Shibaura Machine

BTD-100.R10,R12

BTD-100.R10,R12

Table-Type Horizontal Boring and Milling Machine

Shibaura Machine

View the Future with You

ISO 9001

GOTEMBA plant

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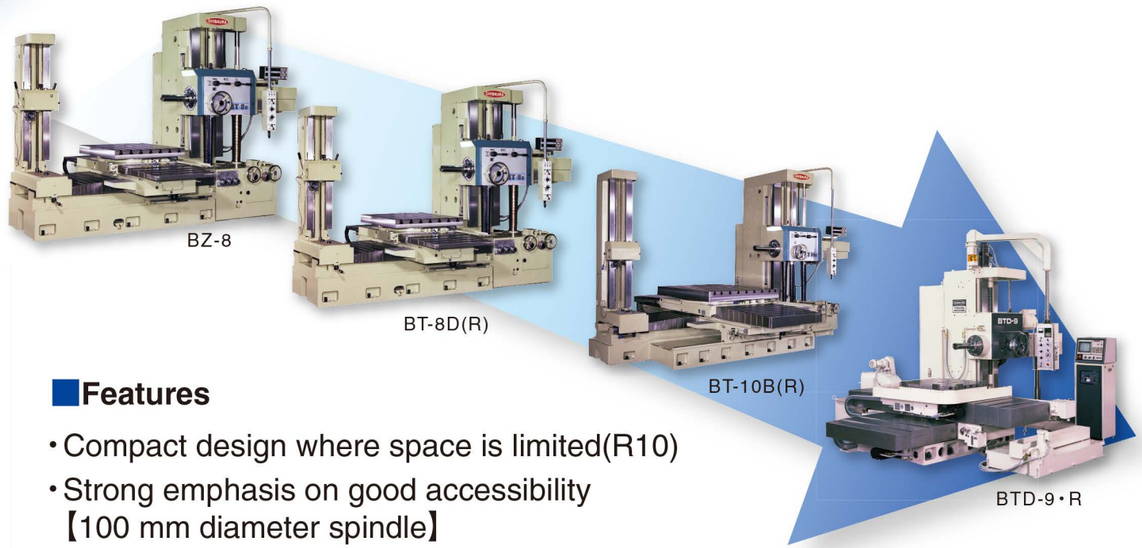
In response to the demands of our increasingly global customer base, Shibaura Machine has launched the evolved Table Type Horizontal Boring and Milling Machine, BTD-100.R10,R12, featuring a compact floor plan design.

BTD-100.R10,R12



Features

- Compact design where space is limited(R10)
- Strong emphasis on good accessibility 【100 mm diameter spindle】
- 30 kW spindle motor assures high productivity
- Simple, user friendly operation pendant to access Manual/MDI/AUTO mode.

Machine Specifications

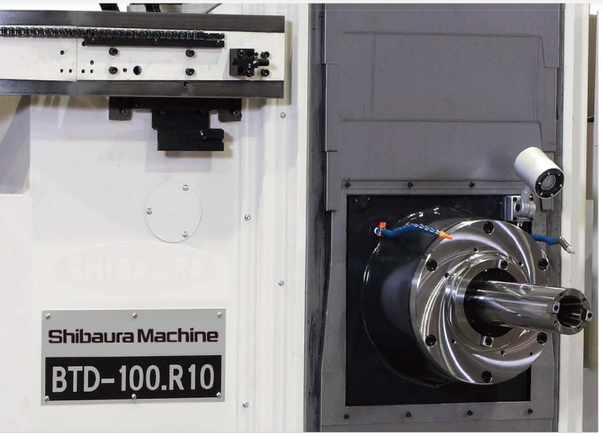
			BTD-100.R10	BTD-100.R12
Table size		mm [in]	900 x 950 [35.4 x 37.4]	1 000 x 1 200 [39.3 x 47.2]
Table loading capacity		kg [lb]	2 500 [5 500]	4 000 [8 800] 【3 500】[7 700]
Travel	X	mm [in]	1 000 [39.3]	1 500 [59.0]
	Y	mm [in]	900 [35.4]	1 200 [47.2] 【1 000】[39.3]
	Z	mm [in]	700 [27.5]	
	W	mm [in]	350 [13.7]	
Table resolution unit	B	deg	0.0001	
Spindle speed		min^{-1}	20 ～ 3 000 (30 ～ 5 000)	
Main motor power		kW [HP]	AC30/22 [40/30]	
Number of tool pots			30 (60)	
Machine height		mm [in]	2 800 [110.2]	3 300 [129.2]
Machine floor space		mm [in]	4 370 x 3 710 [172.0 x 146.1]	4 630 x 4 400 [182.2 x 173.2] 【6 890 x 4 870】[271.2 x 191.7]

Note:Data in blackets 【 】 are the case of R12 APC.
Data in blackets ( ) are the case of option.

Table-Type Horizontal Boring and Milling Machine

BTD-100.R10,R12

Note) This picture is BTD-100.R10.
Options are included in above picture.



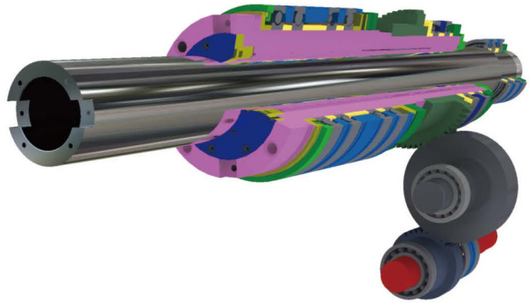
The most powerful and elaborate machine in this class

BTD-100.R10,R12

Boring spindle with a rigid 100mm diameter and 350mm programmable stroke "plus" the capability to reach narrow and confined spaces.

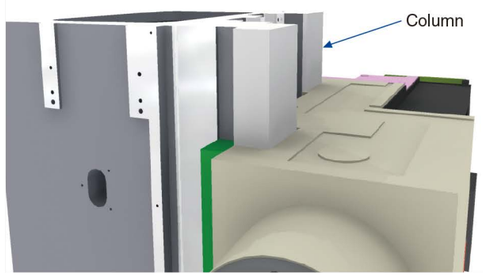
Spindle head construction

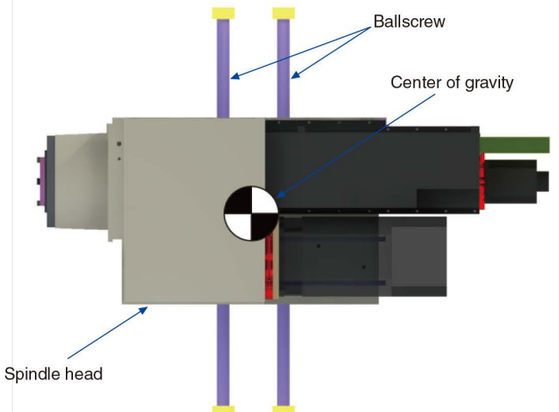
Compact, rigid and low thermal displacement are achieved on the machine based on an ideal layout of shafts, gears and bearings.
Oil mist lubrication is applied in the spindle head in order to minimize heat generation in the driving system and effect on environment.



The column supports the spindle head solidly and securely.

High rigidity column for supporting spindle head
The robust column with stepped guideway is used.
Twin ball screw design putting the center of gravity within the column enables stable up-and-down motion of spindle head.

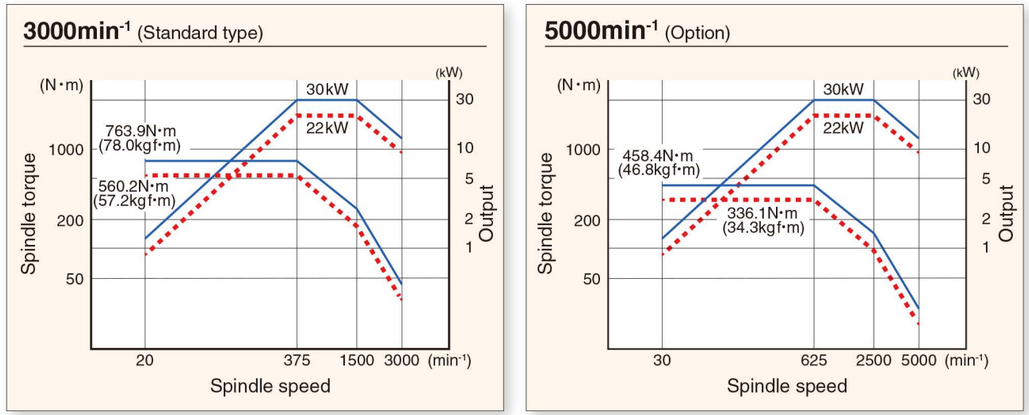




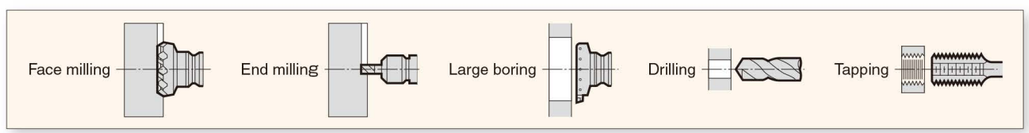
Hardened and ground spindle

The boring spindle is deeply quenched in nitrogen gas, and ground precisely to assure accuracy over a long period.

Spindle torque diagram



An example of cutting ability (workpiece material: AISI 1055)



	Tool diameter mm [in]	Surface speed m/min [fpm]	Spindle speed min-1	Feedrate mm/min [ipm]	Machining width mm [in]	Depth of cut mm [in]	Chip volume cc/min [cipm]
Face milling	ϕ160 [6.3] with 8 blades	150 [492]	300	1000 [39.4]	120 [4.7]	6 [0.24]	720 [44]
End milling	ϕ80 [3.1] with 6 flutes	100 [328.1]	400	720 [28.3]	20 [0.8]	50 [2]	720 [44]
Large boring	ϕ350 [13.8]	110 [360.9]	100	33 [1.3]	-	6 [0.24]	-
Drilling	ϕ69.5 [2.7]	22 [72.2]	100	-	-	-	-
Tapping	M60 [2.36] xP5.5[0.22]	10 [32.8]	54	297 [11.7]	-	-	-
Tapping	M3 [0.12] xP0.6 [0.024]	10 [32.8]	700	350 [13.8]	-	-	-

Above data might be different on each machine, acording to setup jig, machining position, cutting edge and tool holder.
Above data are on the case of BTD-100.R10 3000min-1 machine.

Compact main components, with an emphasis on rigidity and high accuracy.
In addition to our vast experience , modern FEM analysis is utilized to design main components.

Bed

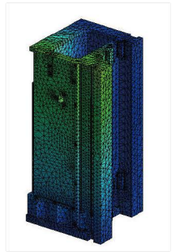
Low but rigid bed securely supports the whole machine to supply lower working height and smaller machine space.

BTD-100.R10

BTD-100.R12

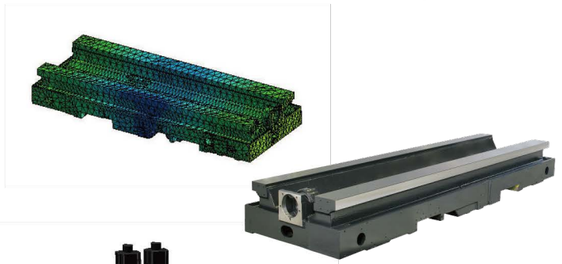
Column

Rigid column securely supports the spindle head securely under heavy load and circumstances on the machine with lower working height and smaller machine space.



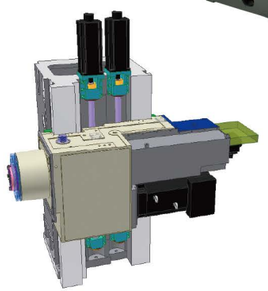
Saddle

The gap and width of supporting areas are optimized to minimize deformation of saddle.



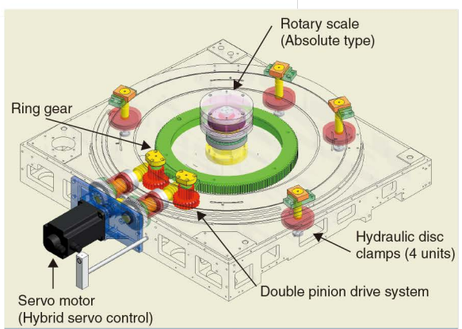
Twin ball screw drive on the spindle head

Servo motors are directly connected to the ball screws to achieve high repeatability and accuracy.
High rigidity feed system driven by two ball screws eliminates a counter weight system, which can be a source of trouble for high speed machine and requires lubrication.



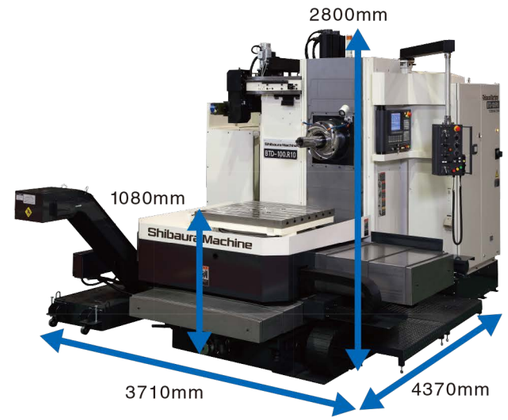
New B-axis drive mechanism (pat. pending)

Rigid double pinion drive system and absolute rotary scale are standard features.
New hydraulic clamps assure stable and high indexing accuracy.



Space saving(R10)

Machine's floor space is only 4370 mm x 3710 mm (14 ft. 4.0 in x 12 ft. 2.0in).



Workpiece arrangement(R10)

Table height is designed lower so that operators can easily load and unload workpieces.

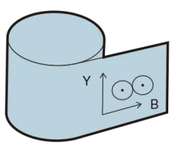
Note: The right picture is BTD-100.R10.

Lighting

Bright LED spot light improves operator's working efficiency.

Convenient rotary milling function (option)

Continuous indexing function of B-axis table enables continuous machining of cylindrical surface and end faces , without an independent or additional NC rotary table .
Machining program of cylindrical surface can be created easily on the machine, without special CAM software.



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G67B__ (Example)
G03Y__B__R__

Centralized maintenance equipment

Oiling points requiring periodic access are located at one place for easy and convenient maintenance.

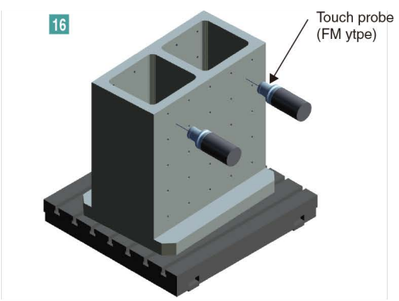
Unified lubricating oil

Same lubricating oil can be used for gears and bearings.

Automatic centering function

Automatic compensation by precision indexing of rotary table , based on touch probe measurement , eliminates troublesome centering work.

16



TOSNUC 999 (triple nine) makes it possible to select Manual, MDI and Auto mode with a single touch

AUTO mode
MDI mode
Full Teaching
Manual mode

Spindle control lever
(5 modes: spindle forward, reverse, stop, forward jog, reverse jog)
Feed selection lever on Y and W axis
Feed selection lever on X and Z axis
Feed selection lever on B axis
Centering rotation of spindle
Change lever for feed and rapid traverse

Full screen editing function helps to easily create a part program.

●Multiple window display (three kinds)
Three windows can be displayed on a screen simultaneously to show such data required for machining as two part programs and offset data

●Part program creation from proven programs
A new part program can be created on a screen based on several existing part programs in memory which are shown on multi windows by referring and copying parts of them.

Visual program check (option)

A part program in memory directory can be checked by drawing a graphic path on a screen in background, while the machine is working under a current part program. Tool path is drawn graphically after completed format check of the part program.

Customized key layout

1. Special operation record buttons
Series of key operation are consolidated into one special key such as ● ⁛ ⁛ ⁛ ⁛ ⁛ , and pressing one of these keys executes the same chain of previous operation by several keys.

2. Special combination screen buttons
A combination pattern of such basic screens as main screen, sub-screen and windows is consolidated into one special key as ♠ ♥ ♦ ♣ . and pressing one of these keys immediately displays a combination screen.

Dual interface port for USB and CF memory

The controller has two kind of ports for USB memory and Compact flash (CF) memory as a standard loading device, to input massive part program data.

Multiple window (three window) function

Graphic function

Manual measurement

Three teaching modes

All information operated on the key board and operator pendant by operator at actual machining are stored in memory as a part program in teaching mode. Combination of such part programs stored in each teaching mode make it easy to create a new part program.

●Manual teaching mode
Such machining information in manual mode as tool path, spindle speed, feedrate, etc. are automatically stored in memory as a part program.

●MDI teaching mode
All program input through key board line by line in MDI mode are automatically stored in memory.

●Automatic teaching mode
Revised data in a working part program in "AUTO mode" or in "DNC mode" are automatically feedback and stored in memory.

Various functions to improve and drastically reduce set up operation.

●Manual centering function
Make the touch probe or master tool contact the measuring surface on a workpiece, following the instruction shown on the interactive screen, to measure hole and/or boss diameter and inclination of a workpiece to X-axis at set-up. A coordinate conversion and fixture offset are executed automatically, based on the result of calculation from these measured data.

Machine specifications

				BTD-100.R10	BTD-100.R12
Travel	X–axis travel (Cross movement of table)		mm [in]	1 000 [39.3]	1 500 [59]
	Y–axis travel (Vertical movement of spindle head)		mm [in]	900 [35.4]	1 200 [47.2]
	Z–axis travel (Longitudinal movement of table)		mm [in]	700 [27.5]	
	W-axis travel (Spindle extension)		mm [in]	350 [13.7]	
	Distance from table surface to spindle center		mm [in]	0〜900 [0〜35.4]	
	Distance from table centerline to spindle gage plane		mm [in]	450〜1 150 [17.7〜45.2]	
Table	Table working surface		mm [in]	900 x 950 [35.4 x 37.4]	1 000 x 1 200 [39.3 x 47.2]
	Table loading capacity		kg [lb]	2 500 [5 500]	4 000 [8 800] 【3 500】[7 700]
	Table surface configuration			7T-slots, size 22mm [0.86in], pitch 120mm [4.72in]	6T-slots, size 22mm [0.86in], pitch 160mm [6.2in]
	Minimum table indexing angle			0.0001° [0.0001deg]	
Spindle	Spindle speed		min^{-1}	20〜3 000	
	Spindle diameter		mm [in]	100 [3.9]	
	Milling spindle nose diameter		mm [in]	196 [7.7]	
	Type of spindle taper hole			7/24 taper No.50	
Feedrate	Rapid traverse rate	X,Y,Z	m/min [ipm]	12 [472.4]	
		W	m/min [ipm]	6 [236.2]	
		B	deg/min	1 080	
	Feedrate	X,Y,Z	mm/min [ipm]	1〜6 000 [0.04〜236.2]	
Automatic tool changer	Type of tool shank			MAS BT50	
	Type of retention knob			MAS P50T-1(45deg)	
	Tool storage capacity			30 (60) tools	
	Maximum tool diameter	When pots are full	mm [in]	125 [4.9]	
		When adjacent pots are enpty	mm [in]	240 [9.4]	
	Maximum tool length		mm [in]	400 [15.7]	
	Maximum tool mass		kg [lb]	25 [55]	
	Tool selection			Pot address random short-cut	
Spindle drive Motor	50%ED/continuous rating		kW [HP]	AC 30/22 [40/30]	
Power sources	Electric Power supply		V	AC200/220±10%, 50/60Hz±2%	
	Power capacity		kVA	71	
	Compressed air supply	Pressure	Mpa [psi]	0.5〜0.8 [72.5〜116]	
		Flowrate	Nl/min [Ngal/min]	450 [117]	
Machine size	Machine height		mm [in]	2 800 [110.2]	3 300 [129.9]
	Floor space		mm [in]	4 370 x 3 710 [172.0 x 146.1]	4 630 x 4 400 [182.2 x 173.2] 【6 890 x 4 870】[271.2 x 191.7]
	Mass of machine (including CNC systems)		kg [lb]	14 700 [32 400]	16 700 [36 810] 【21 700】[47 840]
Accuracy	Positioning accuracy	X,Y,Z	mm [in]	±0.005[±0.0002] /full travel	
		(When closed feedback)	mm [in]	(±0.003[±0.00012] /full travel)	
		W	mm [in]	±0.012mm [±0.00047] /full length	
	Repeatability	X,Y,Z	mm [in]	±0.003 [±0.00012]	
		(When closed feedback)	mm [in]	(±0.002 [±0.00008])	
		W	mm [in]	±0.008 [±0.00031]	
	Table indexing accuracy (arbitrary angle)		sec	±3	
	Table indexing repeatability		sec	±1.5	
Machine color				R4-383 {Ivory-white} and Munsell N2.5 {dark gray} according to Japan Painting Industrial Association For the NC system, servo motors, cooler, etc., each maker'sstandard colors shall apply.	

Note:Data in blackets【 】are the case of R12 APC.
Data in blackets ( ) are the case of option.

Accessories

Standard Accessories

1	Numerical control system TOSNUC 999	1 set	10	Table oil pan	1 set
2	Machine operation box (pendant type)	1 set	11	Saddle slideway cover	1 set
3	Spindle orientation stop function	1 set	12	Bed slideway cover	1 set
4	Automatic tool changer with 30 tool pots	1 set	13	Column front cover (steel)	1 set
5	Spindle speed monitoring function	1 set	14	Work light (spot light)	1 set
6	Constant volume oil mist unit for spindle bearing and gear lubrication	1 set	15	Special maintenance tools	1 set
			16	Installation parts	1 set
7	Portable Hand wheel unit with axis selector	1 set	17	Auto power OFF	1 set
8	CNC controled table with resolution of 0.0001degree	1 set	18	Plug socket for an external device (AC 100 V, 5 A)	1 set
9	Hydraulic table clamps	1 set	19	Coil conveyor(built in the bed)(R12)	

Optional Accessories

Options – Set A

1 Flood coolant set (Use a fire-resistant water-soluble coolant.)
- Lift-up chip conveyor (incorporated on the coolant tank)
- Flood coolant unit

2 Chip chute fixed on saddle(R10)

3 Hydraulic unit with oil cooler

4 Operator call lamp (yellow color)

Other Options

1 Coil type conveyor (fixed on saddle)(R10)
Note: Substitute for 1.3.1 2 Chip disposal chute fixed on saddle.
Required floor space exceeds the standard space, when this option is selected.

2 Intermittent coolant unit

3 Chip bucket
Note: Substitute for 1.3.1 1 Lift-up chip conveyor in the case of dry cutting.

4 Through-spindle type coolant set
Pump pressure:1.2 MPa [170 psi]

5 Operator call lamp (3 colors; red, yellow and green)

6 Chip bucket (C) Bucket capacityy: Approx. 0.18 m^3 [6.34 ft^3]

7 Selection of another retention knob MAS P50T–2 (30°) or CAT-MAS P50T–1(45°)(Tap 1-8unc)

8 Extra order of retension knobs MAS P50T–1 (45°)
MAS P50T–2 (30°)
CAT-MAS P50T–1(45°)(Tap 1-8unc)

9 Deletion of automatic tool changer
Note: floor space is smaller than standard space.

10 Automatic tool changer (ATC) with 60 tool pots
Note: Required floor space exceeds the standard space.

11 Angle head (Type of spindle taper hole:JIS 7/24 taper No. 50)

12 Automatic measuring function and dedicated touch probe (FM type)
Note: Program storage capacity reduces approximately 50 m [164.0 ft].

13 Calibration block (for Automatic measuring function)

14 Test bar (ø60 x 310mm)[ø2.4 x 12.2in]

15 Table edge locators (Table reference piece)

16 B-axis setup compensation function
Shift of work piece setup position on B-axis is measured and compensated automatically.
Note: Automatic measuring function (option) is required.

17 Rotary milling function

18 Linear scale feedback: X-, Y- and Z-axis

19 Customer's designated machine color

20 External M code – 8 siganls

21 Operator side door
※ In the case of R10, it will exceed the standard floor space.

22 ATC side cover

23 Chip cover A

24 High speed type spindle unit (30~5000min^{-1})
Air compressor 5.5 kW[7.4HP] is required.

25 Facing head CS

26 Chip air blow unit Additional air of 150 normal liters/min is required.(equvalent to 1.5 kW air compressor)

27 Spindle locking device (at random angular position) Safety measure in conformity with CSA (CANADA)

28 Flexdrill holder
The special CNC optional function of three dimensional coordinate conversion is required

29 Automatic pallet changer(R12)

Note: Optional accessory item (R10), (R12) are available options in each model.

CNC System TOSNUC 999

User media (including option set "B")

Convenient device to manage programs of large capacity

Pendant operation box

Spindle control lever has 5 function; continuous in CW, Jog in CW, STOP, and continuous in CCW, Jog in CCW,

Feed selector on Y and W axis

Feed selector on X and Z axis

Feed selector on B axis

Feed control lever at feedrate and rapid traverse

Operation switches used in manual mode are placed on the independent operator pendant, to separate operation in auto and manual mode in order to avoid wrong operation in mixed mode operation.

Specifications of CNC controller "TOSNUC 999"

Standard Specifications

●Controlled Axes	
Controlled axes	5 axes: X, Y, Z, W, B
Simultaneously controllable axes	3 axes (X, Y, Z) for positioning (G00) and linear interpolation (G01) 2 axes (any 2 axes excluding W and B) for circular interpolation (G02/G03)
●Programming Methods	
Programming resolution	Linear axes: 0.001 mm [0.0001 in] Rotating axis: 0.0001˚
Maximum programmable dimension	Linear axes: ±99999.999 mm [±9999.9999 in] Rotating axis: ±9999.9999˚
Data code	Automatic recognition of ISO/EIA code JIS B 6311 ISO 6983/1 EIA RS–358–B EIA RS–244–B
Data format	Variable block word address format with a decimal point
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.)
Hand wheel feed (portable)	Linear axis:0.001, 0.01, 0.1 mm per step.[0.0001/0.001/0.01 in / step] Rotating axis: 0.001, 0.01, 0.1˚ per step
Jog feed	
Rapid traverse override	0 ~ 100 % in 10 % increments
Feedrate override	0 ~ 200 % in 10 % increments
Override cancel	M48/M49
Automatic acceleration/deceleration	Linear acceleration/deceleration for rapid traverse and jog feed
Automatic acceleration/deceleration for feed	G08/G09,G50/G51
●Part Program Storage and Edit	
Part program storage	150 m [492 ft] equivalent punched tape (To be reduced as per attached functions)
No. of registrable programs	128 (To be reduced as per attached functions)
Part program edit	Various editing operations are available on stored programs
Background edit	Program deletion, insertion and modification are available in background
Program name	$(0)8-digit characters (alphanumeric)
Program comment	32 characters for display (197 characters for input)
Control in/out	Blacket ( )
Sequence number	N5-digit characters
Sequence number search	Bi-directional search
Program nesting list	
Fixture offset list	
T code list	
Calendar timer	Program creation data management, time display
●Operation and Display	
Operation panel	Display section: 10.4 inch color TFT liquid crystal display Operation section: Keyboard with membrane switches
Customized keys	Key pattern registration (6 types) Display registration (4 types)
Tool table	Tool information such as tool offsets and tool name are batch-displayed and edited
Automatic operation	Memory operation, external operation
MDI operation	Entry of multiple blocks and restart of an already executed block are possible
Manual numerical command	
S.F manual setting	S and F codes are set through keyboard in manual mode
S.F automatic setting	S and F codes are picked up automatically in manual mode
Spindle drive motor load factor display	Load exerted on the spindle drive motor is displayed
Run hour display	NC working time is displayed
Production record	Record of programs executed is displayed. (Date, actual time, etc. of programs executed)
Customized display color tone	Color of frame, background, characters, etc. can be selectes
●I/O Function and Devices	
RS-232-C interface port A	Programs and data are loaded and dumped through the port between memory on CNC and external devices.
●S, T and M Functions	
Spindle speed function	S5-digit numeric
Spindle speed override	50 ~ 200 % in 10% increments
Tool function	T4-digit numeric
Miscellaneous function	M4-digit numeric

●Tool Offset	
Tool length offset	G43,G44/(G49)
Tool radius offset	G45/G46/G47/G48
Cutter compensation C	G40/G41/G42 (Point of intersection calculation)
Number of tool offsets	60 sets (tool length offset , cutter compensation)
●Coordinate System	
Coordinate system setting	G92
Positioning command on machine coordinate system	G73
Plane selection	G17/G18/G19
Fixture offset	G53/G57, 9 sets (This function cannot be used together with the 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	M01
Optional block skip	A block containing a "/" code at its 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	
Hand wheel feed interruption	
●Programming Support Function	
Circular interpolation by radius programming	The radius of a circle can be specified directly by 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 (5) levels is allowed
Macro programming	Single call G72 Modal call 1 G74/G76 Modal call 2 G75/G76
Automatic corner override	Feedrate and surface speed at inside corner are override automatically
Pattern cycle	G109 ~ G119: (Drilling pattern) G121 ~ G132: (Milling pattern)
Programming format check	A format of program is checked
Single block suppression	G990/G991
Feed hold suppression	G992/G993
Override suppression	G994/G995
Hand wheel feed suppression	G996/G997
●Mechanical Error Compensation	
Backlash compensation	
Pitch error compensation	
Pitch error gradient compensation	
Origin correction	X-axis coordinate of the table center is corrected
Unidirectional positioning	G60
Straightness compensation	
Non-linear type compensation control	
●Automation Support Function	
Tool life management ・Counting of tool working time ・Tool wear coefficient function ・Spare tool selection	The tool life and tool working time are counted by multiplying a coefficient.
●Machine Control Support Function	
Integrated PC	TC200
Feed interlock	
●Safety and Maintenance	
Emergency stop	
Stored stroke limit	
Axis interference area setting and axis interference check	G24/G25, G26/G27
Self-diagnostic function	
Door interlock	
Memory lock	
●Servo System	
Servo motors	AC servo motors
Position detectors	Absolute encoders (absolute position detection) Rotary scale (B-axis)

Optional Specifications

Option set-B	
(1)Helical interpolation	G02, G03 (Circular + straight line)
(2)Synchronous tapping	M843, M844, M845
(3)Part program storage	300 m (984 ft) equivalent punched tape (No. of registrable programs: 256)
(4)User media: USB memory slot and CF slot	Loading and dumping NC programs and tool offsets and other data.
(5)Number of fixture offsets	99 sets (including standard sets)
(6)Random angle chamfering and corner R programing	
(7)Manual centering function	Including manual tool length / diameter measurement / coordinate conversion G10/G11
(8)Teaching function	A program is generated based on data set in MDI or manual operations automaticaly
(9)W-axis extension compensation	G173 Z axis fixture offset data in memory are revised based on W axis extension

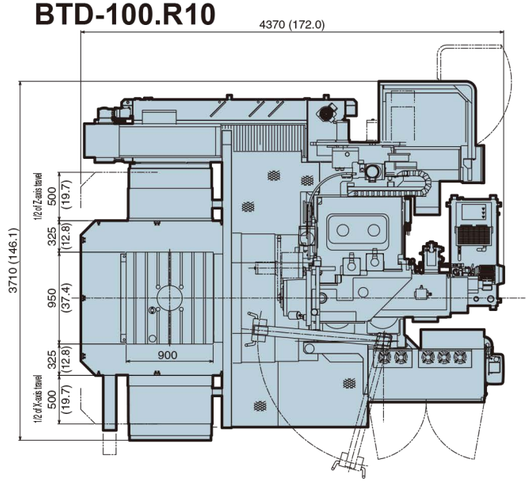
Other options

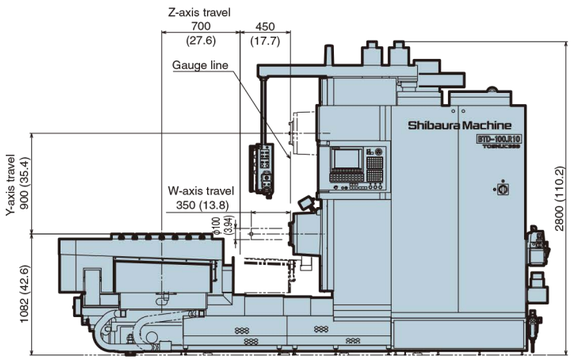
●Programming Methods	
(1)Inch/metric selection	G70/71
●Interpolation	
(2)Cylindrical interpolation	G67
●Feed	
(3)Synchronous threading	
(4)Per-revolution feed	G94/G95
(5)Par-revolution dwell	G05
●Part Program Storage and Edit	
(6)Part program storage	600 m (1968 ft) equivalent punched tape (No. of registrable programs: 512) 1200 m ((3937ft) equivalent punched tape (No. of registrable programs: 1024) 3000m (9842ft) equivalent punched tape (No. of registrable programs: 1024) 5400 m (17716 ft) equivalent punched tape (No. of registrable programs: 1024) 7800 m (25590 ft) equivalent punched tape (No. of registrable programs: 1536) 10200 m (33464 ft) equivalent punched tape (No. of registrable programs: 1536)
(7)Mass memory	256MB. 512MB, 1GB, or 2GB
●Tool Offset	
(8)Three-dimensional tool compensation	G30/G31
●Operation Support Function	
(9)Additional number of optional block skips	Max. 9
●Programming Support Function	
(10)Programmable mirror image	G62/G66
(11)Scaling	G64/G65
(12)Plane conversion	G35 ~ G39
(13)Three-dimensional coordinate conversion	G14
(14)Circle cutting compensation	
(15)Machining time quotation & NC plotting function	Machining time quotation & tool locus function for non-active program in background
(16)W-axis travel distance conversion function	
●Cable	
(17)RS-232-C cable	10 m[32.8 ft]-long

General views

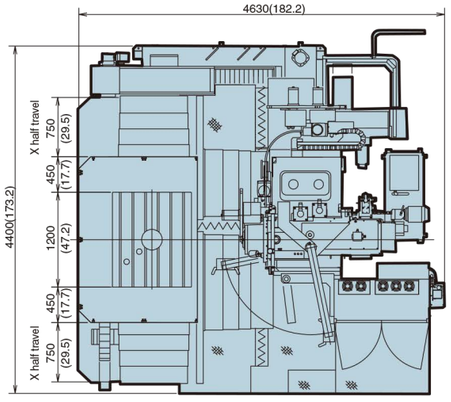
mm (in)

BTD-100.R10

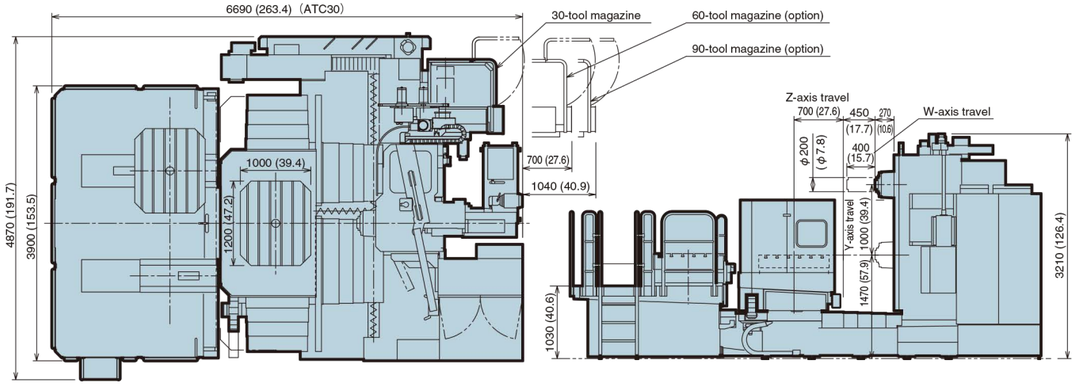




BTD-100.R12

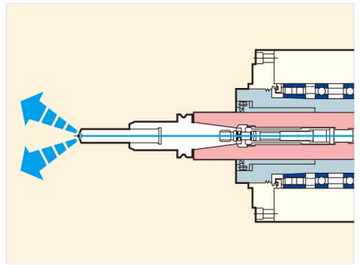


BTD-100.R12(APC)

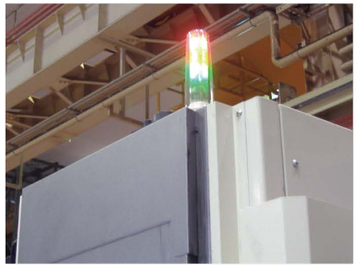


Available options

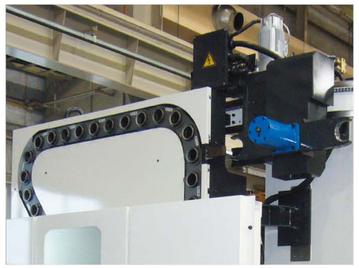
1 Chip conveyor (set A) with slope for disposal



4 Through-Spindle type coolant set

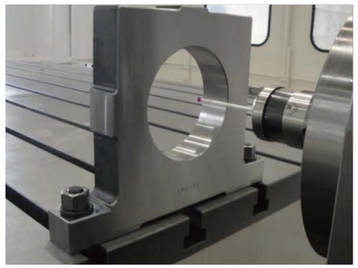


5 Operator call lamp (3 colors; red,yellow and green)



10 Automatic tool changer (ATC) with 60 tool pots

11 Angle head



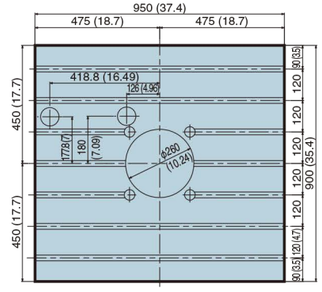
12 Automatic measuring function and dedicated touch probe (FM type)

13 Calibration block (for Automatic measuring function)

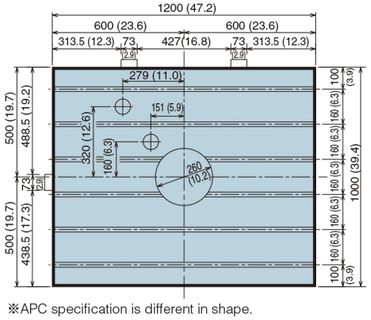
16 B-axis setup compensation function

Table top view

BTD-100.R10

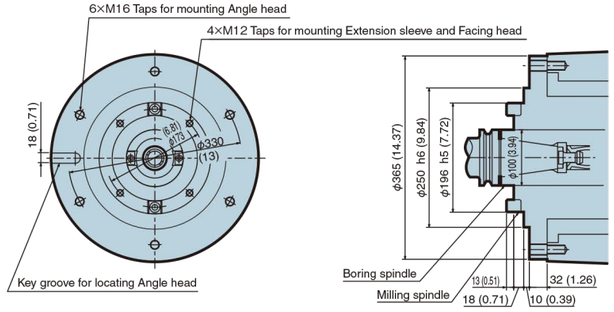


BTD-100.R12



※APC specification is different in shape.

Dimension of spindle nose



ATC tool dimension