The history of Mitsubishi Electric EDMs is the history of electrical-discharge machining.
The history of Mitsubishi Electric EDMs is the history of electrical-discharge machining:

- **1972**: DM300N+EP120M
- **1974**: DK700
- **1976**: DK280
- **1978**: DK140
- **1980**: DK360NC
- **1982**: M35C2
- **1982**: M55
- **1982**: M25C3
- **1986**: M35K
- **1987**: M85KW
- **1989**: M35S
- **1989**: EML20
- **1988**: M115K
- **1990**: M65E
- **1991**: V35F
- **1992**: NS powder specification VP35F
- **1994**: ADMAQ-E
- **1994**: VX10
- **1995**: VX20
- **1996**: EDSCAN8E
- **1996**: EX8
- **1996**: EX30
- **1999**: EA8
- **1999**: EA8P
- **2000**: FP-V power supply tungsten carbide machining circuit EA12V
- **2001**: EA28V
- **2001**: Ultrafine matte finish circuit (NP2 circuit) EA8PV
- **2004**: ADVANCE control unit EA12V ADVANCE
- **2006**: Ultrafine matte finish circuit (NP2 circuit) EA8PV
- **2008**: ADVANCE control unit EA8PV

**Key Features**:
- **1964**: Thyristor power supply, hydraulic servo method
- **1971**: DM100
- **1972**: DM201 DM500+DE90T
- **1978**: DK140
- **1982**: M55C6
- **1983**: M35J
- **1984**: M35S
- **1986**: Ultralow-wear power supply (slope control method)
- **1988**: 16-bit CNC M35C6
- **1989**: 16-bit CNC M55C6
- **1990**: M35J
- **1991**: 32-bit CNC FUZZY control V35F
- **1992**: NS powder specification VP35F
- **1994**: 32-bit CNC FUZZY control V35F
- **1997**: 64-bit CNC EA12E
- **2000**: Thermal displacement compensation MA2000
- **2004**: FP-V power supply tungsten carbide machining circuit EA12V
- **2007**: Ultrafine matte finish circuit (NP2 circuit) EA8PV
- **2008**: ADVANCE control unit EA12V ADVANCE
- **2014**: 64-bit CNC EA12E
## NC-EDM Systems

### Die-sinking EDMs

A variety of models are available for compact high-precision machining to large high-production machining applications.

### Ultra-high accuracy machine

**MA2000**
- Flagship model integrating advanced technology

### High-accuracy machine

**EA8PV ADVANCE**
- High-class model pursuing high accuracy

### High-performance machine

**EA-V ADVANCE Series**
- High-class model pursuing high accuracy and productivity

### Large-sized machine

**EA ADVANCE Series**
- Standard model pursuing multi-function and productivity

---

<table>
<thead>
<tr>
<th>Model</th>
<th>Machine travels (mm) (in)</th>
<th>Max. workpiece dimensions (mm) (in)</th>
<th>Max. workpiece weight (kg) (lb.)</th>
<th>Max. electrode weight (kg) (lb.)</th>
<th>Max. fluid level (mm) (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MA2000</strong></td>
<td>X:400 (15.7) Y:300 (11.8) Z:300 (11.8)</td>
<td>600×450×250 (23.6×17.7×9.8)</td>
<td>700 (1543)</td>
<td>50 (110)</td>
<td>300 (11.8)</td>
</tr>
<tr>
<td><strong>EA8PV ADVANCE</strong></td>
<td>X:300 (11.8) Y:250 (9.8) Z:250 (9.8)</td>
<td>770×490×200 (30.3×19.3×7.9)</td>
<td>550 (1210)</td>
<td>25 (55)</td>
<td>180 (7.1)</td>
</tr>
<tr>
<td><strong>EA-V ADVANCE Series</strong></td>
<td>X:400 (15.7) Y:300 (11.8) Z:300 (11.8)</td>
<td>1000×650×350 (39.3×25.5×13.7)</td>
<td>1000 (2200)</td>
<td>50 (110)</td>
<td>400 (15.7)</td>
</tr>
<tr>
<td><strong>EA ADVANCE Series</strong></td>
<td>X:300 (11.8) Y:250 (9.8) Z:250 (9.8)</td>
<td>740×470×130 (29.1×18.5×5.1)</td>
<td>550 (1213)</td>
<td>25 (55)</td>
<td>180 (7.1)</td>
</tr>
</tbody>
</table>

*The machining accuracy follows the Mitsubishi Electric machining conditions.*

*Automatic elevation tank is available as option.*

*Die-sinking EDMs*  
*Front door is available.*
**Ultra-high accuracy machine**

**MA2000**

64-bit CNC  
(Automatic elevation tank)

<table>
<thead>
<tr>
<th>Model</th>
<th>MA2000M</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine travels (mm)</td>
<td>X:650 Y:450 Z:350</td>
<td></td>
</tr>
<tr>
<td>Max. workpiece weight (kg)</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Max. electrode weight (kg)</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>Max. fluid level (mm)</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

Max. fluid level (mm) (in) 600 (23.6) achieved

* The machining accuracy follows the Mitsubishi Electric machining conditions

**Compact high-accuracy machine**

**EA8PV ADVANCE**

64-bit CNC  
(VERTICAL FRONT DOOR)

<table>
<thead>
<tr>
<th>Model</th>
<th>EA8PV ADVANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine travels (mm)</td>
<td>X:700 Y:550 Z:250</td>
<td></td>
</tr>
<tr>
<td>Max. workpiece weight (kg)</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>Max. electrode weight (kg)</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Max. fluid level (mm)</td>
<td>300 (11.8)</td>
<td></td>
</tr>
</tbody>
</table>

Max. fluid level (mm) (in) 300 (11.8) achieved

* The machining accuracy follows the Mitsubishi Electric machining conditions

**High-performance machine**

**EA12V ADVANCE**

64-bit CNC  
(Automatic elevation tank)

<table>
<thead>
<tr>
<th>Model</th>
<th>EA12V ADVANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine travels (mm)</td>
<td>X:400 Y:300 Z:300</td>
<td></td>
</tr>
<tr>
<td>Max. workpiece weight (kg)</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Max. electrode weight (kg)</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Max. fluid level (mm)</td>
<td>300 (11.8)</td>
<td></td>
</tr>
</tbody>
</table>

Max. fluid level (mm) (in) 300 (11.8) achieved

**Medium-sized high-performance machine**

**EA28V ADVANCE**

64-bit CNC  
(Automatic elevation tank)

<table>
<thead>
<tr>
<th>Model</th>
<th>EA28V ADVANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine travels (mm)</td>
<td>X:300 Y:250 Z:250</td>
<td></td>
</tr>
<tr>
<td>Max. workpiece weight (kg)</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>Max. electrode weight (kg)</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Max. fluid level (mm)</td>
<td>300 (11.8)</td>
<td></td>
</tr>
</tbody>
</table>

Max. fluid level (mm) (in) 300 (11.8) achieved

**Large-sized high-performance machine**

**EA40 ADVANCE**

64-bit CNC  
(Automatic vertical front door)

<table>
<thead>
<tr>
<th>Model</th>
<th>EA40M ADVANCE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine travels (mm)</td>
<td>X:1000 Y:650 Z:350</td>
<td></td>
</tr>
<tr>
<td>Max. workpiece weight (kg)</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td>Max. electrode weight (kg)</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Max. fluid level (mm)</td>
<td>400 (15.7)</td>
<td></td>
</tr>
</tbody>
</table>

Max. fluid level (mm) (in) 400 (15.7) achieved

**Compact machine**

**EA8S**

64-bit CNC  
(Automatic elevation tank)

<table>
<thead>
<tr>
<th>Model</th>
<th>EA8SM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine travels (mm)</td>
<td>X:350 Y:250 Z:250</td>
<td></td>
</tr>
<tr>
<td>Max. workpiece weight (kg)</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Max. electrode weight (kg)</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Max. fluid level (mm)</td>
<td>250 (9.8)</td>
<td></td>
</tr>
</tbody>
</table>

Max. fluid level (mm) (in) 9.8 achieved

**Medium-sized machine**

**EA12D**

64-bit CNC  
(Vertical front door)

<table>
<thead>
<tr>
<th>Model</th>
<th>EA12DM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine travels (mm)</td>
<td>X:300 Y:250 Z:250</td>
<td></td>
</tr>
<tr>
<td>Max. workpiece weight (kg)</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Max. electrode weight (kg)</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Max. fluid level (mm)</td>
<td>400 (15.7)</td>
<td></td>
</tr>
</tbody>
</table>

Max. fluid level (mm) (in) 400 (15.7) achieved
The listed machining results are all based on in-house conditions and measurements.

(Note) JIS B0601: '01 and ISO 4287: '97/ISO 1302: '02 compliant (Rz/H11340 conventional notation Ry)

Ultrafine matte finish surface machining

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
<th>Machining accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA8PV ADVANCE</td>
<td>3 copper</td>
<td>Steel (ELMAX)</td>
<td>Rz0.5µm/Ra0.1µm</td>
<td>In-corner R0.010mm</td>
</tr>
</tbody>
</table>

- Ultrafine matte finish surface is realized using NP2 circuit
- In-corner R of 0.010mm is possible

NP2 circuit: standard for MA2000 / EA8PV ADVANCE option for EA12V / EA28V ADVANCE

Glossy surface machining

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE</td>
<td>Copper</td>
<td>Steel (STAVAX)</td>
<td>Rz0.5µm/Ra0.07µm</td>
</tr>
</tbody>
</table>

- Polish-free glossy mirror finish surface of Rz0.5µm/Ra0.07µm is realized using GM2 circuit

High quality finish surface machining

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE</td>
<td>Copper</td>
<td>Steel (STAVAX)</td>
<td>Rz5.8µm/Ra0.8µm</td>
</tr>
</tbody>
</table>

- Uniform surface of Rz5.8µm/Ra0.8µm is realized using SS jump 5

Rib machining

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE</td>
<td>2 copper</td>
<td>Steel (STAVAX)</td>
<td>Rz1.5µm/Ra0.25µm</td>
</tr>
</tbody>
</table>

- High-grade finish surface is possible using SS jump 5 for rib machining, which is hard to polish

Gate machining

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE</td>
<td>Copper</td>
<td>Steel (STAVAX)</td>
<td>Rz1.0µm/Ra0.15µm</td>
</tr>
</tbody>
</table>

- Machining time is reduced up to 40% using SS jump 5 for slant machining
- Glossy mirror finish surface is possible using GM2 for gate machining, which is hard to polish

* The listed machining results are all based on in-house conditions and measurements.
(Note) JIS B0601: '01 and ISO 4287: '97/ISO 1302: '02 compliant (Rz = conventional notation Ry)
Machining with graphite electrode

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE</td>
<td>2 graphite electrodes</td>
<td>Steel (STAVAX)</td>
<td>Rz5.0µm/Ra0.82µm</td>
<td>High speed machining with low electrode wear is realized using IDPM (IDPM: option for EA8PV / EA12V / EA28V ADVANCE)</td>
</tr>
<tr>
<td>EA28V ADVANCE</td>
<td>2 graphite electrodes</td>
<td>Steel (SKD61)</td>
<td>Rz15µm/Ra2.4µm</td>
<td>High speed and stable machining is realized for the machining with a complex and complicated electrode (IDPM: option for EA8PV / EA12V / EA28V ADVANCE)</td>
</tr>
</tbody>
</table>

**ZC-axis machining**

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE</td>
<td>Copper tungsten</td>
<td>Tungsten carbide (H65 or equivalent)</td>
<td>Rz2.0µm/Ra0.3µm</td>
<td>Highly accurate helical machining is realized. Machining programs and conditions can be created using ESPERADVANCE. High-accuracy built-in C-axis: standard for MA2000 option for all EA ADVANCE</td>
</tr>
</tbody>
</table>

**Contour machining**

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Machining accuracy</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA2000+</td>
<td>Copper</td>
<td>Steel (HAP40)</td>
<td>Shape ±2µm</td>
<td>Contour machining is possible with a rod-shaped electrode using high-accuracy built-in spindle</td>
</tr>
</tbody>
</table>

**EDM resistant materials machining**

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE</td>
<td>Copper tungsten</td>
<td>Sintered boron nitride</td>
<td>Rz2.0µm/Ra0.28µm</td>
<td>Machining of EDM resistant materials is realized, which can not be machined on the previous power supply. A surface with less defect and crack is realized. Machining programs and conditions can be created using ESPERADVANCE. IDPM: option for all EA ADVANCE</td>
</tr>
</tbody>
</table>

**Fine-hole machining**

<table>
<thead>
<tr>
<th>Model</th>
<th>Electrode</th>
<th>Workpiece</th>
<th>Surface roughness</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12V ADVANCE + fine-hole jig</td>
<td>ø0.7 copper pipe electrode</td>
<td>Steel (STAVAX), 1.25.4mm</td>
<td>Rz25µm</td>
<td>Fine-hole approx. 0.2 to 1.0mm in size can be machined with the fine-hole jig (Fine-hole machining jig: option for EA8PV / EA12V ADVANCE)</td>
</tr>
</tbody>
</table>

*The listed machining results are all based on in-house conditions and measurements.
(Note) JIS B0601: 01 and ISO 4287: 97/ISO 1302: 02 compliant (Rz = conventional notation Ry)
Highly evolved technology

Machining Refer to page 9-10

FP-V power supply

- Energy-saving power supply reduces operating cost
- Machine even tungsten carbide at high speed with low electrode wear and few cracks
- Circuits suitable for various machining
- Realizes Rz 0.4μm (Ra 0.06μm) with matte and glossy surface

Machining control

Machining performance is improved using machining stabilizing jump control (SS jump 5) and machining adaptive control (FUZZY control)

- Machining time reduced up to 40% at the rough machining condition in the subgate machining
- Machining time reduced up to 54% for a uniform finishing machining of medium-sized electrode
- Wear using graphite electrode reduced up to 80%

Machine Refer to page 11-12

Semi-cabin structure

- Reduce thermal displacement caused by temperature changes

Thermal displacement compensation system (all EA ADVANCE models)

- Reduces thermal displacement caused by temperature changes
- Stabilizes the accuracy during long-time continuous machining

Working tank

- The three-sided drop tank improves access for work setup
- Adjustable high-volume fluid flow rates increases the range of no-flush machining

Machine dimensions:

- Shape: 140x70mm (5.5”x2.8”)
- Reduced 54%
- Wear using graphite electrode reduced up to 80%
Reaching New Levels with Evolutionary Technology and the New ADVANCE Control Unit

Ergonomic design
• User-friendly keyboard and mouse
• Easy-to-view screen (15-inch)
• Intuitive operations using Touch-panel control

Easy-to-use control (ADVANCE control unit)

Operability Refer to page 13-14

Programming (ESPERADVANCE)
• Simple table-format programming
• Machining conditions and programs suitable for various shapes can be created (shape expert)

Machining program screen

Machining condition search screen

Set-up
• Core alignment positioning with electrode measurement screen
• Core alignment positioning with workpiece measurement screen

Electrode measurement screen

Workpiece measurement screen

Automation

ATC + C-axis specification
• Continuous operation is possible using many electrode changes
• 106 work coordinates and machining position up to 999 places can be used in one program
• Scheduling can be easily managed with built-in scheduler, which can manage programs, workpieces and electrode information

Automation}

3D import (using 3D CAD data)
• Input error can be reduced by reading in machining position coordinates from the CAD/CAM
• Read in 3D models (Parasolid), and visually confirm positions

3D import
(Machining position coordinates, 3D models of electrodes and workpieces)

3D import
(Measurement position confirmation)
FP-V power supply

Circuits suitable for various machining
Energy-saving power supply reduces operating cost

Ultrafine finish circuit (NP2 circuit, GM2 circuit) NP2 circuit standard for EA8PV ADVANCE option for EA12V / EA28V ADVANCE
• Ultrafine matte finish surface of Rz0.4µm/Ra0.06µm is realized using NP2 circuit (EA8PV ADVANCE)
• Glossy mirror finish surface of Rz0.4µm/Ra0.06µm is realized using NP2 circuit (EA8PV ADVANCE)

Tungsten carbide machining circuit
• Tungsten carbide machining circuit is standard equipment
• Machine even tungsten carbide at high speed with low electrode wear
• Electrode wear ratio is reduced by 1/3

Narrow gap circuit
• Compatible with small undersize amounts of 0.015 to 0.030mm per side
• Small in-corner R is realized with suppressing electrode wear when machining with small undersize

FP-V power supply extension unit (for EDM resistant materials) (option)
• High-grade machining circuit for EDM resistant materials such as conductive ceramics and sintered diamonds/boron nitrides
• It is effective and realizes surface with less defect and crack for EDM resistant materials, which can not be machined on the standard power supply

FP120V power supply (option)
• Machining speed increased by around two times when machining with a graphite electrode
• Machining speed increased by around two times when machining tungsten carbide
Machining control

High-speed machining is realized using advanced machining control

Machining stabilizing jump control (SS jump 5)

- Jump control suitable for various shapes is realized by optimizing smoothing of jump up operation and speed/acceleration control

- Machining time is reduced up to 40% at the rough machining condition by optimizing smoothing of simultaneous 2 or 3 axes operation and speed/acceleration control

- Machining time reduced for the uniform fine finish machining using medium-sized electrode

Initial machining control

- Faster machining is realized with improved initial machining control for the start of machining after rough milling

IDPM (option)

- Faster machining and low electrode wear are realized when using graphite electrode

Machining stabilizing jump control (SS jump 5)

- Machine vibration when jumping is suppressed, realizing high-speed jump

Initial machining control

- Faster machining is realized with improved initial machining control for the start of machining after rough milling

IDPM (option)

- Faster machining and low electrode wear are realized when using graphite electrode
High accuracy

EAPV/EAV ADVANCE Series

- Semi-cabin structure reduces the effect of external temperature fluctuation
- Thermal displacement compensation system to be reduced thermal displacement caused by temperature changes

MA2000 Series

- Full-cabin structure shuts out the effect of external temperature fluctuation
- Temperature of machine body is controlled with fluid circulation

High-accuracy built-in C-axis / high-accuracy built-in spindle

- Highly accurate helical machining and index machining are possible
- Highly rigid and accurate built-in C-axis, which increased permission moment of inertia

Rigidity

EAPV/EAV ADVANCE Series

- Highly rigid Z-axis enabled with low head structure
- Highly rigid integrated bed structure with no concave section (indentation)
- Improved servo responsiveness using direct drive method

MA2000 Series

- High rigid roller guide is adopted for the X, Y and Z axes

MA2000 Series

- Thermal displacement compensation function reduces the accuracy impact caused by temperature changes
- Fluid level can be adjusted with the automatic elevation tank

Machine specifications suitable for continuous automatic operation

- Displacement \( \delta \) is small by the low head (L2) and the constant L1 in the figure

- Low head structure

- With concave (indentation)

- With no concave (indentation)
**Operability**

**Hand washing coupler**
- Easily clean sludge in the working tank

**Working tank**
- Three sided drop tank of automatic elevation tank

**Under the machine bed**
- Table access is improved when loading/unloading of large workpieces using hand lifter
- Workability of set-up is improved by improving operator access to the machine table

**Dielectric fluid pressure gage**
- Filter pressure gauge are easy to read from the machine front

**Maintenance & Filter**
- Maintenance space is arranged at the back of the machine to improve workability
- Filter (long-life fine-mesh) can be replaced even during machining

**High productivity**

**Machine specifications suitable for continuous automatic operation**
- Thermal displacement compensation function reduces the accuracy impact caused by temperature changes
- Fluid level can be adjusted with the automatic elevation tank

**Automatic tool changer (ATC)**
- Reduces time of automatic electrode change
ADVANCE Control Unit

Supporting machining of various shapes with optimum machining conditions and easy programming

**Machining support — ESPERADVANCE**

**Navigator**
- Simple programming method even for beginners
- Easily create programs by following the on-screen instructions

**Electrode Workpiece measurement**
- Amples measurement patterns (pole, hole, 2-face, 3-face, 4-face)
- Core deviation can be set when multiple electrodes are used
- Preset workpiece coordinates (max. 106 types)

**3D check**
- Display workpiece layout and electrode movement as animations using 3D models

**Schedule registration**
- Continuously run multiple programs on a schedule
- Schedules can be added and edited during machining

**Machining programming support function**
- Improve programming capabilities with Undo and Redo function
- Programs easily modified with batch changes of depth and undersize calculation

**Machining program**
- Programming is possible simply by inputting the machining start position and machining depth, etc., into a table format

**Machining conditions (ME Pack)**
- Machining condition can be easily changed, which are "need to set starting condition down" or "need to change overlap amount between machining conditions"
- Graphical and easy-to-understand screen settings

**Gate**
- Easily create programs for sub-gate machining
- Machining condition can be easily changed, which are "need to set starting condition down" or "need to change overlap amount between machining conditions"
- Graphical and easy-to-understand screen settings

**Threads**
- Programs for rough/finish machining with one electrode are supported

**Rib**
- Set machining condition to match the pocket rib and edge rib

**Cavity**
- Increased orbit pattern line-up
- Machining details are graphically displayed

**Input electrode undersize amount**
- Set orbit pattern

**M Pack is easily modified with the Insert, Delete, Copy and Redo functions**

**User customization**
- Freely rearrange switches and status displays which are used frequently

**Maintenance**
- Replacement timing for various parts is displayed
- Network version updates

**Operability**

13
Supporting machining of various shapes with optimum machining conditions and easy programming

**Main menu**
- **File**
  - Exchange program data with external computers
- **Set-up**
  - Workpiece and electrode measurements are supported with graphical screens
  - MDI (Manual Data Input) Programming operation is possible using G/M code during set-up
- **Monitor**
  - Machining state is displayed in real-time
- **Maintenance**
  - Replacement timing for various parts is displayed
  - Network version updates

**Machining condition search** (shape expert)
Machining conditions and programs suitable for various shapes can be created

- **Cavity**
  - Increased orbit pattern line-up
- **Rib**
  - Set machining condition to match the pocket rib and edge rib

User customization
- Freely rearrange switches and status displays which are used frequently

**Threads**
- Programs for rough/finish machining with one electrode are supported

**Gate**
- Easily create programs for sub-gate machining
MA2000
Ultra-high accuracy machine

Machining accuracy ±0.002mm (0.00008") achieved (Note 1)
(Note 1) The machining accuracy follows the Mitsubishi Electric machining conditions

Granite table (upper surface) dimension drawing

Standard machine specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>MA2000M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine unit</td>
<td>Dimensions (W x D x H) [mm]</td>
</tr>
<tr>
<td></td>
<td>Total system weight [kg]</td>
</tr>
<tr>
<td>Machine travel (X x Y x Z)</td>
<td>[mm]</td>
</tr>
<tr>
<td>Spindle</td>
<td>Maximum between table and electrode mounting surface [mm]</td>
</tr>
<tr>
<td>Working tank</td>
<td>Capacity, electrode weight [kg]</td>
</tr>
<tr>
<td>Fluid level adjustment range (from top of tank) [mm]</td>
<td>100 to 300 (3.9 x 11.8)</td>
</tr>
<tr>
<td>Dimensions (W x D x H) [mm]</td>
<td>550 x 470 (21.7 x 18.5)</td>
</tr>
<tr>
<td>Max. working piece weight [kg]</td>
<td>700 (1543)</td>
</tr>
<tr>
<td>Table depth [mm]</td>
<td>600 x 450 x 250 (23.6 x 17.7 x 9.8)</td>
</tr>
<tr>
<td>Distance between front and top of table [mm]</td>
<td>188 (7.4)</td>
</tr>
<tr>
<td>Max. working piece weight [kg]</td>
<td>700 (1543)</td>
</tr>
<tr>
<td>Turret</td>
<td>Capacity (integral dielectric fluid supply amount) [l/min]</td>
</tr>
<tr>
<td>Spindle feed rate [mm/min]</td>
<td>1 to 30</td>
</tr>
<tr>
<td>Dielectric fluid reservoir</td>
<td>Dielectric fluid chiller unit</td>
</tr>
</tbody>
</table>

Distance between table and electrode mounting surface

<table>
<thead>
<tr>
<th>3R MACRO</th>
<th>EROWA ITS50</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-axis [mm (in)]</td>
<td>153 to 453 (6.0 to 17.8)</td>
</tr>
<tr>
<td>Spindle [mm (in)]</td>
<td>134 to 434 (5.3 to 17.1)</td>
</tr>
</tbody>
</table>

Mitsubishi Electric machining conditions (example of pitch machining accuracy)

C-axis/ATC (standard specifications)

<table>
<thead>
<tr>
<th>3R MACRO</th>
<th>EROWA ITS50</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-axis</td>
<td>Max. electrode weight [kg (lb.)]</td>
</tr>
<tr>
<td>Speed [mm/min]</td>
<td>10, 20</td>
</tr>
<tr>
<td>ATC</td>
<td>Max. electrode dimensions [mm (in)]</td>
</tr>
<tr>
<td>Max. electrode weight [kg (lb.)]</td>
<td>10 (22.6)</td>
</tr>
<tr>
<td>Magazine total: 40kg (88lb.)</td>
<td></td>
</tr>
</tbody>
</table>

C-axis/ATC (option)

<table>
<thead>
<tr>
<th>3R MACRO</th>
<th>EROWA ITS50</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-axis spindles</td>
<td>Max. electrode weight [kg (lb.)]</td>
</tr>
<tr>
<td>Speed [mm/min]</td>
<td>1 to 1500</td>
</tr>
<tr>
<td>ATC</td>
<td>Max. electrode dimensions [mm (in)]</td>
</tr>
<tr>
<td>Max. electrode weight [kg (lb.)]</td>
<td>5 (11)</td>
</tr>
<tr>
<td>Magazine total: 40kg (88lb.)</td>
<td></td>
</tr>
</tbody>
</table>

Standard functions
- Ultrafine matte finish circuit (NP2 circuit)
- Fine matte finish circuit (PB circuit)
- Glossy mirror finish circuit (GM2 circuit)
- Thermal displacement compensation system
- XYZ-axis linear scale
- High-function manual operation box
- DNC HW, FTP, DNC S/W
- High-accuracy built-in C-axis
- LS-20T ATC

Options
- SP power supply (power supply for tungsten carbide machining)
- High-accuracy built-in spindle
- MVH-40T ATC (option)
- Programmable flushing nozzle section (six nozzles) + Automatic changeover
- Dielectric fluid distributor

Distance between floor and top of table [mm (in)] 880 (34.6)

Dielectric fluid chiller unit

Standard delivery entrance

<table>
<thead>
<tr>
<th>Width [mm (in)]</th>
<th>Height [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 (98.4)</td>
<td>2600 (102.3)</td>
</tr>
<tr>
<td>MVH-40T ATC specifications (Note 1)</td>
<td>2500 (98.4)</td>
</tr>
</tbody>
</table>

(Note 1) With the MVH-40T ATC specifications, the ATC unit and ATC cabin cover are removed before shipment. A crane and assembly work are required when installing the system.
### Standard machine specifications

- **Model**: EA8PV ADVANCE
- **Dimensions (W x D x H)**: 1650 x 1900 x 2075 (65 x 75 x 81.7)
- **Total system weight**: 2000 (4409)
- **Spindle**: 7T, 20T
- **Spindle control unit**: temperature
- **C-axis**: 20T, 5
- **Machine**: horizontally sliding front door
- **Table**: Electrode mounting table dimension drawing
- **Standard delivery entrance**: 1616 (63.6) (standard) 426 (16.8)
- **Dimensions (W x D)**: 500 x 350 (19.7 x 13.8)
- **Distance between table and electrode mounting surface**: 70 x 70 x 100 (2.8 x 2.8 x 3.9)
- **Dielectric fluid reservoir**: One fine paper filter
- **Dielectric fluid chiller unit**: Unit cooler

### Standard functions
- Tungsten carbide machining circuit
- Ultrafine matte finish circuit (NP2 circuit)
- Fine matte finish circuit (PF circuit)
- Glossy mirror finish circuit (GM2 circuit)
- Narrow gap circuit
- Thermal displacement compensation system
- XYZ-axis linear scale
- High-accuracy positioning circuit
- 70mm (2.8") granite table
- CNC H/W

### Options
- High-accuracy built-in C-axis
- High-accuracy built-in spindle
- Automatic clamp
- Automatic clamp (head down specifications)
- Shuttle-type ATC
- LS-10T ATC, LS-20T ATC
- MVH-20T ATC
- One tool jet (0.15 (0.006) to 2.0 (0.079) mm (in))
- High-function manual operation box
- Emission/suction automatic changeover
- Programmable flushing nozzle (eight nozzles) + Automatic changeover
- Dielectric fluid distributor
- DPM
- 10mm (0.4") granite table
- Automatic elevation tank (option)
- FP V power supply extensim unit

### Standard delivery entrance

<table>
<thead>
<tr>
<th>Standard specifications</th>
<th>Width [mm (in)]</th>
<th>Height [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shuttle 4T ATC specifications</td>
<td>1333 (52.5)</td>
<td>2120 (83.5)</td>
</tr>
<tr>
<td>Shuttle 7T ATC specifications</td>
<td>1743 (68.6)</td>
<td>2120 (83.5)</td>
</tr>
<tr>
<td>LS-10T ATC specifications</td>
<td>1785 (70.3)</td>
<td>2120 (83.5)</td>
</tr>
<tr>
<td>LS-20T ATC specifications</td>
<td>2120 (83.5)</td>
<td>2120 (83.5)</td>
</tr>
<tr>
<td>MVH-20T ATC specifications</td>
<td>1616 (63.6)</td>
<td>2120 (83.5)</td>
</tr>
</tbody>
</table>

### C-axis (option)

<table>
<thead>
<tr>
<th>C-axis</th>
<th>Max. electrode weight [kg (lb.)]</th>
<th>Speed [min-1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3R MACRO Combil</td>
<td>10 (22)</td>
<td>1 to 30</td>
</tr>
<tr>
<td>EROWA IT550</td>
<td>10 (22)</td>
<td>1 to 30</td>
</tr>
<tr>
<td>3R MACRO Jr</td>
<td>10 (22)</td>
<td>1 to 30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spindle</th>
<th>Max. electrode weight [kg (lb.)]</th>
<th>Speed [min-1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4T 7T 10T</td>
<td>145 (325)</td>
<td>1 to 1500</td>
</tr>
<tr>
<td>5T 7T 10T</td>
<td>145 (325)</td>
<td>1 to 1500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ATC</th>
<th>Max. electrode weight [kg (lb.)]</th>
<th>Magazine total [kg (lb.)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS-10T</td>
<td>145 (325)</td>
<td>145 (325)</td>
</tr>
<tr>
<td>LS-20T</td>
<td>145 (325)</td>
<td>145 (325)</td>
</tr>
<tr>
<td>MVH</td>
<td>145 (325)</td>
<td>145 (325)</td>
</tr>
</tbody>
</table>

### Distance between table and electrode mounting surface (70mm granite table specifications)

<table>
<thead>
<tr>
<th>3R MACRO Combil</th>
<th>EROWA IT550</th>
<th>3R MACRO Jr</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-axis [mm (in)]</td>
<td>158.16 to 408 (6.2 to 16.1)</td>
<td>158.16 to 408 (6.2 to 16.1)</td>
</tr>
<tr>
<td>Spindle [mm (in)]</td>
<td>158.16 to 408 (6.2 to 16.1)</td>
<td>158.16 to 408 (6.2 to 16.1)</td>
</tr>
<tr>
<td>Automatic clamp [mm (in)]</td>
<td>221.15 to 471 (8.7 to 18.6)</td>
<td>221.15 to 471 (8.7 to 18.6)</td>
</tr>
</tbody>
</table>

*The 3R/ EROWA electrode holder is used when the built-in C-axis/ automatic clamp (option) is provided.*
# Product Introduction

## EA12V ADVANCE

**High-performance machine**

### Standard specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Machine unit</th>
<th>Machine travels (X x Y x Z) [mm (in)]</th>
<th>Spindle</th>
<th>Working tank</th>
<th>Table</th>
<th>Electrode mounting table dimension drawing</th>
<th>Distance between table and electrode mounting surface</th>
<th>Spindle</th>
<th>Machine travels (X x Y x Z) [mm (in)]</th>
<th>Spindle</th>
<th>Machine travels (X x Y x Z) [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12VM ADVANCE</td>
<td>400 x 300 x 300 (15.7 x 11.8 x 11.8)</td>
<td>270 to 570 (10.6 to 22.4)</td>
<td>100 to 300 (3.9 to 11.8)</td>
<td>700 x 500 (27.6 x 19.7)</td>
<td>900 (35.5)</td>
<td>700 (27.6)</td>
<td>340 (13.4)</td>
<td>100 (3.9)</td>
<td>340 (13.4)</td>
<td>100 (3.9)</td>
<td>340 (13.4)</td>
</tr>
</tbody>
</table>

### Standard functions

- Tungsten carbide machining circuit
- Fine matte finish circuit (FS circuit)
- Glossy mirror finish circuit (UM2 circuit)
- Narrow gap circuit
- Thermal displacement compensation system
- XYZ-axis linear scale
- High-accuracy positioning circuit
- Automatic elevation tank
- Working tank fluid flow adjustment function
- DNC H/W

### Options

- Column up (100 [3.9] mm [in]) specifications
- High-accuracy built-in C-axis
- High-accuracy built-in spindle
- Automatic clamp
- Automatic clamp (head down specifications) (Note 1)
- LS-10T ATC/LS-20T ATC
- MVH-20T ATC/MVH-40T ATC
- NS powder specifications
- Fine-hole jig (ø0.15 [0.006] to 2.0 [0.079] mm [in])
- High-function manual operation box
- Emission/vacuum automatic changeover
- Programmable flushing nozzle (eight nozzles)
- Automatic changeover
- Fluid pressure 3-step changeover
- Dielectric fluid distributor
- FP120V
- VRP
- Ultralite matte finish circuit (NP2 circuit)
- FP-V power supply extension unit

### Standard delivery entrance

Width [mm] Height [mm]

- LS10T ATC specifications 1670 (65.7) 2380 (93.7)
- LS20T ATC specifications 2335 (92.0) 2380 (93.7)
- MVH-20T ATC specifications 2065 (81.3) 2380 (93.7)
- MVH-40T ATC specifications 2660 (104.7) 2380 (93.7)

### C-axis/ATC (option)

<table>
<thead>
<tr>
<th>C-axis</th>
<th>Max. electrode weight</th>
<th>Speed</th>
<th>Spindle</th>
<th>Max. electrode weight</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACRO</td>
<td>50 [110] (Note 3)</td>
<td>1 to 30</td>
<td>[kg (lbs)]</td>
<td>10 [22] (Note 3)</td>
<td>1 to 1500</td>
</tr>
<tr>
<td>ITS/COMBI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Distance between table and electrode mounting surface

<table>
<thead>
<tr>
<th>C-axis</th>
<th>[mm (in)]</th>
<th>Spindle</th>
<th>[mm (in)]</th>
<th>Automatic clamp</th>
<th>[mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACRO</td>
<td>135 to 435 (5.3 to 17.1)</td>
<td>181 to 491 (7.1 to 18.9)</td>
<td>199 to 498 (7.8 to 19.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jr</td>
<td>135 to 435 (5.3 to 17.1)</td>
<td>181 to 491 (7.1 to 18.9)</td>
<td>199 to 498 (7.8 to 19.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3R</td>
<td>135 to 435 (5.3 to 17.1)</td>
<td>181 to 491 (7.1 to 18.9)</td>
<td>199 to 498 (7.8 to 19.6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

(Note 1) Please contact a Mitsubishi Electric representative for more information.

(Note 2) For the MVH40T-ATC specifications, the ATC unit and holder are removed before shipment. A crane or lifting device is required when installing the system.

(Note 3) For MACRO Jr of 3R combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb) / electrode.

(Note 4) For MACRO and MACRO Jr of 3R Combi, the weight is 5kg (11lb) / electrode.

(Note 5) For MACRO and MACRO Jr of 3R Combi, the weight is 5kg (11lb) / electrode with MACRO Jr, and Compact of EROWA COMBI, the weight is 10kg (22lb) / electrode.

(Note 6) For MACRO Jr of 3R Combi, the magazine total is 40kg (88lb).
Standard specifications

- Tungsten carbide machining circuit
- Fine matte finish circuit (IPS circuit)
- Glitter mirror finish circuit (GM2 circuit)
- Narrow gap circuit
- Thermal displacement compensation system
- X-axis linear scale
- High-accuracy positioning circuit
- Automatic elevation tank
- Working tank fluid flow adjustment function
- High-function manual operation box
- DNC H/W

Option

- Column up 15mm (0.6") specifications
- High-accuracy built-in C-axis
- High-accuracy built-in spindle
- Automatic clamp
- Large electrode adaptor
- LS-10T ATC/LS-20T ATC
- MVH-20T ATC/MVH-40T ATC
- NS powder specifications
- XY-axis linear scale
- Z-axis stroke 450 specifications
- Emission/suction automatic changeover
- Programmable flushing nozzle (eight nozzle types) Automatic changeover
- Fluid pressure 3-step changeover
- Dielectric fluid distributor
- Special working tank (including 150mm (5.9") column up)
- Long stroke specifications
- PP-L20V
- DDPM
- Ultrasonic mist finish circuit (NP circuit)
- FP-V power supply extension unit

Standard delivery entrance

<table>
<thead>
<tr>
<th>Width [mm]</th>
<th>Height [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2063</td>
<td>2660</td>
</tr>
<tr>
<td>2250</td>
<td>2660</td>
</tr>
<tr>
<td>2475</td>
<td>2660</td>
</tr>
<tr>
<td>2297</td>
<td>2660</td>
</tr>
<tr>
<td>2166</td>
<td>2660</td>
</tr>
</tbody>
</table>

(Note 1) MTB-40T ATC specifications (Note 1)
(Note 2) MACRO Jr of 3R Combi, the weight is 2.5kg (5.5lb.) / electrode.
(Note 3) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 4) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 5) For MACRO of 3R Combi, the weight is 5kg (11lb.) / electrode, and is 2.5kg (5.5lb.) / electrode with MACRO Jr.
(Note 6) For MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 7) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 8) MACRO Jr of 3R Combi, the weight is 2.5kg (5.5lb.) / electrode, and is 2.5kg (5.5lb.) / electrode with MACRO Jr.
(Note 9) For MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 10) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 11) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 12) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 13) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 14) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 15) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 16) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 17) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 18) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 19) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 20) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 21) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 22) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 23) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 24) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 25) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 26) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 27) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 28) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 29) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 30) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 31) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 32) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 33) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 34) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 35) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 36) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 37) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 38) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 39) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 40) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 41) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 42) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 43) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 44) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 45) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 46) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 47) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 48) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 49) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 50) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 51) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 52) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 53) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 54) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 55) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 56) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 57) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 58) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 59) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 60) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 61) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 62) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 63) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 64) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
(Note 65) MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.
(Note 66) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dimensions.
Product Introduction

EA40 ADVANCE / EA50

Large-sized high-performance machine

EA40 ADVANCE

EA50

Options
• High-accuracy built-in C-axis
• Automatic tool changer (Note 1)
• Automatic filter system
• Booster power supply
• Programmable flushing nozzle section (eight nozzles) + automatic changeover
• Lighting
• Dielectric fluid distributor
• Special working tank
• Large electrode adaptor (for built-in C-axis)
• Maximum electrode weight 500kg (1102lb.) specifications (EA40 ADVANCE)

(Note 1) Please contact a Mitsubishi Electric representative for details on the EA40 ADVANCE and EA50 ATC.

Standard specifications

Model | EA40M ADVANCE | EA50M |
---|---|---|
Machine unit | Dimensions (W x D x H) [mm (in)] | 3050 x 3633 x 3140 (120.1 x 143.0 x 123.6) | 4280 x 4295 x 4100 (168.5 x 169.1 x 161.4) |
Total system weight [kg (lb.)] | 12000 (26455) | 20000 (44092) |
Machine travels (X Y Z) [mm (in)] | 1000 x 600 x 450 (39.4 x 23.6 x 17.7) | 1500 x 600 x 650 (59.1 x 23.6 x 25.6) |
Extra travel for workpiece location [mm (in)] | None | X-axis left 600 (23.6) |
Spindle | Distance between table and electrode mounting surface [mm (in)] | 450 to 900 (17.7 to 35.4) | 500 to 1100 (19.7 to 43.3) |
Max. electrode weight [kg (lb.)] | 300 (661) (500 (1102)) | 500 (1102) |
Working tank | Method | Automatic vertical front door | Automatic vertical front door |
Dimensions (W x D x H) [mm (in)] | 1900 x 1100 x 600 (74.8 x 43.3 x 23.6) | 2400 x 1500 x 750 (94.5 x 59.1 x 29.5) |
Distance between floor and top of table [mm (in)] | 860 (33.9) | 1300 (51.2) |
Max. workpiece weight [kg (lb.)] | 5000 (1102) | 10000 (22046) |
Dielectric fluid reservoir capacity (initial dielectric fluid supply amount) [gal.] | 2650 (700) | 5200 (1374) |
Filtering method | Two paper filters | Four paper filters |
Dielectric fluid chiller unit | Unit cooler | Unit cooler |
Standard functions | Thermal displacement compensation function | Standard | Standard |
Operation panel | - | Pendant with turning arm |
Manual operation box | High-function manual operation box | High-function manual operation box |
Automatic dielectric fluid supply/drain | Standard | Standard |

Special working tank (option)

In addition to the standard working tanks above, the following special working tanks are available for the EA40 ADVANCE/EA50.

Model | Working tank | Inner dimensions [mm (in)] | Max. working dimensions [mm (in)] | Table electrode mounting surface [mm (in)] | Fluid level adjustment range [mm (in)] | Required column up [mm (in)] | Door method | Dielectric fluid reservoir capacity |
---|---|---|---|---|---|---|---|---|
EA40M ADVANCE | XK212A | 2000 x 1200 x 800 (78.7 x 47.2 x 31.0) | 1500 x 1100 x 700 (59.1 x 43.3 x 27.6) | 550 to 1000 (21.7 to 39.4) | 360 to 750 (14.2 to 29.5) | 100 (3.9) | Automatic vertical front door | 3460 (869gal.) |
| XK240A | 2300 x 1600 x 700 (90.6 x 63.0 x 27.6) | 2000 x 1500 x 700 (78.7 x 59.1 x 27.6) | 450 to 900 (17.7 to 35.4) | 310 to 650 (12.2 to 25.6) | - | Automatic vertical front door | 3460 (869gal.) |
| XK261A | 2500 x 1200 x 800 (98.4 x 47.2 x 31.0) | 2000 x 1100 x 700 (78.7 x 43.3 x 27.6) | 550 to 1000 (21.7 to 39.4) | 360 to 750 (14.2 to 29.5) | 100 (3.9) | Automatic vertical front door | 3460 (869gal.) |
EA50M | XK291A | 2800 x 1600 x 1100 (110.2 x 63.0 x 43.5) | 2700 x 1500 x 1000 (106.3 x 59.1 x 39.4) | 700 to 1300 (27.6 to 51.2) | 500 to 1050 (19.7 to 41.3) | 200 (7.9) | Automatic vertical front door | 6300 (1664gal.) |

Automatic filter system

• Long-life laminated paper wafers with outstanding filtering performance are used
• Reverse washing eliminates filter replacement (option for EA40 ADVANCE/EA50)

Automatic filter

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF50</td>
<td>4000 (1057gal.)</td>
<td>EA40 ADVANCE(XK212A)</td>
</tr>
<tr>
<td>TF63</td>
<td>6300 (1664gal.)</td>
<td>EA50(XK270)</td>
</tr>
</tbody>
</table>
## EA8S Compact machine

**Automatic elevation tank**

![Automatic elevation tank diagram]

**Front door**

![Front door diagram]

### Standard machine specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Machine unit</th>
<th>Dimensions (W x D x H) [mm]</th>
<th>Max. electrode weight [kg (lb.)]</th>
<th>Fluid level adjustment range (from top of table) [mm (in)]</th>
<th>Max. workpiece weight [kg (lb.)]</th>
<th>T-slot dimension [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EABSM</td>
<td></td>
<td>1530 x 2000 x 2120 (60.2 x 78.7 x 83.5)</td>
<td>10 (22)</td>
<td>200 to 250 (7.9 to 9.8)</td>
<td>500 (19.7)</td>
<td>1200 (47.2)</td>
</tr>
<tr>
<td>EABSM</td>
<td></td>
<td>1530 x 1920 x 2120 (60.2 x 250 x 83.5)</td>
<td>15 (33)</td>
<td>250 to 300 (9.8 to 11.8)</td>
<td>650 (25.6)</td>
<td>1250 (49.2)</td>
</tr>
<tr>
<td>Spindle</td>
<td>Spindle travels (X x Y x Z) [mm]</td>
<td>300 x 250 x 250 (11.8 x 9.8 x 9.8)</td>
<td>150 to 400 (5.9 to 15.7)</td>
<td>900 (35.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spindle</td>
<td>Diameter between table and electrode mounting surface [mm]</td>
<td>150 to 400 (5.9 to 15.7)</td>
<td>900 (35.4)</td>
<td>150 to 400 (5.9 to 15.7)</td>
<td>900 (35.4)</td>
<td>150 to 400 (5.9 to 15.7)</td>
</tr>
<tr>
<td>Spindle</td>
<td>Max. electrode weight [kg (lb.)]</td>
<td>25 (55)</td>
<td>500 (19.7)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
</tr>
<tr>
<td>Spindle</td>
<td>Distance between table and electrode mounting surface [mm]</td>
<td>150 to 400 (5.9 to 15.7)</td>
<td>25 (55)</td>
<td>500 (19.7)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
</tr>
<tr>
<td>Spindle</td>
<td>Fluid level adjustment range (from top of table) [mm (in)]</td>
<td>200 to 250 (7.9 to 9.8)</td>
<td>150 to 400 (5.9 to 15.7)</td>
<td>900 (35.4)</td>
<td>150 to 400 (5.9 to 15.7)</td>
<td>900 (35.4)</td>
</tr>
<tr>
<td>Spindle</td>
<td>Max. workpiece weight [kg (lb.)]</td>
<td>500 (19.7)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
</tr>
<tr>
<td>Spindle</td>
<td>T-slot dimension [mm (in)]</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
<td>1200 (47.2)</td>
</tr>
</tbody>
</table>

### Dielectric fluid reservoir

- Capacity: 1 to 30 gallons (3.8 to 114 liters)
- Filling method: One fine paper filter
- Dielectric fluid chiller unit: Unit cooler

### Distance between table and electrode mounting surface

<table>
<thead>
<tr>
<th>Model</th>
<th>C-axis [mm (in)]</th>
<th>Automatic clamp [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3R MACRO</td>
<td>153 to 383 (5.2 to 15.0)</td>
<td>153 to 383 (5.2 to 15.0)</td>
</tr>
<tr>
<td>3R Combi</td>
<td>153 to 383 (5.2 to 15.0)</td>
<td>153 to 383 (5.2 to 15.0)</td>
</tr>
</tbody>
</table>

### Standard delivery entrance

- **Standard specifications**
  - PA8SM 1120 (44.1) 2150 (84.6)
  - EA40M 1050 (41.3) 2150 (84.6)
  - EA50 1730 (68.1) 2150 (84.6)

- **LS-10T ATC specifications** 1505 (59.3) 2150 (84.6)
- **LS-20T ATC specifications** 1730 (68.1) 2150 (84.6)

### C-axis/ATC (option)

- **Max. electrode weight** 10 (22) (25) (55) [kg (lb.)]
- **Min. table travel** 4.0 to 30.0 [mm (in)]
- **Max. workpiece weight** 250 (9.0) 500 (18.5) [kg (lb.)]
- **Max. electrode weight** 10 (22) (25) (55) [kg (lb.)]
- **Max. workpiece weight** 250 (9.0) 500 (18.5) [kg (lb.)]
- **Max. electrode weight** 10 (22) (25) (55) [kg (lb.)]
- **Max. workpiece weight** 250 (9.0) 500 (18.5) [kg (lb.)]
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- **Max. workpiece weight** 250 (9.0) 500 (18.5) [kg (lb.)]
- **Max. electrode weight** 10 (22) (25) (55) [kg (lb.)]
- **Max. workpiece weight** 250 (9.0) 500 (18.5) [kg (lb.)]
- **Max. electrode weight** 10 (22) (25) (55) [kg (lb.)]
- **Max. workpiece weight** 250 (9.0) 500 (18.5) [kg (lb.)]
- **Max. electrode weight** 10 (22) (25) (55) [kg (lb.)]
- **Max. workpiece weight** 250 (9.0) 500 (18.5) [kg (lb.)]

- **Spindle** 153 to 383 (5.2 to 15.0) 153 to 383 (5.2 to 15.0)
- **Automatic clamp** 148 to 358 (5.8 to 13.7) 148 to 358 (5.8 to 13.7)
- **Automatic clamp** 148 to 358 (5.8 to 13.7) 148 to 358 (5.8 to 13.7)
- **Automatic clamp** 153 to 383 (5.2 to 15.0) 153 to 383 (5.2 to 15.0)

### Standard functions

- Tungsten carbide machining circuit
- Fine matte finish circuit (PS circuit)
- Glossy mirror finish circuit (GM circuit)
- Narrow gap circuit
- High-accuracy positioning circuit
- DNC FW, FTP, DNC S/W
- DPM

### Options

- Highly rigid C-axis
- Automatic clamp
- LS-10T ATC/LS-20T ATC
- 2-axis linear scale
- XY-axis linear scale
- High-function manual operation box
- Emission/suction automatic changeover
- Dielectric fluid distributor
- Anti-virus protection
- FP-V power supply extension unit

- (Note 1) Mountable only for machines with automatic elevation tank.
- (Note 2) It is recommended option for using flushing on machine with ATC.
**Product Introduction**

**EA12D**

Medium-sized machine

**Standard functions**
- Fine matte finish circuit (PS circuit)
- Glossy mirror finish circuit (GM2 circuit)
- Z-axis linear scale
- Unit cooler

**Options**
- Built-in C-axis
- Automatic clamp
- Shuttle-type ATC
- MVH-20T ATC
- XY-axis linear scale
- High-function manual operation box
- Dielectric fluid distributor
- FP100EA
- SP power supply

(for tungsten carbide machining)

---

**Standard machine specifications**

<table>
<thead>
<tr>
<th>Model</th>
<th>Machine unit</th>
<th>Dimensions (W x D x H) [mm]</th>
<th>Total system weight [kg]</th>
<th>Machine travels (X x Y x Z) [mm]</th>
<th>Spindle distance between table and electrode mounting surface [mm]</th>
<th>Max. electrode weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA12D</td>
<td></td>
<td>1840 x 1960 x 2375</td>
<td>2900</td>
<td>400 x 300 x 300</td>
<td>500 to 600 (11.8 to 23.6)</td>
<td>50 (110)</td>
</tr>
</tbody>
</table>

**Working tank**
- Method: Vertical front door
- Inner dimensions (W x D x H) [mm]: 1050 x 700 x 450
- Fluid level adjustment range (from top of table): 180 to 400 (7.1 to 15.7)

**Table**
- Dimensions (W x D) [mm]: 700 x 500 (27.6 x 19.7)
- Max. vertical dimensions (W x D x H) [mm]: 400 x 250 x 13 (15.7 to 9.8 to 0.5)
- Distance between floor and top of table [mm]: 840 (33.1)
- Max. workpiece weight [kg]: 1000 (2205)
- T-slot: Three slots at 12-160mm pitch

**Dielectric fluid reservoir**
- Capacity (initial dielectric fluid supply amount): 500 (132)
- Filtering method: One paper filter
- Dielectric fluid chiller unit: Unit cooler

---

**C-axis/ATC (option)**

<table>
<thead>
<tr>
<th>C-axis</th>
<th>Max. electrode weight [kg (lb.)]</th>
<th>Speed [min⁻¹]</th>
<th>Max. electrode dimensions [mm]</th>
<th>Max. electrode weight [kg (lb.)]</th>
<th>Max. electrode dimensions [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 (22) (Note 1)</td>
<td>2.5 (5.5)</td>
<td>10, 20</td>
<td>70 x 70 x 100 (2.8 x 2.8 x 3.9)</td>
<td>50 (110)</td>
<td>35 x 35 x 100 (1.4 x 1.4 x 3.9)</td>
</tr>
</tbody>
</table>

(Note 1) For MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5 kg (5.5 lb.).

(Note 2) When using four electrodes, the dimensions are 70 x 70 x 100mm [2.8 x 2.8 x 3.9in].

(Note 3) ATC can be used with EROWA IT50, but not with EROWA Compact (manual only).

**Distance between table and electrode mounting surface**

<table>
<thead>
<tr>
<th>3R MACRO</th>
<th>EROWA IT50</th>
<th>3R Combi</th>
</tr>
</thead>
<tbody>
<tr>
<td>278 to 578</td>
<td>287 to 587</td>
<td>271 to 571</td>
</tr>
<tr>
<td>10.9 to 22.8</td>
<td>11.3 to 23.1</td>
<td>10.7 to 22.5</td>
</tr>
<tr>
<td>7.1 to 8.6</td>
<td>7.1 to 8.6</td>
<td>7.1 to 8.6</td>
</tr>
</tbody>
</table>

---

**Standard delivery entrance**

<table>
<thead>
<tr>
<th>Width [mm (in)]</th>
<th>Height [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1650 (65.0)</td>
<td>2324 (91.5)</td>
</tr>
<tr>
<td>1888 (74.3)</td>
<td>2324 (91.5)</td>
</tr>
<tr>
<td>1888 (74.3)</td>
<td>2324 (91.5)</td>
</tr>
</tbody>
</table>

---

(Note 1) For MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5 kg (5.5 lb.).

(Note 2) When using four electrodes, the dimensions are 70 x 70 x 100mm [2.8 x 2.8 x 3.9in].

(Note 3) ATC can be used with EROWA IT50, but not with EROWA Compact (manual only).
Product Introduction

Standard functions
• Fine matte finish circuit (PS circuit)
• Glossy mirror finish circuit (GM2 circuit)
• Z-axis linear scale
• Unit cooler

Options
• Built-in C-axis
• Automatic clamp
• Shuttle-type ATC
• MVH-20T ATC
• XY-axis linear scale
• High-function manual operation box
• Dielectric fluid distributor
• FP100EA
• SP power supply (for tungsten carbide machining)

C-axis [mm (in)]

Distance between table and electrode mounting surface

<table>
<thead>
<tr>
<th>3R MACRO MACRO Jr</th>
<th>EROWA ITS50 3R Combi</th>
</tr>
</thead>
<tbody>
<tr>
<td>278 to 578</td>
<td>271 to 571</td>
</tr>
<tr>
<td>281 to 581</td>
<td>287 to 587</td>
</tr>
<tr>
<td>10.9 to 22.8</td>
<td>10.7 to 22.5</td>
</tr>
<tr>
<td>11.1 to 22.9</td>
<td>11.3 to 23.1</td>
</tr>
</tbody>
</table>

Electrode mounting table dimension drawing

* The 3R/EROWA electrode holder is used when the built-in C-axis/automatic clamp (option) is provided.

Table (upper surface) dimension drawing

<table>
<thead>
<tr>
<th>160 (6.3)</th>
<th>500 (19.7)</th>
</tr>
</thead>
</table>

45°

ø 100 (3.9)

ø 140 (5.5)

174 (6.9)

4-M8 screws 4-M10 screws

Standard specifications

Shuttle-4T ATC specifications

<table>
<thead>
<tr>
<th>Height [mm (in)]</th>
<th>Width [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2524 (99.3)</td>
<td>1650 (65.0)</td>
</tr>
</tbody>
</table>

Shuttle-7T ATC specifications

<table>
<thead>
<tr>
<th>Height [mm (in)]</th>
<th>Width [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2524 (99.3)</td>
<td>1888 (74.3)</td>
</tr>
</tbody>
</table>

Standard delivery entrance

<table>
<thead>
<tr>
<th>2394 (94.3)</th>
<th>2325 (91.5)</th>
</tr>
</thead>
</table>

Machine unit

Working tank

Dielectric fluid reservoir

Filter box

Dielectric fluid chiller unit

Power supply and control unit

2217 (87.3) 40 (1.6)

(Note 1) For MACRO Jr of 3R Combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb)/ electrode.

(Note 2) When using four electrodes, the dimensions are 70 x 70 x 100 (mm) [2.8 x 2.8 x 3.9 (in)].

(Note 3) ATC can be used with EROWA ITS50, but not with EROWA Compact (manual only).
Machine Specifications and Options

Options and retrofit specifications differ according to country and region; please contact a Mitsubishi Electric representative for details.

Machine Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions (W x D x H) [mm]</th>
<th>Total system weight [kg]</th>
<th>Distance between table and electrode mounting surface [mm]</th>
<th>Max. electrode weight [kg]</th>
<th>Method</th>
<th>Working tank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA2000M</td>
<td>2432 x 2421 x 2480</td>
<td>6000 (132.28)</td>
<td>153 to 453 (3R MACRO)</td>
<td>50 (110)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAB/PVM ADVANCE</td>
<td>1460 x 1900 x 2075</td>
<td>2000 (4429)</td>
<td>223 to 473 (8.8 to 18.6)</td>
<td>25 (55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA12VM ADVANCE</td>
<td>1750 x 2050 x 2335</td>
<td>3725 (8212)</td>
<td>270 to 570 (10.6 to 22.4)</td>
<td>50 (110)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA28VM ADVANCE</td>
<td>2195 x 2512 x 2615</td>
<td>5400 (12095)</td>
<td>425 to 775 (16.7 to 30.5)</td>
<td>200 (441)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Working tank

- Automatically adjustable between 50 and 100% with override function.
- Jog feedrate can be changed between 50 and 100%.
- LCD display improves workability. Workpiece coordinates can be set from the manual operation box. Jog feedrate can be changed between 50 and 150% with override function.

Spindle

- Programmable flushing nozzles (four nozzles) can be selected for the EA8PV ADVANCE model with automatic elevation tank, and programmable flushing nozzles (six nozzles) can be selected for the EA8PV ADVANCE model without the automatic elevation tank.
- The shuttle-type ATC cannot be used with the programmable flushing nozzle.

(Dielectric fluid distributor)

- Options and retrofit specifications differ according to country and region; please contact a Mitsubishi Electric representative for details.

Options

- Main option correspondence table
  - Standard equipment
  - Can be added after installation
  - Cannot be added after installation
  - Not available

<table>
<thead>
<tr>
<th>Model</th>
<th>Lubricant</th>
<th>Machine unit</th>
<th>Scale</th>
<th>Scale feedback specification</th>
<th>Thermal-displacement compensation system</th>
<th>Granite table</th>
<th>Column up specifications</th>
<th>High-function manual operation box</th>
<th>LED light</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA2000M</td>
<td>Automatic lubrication unit</td>
<td>MA2000M</td>
<td>2-axis</td>
<td>LED light</td>
<td></td>
<td></td>
<td>X</td>
<td>◎ (4.7)</td>
<td>◯</td>
</tr>
<tr>
<td>EAB/PVM ADVANCE</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○ (4.7)</td>
<td>○</td>
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<tr>
<td>EA12VM ADVANCE</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○ (4.7)</td>
<td>○</td>
</tr>
<tr>
<td>EA28VM ADVANCE</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○ (4.7)</td>
<td>○</td>
</tr>
</tbody>
</table>

Power supply

- Power supply of DC24V for the LED light.
- Effective for medium-to-large-sized EDMs which discharge large quantities of sludge. Reverse wash function is effective in achieving high performance over a long time.

High-function manual operation box

- Standard manual operation box
- LCD display improves workability.
- Workpiece coordinates can be set from the manual operation box.
- Jog feedrate can be changed between 50 and 150% with override function.

AUTOMATIC FILTER

- TF20
Machine Specifications

**Model**

<table>
<thead>
<tr>
<th>Model</th>
<th>EA28VM ADVANCE</th>
<th>EA40M ADVANCE</th>
<th>EA50M</th>
<th>EA8SM Automatic elevation tank</th>
<th>EA8SM Front door</th>
<th>EA12DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x D x H) [mm]</td>
<td>2485 x 2850 x 2865</td>
<td>2400 x 2500 x 2865</td>
<td>2200 x 2450 x 2865</td>
<td>2200 x 2450 x 2865</td>
<td>2200 x 2450 x 2865</td>
<td>2200 x 2450 x 2865</td>
</tr>
<tr>
<td>Total system weight [kg]</td>
<td>9270 (20420)</td>
<td>9270 (20420)</td>
<td>9270 (20420)</td>
<td>9270 (20420)</td>
<td>9270 (20420)</td>
<td>9270 (20420)</td>
</tr>
<tr>
<td>Spindle</td>
<td>Distance between table and electrode mounting surface [mm]</td>
<td>675 to 1125</td>
<td>700 to 1125</td>
<td>700 to 1125</td>
<td>700 to 1125</td>
<td>700 to 1125</td>
</tr>
<tr>
<td>Power supply</td>
<td>Type</td>
<td>DC24V</td>
<td>DC24V</td>
<td>DC24V</td>
<td>DC24V</td>
<td>DC24V</td>
</tr>
<tr>
<td>Liquid level</td>
<td>Adjustment range [mm]</td>
<td>675 to 1125</td>
<td>700 to 1125</td>
<td>700 to 1125</td>
<td>700 to 1125</td>
<td>700 to 1125</td>
</tr>
<tr>
<td>Capacity</td>
<td>Initial dielectric fluid supply amount [gal]</td>
<td>740 (195)</td>
<td>740 (195)</td>
<td>740 (195)</td>
<td>740 (195)</td>
<td>740 (195)</td>
</tr>
</tbody>
</table>

**Options and retrofit specifications differ according to country and region; please contact a Mitsubishi Electric representative for details.**

**Programmable flushing nozzle**

(automatic selection of dielectric fluid emission/suction)

*Fluid treatment for multiple set-up machining etc (set either emission or suction for coupler and sequentially execute with NC program). (photo shows EA12V ADVANCE specifications)*

**Dielectric fluid distributor**

*Sprays dielectric fluid between workpiece and electrode during pitch machining.*

*Distributes dielectric fluid into three flows and sprays onto machining section.*

**Dielectric fluid distributor**

*Sprays dielectric fluid between workpiece and electrode during pitch machining.*

*Distributes dielectric fluid into three flows and sprays onto machining section.*
# Machine Specifications and Options

## Options

<table>
<thead>
<tr>
<th>Head-side tooling</th>
<th>MA2000M</th>
<th>EABP/VM ADVANCE</th>
<th>EA12V ADVANCE</th>
<th>EA28V ADVANCE</th>
<th>EA28VM ADVANCE</th>
<th>EA40M ADVANCE</th>
<th>EA50M</th>
<th>EA8SM</th>
<th>EA12DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-accuracy built-in C-axis</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>X</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>High-accuracy built-in spindle</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Automatic clamp</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Automatic clamp (head down specifications)</td>
<td>○</td>
<td>○</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Remove hole (2R-1MA/MA-R specifications)</td>
<td>X</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Large electrode adaptor</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

| Shuttle | 4T | 3R MACRO | EROWA ITS | X | X | X | X | X | X |
| LS | 7T | 3R MACRO | EROWA ITS | X | X | X | X | X | X |
| 10T | 3R MACRO | EROWA ITS | X | X | X | X | X | X |
| 20T | 3R MACRO | EROWA ITS | X | X | X | X | X | X |
| MVH | 20T | EROWA ITS | X | X | X | X | X | X |
| Shuttle | 3R Combi | X | X | X | X | X | X | X | X |
| LS | 3R MACRO | EROWA ITS | X | X | X | X | X | X |
| 4T | 3R Combi | X | X | X | X | X | X | X | X |
| 7T | 3R MACRO | EROWA ITS | X | X | X | X | X | X |
| 10T | 3R MACRO | EROWA ITS | X | X | X | X | X | X |
| 20T | 3R Combi | X | X | X | X | X | X | X | X |
| MVH | 20T | EROWA ITS | X | X | X | X | X | X |
| Shuttle | 3R Combi | X | X | X | X | X | X | X | X |

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External signal output (M code)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>External signal output (M code with reset)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network Connection Specifications (DNC, FTP option)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data such as NC programs, machining conditions and variables can be exchanged between a personal computer and EDM. The required options differ according to the models and purpose, and can be confirmed with the following table. One IP address must be prepared for each EDM within the user's in-house network.</td>
</tr>
<tr>
<td><strong>Required specifications</strong></td>
</tr>
<tr>
<td>Operate on the EDM side, and receive data from personal computer</td>
</tr>
<tr>
<td>Operate on the EDM side, and send data directly to the EDM's NC</td>
</tr>
<tr>
<td>Operate on the personal computer side, and send data to the EDM</td>
</tr>
<tr>
<td>Operate on the personal computer side, and send data directly to the EDM's NC</td>
</tr>
</tbody>
</table>

(Note 1) Select the chuck from the following types: 3R MACRO, 3R Combi, EROWA ITS, EROWA-COMBI. (Note 2) Specifications are slightly different for EA ADVANCE and EA series. (Note 3) Please contact a Mitsubishi Electric representative for details on the EA40 ADVANCE and EA50 ATC. (Note 4) Mountable only when using high-accuracy built-in spindle. (Note 5) The automatic elevation tank and shuttle ATC can not be combined for the EA8PV ADVANCE. (Note 6) Mountable only for machine with automatic elevation tank. (Note 7) Please contact a Mitsubishi Electric representative for distance between table and electrode mounting surface. (Note 8) It is necessary for attaching an automation system (electrode/ workpiece automatic changer unit) (Note 9) The external signal output (M code with answer) is necessary for attaching external equipment which requires an answer signal. (Note 10) LAN cable should be all straight wiring type with shielded connector, category 5 (100BASE-TX compliant). (Note 11) A high-accuracy built-in spindle and fine-hole guide (ø1.15 to 2.0mm) are required. (Note 12) A personal computer is required for ESPERADVANCE PRO. (Note 1,2) Ethernet hub used. After that, data I/O operations are required. Data I/O operation.FTP (Note 14) Data can be received only using data I/O operation. (Note 14) FTP (Note 14) DPC H/W is required for the EA series.
### Machine Specifications and Options

**Note 14** DNC H/W is required for the EA series.

**Network Connection Specifications (DNC, FTP option)**

One IP address must be prepared for each EDM within the user’s in-house network. The required options differ according to the models and purpose, and can be confirmed with personal computer and EDM. Data such as NC programs, machining conditions and variables can be exchanged between a personal computer and EDM’s computer side, and send data to the EDM computer side. Operate on the personal computer and receive data from EDM side.

<table>
<thead>
<tr>
<th>Required specifications</th>
<th>EA ADVANCE series</th>
<th>MA/EA series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data transmission</td>
<td>DNC S/W or FTP</td>
<td>Standard</td>
</tr>
</tbody>
</table>

*After that, data I/O operations are required. Refer to DNC specifications personal computer side. Commercially available DNC software must be installed on the EDM's common HDD. The personal computer's Explorer is used. After that, data I/O operations are required.*

**Measures against threats**

Pattern file can be used semi-permanently without renewal. Defends machines against the threat of computer viruses (LAN, USB) and internal threats.

**Measures**

Protecting data from thoughtless changes, forbidding protect mode new threats. Use EDM’s Explorer and receive data I/O operation. FTP data can be received only using conventional measures.

**3-color warning light**

3-color warning light indicates machine operation status. Measures against business risk.
## Power Supply / Control Specifications

### Power Supply / Control Specifications

#### Applicable model

<table>
<thead>
<tr>
<th>Model</th>
<th>MA2000M</th>
<th>E8APV ADVANCE</th>
<th>EA12VM ADVANCE</th>
<th>EA28VM ADVANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply unit</td>
<td>FP60MA</td>
<td>FP80V-A</td>
<td>FP120V-A</td>
<td>FP80V-A</td>
</tr>
<tr>
<td>Maximum machining current peak [A]</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td>Standard machining circuits and functions</td>
<td>Pulse transformer circuit (TP circuit)</td>
<td>Super-low-wear circuit (SC, α-SC circuit), Fine matte finish circuit (PS circuit), Glosso mirror finish circuit (GM2 circuit), Ultrafine matte finish circuit (NP2 circuit), Fuzzy adaptive control, SS jump, OrbitPro</td>
<td>Pulse transformer circuit (TP circuit), Super-low-wear circuit (SC, α-SC circuit), Fine matte finish circuit (PS circuit), Glosso mirror finish circuit (GM2 circuit), Fuzzy adaptive control, SS jump, OrbitPro</td>
<td></td>
</tr>
<tr>
<td>Control system</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Power supply method</td>
<td>Resistive, low-heat generating, compact, power regenerating, energy-saving method</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cooling method</td>
<td>Indirect cooling</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

### Control unit

<table>
<thead>
<tr>
<th>Control unit</th>
<th>C30EA-2</th>
<th>C31EA-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control unit</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Input method</td>
<td>USB fan memory, RS232C</td>
<td>Keyboard, USB flash memory, Ethernet</td>
</tr>
<tr>
<td>Display</td>
<td>10.4-inch color LCD</td>
<td>15-inch color TFT-LCD touch screen</td>
</tr>
<tr>
<td>Display characters</td>
<td>Alphanumeric characters</td>
<td>–</td>
</tr>
<tr>
<td>Control system</td>
<td>CNC closed loop</td>
<td>–</td>
</tr>
<tr>
<td>Number of controlled axis</td>
<td>Maximum four axes</td>
<td>–</td>
</tr>
<tr>
<td>Setting (command) unit</td>
<td>XYZ</td>
<td>–</td>
</tr>
<tr>
<td>Minimum drive unit</td>
<td>XYZ</td>
<td>–</td>
</tr>
<tr>
<td>Maximum command value</td>
<td>±9999.99999mm/±9999.99999inch</td>
<td>–</td>
</tr>
<tr>
<td>Position command format</td>
<td>Incremental/Absolute value combination</td>
<td>–</td>
</tr>
<tr>
<td>Interpolation function</td>
<td>Linear, circular, spiral</td>
<td>–</td>
</tr>
<tr>
<td>Orbit mode</td>
<td>Fixed pattern and random path, 3D pattern</td>
<td>–</td>
</tr>
<tr>
<td>Orbit control system</td>
<td>4 types (free, semi-fixed, fixed, variable)</td>
<td>–</td>
</tr>
<tr>
<td>Scale magnification</td>
<td>0.000001 to 99.999999/0.001 to 99999.999</td>
<td>–</td>
</tr>
<tr>
<td>Graphics</td>
<td>X-Y-Y-Z-X plane, solid, table scale, automatic machining path drawing, orbit block drawing</td>
<td>–</td>
</tr>
<tr>
<td>Automatic programming</td>
<td>E.S.P.E.R II</td>
<td>ESPERADVANCE</td>
</tr>
<tr>
<td>Program No. designation range</td>
<td>1 to 99999</td>
<td>–</td>
</tr>
<tr>
<td>Sequence No. designation range</td>
<td>1 to 99999</td>
<td>–</td>
</tr>
<tr>
<td>Subprogram</td>
<td>Nesting levels: 30</td>
<td>–</td>
</tr>
<tr>
<td>Manual feed</td>
<td>High-speed, low-speed, inching (1µm/10µm), extension mode (high-speed/low-speed)</td>
<td>–</td>
</tr>
<tr>
<td>Manual input positioning</td>
<td>Screen input</td>
<td>–</td>
</tr>
<tr>
<td>Graphic check</td>
<td>High-speed graph drawing</td>
<td>–</td>
</tr>
<tr>
<td>Screen basic menu</td>
<td>3D display compatible, high-speed graph drawing</td>
<td>–</td>
</tr>
<tr>
<td>Network specifications</td>
<td>Ethernet port (10/100BaseT (X) port RJ45 connector)</td>
<td>–</td>
</tr>
<tr>
<td>RS232C interface</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Maintenance functions</td>
<td>Consumption rate control (time display)</td>
<td>–</td>
</tr>
<tr>
<td>Outline dimensions (W x D x H) (mm)</td>
<td>400 (15.7) x 900 (35.4) x 1763 (69.3) (FP80V)</td>
<td>80</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>260 (573)</td>
<td>260 (573)</td>
</tr>
</tbody>
</table>

(Note 1) Refer to page 25 for the network specification option combinations. The DNC or FTP option is required to validate the remote monitor function.

### Control unit functions

#### C31 (Advance control unit) control unit functions

<table>
<thead>
<tr>
<th>NC functions</th>
<th>Corner chamfer command</th>
<th>Maintenance functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year, month, day display</td>
<td>Linear angle command</td>
<td>Maintenance check</td>
</tr>
<tr>
<td>Character string replace function</td>
<td>Backlash compensation</td>
<td>–</td>
</tr>
<tr>
<td>Teaching function</td>
<td>Pitch error compensation</td>
<td>–</td>
</tr>
<tr>
<td>Machining start time designation function</td>
<td>Reference block</td>
<td>–</td>
</tr>
<tr>
<td>Various timers</td>
<td>Automatic zero point return</td>
<td>–</td>
</tr>
<tr>
<td>Automatic return</td>
<td>Backlash deviation compensation (Electrode rotation compensation)</td>
<td>–</td>
</tr>
<tr>
<td>Manual input</td>
<td>Machining functions</td>
<td>Pole center positioning</td>
</tr>
<tr>
<td>Program support function</td>
<td>Fuzzy Pro Plus adaptive control</td>
<td>Electrical-discharge positioning</td>
</tr>
<tr>
<td>E.S.P.E.R ADVANCE</td>
<td>Machining results graph, machining results table</td>
<td>–</td>
</tr>
<tr>
<td>Memory operation</td>
<td>Machining condition expert</td>
<td>3-point center positioning</td>
</tr>
<tr>
<td>Offsets</td>
<td>Master Pack</td>
<td>2 to 4 face positioning</td>
</tr>
<tr>
<td>Coordinate value read</td>
<td>Machining</td>
<td>–</td>
</tr>
<tr>
<td>Time read</td>
<td>Tape machining</td>
<td>–</td>
</tr>
<tr>
<td>Workplace coordinate system (106 dimensions)</td>
<td>Lateral machining</td>
<td>–</td>
</tr>
<tr>
<td>Coordinate rotation</td>
<td>3D machining</td>
<td>–</td>
</tr>
<tr>
<td>Figure rotation</td>
<td>Side servo machining</td>
<td>–</td>
</tr>
<tr>
<td>Axis change</td>
<td>Offset machining</td>
<td>–</td>
</tr>
<tr>
<td>Mirror image</td>
<td>Inclined machining</td>
<td>–</td>
</tr>
<tr>
<td>Scales for XY-axis</td>
<td>Contour machining</td>
<td>–</td>
</tr>
<tr>
<td>Function completion</td>
<td>X-axis machining</td>
<td>–</td>
</tr>
<tr>
<td>Corner R command</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

#### C30 control unit functions

<table>
<thead>
<tr>
<th>NC functions</th>
<th>Corner chamfer command</th>
<th>Maintenance functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year, month, day display</td>
<td>Linear angle command</td>
<td>Maintenance check</td>
</tr>
<tr>
<td>Character string replace function</td>
<td>Backlash compensation</td>
<td>–</td>
</tr>
<tr>
<td>Teaching function</td>
<td>Pitch error compensation</td>
<td>–</td>
</tr>
<tr>
<td>Machining start-time designation function</td>
<td>Reference block</td>
<td>–</td>
</tr>
<tr>
<td>Various timers</td>
<td>Automatic zero point return</td>
<td>–</td>
</tr>
<tr>
<td>Automatic return</td>
<td>Backlash deviation compensation (Electrode rotation compensation)</td>
<td>–</td>
</tr>
<tr>
<td>Manual input</td>
<td>Machining functions</td>
<td>Pole center positioning</td>
</tr>
<tr>
<td>Program support function</td>
<td>Fuzzy Pro Plus adaptive control</td>
<td>Electrical-discharge positioning</td>
</tr>
<tr>
<td>E.S.P.E.R ADVANCE</td>
<td>Machining results graph, machining results table</td>
<td>–</td>
</tr>
<tr>
<td>Memory operation</td>
<td>Machining condition expert</td>
<td>3-point center positioning</td>
</tr>
<tr>
<td>Offsets</td>
<td>Master Pack</td>
<td>2 to 4 face positioning</td>
</tr>
<tr>
<td>Coordinate value read</td>
<td>Machining</td>
<td>–</td>
</tr>
<tr>
<td>Time read</td>
<td>Tape machining</td>
<td>–</td>
</tr>
<tr>
<td>Workplace coordinate system (106 dimensions)</td>
<td>Lateral machining</td>
<td>–</td>
</tr>
<tr>
<td>Coordinate rotation</td>
<td>3D machining</td>
<td>–</td>
</tr>
<tr>
<td>Figure rotation</td>
<td>Side servo machining</td>
<td>–</td>
</tr>
<tr>
<td>Axis change</td>
<td>Offset machining</td>
<td>–</td>
</tr>
<tr>
<td>Mirror image</td>
<td>Inclined machining</td>
<td>–</td>
</tr>
<tr>
<td>Scales for XY-axis</td>
<td>Contour machining</td>
<td>–</td>
</tr>
<tr>
<td>Function completion</td>
<td>X-axis machining</td>
<td>–</td>
</tr>
<tr>
<td>Corner R command</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Applicable model</td>
<td>Power supply</td>
<td>Maximum machining current peak [A]</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>MA2000M</td>
<td>FP80V-A</td>
<td>80</td>
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<tr>
<td></td>
<td>FP120V-A</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>FP60V/MA</td>
<td>120</td>
</tr>
<tr>
<td>EA8PV ADVANCE</td>
<td>FP80S</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>FP120S</td>
<td>120</td>
</tr>
<tr>
<td>EA12VM ADVANCE</td>
<td>FP60V/EA</td>
<td>80</td>
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<tr>
<td></td>
<td>FP120D</td>
<td>120</td>
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<tr>
<td>EA28VM ADVANCE</td>
<td>FP80EA</td>
<td>80</td>
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<tr>
<td></td>
<td>FP120D</td>
<td>120</td>
</tr>
<tr>
<td>EA40M ADVANCE</td>
<td>FP80S</td>
<td>80</td>
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<tr>
<td></td>
<td>FP120S</td>
<td>120</td>
</tr>
<tr>
<td>EA12DM</td>
<td>FP60EA</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>FP120D</td>
<td>120</td>
</tr>
</tbody>
</table>

**Machine, power supply and dielectric fluid chiller unit**

<table>
<thead>
<tr>
<th>Machine</th>
<th>Power supply</th>
<th>Total input capacity [kVA]</th>
<th>Machine’s generated heating value [kW] (Note 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA2000M</td>
<td>FP80V-A</td>
<td>15.0</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>FP120V-A</td>
<td>20.0</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td>FP60V/MA</td>
<td>7.0</td>
<td>4.2</td>
</tr>
<tr>
<td>EA8PV ADVANCE</td>
<td>FP80S</td>
<td>10.0</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>FP120S</td>
<td>14.0</td>
<td>8.4</td>
</tr>
<tr>
<td>EA12VM ADVANCE</td>
<td>FP60V/EA</td>
<td>15.5</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>FP120D</td>
<td>19.0</td>
<td>11.4</td>
</tr>
<tr>
<td>EA28VM ADVANCE</td>
<td>FP80EA</td>
<td>8.2</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>FP120D</td>
<td>13.2</td>
<td>7.9</td>
</tr>
<tr>
<td>EA40M ADVANCE</td>
<td>FP80S</td>
<td>15.6</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td>FP120S</td>
<td>19.0</td>
<td>11.4</td>
</tr>
<tr>
<td>EA12DM</td>
<td>FP60EA</td>
<td>8.2</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>FP120D</td>
<td>13.2</td>
<td>7.9</td>
</tr>
</tbody>
</table>

**Note 1:** Refer to page 25 for the network specification option combinations. The DNC or FTP option is required to validate the remote monitor function.

**Note 2:** Please contact a Mitsubishi Electric representative regarding EA50.

**Note 3:** The machine's generated heating value is a reference value. Refer to page 31 for details on calculating the value.
System 3R System Chart

Spindle

Change automatically (for ATC)

- C-axis/Spindle/Automatic clamp (Combi specifications)
- Adaptor plate (MACRO specifications)

Change manually

- Chuck
- Adaptor plate
- Removable holder

Draw bar

- Junior
- MACRO

Electrode/Pallet holder

(common for electrode and workpiece)

- Measurement probe

Measuring

- Master
- Microscope

Table chuck

- MC
- Die-sinking

Table chuck

- MAGNUM
- MC
- Die-sinking

Table chuck

- WEDM
- Lathe

Table chuck

3R-90588
3R-600.22
3R-600.20
3R-612.6

* Please contact System 3R Co., Ltd. for detailed tooling specifications.
EROWA System Chart

Spindle

Change automatically (for ATC)
- C-axis/Spindle/Automatic clamp
- (Combi specifications)
- (ITS specifications)

Change manually
- EJ-1432 adaptor plate
- COMBI
- ITS

Compact

Chucking plug
- ER-029098

Electrode/Pallet holder
- (common for electrode and workpiece)
- ER-029015
- ER-034045
- ER-017532
- ER-009214
- ER-010793
- ER-009219
- ER-009222
- ER-009226
- ER-008458
- ER-008566
- ER-008568
- ER-015776

Measurement probe
- EJ-1433
- EJ-1424(Ø5mm)
- EJ-1427(Ø2mm)
- ER-008617
- ER-010723
- ER-008519

Measuring
- Master
- Microscope

Table chuck
- ER-023931 (power chuck)
- ER-024312 (power chuck)
- ER-036345
- ER-037970
- ER-012299
- ER-007852
- ER-025983

* Please contact EROWA Japan Co., Ltd. for detailed tooling specifications.
Mitsubishi Electric EDM Automation Systems

Automatic operation system configuration

Electrode / workpiece automatic changing unit specification
- Automation system specification using a robotic system
- Magazine configuration of electrode and workpiece can be changed depending on machine configuration
- Machine Up-Time is improved by using offline setup system

Multiple machines control system specification
- Automation system specification for controlling multiple machines with a robotic system
- A cell system can be built which controls die-sinking EDM, wire-cut EDM, milling and a coordinate measuring machine
- Managing multiple machines with a scheduler system is enhanced

Basic configuration options
- High-accuracy built-in C-axis or high-accuracy built-in spindle
- Robot (Note 2)
- External signal output (M code)

Basic configuration options
- High-accuracy built-in C-axis or high-accuracy built-in spindle
- Robot (Note 2)
- External signal output (M code with answer)

RemoteMagic□

Pallet toooring
- Pallets can be from System 3R or Erowa tooling systems
- Unique configuration can be handled on magnetic chucks

Main pallet tooling configuration and machine specifications

<table>
<thead>
<tr>
<th>System 3R</th>
<th>EROWA</th>
<th>EROWA UPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presetter</td>
<td>Pallet</td>
<td>Pallet/ Pallet</td>
</tr>
<tr>
<td>3R-680.10-2</td>
<td>3R-770-1</td>
<td>3R-780.1</td>
</tr>
<tr>
<td>ø160</td>
<td>ø148</td>
<td>ø115</td>
</tr>
<tr>
<td>245</td>
<td>160</td>
<td>198</td>
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<td>280</td>
<td>160</td>
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<td>63.0 to 313.0</td>
<td>84.5 to 334.5</td>
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<td>65.0</td>
<td>65.0</td>
<td>69.0</td>
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<tr>
<td>123.0 to 373.0</td>
<td>136.5 to 386.5</td>
<td>150.0 to 490.0</td>
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<td>35.0 to 335.0</td>
<td>40.0 to 340.0</td>
<td>61.5 to 361.5</td>
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<td>200.0 to 550.0</td>
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<td>226.5 to 576.5</td>
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<tr>
<td>58.0 to 365.0</td>
<td>58.0 to 365.0</td>
<td>213.0 to 563.0</td>
</tr>
<tr>
<td>53.0 to 353.0</td>
<td>53.0 to 353.0</td>
<td>75.0 to 370.0</td>
</tr>
<tr>
<td>ø115 alignment pallet</td>
<td>UPS alignment pallet</td>
<td></td>
</tr>
</tbody>
</table>

Specifications
- Weight (kg)
- Weight (kg)
- Diameter (mm)
- Diameter (mm)
- Height (mm)
- Height (mm)
- Length (mm)
- Length (mm)
- Width (mm)
- Width (mm)
- Chucks

* Each model should be equipped with a high-accuracy built-in C-axis and 3R-Macro or Erowa ITS tooling.
* The max. workpiece height varies depending on pallets and fixtures.
* Please contact System 3R Co., Ltd or EROWA Japan Co., Ltd. for detailed tooling specifications.

Workpiece/Electrode set-up method

In-line set-up method
- Set-up method for continuous operation which measures core alignment of electrode and workpiece using presetters and coordinate measuring machines
- Effective for cases that include many machines, electrodes, and work pieces
- ID system provides easy management of electrodes and work pieces

Off-line set-up method
- Set-up method for continuous operation which measures core alignment of electrode and workpiece using presetters and coordinate measuring machines
- Effective for cases that include many machines, electrodes, and work pieces
- ID system provides easy management of electrodes and work pieces

(Note 1) Please contact a Mitsubishi Electric representative for more information regarding presetters and coordinate measuring machines.
(Note 2) A personal computer is required for installation.
(Note 3) Please contact a Mitsubishi Electric representative regarding available carrier device robots.
Peripheral equipment/System extension options

Scheduling system

E.S.P.E.R SCHEDULE

- Execute continuous schedule operation of EDMs with job management (manage up to five EDMs)
- Control ID numbers, as well as monitor the mounting state of electrodes and the state of communications with the EDM and electrode / workpiece changing unit

Machine remote monitor

RemoteMagic II

- Visualizes workshop with monitor and notification for improving machine operating ratio
- Remotely monitor machining with a personal computer
- Mail notifications when an alarm occurs

3D CAD/CAM system

AD

- 3D electrode model can be created easily, and electrode design CAD system handling orbit deformation
- De-stringing electrical discharge CAM system, which calculates machining positions automatically and eliminates value input mistake
- Operations can be sequenced to wire, milling and hole machining CAMs

Mitsubishi Electric EDM Automation systems

Operating status

Electrical-discharge machining

Set-up

Machining program

Workpiece/Electrode management

Electrode fabrication

Parts pre-machining

Touch probe

Offline automatic programming system

ESPERADVANCE PRO

- Offline programming and program management is possible
- Same screens and operability as ESPERADVANCE, and compatible with 64-bit models (MA, EA Series machining condition search is also available)
- Import data from AD or EPX compatible CAD/CAM

ID tag system

- Mounting status of carrier device robot is managed by ID tag which mounted electrode and workpiece pallets
- Electrode and workpiece pallets can be identified to prevent mounting mistakes and program registering mistake
- Workpiece and electrode can be easily managed using ID tag system and scheduler

Presetter

- Supports setup operation at machine offline, and setup time can be reduced
- The usage of offline setup system will improve machine runtime
- Electrodes and workpiece can be easily managed using ID tag system and scheduler

(Note 1) Please contact a Mitsubishi Electric representative for more information regarding the ID tag systems.
(Note 2) Please contact a Mitsubishi Electric representative for more information regarding the presets and coordinate measuring machines.
(Note 3) Please contact a Mitsubishi Electric representative for more information regarding the touch probes.
Preparation for Machine Installation

Machine installation checklist

Determing the machining details
Check each item, and make sure that no item or order is overlocked.
1) Determine the workspace
2) Determine the machining site
3) Determine the pre-processing site
4) Determine the post-processing site

Preparation of installation fixtures
1) Plan the installation form
2) Prepare or manufacture the fixtures

Preparation of tooling and electrode
It normally takes one to two months for tooling delivery, so please place orders as early as possible.
1) Determination of tooling and electrode
2) Order, preparation or manufacture

Training of programmers and operators
1) Select the programmers and operators
2) Apply for training seminars

Confirmation of foundation and power-supply work
1) Confirmation of floor area
2) Foundation work
3) Primary wiring for power-lead-in
4) Grounding work
5) Air piping work

Confirmation of delivery path
Check the path inside and outside the factory to avoid any trouble during delivery.
1) Traffic arrangements to factory
2) Road width
3) Entry road
4) Factory entrance and width of gate in factory
5) Factory building entrance dimensions (height × width)
6) Confirm-temperature dual-proof room entrance dimensions (height × width)

File applications to fire department
The applications must be filed before the EDM is installed.
1) Confirm the dielectric fluid amount
2) File applications to fire department (EDMs already installed must also be filed.)
   - Application for “Facility using fire” (fluid amount less than 400ℓ)
   - Application for “Low volume hazardous material storage and handling site” (fluid amount more than 400ℓ and less than 2,000ℓ)
   - Application for “General handling site” (fluid amount 2,000ℓ or more)

The required applications differ according to country and region; please contact your nearest fire department for details.

Installation conditions
1. Installation site
   ① Constant-temperature dust-proof room
   - Recommended room temperature: 25°C (±1°C)
   - Usable temperature range: 15 to 35°C or 41 to 95°F
   Temperature fluctuation will directly affect machining accuracy. To maintain performance accuracy, select a place with minimal temperature fluctuation.
   Note that an environment where the temperature fluctuates by 3°C (5°F) or more within 24 hours, or 1°C (2°F) or more within one hour can adversely affect machining accuracy. Make sure that the machine body is not subject to direct wind from air-conditioners or to direct sunlight.
   Dust-free location is recommended.
   Install a EDM in an environment with no corrosive gasses, such as acid or salt, or mist, and with low levels of dust.
   Grinding dust can adversely affect the machine’s linear scales and ball screws.
   Pay special attention to installation location to avoid this hazard (separate from grinding machine, or install in separate room, etc.).
   Humidity: Width 30 to 75%RH (with no dew condensation).
   Temperature range during transportation and storage
   - 85 to 100°F (25 to 38°C) (when power is not connected).
   ② Tolerable vibration of floor
   - EA12V/EA28V/EA45 ADVANCE, EA50, EA8:
   - Select a floor where vibration or impact will not be conveyed.
   - As a reference, the vibration level should have a max. amplitude of 5μm or less at a 10 to 20kHz band.
   - MA2000, EA45 ADVANCE:
   - Select a floor where vibration or impact will not be conveyed.
   - As a reference, the vibration level should have a max. amplitude of 2μm or less at a 10 to 20kHz band.

   Consult with the contractor or vibration measuring instrument manufacturer for details on the measuring method.

Foundation
- The floor should be concrete with a thickness of 400mm (15.7”) or more so it can sufficiently withstand the system’s weight.
- Room construction
   - The room where the EDM is to be installed must be a non-flammable or fire-proof structure. Please contact your local fire department for details.
- Ventilation of combustible vapors
   - Install a ventilator to effectively remove combustible vapors and fire powders.

2. Machine heating value
   Use the equipment capacity to calculate the EDM’s heating value required for designing a constant-temperature room.

   Heating value (kW) = Equipment capacity (kVA) x 0.6
   Example: For EA12V ADVANCE + FPR04V, 7.0kVA x 0.6 = 4.2kW

   The above value is a guideline. Consult with the constant-temperature room manufacturer for details.

3. Power-supply equipment
   - Primary wiring
     Normal wiring: 3-phase 200/200 VACs10% 60Hz, 3-phase 200VACs10% 50Hz
     High-accuracy wiring: 3-phase 200/200 VACs4% 60Hz, 3-phase 200VACs4% 50Hz
     An automatic voltage regulator (AVR) should be used if voltage fluctuations exceed that value above.
     Do not power on in instantaneous power failure occurrence that exceeds 0.02sec.
     A single-phase AC noise power source for the automatic fire extinguisher: 100VACs10% 50kHz
   - Power capacity
     Facility capacity (kVA) = Total power input (Machine input + power supply input = dielectric fluid chiller unit input) [kW]
     Refer to page 24 for details on the machine, power supply and dielectric fluid chiller unit.
     - No-fuse breaker and earth-leakage breaker
       When selecting a no-fuse breaker or earth-leakage breaker for the primary side of the EDM, consult the total facility capacity, and select the breaker using the following table as a reference.

       | Total facility capacity [kVA] | No-fuse breaker | Earth-leakage breaker |
       |-------------------------------|-----------------|-----------------------|
       | ~9                            | N50-GC (50A)   | N50-GC (50A)          |
       | 12                            | F100-GC (100A) | N100-GC (100A)        |
       | 22                            | F225-GC (150A) | N225-GC (150A)        |

   The breakers in the table allow for the rush current of the transformer in the power supply panel.

   - Selecting the input power cable size
     The following table a guide for calculating the appropriate power cable size to use based on total capacity. The cable size should be sufficient to allow some leeway.

     | Total facility capacity [kVA] | Cable size [mm²] | Total facility capacity [kVA] | Cable size [mm²] |
     |------------------------------|------------------|------------------------------|------------------|
     | ~9                           | 5.5              | 15                           | 22.0             |
     | 9-12                         | 8.0              | 21                           | 30.0             |
     | 12-15                        | 14.0             |                              |                  |

4. Grounding work
   The EDMs must always be grounded to prevent external noise, radio disturbance and earth leakage.
   Install a EDM in an environment with no corrosive gasses, such as acid or salt, or mist, and with low levels of dust.
   Common grounding can be used if noise from other devices will not enter through the common grounding; the grounding cable must be connected independently to the grounding location (Fig. 2).
   Use a 14mm² grounding wire.

<table>
<thead>
<tr>
<th>Power-supply unit</th>
<th>Machine body</th>
<th>Power-supply unit</th>
<th>Machine body</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>F100-A</td>
<td>R</td>
<td>F100-A</td>
</tr>
<tr>
<td>T</td>
<td></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>E</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1

Grounding cable for other device

33
5. Primary air equipment
The standard EA12V/EA28V ADVANCE specifications do not require an air source, but an air supply must be prepared when using the optional high-accuracy built-in C-axis etc.
- Hose diameter : 1/4 hose (hose sleeve outer diameter : ø9.0 (0.35”))
- Pressure : 0.5 to 0.7MPa (72.5 to 101.5psi) (0.6MPa (87) or more when using EROWA tooling specifications)
- Flow rate : 75ℓ/min or more (2.65cu.ft./min.)

6. Shield room
Install a shield room if the EDM affects televisions or other communication facilities in the area. Observe the following points when installing the EDM in the shield room.
1. Ground the EDM in the shield room (Fig. 3).
2. If the EDM cannot be grounded in the shield room, connect the EDM’s grounding cable to the shield room’s grounding terminal (through bolt) as shown in Fig. 4.
3. Consult with a Mitsubishi Electric representative for details on installing a shield room.

Cautions
Preventing fires and accidents with EDMs

Never attempt the following operation methods. These are extremely hazardous.

- Electric discharge between tool electrode and jet nozzle.
- Electric discharge between tool electrode and workpiece clamp.
- Electric discharge between tool electrode and shank.
- Electric discharge between tool electrode and workpiece clamp and workpiece clamp.
- Electric discharge between tool electrode and workpiece clamp and shank dislocation.
- Electric discharge between tool electrode and jet nozzle.
- Electric discharge between tool electrode and jet nozzle.
- Machine with sufficient room in the working tank but not enough dielectric fluid.
- Machine with a workpiece that is too tall for the working tank.

Safety measures
A dielectric fluid temperature detector, fluid level detector, abnormal machining detector and automatic fire extinguisher, standard equipment, and a flame-resistance metal hose is used. A tank which has passed the type test of electrical-discharge machine of Hazardous Materials Safety Techniques Association is used (for tank capacities less than 2,000ℓ, tanks which have passed a voluntary water leakage test). Note that the safety devices must be periodically inspected. Refer to the instruction manual (safety manual) when using the EDM.

Automatic fire extinguisher
When heat is detected, a light-water solution is automatically sprayed to extinguish the fire. Machining also stops automatically at this time. A separate 100VAC power supply is required for the automatic fire extinguisher.

Precautions for selecting earth-leakage breaker
To prevent malfunctions caused by the external noise from control units, etc., a filter is installed for the power-supply input. By grounding one end of this filter, an earth-leakage current of approx. 30 to 40mA passes through the filter. A highly sensitive earth-leakage breaker (sensitivity current 30mA) could malfunction. Thus, a medium-sensitivity earth-leakage breaker (sensitivity current 100 to 200mA) is recommended for the EDM. Class C grounding (grounding resistance of 10Ω or less) is recommended for the EDM. Even if the sensitivity current is 200mA, the contact voltage will be 2V or less, and no problems will occur in preventing electric shock (application of tolerable contact current Class 2, 25V or less).

Disposal
The dielectric fluid, dielectric fluid filter, etc. are industrial waste. These must be disposed of following national and local laws and ordinances.

Harmonic distortion
If there is harmonic distortion in the power supply, the machine operation could be affected even if the voltage does not fluctuate. In addition, the harmonic current could flow from the EDM to the power system and adversely affect peripheral devices. If the effect of the harmonic distortion causes problems, install a harmonic suppression filter or take other measures.

Recommended sliding surface lubricants
Use the following lubricant for sliding surface As of March 2014

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Product name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exxon Mobil</td>
<td>Mobil DTE26</td>
</tr>
</tbody>
</table>

Terms of warranty

(1) Terms of warranty
This will differ according to country and region of sale; please contact a Mitsubishi Electric representative for details.

(2) Coverage
Parts labor and travel are included free of charge when the failure occurs during normal use for the stated Terms of the warranty (based on proper usage and maintenance as described in the operations manual and sales agreement). Coverage exceptions:
1. When a failure occurs that was caused by a machine modification that directly affects the machine’s functioning or accuracy.
2. When a failure occurs caused by the use of non-standard parts, consumables or lubricants.

Type test approved proof
It has passed the type test of electrical-discharge machine of Hazardous Materials Safety Techniques Association.
Subject machine: EAMM EA1PV VM ADVANCE EA12VM ADVANCE EA28VM ADVANCE
NS powder, special machine type and special working tank specifications are excluded.

1. When a failure occurs caused by a natural disaster such as lightning, earthquake or storms and flooding.
2. When the use of non-recommended consumables or aftermarket parts are used such as filters or flushing nozzles.
3. Please be aware that any workpiece/property damage and operation loss which may be associated with any fault of our machine are not covered by this warranty.

(3) Post Warranty / Expected Service Life
After the warranty period expires, all standard service rates and travel expenses will apply. Normal service life expectancy is 11 years after installation, but there may be some cases where discontinued electrical parts such as semiconductors and motors will reduce this period.
FA-related Products

PLC | MELSEC-Q Series Universal Model

Introducing the high-speed QCPU (QnUDVCPU) for faster processing of large data volumes.
- Realize high-speed, high-accuracy machine control with various iO Platform compatible controllers and multiple CPUs.
- Easily connect to GOTs and Programming tools using built-in Ethernet port.
- 25 models from 10k step small capacity to 1000k step large capacity, are available.
- Seamless communication and flexible integration at any network level.

Product Specifications
- **Program capacity**: 10k steps to 1000k steps
- **Number of I/O points (X/Y)**: 256 points to 4096 points/8192 points
- **Basic instruction processing speed (I/O instruction)**: 120 ns to 1.9 ns
- **External connection interface**: USB (all models equipped), Ethernet, RS-232, memory card, extended SRAM cassette
- **Function module**: I/O, analog high-speed counter, positioning, single motion, temperature input, temperature control, network module
- **Module extension style**: Building block type
- **Network**: Ethernet, CC-Link IE controller network, CC-Link IE field network, CC-Link, CC-Link/LT, MELSENET/H, SSCNETIII/I/Hi, AnyWire, RS-232, RS-422

AC Servo | Mitsubishi General-Purpose AC Servo MELSERVO-J4 Series

Industry-leading level of high performance servo
- Industry-leading level of basic performance: Speed frequency response (2.5kHz), 4,000,000 (4,194,304p/rev) encoder
- Advanced one-touch tuning function achieves the one-touch adjustment of advanced vibration suppression control II, etc.
- Equipped with large capacity drive recorder and machine diagnosis function for easy maintenance.
- 2-axis and 3-axis servo amplifiers are available for energy-conservative, space-saving, and low-cost machines.

Product Specifications
- **Power supply specifications**: 1-phase/3-phase 200V AC, 1-phase 100V AC, 3-phase 400V AC
- **Command interface**: SSCNET II/H, SSCNET III (compatible in J3 compatibility mode), CC-Link IE Field Network interface with Motion, pulse train, analog
- **Control mode**: Position/Speed/Torque/Fully closed loop
- **Speed frequency response**: 2.5kHz
- **Tuning function**: Advanced one-touch tuning, advanced vibration suppression control II, robust filter, etc.
- **Safety function**: STO, SS1, SS2, SOS, SLS, SBC, SSIM (compatible when combined with motion controller)
- **Compatible servo motor**: Rotary servo motor (rated output: 0.05 to 22kW), linear servo motor (continuous thrust 50 to 3000N), direct drive motor (rated torque: 2 to 240N-m)

CNC | Mitsubishi CNC M700V Series

High-grade model equipped with advanced complete nano control
- Achieve complete nano control with the latest RISC-CPU and high-speed optical servo network.
- Realize super-high grade processing by combining the complete nano control, state-of-the-art SSS control and OMR control, etc.
- Display of essential information of grouped on three screens to greatly reduce processing setup time with easy operability.
- The M700VW Series with WindowsXP and M700VS Series with integrated control unit and display type are available.

Product Specifications
- **Maximum number of control axes (NC axes + spindles + PLC axes)**: 16 axes (MT720VW/MT720VS have 12 axes)
- **Maximum number of part systems**: Machining center system: 2 systems, Lathe system: 4 systems
- **Least command increment**: 1mm (MT720WV/MT720VS 0.1μm)
- **Least control increment**: 1nm
- **Maximum program capacity**: 2,000,048 (5,120m)
- **Maximum PLC program capacity**: 128,000 steps
- **Main functions (for machining center)**: Simultaneous 5-axis machining, SSS control, high-speed high-accuracy control, tool nose point control, tilt plane machining, etc.
- **Main functions (for machining center)**: Milling interpolation, 2-system simultaneous thread cutting, line system control axis synchronization, control axis superstabilizer, coolant control, etc.
Laser Processing Machine | CO₂ 2-Dimensional Laser Processing Machine eX-Series

A global standard CO₂ 2-dimensional laser processing systems.

- Productivity has been dramatically enhanced owing to improved acceleration and the latest control technologies exclusive to Mitsubishi Electric.
- 2 Action Cutting allows for the entire process, from job setup to parts cutting, to be completed in two simple actions.
- When not processing, the system switches to ECO mode and the resonator stops idling. Minimizes energy consumption, reducing running costs by up to 99%.**

**: Compared to the previous LV-Series with Mitsubishi’s designated benchmark shape.

Product specifications
<table>
<thead>
<tr>
<th>Model Name</th>
<th>ML3015eX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive system</td>
<td>Flying optic (3-axis beam movement)</td>
</tr>
<tr>
<td>Stroke (X+Y+Z) (mm)</td>
<td>3100×1565×150</td>
</tr>
<tr>
<td>Rapid feedrate [m/min]</td>
<td>X-Y axes: Max. 100; Z-axis: Max. 65</td>
</tr>
<tr>
<td>Positioning feedrate [m/min]</td>
<td>Max. 50</td>
</tr>
<tr>
<td>Positioning accuracy (mm)</td>
<td>0.05 / 500 (X, Y axes)</td>
</tr>
<tr>
<td>Repeat accuracy (mm)</td>
<td>± 0.01 (X, Y axes)</td>
</tr>
<tr>
<td>Rated output [W]</td>
<td>4500</td>
</tr>
</tbody>
</table>

Laser Processing Machine for Substrate Drilling | GTW4 Series

Ever-evolving global standard machine

- Newly-developed super-fast galvano and 360W high-power resonator achieve industry-leading productivity.
- Laser beam generated by unparalleded resonator enables stable high-quality copper-direct processing on various surface treatments.
- Single machine can support variety of processing application with Mitsubishi unique powerful laser and optimum beam control.
- Original resonator structure, which can be refreshed by replacing some parts only, realizes low operating cost.

Product specifications
<table>
<thead>
<tr>
<th>Model name</th>
<th>ML605GTW4(-H)-5350U / ML605GTW4(-P)-5350U / ML706GTW4-5350U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing workpiece dimensions (mm)</td>
<td>620×560 / 815×662</td>
</tr>
<tr>
<td>XY table maximum feedrate (m/min)</td>
<td>50</td>
</tr>
<tr>
<td>Laser type</td>
<td>CO₂ laser</td>
</tr>
<tr>
<td>Oscillator power (W)</td>
<td>360W</td>
</tr>
<tr>
<td>Oscillator set pulse frequency</td>
<td>10 to 10,000Hz</td>
</tr>
</tbody>
</table>

Robot | MELFA F Series

High speed, high precision and high reliability industrial robot

- Compact body and slim arm design, allowing operating area to be expanded and load capacity increased.
- The fastest in its class using high performance motors and unique driver control technology.
- Improved flexibility for robot layout design considerations.
- Optimal motor control tuning set automatically based on operating position, posture, and load conditions.

Product Specifications

<table>
<thead>
<tr>
<th>Degrees of freedom</th>
<th>Vertical:6  Horizontal:4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>Vertical/Floor-mount; ceiling mount, wall mount (Range of motion for J1 is limited)  Horizontal/Floor-mount</td>
</tr>
<tr>
<td>Maximum load capacity</td>
<td>Vertical:2-20kg  Horizontal:3-20kg</td>
</tr>
<tr>
<td>Maximum reach radius</td>
<td>Vertical:504-1503mm  Horizontal:350-1,000mm</td>
</tr>
</tbody>
</table>
Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems).