R200

Turn-mill center for flexible complete machining

better.parts.faster.
A new dimension in milling and turning

With the R series, INDEX is setting the standard for a new generation of turning/milling centers. Two motorized milling spindles perform machining in two independent sub-systems, including 5-axis machining. Both heavy-duty roughing operations and highly accurate fine-turning operations can be performed simultaneously on the main spindle and counter spindle. This parallel use increases productivity significantly compared to conventional designs. New design solutions for optimum stiffness, thermal and dynamic stability, and vibration damping also provide for maximum machining quality.
Two milling spindles are used simultaneously and independently

**Complete machining**
- Separate subsystems for upper and lower motorized milling spindles, allowing full rear end machining or parallel machining
- Simultaneous 5-axis machining on both spindles possible
- Generous tool memory for high flexibility
- Tool strips with a total of 12 stationary tools permanently in the working area

**Speed**
- Parallel machining with 2 milling spindles
- High accelerations and rapid traverse rates
- Typical chip-to-chip time of only 4 seconds for automatic tool changing
- Short traversing distances in a very easy-to-access and easy-to-view working area
- Powerful motorized milling spindles for high cutting efficiency
Solid construction with impressive kinematics

Due to intelligent kinematics with an efficient arrangement of axes, a trend-setting machine concept has emerged that also facilitates comprehensive complete machining operations. The idea: A vertical machine arrangement in which the main spindle moves in the Z direction, the counter spindle in the X and Z directions, tool carrier 1 in the X, Y, and B directions, and tool carrier 2 in the Y and B directions. The result: A design with two independent sub-systems, exceptional stiffness between moving components and machine bed, as well as impressive dynamic response. Consequently, the workpieces to be machined can be produced highly efficiently and simultaneously on the front and reverse sides.

Work spindles
Two identically-rated motorized spindles designed in synchronous technology and with liquid cooling provide for high cutting volumes.

Motorized milling spindles
The two motorized milling spindles are also designed in synchronous technology with fluid cooling. High rotational speeds and minimum ramp-up times stand for high-performance machining.

Tool strips
Two holding strips affixed to the side of each milling spindle allow fast access to stationary tools with high precision. The W-type serration minimizes the setup effort for these tools.

Workpiece removal
An integrated gantry-type removal unit enables fast handling of workpieces without damage. Finished parts are placed on a conveyor belt and bar remnants in a separate remnant container.

- ø 65 mm
- 5,000 rpm
- 24 kW, 190 Nm (at 40 %)
- Rapid traverse rate 45 m/min
- 11 kW, 18,000 rpm
- Tool carrier, upper: X/Y 350 / 160 mm, B 270°
- Tool carrier, lower: Y 160 mm, B 270°
- Rapid traverse rate 45 m/min
- 6 stationary tools on each milling spindle
- Maximum precision for turning operations
- Workpiece/remnant removal possible for main spindle and counter spindle
- Rapid traverse rate 100 m/min
During development of the R series, emphasis was placed on achieving a high degree of stiffness, thermal and dynamic stability, and vibration damping. For this reason, a vertical cast machine bed with a heavily ribbed, enclosed modular design was chosen. The motorized milling spindles are placed in the center of the machine and are operated freely and wearfree in the Y- and B-axes via hydrostatic circular guides. The guide system contributes considerably to the machine’s enormous stiffness. Optimum force transmission is another premise that was implemented consistently. The short lever arms help to keep the system very stable; vibrations are reduced, and the radial run-out is improved. Another benefit includes the high accelerations and rapid traverse rates at which the R200 can be operated. These are made possible through the use of weight-optimized assemblies and through purposefully designed drives.

**Benefits** resulting from the enclosed modular concept and hydrostatic circular guide in the INDEX design

- Better workpiece quality
- Extended tool service life
- Higher rapid traverse rates and accelerations
- Increased machining performance
The magazine – all tools on board

Two separate shuttle units independently supply the two motorized milling spindles with the tools required in each case from the tool magazine. With a maximum of 120 tool pockets, the R200 has a large tool set. Chip-to-chip time of 4 seconds contributes to minimizing secondary processing times.

At a glance
- 80/120 tool stations (HSK-T40 holder)
- Minimum load cycles; Chip-to-chip time only 4 s
- Simultaneous and independent changes at both milling spindles possible
- High degree of functional reliability due to standard tool magazine with chain design

Reducing secondary processing time:
While machining is performed on the main spindle, the lower spindle can load a new tool (and in reverse), protected from falling chips and coolant. This results in higher productivity and improves process reliability.
Efficient use of energy

For years, INDEX has viewed the efficient use of energy and resources as a key requirement in its machine development activities. Therefore, today all machines already conform to the principle of reduced energy consumption with simultaneous improvement in environmental compatibility. Design experience, such as measurements on machines in the field, form the basis for meeting or even surpassing requirements regarding energy/resource efficiency sustainably, also in the future.

Weight reduction:

- **Reduction of energy consumption**
  Simulation programs enable minimization of weights of moving assemblies, while simultaneously optimizing stiffness and damping of machines. Assemblies with reduced weights consume significantly less energy during braking and acceleration.

- **Increased dynamic response**
  Standard available motor designs and frame sizes are sufficient for achieving above-average high acceleration, braking, and rapid traverse rates at reduced weights. Smaller motors consume less energy and also exhibit less energy losses.

Energy recovery/energy shutdown:

- **Energy recovery**
  Regenerative drives in the turning/milling center transform the motion energy from all braking operations on spindles and axis drives directly into electrical energy and feed it back to the supply network. This reduces energy consumption on a sustainable basis and reduces the heat emission in the proximity of the machine.

- **Energy shutdown**
  The R series has an automated shut-down function that shuts down all high-consumption units in case of an unscheduled interruption in production according to a freely selectable time (standby mode).

Minimized friction:

- **Optimum material pairings**
  Optimized material pairings and surface coatings reduce the coefficient of friction and, thus, the energy consumption of moving components.

- **Low-friction bearings**
  The hydrostatic bearings used on the tool carrier quills are practically free of friction. This minimizes friction heat and energy losses; in addition, these bearings are practically wear-free.

Intelligent use of proven cooling principles:

- **Targeted heat dissipation**
  All high-loss heat sources of the R series are cooled directly via several fluid circuits using different coolants. In addition to main, counter, and milling spindles, the hydraulics and the control cabinet have a separate cooling circuit. The heat energy released is directly connected to the fluid and routed centrally out of the machine.

- **Economic use of waste heat**
  The INDEX “cold water interface” allows the heat loss energy stored in the coolant to be removed from a central location and conveyed for another use, e.g., production hall heating, industrial water heating or processing heat for other production steps. The recovery of machine waste heat facilitates a sustained reduction in energy costs in the company.

- **Climate-neutral dissipation of heat**
  The cold water interface provides the ability to dissipate heat in a climate-neutral manner, if the machine waste heat stored in the cooling medium cannot be used in otherwise. The necessary cooling unit can be used with the help of the water interface first on the outside of the production hall and secondly also centrally for several machines. This offers a considerable energy savings potential for production hall heating dissipation/climate control or increased efficiency as a result of centralized heat disposal.
A control designed according to user's wishes

**Reliable handling**
The INDEX C200-4D sl control is based on the field-proven SIEMENS SINUMERIK S840D Solution Line, paired with drives from the SIEMENS SINAMICS series. INDEX enhanced this field-proven C200-4D sl control with additional user-friendly functions. These specially designed machine and machining cycles make even the most complex machining operations available with ease. They support high-efficiency multi-axis milling and turning operations and provide maximum functional reliability. The result is a control that is designed to meet the machine operator’s needs.

**Easy to program**
A large number of powerful user cycles ensure:
- Simple and fast programming
- Field-oriented applications
- Tested and reliable operation of functions
- Maximum flexibility
- Short machining times and optimum machine utilization

**Optimum support**
The software products of the INDEX VirtualLine, such as the CNC Programming Studio, provide optimum support for programming and operation.

**Superior optimization**
In conjunction with the process simulation of the the Virtual Machine, machining programs can be created, checked, and optimized on the computer.

**Economical production**
Numerous additional control functions support user requirements during manufacturing and, thus, provide for efficient and economical production:
- Direct access to wear offsets
- Adapter transformation for all tool stations
- Start requirements for initial state before a restart
- Plain-text error display
- Online access to diagnostics manual via the control
- Multi-channel block search for interruption or destination block
- Tool break monitoring (option)

**Simple tool selection**
The programmer decides which new tool is to be provided and when – separately and independently for both tool carriers. Simultaneous tool change is also possible. The tool pool in the magazine can be used by both tool carriers without restriction.
**INDEX R200**

**Working area**

**Dimensions**

R200 with SBL bar loading magazine
## Technical data

<table>
<thead>
<tr>
<th>Main spindle, counter spindle</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar capacity</td>
<td>mm (inch)</td>
<td>65 (2.6)</td>
</tr>
<tr>
<td>Spindle diameter in front bearing</td>
<td>mm (inch)</td>
<td>115 (4.5)</td>
</tr>
<tr>
<td>Spindle nose ISO 702/1</td>
<td>Size</td>
<td>D140</td>
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<tr>
<td>Chuck diameter</td>
<td>mm (inch)</td>
<td>176 (6.9)</td>
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<tr>
<td>Speed</td>
<td>rpm</td>
<td>5000</td>
</tr>
<tr>
<td>Power at 100% / 40%</td>
<td>kW (hp)</td>
<td>20 / 24 (26.8 / 32.2)</td>
</tr>
<tr>
<td>Torque at 100% / 40%</td>
<td>Nm, ft (lb)</td>
<td>135 / 190 (99.6 / 140.1)</td>
</tr>
<tr>
<td>C-axis resolution</td>
<td>Degrees</td>
<td>0.001</td>
</tr>
</tbody>
</table>

### Feed drive of main spindle

| Minimum distance for collet | mm (inch) | 20 (0.8) |
| Slide travel of Z-axis      | mm (inch) | 390 (15.4) |
| Rapid traverse rate X, Z    | m (inch)/min | 45 (1771.7) |
| Resolution, X, Z            | µ | 0.02 |
| Feed force X, Z             | N | 4000 |

### Feed drive of counter spindle

| Minimum distance for collet | mm (inch) | 20 (0.8) |
| Slide travel of Z-axis      | mm (inch) | 390 (15.4) |
| Slide travel of X-axis      | mm (inch) | 600 (23.6) |
| Rapid traverse rate X, Z    | m (inch)/min | 45 (1771.7) |
| Resolution, X, Z            | µ | 0.02 |
| Feed force X, Z             | N | 4000 |

### Tool carrier 1

| Quill diameter              | mm (inch) | 190 (7.5) |
| Slide travel X              | mm (inch) | 350 (13.8) |
| B-axis angle of rotation    | Degrees | 270 |
| Brake holding torque B-axis | Nm (ft lb) | 2000 (1475.1) |

### Tool carrier 2

| Quill diameter              | mm (inch) | 190 (7.5) |
| Slide travel Y              | mm (inch) | ± 80 (3.2) |
| B-axis angle of rotation    | Degrees | 270 |
| Brake holding torque B-axis | Nm (ft lb) | 2000 (1475.1) |

### Motorized milling spindle

| Tooling system DIN 69893   | HSK-T40 |
| Holding force of clamping assembly | N | approx. 10000 |
| Maximum speed              | rpm | 18000 |
| Power at 100%              | kW (hp) | 11 (14.8) |
| Torque at 100% / 25%       | Nm, ft (lb) | 19 / 30 (14.0 / 22.1) |
| Brake holding torque       | Nm (ft lb) | approx. 200 (1475) |
| Fixed tool stations on tool strips | 6 x V03/25 |

### Tool magazine

| Max. tool diameter / length | mm (inch) | 50 (2.0) (80* (3.9) / 180 (7.1)) |
| Max. tool weight            | kg (lbs) | 2 (4.4) |
| Chain spacing               | mm (inch) | 53 (2.1) |
| Number of tools             | 80 (120) |

* Adjacent magazine stations must remain free

### Gantry-type removal unit

| Slide travel (Z-axis)       | mm (inch) | 1365 (53.8) |
| Rapid traverse rate         | m (inch)/min | 100 (3937) |
| Max. tool diameter / length | mm | 65 / 200 (2.6 / 7.8) |
| Max. workspace weight       | kg (lbs) | 5 (11) |

### Bar loading magazine SBL 3200

| Max. tool, bar length       | mm (inch) | 3200 / 1500 (126.0 / 59.1) |
| Max./min. bar diameter      | mm (inch) | 65 / 20 (2.6 / 0.8) |
| Bar feed force, velocity    | N, m (inch)/min | 1450 / 35 (1378) |
| Hydraulic tank capacity / max. pressure | ltr, (gal)/ bar | 200 / 80 (22.9 / 1180.3) |
| Weight                      | kg (lbs) | approx. 1500 (3306.9) |

### Weights and connecting values with max. configuration

| Weight                      | kg (lbs) | approx. 11000 (24250.4) |
| Connecting values           |         | 79 kW, 94 kVA, 135 A, 400V, 50/60 Hz |

### Control

INDEX C200 si (based on Siemens S840D si)