State-of-the-art wire EDM, exhibiting the comprehensive strength of FANUC

FANUC ROBOCUT α-iE series

- High-performance CNC coupled with digital servo technology
- High-rigidity casting and a thermal insulation structure
- Reliability first design concept resulting in a high operating rate with less failures
- Advanced AWF2 enabling safe unmanned operation

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**Excellent operationality**
- CNC FANUC Series 31i-WA
- 15-inch large LCD touch pannel
- Operation guidance function
- USB I/O

**Economic efficiency**
- Longer consumables life
- Low running cost
- Power consumption monitor function
- Installation space saving
High precision

• High-rigidity casting with thermal insulation structure
• Twin servo wire tension control
• Inverter-controlled water temperature management
• Upgraded AI pulse control 2
• Upgraded Finish cutting generator

High reliability

• Reliable CNC
• Upgraded AWF2
• Servo water level control
• Pre-seal mechanism

Long machining stroke

<table>
<thead>
<tr>
<th></th>
<th>X×Y×Z axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>0iE</td>
<td>370×270×255 mm</td>
</tr>
<tr>
<td>1iE</td>
<td>600×400×310 mm</td>
</tr>
</tbody>
</table>
High-Speed and High-Precision Cutting with AI Pulse Control

AI Pulse control meets the real needs in the field of cutting.

**Al Pulse Control**

- Issuing velocity commands in accordance with the accurately counts the number of discharge pulses.
- By achieving uniformity in energy density and discharge gap, enables high-speed and high-precision cutting.
- Has improved the discharge state monitoring cycle (4 times faster to the conventional) to control at high speed adaptively to changes of cutting conditions.
- The programmed path interpolated by CNC in a nano unit is reproduced by the servo control at high fidelity.

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**Step Shape Cutting (AI Pulse Control 2)**

- Even in step shape cutting and in cutting an open nozzle state, Al pulse control 2 enables optimum control based on the accurately detected number of discharge pulses, thereby achieving stable high-speed and high-accuracy machining.
- The step shape cutting is possible for 10-150mm thickness of workpiece.

[Cutting example]
Die steel 10~80mm, 10mm Open Nozzle
Wire φ0.25BS 3 times cutting

Profile accuracy ±5µm

**Example of pulse monitoring**

[Image]

Note: The above example is the monitor output on the external PC.
It is not included in the function of ROBOCUT.

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**AI Corner Control**

- Accurately detects changes in the amount of cutting at corners to optimumly control the speed and cutting energy, thereby achieving high-precision corner cutting.

[Cutting example]
Die steel 40mm, Wire φ0.25BS, 3 times cutting

[Image]

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Best surface roughness and enriched cutting performance

The surface roughness Ra 0.30µm can be achieved by a standard power supply, and Ra 0.10µm by the optional MF2 power supply.

**Standard power supply**

- The surface roughness Ra0.30µm can be achieved in the finish cutting for the die steel of below 60mm thickness.

  - [Cutting example 1]
    - Die steel 30mm
    - Wire ø0.20BS
    - ø10mm hole
    - 5 times cutting
    - Surface roughness = Ra0.28µm
    - Circularity = 0.80µm

  - [Cutting example 2]
    - Die steel 40/60mm
    - Wire ø0.25BS
    - 5 times cutting
    - Surface roughness = Ra0.29µm

**MF2 power supply (Option)**

- Fine surface roughness can be obtained without the insulation jig by adding MF2 (micro finish 2) power supply, where minute-fine electrical discharge pulses are generated.

  - [Cutting example 1]
    - Surface roughness = Ra0.20µm
    - Tungsten carbide 100mm
    - Wire ø0.25BS, 6 times cutting
    - Straightness = 2.0µm

  - [Cutting example 2]
    - Best surface roughness = Ra0.10µm
    - Tungsten carbide 30mm
    - Wire ø0.20BS
    - 9 times cutting

**Large Taper Cutting (Option)**

- Highly accurate taper cutting can be achieved by “Four Direction Taper Compensation Function” to compensate the position where the wire is supported in four directions independently and “High Precision Large Taper Die Guide” as an option.

  - [Cutting example 1]
    - Aluminum 80mm
    - Wire ø0.25BS(soft)
    - Taper angle 22~45°
    - 4 times cutting
    - Surface roughness = Ra1.20µm

  - [Cutting example 2]
    - Die steel 50mm
    - Wire ø0.20BS(soft)
    - Taper angle 0~20°
    - 4 times cutting
    - Surface roughness = Ra0.80µm

**High-Grade PCD Cutting (Option)**

- Optimum power supply for PCD cutting.
- Best suitable exclusive power supply for cutting the PCD blank or the cutter blade at pre-finish process, which enables suppressing damage in the edge part to the minimum and keeping-up the high speed cutting.

  - [Cutting example 1]
    - Minimum damage (after skim cutting)
    - PCD surface
    - Cutting surface
    - PCD edge
    - SCALE=0.05mm

  - [Cutting example 2]
    - Minimum damage (after skim cutting)
    - PCD surface
    - Cutting surface
    - PCD edge
    - SCALE=0.065mm

*All cutting results contained herein are those obtained under FANUC-designated conditions and FANUC measurement conditions.*
The ROBOCUT mechanical unit has been designed through accurate analysis, with consideration given to rigidity and thermal balance. It adopts a table movement system suitable for high-precision cutting, thereby achieving stable cutting precision.

### High-Rigidity Casting
- The symmetrical casting structure, with the load and thermal balance, ensures stability, and the pyramid structure with large bed eliminates load over-hang during table movement to maintain a high rigidity even for a heavier workpiece.

### Lower Guide Unit Improvement
- The rigidity has been increased.
- The heat sauce is eliminated from the lower arm.

### Stable square shape Table (1/E)

### Servo Water Level Control
- The water level in the work tank is automatically followed the Z-axis position by the drain gate control using servo motor.
- Optimum for different thickness machining.

### Pre-Seal Mechanism (JP Pat. No. 3483599)
- The adhesion of cutting debris (sludge) on the seal portion is reduced by the pre-seal mechanism.
- Preventing a reduction in cutting precision due to an increase in friction resistance.

### Two-Partition Transparent Seal Plate
- It can be immediately checked if dirt is deposited on it and can easily be disassembled and cleaned.

### Dielectric fluid temperature control
- A high-precision inverter-controlled dielectric fluid cooling system with controlled temperature of ±0.1°C is provided as standard.
AWF2 and Twin Servo Wire Tension Control

With level-up AWF2, wire connection is possible in underwater for max. work thickness=200mm, and in AI wire break repair cycle for max. work thickness =150mm. FANUC’s digital servo technology is applied to the wire running system, achieving high-precision tension control.

**AWF2**

- An air jet transport system is adopted in upper pipe for improving AWF accuracy, reliability and speed.
- A thermal fusion system unique to ROBOCUT is adopted.
- The annealing effect and thermal fusion create straight and very sharp wire.

### Twin Servo Wire Tension Control (JP Pat. No. 4168076)

- The high performance servo motor is used for each of the brake side and the feeding side of the wire running system, and feedback control is done with the sensor that always observes the wire tension.
- The deviation of wire tension is decreased to 1/4 or less compared with the conventional and the stability of the cutting accuracy has been greatly improved.

### AI Wire break repair function

- The function re-connect the wire near the wire breakage point without returning to the start hole position.
- It is effective when the cutting groove shuts by the distortion, etc.
- The percentage of success of the wire break in the step shape workpiece becomes higher.

Wire φ0.20—φ0.30 / Thickness :~150mm
Wire φ0.10—φ0.15 / Thickness :~30mm (option)
High-performance CNC, FANUC Series 31i-WA, is incorporated to considerably improve operability.

**15-Inch Large-Size Touch Panel**
- The 15-inch LCD touch panel has considerably improved the amount of display information and operability.
- The desired screen can be selected with a single push of either of the two dedicated vertical and horizontal keys.

**Cutting Monitor screen**
- Cutting conditions, cutting information and the cutting path are displayed on one screen.

**Easy selection of cutting conditions**

**Guidance of work set-up**
- Guidance by conversation screen

**Power consumption monitor screen**
- Displaying real time of the power consumption situation.
- Displaying cumulative electric power.

**Easy-to-Use External Input/Output**
- Programs can be input and output using a USB memory stick or a memory card and also through Ethernet network communication.
Maintenance Navigation

- Maintenance navigation supports in daily maintenance and in taking action in response to alarms.

High-Performance CAM System FANUC PC FAPT CUT i (Option)

Easy-to-use, dedicated CAM system on a Windows® PC to take advantage of ROBOCUT.

**High affinity with ROBOCUT**
- Creates optimum NC programs for ROBOCUT.
- Incorporates cutting conditions for ROBOCUT.

**User friendly design**
- A self-learning function is available.
- Simply practicing using this system as directed by guidance messages displayed by the function.

**Easy creation of taper figures**
- Enables easy creation of NC programs of tapers with upper and lower irregular figures or tapers with angle commands.

Network System CUT MONITOR i

Can be used in a place away from the ROBOCUT to check the cutting status, send and receive NC programs, and change cutting conditions.

* OS : Microsoft® Windows® 2000 SP4 / XP SP2 / Vista / 7 except for Windows® XP Professional and Vista and 7 x64 Edition

*1: OS : Microsoft® Windows® 2000 SP4 / XP SP2 / Vista / 7 except for Windows® XP Professional and Vista and 7 x64 Edition

*2: Subject to Internet provider

Network System CUT MONITOR i

- Real-time monitoring and recording of the operating status of the cutting
- Input and output of NC programs
- Changes EDM DATA in machining
- E-mail to cellular phones

Host PC

Cellular phone

Internet

Mail function

Ethernet

Machine status monitor

High speed I/O of NC program

System configuration

(*2: Subject to Internet provider)
Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>α -0їE</th>
<th>α -1їE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machining method</td>
<td>Submerge / Flushing</td>
<td></td>
</tr>
<tr>
<td>Maximum workpiece dimensions</td>
<td>without Automatic door 700×600×250 mm</td>
<td>1050×820×300 mm</td>
</tr>
<tr>
<td></td>
<td>with Automatic door 700×555×250 mm</td>
<td>1050×775×300 mm</td>
</tr>
<tr>
<td>Maximum workpiece mass</td>
<td>500 kg</td>
<td>1,000 kg</td>
</tr>
<tr>
<td>XY axis table travel</td>
<td>370×270 mm</td>
<td>600×400 mm</td>
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<tr>
<td>Z axis travel</td>
<td>255 mm</td>
<td>310 mm</td>
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<tr>
<td>UV axis travel</td>
<td>±60 mm×±60 mm</td>
<td>±100 mm×±100 mm</td>
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<tr>
<td>Max. taper angle</td>
<td>±30°/80 mm</td>
<td>±30°/150 mm</td>
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<tr>
<td>Wire diameter</td>
<td>Standard ±45°/40 mm</td>
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<td>Maximum wire mass</td>
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<td>Machine mass</td>
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<td>Part program storage size</td>
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Options

<table>
<thead>
<tr>
<th>Model</th>
<th>α -0їE</th>
<th>α -1їE</th>
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</thead>
<tbody>
<tr>
<td>0.05μm Linear encoder (X,Y-axis)</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>0.05μm Linear encoder (X,Y,U,V-axis)</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>Automatic dropping door</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>Work pan double door</td>
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<td>△</td>
</tr>
<tr>
<td>Work tank door switch</td>
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<tr>
<td>Work light</td>
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<tr>
<td>Warning light</td>
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<tr>
<td>Slide table</td>
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<tr>
<td>High-hardness table</td>
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<tr>
<td>Auto grease lubrication (X,Y-axis ball screw, linear guide)</td>
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<tr>
<td>Auto grease lubrication (X,Y,U,V-axis ball screw, linear guide)</td>
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<tr>
<td>Display swivel unit</td>
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<tr>
<td>Wire cutter</td>
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<tr>
<td>30kg wire loader</td>
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<tr>
<td>Flow meter</td>
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<td>△</td>
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<tr>
<td>20L ion exchanger</td>
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<tr>
<td>Pre-filter</td>
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<tr>
<td>Thin wire specification (wire φ 0.05 ~φ 0.3)</td>
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<tr>
<td>φ 0.5 Jet nozzle</td>
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<td>Spare die guide</td>
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<tr>
<td>Large taper die guide (for 30° or 45°)</td>
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<tr>
<td>MF2 (micro finish 2) power supply</td>
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<tr>
<td>PCD power supply</td>
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<td>△</td>
</tr>
<tr>
<td>Rotary table interface</td>
<td>△</td>
<td>△</td>
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<tr>
<td>Touch sensor</td>
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</tr>
<tr>
<td>Rotary cutting tool cut</td>
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<tr>
<td>3D coordinate system rotation *1</td>
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<tr>
<td>Easy measurement function</td>
<td>△</td>
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</tr>
<tr>
<td>FIN signal support, M code signal support</td>
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<td>△</td>
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<tr>
<td>PC FAPT CUT ɨ (CAM SYSTEM)</td>
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<td>○</td>
</tr>
</tbody>
</table>

※ Selection of options should be consulted to FANUC sales person.
※ Some options should be selected with other options, and some options cannot be selected with other options.
※*1 Manual function with the dial indicator or automatic function with the touch sensor are possible to select.

Installation Conditions

| Power supply | 200 VAC±10%three-phase, 50/60 Hz±1 Hz 220 VAC±10%three-phase, 60 Hz±1 Hz |
| Connection cable terminal size: 8-5 |
| Power consumption | 13kVA |
| Environment | Ambient temperature 15 ~ 30°C 20±1°C in case high precision machining is needed. Install under the oil mist free and dust free environment. Humidity 75%RH or less |
| Grounding | The unit must be grounded to avoid damage resulting from electro-magnetic interference or electrical leakage. The grounding itself should be of Type C (grounding resistance of 100 max.) as specified in the electrical installation standards and should be carried out independently of the grounding of any other piece of machinery. (One point grounding) |
| Shield room | If discharge noise can interfere with surrounding radio, television, and other sets, a shield room needs to be created. |
**Option Details**

- Linear encoder
- Automatic dropping door
- Work pan double door
- Work light
- Warning light
- Slide table (Q/E)
- Auto grease lubrication
- Wire cutter
- Rotary Table interface
- Touch sensor
- 30kg wire loader

**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.

**FANUC Training Center**

FANUC training center operates training programs on FANUC ROBOCUT, which focus on practical operations and programming with machining know how and maintenance.
The above floor plan is that of a standard type machine. Contact FANUC if you wish to order the options such as thin wire and a 30kg wire feed unit.

*) The above floor plan is that of a standard type machine. Contact FANUC if you wish to order the options such as thin wire and a 30kg wire feed unit.