High Reliability, High Performance
Compact Machining Center

FANUC
ROBODRILL α-Dia series
1. Standard Version

High Precision with Standard CNC 31i-B
The Latest CNC, Servo Control Function
High Rigidity Mechanical Design
Direct Drive Rotary Table DDR
Standard Spindle

1. Standard Version

- Standard spindle applicable to wide range machining use

Machining examples by standard spindle
2. High Power Version

- High precision with Standard CNC 31i-B
- The Latest CNC, Servo Control Function
- High Rigidity Mechanical Design
- Direct Drive Rotary Table DDR
- High Torque Spindle
- High Acceleration spindle
- High Speed Spindle
- Excellent Chip Discharging

2. High Power Version

- High torque spindle for heavy machining of iron parts
- High acceleration spindle for high efficiency machining of aluminum parts
- High speed spindle for smooth machining surface

Machining example by high torque spindle
Machining example by high acceleration spindle
Machining example by high speed spindle
1. Standard Version

## Spindle features of standard version

Optimum spindle selectable according to application
- **Standard spindle**: Applicable to wide range machining use
  High rigidity mechanism and outstanding rigidity of main spindle enabling excellent ability in milling in addition to drilling and tapping

## Spindle line-up of standard version

<table>
<thead>
<tr>
<th>Spindle</th>
<th>Max. Speed</th>
<th>BT Tool</th>
<th>DIN Tool</th>
<th>NC5 Tool</th>
<th>BIG-PLUS Tool</th>
</tr>
</thead>
</table>

## Spindle power curves of standard version

### Standard spindle

![Spindle power curves](image)

Machining examples by standard spindle
2. High Power Version

Spindle features of high power version

Optimum spindle selectable according to application
- High torque spindle: Applicable to heavy machining of iron parts
- High acceleration spindle: Applicable to high speed, high efficiency machining of aluminum parts
- High speed spindle: Applicable to smooth surface machining

Spindle line-up of high power version

<table>
<thead>
<tr>
<th>Spindle</th>
<th>Max. Speed</th>
<th>BT Tool</th>
<th>DIN Tool</th>
<th>NC5 Tool</th>
<th>BIG-PLUS Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Speed Spindle</td>
<td>24,000 min⁻¹</td>
<td>Available BT30</td>
<td>Available [DIN69871-A30]</td>
<td>Not Available</td>
<td>Available BBT30</td>
</tr>
</tbody>
</table>

Spindle power curves of high power version

High torque spindle

![High torque spindle power curve](image1)

High acceleration spindle

![High acceleration spindle power curve](image2)

High speed spindle

![High speed spindle power curve](image3)

Machining examples by high power spindle
Control function enabling high-speed, high-precision machining

Shortening cycle time with the latest CNC and Servo function

**FSSB high-speed rigid tapping**

- Achieving high speed rigid tapping by FSSB communication between servo and spindle amplifiers

![Sample Image]

Previous rigid tapping

\[ \text{Cycle time} \]

\[ \text{Spindle speed} \]

\[ \text{Synchronous error} \]

FSSB high-speed rigid tapping

\[ \text{Reducing cycle time} \]

\[ \text{Cycle time} \]

\[ \text{Spindle speed} \]

\[ \text{Synchronous error} \]

\[ \text{Minimization of synchronous error} \]

**Rapid traverse block overlap**

- Shortening cycle time by continuing to operate without stopping motor, between rapid traverse blocks

![Diagram of Rapid Traverse Block Overlap]

**Direct drive rotary table DDR providing high-speed indexing**

**DDR with direct drive motor**

- Additional 1-axis rotary table with Synchronous built-in servo motor and αICZ SENSOR
- Direct drive and non-backlash structure enabling high speed and high precision machining
Software function exclusive to ROBODRILL

AI Thermal Displacement Compensation targeting high precision compensation
- Estimating the thermal displacement along each axis based on the operation status of the spindle and feed axes with using no external sensor
- Possible to adjust the effect of compensation easily by graphic display

* The precision of compensation varies with the operating conditions.
* An effect of ambient temperature and coolant temperature is not considered.

Machining Mode Setting to select suitable control
- Setting the Machining Mode according to the machining to be made on the screen or with the command in a program
- Enables the desired work surface quality and productivity
- Possible to add customer-specific machining modes

### DDR specifications

<table>
<thead>
<tr>
<th>Items</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive system</td>
<td>Direct drive</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>260N•m</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>200min⁻¹</td>
</tr>
<tr>
<td>Feed rate</td>
<td>1~30,000° /min</td>
</tr>
<tr>
<td>Least input increment</td>
<td>0.001°</td>
</tr>
<tr>
<td>Index accuracy</td>
<td>±0.0028° (~±10°)</td>
</tr>
<tr>
<td>Clamp system</td>
<td>Pneumatic cylinder and spring</td>
</tr>
<tr>
<td>Clamp torque</td>
<td>500N•m (at 0.5MPa)</td>
</tr>
<tr>
<td>Max. loading capacity</td>
<td>100kg</td>
</tr>
<tr>
<td>Allowable moment load</td>
<td>Projecting distance x Load = 600N•m</td>
</tr>
<tr>
<td>Center height</td>
<td>150mm</td>
</tr>
<tr>
<td>Machine weight</td>
<td>66kg</td>
</tr>
</tbody>
</table>
Versatile Applications for Wide-variety of Machining Needs

**Automotive parts machining**
- Highly rigid mechanism achieving heavy machining
- Efficient milling, boring and side cutting possible
- Multi-face machining and contouring possible

**Electrical parts and small parts**
- Shortening cycle time by optimum servo control
- Suitable for high-speed machining of electrical parts and small parts

**3D machining**
- High speed processing achieving high-speed and high-precision machining for 3D shape parts
- Possible to machine smooth surface by using latest CNC technology

**Rotary axis machining**
- Using DDR or additional 1-axis rotary table achieving high-speed and high-precision machining of Impeller (component of a turbo engine) or camera tube

**Deep and small hole drilling**
- Possible to drill deep hole (over 30 times deeper than the hole diameter) and small hole (diameter 0.1mm)
10.4 “Color LCD and compact operator’s panel

- Provides CNC with 10.4” color LCD and compact operator’s panel
- Allows all operations by the least key push
- Also allows machine control by vertical softkeys on the right side of LCD
- USB port newly added on the left side of LCD, in addition to conventional memory card slot

Robotization

- Possible to configure machining systems easily using robots
- Provides a built-in interlock function with consideration given to safety
- Enables robot operation and system status display on the robot operation screen

Custom PMC

- Possible to create the ladder program for control of peripheral devices easily on a screen
- Possible to read or write only ladder programs for peripheral devices
Available Options

Top cover  Automatic Oil Lubricating System  Automatic Grease Lubricating System (LHL Liquid Grease)  Probe  Receiver  Tool length switch for automatic measurement

Coolant unit (tank)  Coolant unit with chip flush (spot gun provided)  LED Illumination  Automatic fire extinguisher (Note)

(Note)
- If machining “combustible materials” such as resin and magnesium or using a water-immiscible cutting fluid, select an automatic fire extinguishing system because of fire hazards. For information on the objects that can be extinguished by an automatic fire extinguishing system, contact your ROBODRILL sales representative.
- The machine life may be shortened depending on the workpiece, tool, coolant, or lubricant to be used.

Maintenance and Customer Support

Worldwide customer service and support

FANUC operates customer service and support system anywhere in the world through subsidiaries, affiliates and distributor partners. FANUC provides the highest quality service with the quickest response at the location nearest you.

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Luxembourg

Beijing  Dalian  Shanghai  Shen Zhen

Bangalore  Manila  Bangkok  Ho Chi Minh  Kuala Lumpur  Singapore  Jakarta

Sao Paulo

Inquiries: Yamanakako-mura, Yamanashi, Japan 401-0501
Phone: 81-555-84-6030
Fax: 81-555-84-5540

FANUC training center

FANUC Training Center operates training programs on FANUC ROBODRILL which focus on practical operations and programming with machining know how and maintenance.
Outer Dimensions and Floor Plan

**α-D21SiA/D14SiA**

![Diagram of α-D21SiA/D14SiA](image1)

**α-D21MiA/D14MiA**

![Diagram of α-D21MiA/D14MiA](image2)

**α-D21LiA/D14LiA**

![Diagram of α-D21LiA/D14LiA](image3)
## Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>K-D21SIA</th>
<th>K-D21MIA</th>
<th>K-D21LIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine (Standard)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis travel (Longitudinal movement of table)</td>
<td>300mm</td>
<td>500mm</td>
<td>700mm</td>
</tr>
<tr>
<td>Y-axis travel (Cross movement of saddle)</td>
<td>300mm + 100mm</td>
<td>400mm</td>
<td></td>
</tr>
<tr>
<td>Z-axis travel (Vertical movement of spindle head)</td>
<td>330mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance from table surface to spindle gage plane</td>
<td>150 to 480mm (When no high column is specified)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Table</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working space (X-axis × Y-axis)</td>
<td>630 × 330mm</td>
<td>650 × 400mm</td>
<td>850 × 410mm</td>
</tr>
<tr>
<td>Capacity of workpiece mass</td>
<td>200kg (uniform load)</td>
<td>300kg (uniform load)</td>
<td></td>
</tr>
<tr>
<td>Working surface configuration</td>
<td>31-slots size 14mm pitch 125mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spindle</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed range</td>
<td>100 to 10,000min⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle gage (Call number)</td>
<td>7/24 taper No.30 (with air blow)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedrate</td>
<td>Rapid traverse rate: 48m/min (X,Y,Z)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feedrate: 1 to 30,000mm/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Turret</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum tool diameter</td>
<td>80mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum tool length</td>
<td>200mm: α-D14SIA</td>
<td>190mm (Charged by specifications): α-D21SIA</td>
<td>250mm (Charged by specifications): α-D21LIA</td>
</tr>
<tr>
<td>Method of tool selection</td>
<td>Random shortest path</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motors</strong></td>
<td>Spindle drive motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Bidirectional accuracy of positioning of an axis (ISO230-2:1997, 2006)</td>
<td>0.006 ~ 0.020mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bidirectional repeatability of positioning of an axis (ISO230-2:1997, 2006)</td>
<td>0.004mm</td>
<td></td>
</tr>
<tr>
<td><strong>Sound pressure level</strong></td>
<td>Less than 70dB *2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control unit</strong></td>
<td>Fanuc Series 31i/B</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Installations</strong></td>
<td>Installation conditions specified by Fanuc when installing ROBODRILL *3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power source</strong></td>
<td>Power supply</td>
<td>200 to 220 Vac. +10 to -15% 3-phase, 50/60Hz±1Hz 10kVA *4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Compressed air supply</td>
<td>0.35 to 0.55MPa (0.5MPa is recommended) (gauge pressure) 0.15m³/min (at atmospheric pressure) *5</td>
<td></td>
</tr>
<tr>
<td><strong>Machine size</strong></td>
<td>Machine height</td>
<td>2,230 ± 10mm (When no high column is specified)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Floor space</td>
<td>995mm × 2,210mm</td>
<td>1,565mm × 2,040mm</td>
</tr>
<tr>
<td></td>
<td>Mass of machine</td>
<td>Approx. 1,950kg</td>
<td>Approx. 2,000kg</td>
</tr>
</tbody>
</table>

*1 Positioning accuracy is the adjusted and measured value in compliance with applicable standard at Fanuc’s factory. Depending on an influence of JIG & workpiece mass on table, the use conditions and installation environment, there may be a case where the accuracy shown in this catalog can not be achieved.

*2 Sound pressure level is measured in compliance with FANUC’s own regulation. Depending on the use conditions and installation environment, there may be a case where the sound pressure level shown in this catalog can not be achieved.

*3 Fastening the machine to the floor (mounting anchors) may be required depending on the use conditions and installation environment, or to prevent the machine from toppling over due to an earthquake.

*4 In case of center through coolant and cleaning unit for tool taper shank, additional +1kVA is required respectively. In case of additional 1 axis, additional maximum +1.5kVA is required. A cable with 8mm² or more should be used at primary power connection.

*5 In case of center through coolant, additional +0.05m³/min is required. In case of air blow for chips, additional +0.2m³/min is required. In case of side automatic door, 0.4 MPa compressed air supply or more is required.

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