

**MA<sup>EA</sup>  
EA**  
**ADVANCE Series**



**MITSUBISHI NC EDM**

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

1964



Thyristor power supply  
Hydraulic servo method  
DM201  
1964



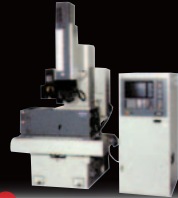
DM500+DE90T  
1965



Transistor pulse power supply  
DM250+DE30T  
1967



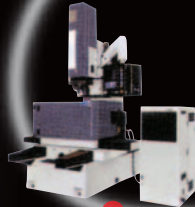
DM100  
1971



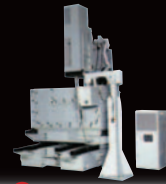
M35K  
1986



Ultralow-wear power supply  
(slope control method)  
M25KC4  
1986



M85KW  
1987



M115K  
1988



EML20  
1988



EX30  
1996



EX8  
1995



VX20  
1995



EDSCAN8E  
1996



64bit CNC  
EA12E  
1999



EA8  
1999



VA10  
2001

2014



EA8PV ADVANCE  
2008



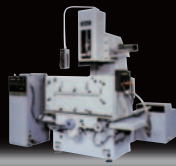
EA28V ADVANCE  
2008



ADVANCE control unit  
EA12V ADVANCE  
2008



DM300N+EP120M  
1972



DK700  
1974



DK280  
1976



DK140  
1978



DK360NC  
1980



16bit CNC  
M55C6  
1982



M25C3  
1982



M55  
1982



M35C2  
1982



Motor servo method  
M30  
1982



M35J  
1989



M35S  
1989



M65E  
1990



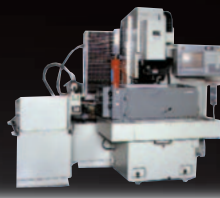
32bit CNC  
FUZZY control  
V35F  
1991



VX10  
1994



ADMAQ-E  
1994



NS powder specification  
VP35F  
1992



Thermal displacement compensation  
MA2000  
2001



EA8P  
2004



FP-V power supply  
(tungsten carbide machining circuit)  
EA12V  
2004



EA28V  
2007



Ultrafine matte finish circuit (NP2 circuit)  
EA8PV  
2006

# EA ADVANCE Series

# NC-EDM Systems

## Die-sinking EDMs

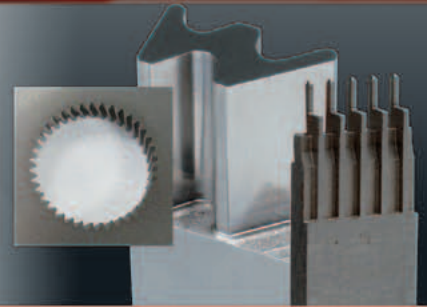
A variety of models are available for compact high-precision machining to large high-production machining applications



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

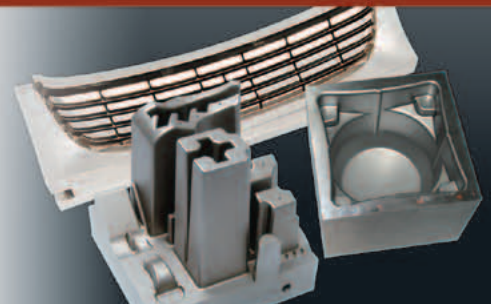
High-class model pursuing high accuracy and productivity



Large-sized machine

# EA ADVANCE Series

Standard model pursuing multi-function and productivity

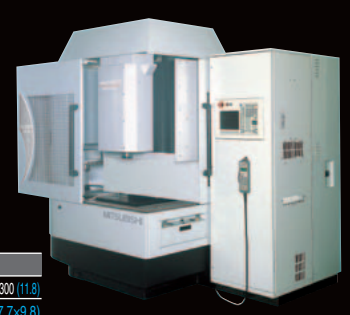




**Ultra-high accuracy machine**

**MA2000**

64-bit CNC  
(Automatic elevation tank)



Model	MA2000M
Machine travels (mm) (in)	X:400 (15.7) Y:300 (11.8) Z:300 (11.8)
Max. workpiece dimensions (mm) (in)	600x450x250 (23.6x17.7x9.8)
Max. workpiece weight (kg) (lb.)	700 (1543)
Max. electrode weight (kg) (lb.)	50 (110)
Max. fluid level (mm) (in)	300 (11.8)

**±0.002mm (0.00008") achieved**

\* The machining accuracy follows the Mitsubishi Electric machining conditions

**Compact high-accuracy machine**

**EA8PV  
ADVANCE**

64-bit CNC  
(Vertical front door)

Automatic elevation tank is available as option



Model	EA8PVM ADVANCE
Machine travels (mm) (in)	X:300 (11.8) Y:250 (9.8) Z:250 (9.8)
Max. workpiece dimensions (mm) (in)	740x470x130 (29.1x18.5x5.1)
Max. workpiece weight (kg) (lb.)	550 (1213)
Max. electrode weight (kg) (lb.)	25 (55)
Max. fluid level (mm) (in)	180 (7.1)

**FP-V power supply (standard)  
±0.003mm (0.0001") achieved**

\* The machining accuracy follows the Mitsubishi Electric machining conditions

**High-performance machine**

**EA12V  
ADVANCE**

64-bit CNC  
(Automatic elevation tank)



Model	EA12VM ADVANCE
Machine travels (mm) (in)	X:400 (15.7) Y:300 (11.8) Z:300 (11.8)
Max. workpiece dimensions (mm) (in)	800x550x250 (31.5x21.7x9.8)
Max. workpiece weight (kg) (lb.)	700 (1543)
Max. electrode weight (kg) (lb.)	50 (110)
Max. fluid level (mm) (in)	300 (11.8)

**FP-V power supply (standard)**

**Medium-sized high-performance machine**

**EA28V  
ADVANCE**

64-bit CNC  
(Automatic elevation tank)



Model	EA28VM ADVANCE
Machine travels (mm) (in)	X:650 (25.6) Y:450 (17.7) Z:350 (13.8)
Max. workpiece dimensions (mm) (in)	1050x760x350 (41.3x29.9x13.7)
Max. workpiece weight (kg) (lb.)	2000 (4409)
Max. electrode weight (kg) (lb.)	200 (441) <small>with standard electrode mounting table</small>
Max. fluid level (mm) (in)	400 (15.7)

**FP-V power supply (standard)**

**Medium-sized high-performance machine**

**EA28V  
ADVANCE**

Long stroke specifications  
64-bit CNC  
(Automatic elevation tank)



Model	EA28VM ADVANCE
Machine travels (mm) (in)	X:1000 (39.4) Y:470 (18.5) Z:450 (17.7)
Max. workpiece dimensions (mm) (in)	1350x850x450 (53.1x33.5x17.7)
Max. workpiece weight (kg) (lb.)	2000 (4409)
Max. electrode weight (kg) (lb.)	200 (441) <small>with standard electrode mounting table</small>
Max. fluid level (mm) (in)	500 (19.7)

**FP-V power supply (standard)**

**Large-sized high-performance machine**

**EA40  
ADVANCE**

64-bit CNC  
(Automatic vertical front door)



Model	EA40M ADVANCE
Machine travels (mm) (in)	X:1000 (39.4) Y:600 (23.6) Z:450 (17.7)
Max. workpiece dimensions (mm) (in)	1900x1100x600 (74.8x43.3x23.6)
Max. workpiece weight (kg) (lb.)	5000 (11023)
Max. electrode weight (kg) (lb.)	300 (661)
Max. fluid level (mm) (in)	650 (25.6)

**FP-V power supply (standard)**

**Compact machine**

**EA8S**

64-bit CNC  
(Automatic elevation tank)  
Front door is available



Model	EA8SM
Machine travels (mm) (in)	X:300 (11.8) Y:250 (9.8) Z:250 (9.8)
Max. workpiece dimensions (mm) (in)	770x490x200 (30.3x19.3x7.9)
Max. workpiece weight (kg) (lb.)	550 (1210)
Max. electrode weight (kg) (lb.)	25 (55)
Max. fluid level (mm) (in)	250 (9.8)

**FP-V power supply (standard)**

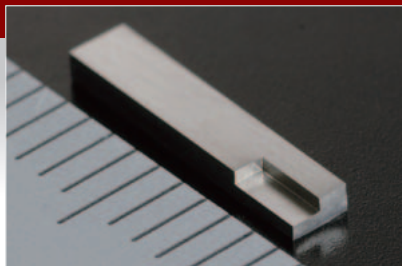
**Medium-sized machine**

**EA12D**

64-bit CNC  
(Vertical front door)



Model	EA12DM
Machine travels (mm) (in)	X:400 (15.7) Y:300 (11.8) Z:300 (11.8)
Max. workpiece dimensions (mm) (in)	1000x650x350 (39.3x25.5x13.7)
Max. workpiece weight (kg) (lb.)	1000 (2200)
Max. electrode weight (kg) (lb.)	50 (110)
Max. fluid level (mm) (in)	400 (15.7)

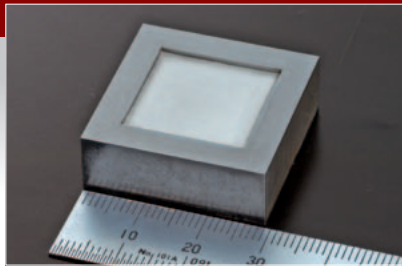


## Ultrafine matte finish surface machining

Model	EA8PV ADVANCE
Electrode	3 copper electrodes
Workpiece	Steel (ELMAX)
Surface roughness	Rz0.5 $\mu$ m/Ra0.1 $\mu$ m
Machining accuracy	In-corner R0.010mm

- 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



## Ultrafine matte finish surface machining

Model	EA8PV ADVANCE
Electrode	Copper tungsten
Workpiece	Tungsten carbide (G3 or equivalent)
Surface roughness	Rz0.5 $\mu$ m/Ra0.08 $\mu$ m

- Ultrafine matte finish surface of Rz0.5 $\mu$ m/Ra0.08 $\mu$ m is realized using NP2 circuit for tungsten carbide

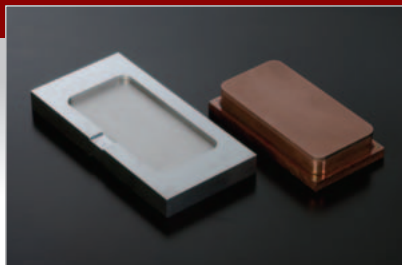
NP2 circuit: standard for MA2000 / EA8PV ADVANCE  
option for EA12V / EA28V ADVANCE



## Glossy surface machining

Model	EA12V ADVANCE
Electrode	Copper
Workpiece	Steel (STAVAX)
Surface roughness	Rz0.5 $\mu$ m/Ra0.07 $\mu$ m

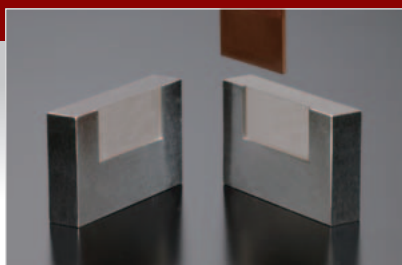
- Polish-free glossy mirror finish surface of Rz0.5 $\mu$ m/Ra0.07 $\mu$ m is realized using GM2 circuit



## High quality finish surface machining

Model	EA12V ADVANCE
Electrode	Copper
Workpiece	Steel (STAVAX)
Surface roughness	Rz5.8 $\mu$ m/Ra0.8 $\mu$ m

- Uniform surface of Rz5.8 $\mu$ m/Ra0.8 $\mu$ m is realized using SS jump 5



## Rib machining

Model	EA12V ADVANCE
Electrode	2 copper electrodes
Workpiece	Steel (STAVAX)
Surface roughness	Rz1.5 $\mu$ m/Ra0.25 $\mu$ m

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



## Gate machining

Model	EA12V ADVANCE
Electrode	Copper
Workpiece	Steel (STAVAX)
Surface roughness	Rz1.0 $\mu$ m/Ra0.15 $\mu$ m

- 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

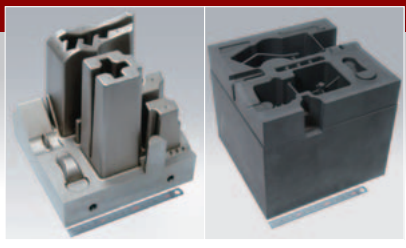
\* The listed machining results are all based on in-house conditions and measurements.  
(Note) JIS B0601: '01 and ISO 4287: '97/ISO 1302: '02 compliant (Rz = conventional notation Ry)



### Machining with graphite electrode

Model	EA12V ADVANCE
Electrode	2 graphite electrodes
Workpiece	Steel (STAVAX)
Surface roughness	Rz5.0μm/Ra0.82μm

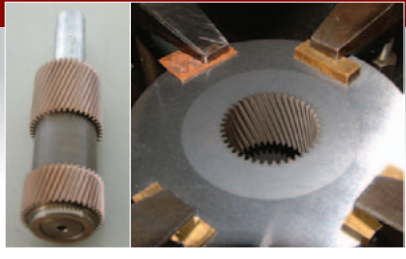
- High speed machining with low electrode wear is realized using IDPM
- IDPM: option for EA8PV / EA12V / EA28V ADVANCE



### Machining with graphite electrode

Model	EA28V ADVANCE
Electrode	2 graphite electrodes
Workpiece	Steel (SKD61)
Surface roughness	Rz15μm/Ra2.4μm

- High speed and stable machining is realized for the machining with a complex and complicated electrode
- IDPM: option for EA8PV / EA12V / EA28V ADVANCE



### ZC-axis machining

Model	EA12V ADVANCE
Electrode	Copper tungsten
Workpiece	Tungsten carbide (V60 or equivalent)
Surface roughness	Rz2.0μm/Ra0.3μm

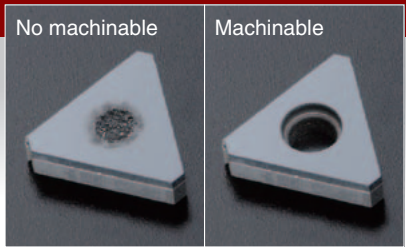
- Highly accurate helical machining is realized
- Machining programs and conditions can be created using ESPERADVANCE
- High-accuracy built-in C-axis: standard for MA2000 option for all EA ADVANCE



### Contour machining

Model	MA2000+ High-accuracy built-in spindle
Electrode	Copper
Workpiece	Steel (HAP40)
Surface roughness	Rz0.9μm/Ra0.13μm
Machining accuracy	Shape ±2μm

- Contour machining is possible with a rod-shaped electrode using high-accuracy built-in spindle



FP-V power supply      FP-V power supply extension unit

### EDM resistant materials machining

Model	EA12V ADVANCE
Electrode	Copper tungsten
Workpiece	Sintered boron nitride
Surface roughness	Rz2.0μm/Ra0.28μm

- 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
- FP-V power supply extension unit: option for EA8PV / EA12V / EA28V ADVANCE



### Fine-hole machining

Model	EA12V ADVANCE + fine-hole jig
Electrode	ø0.7 copper pipe electrode
Workpiece	Steel (STAVAX), t25.4mm
Surface roughness	Rz25μm

- 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

\* 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)



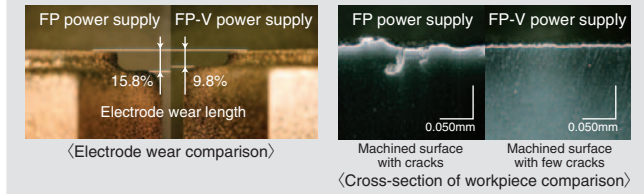
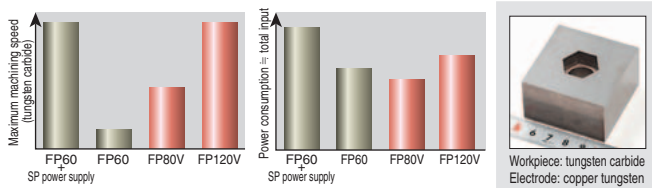


## Highly evolved technology

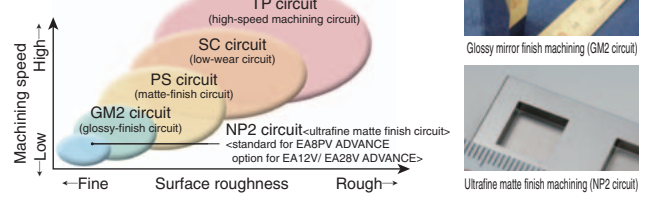
### Machining Refer to page 9-10

#### FP-V power supply

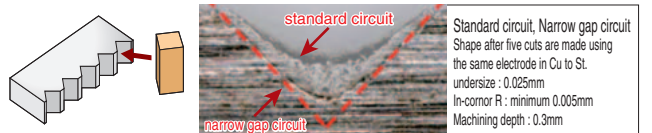
- Energy-saving power supply reduces operating cost
- Machine even tungsten carbide at high speed with low electrode wear and few cracks



- Circuits suitable for various machining
- Realizes Rz 0.4μm (Ra 0.06μm) with matte and glossy surface



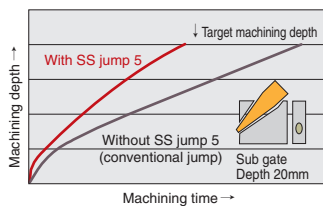
- Compatible with small undersize amounts of 0.015 to 0.030mm per side



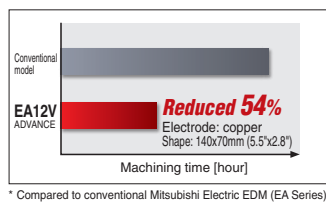
#### Machining control

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 finish machining of medium-sized electrode



- Wear using graphite electrode reduced up to 80%



FP-V power supply

Orbit Pro Orbit control  
Shape expert Machining condition search  
SS jump 5 Machining stabilizing jump control  
IDPM New machining adaptive control  
FIT control Discharge gap control  
FUZZY control Machining adaptive control

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

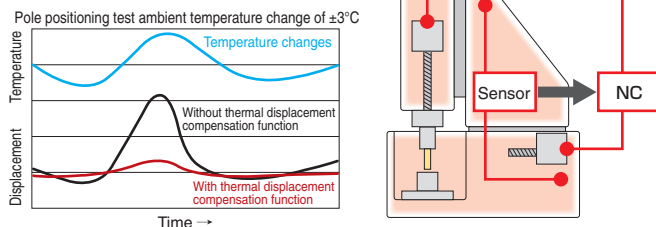
### Machine Refer to page 11-12

#### Semi-cabin structure

- Reduce thermal displacement caused by temperature changes

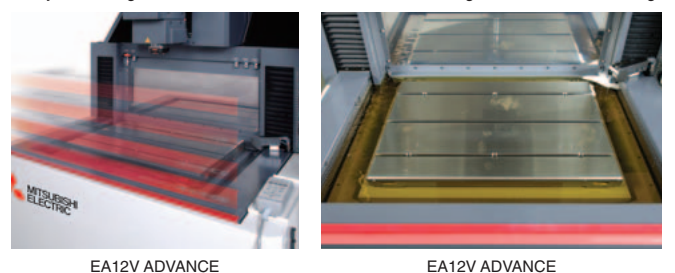
#### Thermal displacement compensation system (all EA ADVANCE models)

- 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





# 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)

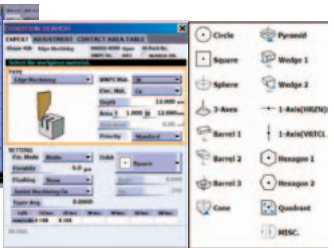
### Operability Refer to page 13-14

#### Programming (ESPERADVANCE)

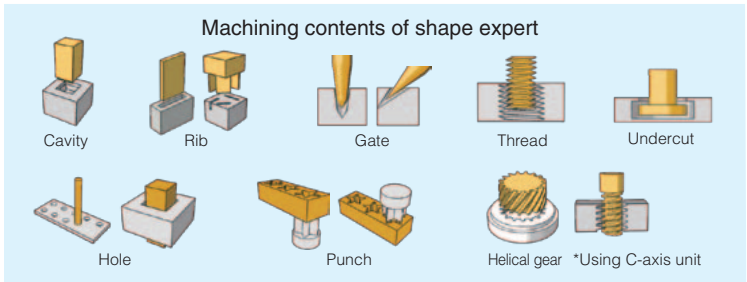
- Simple table-format programming
- Machining conditions and programs suitable for various shapes can be created (shape expert)



Machining program screen



Machining condition search screen



#### Set-up

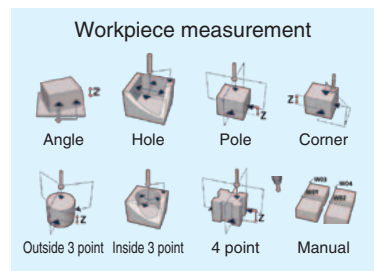
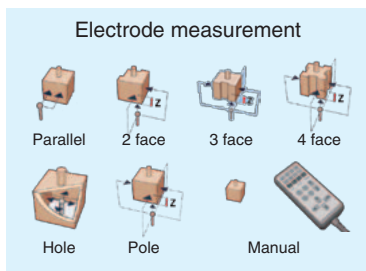
- Core alignment positioning with electrode measurement screen
- Core alignment positioning with workpiece measurement screen



Electrode measurement screen



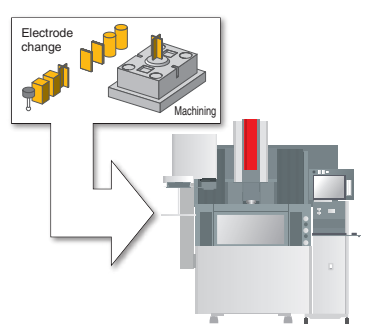
Workpiece measurement screen



### Automation

#### ATC + C-axis specification

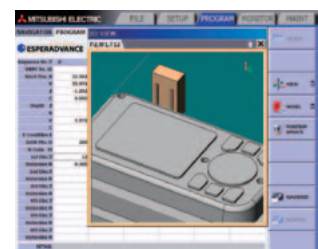
- Continuous operation is possible using many electrode changes
- 106 work coordinates and machining position up to 999 places can be used in one program
- Scheduling can be easily managed with built-in scheduler, which can manage programs, workpieces and electrode information



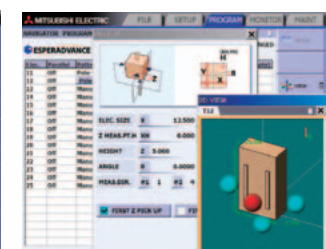
Built-in scheduler

#### 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)

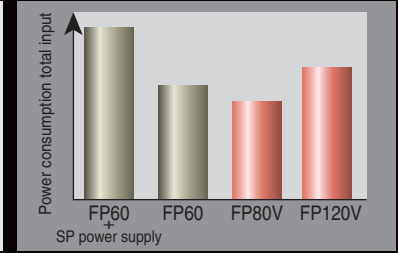
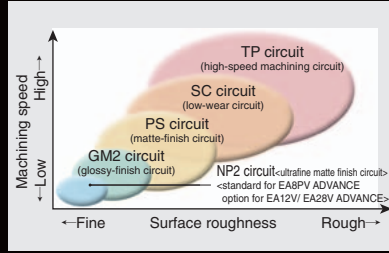


3D import (Measurement position confirmation)

# FP-V power supply

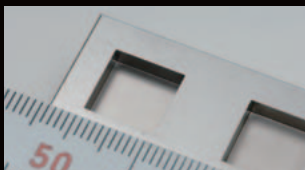
Circuits suitable for various machining

Energy- saving power supply reduces operating cost

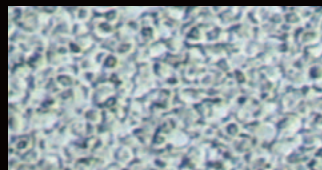


## Ultrafine finish circuit (NP2 circuit, GM2 circuit) NP2 circuit: standard for EA8PV ADVANCE option for EA12V / EA28V ADVANCE

- 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 GM2 circuit



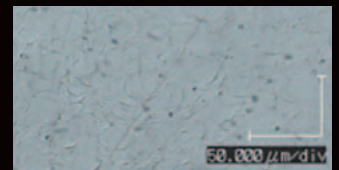
Ultrafine matte finish machining (10x10mm, NP2 circuit)  
Electrode: Copper  
Workpiece: Steel (STAVAX)  
Surface roughness: Rz:0.4μm/Ra:0.06μm



Electrical-discharge marks with NP2 circuit (Rz:0.4μm/Ra:0.06μm)



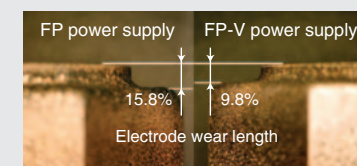
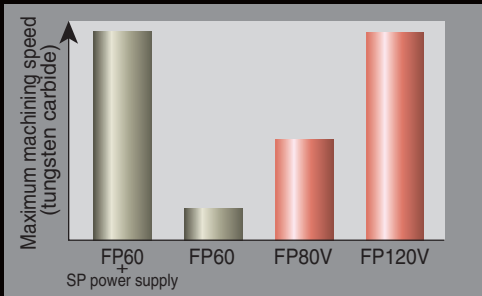
Glossy mirror finish machining  
Electrode: Copper  
Workpiece: Steel (STAVAX)  
Surface roughness: Rz:0.4μm/Ra:0.06μm



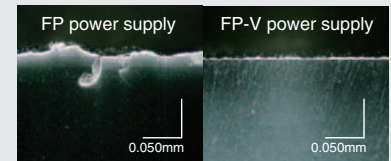
Electrical-discharge marks with GM2 circuit (Rz:0.4μm/Ra:0.06μm)

## 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



Electrode wear when machining tungsten die



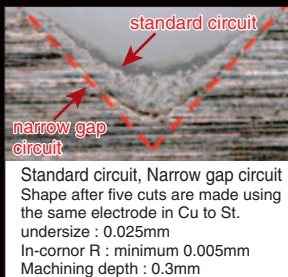
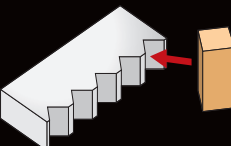
Machined surface with cracks / Machined surface with few cracks  
Cross-section of tungsten-machined workpiece

Electrode	Copper tungsten
Workpiece	Tungsten carbide
Surface roughness	Rz12μm/Ra1.8μm
Machining time	36 min (improved 40%)

\* Compared to conventional Mitsubishi Electric EDM (EA Series)

## Narrow gap circuit

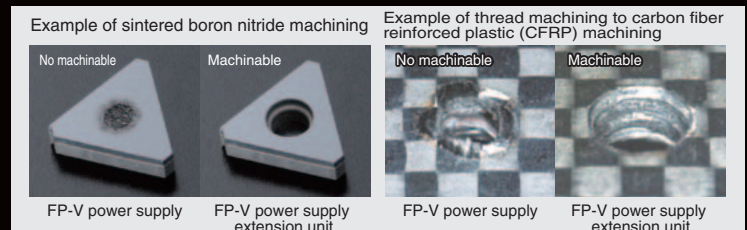
- Compatible with small undersize amounts of 0.015 to 0.030mm per side
- Small in-corner R is realized with suppressing electrode wear when machining with small undersize



Standard circuit, Narrow gap circuit  
Shape after five cuts are made using the same electrode in Cu to St.  
undersize : 0.025mm  
In-corner R : minimum 0.005mm  
Machining depth : 0.3mm

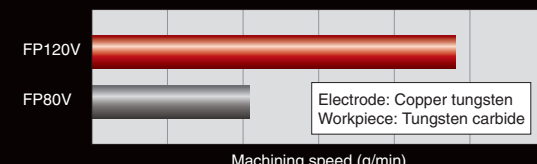
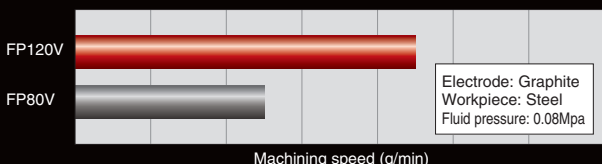
## FP-V power supply extension unit (for EDM resistant materials) (option)

- 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



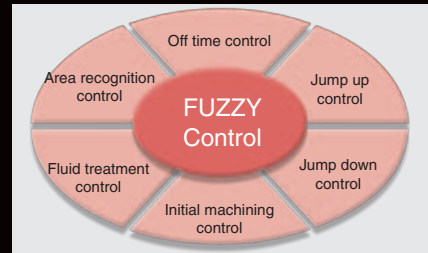
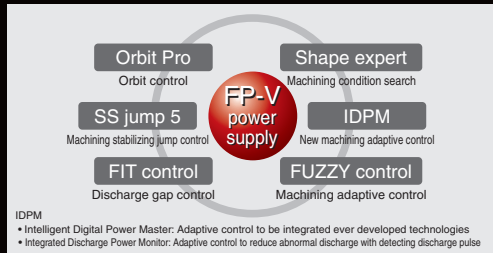
## FP120V power supply (option)

- 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

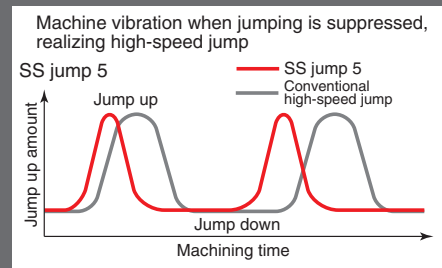
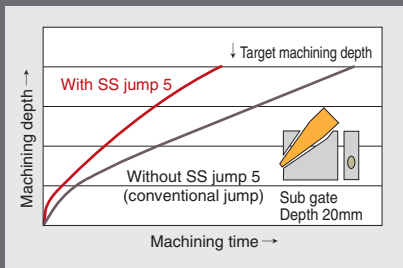
High-speed machining is realized using advanced machining control



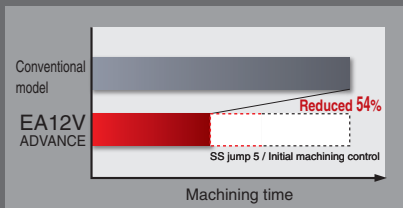
## Machining stabilizing jump control (SS jump 5)

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

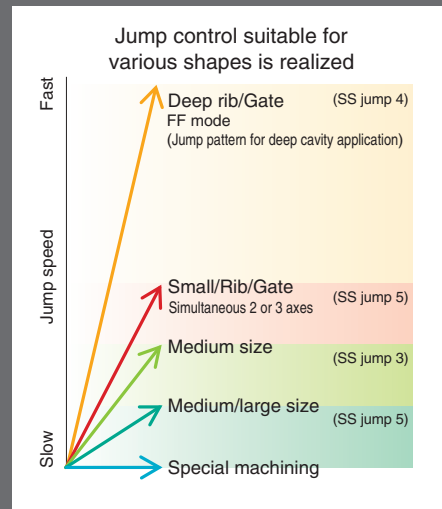
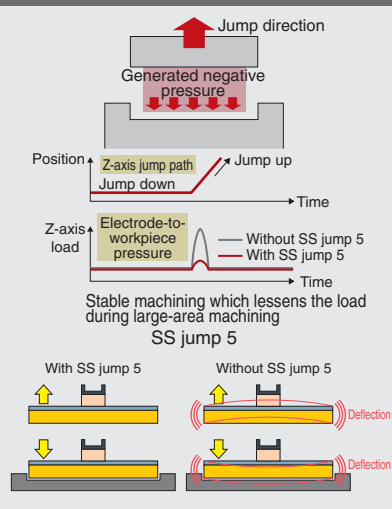
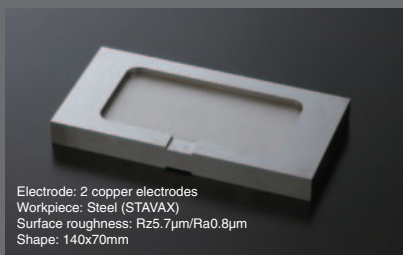
• Machining time is reduced up to 40% at the rough machining condition by optimizing smoothing of simultaneous 2 or 3 axes operation and speed/acceleration control



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

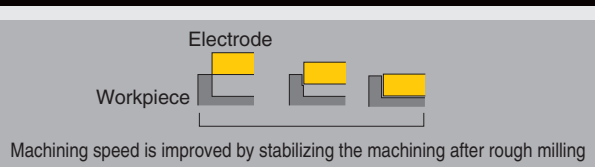


\* Compared to conventional Mitsubishi Electric EDM (EA Series)

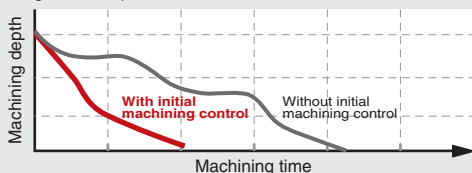


## Initial machining control

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



Machining time reduced up to 50% for the start of machining after rough milling  
 ■Machining time comparison for 140x70mm



## IDPM (option)

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



Wear using graphite electrode reduced up to 80%  
 ■Electrode wear comparison for 15x15mm and 40mm depth

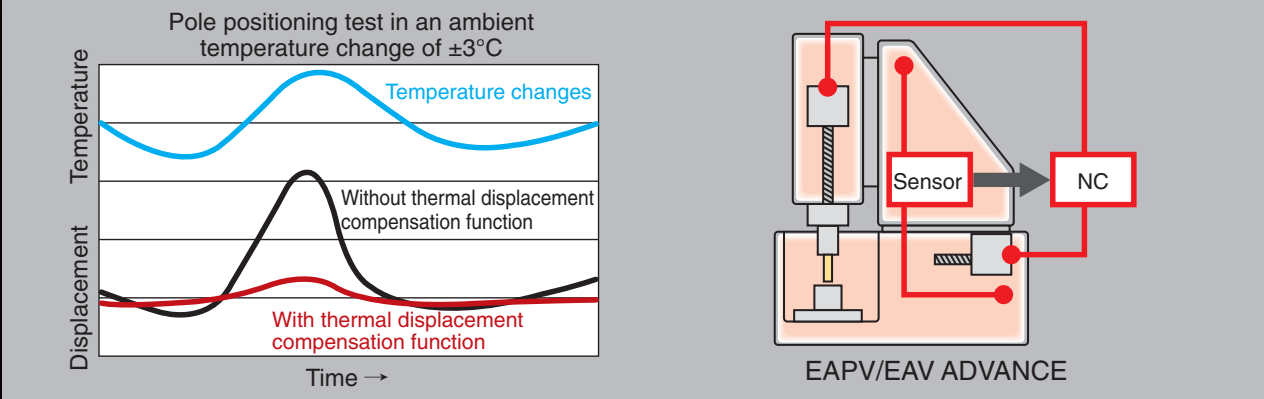




# High accuracy

## 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



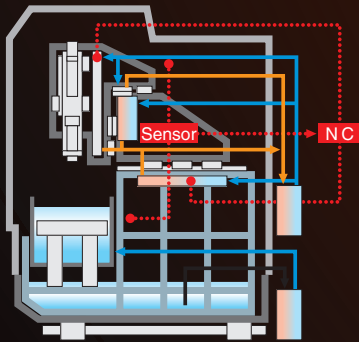
Thermal displacement compensation function

## 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



MA2000



High-accuracy built-in C-axis

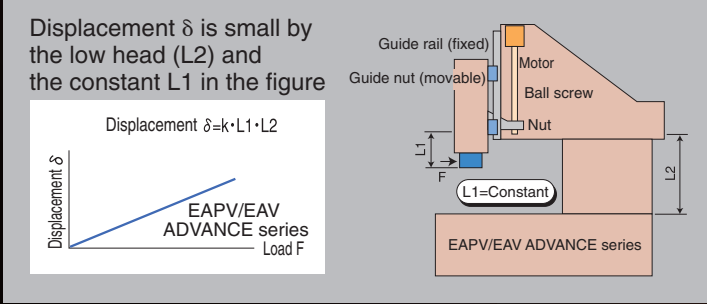
# Rigidity

## EAPV/EAV ADVANCE Series

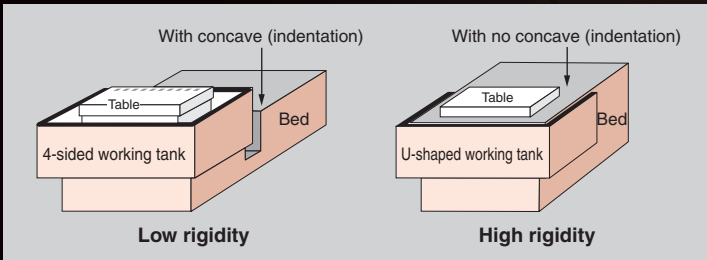
- Highly rigid Z-axis enabled with low head structure
- Highly rigid integrated bed structure with no concave section (indentation)
- Improved servo responsiveness using direct drive method

## MA2000 Series

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



Low head structure



Bed structure



# Operability

## Hand washing coupler

- Easily clean sludge in the working tank



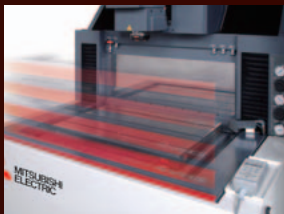
## Dielectric fluid pressure gage

- Filter pressure gauge are easy to read from the machine front



## Working tank

- Three sided drop tank of automatic elevation tank



Automatic elevation tank (EA12V ADVANCE)

## 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



Back of the machine (EA8PV ADVANCE)

## Under the machine bed

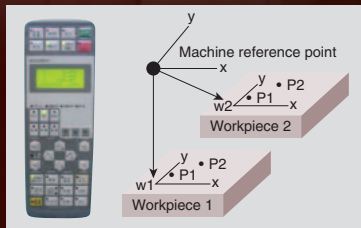
- Table access is improved when loading/unloading of large workpieces using hand lifter
- Workability of set-up is improved by improving operator access to the machine table

## Manual operation box

### Standard manual operation box



### High-function manual operation box



Workpiece coordinates can be set easily

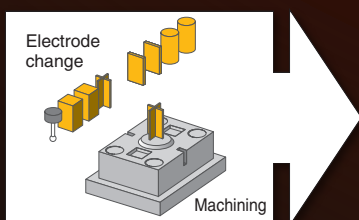


Back of the machine (EA12V ADVANCE)

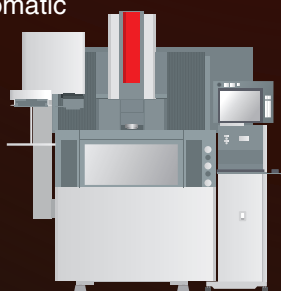
# High productivity

## 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) + C-axis specification



## LS type ATC

Reduces time of automatic electrode change

# ADVANCE Control Unit

## Supporting machining of various shapes with optimum machining

### Machining support —ESPERADVANCE

#### Advanced program support functions

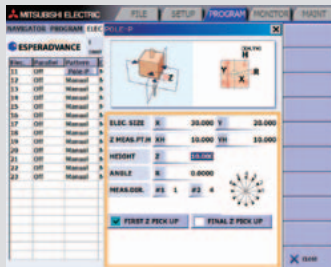
##### Navigator

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



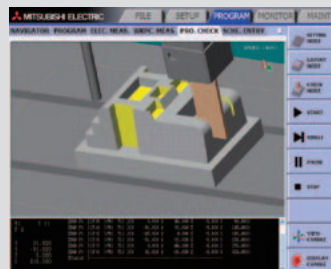
##### Electrode Workpiece measurement

- Ample 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)



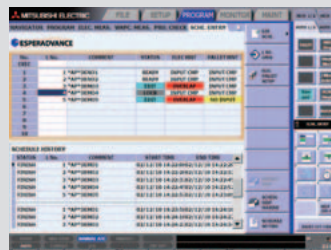
##### 3D check

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



##### Machining program

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

Sequence No.	1-	2-	3-	4-	5-
WKPC No. W	1	1	1	1	1
Start Pos. X	131.500	32.561	32.561	32.561	64.419
Y	-18.526	35.971	-73.029	-73.029	-18.529
Z	-5.092	-1.092	-1.092	-1.092	14.908
Depth Z	0.000	0.000	0.000	0.000	0.000
E-Condition E	9001				
Orbit Ptn. D	200				
M Code M					
1st Elec.T	11				

Input start position and machining depth

Optimum machining conditions for shape are searched and set

### 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

Approach amount and overlap amount can be easily modified

VALID/INVALID of ME Pack's machining condition step

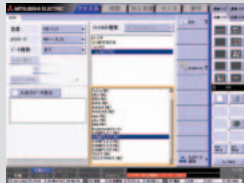


# conditions and easy programming

## Main menu

### File

- Exchange program data with external computers



### Set-up

- Workpiece and electrode measurements are supported with graphical screens

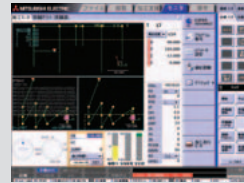


- MDI (Manual Data Input) Programming operation is possible using G/M code during set-up



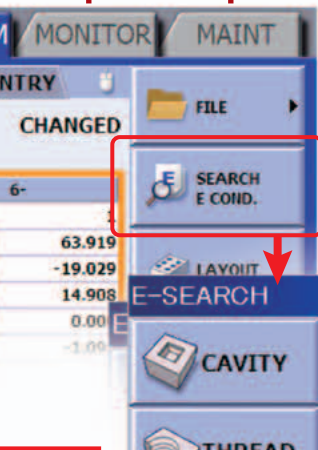
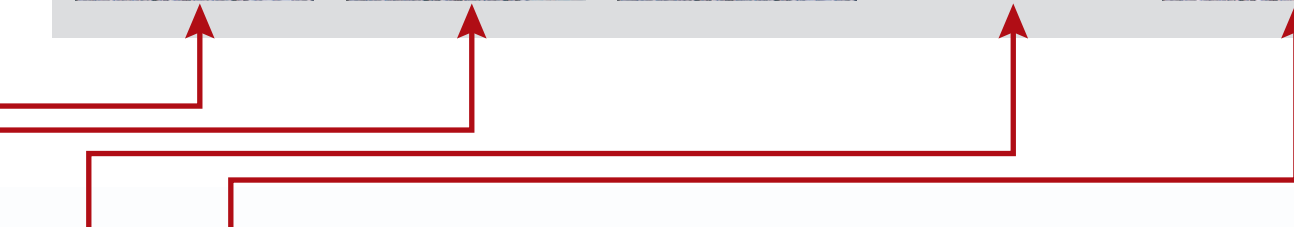
### Monitor

- Machining state is displayed in real-time



### Maintenance

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



## Machining condition search(shape expert)

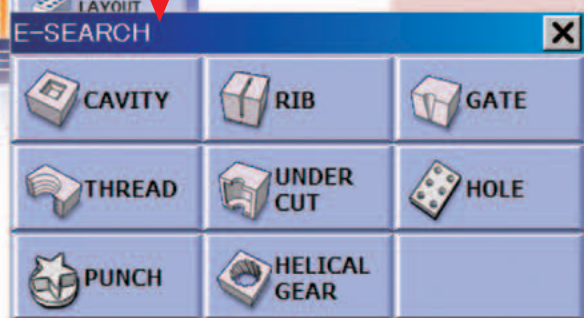
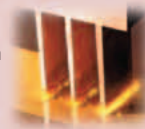
Machining conditions and programs suitable for various shapes can be created

### Cavity

- Increased orbit pattern line-up

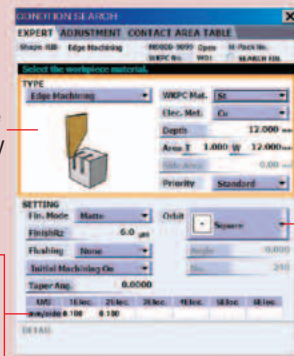
### Rib

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



Machining details are graphically displayed

Input electrode undersize amount



Set orbit pattern

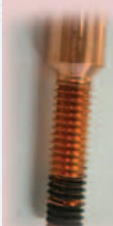
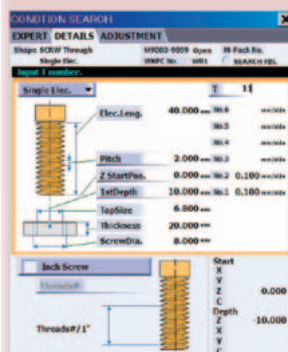
### User customization

- Freely rearrange switches and status displays which are used frequently



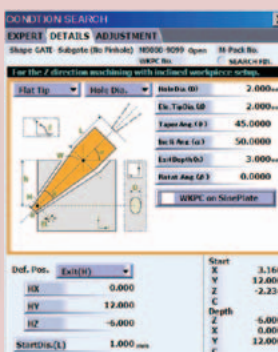
### Threads

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



### Gate

- Easily create programs for sub-gate machining

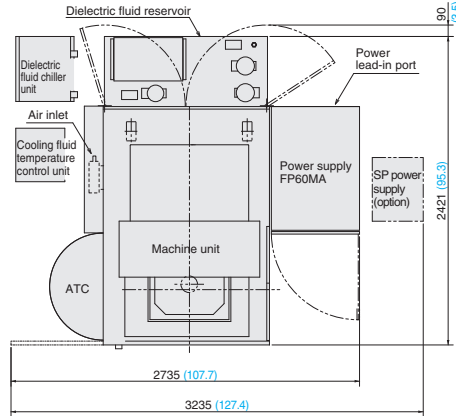
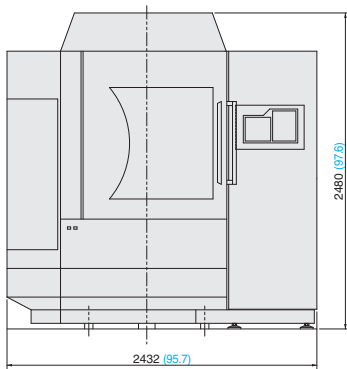


# MA2000

## Ultra-high accuracy machine

Machining accuracy  $\pm 0.002\text{mm}$  ( $0.00008''$ ) achieved (Note 1)

(Note 1) The machining accuracy follows the Mitsubishi Electric machining conditions



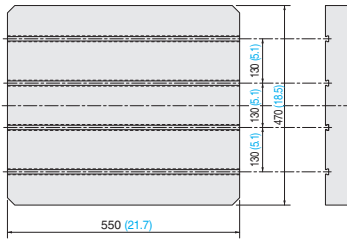
### Standard functions

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

### Options

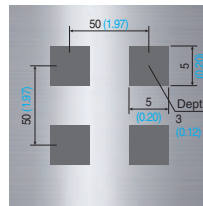
- SP power supply (power supply for tungsten carbide machining)
- High-accuracy built-in spindle
- MVH-40T ATC (Note 1)
- Programmable flushing nozzle section (six nozzles) + Automatic changeover
- Dielectric fluid distributor

(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.



Granite table (upper surface) dimension drawing

### Mitsubishi Electric machining conditions (example of pitch machining accuracy)



Workpiece SKD61; four copper electrodes  
Room temperature during machining:  $20 \pm 1^\circ\text{C}$

(Unit: mm (in))

### Standard delivery entrance

	Width[mm (in)]	Height[mm (in)]
Standard specifications	2500 (98.4)	2600 (102.3)
MVH-40T ATC specifications (Note 1)	2500 (98.4)	2600 (102.3)

### Standard machine specifications

Model	MA2000M	
Machine unit	Dimensions (W x D x H) [mm (in)]	2432 x 2421 x 2480 (95.7 x 95.3 x 97.6)
	Total system weight [kg (lb.)]	6000 (13228)
Machine travels (X x Y x Z)	[mm (in)]	400 x 300 x 300 (15.7 x 11.8 x 11.8)
Spindle	Distance between table and electrode mounting surface [mm (in)]	153 to 453 (3R MACRO) (6.0 x 17.8)
	Max. electrode weight [kg (lb.)]	50 (110)
Working tank	Method	Automatic elevation
	Inner dimensions (W x D x H) [mm (in)]	650 x 500 x 340 (25.6 x 19.7 x 13.4)
Table	Fluid level adjustment range (from top of table) [mm (in)]	100 to 300 (3.9 x 11.8)
	Dimensions (W x D) [mm (in)]	550 x 470 (21.7 x 18.5)
	Max. workpiece dimensions (W x D x H) [mm (in)]	600 x 450 x 250 (23.6 x 17.7 x 9.8)
	Distance between floor and top of table [mm (in)]	880 (34.6)
	Max. workpiece weight [kg (lb.)]	700 (1543)
Dielectric fluid reservoir	T-slot	Four slots at 13-130mm pitch
	Capacity (initial dielectric fluid supply amount) [l (gal.)]	390 (103)
Dielectric fluid reservoir	Filtering method	One fine paper filter
	Dielectric fluid chiller unit	Unit cooler

### C-axis/ATC (standard specifications)

C-axis	Max. electrode weight	50 (110) [kg (lb.)]	3R		EROWA	
			MACRO	Combi	ITS	COMBI
C-axis	Speed	10, 20 [min <sup>-1</sup> ]	○	—	○	—
	Max. electrode dimensions	70 x 70 x 200 (2.8 x 2.8 x 7.9) [mm (in)]	○	—	○	—
ATC	LS-20T	Max. electrode weight	10kg (22lb.) / electrode	○	—	○
		Magazine total:	40kg (88lb.)	○	—	○

### C-axis/ATC (option)

C-axis spindle	Max. electrode weight	30 (66) [kg (lb.)]	3R		EROWA	
			MACRO	Combi	ITS	COMBI
C-axis spindle	Speed	1 to 1500 [min <sup>-1</sup> ]	○	—	○	—
	Max. electrode dimensions	70 x 70 x 200 (2.7 x 2.7 x 7.8) [mm (in)]	○	—	○	—
ATC	MVH 40T	Max. electrode weight	5kg (11lb.) / electrode	○	—	○
		Magazine total:	40 kg (88lb.) (Note 2)	○	—	○

(Note 2) Tolerable electrode weight specifications of 10kg (22lb.) / electrode (magazine total: 80kg (176lb.)) are also available with the MVH40T-ATC.

### Distance between table and electrode mounting surface

		3R MACRO	EROWA ITS50
C-axis	[mm (in)]	153 to 453 (6.0 to 17.8)	170 to 470 (6.7 to 18.5)
Spindle	[mm (in)]	134 to 434 (5.3 to 17.1)	151 to 451 (5.9 to 17.8)



# EA8PV ADVANCE

## Compact high-accuracy machine

Machining accuracy  $\pm 0.003\text{mm}$   
(0.0001") achieved (Note 1)

(Note 1) The machining accuracy follows the Mitsubishi Electric machining conditions

MVH20T-ATC C-axis  
Automatic elevation tank (option)



C-axis (option)



Vertically sliding front door (Unit: mm (in))

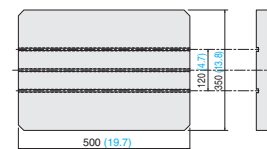
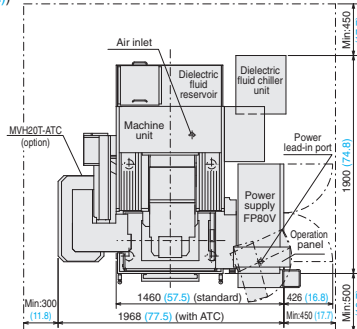
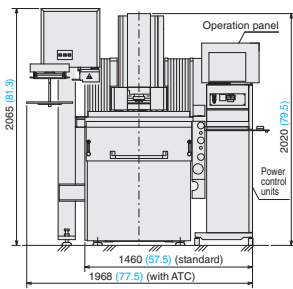
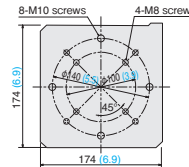
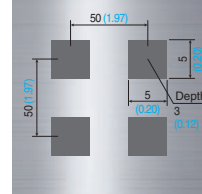


Table (upper surface) dimension drawing



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

Mitsubishi Electric machining conditions (example of pitch machining accuracy)



Workpiece SKD61: four copper electrodes  
Room temperature during machining: 20±1°C

### Standard functions

- Tungsten carbide machining circuit
- Ultrafine matte finish circuit (NF2 circuit)
- Fine matte finish circuit (PS circuit)
- Glossy mirror finish circuit (GM2 circuit)
- Narrow gap circuit
- Thermal displacement compensation system
- XYZ-axis linear scale
- High-accuracy positioning circuit
- 70mm (2.8in) granite table
- DNC H/W

### Options

- High-accuracy built-in C-axis
- High-accuracy built-in spindle
- Automatic clamp
- Automatic clamp (head down specifications) (Note 1)
- Shuttle-type ATC (Note 2,3)
- LS-10T ATC/LS-20T ATC (Note 4)
- MVH-20T ATC
- Fine-hole jig (0.15 (0.006) to 2.0 (0.0079) mm (in))
- High-function manual operation box
- Emission/suction automatic changeover
- Programmable flushing nozzle (eight nozzles) + Automatic changeover (Note 3,5)
- Dielectric fluid distributor
- IDPM
- 110mm (4.3in) granite table
- Automatic elevation tank (option)
- FP-V power supply extension unit

(Note 1) Please contact a Mitsubishi Electric representative for distance between floor and top of table.

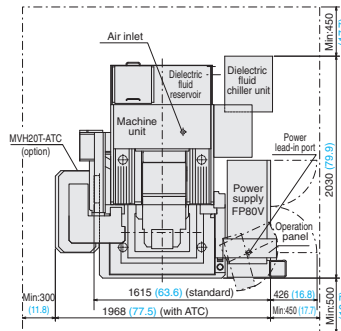
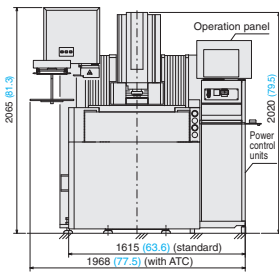
(Note 2) The automatic elevation tank and shuttle ATC can not be combined.

(Note 3) The shuttle ATC and the programmable flushing nozzle (eight nozzle) + Automatic changeover can not be combined.

(Note 4) Mountable only for machine with automatic elevation tank.

(Note 5) Programmable flushing nozzle (four nozzles) can be selected with the automatic elevation tank.

Automatic elevation tank (option)



### Standard machine specifications

< >: Values in parentheses are for automatic elevation tank.

Model		EA8PVM ADVANCE	
Machine unit	Dimensions (W x D x H) [mm (in)]	1460 x 1900 x 2075 (57.5 x 74.8 x 81.7)	<1615 x 2030 x 2075 (63.6 x 79.9 x 81.7)>
	Total system weight [kg (lb.)]	2000 (4409)	
Machine travels (X x Y x Z)	[mm (in)]	300 x 250 x 250 (11.8 x 9.8 x 9.8)	
Spindle	Distance between table and electrode mounting surface [mm (in)]	223 to 473 (8.8 to 18.6) (70 (2.8) granite table)	
	Max. electrode weight [kg (lb.)]	25 (55)	
Working tank	Method	Vertical front door <Automatic elevation tank>	
	Inner dimensions (W x D x H) [mm (in)]	770 x 500 x 230 (30.3 x 19.7 x 9.1) (70 (2.8) granite table) <760 x 520 x 260 (29.9 x 20.5 x 10.2)> (70 (2.8) granite table)	
	Fluid level adjustment range (from top of table) [mm (in)]	90 to 180 (3.5 to 7.1) (70 (2.8) granite table) <85 to 210 (3.5 to 8.3)> (70 (2.8) granite table)	
Table	Dimensions (W x D) [mm (in)]	500 x 350 (19.7 x 13.8)	
	Max. workpiece dimensions (W x D x H) [mm (in)]	740 x 470 x 130 (29.1 x 18.5 x 5.1) (70 (2.8) granite table) <730 x 490 x 160 (28.7 x 19.3 x 6.3)> (70 (2.8) granite table)	
	Distance between floor and top of table [mm (in)]	900 (35.4)	
	Max. workpiece weight [kg (lb.)]	550 (1213)	
Dielectric fluid reservoir	T-slot	Two slots at 13-120mm pitch	
	Capacity (initial supply amount) [ℓ (gal.)]	165 (43.6) <165 (43.6) (175 (46.2))>	
	Filtering method	One fine paper filter	
Dielectric fluid chiller unit		Unit cooler	

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

		3R MACRO	EROWA ITS50	3R combi	
				MACRO	Jr
C-axis	[mm (in)]	158 to 408 (6.2 to 16.1)	175.5 to 425.5 (6.9 to 16.8)	158 to 408 (6.2 to 16.1)	168 to 418 (6.6 to 16.5)
Spindle	[mm (in)]	161 to 411 (6.3 to 16.2)	178.5 to 428.5 (7.0 to 16.9)	161 to 411 (6.3 to 16.2)	171 to 421 (6.7 to 16.5)
Automatic clamp	[mm (in)]	221 to 471 (8.7 to 18.5)	230.5 to 480.5 (9.1 to 18.9)	221 to 471 (8.7 to 18.5)	231 to 481 (9.1 to 18.9)

### Standard delivery entrance

		Width [mm (in)]		Height [mm (in)]	
		Standard specifications	Shuttle-4T ATC specifications	2120 (83.5)	2120 (83.5)
Shuttle-7T ATC specifications		1743 (68.6)	2120 (83.5)	2120 (83.5)	2120 (83.5)
	LS-10T ATC specifications	1785 (70.3)	2120 (83.5)	2120 (83.5)	2120 (83.5)
LS-20T ATC specifications		2120 (83.5)	2120 (83.5)	2120 (83.5)	2120 (83.5)
MVH-20T ATC specifications		1616 (63.6)	2120 (83.5)	2120 (83.5)	2120 (83.5)

### C-axis/ATC (option)

C-axis			3R		EROWA		
			MACRO	Combi	ITS	COMBI	
C-axis	Max. electrode weight	10 (22) (Note 6)	○	○	○	○	
		Speed	1 to 30 [min <sup>-1</sup> ]	○	○	○	○
	Spindle	Max. electrode weight	5 (11) (Note 6)	○	○	○	○
		Speed	1 to 1500 [min <sup>-1</sup> ]	○	○	○	○
ATC	Shuttle 4T (Note 5)	Max. electrode dimensions	70 x 70 x 100 (2.8 x 2.8 x 3.9)	○	—	○	(Note 11)
		Max. electrode weight	5kg (11lb.) / electrode Magazine total: 20kg (44lb.)	○	—	○	(Note 11)
	Shuttle 7T (Note 5)	Max. electrode dimensions	35 x 35 x 100 (Note 7) (1.4 x 1.4 x 3.9 (Note 7))	—	○	—	—
		Max. electrode weight	2.5kg (5.5lb.) / electrode Magazine total: 10kg (22lb.)	—	○	—	—
	LS-10T	Max. electrode dimensions	54 x 54 x 200 (2.1 x 2.1 x 7.9)	○	○	○	—
		Max. electrode weight	5kg (11lb.) / electrode (Note 6) Magazine total: 20kg (44lb.)	○	○	○	—
	LS-20T	Max. electrode dimensions	54 x 54 x 200 (2.1 x 2.1 x 7.9)	○	○	○	—
		Max. electrode weight	10kg (22lb.) / electrode (Note 6) Magazine total: 40kg (88lb.)	○	○	○	—
	MVH 20T	Max. electrode dimensions	70 x 70 x 175 (2.8 x 2.8 x 6.9)	○	○	○	(Note 11)
		Max. electrode weight	10kg (22lb.) / electrode (Note 9) Magazine total: 80kg (176lb.) (Note 10)	○	○	○	(Note 11)

(Note 6) For MACRO Jr of 3R combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.

(Note 7) When using four electrodes, the dimensions are 70 x 70 x 100(mm) (2.7 x 2.7 x 3.9(in)).

(Note 8) For MACRO of 3R Combi, the weight is 5kg (11lb.) / electrode, and is 2.5kg (5.5lb.) / electrode with MACRO Jr.

(Note 9) For MACRO of 3R Combi, the weight is 5kg (11lb.) / electrode, is 2.5kg (5.5lb.) / electrode with MACRO Jr, and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.

(Note 10) For MACRO and MACRO Jr of 3R Combi, the magazine total is 40kg (88lb.).

(Note 11) ATC can be used with EROWA ITS50, but not with EROWA Compact (manual only).

# EA12V ADVANCE

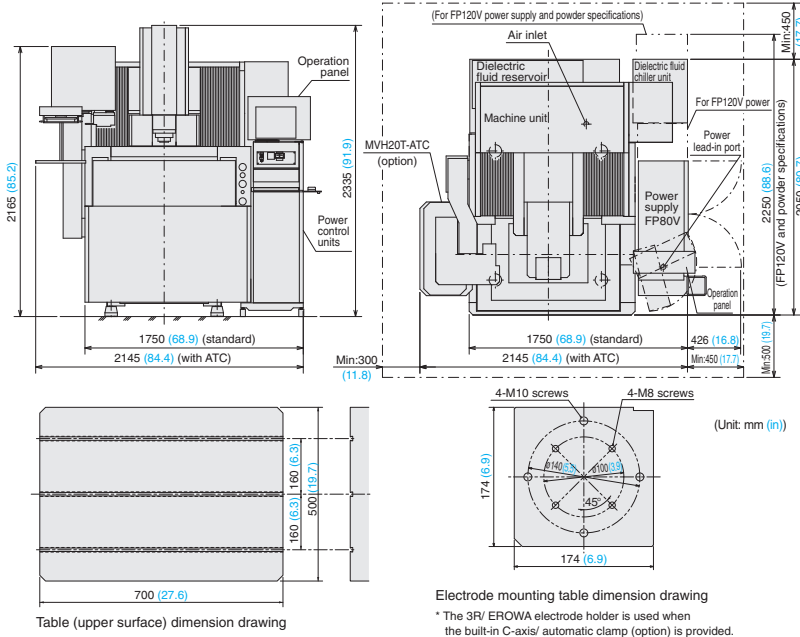
## High-performance machine



MVH20T-ATC C-axis  
Automatic elevation tank (option)



C-axis (option)



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

### Standard functions

- Tungsten carbide machining circuit
- Fine matte finish circuit (PS circuit)
- Glossy mirror finish circuit (GM2 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/suction automatic changeover
- Programmable flushing nozzle (eight nozzles) + Automatic changeover
- Fluid pressure 3-step changeover
- Dielectric fluid distributor
- FP120V
- IDPM
- Ultrafine matte finish circuit (NP2 circuit)
- FP-V power supply extension unit

(Note 1) Please contact a Mitsubishi Electric representative for distance between floor and top of table.

### Standard delivery entrance

	Width [mm (in)]	Height [mm (in)]
Standard specifications	1670 (65.7)	2380 (93.7)
LS-10T ATC specifications	2010 (79.1)	2380 (93.7)
LS-20T ATC specifications	2235 (88.0)	2380 (93.7)
MVH-20T ATC specifications	2065 (81.3)	2380 (93.7)
MVH-40T ATC specifications (Note 2)	1670 (65.7)	2380 (93.7)

(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.

### Standard machine specifications

Model		EA12VM ADVANCE	
Machine unit	Dimensions (W x D x H) [mm (in)]	1750 x 2050 x 2335 (68.9 x 80.7 x 91.9)	
	Total system weight [kg (lb.)]	3725 (8212)	
Machine travels (X x Y x Z)	[mm (in)]	400 x 300 x 300 (15.7 x 11.8 x 11.8)	
Spindle	Distance between table and electrode mounting surface [mm (in)]	270 to 570 (10.6 to 22.4)	
	Max. electrode weight [kg (lb.)]	50 (110)	
Working tank	Method	Automatic elevation tank	
	Inner dimensions (W x D x H) [mm (in)]	850 x 600 x 350 (33.5 x 23.6 x 13.8)	
	Fluid level adjustment range (from top of table) [mm (in)]	100 to 300 (3.9 to 11.8)	
Table	Dimensions (W x D) [mm (in)]	700 x 500 (27.6 x 19.7)	
	Max. workpiece dimensions (W x D x H) [mm (in)]	800 x 550 x 250 (31.5 x 21.7 x 9.8)	
	Distance between floor and top of table [mm (in)]	900 (35.4)	
	Max. workpiece weight [kg (lb.)]	700 (1543)	
	T-slot	Three slots at 12-160mm pitch	
Dielectric fluid reservoir	Capacity (initial dielectric fluid supply amount) [ℓ (gal.)]	340 (90) (400 (106))	
	Filtering method	Two fine paper filters	
	Dielectric fluid chiller unit	Unit cooler	

### Distance between table and electrode mounting surface

	3R MACRO	EROWA ITS50	3R combi	
			MACRO	Jr
C-axis [mm (in)]	135 to 435 (5.3 to 17.1)	152.5 to 452.5 (6.0 to 17.8)	135 to 435 (5.3 to 17.1)	145 to 445 (5.7 to 17.5)
Spindle [mm (in)]	181 to 481 (7.1 to 18.9)	198.5 to 498.5 (7.8 to 19.6)	181 to 481 (7.1 to 18.9)	191 to 491 (7.5 to 19.3)
Automatic clamp [mm (in)]	198 to 498 (7.8 to 19.6)	207.5 to 507.5 (8.2 to 20.0)	198 to 498 (7.8 to 19.6)	208 to 508 (8.2 to 20.0)

### C-axis/ATC (option)

			3R		EROWA			
			MACRO	Combi	ITS	COMBI		
C-axis	Max. electrode weight	50 (110) (Note 3)	[kg (lb.)]	○	○	○	○	
	Speed	1 to 30	[min <sup>-1</sup> ]	○	○	○	○	
Spindle	Max. electrode weight	10 (22) (Note 3)	[kg (lb.)]	○	○	○	○	
	Speed	1 to 1500	[min <sup>-1</sup> ]	○	○	○	○	
ATC	LS-10T	Max. electrode dimensions	54 x 54 x 200 (2.1 x 2.1 x 7.9)	[mm (in)]	○	○	○	—
		Max. electrode weight	5kg (11lb.)/electrode (Note 4) Magazine total: 20kg (44lb.)		○	○	○	—
	LS-20T	Max. electrode dimensions	54 x 54 x 200 (2.1 x 2.1 x 7.9)	[mm (in)]	○	○	○	—
		Max. electrode weight	10kg (22lb.)/electrode (Note 4) Magazine total: 40kg (88lb.)		○	○	○	—
	MVH-20T	Max. electrode dimensions	70 x 70 x 150 (2.8 x 2.8 x 5.9)	[mm (in)]	○	○	○	(Note 7)
		Max. electrode weight	10kg (22lb.)/electrode (Note 5) Magazine total: 80kg (176lb.) (Note 6)		○	○	○	(Note 7)
MVH-40T	Max. electrode dimensions	70 x 70 x 150 (2.8 x 2.8 x 5.9)	[mm (in)]	○	○	○	(Note 7)	
	Max. electrode weight	10 (22lb.)/electrode (Note 5) Magazine total: 80kg (176lb.) (Note 6)		○	○	○	(Note 7)	

(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 of 3R combi, the weight is 5kg (11lb.)/electrode, and is 2.5kg (5.5lb.)/electrode with MACRO Jr.

(Note 5) For MACRO of 3R Combi, the weight is 5kg (11lb.)/electrode, is 2.5kg (5.5lb.)/electrode with MACRO Jr, and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.)/electrode.

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

(Note 7) ATC can be used with EROWA ITS50, but not with EROWA Compact (manual only).

# EA28V ADVANCE

## Medium-sized high-performance machine

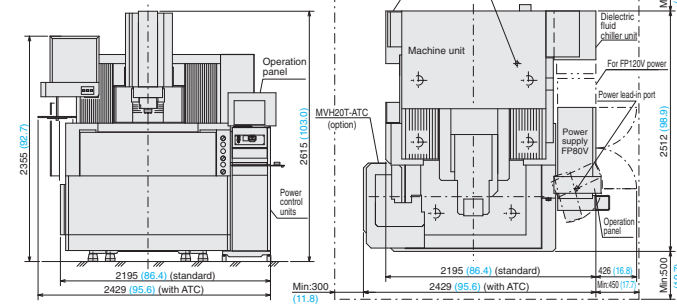


MVH20T-ATC C-axis  
Automatic elevation tank (option)



C-axis (option)

Standard working tank



Long stroke specifications / Special working tank

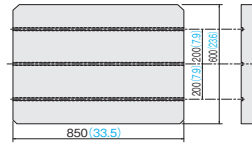
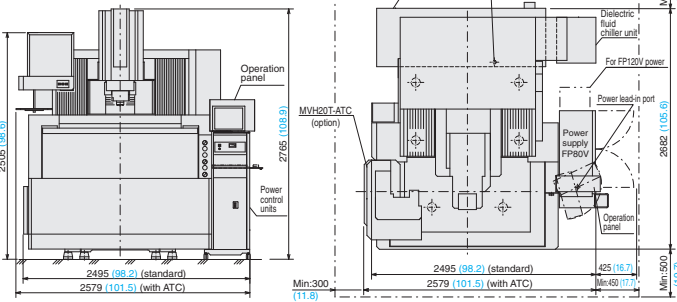


Table (upper surface) dimension drawing

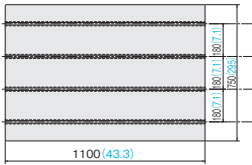
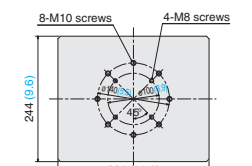


Table (upper surface) dimension drawing  
(Long stroke specifications)



Electrode mounting table dimension drawing

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

### Standard functions

- Tungsten carbide machining circuit
- Fine matte finish circuit (PS circuit)
- Glossy mirror finish circuit (GM2 circuit)
- Narrow gap circuit
- Thermal displacement compensation system
- Z-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 150mm (5.9in) 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 nozzles) + Automatic changeover
- Fluid pressure 3-step changeover
- Dielectric fluid distributor
- Special working tank (including 150mm (5.9in) column up)
- Long stroke specifications
- FP120V
- IDPM
- Ultrafine matte finish circuit (NP2 circuit)
- FP-V power supply extension unit

### Standard delivery entrance

	Width [mm (in)]	Height [mm (in)]
Standard specifications	2063 (81.2)	2660 (104.7)
LS-10T ATC specifications	2250 (88.6)	2660 (104.7)
LS-20T ATC specifications	2475 (97.4)	2660 (104.7)
MVH-20T ATC specifications	2297 (90.4)	2660 (104.7)
MVH-40T ATC specifications (Note 1)	2168 (85.4)	2660 (104.7)

(Note 1) With the MVH40T-ATC specifications, the ATC unit and holder are removed before shipment. A crane or lifting device is required when installing the system.

### Standard machine specifications

Model		EA28VM ADVANCE	EA28VM ADVANCE <Long stroke specifications>
Machine unit	Dimensions (W x D x H) [mm (in)]	2195 x 2512 x 2615 (86.4 x 98.9 x 103.0)	2495 x 2850 x 2865 (98.2 x 112.2 x 112.8)
	Total system weight [kg (lb.)]	5400 (11905)	5950 (13118)
Machine travels (X x Y x Z) [mm (in)]		650 x 450 x 350 (25.6 x 17.7 x 13.8)	1000 x 470 x 450 (35.4 x 18.5 x 17.7)
Spindle	Distance between table and electrode mounting surface [mm (in)]	425 to 775 (16.7 to 30.5)	675 to 1125 (26.6 to 44.3)
	Max. electrode weight [kg (lb.)]	200 (441)	200 (441)
Method		Automatic elevation tank	Automatic elevation tank
Working tank	Inner dimensions (W x D x H) [mm (in)]	1100 x 810 x 450 (43.3 x 31.9 x 17.7)	1400 x 900 x 550 (55.1 x 35.4 x 21.7)
	Fluid level adjustment range (from top of table) [mm (in)]	100 to 400 (3.9 to 15.7)	150 to 500 (5.9 to 19.7)
Table	Dimensions (W x D) [mm (in)]	850 x 600 (33.5 x 23.6)	1100 x 750 (43.3 x 29.5)
	Max. workpiece dimensions (W x D x H) [mm (in)]	1050 x 760 x 350 (41.3 x 29.9 x 13.8)	1350 x 850 x 450 (53.1 x 33.5 x 17.7)
	Distance between floor and top of table [mm (in)]	900 (35.4)	900 (35.4)
	Max. workpiece weight [kg (lb.)]	2000 (4409)	2000 (4409)
Dielectric fluid reservoir	T-slot	Three slots at 14-200mm pitch	Four slots at 14-180mm pitch
	Capacity (initial dielectric fluid supply amount) [l (gal.)]	390 (103) (595 (157))	740 (195) (1070 (283))
Filtering method		Three fine paper filters	Three fine paper filters
Dielectric fluid chiller unit		Unit cooler	Unit cooler

Specifications for special working tank are given in parentheses.

### Distance between table and electrode mounting surface

		3R MACRO	EROWA ITS50	3R combi	
				MACRO	Jr
C-axis	[mm (in)]	300 to 650 (11.8 to 25.6)	317.5 to 667.5 (12.5 to 26.3)	300 to 650 (11.8 to 25.6)	310 to 660 (12.2 to 26.0)
Spindle	[mm (in)]	279 to 629 (11.0 to 24.8)	296.5 to 646.5 (11.7 to 25.5)	279 to 629 (11.0 to 24.8)	289 to 639 (11.4 to 25.2)
Automatic clamp	[mm (in)]	300 to 650 (11.8 to 25.6)	309.5 to 659.5 (12.2 to 26.0)	300 to 650 (11.8 to 25.6)	310 to 660 (12.2 to 26.0)

### C-axis/ATC (option)

			3R		EROWA			
			MACRO	Combi	ITS	COMBI		
C-axis	Max. electrode weight	50 (110) (Note 2)	[kg (lb.)]	○	○	○	○	
	Speed	1 to 30	[min <sup>-1</sup> ]	○	○	○	○	
Spindle	Max. electrode weight	10 (22) (Note 2)	[kg (lb.)]	○	○	○	○	
	Speed	1 to 1500	[min <sup>-1</sup> ]	○	○	○	○	
ATC	LS-10T (Note 9)	Max. electrode dimensions	54 x 54 x 200 (2.1 x 2.1 x 7.9)	[mm (in)]	○	○	○	—
		Max. electrode weight	5kg (11lb.) / electrode (Note 3) Magazine total: 20kg (44lb.)		○	○	○	○
	LS-20T (Note 9)	Max. electrode dimensions	54 x 54 x 200 (2.1 x 2.1 x 7.9)	[mm (in)]	○	○	○	—
		Max. electrode weight	10kg (22lb.) / electrode (Note 3) Magazine total: 40kg (88lb.)		○	○	○	○
	MVH-20T	Max. electrode dimensions	70 x 70 x 200 (2.8 x 2.8 x 7.9)	[mm (in)] (Note 4)	○	○	○	(Note 8)
		Max. electrode weight	10kg (22lb.) / electrode (Note 5) Magazine total: 80kg (176lb.) (Note 6)		○	○	○	(Note 8)
MVH-40T	Max. electrode dimensions	70 x 70 x 200 (2.8 x 2.8 x 7.9)	[mm (in)] (Note 7)	○	○	○	(Note 8)	
	Max. electrode weight	5kg (11lb.) / electrode (Note 5) Magazine total: 40kg (88lb.) (Note 6)		○	○	○	(Note 8)	

(Note 2) For MACRO Jr of 3R combi and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.

(Note 3) MACRO of 3R combi, the weight is 5kg (11lb.) / electrode, and is 2.5kg (5.5lb.) / electrode with MACRO Jr.

(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, is 2.5kg (5.5lb.) / electrode with MACRO Jr, and Compact of EROWA COMBI, the weight is 2.5kg (5.5lb.) / electrode.

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

(Note 7) MVH40T-ATC, electrodes exceeding the specified dimensions cannot be mounted even if space is provided in the magazine because there will be interference with the machine.

(Note 8) ATC can be used with EROWA ITS50, but not with EROWA Compact (manual only).

(Note 9) LS-10T/LS-20T ATC can no be mounted for the long stroke specifications.

Product Line-up

Machining Samples

EA ADVANCE Series Functions and Features

Machining

Machine

Operability

Product Introduction

Machine Specifications and Options

Power Supply/Control Specifications

Tooling

Total Solutions

Preparation for Machine Installation Precautions

Far-related Products

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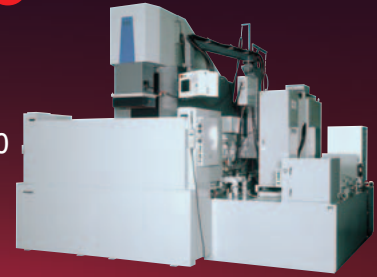


# EA40 ADVANCE / EA50

Large-sized  
high-performance machine

EA40 ADVANCE

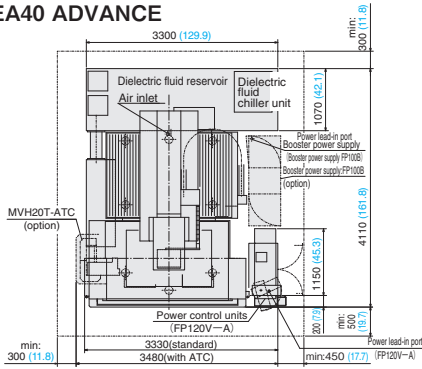
EA50



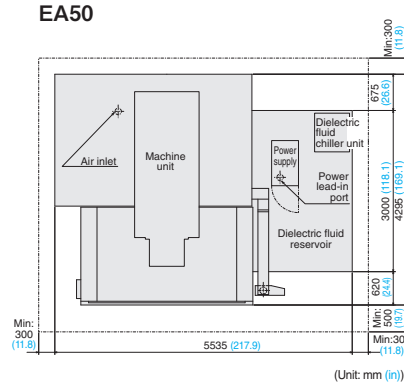
MVH20T-ATC  
C-axis (option)

Automatic filter system and booster power supply (option)

EA40 ADVANCE



EA50



**Options**

- High-accuracy built-in C-axis
- Automatic tool changer<sup>(Note 1)</sup>
- 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 machine 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 x Y x Z) [mm (in.)]	1000 x 600 x 450 (39.4 x 23.6 x 17.7)	1500 x 600 x 600 (59.1 x 23.6 x 23.6)
	Extra travel for workpiece loading [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)) <sup>(Note 2)</sup>	500 (1102)
Working tank	Method	Automatic vertical front door	Automatic vertical front door
	Inner dimensions (W x D x H) [mm (in.)]	2000 x 1200 x 700 (78.7 x 47.2 x 27.6) (XK210A)	2500 x 1600 x 850 (98.4 x 63.0 x 33.5) (XK270)
	Fluid level adjustment range (from top of table) [mm (in.)]	310 to 650 (12.2 to 25.6)	400 to 800 (15.7 to 31.5)
Table	Dimensions (W x D) [mm (in.)]	1400 x 950 (55.1 x 37.4)	2000 x 1350 (78.7 x 53.1)
	Max. workpiece 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 (11023)	10000 (22046)
Dielectric fluid reservoir	T-slot	Five slots at 14-200mm pitch	Seven slots at 14-200mm pitch
	Capacity (initial dielectric fluid supply amount) [ℓ (gal.)]	2650 (700)	5200 (1374)
Standard functions	Filtering method	Two paper filters	Four paper filters
	Dielectric fluid chiller unit	Unit cooler	Unit cooler
	Thermal displacement compensation function	Standard	Standard
	Operation panel	-	Pendant with turning arm
Manual operation box	Manual operation box	High-function manual operation box	High-function manual operation box
	Automatic dielectric fluid supply/ drain	Standard	Standard

(Note 2) The maximum electrode weight 500kg (1102lb.) specifications are available as an option for the EA40 ADVANCE.

**Special working tank (option)**

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

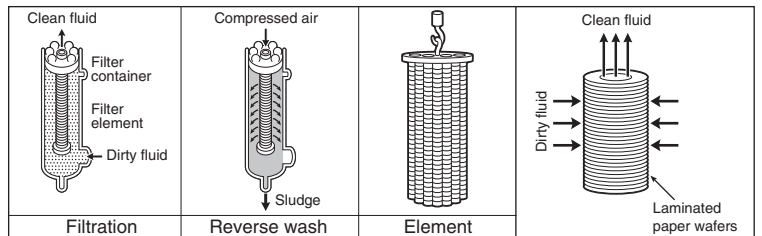
Model	Working tank	Inner dimensions [mm (in.)]	Max. workpiece dimensions [mm (in.)]	Table electrode mounting surface distance [mm (in.)]	Fluid level adjustment range [mm (in.)]	Required column up [mm (in.)]	Door method	Dielectric fluid reservoir capacity	Remarks
EA40M ADVANCE	XK212A	2000 x 1200 x 800 (78.7 x 47.2 x 31.5)	1900 x 1100 x 700 (74.8 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	3400 ℓ (898gal.)	
	XK240A	2300 x 1600 x 700 (90.6 x 63.0 x 27.6)	2200 x 1500 x 600 (86.6 x 59.1 x 23.6)	450 to 900 (17.7 to 35.4)	310 to 650 (12.2 to 25.6)	-	Automatic vertical front door	3400 ℓ (898gal.)	Dummy workpiece 400L
	XK261A	2500 x 1200 x 800 (98.4 x 47.2 x 31.5)	2400 x 1100 x 700 (94.5 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	3400 ℓ (898gal.)	Dummy workpiece 200L
EA50M	XK291A	2800 x 1600 x 1100 (110.2 x 63.0 x 43.3)	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 ℓ (1664gal.)	Dummy workpiece 300L

**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**

Type	Capacity	Remarks
TF50	4000 ℓ (1057gal.)	EA40 ADVANCE(XK212A)
TF63	6300 ℓ (1664gal.)	EA50(XK270)





# EA8S

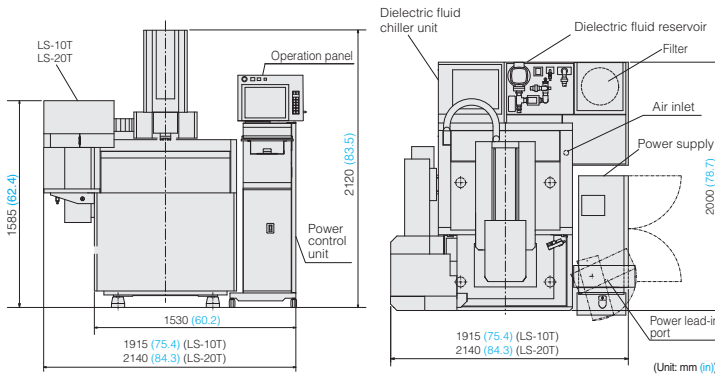
## Compact machine



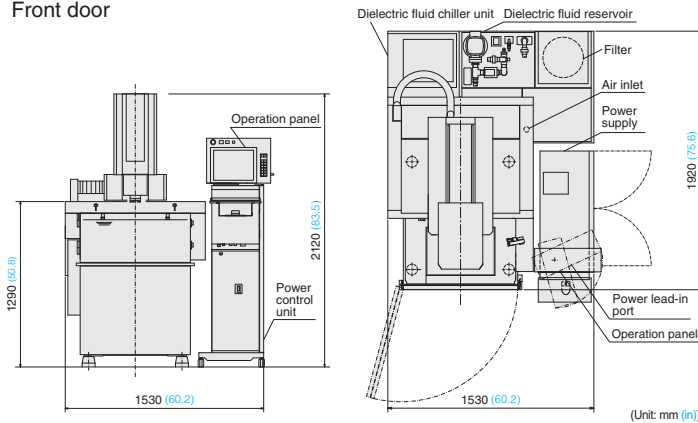
LS-10T ATC  
C-axis (option)

C-axis (option)

### Automatic elevation tank



### Front door



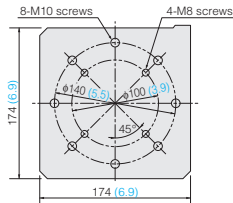
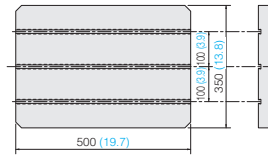
### Standard functions

- Tungsten carbide machining circuit
- Fine matte finish circuit (PS circuit)
- Glossy mirror finish circuit (GM2 circuit)
- Narrow gap circuit
- High-accuracy positioning circuit
- DNC H/W, FTP, DNC S/W
- IDPM

### Options

- Highly rigid C-axis
- Automatic clamp
- LS-10T ATC/LS-20T ATC (Note 1)
- Z-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 machine with automatic elevation tank.  
(Note 2) It is recommended option for using flushing on machine with ATC.



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

### Standard delivery entrance

	Width [mm (in)]	Height [mm (in)]
Standard specifications	1120 (44.1)	2150 (84.6)
LS-10T ATC specifications	1505 (59.3)	2150 (84.6)
LS-20T ATC specifications	1730 (68.1)	2150 (84.6)

### Standard machine specifications

Model		EA8SM	EA8SM
		Automatic elevation tank	Front door
Machine unit	Dimensions (W x D x H) [mm (in)]	1530 x 2000 x 2120 (60.2 x 78.7 x 83.5)	1530 x 1920 x 2120 (60.2 x 75.6 x 83.5)
	Total system weight [kg (lb.)]	2000 (4409)	
Machine travels (X x Y x Z) [mm (in)]	300 x 250 x 250 (11.8 x 9.8 x 9.8)		
Spindle	Distance between table and electrode mounting surface [mm (in)]	150 to 400 (5.9 to 15.7)	
	Max. electrode weight [kg (lb.)]	25 (55)	
Working tank	Method	Automatic elevation tank	Front door
	Inner dimensions (W x D x H) [mm (in)]	800 x 520 x 300 (31.5 x 20.5 x 11.8)	
	Fluid level adjustment range (from top of table) [mm (in)]	85 to 250 (3.3 to 9.8)	
Table	Dimensions (W x D) [mm (in)]	500 x 350 (19.7 x 13.8)	
	Max. workpiece dimensions (W x D x H) [mm (in)]	770 x 490 x 200 (30.3 x 19.3 x 7.9)	
	Distance between floor and top of table [mm (in)]	900 (35.4)	
	Max. workpiece weight [kg (lb.)]	550 (1213)	
Dielectric fluid reservoir	T-slot	Three slots at 12-100mm pitch	
	Capacity (initial dielectric fluid supply amount) [ℓ (gal.)]	260 (68.7) (270 (71.3))	260 (68.7)
	Filtering method	One fine paper filter	
	Dielectric fluid chiller unit	Unit cooler	

### C-axis/ATC (option)

		3R		EROWA			
		MACRO	Combi	ITS	COMBI		
C-axis	Max. electrode weight	10 (22) (Note 3)	[kg (lb.)]	○	○	○	—
	Speed	1 to 30	[min <sup>-1</sup> ]	○	○	○	—
ATC	LS-10T (Note 5)	Max. electrode dimensions	54x54x200 [mm (in)]	○	○	○	—
		Max. electrode weight	5kg (11lb.) / electrode (Note 3) Magazine total: 20kg (44lb.)	○	○	○	—
	LS-20T (Note 5)	Max. electrode dimensions	54x54x200 [mm (in)]	○	○	○	—
		Max. electrode weight	10kg (22lb.) / electrode (Note 4) Magazine total: 40kg (88lb.)	○	○	○	—

(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 of 3R Combi, the weight is 5kg (11lb.) / electrode, and is 2.5kg (5.5lb.) / electrode with MACRO Jr.

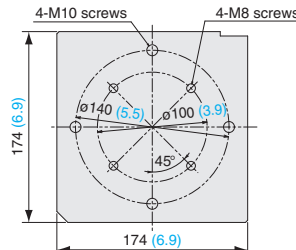
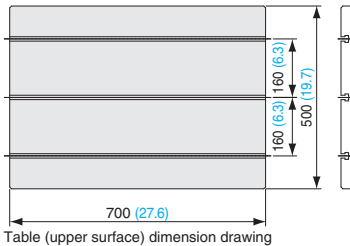
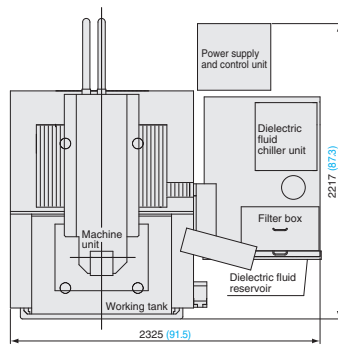
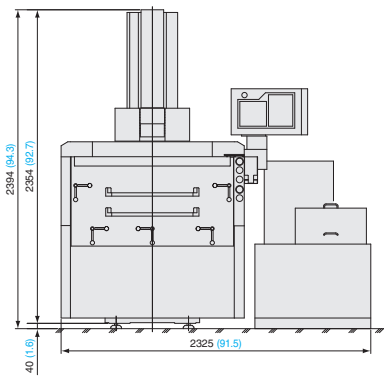
(Note 5) Mountable only for machine with automatic elevation tank.

### Distance between table and electrode mounting surface

		3R MACRO	EROWA ITS50	3R Combi	
				MACRO	Jr
C-axis	[mm (in)]	133 to 383 (5.2 to 15.1)	150 to 400 (5.9 to 15.7)	133 to 383 (5.2 to 15.1)	143 to 393 (5.6 to 15.5)
Automatic clamp	[mm (in)]	148 to 398 (5.8 to 15.7)	150 to 400 (5.9 to 15.7)	148 to 398 (5.8 to 15.7)	158 to 408 (6.2 to 16.1)

# EA12D

## Medium-sized machine



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

### 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 delivery entrance

	Width [mm (in)]	Height [mm (in)]
Standard specifications	1650 (65.0)	2524 (99.3)
Shuttle-4T ATC specifications	1888 (74.3)	2524 (99.3)
Shuttle-7T ATC specifications	1888 (74.3)	2524 (99.3)

### Standard machine specifications

Model		EA12D
Machine unit	Dimensions (W x D x H) [mm (in)]	1840 x 1960 x 2375 (72.4 x 77.2 x 93.5)
	Total system weight [kg (lb.)]	2900 (6393)
Machine travels (X x Y x Z)	[mm (in)]	400 x 300 x 300 (15.7 x 11.8 x 11.8)
Spindle	Distance between table and electrode mounting surface [mm (in)]	300 to 600 (11.8 to 23.6)
	Max. electrode weight [kg (lb.)]	50 (110)
Working tank	Method	Vertical front door
	Inner dimensions (W x D x H) [mm (in)]	1050 x 700 x 450 (41.3 x 27.6 x 17.7)
	Fluid level adjustment range (from top of table) [mm (in)]	180 to 400 (7.1 to 15.7)
Table	Dimensions (W x D) [mm (in)]	700 x 500 (27.6 x 19.7)
	Max. workpiece dimensions (W x D x H) [mm (in)]	1000 x 650 x 350 (39.4 x 25.6 x 13.8)
	Distance between floor and top of table [mm (in)]	840 (33.1)
	Max. workpiece weight [kg (lb.)]	1000 (2205)
Dielectric fluid reservoir	T-slot	Three slots at 12-160mm pitch
	Capacity (initial dielectric fluid supply amount) [ℓ (gal.)]	500 (132)
	Filtering method	One paper filter
	Dielectric fluid chiller unit	Unit cooler

### C-axis/ATC (option)

		3R		EROWA	
		MACRO	Combi	ITS	COMBI
C-axis	Max. electrode weight	10 (22) (Note 1)			
	Speed	10, 20 [min <sup>-1</sup> ]	○	○	○
ATC	Shuttle	Max. electrode dimensions	70 x 70 x 100 (2.8 x 2.8 x 3.9) [mm (in)]	○	○
		Max. electrode weight	5kg (11lb.) / electrode Magazine total: 20kg (44lb.)	○	○ (Note3)
	7T	Max. electrode dimensions	35 x 35 x 100 (Note 2) (1.4 x 1.4 x 3.9) [mm (in)]	○	○
		Max. electrode weight	2.5kg (5.5lb.) / electrode Magazine total: 10kg (22lb.)	○	○

(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).

### Distance between table and electrode mounting surface

		3R MACRO	EROWA ITS50	3R Combi	
				MACRO	Jr
C-axis	[mm (in)]	278 to 578 (10.9 to 22.8)	287 to 587 (11.3 to 23.1)	271 to 571 (10.7 to 22.5)	281 to 581 (11.1 to 22.9)

# MEMO

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# Machine Specifications and Options

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

## Machine Specifications

Model		MA2000M	EA8PVM ADVANCE	EA12VM ADVANCE	EA28VM ADVANCE
Machine unit	Dimensions (W x D x H) [mm (in)]	2432 x 2421 x 2480 (95.7 x 95.3 x 97.6)	1460 x 1900 x 2075 (57.5 x 74.8 x 81.7) <1615 x 2030 x 2075 (63.6 x 79.9 x 81.7)>	1750 x 2050 x 2335 (68.9 x 80.7 x 91.9)	2195 x 2512 x 2615 (86.4 x 98.9 x 103.0)
	Total system weight [kg (lb.)]	6000 (13228)	2000 (4409)	3725 (8212)	5400 (11905)
Machine travels (X x Y x Z) [mm (in)]		400 x 300 x 300 (15.7 x 11.8 x 11.8)	300 x 250 x 250 (11.8 x 9.8 x 9.8)	400 x 300 x 300 (15.7 x 11.8 x 11.8)	650 x 450 x 350 (25.6 x 17.7 x 13.8)
Spindle	Distance between table and electrode mounting surface [mm (in)]	153 to 453 (3R MACRO) (6.0 x 17.8)	223 to 473 (8.8 to 18.6) <sup>(70 (2.8) granite table)</sup>	270 to 570 (10.6 to 22.4)	425 to 775 (16.7 to 30.5)
	Max. electrode weight [kg (lb.)]	50 (110)	25 (55)	50 (110)	200 (441)
Working tank	Method	Automatic elevation	Vertical front door <Automatic elevation tank>	Automatic elevation tank	Automatic elevation tank
	Inner dimensions (W x D x H) [mm (in)]	650 x 500 x 340 (25.6 x 19.7 x 13.4)	770 x 500 x 230 (30.3 x 19.7 x 9.1) <760 x 520 x 260 (29.9 x 20.5 x 10.2)>	850 x 600 x 350 (33.5 x 23.6 x 13.8)	1100 x 810 x 450 (43.3 x 31.9 x 17.7)
	Fluid level adjustment range (from top of table) [mm (in)]	100 to 300 (3.9 x 11.8)	90 to 180 (3.5 to 7.1) <85 to 210 (3.5 to 8.3)>	100 to 300 (3.9 to 11.8)	100 to 400 (3.9 to 15.7)
Table	Dimensions (W x D) [mm (in)]	550 x 470 (21.7 x 18.5)	500 x 350 (19.7 x 13.8)	700 x 500 (27.6 x 19.7)	850 x 600 (33.5 x 23.6)
	Max. workpiece dimensions (W x D x H) [mm (in)]	600 x 450 x 250 (23.6 x 17.7 x 9.8)	740 x 470 x 130 (29.1 x 18.5 x 5.1) <730 x 490 x 160 (28.7 x 19.3 x 6.3)>	800 x 550 x 250 (31.5 x 21.7 x 9.8)	1050 x 760 x 350 (41.3 x 29.9 x 13.8)
	Distance between floor and top of table [mm (in)]	880 (34.6)	900 (35.4)	900 (35.4)	900 (35.4)
	Max. workpiece weight [kg (lb.)]	700 (1543)	550 (1213)	700 (1543)	2000 (4409)
Dielectric fluid reservoir	T-slot	Four slots at 13-130mm pitch	Two slots at 13-120mm pitch	Three slots at 12-160mm pitch	Three slots at 14-200mm pitch
	Capacity (initial dielectric fluid supply amount) [ℓ (gal.)]	390 (103)	165 (43.6) <165 (43.6) (175 (46.2))>	340 (90) (400 (106))	390 (103) (595 (157))
	Filtering method	One fine paper filter	One fine paper filter	Two fine paper filters	Three fine paper filters
Dielectric fluid chiller unit		Unit cooler	Unit cooler	Unit cooler	Unit cooler

## Options

Main option correspondence table ○ Standard equipment ○ Can be added after installation ● Cannot be added after installation × Not available

Model		MA2000M	EA8PVM ADVANCE	EA12VM ADVANCE	EA28VM ADVANCE	
Machine unit	Lubricant	Automatic lubrication unit	○	○	○	
	Scale	Scale feedback specifications	Z-axis	○	○	○
		XY-axis	○	○	○	●
	Thermal displacement compensation system		○	○	○	○
	Granite table		○	○	×	×
	Column up specifications		×	×	● 100mm (3.9")	● 150mm (5.9")
High-function manual operation box		○	○	○	○	
LED light		○	○	○	○	
Working tank	Automatic elevation tank	○	●	○	○	
	Automatic vertical front door	×	×	×	×	
Special working tank		×	×	×	● (Note 1)	
Dielectric fluid system	Dielectric filter	Paper filter - 2-pc. specifications	×	×	○	
		Paper filter - 3-pc. specifications	×	×	○	
		Paper filter - 4-pc. specifications	×	×	×	
	Chiller	Automatic filter	×	×	×	×
		Dielectric fluid chiller unit (unit cooler)	○	○	○	○
		Dielectric fluid chiller unit (for booster power)	×	×	×	×
Fluid system	Dielectric fluid automatic supply/drain	○	○	○	○	
	Emission/suction automatic changeover	×	○	○	○	
	Programmable flushing nozzle (eight nozzles) + Automatic changeover	● (Note 3)	● (Note 2) (Note 3)	○	○	
Dielectric fluid distributor		○	○	○	○	
Power supply	Main power supply	FP80V	×	○	○	
		FP120V	×	×	○	
		FP60EA / MA	○	×	×	
		FP100EA	×	×	×	
		FP100B	×	×	×	
	Special power supply	SP power supply (for tungsten carbide machining)	○ (Note 5)	×	×	×
		NP2 circuit (Ultrafine matte finish circuit)	○	○	○	○
		Narrow gap circuit	×	○	○	○
FP-V power supply extension unit		×	○	○	○	
GF2 control		×	●	●	●	

(Note 1) When the special working tank is at the lowest limit, the upper end of the working tank is approx. 95mm (3.7") above the table.

(Note 2) The shuttle-type ATC cannot be used with the programmable flushing nozzle.

(Note 3) 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 MA2000.

(Note 4) Option tolerable electrode weight specifications of 500kg (1102lb.) is also available for the EA40 ADVANCE.

(Note 5) The maximum working tank elevation position will change if the SP power supply is equipped. (The maximum workpiece height will be 200mm (7.9").)

### High-function manual operation box



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

### LED light



Power supply of DC24V for the LED light.

### Automatic filter



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.

### Machine Specifications

Model		EA28VM ADVANCE <Long stroke specifications>	EA40M ADVANCE	EA50M	EA8SM Automatic elevation tank	EA8SM Front door	EA12DM
Machine unit	Dimensions (W x D x H) [mm (in.)]	2495 x 2850 x 2865 (98.2 x 112.2 x 112.8)	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)	1530 x 2000 x 2120 (60.2 x 78.7 x 83.5)	1530x1920x2120 (60.2 x 75.6 x 83.5)	1840 x 1960 x 2375 (72.4 x 77.2 x 93.5)
	Total system weight [kg (lb.)]	5950 (13118)	12000 (26455)	20000 (44092)	2000 (4409)		2900 (6393)
Machine travels (X x Y x Z) [mm (in.)]		1000 x 470 x 450 (35.4x 18.5 x 17.7)	1000 x 600 x 450 (39.4 x 23.6 x 17.7)	1500 x 600 x 600 (59.1 x 23.6 x 23.6)	300 x 250 x 250 (11.8 x 9.8 x 9.8)		400 x 300 x 300 (15.7 x 11.8 x 11.8)
Spindle	Distance between table and electrode mounting surface [mm (in.)]	675 to 1125 (26.6 to 44.3)	450 to 900 (17.7 to 35.4)	500 to 1100 (19.7 to 43.3)	150 to 400 (5.9 to 15.7)		300 to 600 (11.8 to 23.6)
	Max. electrode weight [kg (lb.)]	200 (441)	300 (661) (500 (1102)) <sup>(Note)</sup>	500 (1102)	25 (55)		50 (110)
Working tank	Method	Automatic elevation tank	Automatic vertical front door	Automatic vertical front door	Automatic elevation tank	Front door	Vertical front door
	Inner dimensions (W x D x H) [mm (in.)]	1400 x 900 x 550 (55.1x 35.4 x 21.7)	2000 x 1200 x 700 (78.7 x 47.2 x 27.6) (XK210A)	2500 x 1600 x 850 (98.4 x 63.0 x 33.5) (XK270)	800 x 520 x 300 (31.5 x 20.5 x 11.8)		1050 x 700 x 450 (41.3 x 27.6 x 17.7)
	Fluid level adjustment range (from top of table) [mm (in.)]	150 to 500 (5.9 to 19.7)	310 to 650 (12.2 to 25.6)	400 to 800 (15.7 to 31.5)	85 to 250 (3.3 to 9.8)	110 to 250 (4.3 to 9.8)	180 to 400 (7.1 to 15.7)
Table	Dimensions (W x D) [mm (in.)]	1100 x 750 (43.3x 29.5)	1400 x 950 (55.1 x 37.4)	2000 x 1350 (78.7 x 53.1)	500 x 350 (19.7 x 13.8)		700 x 500 (27.6 x 19.7)
	Max. workpiece dimensions (W x D x H) [mm (in.)]	1350 x 850 x 450 (53.1x 33.5 x 17.7)	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)	770 x 490 x 200 (30.3x19.3x7.9)		1000 x 650 x 350 (39.4 x 25.6 x 13.8)
	Distance between floor and top of table [mm (in.)]	900 (35.4)	860 (33.9)	1300 (51.2)	900 (35.4)		840 (33.1)
	Max. workpiece weight [kg (lb.)]	2000 (4409)	5000 (11023)	10000 (22046)	550 (1213)		1000 (2205)
	T-slot	Four slots at 14-180mm pitch	Five slots at 14-200mm pitch	Seven slots at 14-200mm pitch	Three slots at 12-100mm pitch		Three slots at 12-160mm pitch
Dielectric fluid reservoir	Capacity (initial dielectric fluid supply amount) [ℓ (gal.)]	740 (195) (1070 (283))	2650 (700)	5200 (1374)	260 (68.7) (270 (71.3))	260 (68.7)	500 (130)
	Filtering method	Three fine paper filters	Two paper filters	Four paper filters	One fine paper filter		One paper filter
	Dielectric fluid chiller unit	Unit cooler	Unit cooler	Unit cooler	Unit cooler		Unit cooler

Model		EA28VM ADVANCE <Long stroke specifications>	EA40M ADVANCE	EA50M	EA8SM Automatic elevation tank	EA8SM Front door	EA12DM
Machine unit	Lubricant	Automatic lubrication unit	○	○	○	○	○
	Scale	Scale feedback specifications	Z-axis	○	×	×	○
			XY-axis	●	×	×	●
	Thermal displacement compensation system		○	○	○	×	×
	Granite table		×	×	×	●	×
	Column up specifications		150mm (5.9")	100mm (3.9")	200mm (7.9")	×	×
	High-function manual operation box		○	○	○	○	○
LED light		○	○	○	○	○	
Working tank	Automatic elevation tank	○	×	×	○	×	×
	Automatic vertical front door	×	○	○	×	×	×
	Special working tank	○ (Note 1)	●	●	×	×	×
Dielectric fluid system	Dielectric filter	Paper filter - 2-pc. specifications	×	○	×	×	×
		Paper filter - 3-pc. specifications	○	×	×	×	×
		Paper filter - 4-pc. specifications	×	×	○	×	×
		Automatic filter	×	●	●	×	×
	Chiller	Dielectric fluid chiller unit (unit cooler)	○	○	○	○	○
		Dielectric fluid chiller unit (for booster power)	×	×	●	×	×
	Fluid system	Dielectric fluid automatic supply/drain	○	○	○	○	○
		Emission/suction automatic changeover	●	×	×	●	×
		Programmable flushing nozzle (eight nozzles) + Automatic changeover	●	○	○	×	×
		Dielectric fluid distributor	○	○	○	○	○
Power supply	Main power supply	FP80V / FP80S	○	×	×	○	×
		FP120V / FP120S	●	○	×	●	×
		FP60EA / MA	×	×	×	×	○
		FP100EA	×	×	○	×	●
		FP100B	×	●	●	×	×
	Special power supply	SP power supply (for tungsten carbide machining)	×	×	×	×	○
		NP2 circuit (Ultrafine matte finish circuit)	○	×	×	×	×
		Narrow gap circuit	○	×	×	○	×
FP-V power supply extension unit	○	×	×	●	×		
GF2 control	●	●	×	○	×		

### 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.

## Options

Main option correspondence table ◎ Standard equipment ○ Can be added after installation ● Cannot be added after installation × Not available

		MA2000M	EA8PVM ADVANCE	EA12VM ADVANCE	EA28VM ADVANCE	EA28VM ADVANCE <Long stroke specifications>	EA40M ADVANCE	EA50M	EA8SM	EA12DM	
Head-side tooling	High-accuracy built-in C-axis (Note 1,2)	◎	○	○	○	○	●	●	○	○	
	High-accuracy built-in spindle (Note 1)	●	●	●	●	●	×	×	×	×	
	Automatic clamp (Note 1)	×	○	○	○	○	○	○	○	○	
	Automatic clamp (head down specifications) (Note 3)	×	○	○	×	×	×	×	×	×	
	Removable holder (3R-16M-MACRO-R specifications)	×	○	○	○	○	○	○	○	○	
	Large electrode adaptor	×	×	● (Note 4)	○	○	○	○	×	×	
ATC	Shuttle	4T	3R MACRO	○ (Note 5)	×	×	×	×	×	○	
		7T	EROWA ITS	○ (Note 5)	×	×	×	×	×	○	
	LS	10T	3R Combi	○ (Note 5)	×	×	×	×	×	○	
			3R MACRO	×	● (Note 6)	○	○	×	×	● (Note 6)	×
		3R Combi	×	● (Note 6)	○	○	×	×	● (Note 6)	×	
		EROWA ITS	×	● (Note 6)	○	○	×	×	● (Note 6)	×	
		20T	3R MACRO	◎	● (Note 6)	○	○	×	×	● (Note 6)	×
			3R Combi	×	● (Note 6)	○	○	×	×	● (Note 6)	×
	EROWA ITS	◎	● (Note 6)	○	○	×	×	● (Note 6)	×		
	MVH	20T	3R MACRO	×	●	○	○	● (Note 7)	● (Note 7)	×	○
			EROWA ITS	×	●	○	○	● (Note 7)	● (Note 7)	×	○
		3R Combi	×	●	○	○	×	×	×	○	
		3R MACRO	●	×	○	○	×	×	×	×	
	40T	EROWA ITS	●	×	○	○	×	×	×	×	
3R Combi		×	×	○	○	×	×	×	×		
Control unit	Communication	External signal output (M code) (Note 8)	○	○	○	○	○	○	○	×	
		External signal output (M code with answer) (Note 9)	○	○	○	○	○	○	○	○	
		DNC H/W (Note 10)	◎	◎	◎	◎	◎	◎	◎	◎	
		FTP	◎	◎	◎	◎	◎	◎	◎	◎	
		DNC S/W	◎	◎	◎	◎	◎	◎	◎	◎	
		RS232C interface	◎	×	×	×	×	×	◎	×	◎
NS powder specifications		×	×	●	●	●	×	×	×		
Fine-hole jig (Note 11)		×	●	●	×	×	×	×	×		
Software	Electronic manual (e-manual)		×	◎	◎	◎	◎	×	◎	×	
	Built-in scheduler		×	◎	◎	◎	◎	×	×	×	
	ESPERADVANCE PRO (Note 12)		○	○	○	○	○	○	○	○	
	Protect mode		×	◎	◎	◎	◎	×	◎	×	
	Anti-virus protection		×	◎	◎	◎	◎	×	◎	×	
Safety	Power saving function		×	◎	◎	◎	◎	×	×	×	
	Infrared flame detector		●	●	●	●	●	●	×	×	
Display	Double automatic fire extinguisher specifications		●	●	●	●	●	●	×	×	
	Run timer		○	○	○	○	○	○	×	×	
	3-color warning light		○	○	○	○	○	○	×	×	
Instruction manual (paper edition)		◎	◎	◎	◎	◎	◎	◎	◎		
Paint color designation		×	●	●	●	●	●	●	×	×	

- (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 distance between table and electrode mounting surface.  
 (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 details on the EA40 ADVANCE and EA50 ATC.  
 (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 shielding connector, category 5 (100BASE-TX compliant), STP (four shielded twist pair). A switchable hub that can ground the shielded LAN cable should be used.  
 (Note 11) A high-accuracy built-in spindle and fine-hole guide (φ0.15 to 2.0mm) are required. Double automatic fire extinguisher specifications and infrared flame detector are added.  
 (Note 12) A personal computer is required for ESPERADVANCE PRO.

## Protect mode

Protecting data from thoughtless changes, forbidding data taken out



## Network Connection Specifications (DNC, FTP option)

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.

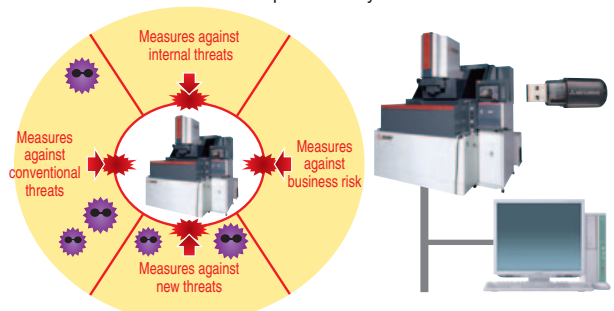
One IP address must be prepared for each EDM within the user's in-house network.

Required specifications	Image	Required option	Supplement
Operate on the EDM side, and receive data from personal computer		Standard for EA ADVANCE series	Use EDM's Explorer and receive data in the common HDD on the EDM side. After that, data I/O operations are required.
Operate on the EDM side, and send data directly to the EDM's NC		FTP (Note 14)	Data can be received only using data I/O operation.
Operate on the personal computer side, and send data to the EDM		Standard for EA ADVANCE series DNC S/W or FTP for MA/EA series	The personal computer's Explorer and the EDM's common HDD are used. After that, data I/O operations are required for the EDM.
Operate on the personal computer side, and send data directly to the EDM's NC		DNC S/W (Note 14)	Commercially available DNC software must be installed on the personal computer side. Refer to DNC specifications operation for details.

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

## Anti-virus protection

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





**High-accuracy built-in C-axis**  
(EA ADVANCE, MA/EA)



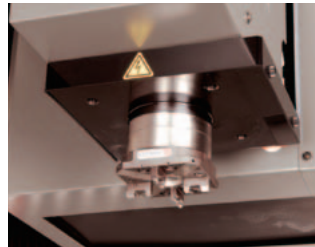
Highly accurate helical machining and index machining are possible  
Compatible with fluid emission from spindle center  
(photo shows 3R MACRO chuck specifications)

**High-accuracy built-in spindle**



Compatible with high-speed rotation (1 to 1500min<sup>-1</sup>) machining  
(photo shows 3R MACRO chuck specifications)

**Automatic clamp**



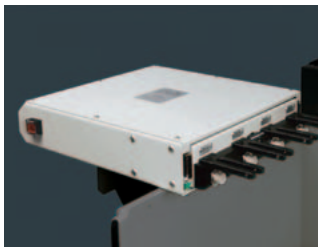
Clamp spindle side holder with air chuck  
(photo shows EROWA ITS50 chuck specifications)

**Removable holder**



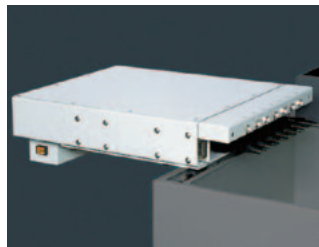
3R-16M-MACRO-R specifications

**Shuttle-4T (automatic tool changer)**



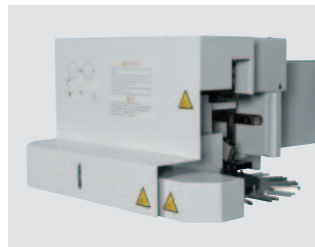
Change up to four electrodes  
Compatible with continuous machining using multiple electrodes

**Shuttle-7T (automatic tool changer)**



Change up to seven electrodes (only Combi specifications)  
Compatible with continuous machining using multiple electrodes

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



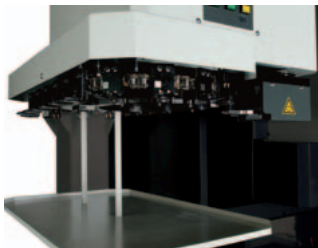
Change up to 10 electrodes  
Compatible with continuous machining using many electrodes

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



Change up to 20 electrodes  
Compatible with continuous machining using many electrodes

**MVH-20T (automatic tool changer)**



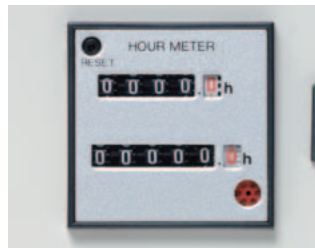
Change up to 20 electrodes  
Compatible with long-time continuous machining using multiple electrodes

**MVH-40T (automatic tool changer)**



Change up to 40 electrodes  
Compatible with long-time continuous machining using multiple electrodes

**Run timer**



Indicates accumulated machining time

**3-color warning light**



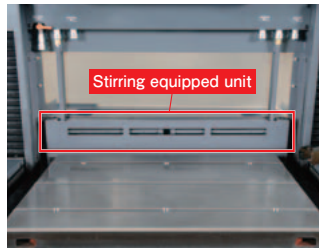
Indicates machine operation status

**Large electrode adapter**



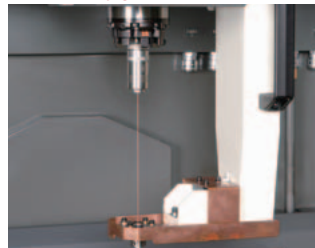
Prepare two T-slots and electrode mounting table installation screw  
(photo shows EA28V ADVANCE specifications)

**NS powder**



An uniform matte surface and polish-less glossy surface can be machined by adding NS powder to the dielectric fluid. Machining stability is improved with dispersing NS powder which stirs in both working tank and dielectric fluid reservoir

**Fine-hole jig specifications**



Removable, and compatible for  $\phi 0.15$  to 2.0mm fine-hole machining  
(photo shows EA12V ADVANCE specifications)

**Infrared flame detector**



Catches infrared rays from flames and stops power supply

# Power Supply / Control Specifications

Applicable model		MA2000M	EA8PVM ADVANCE	EA12VM ADVANCE		EA28VM ADVANCE	
Power supply unit	Power supply model	FP60MA	FP80V-A	FP80V-A	FP120V-A	FP80V-A	FP120V-A
	Maximum machining current peak [A]	80	80	80	120	80	120
	Standard machining circuits and functions	Transistor pulse circuit (TP circuit), Super-low-wear circuit (SC, α-SC circuit), Fine matte finish circuit (PS circuit), Glossy mirror finish circuit (GM2 circuit), Ultrafine matte finish circuit (NP2 circuit), Fuzzy adaptive control, SS jump, OrbitPro		Transistor pulse circuit (TP circuit), Super-low-wear circuit (SC, α-SC circuit), Fine matte finish circuit (PS circuit), Glossy mirror finish circuit (GM2 circuit), Fuzzy adaptive control, SS jump, OrbitPro			
	Power supply method	Resistor-less, low heat generating, compact, power regenerating energy-saving method					
Cooling method	Indirect cooling						
Control unit	Control unit	C30EA-2		C31EA-2			
	Input method	USB flash memory, RS232C		Keyboard, USB flash memory, Ethernet			
	Pointing device	Slide pad		Touch panel, mouse			
	Display	10.4-inch color LCD		15-inch color TFT-LCD touch screen			
	Display characters			Alphanumeric characters			
	Control system			CNC closed loop			
	Number of controlled axis			Maximum four axis			
	Setting (command) unit			XYZ ... 0.1μm, C (rotary axis) ... 0.0001°			
	Minimum drive unit			XYZ ... 0.1μm, C (rotary axis) ... 0.0001°			
	Maximum command value			±99999.9999mm/±9999.9999inch			
	Position command format			Incremental/Absolute value combination			
	Interpolation function			Linear, circular, spiral			
	Orbit mode			Fixed pattern and random path, 3D pattern			
	Orbit control system			4 types (free, semi-fixed, fixed, variable)			
	Scale magnification			0.000001 to 99.999999/0.001 to 99999.999			
	Graphics			X-Y/Y-Z/Z-X plane, solid, table scale, automatic machining path drawing, orbit block drawing			
	Automatic programming	E.S.P.E.R II		ESPERADVANCE			
	Program No. designation range			1 to 99999999			
	Sequence No. designation range			1 to 99999			
	Subprogram			Nesting levels: 30			
	Manual feed			High-speed, low-speed, inching (1μm/10μm), extension mode (high-speed/low-speed) Maximum feedrate XYZ: 2000 mm/min			
	Manual input positioning			Screen input			
	Graphic check	High-speed graphic drawing		3D display compatible, high-speed graphic drawing			
Screen basic menu	8 types		15 types (file, setup, machining support, monitor, maintenance, e-manual, know-how display, E-condition, NC program, variable, coordinate value, alarm troubleshooting, 3D viewer, calculator, USB removal)				
Network specifications	Standard (DNC, FTP, remote monitor)		Ethernet port (10/100BaseT (X) port RJ45 connector) 1 port (Note 1)				
RS232C interface	Code control (including DC1, DC3) / Line control method		-				
Maintenance functions			Consumption rate control (time display)				
Outline dimensions (W x D x H) [mm (in.)]	(Included in machine dimensions)		400 (15.7) x 900 (35.4) x 1763 (69.4)(FP80V) (Operation panel 500 (19.7) x 175 (6.9) x 346 (13.6))				
Weight [kg (lb.)]	260 (573)	260 (573)	260 (573)	300 (661)	260 (573)	300 (661)	

(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

NC functions	Corner chamfer command	Maintenance functions
Year, month, date display	Linear angle command	Maintenance check
Character string replace function	Backlash compensation	Alarm display
Teaching function	Pitch error compensation	(with troubleshooting guidance)
Machining start time designation function	Soft limit (inside/outside prohibit)	e-manual (electronic manual)
	Reference block	System update over web
Various timers	Automatic zero point return	Automatic positioning functions
Automatic return	Electrode multiple deviation compensation	Edge positioning
Start point return	(Electrode rotation compensation)	Hole center positioning
Axis rotation	Machining functions	Pole center positioning
Program support function	Fuzzy Pro Plus adaptive control	Electrical-discharge positioning
E.S.P.E.R ADVANCE	Machining results graph, machining results table	Width center positioning
E.S.P.E.R ADVANCE Navigator		Slot center positioning
Memory operation	Machining condition expert	3-point center positioning
Offset	Master Pack	2 to 4 face positioning
Coordinate value read	Orbit machining	Repeated positioning
Time read	Taper machining	Check functions
Workpiece coordinate system (106 coordinates)	Lateral machining	Graphics (machining shape drawing)
	Automatic coreless machining	Single block
Coordinate rotation	3D machining	Dry run
Figure rotation	Side servo machining	Block delete
Axis change	Offset machining	3D graphic check
Mirror image	Inclined machining	3D viewer (Parasolid data display)
Scales for XY-axis	Contour machining (spindle required)	EPX format data read
Function computations	C-axis machining (C-axis required)	
Corner R command		

### C30 control unit functions

NC functions	Corner chamfer command	Maintenance functions
Year, month, date display	Linear angle command	Maintenance check
Character string replace function	Backlash compensation	Alarm display
Teaching function	Pitch error compensation	Automatic positioning functions
Machining start-time designation function	Soft limit (inside/outside prohibit)	Edge positioning
	Reference block	Hole center positioning
Various timers	Automatic zero point return	Pole center positioning
Automatic return	Electrode multiple deviation compensation	Electrical-discharge positioning
Start point return	(Electrode rotation compensation)	Width center positioning
Axis rotation	Machining functions	Slot center positioning
Program support function	Fuzzy Pro Plus adaptive control	3-point center positioning
New machining programming (E.S.P.E.R II)	Machining results graph, machining results table	2 to 4 face positioning
Program support (E.S.P.E.R Navigator)		Repeated positioning
Memory operation	Machining condition expert	Check functions
Offset	Master Pack	Graphics (machining shape drawing)
Coordinate value read	Orbit machining	Single block
Time read	Taper machining	Dry run
Workpiece coordinate system (106 coordinates)	Lateral machining	Block delete
	Automatic coreless machining	
Coordinate rotation	3D machining	
Figure rotation	Side servo machining	
Axis change	Offset machining	
Mirror image	Inclined machining	
Scales for XY-axis	Contour machining (spindle required)	
Function computations	C-axis machining (C-axis required)	
Corner R command		

Applicable model		EA40M ADVANCE		EA50M	EA8SM		EA12DM		
Power supply unit	Power supply model	FP80V-A	FP120V-A	FP100EA	FP80S	FP120S	FP60EA	FP100EA	
	Maximum machining current peak [A]	80	120	120	80	120	80	120	
	Standard machining circuits and functions	Transistor pulse circuit (TP circuit), Super-low-wear circuit (SC, α-SC circuit), Fine matte finish circuit (PS circuit), Glossy mirror finish circuit (GM2 circuit), Fuzzy adaptive control, SS jump, OrbitPro			Transistor pulse circuit (TP circuit), Super-low-wear circuit (SC, α-SC circuit), Fine matte finish circuit (PS circuit), Glossy mirror finish circuit (GM2 circuit), Fuzzy control, SS jump 5		Transistor pulse circuit (TP circuit), Super-low-wear circuit (SC, α-SC circuit), Fine matte finish circuit (PS circuit), Glossy mirror finish circuit (GM2 circuit), Fuzzy adaptive control, SS jump, OrbitPro		
	Power supply method	Resistor-less, low heat generating, compact power supply					Resistor-less, low heat generating, compact power supply		
Cooling method	Indirect cooling								
Control unit	Control unit	C31EA-2		C30EA-2	C31EA-2		C30EA-2		
	Input method	Keyboard, USB flash memory, Ethernet		USB flash memory, RS232C	Keyboard, USB flash memory, network		USB flash memory, RS232C		
	Pointing device	Touch panel, mouse		Slide pad	Touch panel, mouse		Slide pad		
	Display	15-inch color TFT-LCD touch screen		10.4-inch color LCD	15-inch color TFT-LCD touch screen		10.4-inch color LCD		
	Display characters	Alphanumeric characters							
	Control system	CNC closed loop (Z-axis scale feedback specifications standard for EA12DM)							
	Number of controlled axis	Maximum four axis							
	Setting (command) unit	XYZ ... 0.1μm, C (rotary axis) ... 0.0001°							
	Minimum drive unit	XYZ ... 0.1μm, C (rotary axis) ... 0.0001°							
	Maximum command value	±99999.9999mm/±9999.9999 inch							
	Position command format	Incremental/Absolute value combination							
	Interpolation function	Linear, circular, spira							
	Orbit mode	Fixed pattern and random path, 3D pattern							
	Orbit control system	4 types (free, semi-fixed, fixed, variable)							
	Scale magnification	0.00001 to 99.999999/0.001 to 99999.999							
	Graphics	X-Y/Y-Z/Z-X plane, solid, table scale, automatic machining path drawing, orbit block drawing							
	Automatic programming	ESPERADVANCE		E.S.P.E.R II	ESPERADVANCE		E.S.P.E.R II		
	Program No. designation range	1 to 99999999							
	Sequence No. designation range	1 to 99999							
	Subprogram	Nesting levels: 30							
	Manual feed	High-speed, low-speed, inching (1μm/10μm), extension mode (high-speed/low-speed) Maximum feedrate XYZ: 2000 mm/min							
	Manual input positioning	Screen input							
	Graphic check	3D display compatible, high-speed graphic drawing			High-speed graphic drawing				
Screen basic menu	15 types (file, setup, machining support, monitor, maintenance, e-manual, know-how display, E-condition, NC program, variable, coordinate value, alarm troubleshooting, 3D viewer, calculator, USB removal)			8 types	14 types (file, setup, machining support, monitor, maintenance, e-manual, know-how display, E-condition, NC program, variable, coordinate value, alarm troubleshooting, calculator, USB removal)			8 types	
Network specifications	Ethernet port (10/100BaseT (X) port RJ45 connector) 1 port (Note 1)			—		Ethernet port (10/100BaseT (X) port RJ45 connector) 1 port (Note 1)		—	
RS232C interface	—			Code control (including DC1, DC3) / Line control method		—		Code control (including DC1, DC3) / Line control method	
Maintenance functions	Consumption rate control (time display)								
Outline dimensions (W x D x H) [mm (in)]	500 (19.7) x 840 (33.1) x 1610 (63.4)		500 (19.7) x 840 (33.1) x 1610 (63.4) (Operation panel 546 (21.5) x 170 (6.7) x 346 (13.6))	400 (15.7) x 900 (35.4) x 1763 (69.4) (FP80S) (Operation panel 500 (19.7) x 175 (6.9) x 346 (13.6))		500 (19.7) x 550 (21.7) x 1610 (63.4)		500 (19.7) x 840 (33.1) x 1610 (63.4) (Operation panel 546 (21.5) x 170 (6.7) x 346 (13.6))	
Weight [kg (lb.)]	300 (661)		300 (661)	260 (573)	300 (661)	180 (397)	300 (661)		

(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.

## Machine, power supply and dielectric fluid chiller unit

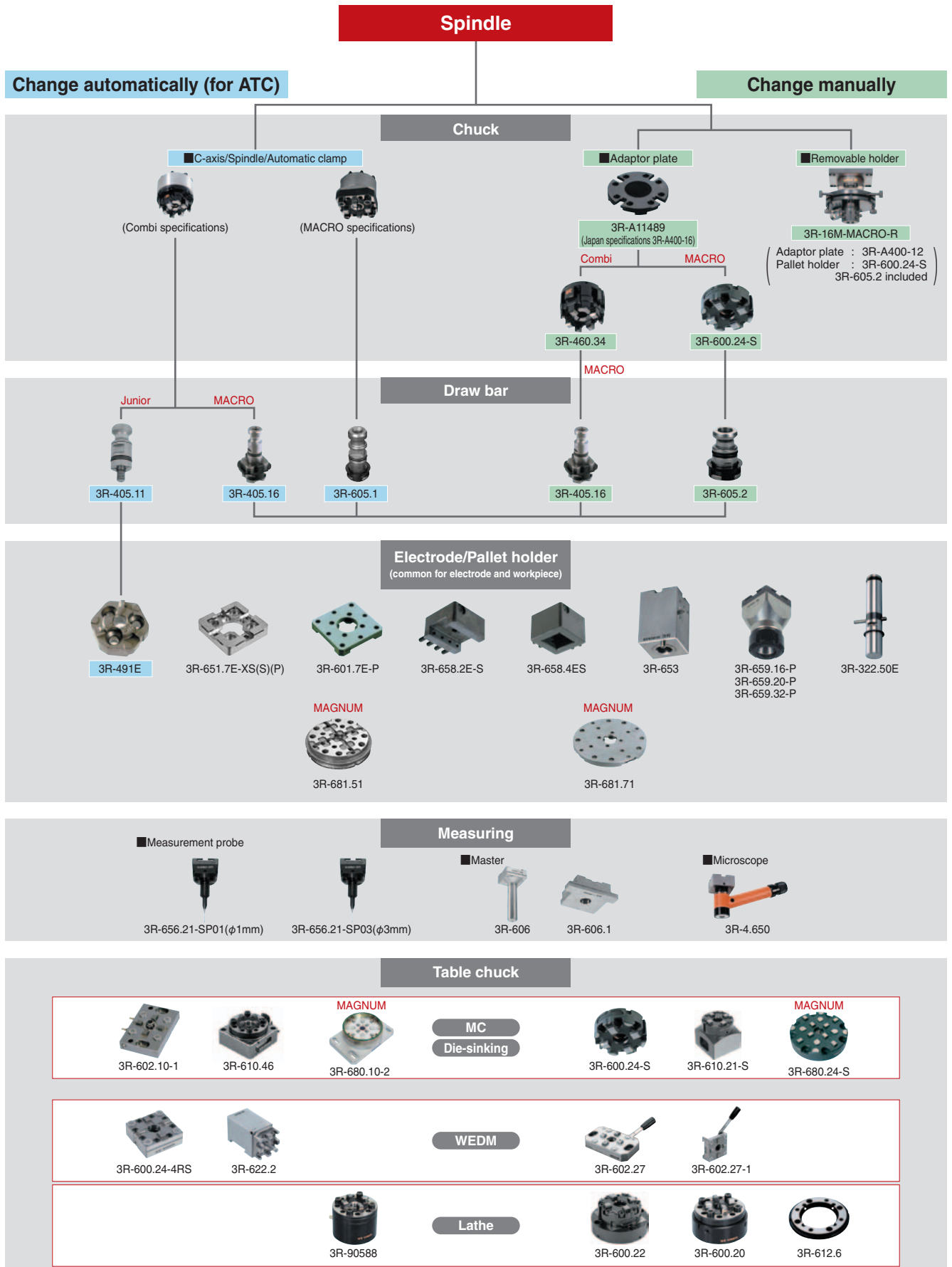
		Power supply				Total input capacity [kVA]	Machine's generated heating value [kW] (Note 3)
		FP80V-A	FP120V-A	FP60EA/MA	SP		
Machine (Note 2)	MA2000M	—	—	○	—	15.0	9.0
	EA8PVM ADVANCE	○	—	—	○	20.0	12.0
	EA12VM ADVANCE	○	—	—	—	6.5	3.9
		—	○	—	—	7.0	4.2
	EA28VM ADVANCE	○	—	—	—	10.0	6.0
	EA28VM ADVANCE Special working tank	—	○	—	—	9.0	5.4
		○	—	—	—	13.0	7.8
	EA40M ADVANCE	—	○	—	—	10.0	6.0
		○	—	—	—	14.0	8.4
	EA12DM	—	—	—	—	15.5	9.3
—		—	○	—	19.0	11.4	
—		—	—	○	8.2	4.9	
Maximum machining current average [A]	60	100	60	SP: power supply for tungsten carbide machining	13.2	7.9	
Maximum machining current peak [A]	80	120	80		15.6	9.4	

(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.

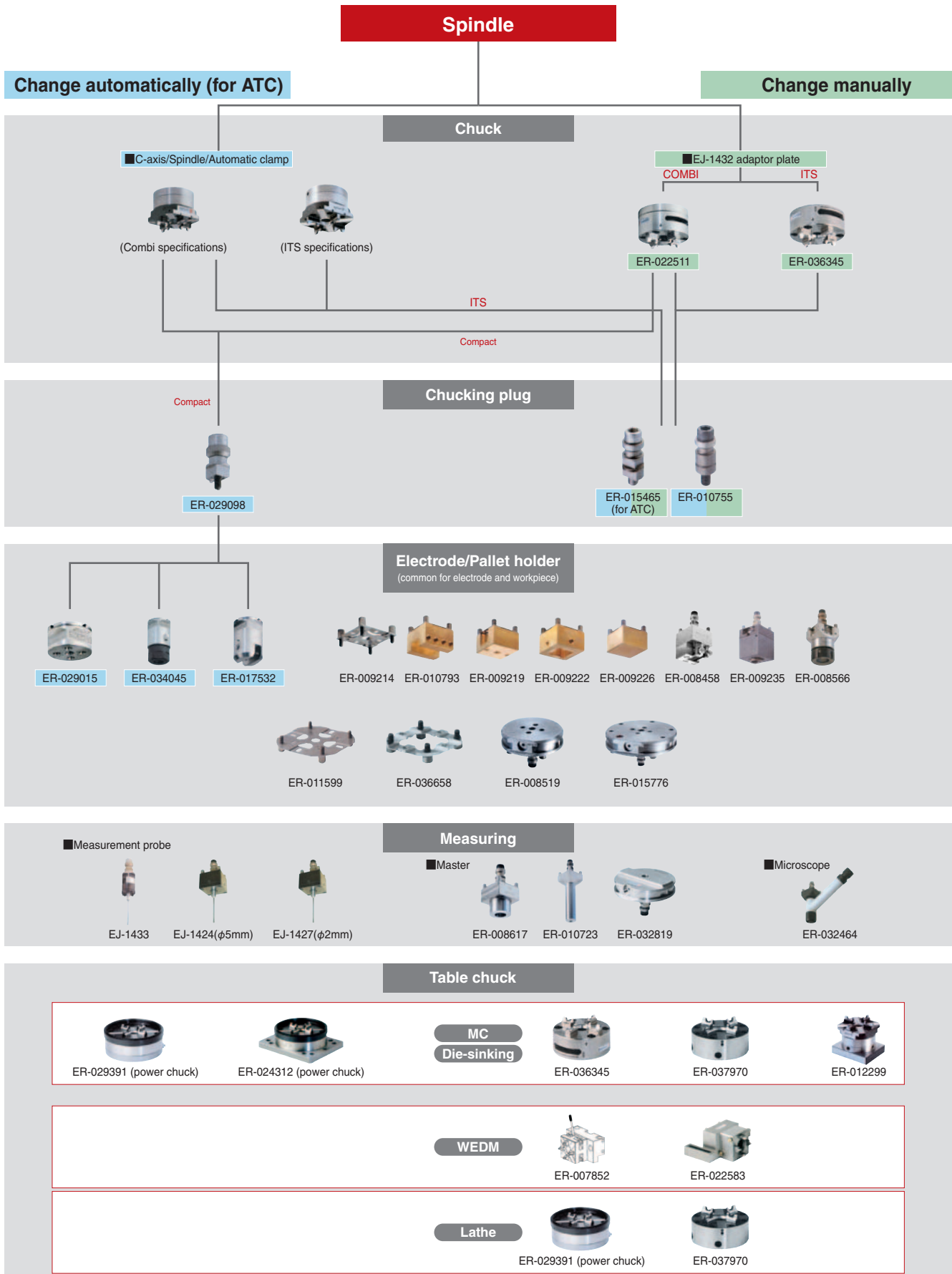


# System 3R System Chart



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

# EROWA System Chart



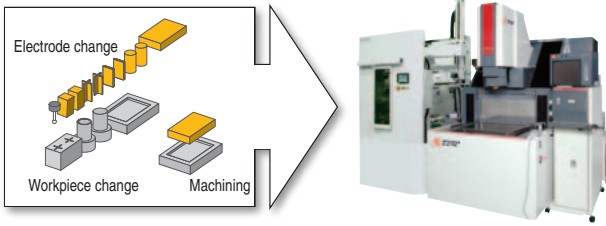
\* Please contact EROWA Japan Co., Ltd. for detailed tooling specifications.

# 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

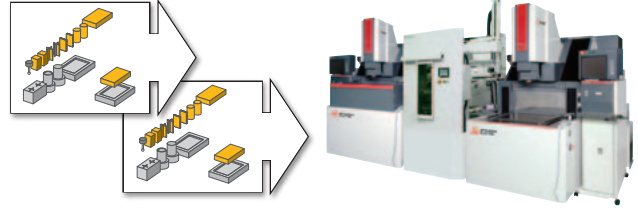


#### Basic configuration options

- High-accuracy built-in C-axis or high-accuracy built-in spindle
- Robot <sup>(Note 2)</sup>
- External signal output (M code)
- Work chuck
- ESPERADVANCE PRO <sup>(Note 1)</sup>

### 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



(Note 1) A personal computer is required for installation.  
 (Note 2) Please contact a Mitsubishi Electric representative regarding available carrier device robots.  
 (Note 3) Please contact a Mitsubishi Electric representative for more information regarding system configurations.

#### Basic configuration options

- High-accuracy built-in C-axis or high-accuracy built-in spindle
- Robot <sup>(Note 2)</sup>
- External signal output (M code with answer)
- Work chuck
- ESPERADVANCE PRO <sup>(Note 1)</sup>
- E.S.P.E.R SCHEDULE <sup>(Note 1)</sup>
- DNC S/W, FTP

## Pallet tooling

- 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

		System 3R				EROWA				
		Magnum series		Dynafix series		Power chuck P		EROWA UPC		
		Pallet ø156 3Rrefix 3R-681.51	MACRO Magnum chuck 3R-680.10-2	Pallet 280x280 made of aluminun 3R-772.1	Dynafix chuck 3R-770-1	Pallet ø148 GR25 ER-015899	Power chuck P 158x198 ER-024312	UPC Pallet made of aluminun R50 ER-018570	UPC chuck ER-016841	
Figure										
Specifications	W	[mm]	245	280	340	ø148	158	320	320	
	D	[mm]	160	280	277		198	300	300	
	H	[mm]	35	78.28	44		51	40	64.5	
	Weight	[kg]	5	5	6		24.5	3.3	9.3	13.5
EA8PV ADVANCE standard	Max. workpiece height	[mm]	30.0		35.0		39.0		25.5	
	Distance between pallet and electrode mounting surface	[mm]	58.0 to 308.0		63.0 to 313.0		84.5 to 334.5		71.0 to 321.0	
EA8PV ADVANCE Automatic elevation tank	Max. workpiece height	[mm]	60.0		65.0		69.0		55.5	
	Distance between pallet and electrode mounting surface	[mm]	58.0 to 308.0		123.0 to 373.0		136.5 to 386.5		150.0 to 400.0	
EA12V ADVANCE	Max. workpiece height	[mm]	150.0		155.0		159.0		145.5	
	Distance between pallet and electrode mounting surface	[mm]	35.0 to 335.0		40.0 to 340.0		61.5 to 361.5		48.0 to 348.0	
EA28V ADVANCE	Max. workpiece height	[mm]	250.0		255.0		259.0		245.5	
	Distance between pallet and electrode mounting surface	[mm]	200.0 to 550.0		205.0 to 555.0		226.5 to 576.5		213.0 to 563.0	
MA2000	Max. workpiece height	[mm]	150.0		155.0		159.0		145.5	
	Distance between pallet and electrode mounting surface	[mm]	53.0 to 353.0		58.0 to 358.0		79.0 to 379.0		65.5 to 365.5	
Chuck accuracy alignment tool			Master pallet 3R-686.1-HD		Master pallet 3R-776.1		ø115 alignment pallet		UPS alignment pallet	

\* 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

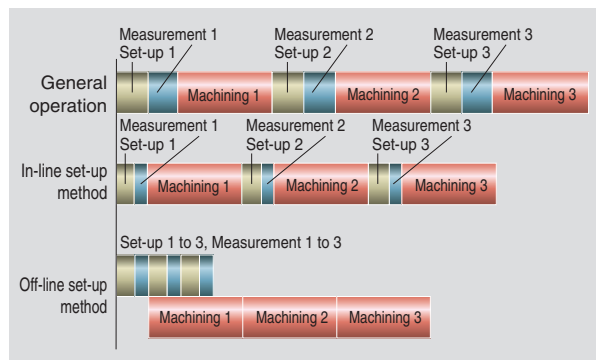
### In-line set-up method

- Set-up method for continuous operation which measures core alignment of electrode and workpiece using measuring program and compensation function
- An effective system for cases requiring high-accuracy core alignment and measurement before machining
- The measuring accuracy is improved when using a touch probe is used as a reference position

### Off-line set-up method

- Set-up method for continuous operation which measures core alignment of electrode and workpiece using presetter and coordinate measuring machine <sup>(Note 4)</sup>
- Is effective for cases that include many machines, electrodes, and work pieces
- ID system provides easy management of electrodes and work pieces

(Note 4) Please contact a Mitsubishi Electric representative for details on which presetters or coordinate measuring machines can be used.

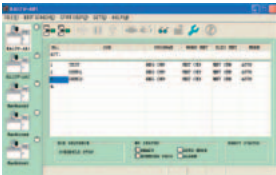




## Peripheral equipment/System extension options

### Scheduling system

#### E.S.P.E.R SCHEDULE



- Execute continuous schedule operation of EDMs with job management<sup>(\*)</sup> (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
- (\*) A personal computer is required for installing applications

### Machine remote monitor

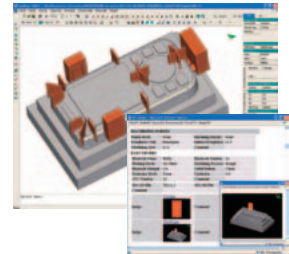
#### RemoteMagic II



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

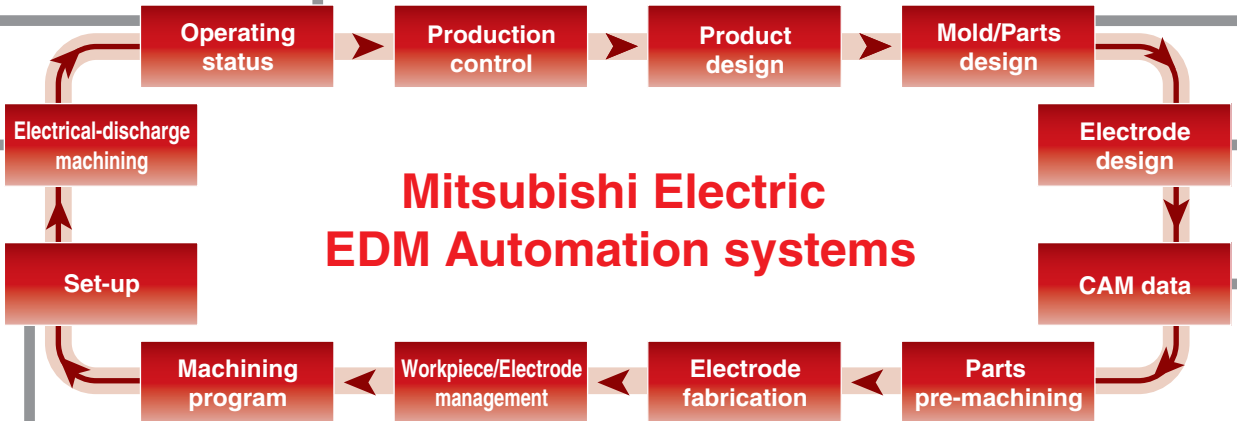
### 3D CAD/CAM system

#### AD

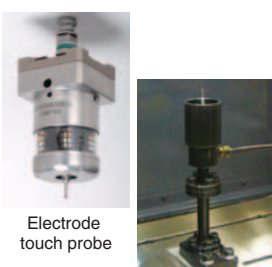


- 3D electrode model can be created easily, and electrode design CAD system handling orbit deformation
- Die-sinking electrical-discharge CAM system, which calculates machining positions automatically and eliminates value input mistake
- Operations can be sequenced to wire, milling and hole machining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

## Mitsubishi Electric EDM Automation systems



### Touch probe



- Support in-line setup
- Reduces core alignment measurement and measuring time of workpiece position
- Speeds up machine operation by use of installed measuring programs

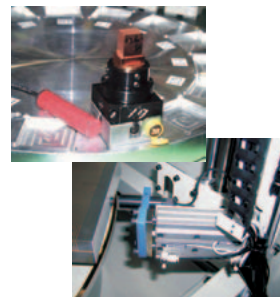
### Offline automatic programming system

#### ESPERADVANCE PRO



- Offline programming and program management is possible<sup>(\*)</sup>
  - 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
- (\*) A personal computer is required for installing applications.

### 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
- Electrode 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 presetters and coordinate measuring machines.

(Note 2) Please contact a Mitsubishi Electric representative for more information regarding the ID tag systems.

(Note 3) Please contact a Mitsubishi Electric representative for more information regarding the touch probes.

## Preparation for Machine Installation

### Machine installation checklist

#### Determining the machining details

Check each item, and make sure that no item or order is overlooked.

1) Determine the workpiece	
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 fixtures	
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

If there is any possibility of radio disturbance, investigate it prior to starting work.

1) Confirmation of floor area	
2) Confirmation of environment (constant-temperature dust-proof room, measure for radio disturbance, prevention of external noise)	
3) Confirmation of foundation floor	
4) Foundation work	
5) Primary wiring for power lead-in	
6) Grounding work	
7) Air piping work	

#### Confirmation of delivery path

Check the path inside and outside the factory to avoid any trouble during delivery.

1) Traffic restrictions to factory	
Road width	
Entry road	
2) Factory entrance and width of gate in factory (m)	
Factory building entrance dimensions (height x width) (m)	
3) Constant-temperature dust-proof room entrance dimensions (height x width) (m)	

#### Cautions

The standard delivery entrance dimensions for standard shipment delivery are given on the product line-up page. If the entrance is smaller than the standard delivery entrance, a machine with different dimensions can be shipped. \* Please contact a Mitsubishi Electric representative for details (a separate estimate will be issued). Note that delivery may not be possible in some cases depending on the dimensions.

#### 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.

#### Oil for EDMs

Always use dielectric fluid which has a flash point of 70°C or more. Prepare the following dielectric fluid when operating the EDMs.

#### ■Dielectric fluid example <JX Nippon Oil & Energy Metal Work EDF-K2>

Table of dielectric fluid properties

Item	Product brand	Metal Work EDF-K2
Density g/cm <sup>3</sup> (@ 15°C)		0.770
Flash point °C (PM)		93
Kinematic viscosity mm <sup>2</sup> /s (@ 40°C)		2.2
Appearance		Clear and colorless

\*Please contact the manufacturer for the Material Safety Data Sheet (SDS/MSDS).

#### ■Dielectric fluid example (Showa Shell Sekiyu Shell Paraol 250)

Table of dielectric fluid properties

Item	Product brand	Shell Paraol 250
Density g/cm <sup>3</sup> (@ 15°C)		0.797
Flash point °C (PM)		92
Kinematic viscosity mm <sup>2</sup> /s (@ 40°C)		2.42
Appearance		Clear and colorless

\*Please contact the manufacturer for the Material Safety Data Sheet (SDS/MSDS).

### Installation conditions

#### 1. Installation site

- Constant-temperature dust-proof room
  - Recommended room temperature 20±1°C (68°F±2)
  - Usable temperature range 5 to 35°C (41°F to 95°F)
  - Temperature fluctuation will directly affect machine 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 gases, 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 Within 30 to 75%RH (with no dew condensation).
  - Temperature range during transportation and storage
    - 25 to 55°C (-13°F to 131°F) (when power is not connected).
- Tolerable vibration of floor
  - EA12V/EA28V/EA40 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 20Hz frequency.
  - MA2000, EA8PV 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 20Hz frequency.
  - \* 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 fine 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 EA12VM ADVANCE + FP80V, 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 machining : 3-phase 200/220VAC±10% 60Hz, 3-phase 200VAC±10% 50Hz
  - High-accuracy machining : 3-phase 200/220VAC±4% 60Hz, 3-phase 200VAC±4% 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 20msec.
  - A single-phase AC night power source for the automatic fire extinguisher : 100VAC±10%(50/60Hz)
- Power capacity
  - Facility capacity [kVA] = Total power input (Machine input + power supply input + dielectric fluid chiller unit input) [kVA]
  - Refer to page 26 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, calculate 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
~12	NF50-CV (50A)	NV50-CV (50A)
12~22	NF100-CV (100A)	NV100-CV (100A)
22~33	NF225-CV (150A)	NV225-CV (150A)

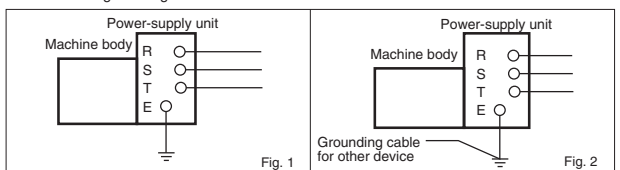
The breakers in the table allow for the rush current of the transformer in the power supply panel.

- Selecting the power input cable size
  - The following table is 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 [mm <sup>2</sup> ]	Total facility capacity [kVA]	Cable size [mm <sup>2</sup> ]
~9	5.5	15~21	22.0
9~12	8.0	21~28	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 gases, 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 14mm<sup>2</sup> grounding wire.



## 5. Primary air equipment

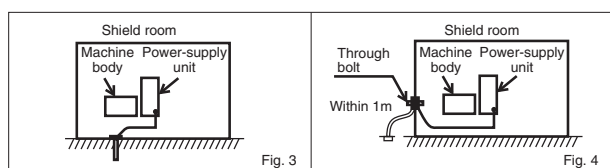
The standard EA12V/EA28V ADVANCE specifications do not require an air source, but an air supply must be prepared when using the optional high-accuracy built-in C-axis etc.

- Hose diameter : 1/4 hose (hose sleeve outer diameter:  $\phi 9.0$  (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 : 75  $\ell$  /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.



## 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 10 $\Omega$  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

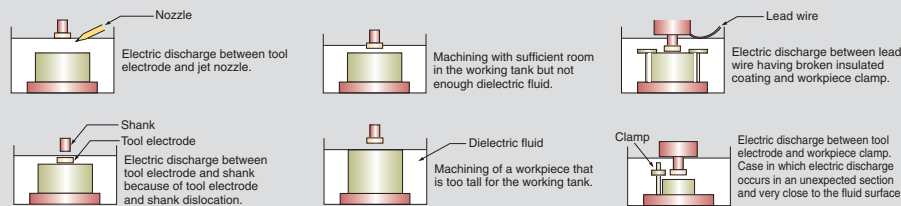
Use the following lubricant for sliding surface As of March 2014

Manufacturer	Product name
Exxon Mobil	Mobil DTE26

## Cautions

### Preventing fires and accidents with EDMs

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



- Ensure that the upper part of the workpiece is submerged by 50mm (1.97in) or more (FP60EA, FP60MA, FP80V) or 100mm (3.94in) or more (FP100EA, FP120V) from the surface of the dielectric fluid
- Never conduct spray machining as there is a risk of fire
- Do not use equipment that produces heat or sparks such as heating systems, welding machines, or grinding machinery near the EDM
- Always keep the area clean and tidy, and do not store flammable materials near the EDM
- Install an extra fire extinguisher in addition to the automatic fire extinguisher enclosed with the EDM
- Ensure that the area is sufficiently ventilated
- Monitoring automatic operation : For safety purposes, make sure an operator is always present during operation, even if various safety devices are equipped, so that appropriate actions can be taken

## Safety measures

A dielectric fluid temperature detector, fluid level detector, abnormal machining detector and automatic fire extinguisher, standard equipment, and a flame-resistant 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 2,000  $\ell$ , 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.



### Dielectric fluid temperature and fluid level detector

Machining is automatically stopped when the dielectric fluid temperature reaches approx. 60°C, or when the fluid level drops during machining.

### Type test approved proof

It has passed the type test of electrical-discharge machine of Hazardous Materials Safety Techniques Association.

Subject machine:EA8M  
EA8PVM ADVANCE  
EA12VM ADVANCE  
EA28VM ADVANCE

NS powder, special machine type and special working tank specifications are excluded.



## 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.

- ③ When a failure occurs caused by a natural disaster such as lighting, earthquake or storms and flooding.
- ④ When the use of non-recommended consumables or aftermarket parts are used such as filters or flushing nozzles.

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.



## 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 iQ 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], number of I/O device points [X/Y]	256 points to 4096 points/8192 points
Basic instruction processing speed (LD 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, simple 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, MELSECNET/H, SSCNET III (/H), 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 III/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, SSM (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 (M720VW/M720VS have 12 axes)
Maximum number of part systems	Machining center system: 2 systems Lathe system: 4 systems
Least command increment	1nm (M720VW/M720VS 0.1μm)
Least control increment	1nm
Maximum program capacity	2,000kB (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 lathe)	Milling interpolation, 2-system simultaneous thread cutting, inter-system control axis synchronization, control axis superimposition, combination control, etc.

## Laser Processing Machine | CO<sub>2</sub> 2-Dimensional Laser Processing Machine eX-Series

A global standard CO<sub>2</sub> 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%\*<sup>1</sup> during standby.
- \*<sup>1</sup>: Compared to the previous LV-Series with Mitsubishi's designated benchmark shape.



### Product specifications

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

## 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 unparalleled 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

Model name	ML605GTW4(-H)-5350U / ML605GTW4 (-P)-5350U / ML706GTW4-5350U
Processing workpiece dimensions (mm)	620×560 / 815×662
XY table maximum feedrate (m/min)	50
Laser type	CO <sub>2</sub> laser
Oscillator power (W)	360W
Oscillator set pulse frequency	10 to 10000Hz

## 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

Degrees of freedom	Vertical:6    Horizontal:4
Installation	Vertical:Floor-mount, ceiling mount, wall mount (Range of motion for J1 is limited) Horizontal:Floor-mount
Maximum load capacity	Vertical:2-20kg    Horizontal:3-20kg
Maximum reach radius	Vertical:504-1503mm    Horizontal:350-1,000mm

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



## MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN  
 NAGOYA WORKS: 1-14, YADA-MINAMI, 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN

\* Not all models are supported for all countries and regions.

\* Machine specifications differ according to the country and region, so please check with your dealer.

\* Processing data provided in this brochure is for reference only.