Brother Earth

Working with you for a better environment
www.brotherearth.com

Global Service Sites

Local dealers are available to provide services in each region, in addition to the sites below.

U. S. A.

BROTHER INTERNATIONAL CORP.
MACHINE TOOLS DIV. TECHNICAL CENTER
2200 North Stonington Avenue, Suite 270, Hoffman Estates, IL 60169, U.S.A.
PHONE:(1)224-653-8415 FAX:(1)224-653-8821

Thailand

BROTHER COMMERCIAL THAILAND LTD.
MACHINE TOOLS TECHNICAL CENTER
1232 Rama 9 Road, Suanluang Sub-District, Suanluang District,
Bangkok 10250, Thailand
PHONE:(66)2-374-6447 FAX:(66)2-374-2706

China

BROTHER MACHINERY (SHANGHAI) LTD.
(MACHINE TOOLS DIV.) SHANGHAI TECHNICAL CENTER
Room B, 3/F., No.567, West Tianshan Rd., ChangNing District,
Shanghai 200335, P.R.China
PHONE:(86)21-2225-6666 FAX:(86)21-2225-6688

China

BROTHER MACHINERY (SHANGHAI) LTD.
CHONGQING BRANCH (MACHINE TOOLS DIV.) CHONGQING TECHNICAL CENTER
Room 105, No.51 Xuefudadao, Nan' an District, Chongqing Province, 400074, P.R.China
PHONE:(86)23-6865-5600 FAX:(86)23-6865-5560

Germany

BROTHER INTERNATIONALE INDUSTRIEMASCHINEN GmbH
MACHINE TOOLS DIVISION FRANKFURT TECHNICAL CENTER
Hoechster Str.94, 65835 Liederbach, Germany
PHONE:(49)69-977-6708-0 FAX:(49)69-977-6708-80

India

BROTHER INTERNATIONAL (INDIA) PVT LTD.
BANGALORE TECHNICAL CENTER
Park Landing, Ground Floor, Municipal No.5AC-709, 2nd Block, HRBR Extension,
Bangalore - 560 043 Karnataka, India
PHONE:(91)80-6405-7999

China

BROTHER MACHINERY (SHANGHAI) LTD.
DONGGUAN BRANCH (MACHINE TOOLS DIV.) DONGGUAN TECHNICAL CENTER
1F, Fuyuan Business Center Building, No.1 Lane 13, Maiyuan Road, Xin'an community,
Chang'an Town, Dongguan City, Guangdong Province, 523008, P.R.China
PHONE:(86)769-2238-1505 FAX:(86)769-2238-1506

Figures in brackets ( ) are the country codes.

Specifications may be subject to change without any notice.

BROTHER INDUSTRIES, LTD.
MACHINERY & SOLUTION COMPANY
1-5, Kitajizoyama, Noda-cho, Kariya-shi,
Aichi-ken 448-0803, Japan
PHONE: 81-566-95-0075
FAX : 81-566-25-3721
http://www.brother.com

The information in this catalogue is current as of May 2015. ver.1505

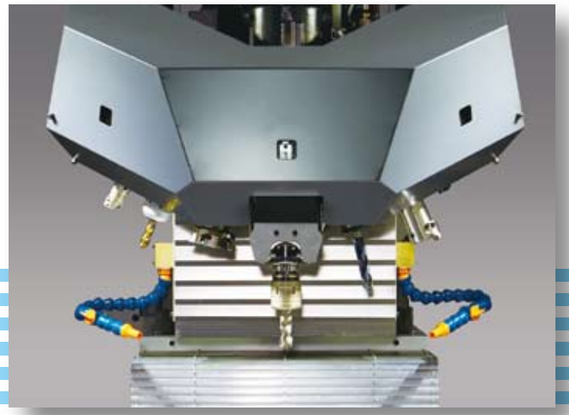
Compact Machining Center
SPEEDIO

brother
at your side

NEW

R650X1

SPEEDIO
with Pallet Changer



Expanding World of the SPEEDIO

The R650X1 is equipped with the “QT table”, Brother’s original high-speed 2-face pallet changer that has now been installed on over 15,000 units.
The machine demonstrates high productivity, and also provides the largest machining area among "QT table" machines, enabling the mounting of large jigs that was not possible on conventional machines.
The release of this new model will further expand the world of the SPEEDIO.

Enlargement of Machining Area

Quest for High Performance

High Reliability and Environmental Performance

R650X1

Max. spindle speed (min^{-1})	10,000 / 16,000 (optional) 10,000 high torque (optional)
Travel of each axis (mm)	X 650 Y 400 Z 305
Tool storage capacity (pcs.)	14／22
Rapid traverse rate (m/min)	X／Y／Z 50／50／50
Required floor space (mm)	1,837 × 3,248
Coolant Through Spindle (CTS)	Optional
BT dual contact spindle (BIG-PLUS)	Optional
Low-floor table	Optional

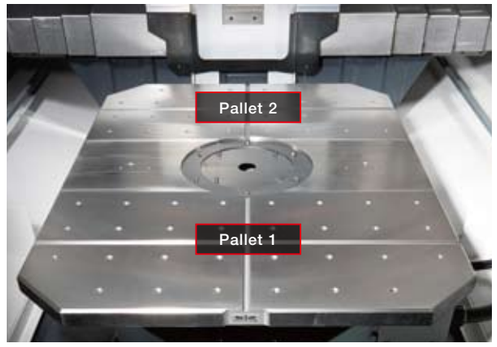
Enlargement of Machining Area

Pallet Changer Technologies Accumulated over Many Years

QT table

The QT (Quick Turn) table is Brother's original turn table type high-speed 2-face pallet changer. High-speed pallet change is enabled by avoiding lift-up operation while achieving high reliability through a sealed structure. Workpieces on one pallet can be changed while machining workpieces on the other pallet. Therefore, waste in workpiece change time is eliminated, enabling nonstop machining.

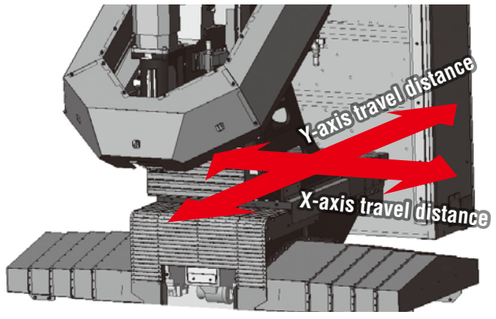
Pallet change time 3.4s



Machining area

Making use of our original pallet changer technologies that have been installed on over 15,000 units, the machine provides sufficient travels and a large jig area, which are not available on conventional #30 machines standard equipped with a pallet changer.

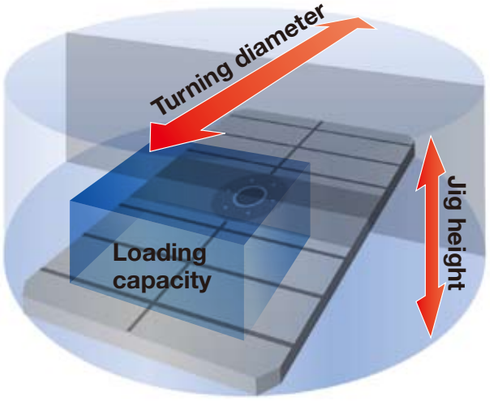
Sufficient travels that enlarge machining range



Provides 650 mm X-axis travel, the largest among QT table machines. Effective for large workpiece machining or multiple parts machining.

X-axis travel distance	650mm
Y-axis travel distance	400mm

Jig area that enables mounting of large jigs



The turning diameter and the table size have been increased, enabling the mounting of large jigs. In particular, this makes mounting a trunnion jig using a rotary table easier.

Turning diameter	1,250mm
Jig height	350mm
Loading capacity (one face)	200kg
Work area size (one face)	800×400mm

Expandability

To enable the mounting of much larger jigs, two options are available: a low-floor table option that increases the jig height and a turning diameter enlargement option that increases the turning diameter to 1,300 mm. The loading capacity can also be increased to 300 kg (one face).

Low-floor table specifications

Increase in loading capacity

Max. loading capacity (one face)

200kg → 300kg*

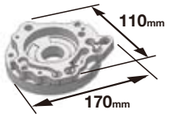
* The parameter must be changed.

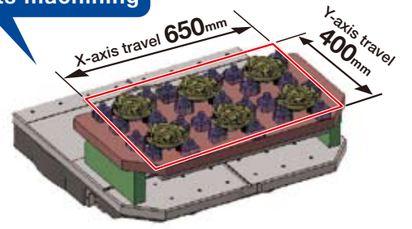
Jig mounting examples

Mounting example 1

Multiple parts machining

- Workpiece : Oil pump body (automobile)
- Machining details : Machining six small workpieces using a flat jig

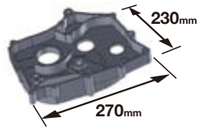


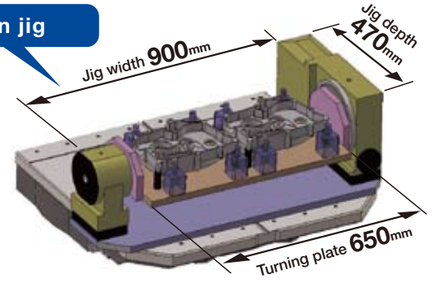


Mounting example 2

Trunnion jig

- Workpiece : Crank case (motorcycle)
- Machining details : Multi-face machining for medium-sized workpieces (2 pcs.) using a trunnion jig

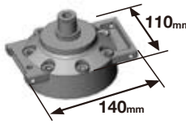


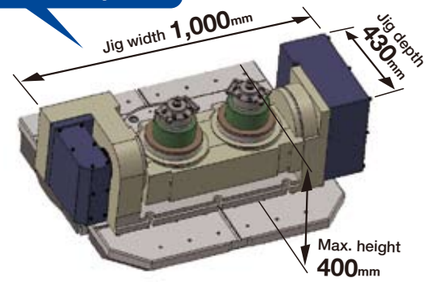


Mounting example 3

Tilting two-spindle rotary table

- Workpiece : Compressor housing (automobile)
- Machining details : Five-face machining using a tilting two-spindle rotary table (When low-floor table is used)





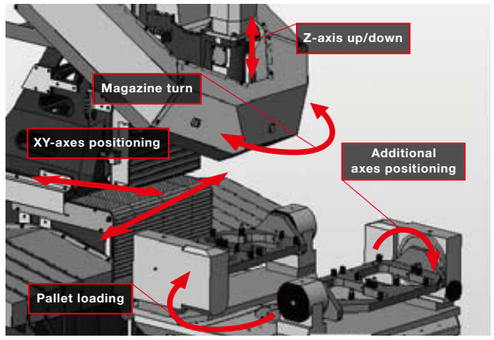
Quest for High Performance

Quest for High Performance Based on Our Passion for #30 and Original NC Unit

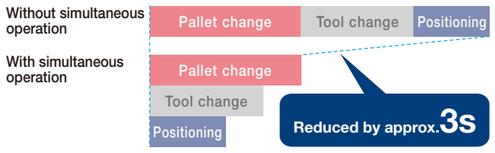
Productivity

Enhanced speed and acceleration, and optimal control with any waste operation and time eliminated, drive machine performance to the fullest, demonstrating high productivity.

Simultaneous operation



The machine is equipped with a simultaneous operation function where the QT table turns and the X/Y- and additional axes are positioned simultaneously when tools are changed. This avoids any waste pallet change time, enabling non-stop machining in our quest for “Wasted time = Zero.”



High acceleration spindle

Using a fast acceleration/deceleration spindle motor achieves quicker starting and stopping of the spindle. Tool change is completed without stopping the Z-axis.

Spindle start / stop time 0.15s

* Data taken using high-torque specifications.

High-speed tool change

High-speed tool change is achieved by increasing the speed of, and optimizing the control for, spindle start/stop, Z-axis up/down, and magazine operation.

22-tool magazine	Tool - Tool :	0.9s
	Chip - Chip :	1.7s
14-tool magazine	Tool - Tool :	0.8s
	Chip - Chip :	1.6s

NC unit

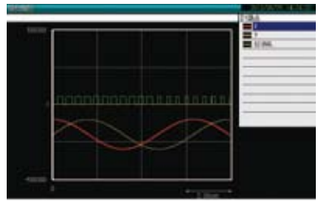
Equipped with the latest CNC-C00 controller with greatly enhanced processing capabilities. Operability and maintainability are improved, providing increased user-friendliness.

Shortcut keys

Open the screen you want to view quickly.

Waveform display

Check the torque of the spindle motor etc. as a waveform.



USB interface

In addition to high-speed file transfer, programs in the USB memory can be run directly or data, such as data measured by the touch probe, can be output.

Network function

High capacity program data can be transferred via Ethernet at high speed. The standard memory capacity is 100 Mbytes (max. 500 Mbytes).

G/M code macro

Macro programs can be called using G/M codes by assigning subprogram numbers to the desired G/M codes.

Tap return function

Releases the tool caught in the workpiece due to a power failure during tapping.

PLC function

Standard equipped with PLC. The standard 16 input and output points each can be extended to up to 1,024 points each (optional).

Accessibility

Accessibility and operability from the front or side of the machine is enhanced so that operators can easily perform setup work, such as workpiece change or tool change.

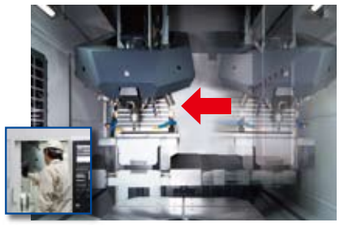
Operation from the front

Wider door opening width is secured to make workpiece change easier.

Operation from the side

The operation panel is placed on the side of the machine to make setup work easier.

The column can be moved to a position where tools can easily be changed.



Machining capabilities

The highly rigid structure and a high-power spindle motor provide high-range machining capabilities from heavy-duty machining to high-speed high-efficiency machining.

Highly rigid structure

High rigidity achieved by reviewing the structure of the column and base through analysis.

High-power spindle motor

Demonstrates high machining capabilities, with high characteristics from low-speed to medium-speed range.

Grooving using standard specs

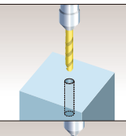
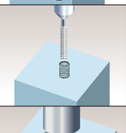
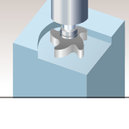
Machining details: Cutting amount : 110 cc/min
Material : Carbon steel (using D16 end mill)

Spindle motor characteristic value
Max.torque (momentary) 40Nm
Max.output 18.9kW

Large hole drilling using high-torque specs

Machining details: Holediameter : D40 mm
Material : Carbon steel

Spindle motor characteristic value
Max.torque (momentary) 92Nm
Max.output 26.2kW

Machining	Material	ADC	Cast iron	Carbon steel
Drilling  Tool diameter mm(inch) × Feed mm(inch)/rev	10,000min^{-1}	D32(1.26) × 0.2(0.008)	D28(1.1) × 0.15(0.006)	D25(0.98) × 0.1(0.004)
	16,000min^{-1}	D24(0.94) × 0.2(0.008)	D22(0.87) × 0.15(0.006)	D18(0.71) × 0.1(0.004)
	10,000min^{-1} high-torque	D40(1.57) × 0.2(0.008) D30(1.18) × 0.7(0.03)	D34(1.34) × 0.15(0.006) D26(1.02) × 0.4(0.02)	D30(1.18) × 0.15(0.006) D26(1.02) × 0.25(0.01)
Tapping  Tool diameter mm(inch) × Pitch mm(inch)	10,000min^{-1}	M27 × 3.0(1-8UNC)	M24 × 3.0(7/8-9UNC)	M16 × 2.0(5/8-11UNC)
	16,000min^{-1}	M22 × 2.5(7/8-9UNC)	M18 × 2.5(5/8-11UNC)	M14 × 2.0(1/2-13UNC)
	10,000min^{-1} high-torque	M39 × 4.0(1 1/2-6UNC)	M33 × 3.5(1 1/4-7UNC)	M27 × 3.0(1-8UNC)
Facing  Cutting amount cm^3/min(inch^3/min): Cutting width mm(inch) × Cutting depth mm(inch) × Feed rate mm/min(inch/min)	10,000min^{-1}	960 : 100 × 3.2 × 3,000 (58.6 : 3.94 × 0.13 × 118.1)	128 : 40 × 5.6 × 573 (7.8 : 1.57 × 0.22 × 22.6)	81 : 40 × 4.2 × 484 (5.0 : 1.57 × 0.17 × 19.1)
	16,000min^{-1}	660 : 100 × 2.2 × 3,000 (40.3 : 3.94 × 0.09 × 118.1)	73 : 40 × 3.2 × 573 (4.5 : 1.57 × 0.13 × 22.6)	48 : 40 × 2.5 × 484 (2.9 : 1.57 × 0.1 × 19.1)
	10,000min^{-1} high-torque	1700 : 100 × 5.7 × 3,000 (102.4 : 3.94 × 0.22 × 118.1)	128 : 40 × 5.6 × 573 (7.8 : 1.57 × 0.22 × 22.6)	81 : 40 × 4.2 × 484 (5.0 : 1.57 × 0.17 × 19.1)

* Data obtained from tests conducted by Brother

High Reliability and Environmental Performance

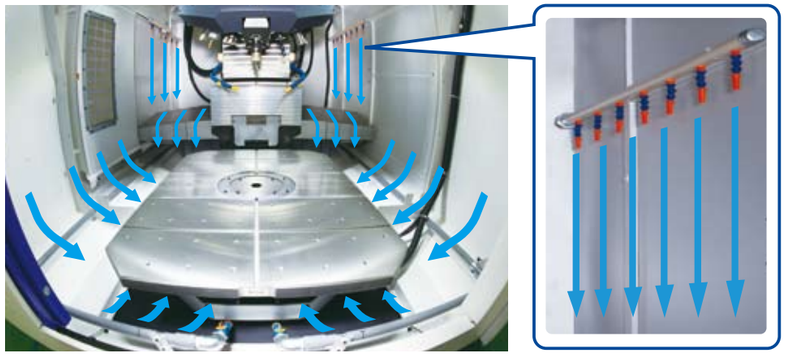
Reliability and Environmental Performance Achieved through Brother's Accumulated Expertise

Reliability

High reliability is achieved by improving chip discharge performance and enhancing maintenance functions, contributing to the improvement of the machine's operating rate.

Chip shower

Two chip shower pumps are installed to greatly increase the flow rate. Piping is added to the top face to discharge chips from the machine quickly.



Air-assisted tool washing(optional)

High discharge pressure prevents chips becoming attached to the holder.

Motor insulation resistance Maintenance notice function

Detects motor failure in advance.

Maintenance notice function

Notifies operators of maintenance requirements, such as greasing.

Environmental performance

Various energy saving functions reduce power consumption, achieving high environmental performance.

Power regeneration system

Equipped with a power regeneration system that reuses energy generated when the spindle motor decelerates. Low power consumption is achieved in combination with a highly efficient spindle motor.

Energy saving pump

Energy saving coolant pump reduces power consumption of the coolant unit.

Various energy saving NC functions

Automatic coolant off
Turns off the coolant pump when the preset time elapses.

Automatic work light off
Turns off the work light when the preset time elapses.

Standby mode
Turns off the servomotor when the machine is not operated for the preset time.

Automatic power off
Turns off the power at the preset time.

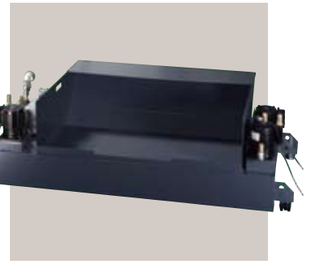
LED type work light

LED type work light is used to achieve low power consumption and long service life.

Highly efficient spindle motor

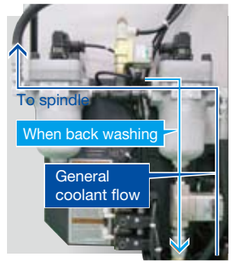
Highly efficient motor is used for the spindle motor to increase acceleration and save energy.

Optional Specifications



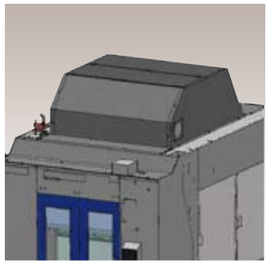
Coolant unit

A large 200L tank is available.
(Photo: Tank with CTS)



Coolant Through Spindle (CTS)

1.5 MPa CTS is ideal for deep drilling and high-speed machining. The back washing system automatically washes the filter to prevent it from clogging, enabling longer continuous operation without filter replacement.
* Please consult Brother separately for 3 MPa CTS.

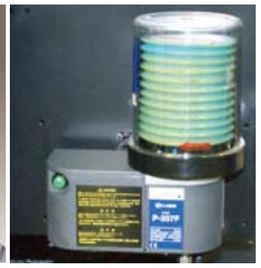


Top cover

This cover prevents the mist leaking from the top of the machining room. There is also a hole for a mist collector.

Hydraulic rotary joint (4P)/Pneumatic relay box(12P)

12 pneumatic ports and 4 hydraulic ports have been prepared so that jigs that use pneumatic or hydraulic pressure can be mounted easily.



Automatic oil lubricator/Automatic grease lubricator

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

Outside index switch

This switch enables operation of the outer index table.
(Photo: Tank with CTS)

Front switch panel

Operation switches can be added to the switch box from the front of the machine.

B-axis cord

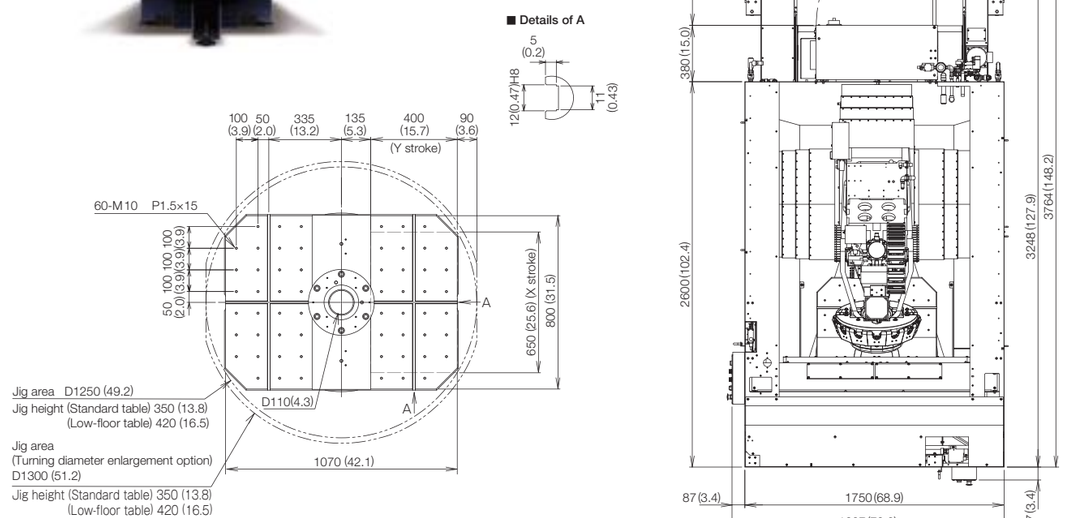
Multi-face machining is possible by adding additional axes.

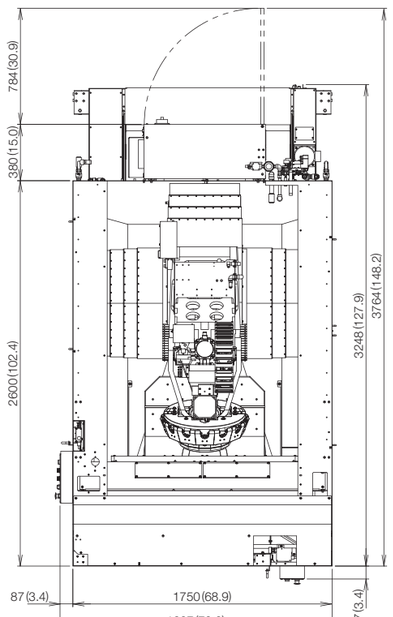
- Coolant unit
  - ①200L
    With chip shower and valve
    Pump: 250W x 3
  - ②200L for CTS
    With chip shower, CTS, and valve
    Pump: 250W x 3 + 650W
- Coolant Through Spindle (CTS)
- Back washing system (for CTS)
- Tool washing (air-assisted type)
- Tool breakage detector (touch type)
- Hydraulic rotary joint (4P)
  + Pneumatic relay box (12P)
- Pneumatic relay box (12P)
- Cleaning gun
- Automatic oil lubricator
- Automatic grease lubricator
- LED type work light (1 or 2 lamps)
- Table light
- Indicator light (1, 2, or 3 lamps)
- Automatic door (motor-driven)
- Area sensor
- Specified color
- Manual pulse generator
- B-axis cord (1, 2, 3, or 4 axes)
- Spindle override
- Outside index rotation switch
- Turning diameter enlargement
  (D1,300 mm)
- Top cover
- Side cover (transparent board type)
- Memory expansion (approx. 500 Mbytes)
- RS232C (25 pin) for control box
- Expansion I/O board (EXIO board)
  - ①EXIO board assembly *2
  - ②Additional EXIO board assembly
- High accuracy mode BII
  (look-ahead 200 blocks, smooth path offset)
- Submicron command *1
- Interrupt type macro
- High-speed processing *1
- Rotary fixture offset
- Switch panel (6 or 10 holes)
- Front switch panel (8 holes)
- Fieldbus *2
  - ①CC-Link (remote device station)
  - ②PROFIBUS DP (slave)
  - ③DeviceNet (slave)
- PLC programming software
  (for Windows® XP, Vista, and 7)
- Teaching pendant
- Jig shower valve unit
- Grip cover
- Mesh basket for chips

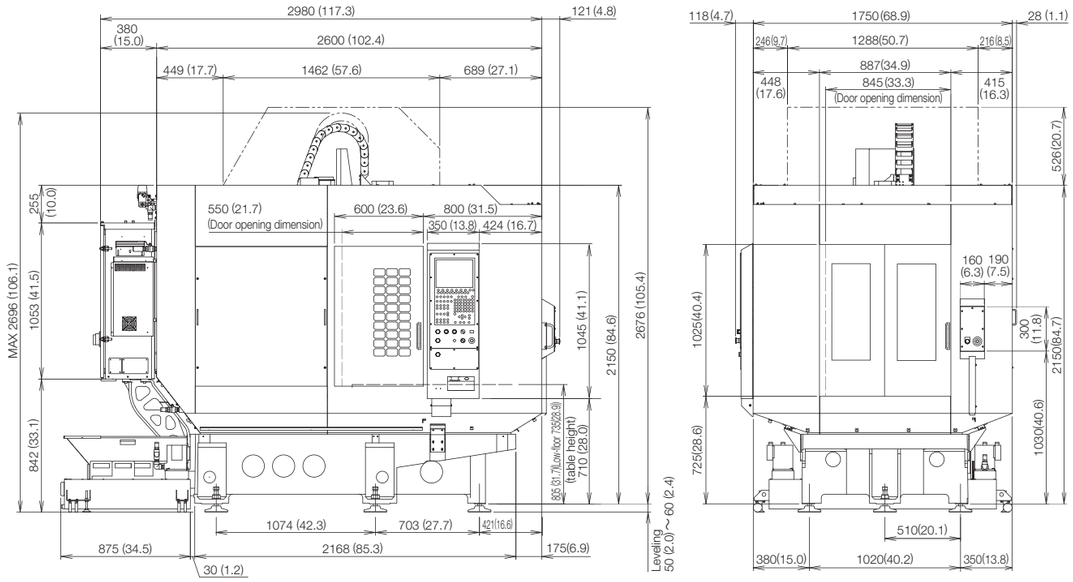
* Please contact your Brother dealer for details.
*1. Changing to the conversation program is disabled.
*2. When the fieldbus is selected, the EXIO board assembly cannot be selected.

External Dimension

SPEEDIO
R650X1







mm(inch)

Secure 700 mm(27.6 inch) between machines as maintenance space.

Machine Specifications and NC Unit Specifications

Machine specifications

Item			SPEEDIO R650X1
CNC Unit			CNC-C00
Travels	X axis	mm (inch)	650 (25.6)
	Y axis	mm (inch)	400 (15.7)
	Z axis	mm (inch)	305 (12.0)
	Distance between table top and spindle nose end	mm (inch)	250～555 (9.8～21.8) [320～625 (12.6～24.6)] ＊7
Table	Work area size	mm (inch)	One face 800×400 (31.5×15.7)
	Max.loading capacity (uniform load)	kg (lbs)	One face 200 (441) [300 (661) ＊6]
Spindle	Spindle speed	min-1	10,000min-1 specifications : 10～10,000 16,000min-1 specifications (Optional) : 16～16,000 10,000min-1 high-torque specifications (Optional) : 10～10,000
	Speed during tapping	min-1	MAX. 6,000
	Tapered hole		7/24 tapered No.30
	BT dual contact system (BIG-PLUS)		Optional
	Coolant Through Spindle (CTS)		Optional
Feed rate	Rapid traverse rate (XYZ-area)	m/min (inch/min)	50 × 50 × 50 (1,969 × 1,969 × 1,969)
	Cutting feed rate	m/min (inch/min)	X,Y,Z axis : 1～30,000 (0.04～ 1,181) ＊8
ATC unit	Tool shank type		MAS-BT30
	Pull stad type ＊4		MAS-P30T-2
	Tool storage capacity	pcs.	14／22
	Max. tool length	mm (inch)	200 (7.9)
	Max. tool diameter	mm (inch)	80 (3.1)
	Max. tool weight ＊1	kg (lbs)	3.0 (6.6) 〈total tool weight : 25 (55.1) for 14 tools, 40 (88.2) for 22 tools〉
	Tool selection method		Random shortcut method
Tool change time ＊5	Tool To Tool	sec.	0.8／0.9 (14 tool / 22 tool)
	Chip To Chip	sec.	1.6／1.7 (14 tool / 22 tool)
	Cut To Cut	sec.	1.3／1.4 (14 tool / 22 tool)
Electric motor	Main spindle motor (10min/continuous) ＊2	kW	10,000min-1 specifications : 10.1／6.7 16,000min-1 specifications (Optional) : 7.4／4.9 10,000min-1 high-torque specifications (Optional) : 12.8／8.8
	Axis feed motor	kW	X,Y axis : 1.0 Z axis : 1.8
Power source	Power supply		AC V±10%、50/60Hz±1Hz
	Power capacity (continuous)	kVA	10,000min-1 specifications : 9.5 16,000min-1 specifications (Optional) : 9.5 10,000min-1 high-torque specifications (Optional) : 10.4
	Air supply — Regular air pressure	MPa	0.4～0.6 (recommended value : 0.5MPa ＊9)
	Air supply — Required flow	L/min	50
Machining dimensions	Height	mm (inch)	2,696 (106.2)
	Required floor space [with control unit door open]	mm (inch)	1,837×3,248 [3,764] (72.3×127.9 [148.2])
	Weight	kg (lbs)	3,500 (7,717)
Accuracy ＊3	Accuracy of bidirectional axis positioning (ISO230-2 : 2006)	mm (inch)	0.006～0.020 (0.00024～0.00079)
	Repeatability of bidirectional axis positioning (ISO230-2 : 2006)	mm (inch)	Less than 0.004 (0.00016)
Standard accessories			Instruction Manual (1 set), anchor bolts (5 pcs.), leveling bolts (5 pcs.)

＊1／Actual tool weight differs depending on the configuration and center of gravity.The figures shown here are for reference only. ＊2／Spindle motor output differs depending on the spindle speed. ＊3／Measured in compliance with ISO standards and Brother standards.Please contact Brother for details. ＊4／Brother specifications apply to the pull studs for CTS. ＊5／Measured in compliance with JIS B6336-9 and MAS011-1987. ＊6／Can be increased up to 300kg (one face) by changing the parameter. Please consult us separately. ＊7／Values when the low-floor table is selected ＊8／When using high accuracy mode B. 〈Non high accuracy mode B〉 X,Y axis : 1～10,000mm/min Z axis:1～20,000mm/min. ＊9／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.

NC unit specifications

Item		
CNC model	CNC-C00	
Control axes	7axes (X,Y,Z, 4 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)
Least input increment	0.001mm, 0.0001inch, 0.001 deg.	
Max.programmable dimension	±9999.999mm, ±999.9999inch	
Display	12.1-inch color LCD	
Memory capacity	Approx.100 Mbytes (Total capacity of program and data bank)	
External communication	USB memory interface, Ethernet, RS232C	
No.of registrable programs	4,000 (Total capacity of program and data bank)	
Program format	NC language, conversation (changed by parameter) conversion from conversation program to NC language program available	

＊ When program size is bigger than 2 Mbytes, machine works with extended memory operation.
＊ Ethernet is a trademark or registered trademark of XEROX in the United States.

Quick turn table specifications

Type		0 deg./180 deg. turntable system
Table dimension	mm (inch)	One face 800 x 535 (31.5 x 21.1)
Max. turning diameter	mm (inch)	D1,250(49.2) [D1,300 (51.2)] ＊10
Max. jig height	mm (inch)	350 (13.8) [420(16.5)] ＊7
Table work area size	mm (inch)	One face 800 x 400 (31.5 x 15.7)
Max. loading capacity	kg (lbs)	One face 200 (441) [300(661)] ＊6
Rated table load inertia for turning axis	kg・m²	One face 35.8 [53.7] ＊6
Table turning system		AC servo motor(0.82kW) Worm gear(total speed reduction ratio:1/60)
Table position time	sec	3.4 ＊11
Table change repeatability	mm (inch)	0.01(0.0004) (in the X,Y, and Z axes directions 335(13.2) from the center of rotation)

＊10／When the turning diameter enlargement option is selected.
＊11／When table loading on one face is 200kg.
＊ Quick turn table is a turntable type 2-face pallet changer

Standard NC functions

- Absolute / incremental
- Inch / metric
- Corner C / Corner R
- Rotational transformation
- Synchronized tap
- Coordinate system setting
- Dry run
- Restart
- Backlash compensation
- Rapid traverse override
- Cutting feed override
- Alarm history (1,000 pieces)
- Startus log
- Machine lock
- Computer remote
- Built-in PLC
- Motor insulation resistance measurement
- External input signal key
- High-accuracy mode AIII
- Tool length measurement
- Tool life management / spare tool
- Background editing
- Graphic display
- Subprogram
- Herical / conical interpolation
- Standby mode (energy saving function)
- Chip shower off delay
- Tap return function
- Automatic work light off (energy saving function)
- Automatic workpiece measurement *1
- Heat expansion compensation systemII (X,Y,Z axes)
- Automatic power off (energy saving function)
- Automatic coolant off (energy saving function)
- Tool washing filter with filter clogging detection
- Waveform display
- Operation level
- External input signal key
- High accuracy mode BI (look-ahead 30blocks)

NC
- Expanded workpice coordinate system
- Scaling
- Mirror image
- Menu programming
- Program compensation
- Tool length compensation
- Cutter compensation
- Macro function
- Local coordinate system
- One-way positioning
- Opeation in tape mode

Conversation
- Operation program
- Schedule program
- Automatic tool selection
- Automatic cutting condition setting
- Automatic tool length compensation setting
- Automatic cutter compensation setting
- Automatic calculation of unknown number input
- Machining order control

Optional NC functions

- Memory expansion (Approx. 500 Mbytes)
- High accuracy mode BII (look-ahead 200 blocks, smooth path offset)
- Spindle override

NC
- Submicron command *2
- Interrupt type macro
- Rotary fixture offset
- High-speed processing *3

*1. Measuring instrument needs to be prepared by users.
*2. When the submicron command is used, changing to the conversation program is disabled.
*3. Minute block processing time can be changed. As there are some restrictions, please contact your local distributor for details.
*Functions listed under (NC) and (Conversation) are available only for NC programs and conversation programs respectively.