

# EWP-B3S2

## The pinnacle of submerged ultra-precision machining in the sub-micron class

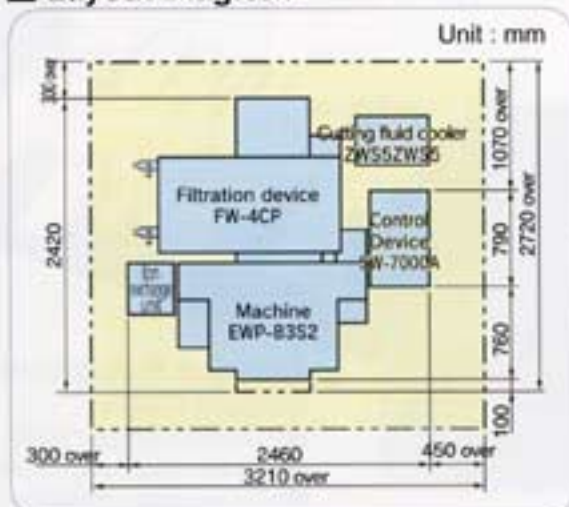
- A state-of-the-art system delivering machining precision of within  $\pm 2 \mu\text{m}$  and surface roughness as high as  $0.7 \mu\text{m Ry}$ .
- Automatic feeding of 0.07mm-diameter wire electrode with the high-speed feeder provided as standard equipment.
- Seal-free construction between lower arm and submerged work tank means long-term high precision.
- Mounts the EP-A non-electrolytic power supply and the SF-3 super finishing power supply.
- Gate-type frame offers superb thermal balance through a high-rigidity cast structure.
- Full closed-type table drive controlled in 0.1 micron units by linear scale.



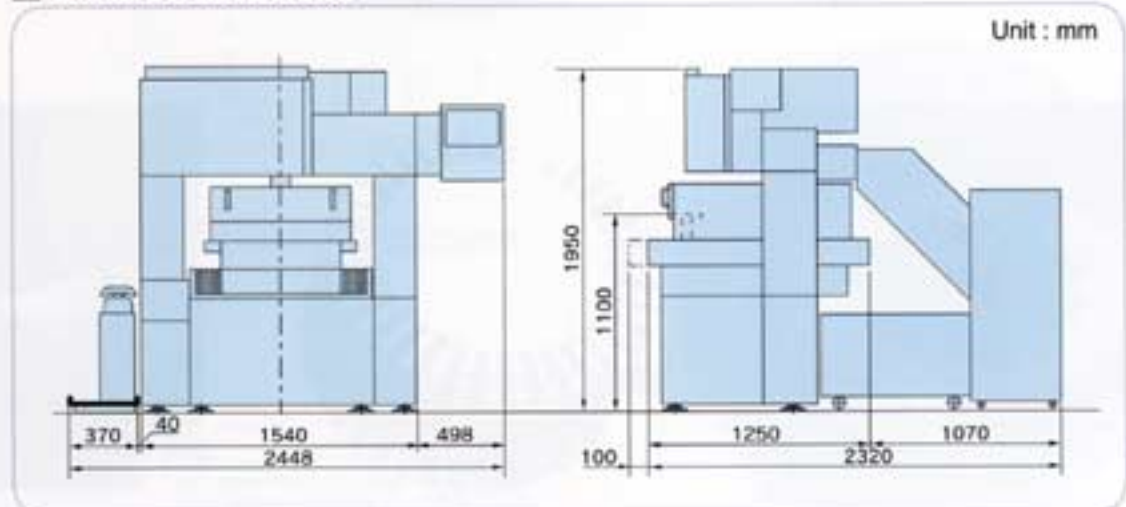
### Major Specifications

- Max. dimensions of workpiece  
400(15.7)×300(11.8)×120(4.7) mm (W×D×H)  
(Maximum workpiece height 100mm for submerged machining.)
- Max. weight of workpiece : 100kg (220Lbs)
- Table driving system : AC servo motor
- Table travel  
Right & left (X axis) : 300 (11.8) mm  
Back & forth (Y axis) : 200 ( 7.8 ) mm
- Z axis travel (up & down) : 140 ( 5.5 ) mm

### Layout Diagram



### Outline Dimensions



# All models feature LCD panels. Compact, one-box designs are easier to use than ever.

With two 32-bit onboard CPUs, this NC controller offers dramatically enhanced processing speed and the performance only possible with our new cutting circuitry. The user interface and machine control software have been improved to combine multi-function performance with simple operation. The NC controller can control the XY, UV and Z axes individually, and with simultaneous 4axis control can handle complex machining tasks like work-piece with differing upper and lower shapes, a wide range of tapers, and continuous cutting of work-pieces with varying heights through Z-axis control.



## Multi-window functions

Four powerful multiwindow functions instantly display needed information. The custom window can be freely sized and positioned by the user, and can show up to three diagnostic and maintenance screens. There are also the help window, menu window to display data parameters, and the alarm window to display alarm information.



## One-touch positioning

A special screen has been provided for positioning, adjusting wire perpendicularity and measuring guides span. Once parameters are set positioning can be executed automatically later with a single button. And because of the extensive automation used, positioning is simpler than ever.



## Memory and MDI operation

The machining screen now shows all essential information, including any four of the ten supported coordinate data systems, operating conditions, taper constants, cutting speed and circumference, cutting path, and soft limit switch set regions. All with instantaneous screen update. With the multi-window function, user-defined screen layout is simple.



## Mini-APT

Even while cutting, graphic editing is possible for the next shape to be machined. Simple shapes can be created inter-actively from lines and arcs, and the NC program automatically generated when complete. The controller will handle tedious intersection and contact point coordinate calculation, making it possible to design shapes just like using a pencil.



## Enhanced maintenance and diagnostic information

Alarms and warnings generated during cutting are instantly displayed on the screen, while consumables and maintenance points are managed on a special maintenance screen. Production information and operation history data provide statistical management of uptime ratios and wire feeding status and alarm log.



## Program load/save

Programs and cutting conditions can be read in from paper tape or floppy disks, and direct up and down loading with CAD systems is possible through the RS232C interface. Many programs written in formats from other vendors can also be converted to Seibu format.

## Powerful editing functions

Include cut and paste, search and replace, partial saving, and reference functions.

## Drawing check

Drawings can be checked quickly and accurately with functions like automatic scaling, partial magnification and 3D wire frame generation. And because the drawings for one program can be edited while cutting a different program, efficiency is better than ever.

## Load/save for cutting conditions

14,000 items of 1,000 types cutting conditions can be saved to later use. automatic search of cutting condition is possible from keys like work material, thickness, finish surface roughness and wire type.

# High-grade, high-precision non-electrolytic cutting with the Seibu EP

supply : and a cutting speed close to that of conventional systems.

In non-electrolytic cutting, elution of cobalt as a binder used in tungsten carbides, can be prevented, maintaining material strength at the premachined level. Electrolytic degradation of machined titanium alloy and aluminum surfaces is prevented, and elimination of titanium alloy discoloration yields high-quality output.



## Corrosion - free effect

Non-electrolytic cutting controls oxidation of the anode, providing a dramatic rust suppression effect for ferrous materials.

## High-grade cutting

The non-electrolytic cutting method totally eliminates electrolytic corrosion, helping prevent hairline cracks and softening on the cutting surface, enhancing die life.

## High-speed non-electrolytic cutting

Non-electrolytic cutting is used for the complete process from rough cutting to finishing, with cutting speeds close to that of traditional designs.

### ■ Tungsten carbide

#### EP cutting



#### Conventional cutting

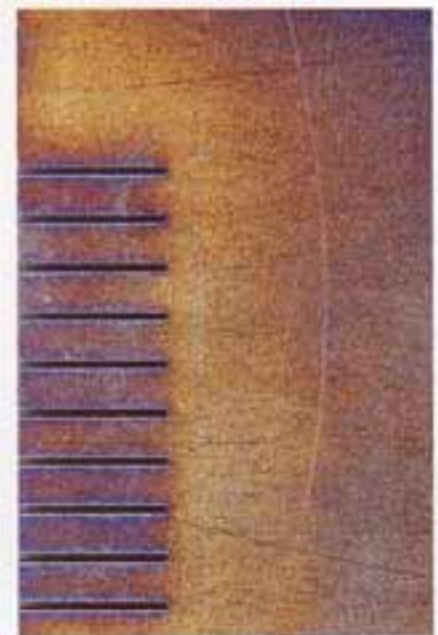


### ■ Titanium alloy

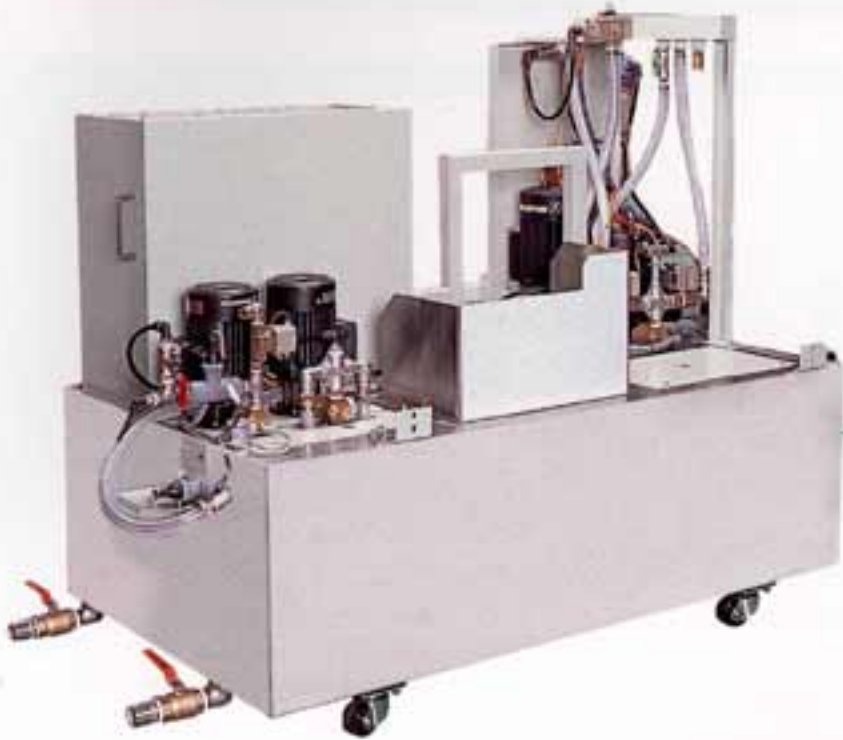
#### EP cutting



#### Conventional cutting



# Filtration Device



## FW-4CP

- Target machine / EWP-B3S2
- Ion exchange resin / 20 l
- Internal/external pressure paper filter / 2 pcs.
- Tank capacity / 400 l
- Weight / 400kg (not including cutting fluid)
- Power input / Included in control system
- Dimensions / 850 × 1,500 × 1,350mm  
(33.5 × 59.1 × 53.2)

## FW-7C

- Target machine / EW-A5S2
- Ion exchange resin / 20 l
- Internal/external pressure paper filter / 2 pcs.
- Tank capacity / 700 l
- Weight / 350kg (not including cutting fluid)
- Power input / Included in control system
- Dimensions / 1,000 × 2,030 × 1,150mm  
(39.4 × 80.0 × 45.3)



# Preparation for installation

### Installation site

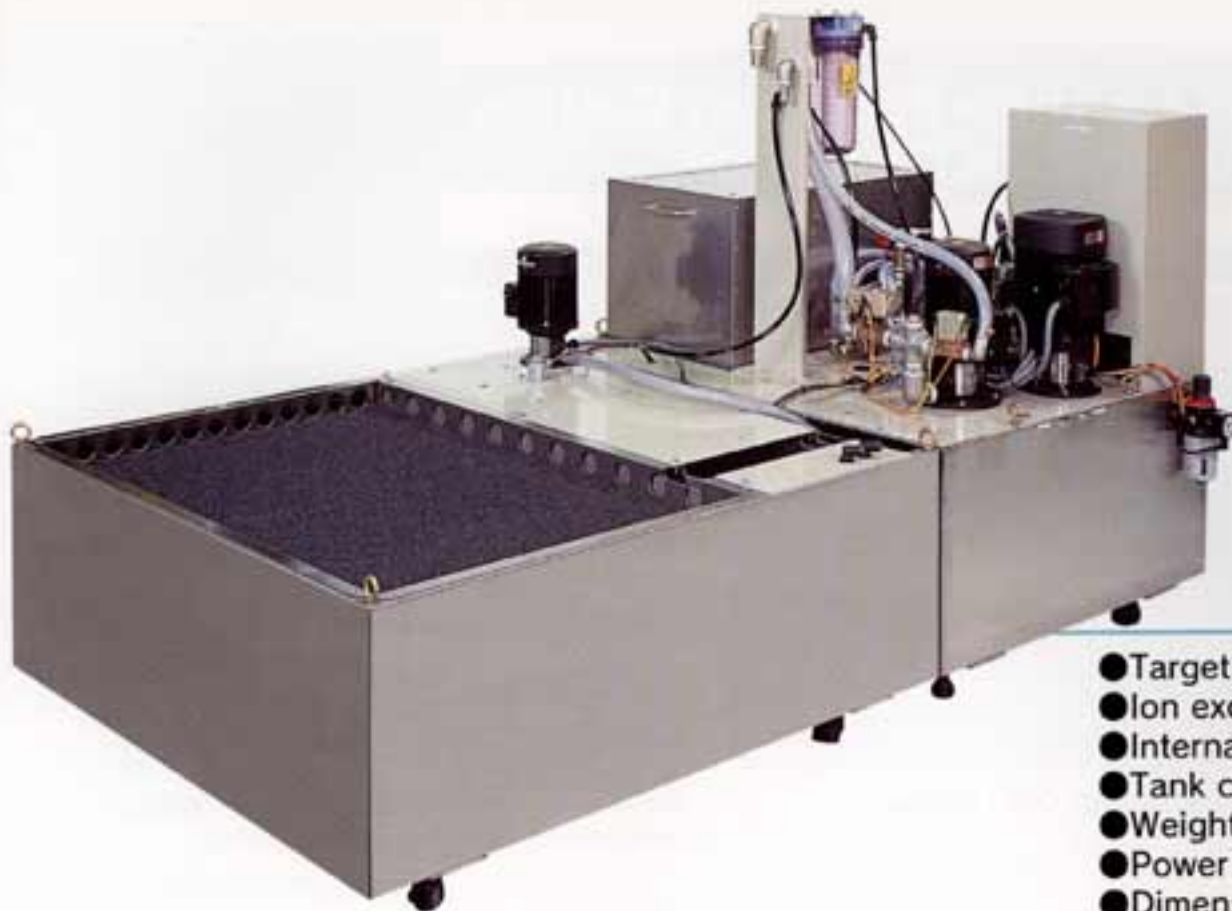
We recommend that you install your EDM system in a site that fulfills the following conditions:

- Small temperature change  
The optimum temperature is  $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . Temperature change will adversely affect the system's precision. Avoid direct exposure to air conditioning cold air or sunlight.
- Low humidity and particle count  
If other machine tools are located nearby the machining dust will have an adverse effect on the sliding and rotating surfaces (ballscrews, etc.) of the system, so be sure that the operating environment is clean. Any condensation will cause system corrosion.
- Low vibration  
Excessive vibration will make it difficult to maintain machining precision. Either resite the system or use foundations to isolate it.
- We recommend using this system in a shielded room to avoid excessive EMI.

### Installation construction

Be sure to ground this system to prevent leakage accidents, misoperation due to electrical noise and EMI problems.

- Class 3 grounding (ground resistance  $10\Omega$  max.) is required, with each EDM system to be grounded separately.
- The grounding cable should be at least  $14\text{mm}^2$  in cross-section.



## FW-11C

- Target machine / EW-A7S2
- Ion exchange resin / 20ℓ
- Internal/external pressure paper filter / 2 pcs.
- Tank capacity / 1,100 ℓ
- Weight / 400kg (not including cutting fluid)
- Power input / Included in control system
- Dimensions / 1,200 × 2,500 × 1,150mm  
(47.3 × 98.5 × 45.3)

## FW-3C

- Target machine / EW-K3 Series
- Ion exchange resin / 5 ℓ
- Internal/external pressure paper filter / 2 pcs.
- Tank capacity / 340ℓ
- Weight / 300kg (not including cutting fluid)
- Power input / Included in control system
- Dimensions / 1,030 × 1,170 × 950mm  
(40.6 × 46.1 × 37.4)



For FW-3C and 4CP



Internal/external pressure  
3 μm paper filter  
φ 300 × 500mm  
(OD × height)

For FW-7C and 11CP

Internal/external pressure  
3 μm paper filter  
φ 340 × 300mm  
(OD × height)

### Shielded room

If televisions, radios or other communication equipment are affected, it may be necessary to install the system in a shielded room.

- Ground the system within the shielded room.
- If the ground can not be made within the shielded room, use a thubolt into the shielded room. Please consult the vendor in advance for shielded room installations.

### Power supply

Complete power supply construction before installing the EDM system. The input power supply must use a dedicated line from the factory supply.

- If there is excessive voltage fluctuation it may be impossible to assure stable machining or precision.
- The wire EDM system input capacity will vary with the specific system; refer to the specifications.
- Use a leakage breaker with a 100mA current sensitivity.

### Compressed air supply

The wire EDM requires connection to a compressed air supply. Complete all piping before installing the EDM system.

- Required air pressure : 0.5MPa minimum (5kgf/cm<sup>2</sup> minimum)
- Connector ID : 0.8mm diameter nylon or urethane hose

# Machine Specifications

| Item                                   | Model                               | EW-A5S2  | EW-A7S2                                      | EW-300K3                                  |                      |     |
|--|-------------------------------------|--|--|---|----------------------|-----|
| Machine                                | Max dimensions of workpiece (W×D×H) | ※3 750×600×300(250)<br>(29.5)×(23.6)×(11.8)  | ※3 900×700×300(250)<br>(35.4)×(27.5)×(11.8)  | ※1 450×400×250<br>(17.7)×(15.7)×(9.8)     | ※1                   |     |
|  | Max weight of workpiece             | 750kg(1,650Lbs)  | 1,000kg (2,200Lbs)                           | 300kg(660Lbs)                             |                      |     |
|  | Table travel distance               | Right & left direction   | (X-axis) 500mm (19.6)                        | (X-axis) 700mm(27.5)                      | (X-axis) 300mm(11.8) | (X) |
|  |                                     | Back & forth direction   | (Y-axis) 300mm(11.8)                         | (Y-axis) 500mm(19.6)                      | (Y-axis) 250mm( 9.8) | (Y) |
|  | Table manual feed rate(X-Y axes)    | (Quick)900mm/min(35.4 in / min)<br>Step feed 0.0001mm(0.000004)~1.0mm(0.04)(0.1 μm unit)                           |  | (Quick)1,200mm/min(47.2 in/min)           |                      |     |
|  | Table driving system                |  |  |   |                      |     |
|  | Z axis travel distance              | 315mm(12.4)  |  |   |                      |     |
|  | Wire feeding speed                  |  |  |   |                      |     |
|  | Wire tension controlling range      |  |  |   |                      |     |
|  | Applicable wire electrode diameter  | ※2 0.2~0.3mm(0.008~0.012)  |  | ※2 0.1mm~0.3mm                            |                      |     |
|  | Outline dimension (W×D×H)           | ※5 1,655×2,025×2,100<br>(65.1)×(79.6)×(82.6)   | ※5 2,300×2,420×2,245<br>(90.5)×(95.2)×(88.3) | 1,820×1,075×2,100<br>(71.7)×(42.3)×(82.6) |                      |     |
|  | Weight                              | 3,000kg (6,600Lbs)   | 5,000kg (11,000Lbs)                          | 2,000kg(4,400Lbs)                         |                      |     |
|  | Taper Cutting                       | Upper guide travel distance  | Right & left direction                       | (U-axis) : 100mm(3.9)                     |                      |     |
| Back & forth direction                 |                                     |  | (V-axis) : 100mm(3.9)                        |   |                      |     |
| Upper guide manual feed rate           |                                     | Quick 300mm(11.8)/min Middle 30mm(1.18)/min Slow 9mm(0.35)/min<br>Step feed 0.0001~1mm(0.000004~0.04)(0.1 μm unit) |  | (Quick)300mm/min                          |                      |     |
| Taper angle                            |                                     | ※2 ±10° Height 250mm(9.8)  |  |   |                      |     |
| Angle changing function during cutting |                                     |  |  |   |                      |     |
| Top-bottom equal R cutting             |                                     |  |  |   |                      |     |

※1. In the case of machine with automatic wire feeding device(option), Z axis stroke is 210mm, and max. workpiece height is 200mm.

※2. As for the case with an optional Automatic Wire Feeding Device, these items will be decided by the specifications of AWF - 3A and AWF-3B.

## Special accessories

○ Factory option ○ shows that option can be mounted × shows that option cannot be mounted

| Item   | Model  | EW-A5S2  | EW-A7S2  | EW-300K3 |
|--|--------|----------|----------|----------|
| Automatic wire feeding device                    |        | Standard | Standard | ○        |
| Automatic wire square jig                        |        | ○        | ○        | ○        |
| Wide-angle taper nozzle                          |        | ○        | ○        | ○        |
| Working fluid cooling device                     | Type 1 | ×        | ×        | ○        |
|  | Type 2 | ○        | ○        | ○        |
| Source wire feeder (for 20kg bobbin)             |        | ○        | ○        | ○        |
| Air compressor                                   |        | ○        | ○        | ○        |
| Super finishing power supply (SF supply)         |        | ○        | ×        | ○        |
| Non - electrolytic power supply (EP supply)      |        | ○        | ○        | ○        |
| Linear scale for X-Y axes                        |        | ○        | ○        | ×        |
| Start hole drilling device (for FA support type) |        | ×        | ×        | ※1 ○     |
| Automatic punch-out ejector ※4                   |        | ×        | ×        | ※2 ○     |
| Needle type tension meter                        | 1 kgf  | ○        | ○        | ○        |
| Digital tension meter                            | 2 kgf  | ○        | ○        | ○        |
| Integrated cutting hour meter                    |        | ○        | ○        | ○        |
| Different wire diameter adjustment               |        | ○        | ○        | ※3 ○     |
| Tape reader (RS-232C interface)                  |        | ○        | ○        | ○        |
| External alarm output                            |        | ○        | ○        | ○        |
| Plotting table                                   |        | ○        | ○        | ○        |

※1. Can not be equipped with punch-out ejector. ※2. Can not be equipped with start-hole drilling device.

※3. Can only be used together with automatic wire feeding device (AWF). ※4. Automatic punch-out ejector can be offered only in Japan.

| EW-450K3  | EW-600K3                                  | EW-700K3                                  | EW-1000K3                                  | EWP-B3S2  |
|---|---|---|--|---|
| 450 x 600 x 250<br>(17.7)x(23.6)x(9.8)  | ※1 650x900x250<br>(25.5)x(35.4)x(9.8)     | ※1 650x1,000x250<br>(25.5)x(39.4)x(9.8)   | ※1 650x1,300x250<br>(25.5)x(51.1)x(9.8)    | ※4 400x300x120(100)<br>(15.7)x(11.8)x(4.7)  |
| 500kg(1,100Lbs)   | 750kg(1,650Lbs)                           | 1,000kg(2,200Lbs)                         | 1,200kg(2,640Lbs)                          | 100kg(220Lbs)   |
| (X-axis) 300mm(11.8)  | (X-axis) 450mm(17.7)                      | (X-axis) 450mm(17.7)                      | (X-axis) 450mm(17.7)                       | (X-axis) 300mm(11.8)  |
| (Y-axis) 450mm(17.7)  | (Y-axis) 600mm(23.6)                      | (Y-axis) 700mm(27.5)                      | (Y-axis) 1,000mm(39.3)                     | (Y-axis) 200mm(7.8)   |
| (Middle)90mm/min(3.5) (Slow)9mm/min(0.35) (Step feed)0.00025(0.00001)~2.5mm/min(0.01)     |   |   |  | (Quick)900mm/min(35.4 in/min)<br>(Step feed)0.0001(0.000004)~1.0(0.04)(0.1 μm unit) |
| X-Y, U-V, Z axis : AC servo motor   |   |   |  |   |
| 265mm(10.4)   |   |   |  | 140mm(5.5)  |
| 250mm/sec(2.0~9.8in / sec)  |   |   |  |   |
| 300~1,800gf(0.66~3.96Lbs)   |   |   |  | 50~1,400gf(0.11~3.08Lbs)  |
| (0.004~0.012)   | ※2 0.2mm~0.3mm(0.008~0.012)               |   |  | 0.07~0.2mm(0.0028~0.008)  |
| 1,825x1,505x2,100<br>(71.9)x(42.3)x(82.6)   | 2,285x2,070x2,100<br>(90.0)x(81.4)x(82.6) | 2,380x2,240x1,980<br>(93.6)x(88.1)x(77.8) | 1,980x2,780x2,125<br>(78.0)x(109.3)x(83.5) | 1,540x1,250x1,920<br>(60.7)x(49.3)x(75.6)   |
| 2,500kg(5,500Lbs)   | 3,500kg(7,700Lbs)                         | 4,000kg(8,800Lbs)                         | 6,000kg(13,200Lbs)                         | 2,000kg(4,400Lbs)   |
|   | (U-axis) : 60mm(2.36)                     |   |  | (U-axis) : 40mm(1.57)   |
|   | (V-axis) : 60mm(2.36)                     |   |  | (V-axis) : 40mm(1.57)   |
| 30mm/min(1.18) (Slow)9mm/min(0.35) (Step feed)0.00025(0.00001)~2.5mm(0.01) (0.25 μm unit) |   |   |  | Quick 300mm/min(11.8)<br>Step feed 0.0001(0.000004)~1mm(0.04)<br>(0.1 μm unit)      |
| ※2 ±10° (Height 150mm)(5.9)   |   |   |  | ※2 ±7° (Height 100mm)(3.9)  |
| Possible  |   |   |  |   |
| Possible  |   |   |  |   |

- ※3. In the case of submerged cutting, height is Max. 250mm. As to the workpiece of 250 ~ 300mm height, flushing cutting is available.  
 ※4. In the case of submerged cutting, height is Max. 100mm. As to the workpiece of 100 ~ 120mm height, flushing cutting is available.  
 ※5. Depth dimension includes wire hopper (600mm). Filtration device and control device are not included.

| EW-450K3 | EW-600K3 | EW-700K3 | EW-1000K3 | EWP-B3S2 |
|----------|----------|----------|-----------|----------|
| ○        | ○        | ○        | ○         | Standard |
| ○        | ○        | ○        | ○         | ○        |
| ○        | ○        | ○        | ○         | ○        |
| ○        | ○        | ○        | ○         | ×        |
| ○        | ○        | ○        | ○         | Standard |
| ○        | ○        | ○        | ○         | ×        |
| ○        | ○        | ○        | ○         | ○        |
| ◎        | ×        | ×        | ×         | Standard |
| ◎        | ◎        | ◎        | ×         | Standard |
| ×        | ×        | ×        | ×         | Standard |
| ※ ◎      | ※1 ◎     | ×        | ※1 ◎      | ×        |
| ※2 ◎     | ※2 ◎     | ◎        | ※2 ◎      | ×        |
| ○        | ○        | ○        | ○         | ○        |
| ○        | ○        | ○        | ○         | ○        |
| ○        | ○        | ○        | ○         | ○        |
| ※3 ○     | ※3 ○     | ※3 ○     | ※3 ○      | ○        |
| ○        | ○        | ○        | ○         | ○        |
| ○        | ○        | ○        | ○         | ○        |
| ◎        | ◎        | ◎        | ◎         | ×        |

## Specification of Control Device

| Item                     | Model                     | S W-7000K (32bit)  | S W-7000A (32bit)   |  |
|--------------------------|---------------------------|--|---|--|
| <b>Control Device</b>    | Input power source        | 3-phase 200V ±10% 50/60Hz 10KVA  | 3-phase 200V ±10% 50/60Hz 11KVA                                     |  |
|                          | Outline dimensions(W×D×H) | 480×790×1,715mm(18.9×31.1×67.6)  |   |  |
|                          | Weight                    | 240kg(528Lbs)  |   |  |
| <b>Power Supply</b>      | Pulse generation          | Transister pulse circuit   |   |  |
|                          | Cutting voltage           | 90 steps   |   |  |
|                          | Cutting current           | 15 steps(Max. working current 25A)   |   |  |
| <b>Numerical Control</b> | Control system            | CNC of 32bit micro computer  |   |  |
|                          | Ambient temperature       | 0~40°C   |   |  |
|                          | Control axis              | X-Y·U-V·Z 5axes (X-Y·U-V 4axes simultaneously)   |   |  |
|                          | Input system              | 3.5inch FDD, MDI, RS 232C interface  |   |  |
|                          | Code                      | I S O (R840) / E I A (R S 244-A) selective   |   |  |
|                          | Position command system   | Incremental value/Absolute value, joint use  |   |  |
|                          | Max.programmble dimension | (X,Y) ±9999.999mm (393.7), (I-J) ±99999.999mm (3937.0)                                   |   |  |
|                          | Least input increment     | 0.001mm (0.00004)  |   |  |
|                          | Least command increment   | 0.00025mm (0.00001)/Pulse  | 0.0001mm (0.000004)/Pulse   |  |
|                          | Interpolation             | Linear, Circular   |   |  |
|                          | Intersection calculation  | Sharp edge, Corner R   |   |  |
|                          | Wire offset               | - 9.999~ +9.999mm (- 0.39366~ + 0.39366)   |   |  |
|                          | Table manual feed rate    | Quick, Middle, Slow, Step feed<br>(Step feed settable 0.00025~2.5mm)                     | Quick, Middle, Slow, Step feed<br>(Step feed settable 0.0001~1.0mm) |  |
|                          | Cutting feed control      | Servo feed/Constant feed, selective  |   |  |
|                          | Reverse function          | At short circuit, reverse along cutting locus (Reverse distance 0.5/1.0/2.0mm selective) |   |  |
| Plotting rate            | 400mm (15.7)/min          |  |   |  |

## Display specifications

|                                   |   |
|-----------------------------------|---|
| ● <b>Display</b>                  | 10.4-inch color TFT LCD   |
| ● <b>Displayed characters</b>     | Alphanumerics, and Japanese characters  |
| ● <b>Display screen</b>           | Present coordinates, cutting conditions, cutting locus, and operating conditions displayed simultaneously or individually                     |
| ● <b>Coordinate display</b>       | Workpiece coordinates, relative coordinates, machine coordinates, and command coordinates displayed simultaneously(XY,UV,Zaxes 0.001mm units) |
| ● <b>Current coordinates</b>      | XY,UV and Z 5-axis simultaneous display in 0.001mm units (model SW-7000K)   |
| ● <b>Current coordinates</b>      | XY,UV and Z 5-axis simultaneous display in 0.0001mm units (model SW-7000A)  |
| ● <b>Graphic functions</b>        | XY plane,UV plane and 3D graphics (automatic scaling, partial magnification)  |
| ● <b>Cutting status display</b>   | Cutting time, cutting length cutting speed, remaining cutting time  |
| ● <b>Other displays</b>           | NC data, alarm, warning messages, system parameters, maintenance information, production information, operation log                           |
| ● <b>Editing functions</b>        | Search and replace, reference, cut and paste, copy to file  |
| ● <b>Multi-operation function</b> | During cutting, NC data editing and drawing are possible.   |
| ● <b>Multi-window function</b>    |   |
| ● <b>Help function</b>            |   |

## Control functions

|   |   |
|---|---|
| ● <b>Memory operation</b>                     | 512 programs (memory capacity 1MB)<br>total tape length : approx. 2,500m  |
| ● <b>Compensation</b>                         | Pitch error, backlash compensation  |
| ● <b>Control functions</b>                    | Axis exchange, mirror image (XY axis, individual / simultaneous), optional stop, M20 stop, M21 stop, M29 stop, single block, machine lock, dwell, dry run, block skip |
| ● <b>Drawing expansion / shrinkage</b>        | 0.001 to 99.999 magnification factor  |
| ● <b>Drawing rotate</b>                       | ±1°~±360°   |
| ● <b>Automatic positioning</b>                | Submerged operation possible (edge, side center, corner edge, hole center, column center, slit center)  |
| ● <b>Return to origin</b>                     | Cutting start point, reference point, wire breakage point, designation of returning axes  |
| ● <b>Automatic measurement functions</b>      | Wire perpendicularity, axis compensation, circle compensation, taper parameter (wire perpendicularity requires optional jig)  |
| ● <b>Soft limit</b>                           | 5 regions   |
| ● <b>Macro functions</b>                      | Calculation function  |
| ● <b>Corner chamfering control</b>            |   |
| ● <b>Top - bottom equal radius cutting</b>    |   |
| ● <b>Top - bottom different shape cutting</b> |   |
| ● <b>Mini-APT</b>                             |   |



# Power Support for High-Precision Cutting and Unattended Operation.

Source wire feeder



Can supply wire electrodes continuously for long periods (20kg bobbin wire). Supports 0.2, 0.25 and 0.3 diameter wires.

NC indexing device



Min. indexing unit : 0.001 degree

Working fluid cooling device



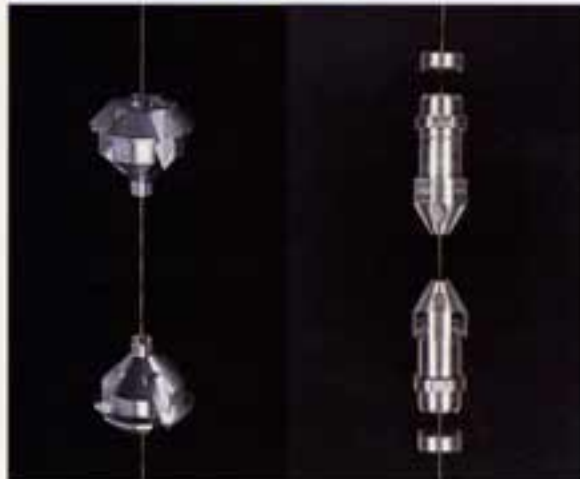
Maintains working fluid at a constant temperature for high-precision cutting.

Automatic wire square jig



By setting the jig on the table and touching the wire with its edges, the verticality of wire electrode against the table can be automatically detected corrected.

Die guide



Wire die guides provided for 0.1, 0.15, 0.2, 0.25 and 0.3 diameter wires, supporting a wide range of applications.

Digital tension meter



High performance meter with an accuracy of  $\pm 1.5\%$  (fullscale). Measurement range : 200 to 2,000 gf.

Integrated cutting hour meter



Logging and display of cumulative cutting time for long periods of time (for example, in monthly units.)

Wide angle taper nozzle



Supports tapering up to an incredible  $32^\circ$ , dramatically expanding your range of wire electrical discharge machining. (Upper : EW-K3, Lower : EW-A)

Tension meter



Quick verification of wire electrode tension up to 1000 gf.