MITSUBISHI NC EDM SYSTEMS
EA-PS Series

FACTORY AUTOMATION

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001 (standards for quality assurance management systems).

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〈IP〉
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Mitsubishi Electric continues the challenge to be the only one FA machine and systems supplier delivering total customer satisfaction.

Mitsubishi Electric is a world-leading general electrical and electronic products manufacturer with wide-ranging business reach, from appliances for the home to systems used in outer space. Global-scale business development is in five business domains: heavy electrical machinery and systems, industrial automation, information and communication systems, electronic devices, and home appliances. Producing general electrical machinery for over 90 years, as Mitsubishi Electric’s Factory Automation Systems Business Group, we have supported manufacturing in Japan, China, and Asia, and around the globe. In doing so, we have accumulated and refined technologies for FA control, drive control, automation, and manufacturing that are utilized to expand and improve a vast product lineup, such as controllers, drives, and automation and power distribution control products. In addition to product components like those listed above, we are quick to propose systems such as e-F@ctory and iQ Platform as solutions for production site innovation. As a comprehensive supplier of FA products and systems, Mitsubishi Electric will continue to respond to the voice of customers and deliver products of the utmost quality throughout the world.

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Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following:

**Energy and Electric Systems**
A wide range of power and electrical products from generators to large-scale displays.

**Electronic Devices**
A wide portfolio of cutting-edge semiconductor devices for systems and products.

**Home Appliance**
Dependable consumer products like air conditioners and home entertainment systems.

**Information and Communication Systems**
Commercial and consumer-centric equipment, products and systems.

**Industrial Automation Systems**
Maximizing productivity and efficiency with cutting-edge automation technology.

Through Mitsubishi Electric’s vision, “Changes for the Better” are possible for a brighter future.
The history of Mitsubishi Electric EDMs is the history of electrical-discharge machining.
Die-sinking EDMs in response to expectations for high accuracy

EA-PS Series

NC-EDM Systems

An extensive product lineup ready to support the most diversified needs, from high-precision machining of small workpieces to highly productive machining of large workpieces. Mitsubishi Electric die-sinking EDMs offer comprehensive solutions that contribute to improving the productivity of customers’ facilities.

Ultrahigh-accuracy machine

MA2000
Flagship model integrating advanced technologies

High-accuracy machine

EA-PS Series
High-grade model compatible for various uses

High-performance machine

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

Productivity machine

EA-S Series
Supports various machining needs in pursuit of higher productivity

Large-size high-performance machine

EA ADVANCE Series
Standard model pursuing high performance and high productivity
Line-up
High-grade models compatible for various uses

Compact high-accuracy machine
EA8PS
Machining accuracy ±3µm achieved
*The machining accuracy follows the Mitsubishi Electric machining conditions

High-accuracy machine
EA12PS
Machining accuracy ±3µm achieved
*The machining accuracy follows the Mitsubishi Electric machining conditions

Automatic elevation working tank specifications (standard)

Guaranteed accuracy conditions
- Workpiece SKD11 20mm
- W550-S7 after quenching
- Sub-zero treatment
- High-temperature tempering
- Stabilization treatment
- Electrodes: 4mm copper
- Room temperature 20±1°C

Machine main unit (standard specifications)

C-axis/ATC (option)

Distance between table and electrode mounting surface

High-accuracy machine
EA12PS

Operation
- Table dimensions [W x D x H] (mm) 1725X1320X140
- Max. electrode mounting surface (mm2) 498X498X150
- Max. electrode diameter 3R
- Max. electrode weight 10(22) *2 [kg (lb.)]
- Max. elevation system 2140 (84.3)
- Spindle
- Speed (rpm) 1 [min-1] 30
- High-speed back/forward 2.8
- High-speed rotation 3.9
- C-axis
- Power 700 (27.5)
- Spindle diameter 10(22) *2 [mm (in)]
- Spindle rotation (rpm) 1 [min-1] 30
- High-speed back/forward 2.8
- High-speed rotation 3.9
- C-axis
- Power 700 (27.5)

Standard delivery entrance

- Standard ATC
- ATC type
- Tool type
- LS type
- M5 type

* The table lists the basic specifications. Specifications are different from the table above when the high-accuracy C-axis/automatic clamp (option) is attached.

*1 Regarding the distance between table and electrode mounting surface of automatic clamp (option), please contact a Mitsubishi Electric representative.

*2 The weight of 10(22) [kg (lb.)] is the total weight of the electrodes. The weight of the electrode mounting surface (table) is not included in the weight. The weight of the electrode mounting surface (table) is approximately 80kg (176lb).
Functions and Features
Integration of advanced machining technologies and ADVANCE control equipment
Supports various types of EDM machining

Realizes highly accurate high-speed, low electrode wear machining

- Pitch/Shape accuracy: ±2μm
- In-Corner radius: 5μm
- Machining time up to 40% shorter compared to conventional model
- Mold maintenance interval 2.5 times longer compared to conventional surface

Machining Accuracy
- ±3μm pitch accuracy achieved *1
  XY-axis linear scale standard equipment
- Standard function of "Thermal buster" (in-house original technology) Temperature change is visualized with "visualization monitor"
  - Machining speed is up to 40% faster with the combination of highly accelerated (1.6G) jump control and adaptive control "IDPM".
  - Ultrafine finish surface of Ra0.05μm is realized with upgraded NP2 circuit.
  - New finishing circuit LLTX Mold cleaning interval is extended with improved mold release.

Productivity
- Machining speed is up to 40% faster with the combination of highly accelerated (1.6G) jump control and adaptive control "IDPM".
  - Machining speed is up to 40% faster with the combination of highly accelerated (1.6G) jump control and adaptive control "IDPM".
  - New finishing circuit LLTX Mold cleaning interval is extended with improved mold release.

Workability / Operability
- 3-sided automatic elevation tank standardized
  Automatic emission/suction changeover also standardized
- Setup time reduced by faster jog operations speed
  Jog operation speed is customizable
- Magnet stand attachment area secured on head
  Increased the number of T-slots on table for easier workpiece setup
- Possible to utilize variables with the ESPER program

Automation compatibility
- Enlarged worktank size
  Easily add the table chuck and the rotary axis
- Available of both right and left side controller layout
- ATC can be chosen from LS and MVH tool changer
- Ready for automation system
Low copper electrode wear for tungsten carbide machining

- Newly developed ‘HPS circuit’
  - Up to 50% less electrode wear machining using copper electrode (less than 25% electrode weight wear ratio compared to conventional model)

<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>EA-PS</td>
<td>Copper</td>
<td>Tungsten carbide (GL60)</td>
<td>Rz13.0/μm, Ra1.9/μm</td>
<td>±0.003mm</td>
</tr>
</tbody>
</table>

High speed machining with low electrode wear by IDPM+SS jump

- High speed machining with IDPM+SS jump
- Low electrode wear machining with IDPM (electrode length wear reduced up to 50%)
- Machining time is 30% reduced with boosted up jump speed (compared to conventional model)

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</tr>
</thead>
<tbody>
<tr>
<td>EA-PS</td>
<td>Graphite</td>
<td>Steel (STAVAX)</td>
<td>Rz8.4/μm, Ra0.11/μm</td>
<td>±0.010mm</td>
</tr>
</tbody>
</table>

Up to 35% faster submarine gate machining

- Machining time for simultaneous 2 or 3 axes operation is reduced up to 35% with improved jump speed
- High speed and high quality machining is realized with multi axis machining
- Easy programming with shape expert

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</thead>
<tbody>
<tr>
<td>EA-PS</td>
<td>Copper</td>
<td>Steel (AS23)</td>
<td>Rz3.0<del>9.8/μm, Ra0.4</del>1.6/μm</td>
<td>±0.003mm</td>
</tr>
</tbody>
</table>

High speed bevel gear machining

- Maximum machining speed is twice faster than copper tungsten electrode
- Stable machining is realized with IDPM and SS Jump

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</tr>
</thead>
<tbody>
<tr>
<td>EA-PS</td>
<td>Copper graphite</td>
<td>Tungsten carbide</td>
<td>Rz2.5/μm, Ra0.4/μm</td>
<td>±0.003mm</td>
</tr>
</tbody>
</table>

Maintenance cycle time of molds increases more than twice

- Uniform machined surface on shapes by LLTX
- Relieving property can be improved by LLTX, eliminating the polish of the plastic molds

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<th>Machining accuracy</th>
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<tr>
<td>EA-PS</td>
<td>Copper</td>
<td>Steel (ASP23)</td>
<td>Rz3.0<del>9.8/μm, Ra0.4</del>1.6/μm</td>
<td>±0.003mm</td>
</tr>
</tbody>
</table>
Machining Accuracy

±3μm pitch accuracy achieved

- Standard installation of "Thermal buster" (in-house original technology)
- Thermal displacement of machine is reduced by Thermal displacement compensation system and Z-axis cooling mechanism
- Temperature change is visualized with "visualization monitor"
- High accuracy wide stroke pitch machining is realized with in-house NC equipments + original servo technology + high accuracy drive systems

High rigidity construction

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

Displacement amount for each axis under ±3℃ environment

Visualization Monitor screen

Explanatory view of thermal buster

High-quality ultrafine finishing function (NP2 circuit)

- Ultrafine surface roughness of Ra0.050μm has been realized by minimize the floating capacitance
- Standard installation of 'Thermal buster' (in-house original technology)
- Thermal displacement of machine is reduced by Thermal displacement compensation system and Z-axis cooling mechanism
- Temperature change is visualized with "visualization monitor"

Narrow gap circuit

- Compatible with small undersize amounts of 0.015 to 0.030mm per side
- Small in-corner R realized by suppressing electrode wear for small undersize machining

Pitch machining example

Dimensional accuracy

Depth accuracy

Pitch accuracy

Workpiece: Steel (SKD11)
Electrode: Copper tungsten
surface roughness: Rz0.02μm/Ra0.08μm

Workpiece: Steel (ELMAX)
Electrode: Copper
Surface roughness: Rz0.30μm/Ra0.048μm
In-corner R: 0.005mm

In-corner R: 0.005mm

Displacement δ = k ・L1 ・L2

Displacement δ is small by the low head (L2) and the constant L1 in the figure

Low rigidity with concave (indentation)

High rigidity with no concave (indentation)

Bed structure

Low head structure

Conventional circuit

Standard circuit

Narrow gap circuit

Shape after five cuts are made using the same electrode in Cu to St.
undersize: 0.025mm
Depth: 1.0mm
Machining depth: 0.3mm
Productivity

Advanced Machining Control

High-speed machining realized with advanced machining control

- Orbit Pro: Orbit control
- SS Jump: Machining stabilization jump control
- FP-PS power supply
- FIT Control: Discharge gap control

IDPM
- Intelligent Digital Power Master: Adaptive control to be integrated over developed technologies
- Integrated Discharge Power Monitor: Adaptive control to reduce abnormal discharge with detecting discharge pulse

Machining adaptive control: IDPM

High-speed/Low-wear machining with graphite electrodes
- IDPM reduces graphite electrode wear up to 80%

Tungsten carbide high-speed machining
- Machining speed is improved up to 60% with using IDPM and copper-graphite electrode

Machining speed improved with IDPM advanced adaptive control and SS Jump jump control

- Mitsubishi Electric’s IDPM adaptive control is utilized not only for graphite electrode machining, but widely applied for copper electrode machining as well
- Machining speed increased up to 40% by raising the speed and acceleration of the SS Jump jump control function

Lotus Leaf Texture (LLTX) glossy mirror-finish function

- Machining steel using a copper electrode enables the acquisition of a larger RSm than conventional machining owing to the improvement in release property
- Extension of the maintenance cycle realizes a longer die service life

HPS circuit (machining circuit for difficult-to-machine materials)

- Electrode wear of copper electrode dramatically improved
- Enables the machining of difficult-to-machine materials including conductive ceramics and diamond-sintered compact, and realizes faster machining compared to conventional power supplies

Electrode weight wear ratio (%)

Example of thread machining using carbon fiber-reinforced plastic (CFRP)

Machinable Not machinable

Example of sintered boron nitride machining

Machinable Not machinable
Workability / Operability
Easy-to-use control (ADVANCE control unit)

ESPERADVANCE - Easy Programming and machining condition search -
- Programming is possible simply by inputting the machining start position and machining depth, etc., into a table format.
- Machining conditions and programs suitable for various shapes can be created (Shape Expert).

ESPERADVANCE - New feature -
- Easy-to-view screen (15-inch).
- Intuitive operation using touch-panel display.
- User-friendly keyboard and mouse.

Ergonomic design
- Easy-to-view screen (15-inch).
- Intuitive operation using touch-panel display.
- User-friendly keyboard and mouse.

Setup
- Incred the number of T-slots on table for easier workpiece setup.
- Setup time reduced by faster jog operations speed. Jog operation speed is customizable.

Attachable magnet stand
- Magnet stand attachment area secured on head.
- 3-sided automatic elevation tank standardized. Improved access for workpiece setup.

3-sided automatic elevation tank
- 3-sided automatic elevation tank standardized. Improved access for workpiece setup.

Electrode/Workpiece measurement
- Electrode alignment electrode measurement screen.
- Workpiece alignment of workpiece measurement screen.

Built-in scheduler
- Continuously run multiple programs on a schedule.
- Schedules can be added and edited during machining.

** ESPERADVANCE PRO lite** is limited version of ESPERADVANCE PRO. Please refer for the details to Mitsubishi.
Automation Support

**LS-10T/20T Tool changer**

- Automatic electrode replacement enables continuous operation
- Robotic transfer devices automatically change electrodes and workpieces, enabling continuous operation

**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
  - Assign work orders and monitor the workpiece machining status in real-time

**Machine remote monitor**

- Remote Magic II
  - Visualize workshop with monitor and notification for improving machine operating ratio
  - Monitor machine with a personal computer

**3D CAD/CAM system**

- AD
  - CAD/CAM system which calculates machining positions automatically and eliminates value input mistakes
  - Operations can be transferred to wire, milling, and hole machining CAMs

**Touch probe**

- Touch probe
  - Offline automatic programming system
  - Offline programming and program change is possible
  - Server and network capacity are strengthened
  - Keyaxes can be controlled with dedicated software
  - Scheduling system is also available

**ID tag system**

- ID tag system
  - Mounting status of carrier device robot is managed by ID tag which recorded electrode and workpiece position
  - Workpiece and electrode can be easily managed using ID tag system and scheduler

**Presetter**

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

**Mitsubishi Electric EDM Automation systems**

**MEMO**

- (*) A personal computer is required for installing applications

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**Note**

1. Please contact a Mitsubishi Electric representative for more information regarding the presetters and coordinate measuring machines.
2. Please contact a Mitsubishi Electric representative for more information regarding the ID tag systems.
3. Please contact a Mitsubishi Electric representative for more information regarding the touch probes.
Power Supply/Control Specifications and Options

### Power Supply Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>EAP8PM</th>
<th>EA12PSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>20T</td>
<td>20T</td>
</tr>
<tr>
<td>Maximum machining current peak</td>
<td>19.2</td>
<td>19.2</td>
</tr>
</tbody>
</table>

### Control unit functions

- Display: Touch panel, Touch panel, LED
- Display characters: Alphanumeric, Alphanumeric, Alphanumeric
- Power supply: Digital Power Master (IDPM, optimum machining control), Digital Power Master (IDPM, optimum machining control), Digital Power Master (IDPM, optimum machining control)
- Power supply system: Proprietary control unit is to be acquired separately.
- Power supply system: Proprietary control unit is to be acquired separately.
- Power supply system: Proprietary control unit is to be acquired separately.

### Options

- Options and retrofit specifications differ according to country and region; please contact a Mitsubishi Electric representative for details.
- Options: Cannot be added after installation. *1 Cannot be added after installation. *2 Not available.

#### Network Connection Specifications (FTP and DNC S/W)

- FTP: Available for connection to external servers and computers.
- FTP: Available for connection to external servers and computers.
- FTP: Available for connection to external servers and computers.

#### Power Facilities Capability

<table>
<thead>
<tr>
<th>Model</th>
<th>EAP8PM</th>
<th>EAP12PSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Maximum machining current peak</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Maximum machining current peak</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

### Power Supply Specifications

- Power supply specifications for LED light require DCG-2AV.

### Dielectric fluid system, Etc.

#### Dielectric fluid distributor

- Supports continuous machining using many electrodes
- Machine-Generated Heat (unit)
- Machine-Generated Heat (unit)
- Machine-Generated Heat (unit)

#### ATC

- Change up to 10 electrodes
- Supports continuous machining using many electrodes
- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)
- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)

#### Dielectric fluid system

- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)
- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)
- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)

### Head-side tooling

- Removable holder
- Automatic clamp
- High-rigidity C-axis

#### ATC

- Change up to 20 electrodes
- Supports continuous machining using many electrodes
- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)
- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)
- LS-10T (automatic tool changer)
- LS-20T (automatic tool changer)

#### LS-10T (automatic tool changer)

- Change up to 20 electrodes
- Supports continuous machining using many electrodes
- Change up to 20 electrodes
- Supports continuous machining using many electrodes
- Change up to 20 electrodes
- Supports continuous machining using many electrodes

#### LS-20T (automatic tool changer)

- Change up to 20 electrodes
- Supports continuous machining using many electrodes
- Change up to 20 electrodes
- Supports continuous machining using many electrodes
- Change up to 20 electrodes
- Supports continuous machining using many electrodes

#### Dielectric fluid distributor

- Sprays dielectric fluid between the workpiece and electrode during pitch machining
- Distributes dielectric fluid into three flows and sprays onto the machining section
- Distributes dielectric fluid into three flows and sprays onto the machining section

#### LED light

- Advanced-function manual operation box
- Standard manual operation box

### Specifications

Specifications are subject to change without notice, and appearance may be different from the photo.
Preparation for Machine Installation/Cautions

Installation conditions

1. Installation site
   - Operating temperature: 20°C±5°C (68°F±95°F)
   - Humidity: 85% or less, non-condensing
   - The standard delivery entrance dimensions for standard shipment delivery are given on the product line-up page.
   - The standard delivery entrance dimensions for standard shipment delivery are given on the product line-up page.

2. Oil filter
   - The dielectric fluid filter, dielectric fluid filter, etc. are industrial waste. These must be disposed of according to applicable laws.

3. EDM water and gas connections
   - EDM water and gas connections are equipped with self-regulating level detectors, abnormal machining detectors, A dielectric fluid temperature detector, fluid temperature, etc.

4. Grounding work
   - EDM in an environment with no corrosive gases, such as acid or salt, or in an environment where the EDM has been subjected to corrosion due to moisture. The grounding work should be done according to the instructions in the instruction manual (safety manual) when using the EDM.

5. Equipment for fire extinguishing
   - A dielectric fluid temperature detector, fluid level detector, automatic flame extinguishing system, and fire extinguishing system, and a flame-resistant material in use are not included in the list.
   - The safety valve must be periodically inspected. Refer to the installation manual (safety manual) when using the EDM.

Cautions

1. Terms of warranty
   - This will only apply to the country and region of sale. Please contact a Mitsubishi Electric representative for details.

2. Coverage
   - The Terms of Warranty are subject to change when the Warranty is issued for the stated terms of the warranty based on project usage and maintenance as described in the installation manual (safety manual) when using the EDM.

3. Post Warranty/Expected Service Life
   - After the warranty period is over, scheduled maintenance and travel expenses will apply to keep the EDM running. Please contact the manufacturer for details.

Refrigerant for dielectric fluid chiller

The dielectric fluid chiller includes a refrigeration unit (AHU or HUA) for booster power. Please use only the specified refrigerant (R410A or R514A). When using the dielectric fluid chiller, refer to the installation manual (safety manual) when using the EDM.

Disposal

The dielectric fluid, electric fluids, etc., must be handled and disposed of according to the applicable regulations and guidelines.

Harmonic distortion

If harmonic distortion in the power supply is too high, 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 surfaces.

EA-PS Series
Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world’s leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

* Not all products are available in all countries.

A NAME TO TRUST
Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

* Not all products are available in all countries.
Global Partner. Local Friend.