CNC SWISS TYPE AUTOMATIC LATHE  Type C/G
CNC AUTOMATIC LATHE [ Non-Guide-Bush Type ]  Type N

SB-R Series
Design in Pursuit of Optimal Efficiency
The DNA of the Best-Selling Machine

SB Series, the Best-Selling Family Line

2002
Release of SB-16 type S/B
The rigid tool post with a slanted type sliding guide won wide strong support from the market because of capability and high rigidity in spite of superior cost performance.

2004
SB-16 type A/C Released
The main spindle C axis control is added as an optional function. The strengthened machine performance of the power-driven tools and back working attachments also contributes to the best-selling status.

2006
SB-16 type D Released
A new model, equipped with a tool post exclusively for back working to enable overlap machining on the front and rear end, is added to the SB series which has been enjoying tremendous market success.

2007
SB-16 type E Released
The main and sub spindles are equipped with a C axis control as a standard function. In addition, a phase synchronization control on the sub spindle allowing rear end thread cutting and other sophisticated functions are enhance the machine.

2011
SB-20VCE/E Released
Increased number of attachable tools, strengthened motor output, reduction of remnant bar length and more to meet user requests. The SB series has been reaching for the next level to be the best machines of the times.

2013~2014
Upgraded Machines to Get With the Tide

The latest SB series aims for optimization of machining to perform respective applications through “flexible selection”. By fabricating an ideal tooling layout, a new ordering system has been established. A rigid structure to ensure high accuracy and many other functions, which traditionally accompany the SB series, enable response to detailed needs. You must be assured of satisfactory performance to justify the investment.

The latest version of the SB series - a design to realize the ideal form of machine tools as an eternal best-seller.
A Wide Variety of Machining through Tooling Variation
Fabricated for All Application by Selecting Suitable Tool Post and Tools to Mount

- A guide bush type to achieve high accuracy by controlling bending of long workpieces and the non-guide bush type to cut down the material cost by reducing the remnant bar length of short workpieces.
- A tool post selectable from four types to be best suited to machining applications.
- A tool rotation drive unit optionally attachable on the four-spindle unit.
- The main spindle’s/4 spindle is equipped with a C-axis control function as standard.
- A built-in motor is incorporated in the main spindle for improvement of rotating accuracy.
- A movable operation panel to be used at the optimum position.

**TOOLING SYSTEM**

<table>
<thead>
<tr>
<th>Toolholder</th>
<th>Turning tool</th>
<th>6 tools (11mm)/7 tools (13mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-spindle seive holder</td>
<td>Front-end stationary tool</td>
<td>4 tools</td>
</tr>
<tr>
<td>Power-driven tool</td>
<td>Rear-end stationary tool</td>
<td>4 tools</td>
</tr>
</tbody>
</table>

- 4-spindle cross drilling unit
- 6-spindle cross drilling unit
- Cross machining tool: 4 spindles (ER16)
- Cross machining tool: 5 spindles (ER13)
- Cartridge-type 5-spindle cross drilling unit: Cross machining tool: 2 spindles (ER11)
- Cartridge-type 6-spindle high-speed cross drilling unit: Cross machining tool: 2 spindles (ER11)

**Tool Post:** Cartridge type 6-spindle cross drilling unit (guide bush type)
Four Types of Tool Posts and Various Tool Units
Selectable Combination to Achieve Versatile Complex Machining on Front End

- The cartridge-type 5-spindle cross drilling unit (optional), when equipped with various power tool units and 6 spindle sleeve holder, allows a variety of complex machining.
- A built-in motor is incorporated in the main spindle for improvement of indexing accuracy.
- The main spindle hub spindle is equipped with a C-axis control function as standard.
- The movable operation panel and various help functions improve both operability and workability.

<table>
<thead>
<tr>
<th>TOOLING SYSTEM</th>
<th>Tool holder</th>
<th>Turning tool</th>
<th>6 tools(¢18mm) / 7 tools(¢16mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 spindle</td>
<td>Front-end</td>
<td>4 tools</td>
</tr>
<tr>
<td></td>
<td>sleeve holder</td>
<td>stationary</td>
<td>4 tools</td>
</tr>
<tr>
<td>Power-</td>
<td>4-spindle cross drilling unit</td>
<td>Cross machining tool</td>
<td>4 spindles(ER11)</td>
</tr>
<tr>
<td>driven tool</td>
<td>5-spindle cross drilling unit</td>
<td>Cross machining tool</td>
<td>5 spindles(ER11)</td>
</tr>
<tr>
<td></td>
<td>Cartridge type</td>
<td>Cross machining tool</td>
<td>2 spindles(ER11)</td>
</tr>
<tr>
<td></td>
<td>Cartridge type</td>
<td>Cross machining tool</td>
<td>3 Pos</td>
</tr>
<tr>
<td></td>
<td>Cartridge type</td>
<td>Cross machining tool</td>
<td>2 spindles(ER11)</td>
</tr>
</tbody>
</table>

Tool post: 4-spindle cross drilling unit
CNC AUTOMATIC LATHE [ Type N ]

SB-20R type N

Extended Complex Machining Aimed at Higher Dimensional Non-Guide Bush Models

With a maximum of 30 tools for complex machining, non-guide bush type for reduction of material cost. Type N meets the needs of the times.

- At remnant bar length of minimum 31 mm significantly contributes to the reduction of material cost.
- The cartridge-type 5-spindle cross drilling unit (optional), when equipped with various power tool units and 4 spindles sleeve holder, allows a variety of complex machining.
- A 4-spindle backworking unit designed for rear-end working is attached with a tool rotation drive unit to improve machining capability on the rear end.
- A built-in motor is incorporated in the main spindle for improvement of indexing accuracy.
- The main spindle/sub spindle is equipped with a C-axis control function as standard.
- The movable operation panel and various help functions improve both operability and workability.

TOOLING SYSTEM

- Tool holder: 6 tools (11.2 mm) / 7 tools (10 mm)
- 4-spindle sleeve holder: 4 tools
- Front-end stationary tool: 4 tools
- Rear-end stationary tool: 4 tools
- Power-driven tool: 4 spindle cross drilling unit
- 5-spindle cross drilling unit: Cross machining tool
- 5-spindle cross drilling unit: 5 spindles (ER 16)
- Cartridge-type 5-spindle high-speed cross drilling unit: Cross machining tool
- Cartridge-type 5-spindle high-speed cross drilling unit: 5 spindles (ER 11)
- Cartridge-type 5-spindle high-speed cross drilling unit: Cartridge type
- Cartridge-type 5-spindle high-speed cross drilling unit: 5 spindles (ER 11)

* When a cartridge-type 5-spindle/4-spindle high-speed cross drilling unit is optionally selected.

Tool post: Cartridge type 5-spindle cross drilling unit
Traditional High Accuracy Machining by Rigid Design from this Series

Slanted slide guideway structure  |  High rigidity tool post

Comparison of moment load by cutting force

The moment load applied to the guideway surface by cutting force is the combined radial and axial load $M_y$. The $M_y$ of the slant type is the smallest when compared to that of the vertical type and horizontal type.

- Slant type: $M_y = 1$
- Vertical type: $M_y = 1.3$
- Horizontal type: $M_y = 1.9$

Comparison of moment load by feed force

As for the feed force $F_z$, the moment load $M_z$ of the slant type is the smallest when compared to that of the vertical type and horizontal type.

- Slant type: $M_z = 1$
- Vertical type: $M_z = 1.3$
- Horizontal type: $M_z = 1.5$

The SB series tool post employs a slant-type slide guideway structure. This enables the construction of the X and Y axes guideways radially around the cutting point to improve machine rigidity. The construction also allows a linear line which passes the ball screw center and forms to be close to the cutting point (Fig. a1 on the right), and reduces the moment load by cutting resistance improves the tool post rigidity in the Y and Z axes directions. The Star original rigid tool post structure allows for an extended tool life and stable accuracy even in continuous machining over time.
High Power, High Function and High Accuracy

Machining Performance Suited to the Up-to-date Models

- As for the tool post, a total of four types are available, including a 5-spindle cross drilling unit, a cartridge-type 5-spindle cross drilling unit, and a 5-spindle high speed cross unit in addition to a standard-type 4-spindle cross drilling unit. This allows the most appropriate tooling layout according to the required machining applications.
- The 1.0kw (continuous) high-output power tool motor enables M6 tapping.
- The main spindle/sub spindle is equipped with a C-axis control function as standard (*) to enlarge the machining range.
- The main spindle employs a built-in motor for improved indexing accuracy.
- The 5-spindle high-speed cross drilling unit (max. 10,000min⁻¹) can be optionally set for small-scale production.
- The 5-spindle cartridge type cross drilling unit, with 3 cartridge positions available for use, can accommodate a variety of tool units for polygon machining, thread whirling and so on.

Material and Maintenance Costs

Contribution to the Reduction of Production Cost

- With the aim of reduced remnant bar length, the non-guide bush type achieves the minimum length of 31mm (*) to significantly contribute to the reduction of material cost.
- Guide bush/non-guide bush switching function (type G) Guidance for switching between the G.B type and the N.G.B type is displayed on the operation screen. The G.B type is for preventing long workpieces from bending and the N.G.B type is for reducing the remnant length of short workpieces. This function responds flexibly to the diversified needs of parts machining.
- The centralized lubrication system for lubrication to all ball screw shafts and the headstock with a sealed belt are both designed for higher durability in order to reduce the maintenance cost.

For Both Cutting & Non-Cutting Times

To Achieve Improved Productivity

- The 4-spindle backworking unit equipped with a tool rotation drive (**) strengthens complex machining to allow rear-end eccentric hole drilling and front-end/year-end overlap machining.
- High-speed feed at 35m/min X1, X2, Y1, Z1, Z2 (*) reduces the idle time.
- Attachment of a large-volume tool pan and a coolant tank enables continuous operation for a long period of time.

For High Operability and Workability

User-Friendly Machine Design

- The movable operation panel and various help functions improve both operability and workability.
- The latest control unit and 8.4" color LCD unit are combined to improve visibility.
- A manual pulse generator also helps the machine to be more user-friendly.
List of Tool Post Configurations

4-spindle cross drilling unit

5-spindle cross drilling unit

Cartridge-type cross drilling unit

A combination of 4 types of tool posts and

Cartridge-type 5-spindle cross drilling unit

VARIATION

03

Cartridge-type 5-spindle cross drilling unit

VARIATION

04

Cartridge-type 5-spindle cross drilling unit

VARIATION

07

Cartridge-type 5-spindle cross drilling unit

VARIATION

08

6 The material diameter for 1 000 mm machining must be larger than 0.01 cm to avoid interference with the polygon cutters.

© T3000 is a registered trademark. It is not usable together with the 3-spindle rear-end unit (3R616).
This tool units ensures the optimum tooling layout.
Use of up to 30 tools ensures optimal machining capability.

Tool Unit (main):

- 33150: Milling unit ER16
- 0M155: 3-spindle opposing type front drilling unit

Tool Unit (back):

* When a cartridge-type 5-spindle/6-spindle high-speed cross drilling unit is optionally selected, it is Type G/N only.
Standard Machine Specifications

1. CNC unit: FANUC 0i-TD
2. Operation panel: 6.4-inch color LCD display
3. Pneumatic unit
4. Automatic centralized lubrication unit
5. Coolant level detector
6. Door interlock system
7. Broken cutter tool detector
8. Parts ejection detector
9. Drive unit for revolving guide bush
10. Revolving guide bush unit
11. Main / Sub collet
12. C-axis control (Main / Sub)
13. Spindle clamp unit (Main / Sub)
14. Tool holder
15. 4-spindle cross drilling unit
16. 4-spindle sleeve holder
17. Back 4-Spindle unit
18. Air purger for revolving guide bush
19. Air purger for main spindle
20. Sub spindle air purger unit
21. Sub spindle air blow unit
22. Work light
23. Leakage breaker

Type G/N only
Type SWISS only
Type N only

Optional Accessories and Functions

1. Coolant flow detector
2. Water removal unit
3. Beacon
4. Parts conveyor
5. Parts receptacle in the machine
6. Parts separator unit A
7. Main spindle inner tube
8. 5-spindle cross drilling unit
9. Cartridge-type 5-spindle cross drilling unit
10. Cartridge-type 5-spindle high-speed cross drilling unit
11. Drive unit for power-driven attachment B

(Type N : Standard)
12. Parts ejector (Air cylinder type)
13. Parts ejector (Spring type)
14. Parts ejector with guide tube
15. Parts stopper unit

Parts conveyor
Coolant unit 2.5MPa

External Dimensions and Floor Space

**Barfeeder (12RF)**

<table>
<thead>
<tr>
<th>Type/Max. file capacity</th>
<th>A [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASK-16AS1</td>
<td>125</td>
</tr>
<tr>
<td>OS12/5</td>
<td>125</td>
</tr>
<tr>
<td>OS12/6</td>
<td>125</td>
</tr>
</tbody>
</table>

**Barfeeder (16RF / 20RF)**

<table>
<thead>
<tr>
<th>Type/Max. file capacity</th>
<th>A [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASK-20AS</td>
<td>120</td>
</tr>
<tr>
<td>OS20/6</td>
<td>120</td>
</tr>
<tr>
<td>OS20/6</td>
<td>120</td>
</tr>
</tbody>
</table>

Type G/N

Overall height: 1,768 [mm] (5.77)

Type G

Overall height: 1,768 [mm] (5.77)

Other accessories:

- Slotting unit
- Polygon machining unit
- Thread whisking unit
- 4-spindle sleeve holder
- 3-spindle back drilling unit
- Slotting unit
## Standard Machine Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>4-Spindle Cross drilling unit</th>
<th>5-Spindle Cross drilling unit</th>
<th>Cartridge-type cross drilling unit</th>
<th>5-Spindle high-speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12R</td>
<td>16R</td>
<td>20R</td>
<td>12R</td>
</tr>
<tr>
<td>Max. machining diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type C</td>
<td>205mm</td>
<td>205mm</td>
<td>205mm</td>
<td>205mm</td>
</tr>
<tr>
<td>Type G</td>
<td>N.G.B. type</td>
<td>12R: Bar diameter&lt;2.5 (max. 30mm) (max. 1.3/16&quot;) 18R/20R: Bar diameter&lt;2.5 (max. 50mm) (max. 1.3/16&quot;)</td>
<td>18R/20R: Bar diameter&lt;2.5 (max. 50mm) (max. 1.3/16&quot;)</td>
<td></td>
</tr>
<tr>
<td>Max. headstock stroke</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of tools</td>
<td>6 tools</td>
<td>7 tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-Spindle sleeve holder</td>
<td>Front 4 tools</td>
<td>Rear 4 tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. drilling capability</td>
<td>12R: Ø10mm (28/64&quot;) 18R/20R: Ø12mm (1/2&quot;)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. tapping capability</td>
<td>M10×P1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Power driven att.**

<table>
<thead>
<tr>
<th>Number of tools</th>
<th>Cross power driven att. 4 tools (ER16)</th>
<th>Cross power driven att. 5 tools (ER11)</th>
<th>Cross power driven att. 2 tools (ER11)</th>
<th>Cartridge type: 3Pos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. drilling capability</td>
<td>ER16: Ø7mm (3/32&quot;)</td>
<td>ER16: Ø6mm (5/64&quot;)</td>
<td>ER16: Ø6mm (11/64&quot;)</td>
<td>φ7mm (3/32&quot;)</td>
</tr>
<tr>
<td>Max. tapping capability</td>
<td>ER11: M6xP1.0</td>
<td>ER11: M6xP1.0</td>
<td>ER11: M6xP1.0</td>
<td>φ6mm</td>
</tr>
<tr>
<td>Spindle speed</td>
<td>ER16: max. 6,000min⁻¹</td>
<td>ER11: max. 10,000min⁻¹</td>
<td>ER11: max. 10,000min⁻¹</td>
<td>ER11: max. 6,000min⁻¹</td>
</tr>
<tr>
<td>Drive motor</td>
<td>1.0kW (continuous) / 1.2kW (5min) / 30% (15°)</td>
<td>1.0kW (continuous) / 1.2kW (5min) / 30% (15°)</td>
<td>1.0kW (continuous) / 1.2kW (5min) / 30% (15°)</td>
<td>1.0kW (continuous) / 1.2kW (5min) / 30% (15°)</td>
</tr>
</tbody>
</table>

**Rapid feed rate**

35mm/min (X1,Y1,Z1,Z2) 382mm/min (X2) / Except for Type C

**C-axis control**

**Main spindle indexing angle**

**Main spindle speed**

12R: Max. 15,000min⁻¹ 18R/20R: Max. 10,000min⁻¹

**Main spindle motor**

2.2kW (continuous) / 3.7kW (10min) / 25% (15°)

**Coolant tank capacity**

150L

**Dimensions (WxDxH)**

2,070x1,177x1,780mm

**Center height**

1,080mm

**Weight**

1,050kg (Type C) 1,700kg (Type N) 1,700kg (Type G)

**Power consumption**

12R: 4.8kVA 18R/20R: 3.7kVA

**A-weighted sound pressure**

Type C: 78dB

Type N: 74dB

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## Backworking Attachment Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>12R</th>
<th>16R</th>
<th>20R</th>
<th>12R</th>
<th>16R</th>
<th>20R</th>
<th>12R</th>
<th>16R</th>
<th>20R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. chucking diameter</td>
<td>Ø18mm (5/8&quot;)</td>
<td>Ø18mm (5/8&quot;)</td>
<td>Ø18mm (5/8&quot;)</td>
<td>Ø20mm (3/4&quot;)</td>
<td>Ø20mm (3/4&quot;)</td>
<td>Ø20mm (3/4&quot;)</td>
<td>Ø20mm (3/4&quot;)</td>
<td>Ø20mm (3/4&quot;)</td>
<td>Ø20mm (3/4&quot;)</td>
</tr>
<tr>
<td>Max. length for front ejection</td>
<td>80mm (3.1/8&quot;)</td>
<td>80mm (3.1/8&quot;)</td>
<td>80mm (3.1/8&quot;)</td>
<td>90mm (3.5/8&quot;)</td>
<td>90mm (3.5/8&quot;)</td>
<td>90mm (3.5/8&quot;)</td>
<td>90mm (3.5/8&quot;)</td>
<td>90mm (3.5/8&quot;)</td>
<td>90mm (3.5/8&quot;)</td>
</tr>
<tr>
<td>Max. projection length</td>
<td>30mm (1.1/8&quot;)</td>
<td>30mm (1.1/8&quot;)</td>
<td>30mm (1.1/8&quot;)</td>
<td>30mm (1.1/8&quot;)</td>
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<td>30mm (1.1/8&quot;)</td>
<td>30mm (1.1/8&quot;)</td>
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<tr>
<td>Number of tools</td>
<td>6 tools</td>
<td>6 tools</td>
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<td>6 tools</td>
<td>6 tools</td>
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<td>6 tools</td>
</tr>
<tr>
<td>4-spindle unit</td>
<td>Power driven</td>
<td>Stationary tool</td>
<td>Power driven</td>
<td>Stationary tool</td>
<td>Power driven</td>
<td>Stationary tool</td>
<td>Power driven</td>
<td>Stationary tool</td>
<td>Power driven</td>
</tr>
<tr>
<td>Max. tapping capability</td>
<td>M6xP1.0</td>
<td>M6xP1.0</td>
<td>M6xP1.0</td>
<td>M6xP1.0</td>
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</tr>
<tr>
<td>Power-driven att. spindle speed</td>
<td>max. 6,000min⁻¹</td>
<td>max. 6,000min⁻¹</td>
<td>max. 6,000min⁻¹</td>
<td>max. 6,000min⁻¹</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Power-driven att. drive motor</td>
<td>0.3kW</td>
<td>0.3kW</td>
<td>0.3kW</td>
<td>0.3kW</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sub spindle indexing angle</td>
<td>C-axis control</td>
<td>C-axis control</td>
<td>C-axis control</td>
<td>C-axis control</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sub spindle speed</td>
<td>max. 8,000min⁻¹</td>
<td>max. 12,000min⁻¹</td>
<td>max. 8,000min⁻¹</td>
<td>max. 8,000min⁻¹</td>
<td></td>
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<tr>
<td>Sub spindle speed control</td>
<td>AC servo drive</td>
<td>AC servo drive</td>
<td>AC servo drive</td>
<td>AC servo drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sub spindle motor</td>
<td>1.0kW</td>
<td>1.0kW</td>
<td>1.0kW</td>
<td>1.0kW</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Note:**

The machining capacities apply to SUS303 material.

The machining capacities may differ from fixed values depending on the machining conditions, such as the material to be machined or the tools to be used.

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