High-reliability and High-performance
Ultra-precision machine

FANUC

ROBONANO OX-NMIA

Main specifications

- Stroke:
  - X axis (horizontal linear): 450mm
  - Z axis (horizontal linear): 300mm
  - Y axis (vertical linear): 200mm
  - B axis (horizontal rotation)
  - C axis (vertical rotation)

- Bearing type:
  - Hydrostatic oil bearing (all axes)

- Command resolution:
  - X, Z, and Y axes: 0.1nm
  - B and C axes: 0.000001°

- Work-table area:
  - B axis: Φ215mm

- Maximum feedrate:
  - X and Z axes: 1000mm/min
  - Y axis: 200mm/min
  - B and C axes: 3600°/min

- Motion accuracy:
  - X axis: 0.2μm/450mm
  - Z axis: 0.2μm/300mm
  - Y axis: 0.2μm/200mm
  - B and C axes: ±3 arcsec / 360°

- Tool-holding spindle:
  - Maximum rotation speed: 50000/min

- Driving system:
  - Aerostatic bearing, air turbine type

- Mass of the machine:
  - Approx. 3600 kg

- Standard accessories:
  - Smart M-Setup, Smart M-Form

- Option:
  - Oshino-mura, Yamanashi 401-0597, Japan
  - Phone: 81-555-84-5555
  - Fax: 81-555-84-5512
  - http://www.fanuc.co.jp

RNANO α -NMiA (E)-01, 2019.9, Printed in Japan
High-reliability and High-performance Ultra-precision machine

High Performance of Machining

- 5-axis Machining
- Stable machining
- 0.1nm command

Applying the latest CNC & servo technology

Minimizing Downtime

- FANUC standard CNC & servo technology
- Non-contact bearing
- Simple parts change

Ease of Use

- Smart M-Setup
- On-machine measurement
- Conformity to safety standards

Smart M-Setup provides superior operability

On-machine measurement unit Smart M-Form

Conformity to safety standards (CE and KCs marking)
High Performance of Machining

5-axis controlled machining
Hydrostatic oil bearing for stable ultra-precision machining
0.1nm command and control with FANUC CNC & servo technology

Minimizing Downtime

High reliability with FANUC standard CNC and servo technology
Mechanical unit using non-contact bearings for all axes and spindle
Simple and quick parts change in maintenance

Ease of Use

Smart M-Setup provides superior operability
On-machine measurement unit Smart M-Form
Conformity to safety standards (CE and KCs marking)
High Performance of Machining

5-axis controlled machining

- Suitable for machining of complex shaped core and parts
- Suitable for fields with increasing demands of ultra-precision machining

| Machining target          | · Automobile parts (HUD, Headlight core)  |
|                         | · Watch parts                           |

| Machining type          | · Scribing  |
|                        | · Milling  |

| Stroke                  | X450×Z300×Y200mm |

Hydrostatic oil bearing for stable ultra-precision machining

- Hydrostatic oil bearing with high rigidity and damping effect applied to linear and indexing axis
- Enhancing stability in machining with high rigidity that realize high feed rate and deep cutting depth and high damping effect that reduce vibration transferred from floor and motion
- FANUC original hydraulic pump unit with low heat generation
0.1nm command and control with FANUC CNC & servo technology

- Applying 0.1nm command in machining program and ultra precision interpolation to ROBONANO with the latest technology of FANUC CNC & servo technology
- Enhancing surface roughness and quality of a workpiece with 0.1nm command and control

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Accessories for stable machining

Active damper

- Eliminating floor vibration as much as possible by the active damper.

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Precision compressed air temperature control system

- Precise temperature control of compressed air consumed by ROBONANO to realize long-time stable machining

<table>
<thead>
<tr>
<th>System specifications</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature control system</td>
<td>Peltier constant current control</td>
</tr>
<tr>
<td>Air temperature control precision</td>
<td>Setting ±0.01°C</td>
</tr>
<tr>
<td>Input power supply</td>
<td>200VAC±10% 50/60Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>0.5kW</td>
</tr>
<tr>
<td>Dimensions/mass</td>
<td>W320×D550×H510mm/38kg</td>
</tr>
</tbody>
</table>
Minimizing Down Time

High reliability with FANUC standard CNC and servo technology

- Adapting FANUC Series 30i-B with 15" Color LCD PANEL iH-Pro
- Intuitive and operable interface by iHMI realizing easy operation on programming, setup and machining
- Linear motion units and rotary units directly driven by linear motors and built-in servo motors

![FANUC Series 30i-B with PANEL iH Pro and iHMI](image)

Mechanical unit using non-contact bearings for all axes and spindle

- Non-contact bearings adapted and optimized for all axes and spindle
- No periodic overhaul by non-contact bearings without bearing abrasion, vibration and heat generation caused by friction of bearing
- Hydrostatic oil bearing for linear and indexing axis, aerostatic bearing for spindle

![Hydraulic oil and Compressed air](image)
Ease of Use

**Smart M-Setup (Option)**

- Operating and observing peripheral devices on ROBONANO operation screen
- Enhance the ease of use by collecting peripheral devices on ROBONANO screen

![Operation screen for ROBONANO based on iHMI](image)

**Previous model (Before)**

- Electronic Micrometer
- Microscope
- CNC

**C3i-MiA (After)**

- Operation screen for ROBONANO
Ease of Use

**On-machine measurement unit Smart M-Form (Option)**

- Measuring and compensating form-accuracy of a workpiece with the Smart M-Form on the machine without another metrology system
- Measuring whole surface of workpiece by 3-dimensional on-machine measurement
- Not only symmetrical form but also complicated form such as asymmetrical free-form is measurable

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring speed</td>
<td>1000mm/min or less</td>
</tr>
<tr>
<td>Measuring resolution</td>
<td>0.1nm</td>
</tr>
<tr>
<td>Measuring force</td>
<td>500mgf or less</td>
</tr>
<tr>
<td>Maximum measuring angle</td>
<td>±60° (downward 75°)</td>
</tr>
<tr>
<td>Setting direction</td>
<td>Vertical</td>
</tr>
</tbody>
</table>

Measurement software (With CAD/CAM function)

**Conformity to safety standards**

- Acquisition of the standard for the market of Europe and Korea

Conformity to safety standards

- CE Marking
- KCs Mark
- EU
- Korea
Application to a range of machining fields

Suitable machining fields

- Suitable for machining of mold core and parts with complicated shapes
- High reliability for maintenance-free long hours machining

Machining of Head Up Display (HUD) core

- Material: STAVAX
- Size: A4 size (300mm x 210mm)
- Surface roughness: Ra 6nm
- Machining time: 50 hours

Machining of watch parts

- Brilliant cut on the bezel
  - Material: Brass
  - Surface roughness: Ra 1.1nm
  - Machining time: 10 minutes

- Hologram on the plate
  - Material: NiP plate
  - Size: Φ 20mm
  - Number of grooves: 20,000
  - Machining time: 30 hours
**Installing Conditions**

### Environmental conditions

- Install the machine in the environment described below for the performance and reliability of the machine
- For details, contact FANUC

<table>
<thead>
<tr>
<th>Input power supply (three phase)</th>
<th>200 to 220 VAC±10%, 50/60Hz±1Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power source</td>
<td>7kVA (20A) *Only main body</td>
</tr>
<tr>
<td>Floor vibration amplitude</td>
<td>0.1μm or less (Acceleration: 0.1Gal or less) *In advance, measurement and analysis of vibration are required.</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>23°C</td>
</tr>
<tr>
<td>Temperature change</td>
<td>±1°C or less of the above ambient temperature (30 minutes or less of cycle of change) *According to required machining accuracy.</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>50% or less</td>
</tr>
</tbody>
</table>

### Compressed air conditions

- Air conditioning and air supply required during machine operation
- Recommend air conditioning and air supply in the nighttime and on holidays
- Measure the below air flow rates near the air supply port of the machine
- For details, contact FANUC

<table>
<thead>
<tr>
<th>Input air pressure</th>
<th>0.7 MPa or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air pressure fluctuation</td>
<td>0.01 MPa or less</td>
</tr>
<tr>
<td>Air flow level</td>
<td>1.0m³/min or more</td>
</tr>
<tr>
<td>Air temperature</td>
<td>15 to 28°C</td>
</tr>
</tbody>
</table>
Outer Dimensions and Floor Plan

Outer dimensions

- Machine part: Mas: Approx.3,600kg
- Operator’s panel: Mass: 100kg
- CNC cabinet: Mass: 130kg

Floor plan (Minimal temperature-controlled room size)

- Floor plan dimensions: 5.0m x 5.0m x 3.0m

Maintenance and Customer Support

Worldwide Customer Support and Service

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.
### Main specifications

<table>
<thead>
<tr>
<th>Stroke</th>
<th>X axis (horizontal linear)</th>
<th>450mm</th>
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<td>300mm</td>
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<tr>
<td></td>
<td>Y axis (vertical linear)</td>
<td>200mm</td>
</tr>
<tr>
<td></td>
<td>B axis (horizontal rotation)</td>
<td>360° (continuous rotation)</td>
</tr>
<tr>
<td></td>
<td>C axis (vertical rotation)</td>
<td></td>
</tr>
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<td>Bearing type</td>
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<td>200mm/min</td>
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<td></td>
<td>B axis</td>
<td>3600° /min</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>B and C axes</td>
<td>±3 arcsec / 360°</td>
</tr>
<tr>
<td>Tool-holding spindle</td>
<td>Maximum rotation speed</td>
<td>50000min−1</td>
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<td></td>
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<td>Standard accessories</td>
<td>CNC cabinet, Operation panel, Tool holding spindle, Scribing tool holder, Hydraulic pump, Active damper, Supplying cutting fluid unit, Air temperature control system</td>
<td></td>
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<tr>
<td>Option</td>
<td>Smart M-Setup, Smart M-Form</td>
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**FANUC CORPORATION**  
Oshino-mura, Yamanashi 401-0597, Japan  Phone: 81-555-84-5555  Fax: 81-555-84-5512  http://www.fanuc.co.jp

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