High Speed Machining with Fine Surface Finish and Repeatable Accuracy for Higher Productivity
In the stamping industry, time can be critical. Makino’s **U3, with 3μmRz / 3 pass** capability cuts faster than other technologies. The mechanical structure of the machines also assures that movements between details will be accurate anywhere within the work envelope. This combination of speed, finish, and repeatability will help increase productivity.
Achieving Accuracy Through Mechanical Means

Utilizing structural analysis simulations, the modular machine structure of U3 achieves good rigidity even under extreme conditions.

Geometric accuracy is achieved through proven machine structure and not just obtained from electronic compensation.
EASE OF OPERATION

Revolving 15 inch Touch Screen Panel with height adjustable Keyboard

The revolving and adjustable control panel with keyboard provides operators with the flexible height and work requirements, making daily operations more efficient.

Accessibility

Table access allows easy loading / unloading of large workpiece on table, using mobile mechanical lifter.

MAINTENANCE

Guide Maintenance

When PICO Precision guides are removed for any reason, no lengthy re-alignment procedures are required after re-installing the guides. Reinstalling takes less than 45 seconds per guide and is done by simply threading the guide into the head and tightening. The U3’s new PICO Precision guides are inserted into a precisely located tapped hole, maintaining the vertical position of the guide. Precision machined mating surfaces of the guide and head assure proper guide height.
PICO Precision Guide System

(Wire diameter: Dia. 0.1, 0.15, 0.2, 0.25, 0.3 mm)

Pico Precision Guide System offers an innovative approach to closed round guides with high precision. Our Pico guides are specifically designed to cut Micro tapers with the highest possible accuracies. Initial start holes as small as 0.4mm diameter are automatically threaded without failure. These guides also are able to successfully thread small holes located in very tight pitch locations.

Reliable Simple and Compact Head Design

The Compact Head provide a powerful jet which lead the wire tip remove any sludge sticking to the insider surface of the guide to achieve stable automatic threading at all time. At the same time a new auto locking system for energizing plate is design for quick adjustment and tightening.

Makino Pre-Guide Technology

Makino’s wire guide system has an additional Sapphire V guide positioned between the Wire Guide and the energizer plate. This assures proper contact of the wire to the energizer as the energizer wears.
AUTOMATIC WIRE THREADING

High-Performance Twin-Jet Automatic Wire Threading System

The machine comes with a twin-jet system that discharges small diameter, high pressure fluid jet through nozzles provided at the top and inside of the Pico guide on the upper head. The powerful twin-jets and the wire pecking feed system thread the wire tip through the Pico guide at high speed. When there is an unfavorable wire start hole or wire break recovery, the reliability of wire threading will be affected, our new Pecking Feed System will improve the success of threading.

High-Speed Automatic Wire Threading

A new wire feed system accomplishes automatic threading in within 10 second according to the hole diameter and plate thickness recommended. *High-speed pecking enables quick retries and rethread if the wire is blocked when threading small diameter start hole.

Thermal Cutter System

The new wire cutting system will cut the wire without burrs and with pointed tip which further enhances the reliability of Automatic Wire Threading. It works on all range of wire.
HYPER-CUT TECHNOLOGY

3μmRz / 3 Pass Machining Improves Productivity

Under standard machining condition, the U3 machines is able to deliver a surface finish of 3μmRz with just 3 pass machining. This met the requirement of cutting blades of progressive die used in precision metal stamping operation.

![Image of a blade](image)

**Makino's Taper Compensation Function** facilitates more accurate taper machining up to eight different taper angles. Split compensation and land compensation can be used to further improve the accuracy.

The compensation amount can also be easily calibrated by using dial indicator. This eliminates the need to remove the job for measurement. The results are time saving and more effective machine usage.

### TAPER COMPENSATION FUNCTION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece Material</td>
<td>Steel(SKD-11)</td>
</tr>
<tr>
<td>Wire Used</td>
<td>0.25mm dia. Brass Wire</td>
</tr>
<tr>
<td>Material Thickness</td>
<td>80 mm</td>
</tr>
<tr>
<td>Surface Finish</td>
<td>3μmRz</td>
</tr>
</tbody>
</table>

**Adapt Taper**

<table>
<thead>
<tr>
<th>Taper Angle</th>
<th>Start Value</th>
<th>End Value</th>
<th>Step Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.000°</td>
<td>7°</td>
<td>-4°</td>
</tr>
<tr>
<td>2</td>
<td>0.000°</td>
<td>57°</td>
<td>-47°</td>
</tr>
<tr>
<td>3</td>
<td>10.000°</td>
<td>64°</td>
<td>-63°</td>
</tr>
<tr>
<td>4</td>
<td>15.000°</td>
<td>65°</td>
<td>-70°</td>
</tr>
<tr>
<td>5</td>
<td>20.000°</td>
<td>111°</td>
<td>-110°</td>
</tr>
<tr>
<td>6</td>
<td>25.000°</td>
<td>111°</td>
<td>-110°</td>
</tr>
<tr>
<td>7</td>
<td>30.000°</td>
<td>111°</td>
<td>-110°</td>
</tr>
</tbody>
</table>

**Machining Result**

- Upper: 0.000 mm
- Lower: 0.000 mm

**Machining Parameters**

- Taper Angle: 3.00°
- Taper Compensation: 0.250°
- Machining Time: 10,000 ms
- Machining Mode: COOLANT ON

**U3 Wire Electrical Discharge Machine**
WIRE NAVI - 3 EASY STEPS TO OPERATE

A programming guidance system that guides the operator along the shortest path to start of machining.

**STEP 1** PROJECT

This screen is used to set the program and machining setting method.

1. Select the wire diameter.
2. Select the wire material.
3. Select the plate thickness.
4. Select the machining method according to the wire shape.
5. Select the finishing method for the targeted surface finish.

Operators can simply select the optimum machining conditions from a wide variety of machining conditions.

**STEP 2** SET UP

Workpiece setting work has been consolidated on one screen.

Measurement pattern display

A detailed and easy explanation is provided for the procedures to perform actual measurements.

**STEP 3** OPERATION

Information relating to the status of machining operations is centralized on one screen. The status of process of machining can be ascertained through the upper level graphics. Also, the lower level makes it possible for the operator to check machining conditions, the coordinate system and project settings.
## Machine Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>U3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel (X + Y + Z axes)</td>
<td>mm</td>
</tr>
<tr>
<td>Travel (U + V axes)</td>
<td>mm</td>
</tr>
<tr>
<td>Table Working Area</td>
<td>mm</td>
</tr>
<tr>
<td>Maximum Workpiece Size</td>
<td>mm</td>
</tr>
<tr>
<td>Maximum Dielectric Fluid Height</td>
<td>mm</td>
</tr>
<tr>
<td>Maximum Workpiece Weight</td>
<td>kg</td>
</tr>
<tr>
<td>Height to Table Surface</td>
<td>mm</td>
</tr>
<tr>
<td>Wire Electrode Diameter</td>
<td>mm</td>
</tr>
<tr>
<td>Maximum Taper Angle</td>
<td></td>
</tr>
<tr>
<td>Dielectric Fluid Tank Capacity</td>
<td>L</td>
</tr>
<tr>
<td>Deionizing Resin</td>
<td></td>
</tr>
<tr>
<td>Dielectric Fluid Filters</td>
<td></td>
</tr>
<tr>
<td>Machine Dimensions (W × D)</td>
<td>mm</td>
</tr>
<tr>
<td>Machine Height (H)</td>
<td>mm</td>
</tr>
<tr>
<td>Floor Space (W × D)</td>
<td>mm</td>
</tr>
<tr>
<td>Machine Weight</td>
<td>kg</td>
</tr>
</tbody>
</table>

*1 MEGACUT-A wire is required for taper machining larger than 10°. And Machinable taper angle larger than 2° is limited according to jet nozzle diameter.

## Optional Specifications

- Submerged Machining Specification
- PICO Precision Guide (Round Guide) System
- U Shape Work Table
- Automatic Water Level Setting
- Automatic Wire Threading Unit
- Fine-hole Automatic Wire Threading Unit
- Jet Nozzle (dia 1.2 mm)
- Dielectric Fluid Cooling Unit
- Automatic Power Failure Recovery
- Power Supply Line Filter
- Portable Multifunction Control Panel FPB2
- Ethernet 10/100BASE-TX
- USB Flash Memory Interface
- Part Program Storage Length 1000 m

## MGW-S7 Power Supply Unit

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit Type</td>
<td>Transistor Pulse Circuit</td>
</tr>
<tr>
<td>Maximum Machining Current</td>
<td>30 A</td>
</tr>
<tr>
<td>Current Settings</td>
<td>128 levels</td>
</tr>
<tr>
<td>Voltage Settings</td>
<td>35 levels</td>
</tr>
<tr>
<td>Off intervals</td>
<td>256 levels</td>
</tr>
<tr>
<td>Automatic Voltage Regulator</td>
<td>Standard</td>
</tr>
<tr>
<td>Cooling System</td>
<td>Forced Air Cooling</td>
</tr>
<tr>
<td>LL Generator Circuit</td>
<td>Standard</td>
</tr>
</tbody>
</table>

Jet nozzle diameter and start hole diameter for machining with nozzle contact (2)

<table>
<thead>
<tr>
<th>Dia. 0.7 mm jet</th>
<th>Dia. 0.5 mm jet</th>
<th>Dia. 0.4 mm jet</th>
<th>Dia. 0.3 mm jet</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ~ 30</td>
<td>0 ~ 35</td>
<td>0 ~ 50</td>
<td>0 ~ 100</td>
</tr>
</tbody>
</table>

*2 Automatic wire threading success rate for wire exceeding 100mm have been decreased.

## Optional Equipment

- **Machine**
  - Square Shape Work Table
  - Special Hardening Work Table (U Shape, Square Shape)
  - 0.05μm Scale Feedback (X, Y axes or X, Y, U, Y axes)
  - Special Customer-specified Machine Colors
  - Large-capacity Wire Reel Loader (20 kg, 30 kg)
  - Jet Nozzle (dia. 0.5, 0.7 mm)
  - Workpiece Clamp Set
  - Automatic Water Supply Unit
  - Additional Filters Unit
  - Workpiece Washing Gun
  - Maintenance Set
  - Running Kit
  - Work Light

- **Control System**
  - Alarm Signal Tower (1, 3 lamps)
  - Program Master
  - Additional Part Program Storage (total 1000 + 2000 = 3000 m)
  - Operated Circuit Breakers

*Not Retrofitable*
STANDARD FLOOR PLAN

U Shape Work Table

Square Shape Work Table

Top View

Front View

Side View

U3 Wire Electrical Discharge Machine
1. Floor area and foundation work

<table>
<thead>
<tr>
<th>Required installation space (including maintenance area) mm</th>
<th>U3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Depth</td>
</tr>
<tr>
<td>1981</td>
<td>2941</td>
</tr>
</tbody>
</table>

It is recommended that a foundation be prepared for installing a machine, because a solid foundation is essential for maintaining high accuracy. Allowable vibration: 0.7 m/s² (0.07G) maximum

2. Factory air-conditioning equipment

Recommended optimal temperature: 20 ± 1°C

<table>
<thead>
<tr>
<th>Temperature range</th>
<th>10°C-35°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative humidity</td>
<td>75% max (without any condensation)</td>
</tr>
</tbody>
</table>

3. Measures against electromagnetic interference

It is recommended that EDM machines be isolated from equipment that produces dust. EDM machines should be isolated from equipment that produces dust. EDM machines should not be exposed to direct sunlight or discharges from an air-conditioning system. EDM machines should not be partially heated by a stove or other heating device.

4. Electrical work

<table>
<thead>
<tr>
<th>Power supply specification</th>
<th>U3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply specification</td>
<td>AC 3-phase, 200 V ±100%, 50/60 Hz ± 2%</td>
</tr>
<tr>
<td>Breaker capacity (A)</td>
<td>8 (standard)</td>
</tr>
<tr>
<td>Power line cable size (mm²)</td>
<td>50</td>
</tr>
</tbody>
</table>

5. Provision of compressed air

0.6 MPa, 10 L/min (equivalent to a 1.5 kW compressor)

6. Provision of water supply

An automatic water supply unit is available as optional equipment for controlling the fluid volume of the dielectric fluid supply unit automatically. A water supply source will be necessary if the automatic water supply unit is used.

7. Factory environment

The following factory environment is recommended for maintaining high machine accuracy at all times.
- EDM machines should be isolated from equipment that produces dust.
- EDM machines should not be exposed to direct sunlight or discharges from an air-conditioning system.
- EDM machines should not be partially heated by a stove or other heating device.

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*The specifications in this catalog may be changed without prior notice to incorporate improvements resulting from ongoing R&D programs.*

*The machines displayed in this catalog are fitted with optional equipment.*

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