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\*The all products in this catalogue include the optional specifications and equipment.

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H281Ed 1512/1(SJ-T-M)

Large Submerged Wire Electrical Discharge Machine

# U86·UI310



# Large submerged Wire EDM machines with high precision capability

Besides delivering the superb accuracy and high speed machining that hallmark Makino's U series Wire EDMs, the U86 and U1310 are the world's first large machines to feature a programmable 3-sided drop tank system. This ergonomic design provides outstanding accessibility for work piece loading and part setups, and simplifies process automation. With its ease of use and flexibility, the U86 and U1310 machines deliver unmatched versatility and productivity to serve every industry.



			U86	U1310
Axis travels	X × Y × Z	mm	800 × 600 × 520	1310 × 1010 × 520 or 620*
	U × V	mm	± 101 × ± 101	± 101 × ± 101
Maximum workpiece size L × W × H		mm	1220 × 910 × 500	2000 × 1600 × 500 or 600*
Maximum workpiece weight		kg	3000	6000

\*: optional specification

# H.E.A.T. Note

Fastest both nozzle away machining in the world In EDM, the most difficult cuts are when the nozzles are detached from the workpiece. Makino H.E.A.T. Note uses a combination of flushing enhancements and special generator upgrades that greatly increase cutting speed. As a result, Makino H.E.A.T. Note delivers a part to the customer with minimal operator intervention, fast, accurate and with superior surface finishes. This combination is unmatched in the EDM industry.

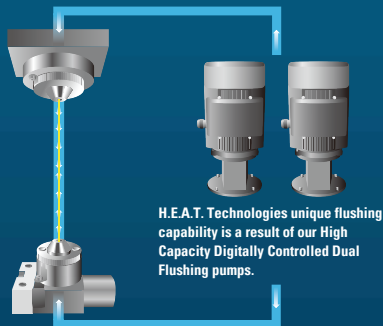
Note : H.E.A.T. is an abbreviation of High Energy Applied Technology

Wire diameter : 0.2 - 0.3 mm (brass wire)  
Workpiece height : 20 - 350 mm



## Machining Time

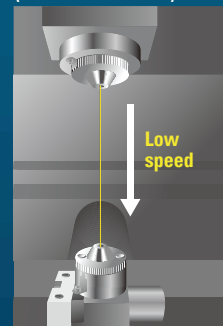
**43%** faster\* than conventional machine technology (vs. non-H.E.A.T.)



H.E.A.T. Technologies unique flushing capability is a result of our High Capacity Digitally Controlled Dual Flushing pumps.

## Running Cost

**33%** reduction of wire consumption from conventional technology (vs. non-H.E.A.T.)



The supply of the wire electrode is automatically optimized according to the machining condition. Using advanced adaptive control technology, Low Wire Consumption is achieved with no loss to machining speed or accuracy.

\* The actual value of the machining under the following conditions.  
Used wire diameter: 0.25 mm (brass) Workpiece height: 150 mm

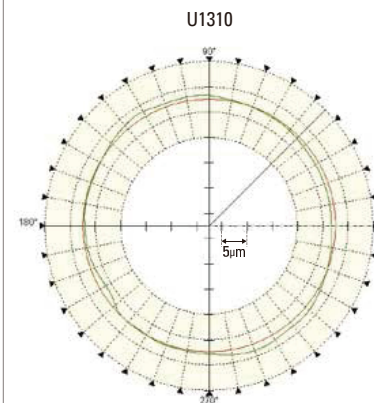
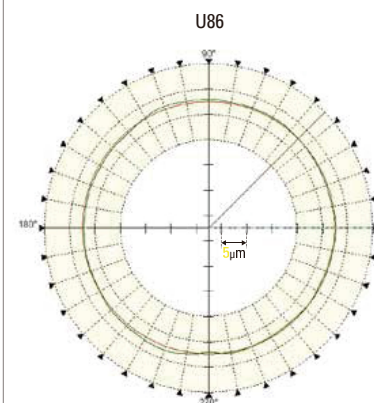
## Superior accuracy

The U86 and U1310 adopt a fixed table for superior machining accuracy even when the table is loaded with a heavy workpiece.

### Roundness

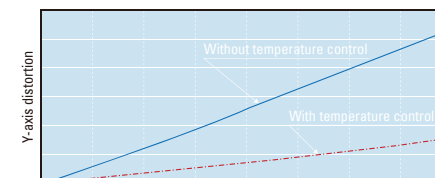
Superior machine rigidity, machining technology and control software combine to deliver exceptional roundness.

Example of roundness (actual measured value)



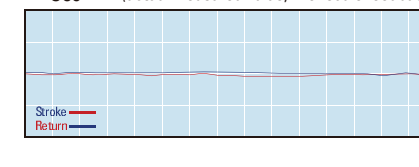
### Machine temperature control

Thermal distortion is reduced by keeping the temperature inside the machine at the same level as the dielectric fluid temperature, which is controlled by the dielectric fluid cooling unit.

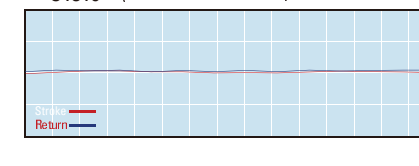


### Position accuracy

(μm) U86 (actual measured value, with scale feedback\*)



(μm) U1310 (actual measured value, with scale feedback\*)



\*: optional specification



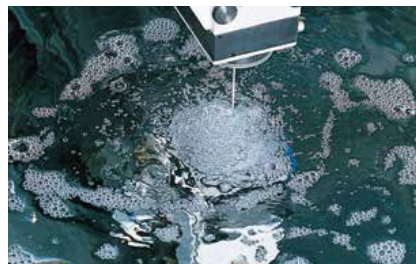
# Superior operating ease

With Makino's unique 3-sided drop tank design, even a large machine can provide excellent accessibility for easy operation.



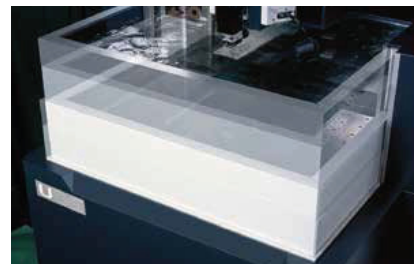
Lowering the work tank allows unobstructed access from three sides, and drops below the table level for even greater accessibility.

Using a pair of L-shaped workpiece fixtures allows workpieces to be set up within easy reach.



## Shorter automatic threading time

Makino's outstanding threading control feature selects an efficient threading procedure to match the hole diameter and workpiece thickness. This function substantially reduces automatic threading time over that of previous machines.



## Fast work tank fill/drain times

Since the work tank height can be adjusted to match the workpiece, the operator can clearly see the machining condition at all times.

	U86 Z axis 520 mm (std.) (Work tank capacity 1150 L)	U1310 Z axis 520 mm (std.) (Work tank capacity 3000 L)
Tank filling time	110 sec.	160 sec.
Tank draining time	70 sec.	90 sec.

## Simple setups even for large workpieces



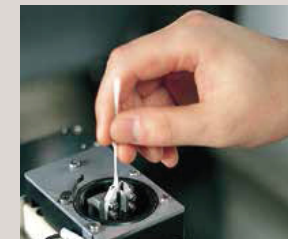
Foot recesses are provided at the bottom of the cast bed on three sides of the table to allow a comfortable working posture. A space of 160 mm from the floor is provided at the front of the machine to facilitate the use of a simple lift for easy workpiece setups.

## Simple maintenance



### Energizing plate replacement

Lowering the work tank below the table surface allows easy energizing plate replacement even with a workpiece on the table.

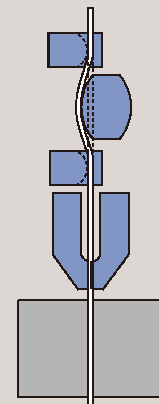


### Wire guide cleaning

Simply open the wire guide and wipe it clean with a cotton swab. Since the wire guide is not removed during cleaning, there is no need to align the wire vertically afterwards. Cleaning can be completed in just a few minutes.

### Reduction of total running cost

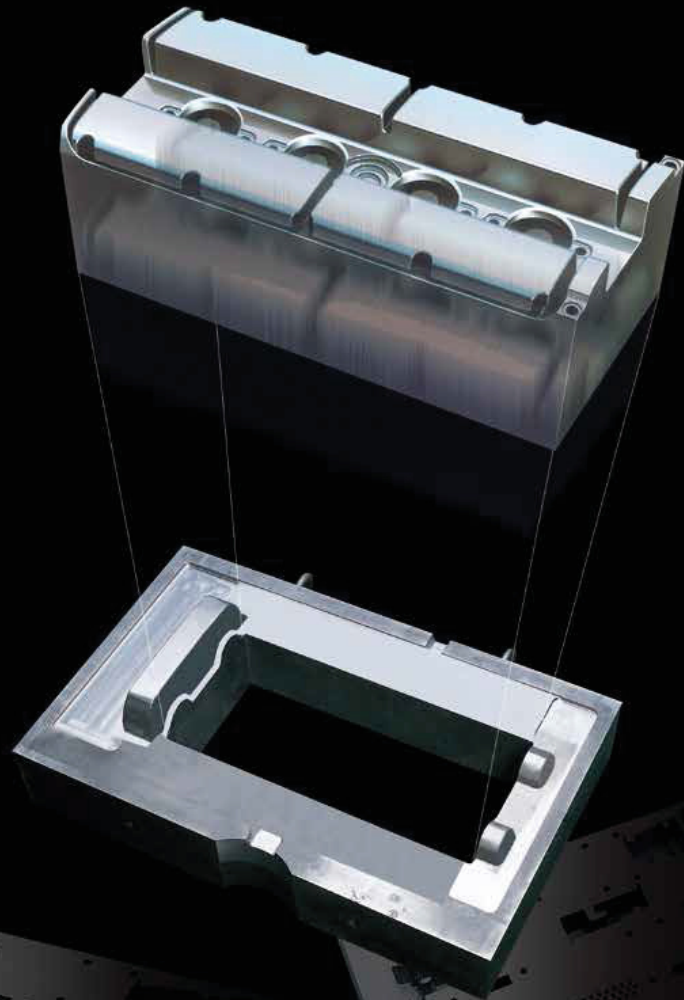
The U-Series achieves a lower running cost by using less wire and consumables such as filters and energizing plates.



Makino's wire guide system maintains excellent vertical alignment

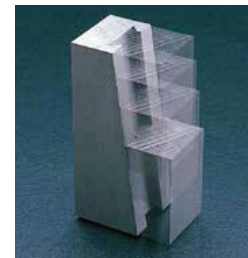
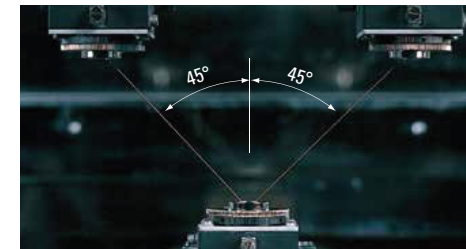
# Versatility for handling diverse applications

The large machining area easily accommodates big workpieces, and provides productive machining for any industry need. The U-Series can handle diverse applications from tall work pieces and high precision machining, to taper angle cut requirements for Die and Mold components.

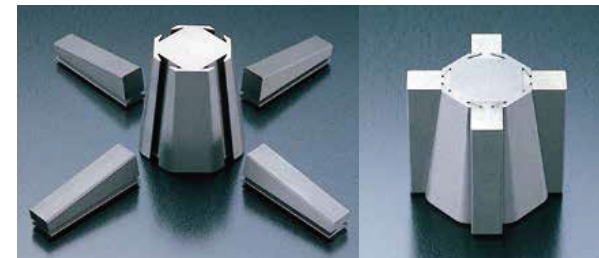


## Angle cut set (optional equipment)

Large taper angles up to 45 degrees can be machined with the optional Split C-Guides. Improved taper accuracy and finer surface finish can also be achieved with the C-Guide when using wire designed for high taper machining. The C-Guides are available in 0.20 and 0.25 mm diameter.



Workpiece material : Carbon steel (S55C)  
Wire used :  $\phi 0.2$  mm coated wire  
Plate thickness : 40 mm, 80 mm  
The number of machining passes : 3  
Machining time : 40 mm 3 hr. 29 min.  
80 mm 7 hr. 53 min.  
Surface finish : Rz 7 $\mu$ m  
Taper angle : 8°



Workpiece material : Tool steel (SKD11)  
Wire used :  $\phi 0.2$  mm coated wire  
Plate thickness : 30 mm  
The number of machining passes : 3  
Machining time : 6 hr. 1 min.  
Surface finish : Rz 7 $\mu$ m  
Taper angle : 8°

## Hyper *i*

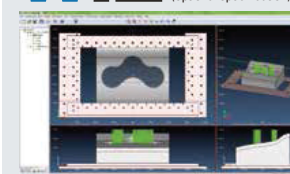
### intuitive | intelligent | interactive

Makino's new Hyper *i* Control revolutionizes the interface between the operator and the machine. Using the most current interface technologies used by Smartphones and Tablets, Makino's Hyper *i* Control makes use of Pinch, Swipe and Spread functions that provide the operator with a simple and natural feel that is comfortable and extremely efficient. The user friendliness of the high definition touch screen on the Hyper *i* Control is further enhanced with the integration of on-board digital manuals, intelligent help functions, and e-Learning training system.



### CAM system for wire EDM

## WIZ (optional specification)



The optional WIZ CAM system can be used to efficiently create machine NC programs, and also perform process simulation. The system support common 2D and 3D file formats, such as IGES and Parasolid files. The WIZ CAM system can be selected as an off-line PC system or built into the Hyper *i* control.



### Second Display Screen Option

The U series machines can be equipped with a second high definition touch screen for use with the optional on-board WIZ programming system, or to display a second control page.

			U86	U1310
Axis travels	X × Y × Z	mm	800 × 600 × 520	1310 × 1010 × 520 or 620 *
	U × V	mm	±101 × ±101	±101 × ±101
Maximum workpiece size	mm		1220 × 910 × 500	2000 × 1500 × 500 or 600 *
Maximum dielectric fluid height	mm		530	570 or 670 *
Maximum workpiece weight	kg		3000	6000
Wire electrode diameter	mm		To be select among 0.20, 0.25 and 0.30	To be select among 0.20, 0.25 and 0.30
Rapid traverse X and Y axes	mm/min		3000	3000
Maximum taper angle (standard guides)			±15°	±15°
Dielectric fluid tank capacity	liters		2150	4500 / 4630 *
Deionizing resin			5liters × 4	20liters × 2
Machine dimensions (W × L × H)	mm		2940 × 3725 × 2785	3755 × 5255 × 2925 or 3125 *
Floor space (W × L) (including equipment units and maintenance area)	mm		3650 × 4000 (When large capacity wire reel loader located at the back of the U86)	4500 × 6300
Machine weight (including equipment units)	kg		9600	16700 or 17000 *

\*: optional specification

#### Standard specifications

- Drop tank design
- Taper machining unit
- Automatic wire threading unit
- Fine-hole automatic wire threading unit
- Opposed L-shaped table
- Machine temperature control
- Large-capacity wire reel loader (30 kg reel)
- H.E.A.T.
- Custom pitch function
- Power supply line filter

#### Power supply · Control Unit Hyper i

- High definition screen (Touch panel)
- Portable operation panel
- Automatic power failure recovery device
- Ethernet 1000BASE-T/100BASE-TX/10BASE-T
- USB flash memory interface
- Anti-virus software
- EDM Explorer

#### Optional specifications ◆ Optional equipment

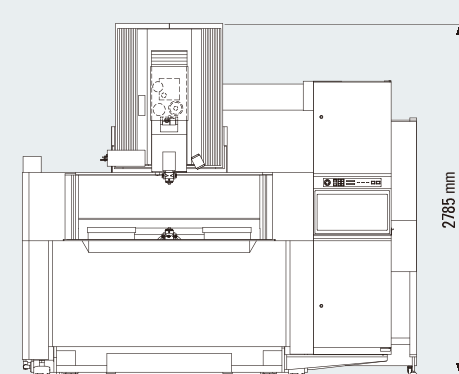
- Z axis 620 mm specification (only U1310)
- Square table (only U86)
- 0.1 μm scale feedback (X and Y axes)
- 0.1 μm scale feedback (X, Y, U and V axes)
- Workpiece measuring device
- Automatic tank height setting
- Additional filter unit  
(standard 4 units+ 2 units) / (standard 4 units + 4 units)
- Electric antirust unit
- Workpiece air blow for anti-rust
- Cartridge type ion exchange deionizing resin unit  
(available only in Japan)
- High speed machining specification  
(Only for U86. For U1310 this is standard specification.)
- Customer specified machine color
- ◆ Washing gun
- ◆ Automatic water supply unit
- ◆ Angle cut set  
(available only when 0.2 and 0.25 mm diameter wire)
- ◆ Wire cutting device
- ◆ Export transformer
- ◆ Signal tower (1-layer, 2-layer or 3-layer)
- ◆ Program master
- ◆ External keyboard & mouse
- ◆ Additional monitor  
(Including external keyboard & mouse)
- ◆ WIZ CAM system for wire-EDM
- ◆ Circuit breaker
- ◆ I/O interface RS-232C
- ◆ MEL machine kit
- ◆ EDM Viewer \*1
- ◆ EDM Viewer connecting kit \*2
- ◆ Email notified function

\*Optional specifications are not retrofittable.

#### Power supply · Control Unit Hyper i

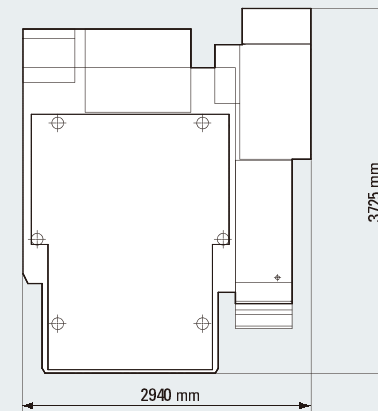
Item	Specification
Model	EW100A
Circuit type	Transistor pulse
Maximum machining current	30 A
Current setting	128 steps
Voltage setting	35 steps
OFF intervals	256 steps
Automatic voltage	Standard
Regulator cooling system	Forced air cooling
LL generator circuit	Standard

#### Front View and Floor Plan



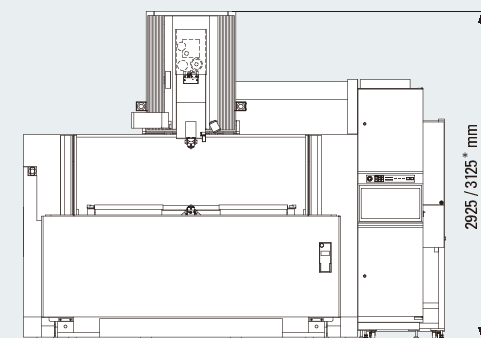
#### U86 Front View

(When large-capacity wire reel loader located at the back of the U86)



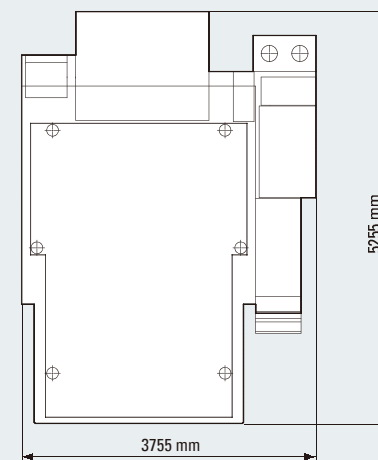
#### U86 Floor Plan

(When large-capacity wire reel loader located at the back of the U86)



\*: Z axis 620 mm (optional specification)

#### U1310 Front View



#### U1310 Floor Plan

\*1 Requires EDM Viewer connecting kit.  
But ignore it when MEL machine kit is attached.  
\*2 Not available with MEL machine kit.