameter improves stiffness and ATC repeatability, and Z-axis displacement is prevented which further extends tool life.

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.

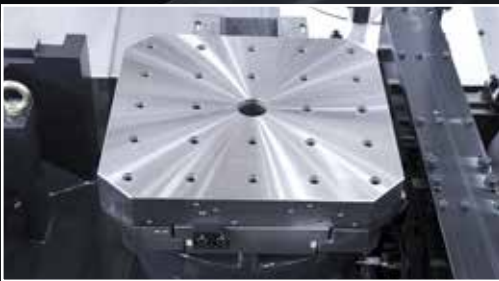


20 bar / 30 bar / 70 bar

03 APC & ATC

High Productivity Achieved with High Rigidity, Accuracy Machining

◎ Tap Pallet



◎ T-Slot Pallet **OPTION**



❖ The pallet in the photo above is a pallet with an optional center hole. Center hole is not applied as standard specification.

ATC & Magazine Specifications

[] : Option

No. of Tools	Max. Tool Dia. (W.T/W.O)	Max. Tool Length	Max. Tool Weight
40 [60, 90, 120] EA	Ø110/Ø245 mm (Ø4.3"/Ø9.6")	400 mm (15.7")	20 [35] kg (44 [77] lb)

APC & Pallet Specifications

Pallet Size (L×W)	Max. Load Capacity	Min. Indexing Angle	APC Type
500×500 mm (19.7"×19.7")	800 kg (1,764 lb)	1° [0.001°]	SHUTTLE

HIGH RIGIDITY, TOOL & PALLET CHANGE SYSTEM

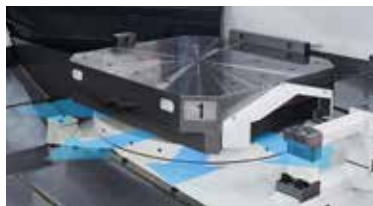
APC & PALLET

Shuttle Type APC

HB50 is equipped with a shuttle type APC (Automatic Pallet Changer) as standard. The pallet can be rotated in the loading station for quick and easy load/unload of machined parts.



B Axis Index Angle Std. : 1° [Opt. : 0.001°]



Air Clearing System

During the pallet change cycle, strong air blasts from the taper cones on the machine table helps remove chips to provide clean surface for locating the pallet. This ensures high accuracy of pallet positioning and guarantees optimum rigidity.

ATC & MAGAZINE

HB50 offers various tool magazines which expand the range of machining. Also, fixed address tool selection method and 2 types of ATC cycles for heavy tools and standard tools increase convenience.

ATC Air Blow & Brush

Tool holders are automatically cleaned by an air blow and brush when they are placed in the standby position.



40 Tool **OPTION**



60 Tool **OPTION**



90 Tool **OPTION**



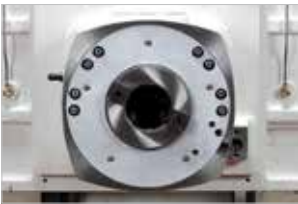
120 Tool **OPTION**



04 USER CONVENIENCE

Various Devices for User Friendly

CHIP DISPOSAL SOLUTION & COOLANT UNIT



Std. Coolant (Nozzle)



Gun Coolant (Opt.)



Air Gun (Opt.)



Spindle Cooling Unit

The cooling unit is installed within the side of the machine to minimize the installation area. The application of the inverter type, $\pm 0.1^\circ$, enables rapid and effective control of the spindle thermal displacement.



Interior Screw Chip Conveyor

Dual screw type chip conveyors are located at each side of the bed which makes it convenient to remove chips.

Chip Conveyor

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



Hinge	Chip Type : Roughing chip, long chip, chip complex	Material : SS41, 45C, Cast Steel	Left Direction
	Highly efficient when disposing a lot of chips. Capable of handling stringy chips..		
Scraper	Chip Type : Finely broken chip blown out	Material : cast Iron, Nonferrous	
	Convenient for shortly cut chips.		
❖ Screw	Chip Type : The lower portion of micro-chips	Material : Steel, Casting	
	Compresses and ejects chips to reduce chip trouble.		
❖ Drum Filter	Chip Type : Powder, micro chip	Material : AL	
	Advantageous in precision, as the chips do not flow in to the coolant nozzle.		

❖ When ordering a screw or drum filter chip conveyor, prior consult with hyundai wia's sales person.

6PPL

6PPL contains 5 buffer stations and a setup station as standard. Compared to conventional machines that feature APC (2 Pallets), 6PPL runs automatically for longer time. Also, machining various products is possible under a scheduled operation.



PRECISION SYSTEM



Linear Scale

Linear scales increase positioning accuracy and reduce distortion caused by thermal growth, thus ensuring a more accurate finished part



TLM (Laser & Touch)

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.



Touch Sensor

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



APC Safety Sensor & Control Panel

Safety Sensors on APC covers detect the presence of operators near APC. When a contact is detected on the beam, APC Automatically stops. This helps establish a safe work environment.

Also, additional control panel is provided for APC operating.



CNC ROTARY TABLE & HYDRAULIC SUPPLY UNIT

Various shapes of products can be processed when using CNC Rotary Table. In addition, 100 bar of high pressure hydraulic unit for the fixture increases the tightening power of the teeth.

SPECIFICATIONS

Standard & Optional

		HB50
Spindle		
4,500rpm (18.5kW [25HP])	2 Step Gear	●
4,500rpm (22kW [30HP])	2 Step Gear	○
8,000rpm (18.5kW [25HP])	2 Step Gear	○
8,000rpm (22kW [30HP])	2 Step Gear	○
Spindle Cooling System		●
ATC		
ATC Extension	40	●
	60	○
	90	○
	120	○
Tool Shank Type	BT50	●
	BBT50	○
	CAT50/BCV50	○
Heavy Weight Tool	20kg (44lb)	●
	35kg (77lb)	○
U-Center	D'andrea	○
Pull Stud	45°	○
	60°	○
	90°	●
Servo Motor Magazine		○
Table & Column		
APC	Shuttle	●
Tap Type Pallet		●
T-Slot Pallet		○
Std. Table	1°	●
B Axis NC Table	0.001°	○
Coolant System		
Std. Coolant (Nozzle)		●
Through spindle coolant*	20 bar	○
	30 bar	○
	70 bar	○
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	400 ℓ (105.7 gal)	●
Cabin Screw Chip Conveyor		●
Chip Conveyor (Hinge/Scraper)	Left(Front)	○
	Left(Rear)	○
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	☆
Safety Device		
Total Splash Guard		●
APC Splash Guard		○
ETC		
Tool Box		●
Customized Color	Need for Munsel No.	☆
CAD&CAM Software		☆
Air Lift Slide Method	Z Axis	●

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

		HB50
Electric Device		
Call Light	1 Color : ●	●
Call Light & Buzzer	3 Color : ● ● ● B	○
Work Light		●
Electric Cabinet Light		○
Remote MPG		●
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	35KVA	○
Auto Power Off		○
Back up Module for Black out		○
Back up Module for Black out - Extension (FANUC : PFB-R/C)		☆
Measuring Device		
Air Zero	TACO	☆
	SMC	☆
Work Measuring Device		○
TLM (Marposh/Renishaw/Blum)	Touch	○
	Laser	○
Tool Broken Detective Device		○
Linear Scale	X/Y/Z Axis	○
Rotary Scale	B Axis	○
Pallet Close Confirmation Device		○
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		
Sub O/P		☆
Control of Additional Axis	1Axis / Pallet	☆
External M Code 4ea		○
Automation Interface		☆
I/O Extension (In & Out)	16Contact	☆
	32Contact	☆
PPL (6PPL)		○
Hyd. Device		
Std. Hyd. Unit	45bar/60 ℓ (16.9 gal)	●
Center Type Hyd. Supply Unit (Upper)	2x4(8Port)	○
Manual Coupler	2x2(4Port)	☆
Auto Coupler		☆
Hyd. Unit for Fixture	45bar	☆
	70bar	☆
	100bar	☆
	Customized	☆
S/W		
Dialogue Program (HW-DPRO)		○
DNC software (HW-eDNC)		○
Machine Monitoring System (HW-MMS Cloud)		☆
Smart Guide-i : FANUC		● (F311-B : ☆)
Smart S/W		☆

Through Spindle Coolant* : Please check the filter types with sales representative.

Specifications are subject to change without notice for improvement. / Please refer to the S/W catalog (iRIS) for details by S/W product.

SPECIFICATIONS

Spindle Output/Torque Diagram

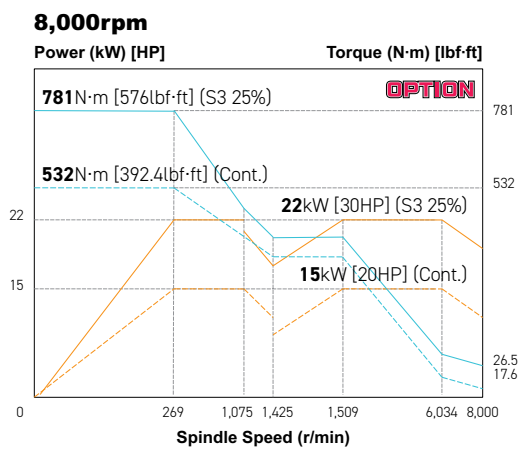
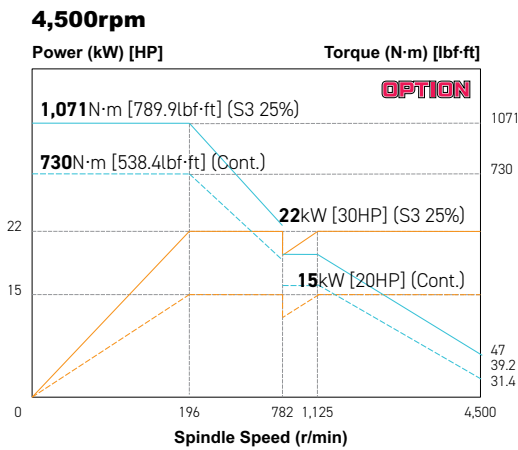
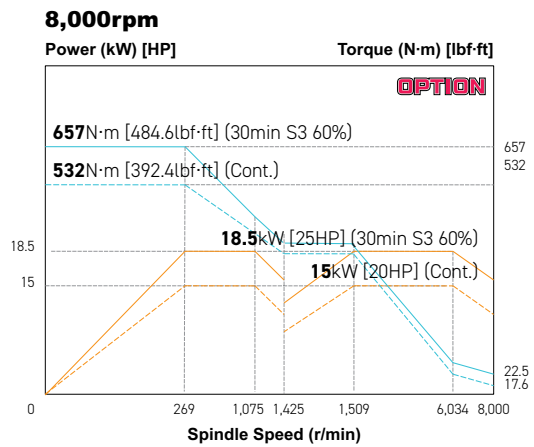
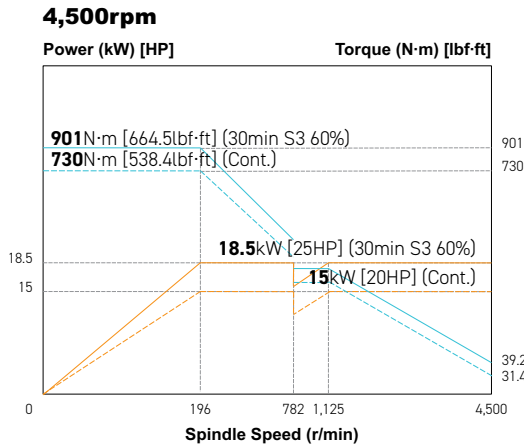
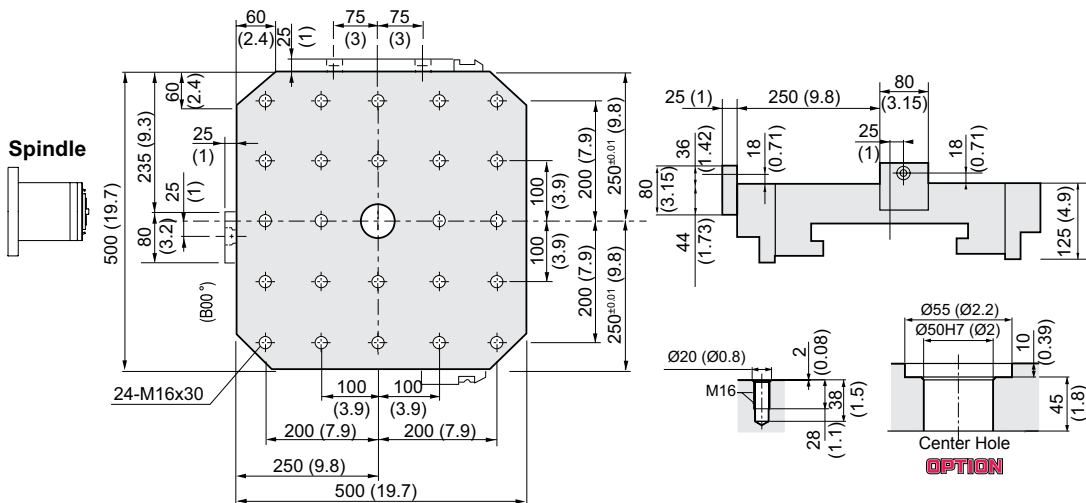


Table Dimensions

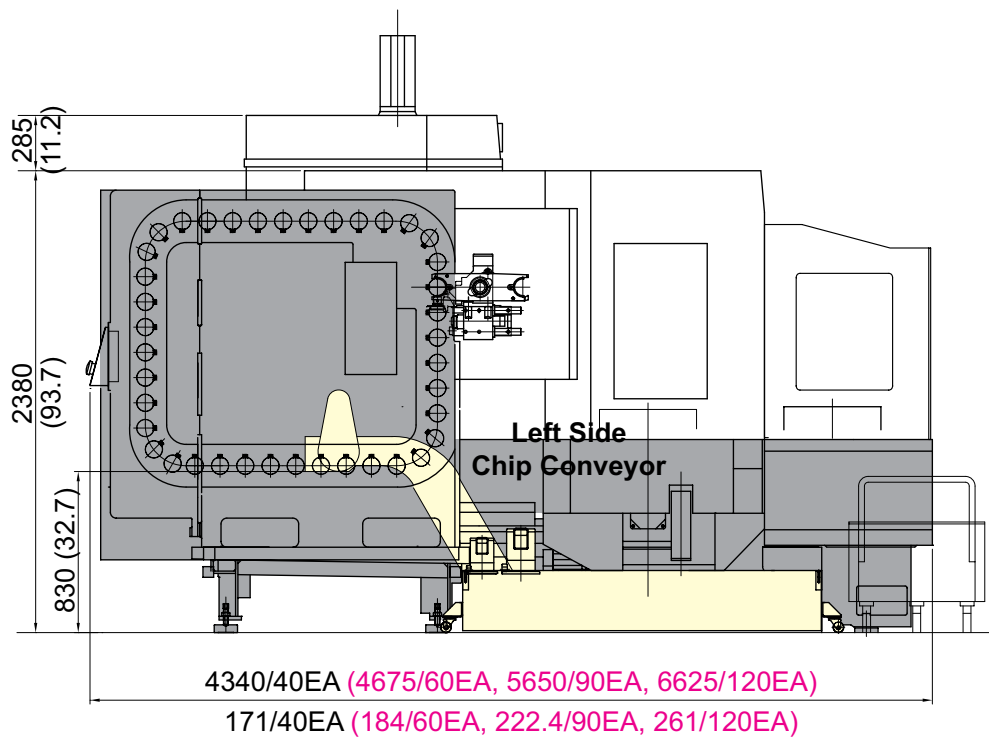
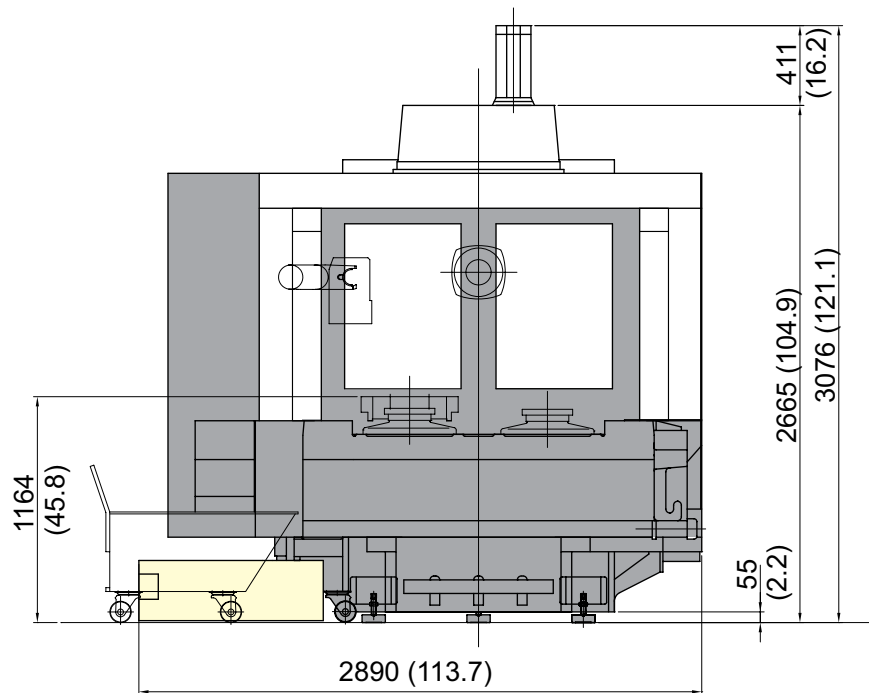
unit : mm(in)



SPECIFICATIONS

External Dimensions

unit : mm(in)

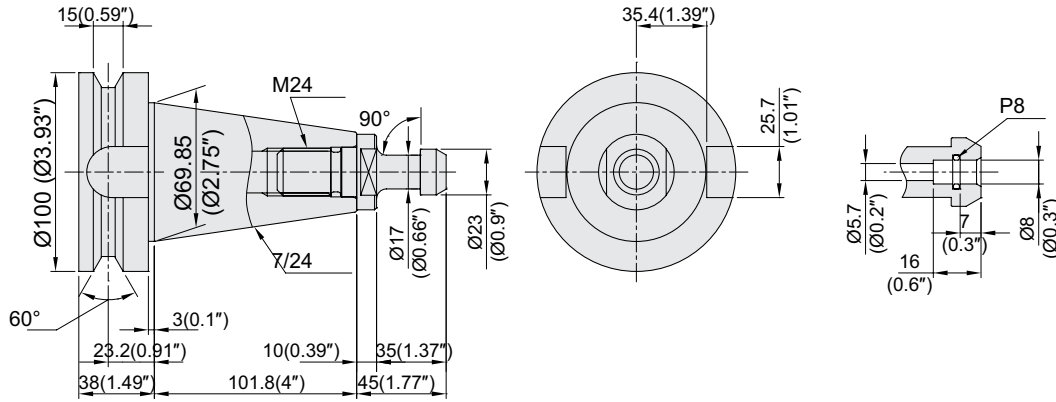


SPECIFICATIONS

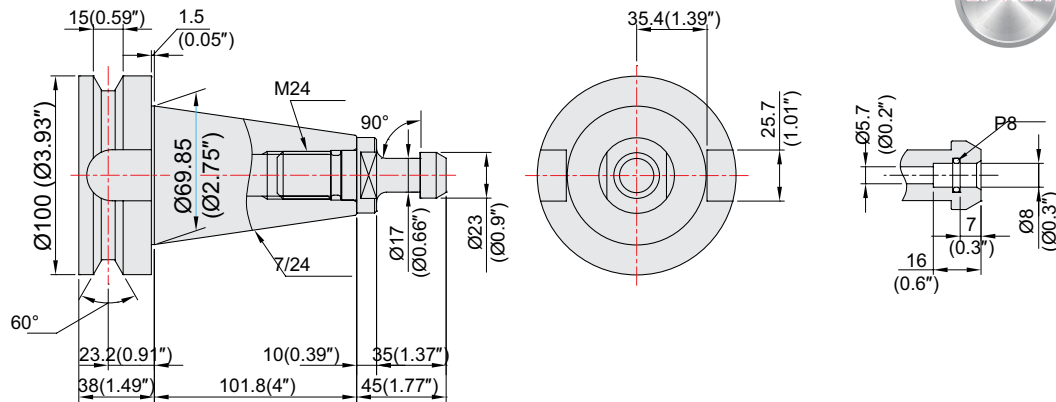
Tool Shank

unit : mm(in)

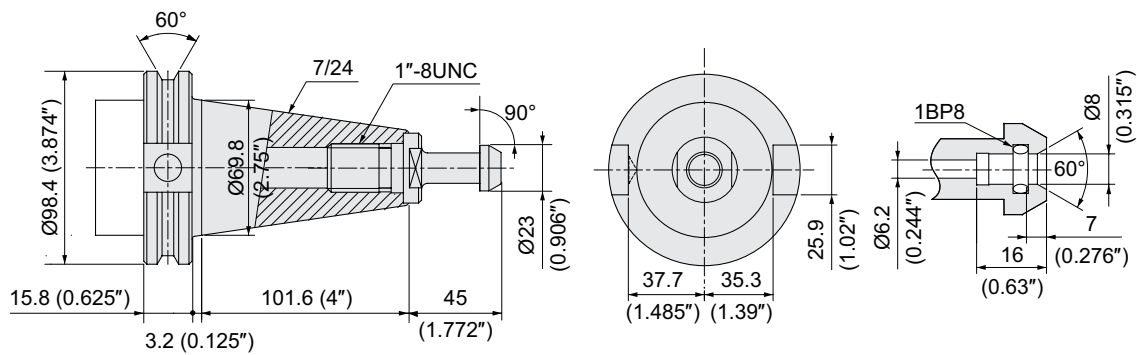
BT50



BBT50, BIG PLUS



CAT-50



PULL STUD DEGREE : 90° (Std.) / 45°, 60° (Opt.)

SPECIFICATIONS

Specifications

[] : Option

ITEM		HB50	
PALLET	Pallet Size	mm(in)	500×500 (19.7"×19.7")
	Maximum Load Capacity	kg(lb)	2-800 (2-1,764)
	Maximum Working Size	mm(in)	Ø900×H780 (Ø35.4"×H30.7")
	Min. Indexing Angle	deg	1° [0.001°]
SPINDLE	Spindle Taper	-	BT50 [BBT50] [CAT50] [BCV50]
	Spindle Speed	r/min	4,500 [4,500] [8,000] [8,000]
	Spindle Motor Output (Max./Cont.)	kW(HP)	18.5/15 (25/20) [22/15 (30/20)] [18.5/15 (25/20)] [22/15 (30/20)]
	Spindle Torque (Max./Cont.)	N·m(lbf·ft)	901/730 (664.5/538.4) [1,071/730 (789.9/538.4)] [657/532 (484.6/392.4)] [781/532 (576/392.4)]
	Spindle Driving Method	-	2 STEP GEAR
FEED	Travel (X/Y/Z axis)	mm(in)	760/705/650 (29.9"/27.8"/25.6")
	Distance from Table Top to Sp. Center	mm(in)	0~705 (0"~27.8")
	Distance from Table Center to Sp. Nose	mm(in)	135~785 (5.3"~30.9")
	Rapid Traverse Rate (X/Y/Z)	m/min(ipm)	20/20/20 (787/787/787)
	Slide Type	-	BOX GUIDE
ATC	Number of Tools	EA	40 [60, 90, 120]
	Tool Shank	-	BT50 [BBT50] [CAT50] [BCV50]
	Max. Tool Dia. (W.T/W.O)	mm(in)	Ø110/Ø245 (Ø4.3"/Ø9.6")
	Max. Tool Length	mm(in)	400 (15.7")
	Max. Tool Weight	kg(lb)	20 (44) [35 (77)]
	Tool Selection Method	-	FIXED ADDRESS
	Tool Change Time	T-T	sec
C-C		sec	11
APC	No. of Pallet	EA	2 [6]
	Pallet Change Time	sec	26
	APC Type	-	SHUTTLE
TANK CAPACITY	Coolant Tank	ℓ (gal)	400 (105.7)
	Lubricating Tank	ℓ (gal)	3 (0.8)
	Hyd. Tank Unit	ℓ (gal)	60 (15.9)
POWER SUPPLY	Air Consumption (0.5MPa)	ℓ /min(gal/min)	300 (79.2)
	Electric Power Supply	KVA	33
	Thickness of Power Cable	mm ²	Over 25
	Voltage	V/Hz	220/60 (200/50*)
MACHINE	Floor Space (L×W)	mm(in)	3,530×4,815 (139"×189.6")
	Height	mm(in)	3,076 (121.1")
	Weight	kg(lb)	12,000 (26,455)
PC	Controller	-	FANUC 31i-B [FANUC i Series-Smart Plus]

*) Using 50Hz voltage instead of 60Hz may lower the output of motors. (excluding servo motors and inverter motors)
Specifications are subject to change without notice for improvement.

CONTROLLER

FANUC 31i-B

[] : Option ☆ Needed technical consultation

Controlled axis / Display / Accuracy compensation	
Control axis	3 axis (X, Y, Z) 4 axis (X, Y, Z, B)
Simultaneously controlled axis	3 axis [Max. 4 axis]
Least setting Unit	X, Y, Z axis : 0.001 mm (0.0001 inch) B axis : 0.001 deg
Least input increment	X, Y, Z axis : 0.001 mm (0.0001 inch) B axis : 0.001 deg
Inch / Metric conversion	G20 / G21
High response vector control	
Interlock	All axis / Each axis
Machine lock	All axis
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 axis Machine lock, Stroke check before move
Single block	
Search function	Program Number / Sequence Number
Interpolation functions	
Pano 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 axis(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 (± 99,999.9999 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
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

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 axis 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	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/ridigity 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 offset number	Max. 2000 pair ☆
Program storage capacity	512KB ~ 8MB ☆
Program registration number	Max. 4000 ea ☆
Additional work coordinate	Max. 300 pair (G54.1 P1 ~ P300)
AICC II	200 block 400 / 600 / 1000 block ☆

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CONTROLLER

FANUC i Series – Smart Plus

[] : Option ☆ Needed technical consultation

Controlled axis / Display / Accuracy Compensation	
Control axis	3 axis (X, Y, Z) 4 axis (X, Y, Z, B)
Simultaneously controlled axis	3 axis [Max. 4 axis]
Least setting Unit	X, Y, Z axis : 0.001 mm (0.0001 inch) B axis : 1 deg [0.001] deg
Least input increment	X, Y, Z axis : 0.001 mm (0.0001 inch) B axis : 1 deg [0.001] deg
Inch / Metric conversion	
High response vector control	
Interlock	All axis / Each axis
Machine lock	All axis
Backlash compensation	± 0 ~ 9999 pulses (Rapid traverse / Cutting feed)
Position switch	
LCD / MDI	15 inch LCD unit (with Touch Panel)
Feedback	Absolute motor feedback
Stored stroke check 1	Over travel
Stored stroke check 2, 3	
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 axis Machine lock Stored limit check before move
Single block	
Search function	Program Number / Sequence Number
Handle interruption	
Interpolation functions	
Nano 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
Reference position return	1st reference, G28 / 2nd reference, G30 Ref. position check, G27
Single direction positioning	G60
Thread synchronous cutting	G33
Helical interpolation	Circular + Linear 2 axis (Max.)
Feed function / Acc. & Dec. control	
Manual feed	Rapid traverse Jog : 0~2,000mm/min (79 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	1%, 25%, 50%, 100%
Override cancel	
Feed per minute	G94
Feed per revolution	G95
Cylindrical interpolation	G07.1
Inverse time feed	G93
Look-ahead block	200 blocks (AI APC)
Program input	
Tape Code	EIA / ISO
Optional block skip	9 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 ~ #199, #500 ~ #999
Programmable mirror image	G51.1, G50.1
G code preventing buffering	G4.1
Optional chamfering corner R	

Program input	
Polar coordinate command	G15, G16
Canned cycle	G73, G74, G76, G80 ~ G89
Scaling	G50, G51
Coordinate system rotation	G68, G69
Conversational Program	SmartGuide-i
Auxiliary function / Spindle speed function	
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 axis Input C
Editing function	
Part program storage size	5,120m (2MB)
No. of registerable programs	1,000 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	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 24 languages
Display language switching	Selection of 5 optional Languages
LCD Screen Saver	Screen saver
Option	
Fast ethernet	Needed option board
Data server	Needed option board
Protection of data at 8 levels	
Additional Axis	
Manual handle feed	2/3 units #100 ~ #199, #500 ~ #999, #98000 ~ #98499
Add. Workpiece	Max. 300 pairs (G54.1 P1 ~ P300)
AICC II	400 blocks ☆

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