Shibaura Machine

BTH-130.R24

BTH-130.R24

Table-Type Horizontal Boring and Milling Machine

Shibaura Machine

View the Future with You

Experience with over 8 000 machines with continual technical improvements, the "BTH-130.R24, H³" has been developed to provide horizontal boring operational ability with machining center productivity and flexibility.

BTH-I3O.R24 H³

High-Rigidity

High-Accuracy

High-Speed

Designed by us to provide you with:

Floor space saving	Efficient 7m by 7m (23ft by 23ft) "Square floor space"
Easy chip disposal	High-level side discharge hinge-type chip conveyor
Protective covers	Operator protection from chip and coolant with easy access
Workability	Ease of operation with manual pendant box and environmental platform
Operation capability	Enhanced functions and options from TOSNUC 999

Photo shows with options
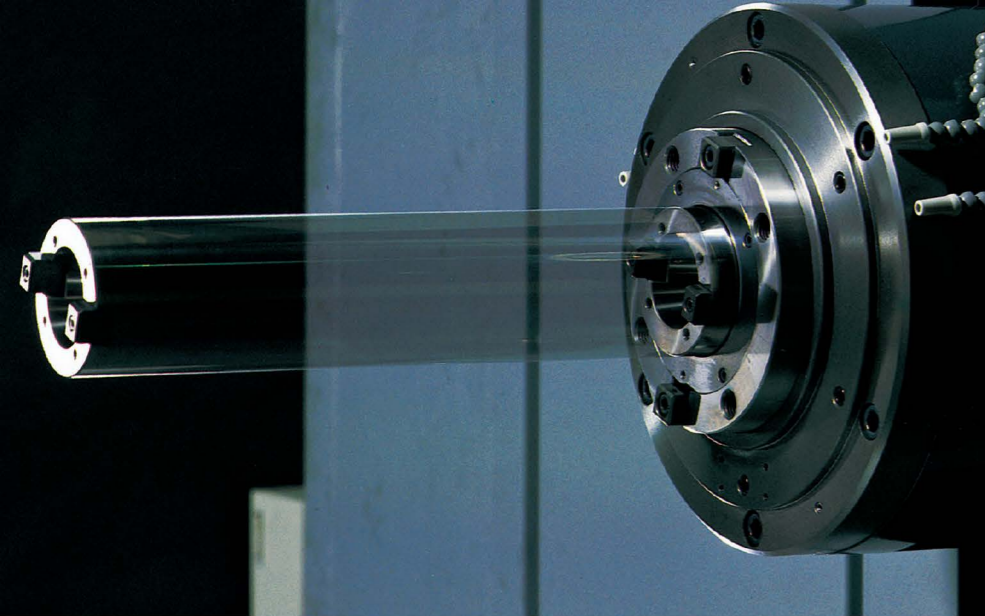
A newly developed spindle for optimum high speeds, assurance of high accuracy and heavy duty machining.

BTH-130.R24

3-step (low, middle and high) spindle drive system provides wide speed range, high rigidity and high torque. Therefore, lots of demands in machining such as in facing, boring, drilling and tapping will be effectively performed with high accuracy and high productivity.

Hardened and ground spindle

In addition air-oil mist over-sized spindle bearing, the entire unit is nitrided, hardened and precision ground to assure accuracy over the life of the machine.

Step-type column guideways

Extra wide guideways that withstand the cutting force moment for assuring powerful machining with virtually no thermal displacement.

Spindle construction designed for deep hole boring

Spindle designed with extremely rigid, long-span type bearings and an automatic spindle end clamp for increased cutting force and positioning not found on other machining centers.

A virtually vibration free tool cutting edge designed spindle structure

- Powerful mechanism for moment
- Wide guideways 770mm (30.3in)
- Stepped guideways Column
- ϕ130mm (5.1in)
- 140mm (5.5in)
- Extremely high rigidity
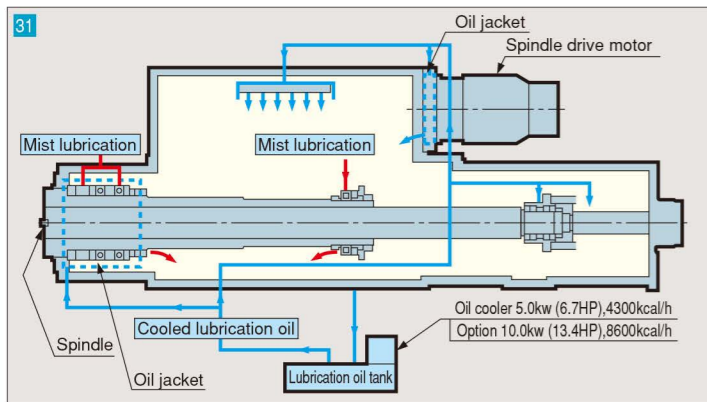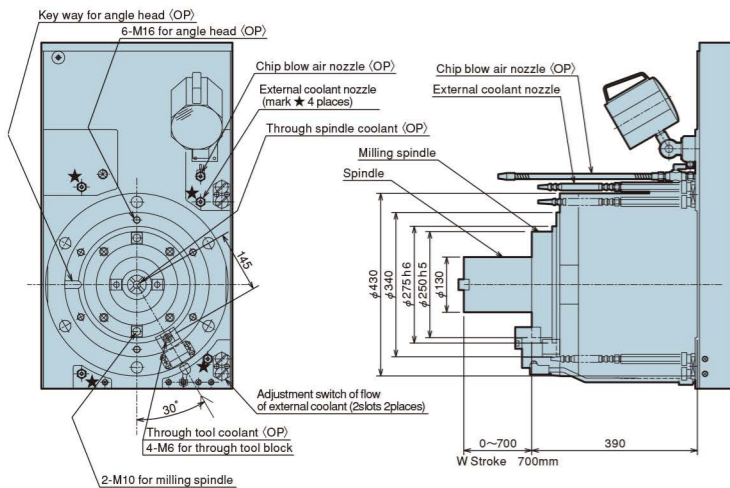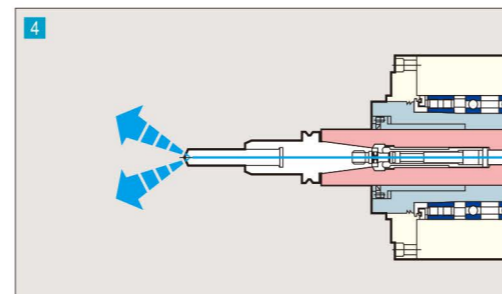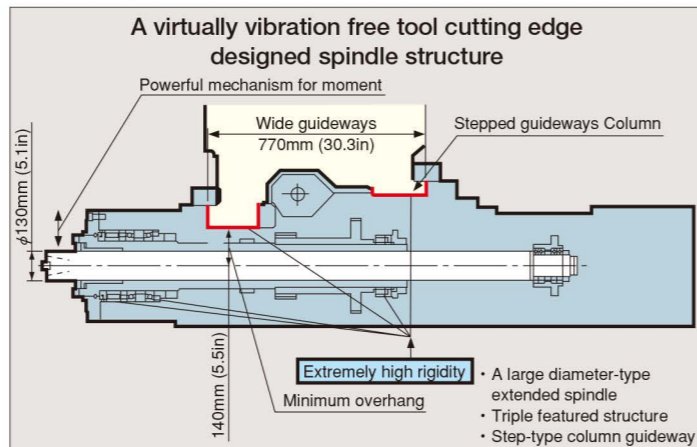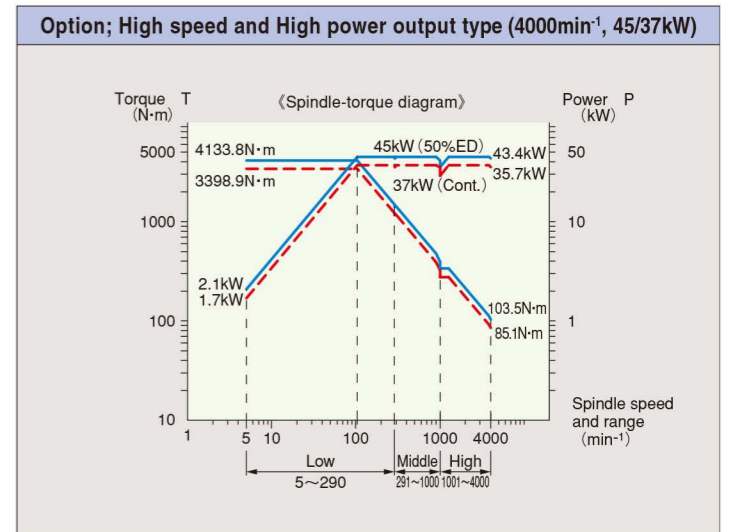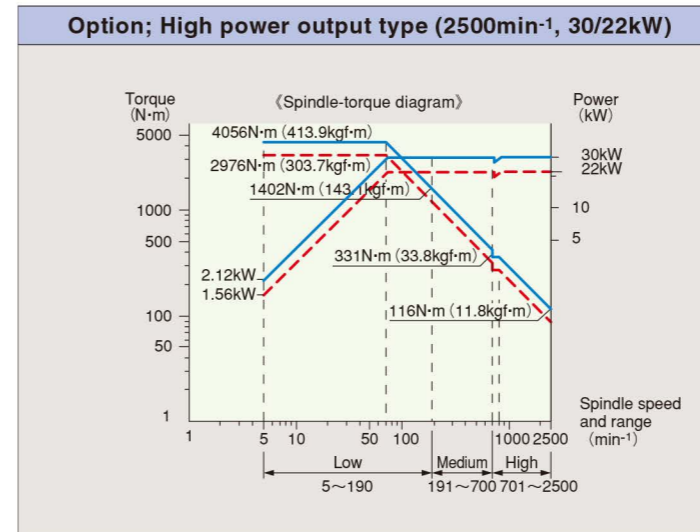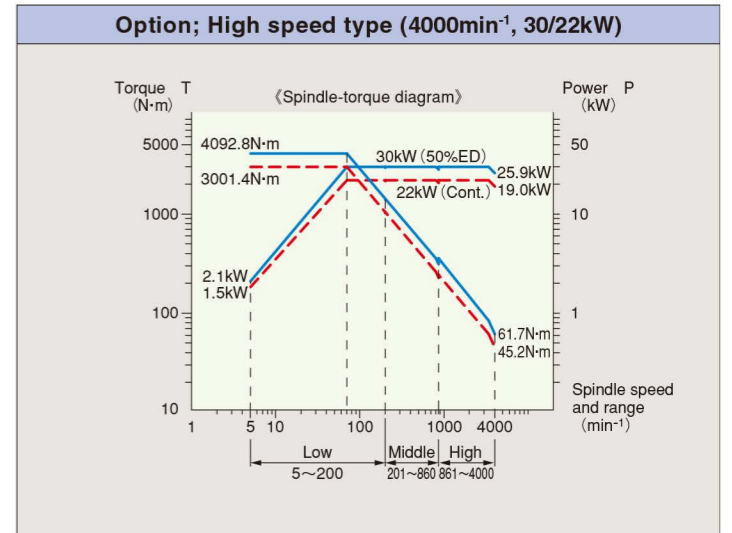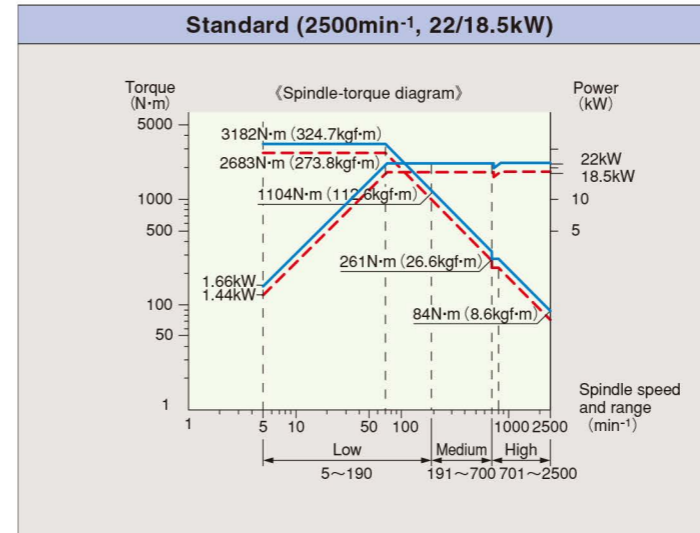- Minimum overhang
  - A large diameter-type extended spindle
  - Triple featured structure
  - Step-type column guideway

Minimal thermal displacement of spindle head

Use of an oil jacket and constant lubrication air mist volume for stabilized high accuracy cutting operations.
・Spindle bearings constant mist lubrication

- Oil jacket
- Spindle drive motor
- Mist lubrication
- Mist lubrication
- Spindle
- Oil jacket
- Cooled lubrication oil
- Lubrication oil tank
- Oil cooler 5.0kw (6.7HP),4300kcal/h
- Option 10.0kw (13.4HP),8600kcal/h

Spindle detailed drawings Spindle head (2500min⁻¹)

- Key way for angle head (OP)
- 6-M16 for angle head (OP)
- Chip blow air nozzle (OP)
- External coolant nozzle (mark ★ 4 places)
- Through spindle coolant (OP)
- Chip blow air nozzle (OP)
- External coolant nozzle
- Milling spindle
- Spindle
- ϕ430
- ϕ340
- ϕ275h6
- ϕ250h5
- ϕ130
- 30°
- 145
- Adjustment switch of flow of external coolant (2slots 2places)
- Through coolant (OP) 4-M6 for through tool block
- 2-M10 for milling spindle
- 0~700
- 390
- W Stroke 700mm

■Through-spindle type coolant (option)

Spindle variations

Spindle-torque diagram

Standard (2500min⁻¹, 22/18.5kW)

Torque (N·m) / 《Spindle-torque diagram》 / Power (kW)
- 3182N·m (324.7kgf·m)
- 2683N·m (273.8kgf·m)
- 1104N·m (112.6kgf·m)
- 22kW
- 18.5kW
- 261N·m (26.6kgf·m)
- 1.66kW
- 1.44kW
- 84N·m (8.6kgf·m)
- Spindle speed and range (min⁻¹)
- Low 5~190 / Medium 191~700 / High 701~2500

Option; High speed type (4000min⁻¹, 30/22kW)

Torque T (N·m) / 《Spindle-torque diagram》 / Power P (kW)
- 4092.8N·m
- 3001.4N·m
- 30kW (50%ED)
- 25.9kW
- 22kW (Cont.)
- 19.0kW
- 2.1kW
- 1.5kW
- 61.7N·m
- 45.2N·m
- Spindle speed and range (min⁻¹)
- Low 5~200 / Middle 201~860 / High 861~4000

Option; High power output type (2500min⁻¹, 30/22kW)

Torque (N·m) / 《Spindle-torque diagram》 / Power (kW)
- 4056N·m (413.9kgf·m)
- 2976N·m (303.7kgf·m)
- 1402N·m (143.0kgf·m)
- 30kW
- 22kW
- 331N·m (33.8kgf·m)
- 2.12kW
- 1.56kW
- 116N·m (11.8kgf·m)
- Spindle speed and range (min⁻¹)
- Low 5~190 / Medium 191~700 / High 701~2500

Option; High speed and High power output type (4000min⁻¹, 45/37kW)

Torque T (N·m) / 《Spindle-torque diagram》 / Power P (kW)
- 4133.8N·m
- 3398.9N·m
- 45kW (50%ED)
- 43.4kW
- 37kW (Cont.)
- 35.7kW
- 2.1kW
- 1.7kW
- 103.5N·m
- 85.1N·m
- Spindle speed and range (min⁻¹)
- Low 5~290 / Middle 291~1000 1001~4000 / High

Spindle normal direction control ((spring necked turning)) (option)

Composite machining of any shape such as cutoff and hale type finishing on an arc or along a straight line on any plane is possible with this C axis spindle control. Simple-type programs and tooling available for the machining of complex seal surfaces on the slots of such workpieces as vacuum devices.
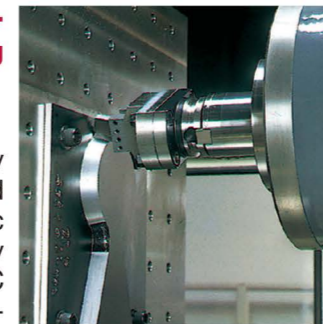
Long nose type spindle head (option)

A long spindle head nose allows easy access to the workpiece, assuring stabilized accuracy even during heavy-duty machining operations.
(The spindle extension is 700 mm (27.3 in) same as standard.)
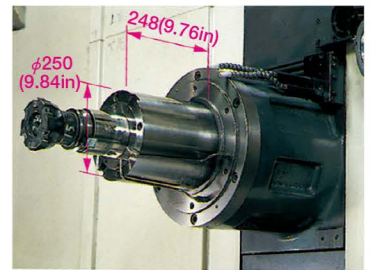
Note : Detailed of option specifications to be decided at a separate meeting.

- ϕ250 (9.84in)
- 248(9.76in)

Example of machining data, material : AISI 1055 (Carbon steel)

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FACE MILLING φ160 (6.3 in) No. of flutes 8

- 250mm(9.8in)
- Width of cut 120mm (4.7in)
- Depth of cut 6mm (0.23in)
- 2100mm(82.6in)
- Dry cutting
- Y0

Workpiece material : AISI 1055 (Carbon steel)

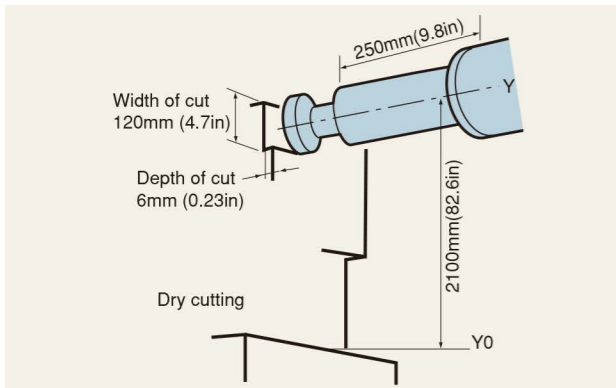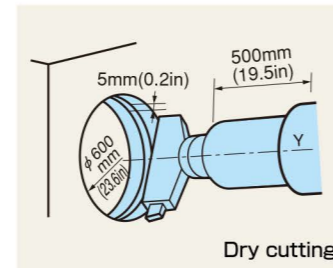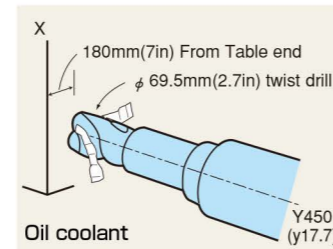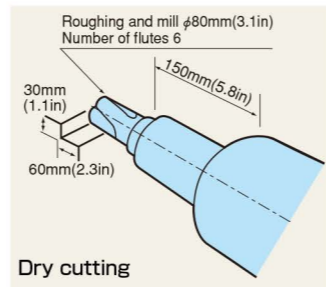|	
W axis extension	**250mm (9.8in)**
Cutting speed	**201m/min (688.8ft/min)**
Spindle speed	**400min⁻¹**
Cutting feedrate	**1200mm/min (46.8in/min)**
Volume of cutting	**864cc/min (52.7cu.in/min)**
Cutting power	**26.8kw (35.9HP)**

BORING

- 5mm(0.2in)
- 500mm (19.5in)
- φ600 mm (23.6in)
- Dry cutting

Workpiece material : AISI 1055 (Carbon steel)

|	
Tool dia.	φ100mm (3.9in)
W axis extension	500mm (19.5in)
Cutting speed	150m/min (492ft/min)
Spindle speed	80min⁻¹
Cutting feedrate	32mm/min (1.25in/min)
Volume of cutting	298cc/min (18.2cu.in/min)

END MILLING

Roughing and mill φ80mm(3.1in) Number of flutes 6

- 30mm (1.1in)
- 150mm(5.8in)
- 60mm(2.3in)
- Dry cutting

Workpiece material : AISI 1055 (Carbon steel)

Tool dia.	φ80mm (3.1in)
W axis extension	150mm (5.85in)
Cutting speed	151m/min (495ft/min)
Spindle speed	600min⁻¹
Cutting feedrate	600mm/min (23.4in/min)
Volume of cutting	1080cc/min (66cu.in/min)
Cutting power	38kw (50.9HP)

DRILLING(Pick cycle)

- X
- 180mm(7in) From Table end
- φ69.5mm(2.7in) twist drill
- Oil coolant
- Y450 (y17.7)

Workpiece material : AISI 1055 (Carbon steel)

Tool dia.	φ69.5mm (2.7in)
Cutting speed	22m/min (72ft/min)
Spindle speed	101min⁻¹
Cutting feedrate	91mm/min (3.6in/min)
	0.9mm/rev (0.04in/rev)
Cutting power	13.6kw (18.2HP)

TAPPING

- M 60 (P5.5)
- 70mm(2.7in)
- φ54.5mm(φ2.1in)
- Tapping oil(paste)
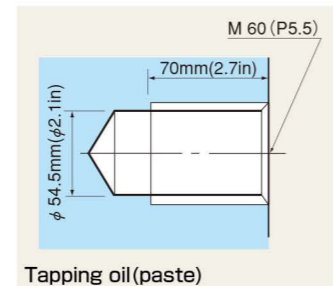
Workpiece material : AISI 1055 (Carbon steel)

Tool dia.	M60P5.5
Cutting speed	10m/min (32.8ft/min)
Spindle speed	54min⁻¹
Cutting feedrate	297mm/min (11.6in/min)
Cutting power	3.3kw (4.4HP)

High speed precision machining is achieved through the use of a new B-axis drive mechanism (pat. pending).

B-axis positioning time : 15sec (0˚～90˚)
The revolutionary type of clamp is standard with a highly rigid double pinion-type drive system and rotary scale for stabilized precision table indexing.

- Rotary scale (Absolute position detection)
- Ring gear
- Servo motor (Hybrid servo control)
- Double pinion drive system
- Hydraulic disk clamping unit (4-points clamping)
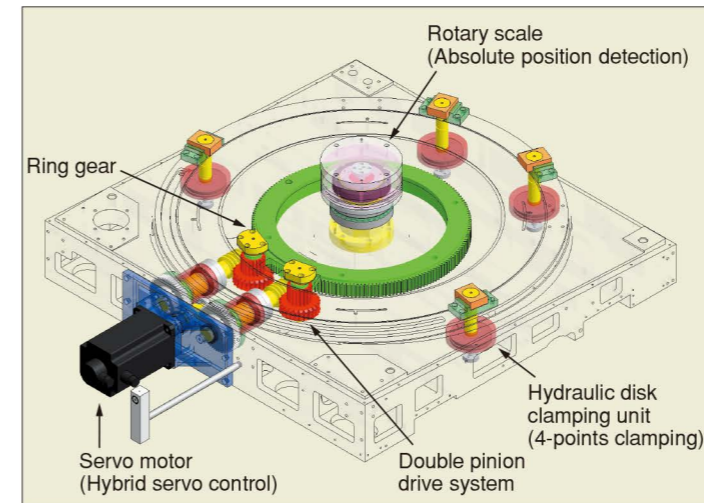
Efficient NC rotary milling (option)

Cylindrical and end surfaces can be machined continuously by the B-axis continuous indexing function, eliminating the need for an optional independent-type NC rotary table. Cylindrical surface machining is easily programmed in the manual programing by the cylindrical interpolation function.

Machining Example : Winding Drum
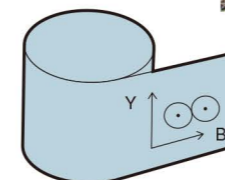
- G67B＿＿
- G03Y＿＿B＿＿R＿＿

Set-up compensation function (option) eliminates manual workpiece centering!

After placing workpiece on a suitable location on the table surface, workpiece paralleling is simply completed by the automatic measuring and recording of workpiece position dimensions which is then used to precision index the table. Table will then be precision indexed to bring it in parallel with the X axis.

Automatic measurement (FM type)
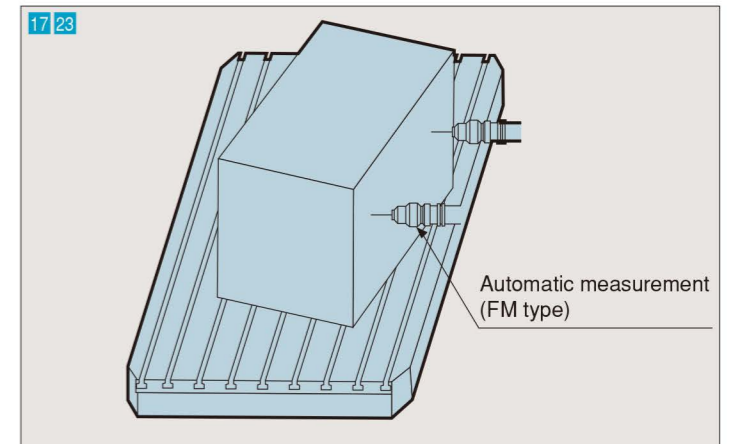
※ Cutting data may vary according to such factors as the machine model, work piece fixture, machining position, cutter and tool holders used.
※ These data are results of high power output type spindle head(S4000,45/37kw)

TOSNUC 999 (Triple nine) permits quick switching between manual, MDI and Automatic operation modes.

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Spindle operation lever (5 modes : spindle forward, reverse, stop, forward jog, reverse jog)

Select direction Y, W

Select direction X, Z

Select direction B

Spindle centering rotation

Automatic mode

Manual mode

MDI mode

Full tea ching

Feed/rapid feed select lever

USB flash drive

Compact flash

● **Customizing keys**
1. Memorize a series of input operations beforehand in one of the special keys (□ □ □ □ □ □) and press these keys to execute operations continuously.
2. Memorize a combination of NC standard displays such as main, sub and window displays in one of the special keys (□ □ □ □). By pressing these keys it displays the combination memorized.

● **Supporting both USB flash drive unit and compact flash (CF)**
TOSNUC 999 is standard equipped with USB port and CF card slot in response to capacity enlargement of NC programs.

Full screen program editing function helps create an NC program easily.

● **Multi-window triple display**
The display of TOSNUC 999 can be divided into three separate screens where simultaneous display of two different programs and offset data necessary for machining is possible. Also, data entry and editing can be done separately on each screen.

● **Multi-editing function**
A new program can be easily created by referring to and utilizing a previously made program on the multi-window display.

Visual program check function (option)

During programmed operation (i.e., background operation), an NC tape image of another program can be checked graphically. After program check, relevant tool path is drawn.

Triple teaching function for simultaneous machining and NC programming (option)

TOSNUC 999 stores in its memory all data created by the operator as NC programs. Programming is very easy by combining these programs, using various teaching functions.

● **Manual teaching function**
All machining data such as tool path, spindle speed and feedrate as obtained in the manual mode are stored automatically as an NC program.

● **MDI teaching function**
When machining processes are executed one by one consecutively in the MDI mode, all such data are stored automatically as an NC program.

● **Auto teaching function**
In the AUTO or DNC mode, any data which has been modified can be fed back to the memory automatically.

Multi-window triple display

NC drawing function

Manual measurement

Various functions shown above significantly improve operability

● **Manual alignment (centering) function**
The touch sensor or master tool comes into contact with the measured surface of a workpiece according to the interactive screen, inner and outer diameters and angle of inclination of the specific workpiece that automatically calculates set-up.

Machine Specifications

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Machine Specification			BTH-130.R24	BTH-130.R24 (APC)
Travel	X-axis travel (Cross movement of table)	mm (in)	3 000 ［3 500］(118.0 ［138.0］)	
	Y-axis travel (Vertical movement of spindle head)	mm (in)	2 300 ［2 540］(90.5 ［100］)	2 000 (80.0)
	Z-axis travel (Longitudinal movement of column)	mm (in)	1 500 ［2 400］(60 ［94.5］)	
	W-axis travel (Spindle extension)	mm (in)	700 (27.5)	
	Distance from table surface to spindle centerline	mm (in)	0 to 2 300 ［0 to 2 540］(0 to 90.5)［0 to 100］	0 to 2 000 (0 to 78.7)
	Distance from table centerline to spindle gage plane	mm (in)	900 to 2 400 (35.4 to 94.4) ［900 to 3 300］(［35.4 to 129.9］)	
Table	Table working surface	mm (in)	2 000×2 400 (78.7×94.4)	
	Table loading capacity	kg (lbs)	20 000 (44 000)	15 000 ［33 000］
	Table surface configuration (Pitch of T-slots: 160 mm)	mm (in)	13T-slots, size 22, pitch 160 (size 0.86, iptch 6.2)	
	Minimum table indexing angle		0.0001°	
Spindle	Rotating spindle diameter	mm (in)	130 (5.1)	
	Spindle speed	min⁻¹	5～2 500 ［6～4 000］	
	Milling spindle nose diameter	mm (in)	250 (9.8)	
	Type of spindle taper hole		7/24 taper No.50	
Feedrate	Rapid traverse rate	X, Y, Z	mm/min (ipm)	14 000 (551.1)	
		W	mm/min (ipm)	5 000 (196.8)	
		B	deg/min	500	
	Feedrate	X, Y, Z	mm/min (ipm)	1 to 7 000 (0.039 to 275.5)	
Automatic tool changer (ATC)	Type of tool shank		MAS BT50 (CAT 50V)	
	Type of retention knob		MAS P50T–1 (45 degree)	
	Tool storage capacity		38 ［60, 90, 120］ tools	
	Maximum tool diameter	When pots are full	mm (in)	125 (4.92)	
		When adjacent pots are empty	mm (in)	240 (9.44)	
	Maximum tool length	mm (in)	400 (15.74)	
	Maximum tool mass	kg (lbs)	25 (55)	
	Method of tool selection		Pot address random short-cut	
Spindle drive motor	(30-min. rating/cont. rating)	kW (HP)	［AC22/18.5, AC30/22］<AC/30/22, AC45/37> (［AC30/25, AC40/30］<AC/40/30, AC60/50>)	
Power source	Electric power supply		AC200/220V±10%, 50/60Hz±2%	
	Power capacity	kVA	90 ［High Power］	
	Compressed air supply	Pressure	MPa {kgf/cm²} (psi)	0.5 to 0.8 {5 to 8} (82.5 to 116)	
		Flowrate	Nℓ/min	900	
Machine size	Machine height	mm (in)	5 060 (199.2)	
	Floor space	mm (in)	6 950×7 250 (273.6×289.3)	
	Mass of machine (including CNC system)	kg (lbs)	45 000 (99 000)	
Accuracy	Positioning accuracy	X, Y, Z	mm (in)	±0.016/full length (±0.00064/full length)	
		W	mm (in)	±0.012/full length (±0.00047/full length)	
	Repeatability	X, Y, Z	mm (in)	±0.007 (±0.00027)	
		W	mm (in)	±0.008 (±0.00031)	
	Table indexing accuracy (arbitrary angle)		±3″	
	Table indexing repeatability (arbitrary angle)		±1.5″	
Machine colour			R4-383 (Munsell 5Y8.4/0.5) and N2.5 (For CNC system, servo motors and cooler, each maker's standard color shall apply.)	

Note : Values in brackets ［ ］ refer to the options.
The values in the specifications tablle above indicate the maximum capacity. If a continuous long-hour operation is requred at the maxmum capacity, please consult with us beforehand.

Accessories (Machine)

STANDARD ACCESSORIES

1. Numerical control system TOSNUC 999 — 1 set
2. Machine operation box (Pendant type) — 1 set
3. Spindle orientation stop function — 1 set
4. Spindle speed drop monitoring function — 1 set
5. Constant volume mist unit for spindle bearing lubrication — 1 set
6. Spindle head cooling unit (main bearing, motor flange oil jacket) — 1 set
7. Hand wheel feed unit (portable) fox X, Y, Z, W and B axes — 1 set
8. Automatic table random angle indexing unit, every 0.0001 degree — 1 set (with B-axis rotary scales feedback)
9. Automatic table clamping unit (hydraulic) — 1 set
10. Table oil pan — 1 set
11. High rigid type X-axis feed system
    Ball-screw diameter: 80 mm (Ball-screw diameter: 3.14 in)
12. High rigid type Z-axis feed system
    Ball-screw diameter: 80 mm (Ball-screw diameter: 3.14 in)
13. High type Chip cover (with operator door) at table side — 1 set
14. Table-bed slideway cover on X-axis (both right and left side) — 1 set
15. Column-bed slideway cover on Z axis (both front and back side) — 1 set
16. Column-front slideway cover: Y axis (column vertical) — 1 set
17. ATC rail cover — 1 set
18. Chip disposal chute for Z-axis (both sides of column-bed) — 1 set
19. Spindle head cooling unit and hydraulic unit — 1 set
    Inverter controlled oil cooler
    Cooling capacity: 2.8/3.2kW [3.7/4.3 HP] (50/60 Hz): 2400/2750 kcal/h
20. Assembly and reassemble tools for maintenance — 1 set
21. Installation parts — 1 set
22. Operator call lamp: one color (Yellow) — 1 set
23. Automatic power OFF device — 1 set

MECHANICAL ACCESSORIES

1. Flood coolant set
   • X-axis chip conveyor combined with Lift-up type chip conveyor (incorporating coolant tank)
   Mainly used for cast and steel milling chips.
   Processing capability — 3 liters/min
   • Flood coolant unit
   Pump capacity — 50 liters/min., head 5 m (13.2 gal/min., head 16.4 ft)
   Tank capacity — 400 liters (105 gal)
2. Through-tool type coolant set
   • Flood coolant set
   • Through-tool coolant set
   Pump capacity — 1.2 MPa, 20 liters/min. (170 psi, 5.25 gal/min)
3. Coolant/Air blow set
   It is necessary to attach air-compressor of 1 200/1 300 normal liters/min (50/60 Hz) (Recommend type: IDF11E (11kW) made by SMC)
   • Flood coolant set
   • Through-tool coolant set
   • Coolant/air blow unit
4. Through spindle type coolant set
   It is necessary to attach air-compressor of 1200/1300 normal liters/min (50/60 Hz) (Recommend type: IDF11E (11kW) made by SMC)
   • Flood coolant set
   • Through-spindle type coolant unit (including sub-tank)
   1.2 MPa, 20 liters/min or 2.0 MPa, 20 liters/min (170 psi, 5.25 gal/min or 290 psi, 5.25 gal/min)
   • Through-spindle type air blow unit
***Coolant set cannot be selected at the same time. Please select either one from Item No. 1 to 4.
***Caution: To avoid serious case of fire, we recommend the followings.
• Must provide fire distinguisher near machine in case of using inflammable type coolant material(s), which may cause fire. And also must observe machine during using coolant by machine operator(s).
• Regarding the ignition point of coolant material, there are two kinds of Open-type and Closed-type features.

If your facility has a Closed-type splash cover, you must obtain details of coolant material(s) and make cross check to avoid unfavourable situation of fire. Before to use machine, must provide Prevention of fire or equivalent facility, just in case.
• Must use anti-inflammable coolant material for un-manned operation.

5. Chip blow air unit
   It is necessary to attach air-compressor of 1 200/1 300 normal liters/min (50/60 Hz) (Recommend type: IDF11E (11kW) made by SMC)
6. Intermittent coolant unit
7. Type of retention knob — MAS P50T-2 (30 degree)
8. Attached retention knob — MAS P50T-1 (45 degree)
9. Automatic tool changer (ATC) — Tool storage capacity 60, 90, 120 tools
   In case of ATC-60, 90 and 120, required floor space will be larger than standard
10. Maximum tool length up to 600 mm [23.6 in]
11. Z-axis Coil type chip conveyors for both sides of column-bed (AC 0.4 kW x 2) [AC 0.53 HP x 2]
12. Chip cover-A (Simple and detachable)
13. Chip cover A included opening the door by manually
14. Chip bucket C (Capacity: 0.18m³ [6.3 ft³])
15. Box type cover, totally closed, for Standard type machine
16. Automatic pallet changer (APC) two (2) pallets
    Pallet loading capacity: — 15 000 kg (33 000 lbs)
    Note that some of machine specifications will be changed when APC selected.
17. Automatic measuring function and dedicated touch probe (Renishaw made) (FM wave type and part program storage capacity reduces approximately 50 m [164 ft])
18. Calibration block (for Automatic measuring function)
19. Automatic tool length measurement (Part program storage capacity reduces approximately 30 m [98.4 ft])
20. Reference tool for Automatic tool measurement function
21. Test bar: diameter 60 x 310 mm length (diameter 2.36 x 12.2 in length)
22. Table reference piece
23. B-axis set-up compensation function
    Shift workpiece setup position in B-axis direction is automatically measured and compensated.
    Automatic measuring function option is required.
24. Continuous table indexing device: 0.0001-degree NC rotary milling operation
25. Automatic table indexing unit, every 90 degree — Locator pin at every 90 degree
26. High power output type spindle head (2500min⁻¹)
    AC30/22kw[40/30HP](30min/cont.)
    Spindle speed range 5 to 2500 min⁻¹
27. High speed type spindle head (4000min⁻¹)
    AC30/22kw[40/30HP](30min/cont.)
    Spindle speed range 6 to 4000 min⁻¹
28. High speed and High power output type spindle head (4000min⁻¹)
    AC45/37kw[60/50HP](10min. /cont.)
    Spindle speed range 6 to 4000 min⁻¹
    Note : Adding the piping, floor space will be changed.
29. Spindle lock device (at random angle)
30. Linear scale feedback for X, Y and Z-axes
    Positioning accuracy — linear scale (X, Y, Z):±0.008mm (0.00032in)/ full length
    Repeatability — linear scale (X, Y, Z):±0.004mm (0.00016in)
31. Z axis thermal displacement compensation
32. External M-code: 8 types
33. Operator call lamp: three (3) colours
34. Residual current operated protective device
35. Customer's specified painting colour
    Submit a colour samples to us
    For internal paiting colour, however, our standard colour shall govern.
36. Angle head (spindle taper hole : JIS 7/24taper No50)
37. Rotating facing head CS (accuracy improved type)
    Outer diameter 430mm(17in)
    Tool slide travel 80mm(3.1in)
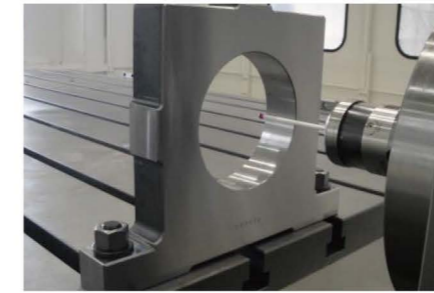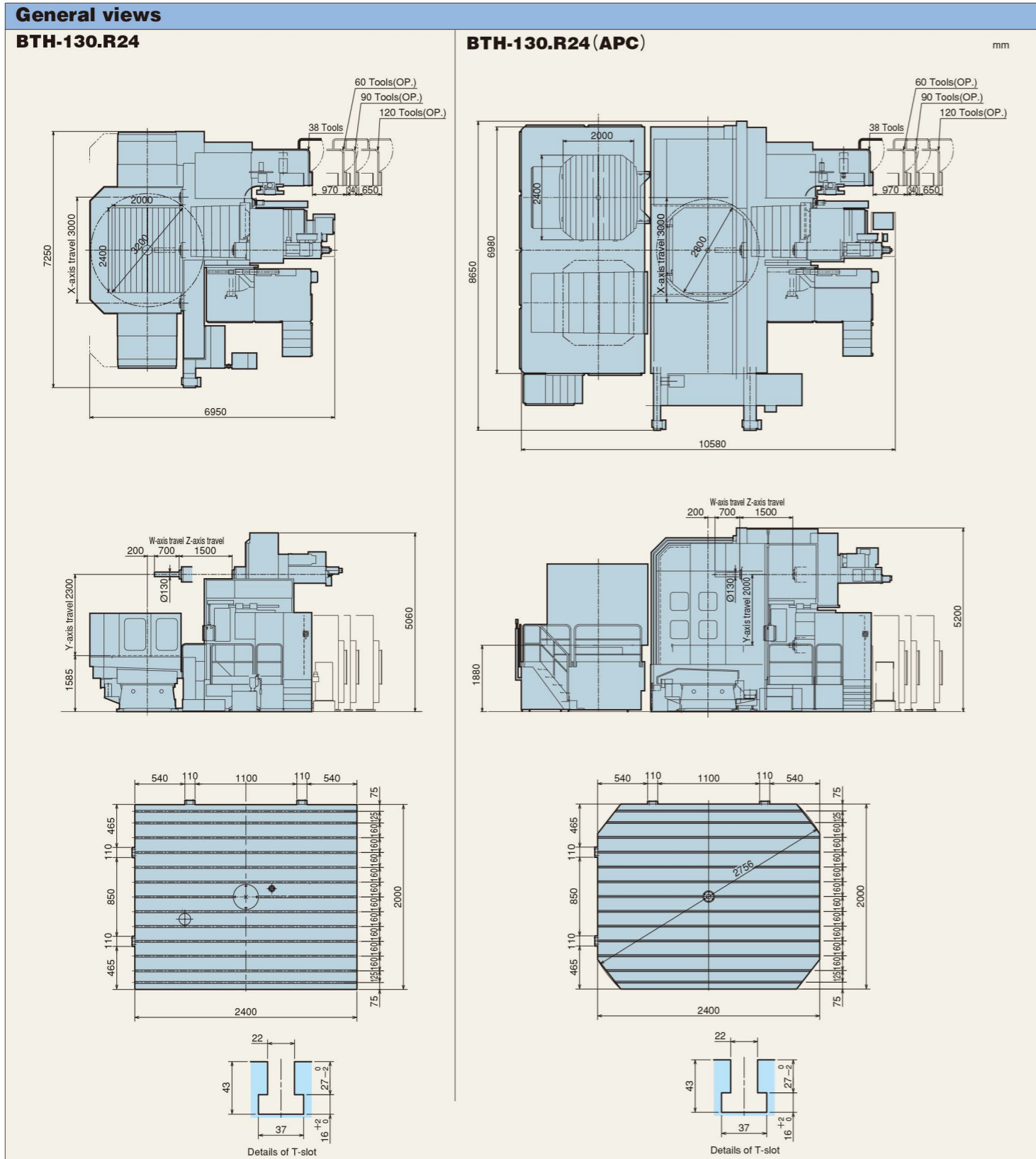38. Tool holder for rotating facing head CS

Note) Air source to be supplied by the customer
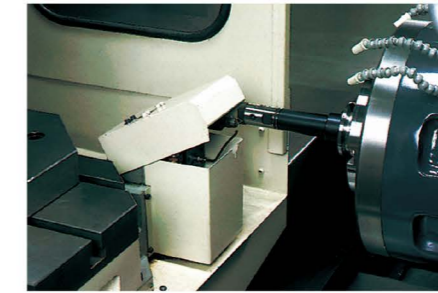   When conventional type air compressor is used, must prepare Air dryer.

General views

General views

BTH-130.R24

mm

60 Tools(OP.)
90 Tools(OP.)
120 Tools(OP.)
38 Tools

970 340 650

X-axis travel 3000
7250
2000
2400
4000
6950

W-axis travel Z-axis travel
200 700 1500
Ø130
Y-axis travel 2000
1585
5060

540 110 1100 110 540
465 110 110 465
850
465 110
2000
75
2400
2/56

22
43
27⁻₂⁻⁰
37
16⁺₀·⁻²
Details of T-slot

BTH-130.R24（APC）

60 Tools(OP.)
90 Tools(OP.)
120 Tools(OP.)
38 Tools

970 340 650

2000
2400
8650
6980
X-axis travel 3000
2900
10580

W-axis travel Z-axis travel
200 700 1500
Ø130
Y-axis travel 2000
1880
5200

540 110 1100 110 540
465 110 110 465
850
465 110
2000
75
2400
2/56

22
43
27⁻₂⁻⁰
37
16⁺₀·⁻²
Details of T-slot

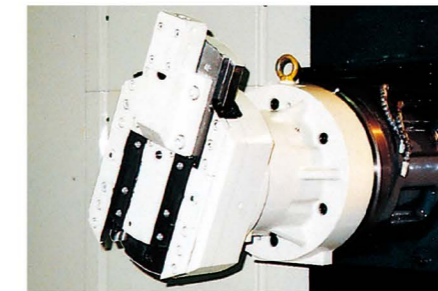# Available options

17 Automatic measuring function

19 Automatic tool length measuring function

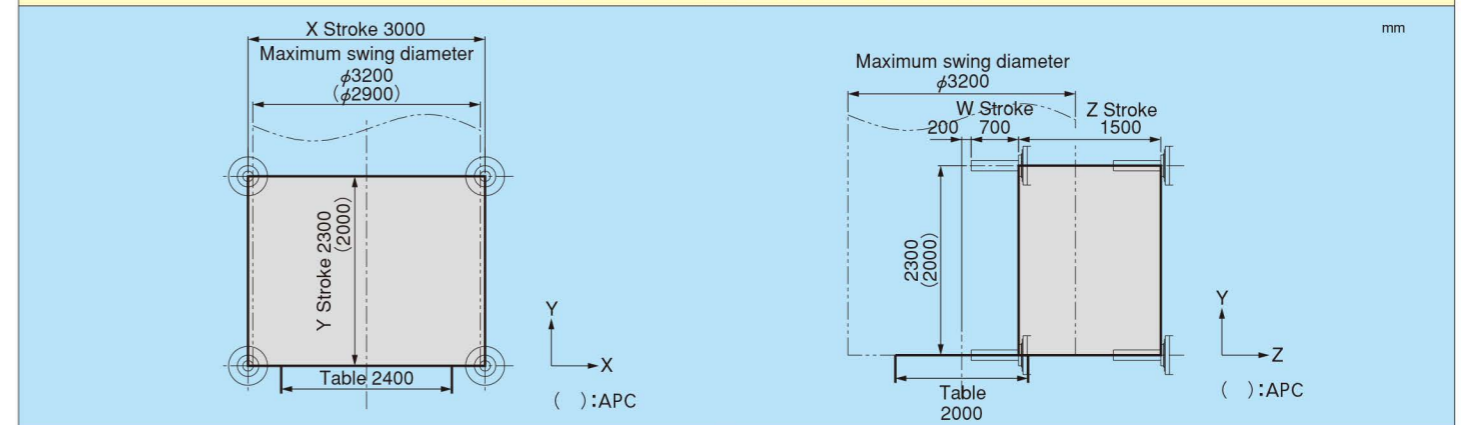13 Chip cover A included opening the door by manually

36 Angle head

37 38 Rotating facing head CS

15 Box type cover, totally closed, for Standard type machine
16 Automatic pallet changer (APC) two (2) pallets

Maximum work area and Axis travel

mm

X Stroke 3000
Maximum swing diameter
φ3200
(φ2900)

Y Stroke 2300
(2000)

Table 2400

（ ）:APC

Maximum swing diameter
φ3200

W Stroke 700
Z Stroke 1500
200

2300
(2000)

Table 2000

（ ）:APC

Maximum tool diameter

mm

When pots are full
max. φ125

φ125
φ125
φ125
φ125
φ125

When adjacent pots are empty
max. φ240

φ240
φ240

When adjacent pots are empty
φ240
Gravity center of tool
L1 L2
Gravity center of tool shank

φ125
φ100
W2
Gage line
W1
45
Max.400

Tool mass：Max 25kg （W1＋W2）
Tool moment：Max 24.5N・m（250kg・cm）
　　　　　（W1×L1－W2×L2）
＊When using a general BT50 taper shank.
　　W2＝approximately3.8kg
　　L2＝approximately38.2mm
(These values may vary, however, with the type of an applicable retention knob and
The manufacturer of shank)

CNC System TOSNUC 999

BTH-130.R24

User media (option set B)

Very useful device for managing long programs.

Pendant operation box

Manual operations relating to machine movements are separated from the NC operation unit and centrally arranged on the pendant operation box. Thus, combined NC and manual machining operations can be performed smoothly.

CNC System Specifications TOSNUC 999

Standard Specifications

● Controlled Axes
Controlled axes　　　　　5 axes：X,Y,Z,W,B
Simultaneously controlled axes
　3 axes (X, Y, Z) for positioning (G00) and linear interpolation (G01)
　2 axes (any two axes excluding W- and B-axes) for circular interpolation (G02, G03)

● Programmable Methods
Programming resolution Linear axis : 0.001 mm
　　　　　　　　　　　Rotating axis : 0.0001°
Maximum programmable dimensionLinear axis :±99999.999mm
　　　　　　　　　　　Rotating axis :±9999.9999°
Data code　Automatic recognition of ISO/EIA code
　　　　　　　　　　　JIS B6311
　　　　　　　　　　　ISO 6983/1
　　　　　　　　　　　EIA　RS-358-B
　　　　　　　　　　　EIA　RS-244-B
Data format Variable block with a decimal point
　　　　　　　　　word address format
Absolute/incremental programming　　　G90/G91
Decimal point input　Calculator type/Programming resolution type

● Interpolation
Positioning　　　　　　　　　　　　　G00
Linear interpolation　　　　　　　　　G01
Circular interpolation　　　G02/G03: CW/CCW

● Feed
Feedrate　　　F5-digit programming in mm/min
Dwell　　　　　　　G04 (0 ～ 999.99 sec)
Handwheel feed (portable)
　　Linear axis : 0.001/0.01/0.1 mm (per division)
　　Rotary axis : 0.0001/0.001/0.01° (per division)
Continuous jog feed
Rapid traverse rate override　0 ～ 100 % in 10 % increments
Feedrate override　0 ～ 200 % in 10 % increments
Override cancel　　　　　　　　　　M48/M49
Automatic acceleration/deceleration
　Linear acceleration or deceleration is effected on rapid traverse rate and jog feedrate.
Automatic acceleration/deceleration for feed　G08/G09　G50/G51

● Part Program Storage and Edit
Program storage150 m equivalent punched tape
　(To be reduced as per the attached functions.)
No. of registrable programs
　128 (To be reduced as per the attached functions.)
Program edit　　　Various editing operations are
　　　　　　　　　possible for stored programs.
Background edit
　Program deletion, insertion and modification are possible in the background edit mode.
Program name $ (or O)8-digit programming (alphanumeric characters)
Program comment　No. of displayed characters　max. 32
　　　　　　　　　　　　　　　(max. 197 for input)
Control　in/out
Sequence number　　　　N5-digit programming
Sequence number search　　Bidirectional search is possible.
Program nesting list
Fixture offset list
T-code list
Calendar timer
　Program creation date management, time display

● Operation and Display
Operation panel
　Display section: 10.4 inch color TFT liquid crystal display
　　Operation section: Keyboard with membrane switches
Customizing keys
　A series of key input operations (key pattern) can be registered. (6 types)
　　　A combination of screens can be registered. (4 types)
Tool file
　Tool information such as tool offset and tool name can be batch-displayed and edited.
Automatic operation　Memory operation and DNC operation
MDI operation　Entry of multiple blocks and restart
　　　　　　　of an already executed block are possible.
Manual numerical input command
S.F manual setting　Setting of S and F codes in manual mode.
S.F auto setting
　Automatic setting of S and F codes in manual mode.
Spindle drive motor load factor display
　Load imposed on spindle drive motor is displayed.
Run hour displayThe NC working time is displayed.
Program record　A record of programs already executed is displayed.
　　　　　　　(Date of program execution, actual time, etc.)
User's name registration
　A user's name is displayed at system startup.
Customized display color tone

● I/O functions and Devices
RS232C interface port A
　Operation via external device, loading and dumping of programs and data are possible.

● S, T and M Functions
Spindle speed function　S5-digit programming
Spindle speed override　50 ～ 200 % (in 10 % increments)
Tool function　　　　　T4-digit programming
Miscellaneous function　M4-digit programming

● Tool Offset
Tool length offset　　　　　G43/G44/(G49)
Tool offset　　　　　G45/G46/G47/G48
Cutter compensation C　G40/G41/G42, point of intersection calculation
No. of tool offsets　60 sets (tool length offset, cutter compensation)

● Coordinate System
Coordinate system setting　　　　　G92
Machine coordinate system positioning command　G73
Plane selection　　　　　　G17/G18/G19
Fixture offset　　　　　G53/G57, 9 sets
(This function cannot be used together with fixture offset 2.)
Fixture offset 2　　　G53/G54/G55/G56, 3 sets

● Operation Support Function
Single block　A program can be executed block by block.
Optional stop
Optional block skip
　A block containing a "/" code at the head is ignored.
Dry run
Machine lock
Auxiliary function lock
Z-axis feed cancel
Manual absolute ON/OFF
All clear

Reset
Feed hold
Cycle stop
Program restart
　　　　　　　　Program restart, block restart
Sequence number collation and stop
Manual interruption
Handwheel feed interruption

● Programming Support Function
Circular interpolation by radius R designation
Radius of a circle can be specified directly, using R code.
Circle cutting　Inner circle cutting: G12/G13, G22/G23
　　　　　　　　Outer circle cutting: G222/G223
Canned cycle
　　　　G77 ～ G89, G98, G99, G100, G186
Subprogram call　G72 (Nesting of up to five levels is possible.)
Macro programming　　　　　Single call: G72
　　　　　　　　　　Modal call 1: G74/G76
　　　　　　　　　　Modal call 2: G75/G76
Automatic corner override
　　　　　　Inside corner automatic override
　and inside corner cutting speed change.
Pattern cycle　　G109 ～ G119 (Drilling pattern)
　　　　　　　G121 ～ G132 (Milling pattern)
Programming format check function　Program format check
Tapping range selection　　　　　　　G63
Single block suppression　　　　G990/G991
Feed hold suppression　　　　　G992/G993
Override suppression　　　　　G994/G995
Handwheel feed interruption suppression　G996/G997

● Mechanical Error Compensation
Backlash compensation
Pitch error compensation
Pitch error gradient compensation
Origin correction
　　　X-axis shift from table center is corrected.
Unidirectional positioning　　　　　　G60
Straightness compensation
Non-linear type compensation control

● Automatic Support Function
Tool life management
　・Counting of tool working time
　・Tool wear coefficient function Tool life and workingtime are
　　　　　　　　　counted by multiplying a specified coefficient.
　・Spare tool selection

● Machine Control Support Function
Integrated PLC　　　　　　　TC200
Axis feed interlock

● Safety and Maintenance
Emergency stop
Stored stroke limit
Axis interference area setting and axis interference check
　　　　　　　　　G24/G25, G26/G27
Self-diagnosis function
Door interlock

● Servo System
Servo motor　　　　　　AC servo motors
Position detectors
Absolute encoders (All axes: Absolute position detection)
　　　　　　　　　　　Rotary scale (B-axis)

Special Specifications (Options)

Options - Set B
(1)Helical interpolation　　G02/G03 (arc + linear)
(2)Synchronous tapping　　M843, M844, M845
(3)Part program storage
　300 m equivalent punched tape (No. of registrable programs: 256)
(4)User media
　　　　　　　(USB port and compact flash slot)
　For loading and dumping of NC programs and tool offset data.
(5)No. of fixture offsets
　　　　　　99 sets (including the standard sets)
(6)Random angle chamfering & corner R
(7)Manual alignment function
　Including manual tool length/diameter measurement
　　　　　and coordinate conversion (G10/G11).
(8)Teaching function
　Automatic program creation by MDI and manual operations.
(9)W-axis offset function
　　　W-axis extended position is compensated
　　　with Z-axis fixture offset.

Other Options
● Controlled Axes
(1)One additional controlled axis
● Programming Methods
(2)Inch/metric selection　　　　　　G70/G71
● Interpolation
(3)Parabolic interpolation　　　　　　G06
Note : It is not compatible with NURBS interpolation.
(4)Hypothetical axis interpolation (i.e., interpolation with sine curve)　G07
(5)Cylindrical interpolation　　　　　G67
(6)Involute interpolation　　　　　　G105
(7)Spindle normal direction control
　　(Spring necked turning)　G140/G141/G142
(8)Archimedes interpolation (Spiral interpolation)
　　　　　　　　　　　　　　G102/G103
● Feed
(9)Synchronous thread-cutting
(10)Per-revolution feed　　　　　　G95
(11)Per-revolution dwell　　　　　　G05
● Part Program Storage and Edit
(12)Part program storage
　　600 m equivalent punched tape (No. of registrable programs: 512)
　　1,200 m equivalent punched tape (No. of registrable programs: 1024)
　　3,000 m equivalent punched tape (No. of registrable programs: 1024)
　　5,400 m equivalent punched tape (No. of registrable programs: 1024)
　　7,800 m equivalent punched tape (No. of registrable programs: 1536)
　　10,200 m equivalent punched tape (No. of registrable programs: 1536)
*(13)Mass memory (CF)　　　　　　2GB

● I/O Functions and Devices
(14)Remote buffer operation　(including port C connection)
*(15)High-speed LAN linkage
　　File transfer by connecting CNC and LAN.
● Tool Offset
(16)No. of tool offsets
　　No. of tool length offsets: 499 sets (including the standard sets)
　　No. of cutter compensations: 499 sets (including the standard sets)
(17)Three-dimensional tool compensationG30/G31
● Operation Support Function
(18)Foreground plotting function
　　A tool locus of active program is plotted.
(19)Additional number of optional block skips　Max. 9
● Programming Support Function
(20)Programmable mirror image　　G62/G66
(21)Programmable data input
　　　　　Updating of offsets by G58/G59.
(22)Scaling　　　　　　　　　　G64/G65
(23)Plane conversion　　　　　G35～G39
(24)Three-dimensional coordinate conversion　G14
(25)Figure copy function　　　　G721/G722
(26)Circle cutting compensation
(27)Machining time estimate & NC plotting function
　　Machining time estimate and tool path plotting
　　for non-active program on the background.
(28)Pattern cycle division into NC statements
(29)W axis travel distance　Conversion function
● Automatic Support Function
(30)Faulty cut detection & feedrate regulation function
　　　　　Tool breakage and wear detection
　　　　　Feedrate regulation
　　　　　Note)Counting of tool working time and
　　　　　　　spare tool selection are included
　　　　　　　in the standard specifications.
(31)Program check & used tool list creation
　　　Check of a program to be executed next
　　　and creation of a slated tool list.
(32)Cutting start detectionUsed for spot facing, etc.
(33)NEXUS Schedule operation function
● Safety and Maintenance
(34)Memory lock
● High-Accuracy Machining & Servo System
(35)Shape recognition preview positioning control
(36)NURBS interpolation
Note : Shape recognition preview control function is required.
● Cable
(37)RS232C cable　　　　　　　10 m-long

Note) Marked with *, selectable between two options.