

***SPEEDIO***

**W1000Xd1**

Wide Travel Compact Machining Center



# Cutting Out the Waste

Times are changing. Are you ready?  
You need a machine that's fast and compact.

With the ability to make any cut.  
In this world, only the strong survive.

Make it better with SPEEDIO.

## **SPEEDIO**



\* The photo shows the machine with 150 mm high column specifications.

**Provides better solutions that eliminate all possible waste, utilizing unparalleled wide travels and maximized high-speed control**

In response to customers' expectations of "machining larger workpieces with #30 machine," 500 mm travel Y-axis has been achieved despite the compact body, breaking common conceptions of #30 machines.

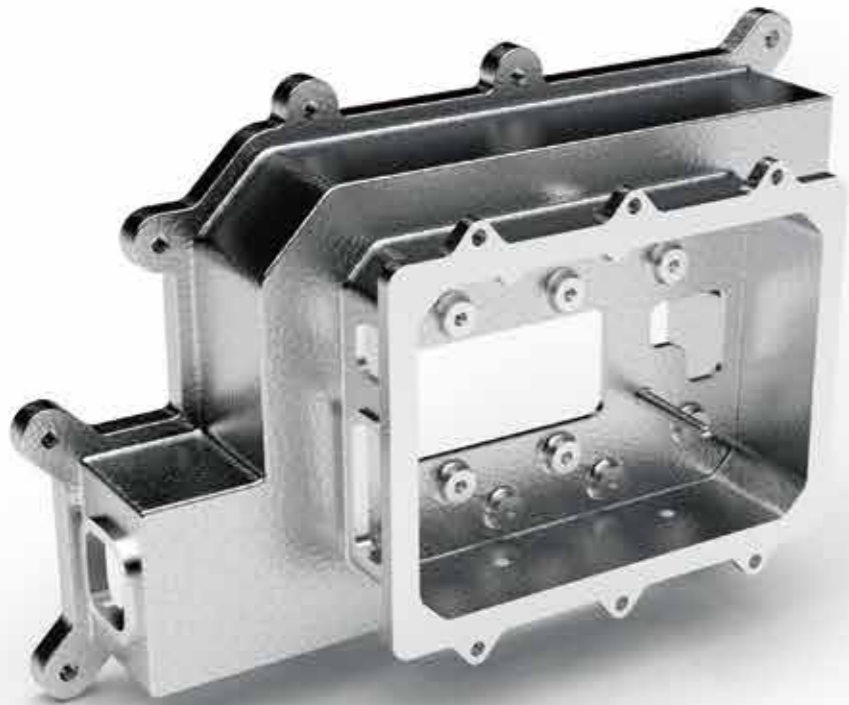
- |                              |   |
|------------------------------|---|
| 1. NC operability            | Equipped with a new usability-oriented "CNC-D00 controller"   |
| 2. Machining area            | Wide machining area to accommodate a variety of machining, such as large workpiece machining and multi-part machining.    |
| 3. Productivity              | Further improves productivity with optimal operation control achieved through machine/controller integrated development   |
| 4. Machining capability      | Demonstrates a broad range of machining capabilities, from high-speed, highly efficient machining to heavy-duty machining |
| 5. Environmental performance | Creates an earth-friendly plant environment by greatly reducing power consumption   |

Basic specifications	
Max. spindle speed (min <sup>-1</sup> )	10,000 Optional: 10,000 high-torque, 16,000
Travels (mm)	X1,000 Y500 Z300
Tool storage capacity (pcs.)	14/21
Rapid traverse rate (m/min)	X/Y/Z 50/50/56
Required floor space (mm)	2,410 x 2,443
BT dual contact spindle	Optional
Coolant Through Spindle	Optional

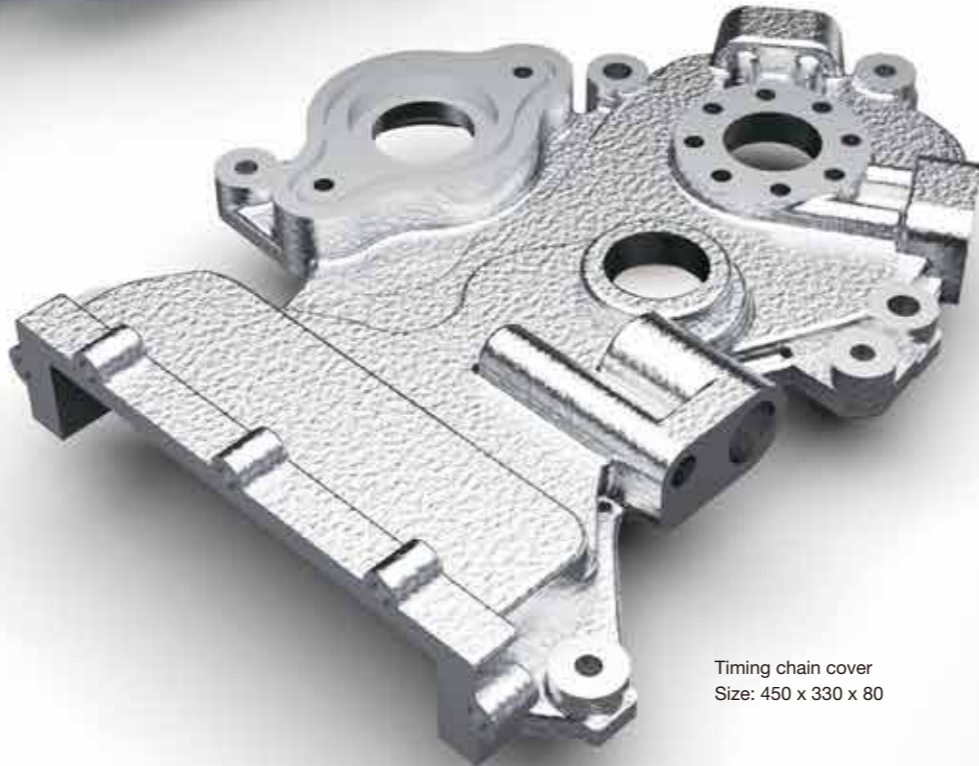
## Expands target machining parts and process flexibility utilizing the widest machining area in #30 machines' history

The large machining area can respond to customers' expectations in a variety of situations, while maintaining high-speed and easy-to-handle features of #30 machining centers.

This new machine enables workpiece machining previously considered impossible in various industries, including the automobile industry.



Inverter case  
Size: 400 x 280 x 150



Timing chain cover  
Size: 450 x 330 x 80



Oil pan  
Size: 380 x 280 x 90



Cylinder head cover  
Size: 830 x 250 x 135



20-inch wheel  
Size:  $\phi 350$  x 200



Battery case  
Size: 720 x 350 x 105



Transmission case  
Size: 550 x 300 x 280



Bike frame  
Size: 820 x 450 x 160

# Equipped with new “CNC-D00 controller” Enhanced usability with 15-inch LCD touch panel

Intuitive operation is possible with new support apps and vertical touch panel screen.  
Relevant functions are grouped according to purpose, such as setup and machining, leading to efficient operation.  
Production and operation states are visualized, allowing faster understanding.  
The new NC controller further improves work efficiency in pursuit of higher productivity.

### Home screen

Created a new home screen that serves as the start point of all operations.  
Useful information like workpiece counter and tool life are displayed during mass production. New support app screens or conventional screens are opened from here.



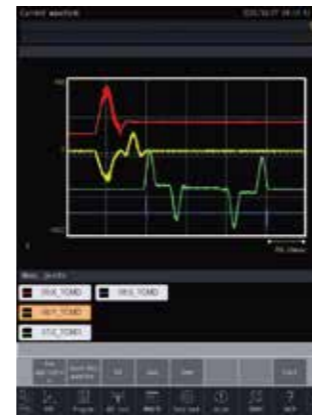
### Support apps

Created new support apps with improved operability and visibility, such as an ATC tool app that enables all tool settings to be performed on one screen and a production result app that visualizes production results and operation state.



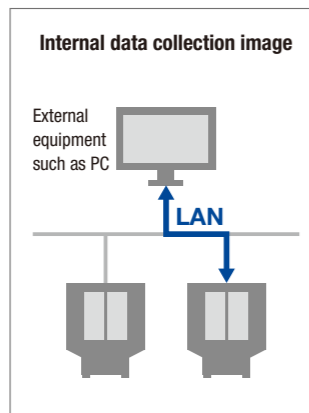
### Machining support

Equipped with functions to reduce the cycle time, such as a machining load waveform display/saving function and an app that enables operators to adjust parameters easily according to machining details.



### Network function compatible with peripheral equipment/automation

Standard equipped with a PLC function. Increased program memory and object memory enhance peripheral device operation.  
Large volumes of program data can be transferred at high speed via Ethernet.  
The production result app screen can be viewed from the PC's browser.



### Maintenance functions

Equipped with functions to improve the operating rate, such as tool monitoring, maintenance time notice, details display when an alarm occurs, and guidance for recovery/check work.



### Accessories

Equipped with handy tools to support smooth operation, such as a calculator where results can be copied/pasted, memo pad you can write in directly on the screen, and file viewer you can use to refer to pdf files.



HIGH TORQUE



## Achieved unprecedented large machining area to accommodate a variety of machining from small to large workpieces

The wide machining area can accommodate constantly varying onsite needs, such as large workpiece machining, long-hour multi-part machining of small parts, multi-product small-volume production with various jigs placed side by side, which enhances the plantwide flexibility.

### Ample travels and table size

Ample X/Y-axes travels and sufficient loading capacity allow machining large workpieces and mounting a large jig, not available on conventional #30 machines.

A trunnion jig with a turning diameter of 540 mm can be mounted. (High column 250 mm)

#### Travels

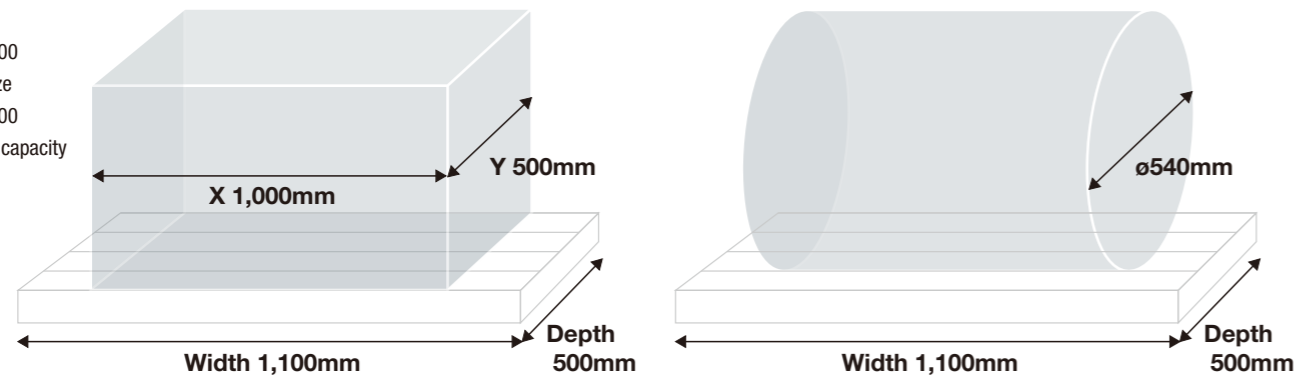
X 1,000 Y 500

Work area size

X 1,100 Y 500

Max. loading capacity

400 kg



### Flexibly applicable to various types of machining

Making use of the width and depth of the broad jig area, jigs and workpieces can now be placed freely, enabling more flexible and efficient machining in various processes.

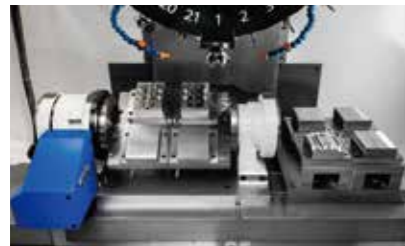
#### Large workpiece machining



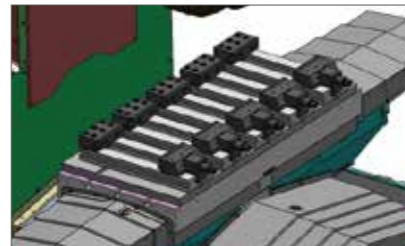
#### Multi-part machining



#### Rotary table and flat jig



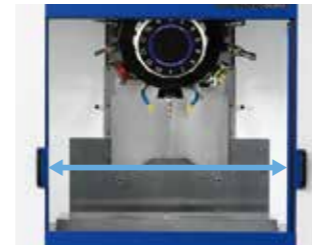
#### Parallel arrangement of vises



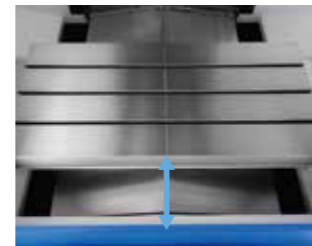
### Improved workability

Linked double doors are used. The wide opening and highly accessible table improve workability.

#### Door opening dimension: 1,140 mm



#### From front to table: 226 mm



## Demonstrates high productivity utilizing lightweight and low inertia features of #30 machines and original NC controller

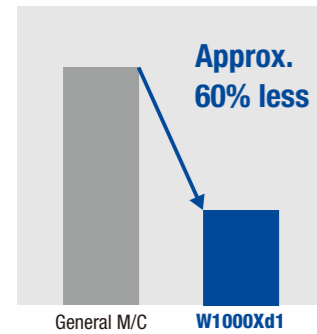
High speed, high acceleration, and high responsiveness have been the aim of machine/controller integrated development, and any wasted motion and time has been thoroughly eliminated to drive machine performance to the fullest and achieve high productivity.

### Productivity improvement

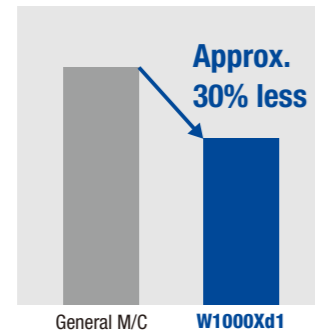
Productivity has been further improved by optimally controlling operation with the new CNC-D00 controller and using a low inertia motor.

Improved by **3% or more** (compared to previous model)

Program mainly consisting of drilling and tapping



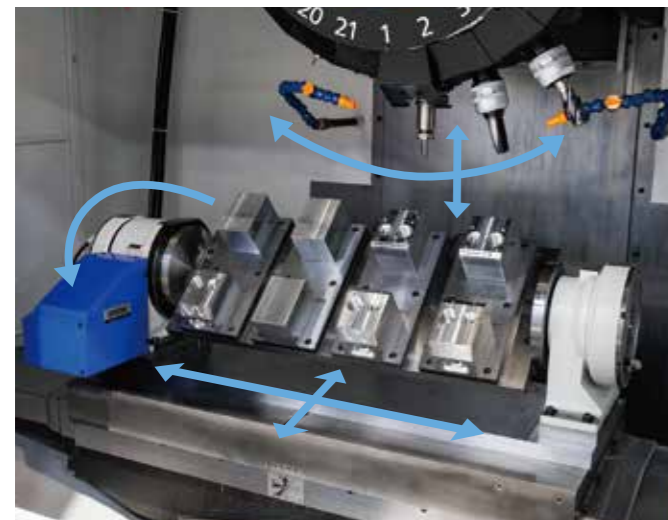
Program mainly consisting of milling and end milling



\* Data taken running machining program created by Brother

### Simultaneous operation control

Reduction in non-cutting time has been achieved by simultaneously performing tool change and positioning X/Y and additional axes.



### Non-stop ATC

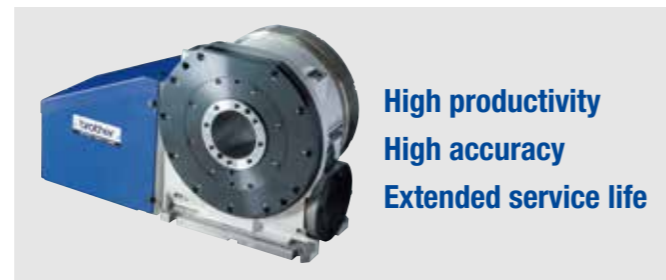
Tool change time has been reduced by increasing the speed of spindle start/stop, Z-axis up/down, and magazine operation.

Operation	Old Time	New Time
Chip-Chip	1.4s	1.2s
Tool-Tool	0.8s	0.6s

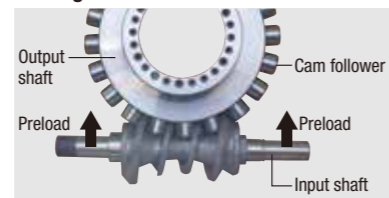


### Rotary table T-200Ad (optional)

Contributes to further improve productivity in multi-face machining. Use of the roller gear cam mechanism achieves high productivity, high accuracy, and extended service life.



Feature	Value
High productivity	
High accuracy	
Extended service life	
Roller gear cam mechanism	
0 to 180-deg. indexing time	
Clamp mode	1.02s
Unclamp mode	0.45s



# Provides broad cutting performance from high-speed and highly efficient machining to heavy-duty machining

High rigidity based on a special design and use of a high-torque spindle motor achieve stable machining while demonstrating high machining capability.

## Max. tool weight 4 kg

Increased the weight of tools that can be mounted. Combined with wide travels (X 1,000 mm, Y 500 mm), the machine is suitable for a wider variety of applications than ever.

\* Changing parameter settings is required. (Tool indexing time is changed.)

## Compatible with 7 MPa high-pressure CTS (optional)

The machine is compatible with 7 MPa high-pressure CTS in addition to 1.5 MPa CTS. Demonstrates its abilities in high-speed drilling or peck drilling.

\* CTS: Coolant Through Spindle

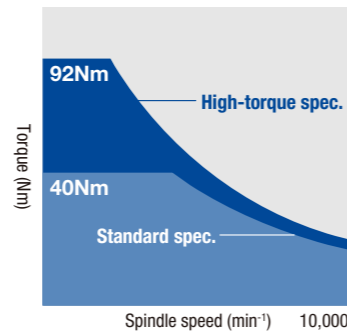


ø6 × 170mm (L/D=28)  
Workpiece: Carbon steel

## High-power spindle motor

A spindle motor with high torque in the medium- and high-speed range is used to achieve high-speed and highly efficient machining. The machine with high-torque spec. (optional) greatly improves the torque in the low-speed range, and demonstrates its abilities in heavy-duty steel machining.

### Motor torque characteristics

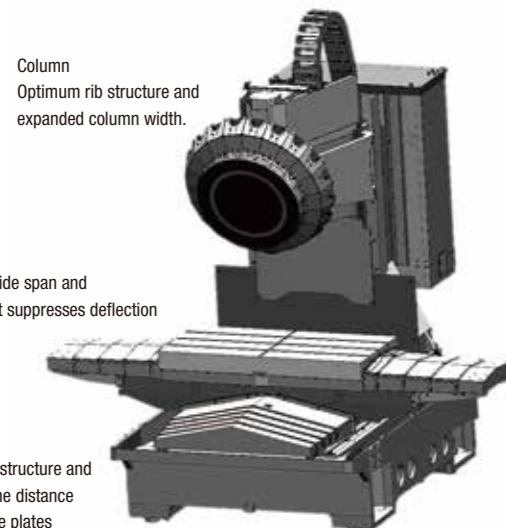


### Spindle motor torque values

High-torque spec. (optional)	
Max. torque	92Nm
Max. output	26.2kW
Standard spec.	
Max. torque	40Nm
Max. output	18.9kW

## Highly rigid structure

Structural parts, such as the base, column, and table, have been specially designed through CAE analysis to secure high rigidity.



Column  
Optimum rib structure and expanded column width.

Table  
Expanded guide span and structure that suppresses deflection

Base  
Optimum rib structure and increase in the distance between base plates

## Machining examples

### End milling (groove)

Cutting amount: 430 cc / Workpiece: Carbon steel  
ø16 end mill \* High-torque spec.



### Large hole machining

Hole size: ø50 mm / Workpiece: Carbon steel  
Throw-away drill \* High-torque spec.



### Facing

Depth of cut: ap 3 mm / Workpiece: Carbon steel  
ø80 face mill \* High-torque spec.



### Taper tapping

Tapered tap for tubes: PT 1/2  
Workpiece: Stainless steel \* High-torque spec.



## Machining capability

	ADC	Cast iron	Carbon steel
<b>Drilling</b>	10,000min <sup>-1</sup>	D32 × 0.2 (1.26 × 0.008)	D28 × 0.15 (1.1 × 0.006)
	10,000min <sup>-1</sup> high-torque	D40 × 0.2 (1.57 × 0.008) D30 × 0.7 (1.18 × 0.03)	D34 × 0.15 (1.34 × 0.006) D26 × 0.4 (1.02 × 0.02)
	16,000min <sup>-1</sup>	D24 × 0.2 (0.94 × 0.008)	D22 × 0.15 (0.87 × 0.006)
<b>Tapping</b>	10,000min <sup>-1</sup>	M27 × 3.0 (1-8UNC)	M24 × 3.0 (7/8-9UNC)
	10,000min <sup>-1</sup> high-torque	M39 × 4.0 (1 1/2-6UNC)	M33 × 3.5 (1 1/4-7UNC)
	16,000min <sup>-1</sup>	M22 × 2.5 (7/8-9UNC)	M18 × 2.5 (5/8-11UNC)
<b>Facing</b>	10,000min <sup>-1</sup>	960 (58.6)	137 (8.4)
	10,000min <sup>-1</sup> high-torque	1,700 (102.4)	255 (15.5)
	16,000min <sup>-1</sup>	660 (40.3)	73 (4.5)

\* Data obtained from tests conducted by Brother.

# Reliability maintains high productivity

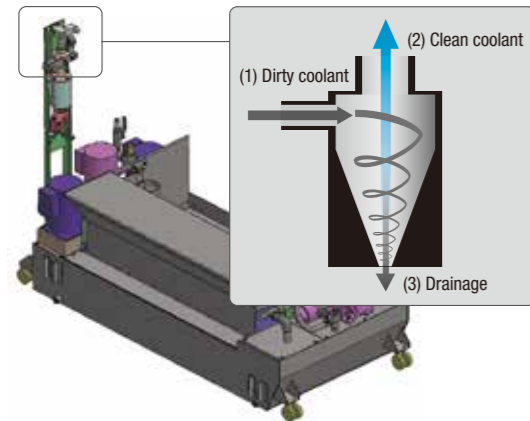
## Earth-friendly machine

Reliability functions that prevent defective products and maintenance functions that prevent machine failure achieve high reliability and maintain high productivity. Our efforts to improve environmental performance and effects of high productivity greatly reduce power consumption, making the machine earth-friendly.

### High reliability – Improved chip control

Clean coolant is returned to a clean tank through a tank with a cyclone filter that removes fine chips. This reduces the filter change frequency and extends the service life of the pump.

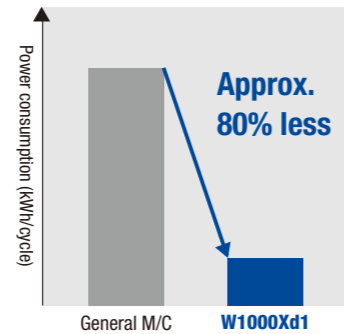
#### Tank with cyclone filter (special option for CTS)



### High environmental performance

In addition to the low inertia spindle and highly efficient spindle motor, various energy/air saving technologies are utilized to achieve low power consumption. The amount of power consumption can be viewed on the monitor.

#### Power consumption for one cycle



\* Data taken running machining program created by Brother

#### Energy-saving technologies

Low inertia spindle, highly efficient spindle motor, power regeneration system, energy-saving pump, energy-saving NC functions

#### Air-saving technologies

Optimized air blast timing, extremely airtight air purge structure

#### Power consumption app



### Reliability/maintenance functions that prevent defective products and machine failure, and assist quick recovery

To maintain productivity at plants, the machine is equipped with many functions that can prevent possible defects in daily production sites, such as tool abrasion, omission of tool attachment, and re-machining of the same workpiece, and that assist with recovery in the case of machine failure or other problems.

#### ATC tool monitoring

The presence of a spindle tool is detected before and after tool change without using a sensor.



#### Machining load monitoring

Machining load applied to the spindle is monitored to issue an alarm when the load is not within the preset range.



#### Maintenance notice

Notifies operators of maintenance related issues in advance, such as greasing time.



#### Alarm log

Displays alarm log details to help identify the cause.



### High reliability – Measure for chips

Chip evacuation performance has been improved to satisfy the wide machining area. Two chip shower pumps are installed to double the flow rate.

#### Roof-shape telescopic cover

Roof-shape telescopic covers are used for the X/Y-axes to prevent chips from building up.

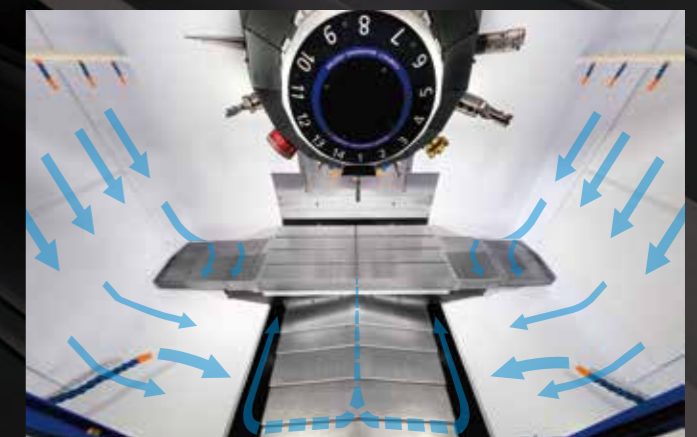


#### Tool washing, air assisted type (optional)

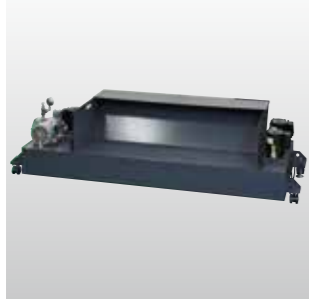
Discharge pressure and flow rate have been increased to steadily remove chips attached to the holder.



#### Image of chip evacuation flow



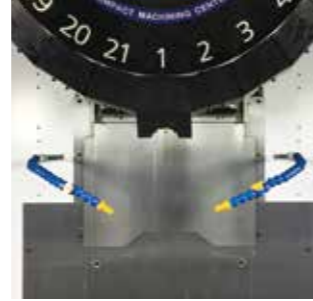




**Coolant tank**  
A large 200L tank is available.



**Coolant Through Spindle (CTS)**  
Can be selected from 1.5 MPa or 7 MPa. Particularly effective in non-step peck drilling.



**Column coolant nozzle**  
Powerfully removes chips on and around the workpiece to prevent chips building up.



**Head coolant nozzle**  
Coolant can reliably be applied to the machining section as the tool and nozzles are set in place.



**Chip shower**  
Chip shower pipes are located at the upper section inside the machine for more efficient flow, and flexible shower nozzles can be directed to the side of the machine cover or sections where chips tend to accumulate.



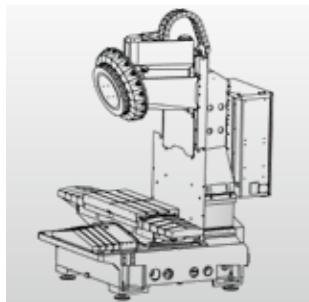
**Tool washing, air-assisted type**  
High discharge pressure and flow rate efficiently remove chips attached to the holder. Equipped with a filter clog warning function.



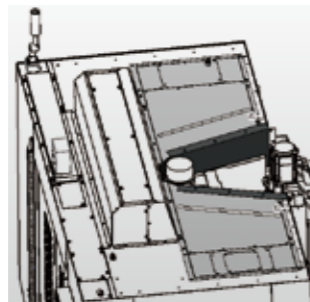
**Fixture shower valve unit**  
Consists of jig washing valves and pipes to the ceiling of the machine. Pipes from the machine to the required location must be prepared by customers.



**Cleaning gun**  
Helps clean the workpiece or chips inside the machine after machining.



**High column 150mm, 250mm, or 350mm**  
150mm, 250mm and 350mm high columns are available to meet customer's needs.



**Top cover**  
Shutting the opening on the top prevents coolant or chips splashing outside of the machine. A hole for the mist collector is provided.



**Side cover with transparent window (single side, both sides)**  
External light is drawn in to make the inside of the machine brighter and improve visibility.



**Work light (right side, left side)**  
LED lamps are used to extend lamp life and save energy.

- Coolant tank
  - 1) Coolant tank 200L
  - 2) Coolant tank 200L for CTS 1.5MPa with cyclone filter
- Coolant Through Spindle (CTS) 1.5MPa
- Coolant Through Spindle (CTS) 7MPa
- Column coolant nozzle
- Head coolant nozzle
- Chip shower
- Tool washing, air-assisted type
- Fixture shower valve unit
- Cleaning gun
- Mesh basket for collecting chips
- High column, 150mm, 250mm, or 350mm

- Top cover
- Side cover with transparent window (single side, both sides)
- Work light, 1 lamp for right side
- Work light, 1 lamp for left side
- Signal light, 1, 2, or 3 lamps
- Automatic oil lubricator
- Automatic grease lubricator
- Automatic door with switch panel 10 holes
- Area sensor
- Manual pulse generator with enable switch
- Connector and hook, for manual pulse generator with enable switch
- Rotary table T-200Ad

- Tool breakage detector, touch type
- Additional axis cable for 1 axes
- Spindle override
- Switch panel 8 or 10 holes
- Grip cover for tool magazine
- Data protection switch, key type
- Master on circuit
- RS232C 25pin connector at control box
- 100V outlet in control box
- Power supply expansion 50A
- Parts name sticker set
- Specified color
- Transformer box
- Origin alignment mark

- EXIO board assembly
  - EXIO board, input32/output32, additional #1
  - EXIO board, input32/output32, additional #2
- PLC programming software for Windows® 8.1 and 10
- PLC manual
- Industrial network
  - 1) CC-Link, master station
  - 2) CC-Link, intelligent device station
  - 3) PROFIBUS DP, slave
  - 4) DeviceNet, slave
  - 5) PROFINET, slave (scheduled to be installed)
  - 6) EtherNet/IP, slave (scheduled to be installed)
- Memory expansion 3Gbytes

\* Depending on the type of coolant, it may have a significant influence on the machine lifecycle. It is recommended to use the coolant which is commercially designated as high lubricity, for example Emulsion type. Especially, the coolant of chemical solution type (ex. Synthetic type) is prohibited to use, because it may cause machine damages.

\* When using CTS (Coolant Through Spindle) function, usage of the coolant of combustible type (ex. Oil-based type) is prohibited.

\* Windows® is a trademark or registered trademark of Microsoft Corporation in the United States and/or other countries.



**Signal light, 1, 2, or 3 lamps**  
LED lamps are used. No maintenance required. Can be tilted to improve visibility.



**Automatic oil lubricator**  
Regularly applies oil to all lubricating points on the tree axes.



**Automatic grease lubricator**  
Regularly applies grease to all lubricating points on the three axes. \*Manual greasing is required for the standard specification model.



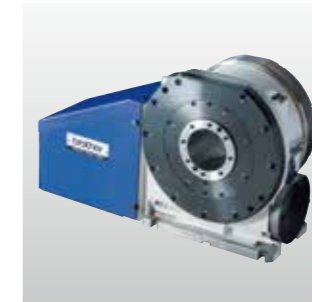
**Automatic door with switch panel 10 holes**  
A motor-driven door is used, achieving smooth operation.



**Area sensor**  
Optical area sensors are used. Attach area sensors to prevent operators being caught in the automatic door.



**Manual pulse generator with enable switch**  
A cable is provided for the manual pulse generator, making setup easier.  
\* Emergency stop with enable switch



**Rotary table T-200Ad**  
Reduction in the body width secures a wider jig area. Use of the roller gear cam mechanism achieves high productivity, high accuracy, and extended service life.



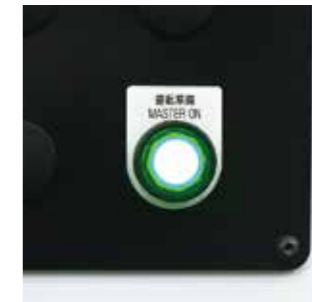
**Tool breakage detector, touch type**  
A touch switch type tool breakage detector is available.



**Spindle override**  
Spindle speed can be changed without changing the program.



**Switch panel 8 or 10 holes**  
Various switches, such as automatic door open/close switches, are set in specific locations. The switch panel (8 holes) is also available so that the position of the manual pulse connector can be changed.



**Master on circuit**  
Master on circuit and switch can be attached. \* A switch panel (8 holes, 10 holes) is required separately.



**RS232C 25pin connector**  
RS232C 25pin connector can be attached to the side of the control box.

- Please read the instruction manuals and safety manuals before using Brother products for your own safety.

When using oil-based coolant oil or when machining the materials which can cause a fire (ex. Magnesium, resin material), customers are requested to take thoroughgoing safety measures against fire. Depending on the types of cutting material, cutting tools, coolant oil, lubrication oil, it may have an influence on the machine lifecycle. Further questions, please contact our sales representative in charge.

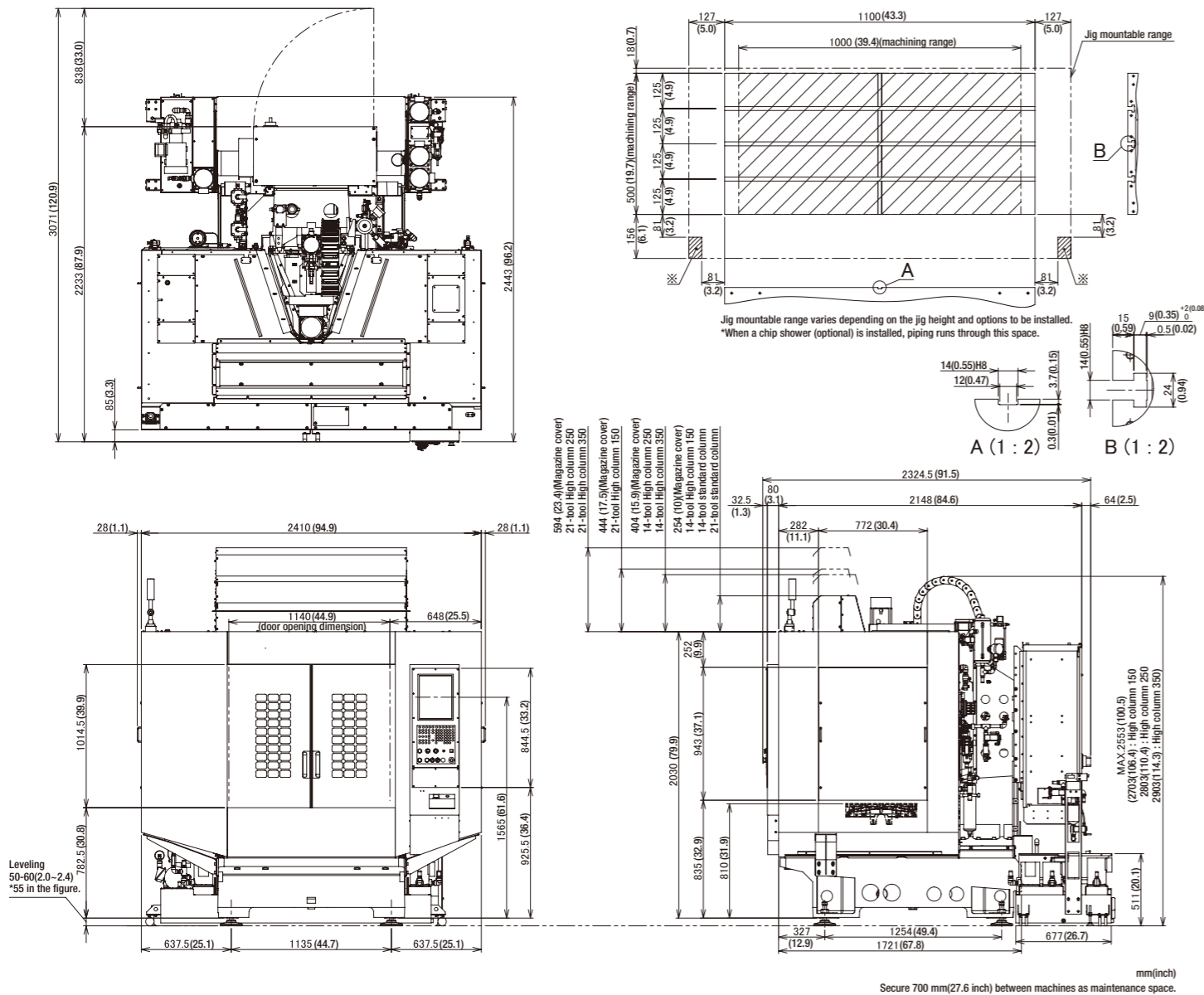
- Leave 700 mm between machines as a maintenance space.

- When exporting our machine together with additional 1-axis rotary table or compound rotary table (including case that a rotary table is scheduled to be installed overseas), the machine is deemed to be included in the "applicable listed items" controlled by the Foreign Exchange and Foreign Trade Law of Japan. When exporting the machine, please obtain required permissions, including an export license, from the Ministry of Economy, Trade and Industry (METI) or Regional Bureaus of Economy, Trade and Industry before shipment. When re-selling or re-exporting the machine, you may need to obtain permissions from METI, and the government of the country where the machine is installed.

- When exporting our machine together with compound rotary table (including case that a rotary table is scheduled to be installed overseas), as a machine conforming to Row 2 of Appended Table 1 of Export Trade Control Order, a relocation detection device is installed on the machine depending on the destination country. After relocating the machine with the detection device, the machine is locked and any operation is temporarily impossible. Please inform your local distributor of machine relocation in advance and apply to perform the release operation of relocated machine.

- In order to operate our machine with an additional axis rotary table installed separately overseas after exporting the machine, the procedure to activate the axis of rotary table is needed. Please inform your local distributor of these processes in advance, because the predetermined procedure is required to perform the activation. In addition, for export to some countries and regions other than "Group A countries", it is not possible to install a compound rotary table separately overseas after exporting the machine. Please make sure to obtain the export license of the machine together with compound rotary table before shipment.

External Dimensions



NC unit specifications

CNC model	CNC-D00
Control axes	5 axes (X,Y,Z, two additional axes)
Simultaneously controlled axes	Positioning 5 axes (X,Y,Z,A,B) Interpolation Linear: 4 axes (X,Y,Z one additional axis) Circular: 2 axes Helical/conical: 3 axes (X,Y,Z) Involute interpolation (optional)
Least input increment	0.001mm, 0.0001inch, 0.001 deg.
Max. programmable dimension	±999999.999mm, ±99999.9999inch
Display	15-inch color LCD touch display
Memory capacity	500 Mbytes (Total capacity of program and data bank)
External communication	USB memory interface, Ethernet, RS232C (optional)
No. of registrable programs	4,000 (Total capacity of program and data bank)
Program format	NC language, conversation (changed by parameter), conversation from conversation program to NC language program available

\* Number of "control axes" and/or "simultaneously controlled axes" are the maximum number of axes, which will differ depending on the destination country and the machine specifications.  
\* Ethernet is a trademark or registered trademark of XEROX in the United States.

Machine Specifications

Item		W1000Xd1 / W1000Xd1 RD *10	
CNC unit			CNC-D00
Travels	X axis	mm(inch)	1,000 (39.4)
	Y axis	mm(inch)	500 (19.7)
	Z axis	mm(inch)	300 (11.8)
	Distance between table top and spindle nose end	mm(inch)	180-480 (7.1-18.9)
Table	Work area size	mm(inch)	1,100 x 500 (43.3 x 19.7)
	Max. loading capacity (uniform load)	kg(lbs)	300[400 *1] (661[881*1])
Spindle	Spindle speed	min <sup>-1</sup>	10,000min <sup>-1</sup> specifications: 1-10,000, 10,000min <sup>-1</sup> high-torque specifications (optional): 1-10,000, 16,000min <sup>-1</sup> specifications (optional): 1-16,000
	Speed during tapping	min <sup>-1</sup>	MAX. 6,000
	Tapered hole		7/24 tapered NO.30
	BT dual contact spindle (BIG-PLUS)		Optional
Feed rate	Coolant through spindle (CTS)	MPa	1.5/7.0: Optional
	Rapid traverse rate (XYZ-area)	m/min(inch/min)	50 x 50 x 56 (1,969 x 1,969 x 2,205)
ATC unit	Cutting feed rate	mm/min(inch/min)	X,Y,Z: 1-30,000 (0.04 - 1,181) *2
	Tool shank type		MAS-BT30
	Pull stud type *3		MAS-P30T-2
	Tool storage capacity	pcs.	14 / 21
	Max. tool length	mm(inch)	250 (9.8)
	Max. tool diameter	mm(inch)	ø110 (4.3)
Tool change time *6	Max. tool weight *4	kg(lbs)	3.0(6.6) [4.0(8.8) *5]/tool, (TOTAL TOOL WEIGHT : 25 (55.1) for 14 tools, 35 (77.2) for 21 tools)
	Tool selection method		Random shortcut method
Electric motor	Tool To Tool	sec	0.6
	Chip To Chip	sec	1.2
Power source	Main spindle motor (10min/continuous) *7	kW	10,000min <sup>-1</sup> specifications: 10.0/6.9, 10,000min <sup>-1</sup> high-torque specifications (optional): 12.8/9.2, 16,000min <sup>-1</sup> specifications (optional): 7.3/5.0
	Axis feed motor	kW	X,Y axis: 1.0 Z axis: 2.0
Machining dimensions	Power supply		AC200V±10%, 50/60Hz±1Hz
	Power capacity (continuous)	kVA	10,000min <sup>-1</sup> specifications: 9.5, 10,000min <sup>-1</sup> high-torque specifications (optional): 10.4, 16,000min <sup>-1</sup> specifications (optional): 9.5
	Air supply	Regular air pressure Required flow	MPa L/min
Accuracy *9	Height	mm(inch)	2,553 (100.5)
	Required floor space [with control unit door open]	mm(inch)	2,410x2,443 [3,072] (94.9x96.2[121.0])
	Weight	kg(lbs)	3,350 (7,386)
Front door	Accuracy of bidirectional axis positioning (ISO230-2:1988)	mm(inch)	0.006 ~ 0.020 (0.00024 ~ 0.00079)
	Repeatability of bidirectional axis positioning (ISO230-2:2014)	mm(inch)	Less than 0.004 (0.00016)
Standard accessories	Instruction Manual (DVD 1 set), leveling bolts (4 pcs.), leveling plate (4 pcs.)		2doors

\*1 Acceleration must be adjusted for X and Y axes. \*2 When using high accuracy mode B. \*3 Brother specifications apply to the pull studs for CTS. \*4 Actual tool weight differs depending on the configuration and center of gravity. The figures shown here are for reference only. \*5 Parameter settings must be changed. (Tool magazine indexing time will change.) \*6 Measured in compliance with JIS B6336-9 and MAS011-1987. \*7 Spindle motor output differs depending on the spindle speed. \*8 Regular air pressure varies depending on the machine specifications, machining program details, or use of peripheral equipment. Set the pressure higher than the recommended value. \*9 Measured in compliance with ISO standards and Brother standards. Please contact your local distributor for details. \*10 The machine needs to be equipped with a relocation detection device depending on the destination. Machines equipped with a relocation detection device come with "RD" at the end of the model name.

NC functions

Standard NC functions

Absolute / incremental	Background editing	NC	Menu programming
Inch / metric	Graphic display		Local coordinate system
Coordinate system setting	Screen shot		Expanded workpiece coordinate system
Corner C / Corner R	File viewer		One-way positioning
Rotational transformation	Status log		Inverse time feed
Synchronized tap	Alarm log		Programmable data input
Subprogram	Operation log		Tool length compensation
High-accuracy mode A III	Production performance display		Cutter compensation
High-accuracy mode B I (look-ahead 160blocks)	Computer remote		Scaling
Tool life / Spare tool	Auto notification		Mirror image
Automatic workpiece measurement *1	OPC UA		External sub program call
Dry run	Built-in PLC		Multiple skip function
Machine lock	External input signal key		Macro
Restart	Automatic power off		Operation in tape mode
Rapid traverse override	Servomotor off standby mode		
Cutting feed override	Automatic coolant off		
Tool length measurement	Automatic work light off	Conversation	Operation program
Spindle load monitoring	Chip shower off delay		Schedule program
ATC monitoring	Power consumption display		Automatic tool selection
Adjust machining parameter screen	Motor insulation resistance measurement		Automatic cutting condition setting
Check over load	Tool washing filter with filter clogging detection		Automatic tool length compensation setting
Waveform display / waveform output to memory card	Operation level		Automatic cutter compensation setting
Heat expansion compensation system II (X,Y,Z axes)	Backlash compensation		Automatic calculation of unknown number input
Tap return function			Machining order control

Optional NC functions

Memory expansion 3Gbytes
Spindle override
High accuracy mode BII, look-ahead 1,000 blocks, with smooth path offset
NC Submicron command *2
Interrupt type macro
Rotary fixture offset
Involute interpolation

\*1. Measuring instrument needs to be prepared by users.  
\*2. When the submicron command is used, changing to the conversation program is disabled.  
\* Functions listed under (NC) and (Conversation) are available only for NC programs and conversation programs respectively.

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Figures in brackets ( ) are the country codes.

Specifications may be subject to change without any notice.

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