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FACTORY AUTOMATION

MITSUBISH ELECTRIC **NC EDM Systems EA Series** Medium&Large



Global Player Contents

GLOBAL IMPACT OF MITSUBISHI ELECTRIC







Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

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

Mitsubishi Electric is involved in many areas including the following

Energy and Electric Systems

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

Electronic Devices

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

Home Appliance

Dependable consumer products like air conditioners and home entertainment systems.

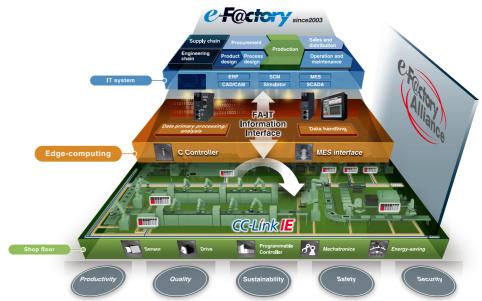
Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

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



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

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EA Series

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

History



Medium & Large size machine

Standard model pursuing multi-function and productivity



EA Series Medium & Large

NC-EDM Systems

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

Ultrahigh-accuracy machine

MA2000

Flagship model integrating advanced technologies



High-accuracy machine

EA-PS Series

High-grade model compatible for various use



High-performance machine

EA-V ADVANCE Series

High-class model pursuing accuracy and productivity





Productivity machine

EA-S Series

Supports various machining need in pursuit of higher productivity





Large-size high-performance machine

EA ADVANCE Series

Standard model pursuing high performance and high productivity





Medium-size high-performance machine

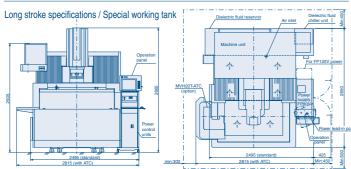
EA28V ADVANCE **EA28V** ADVANCE Long stroke specifications





Photo: EA28V ADVANCE Long stroke specifications

Standard working tank



[mm] 2195×2512×2615

650×450×350

425 to 775(Note 1

200

tomatic elevation ta

1100×810×450

100 to 400

850×600

2495×2850×2865 5950 1000×470×450

575 to 1025

200

Automatic elevation tank

1400×900×550

150 to 500

1100×750

1350×850×450 900

2000

Table (upper surface) dimension drawing

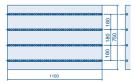


Table (upper surface) dimension drawing



Electrode mounting table dimension drav

* The 3R/ EROWA electrode holde is used when the built-in C-axis/

Standard functions

•Z-axis linear scale

Option •High-accuracy built-in C-axis

 High-accuracy built-in spindle
 Automatic clamp •MVH-20T ATC/MVH-40T ATC NS powder specifications

XY-axis linear scale

Z-axis stroke 450 specifications Emission/suction automatic changeov 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

•Ultrafine matte finish circuit (NP2 circuit) •FP-V power supply extension unit

Standard delivery entrance

	Width [mm]	Height [mm]
Standard specifications	2063	2660
LS-10T ATC specifications	2250	2660
LS-20T ATC specifications	2475	2660
MVH-20T ATC specifications	2297	2660
MVH-40T ATC specifications (Note 2)	2168	2660

(Note 2) 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.

C-axis/ATC (option)

				31	R	ERG	AWC
				MACRO	Combi	ITS	COMBI
C-axi	ia	Max. electrode weight	50 ^(Note 3) [kg]				
C-axi	is .	Speed	1 to 30 [min-1]	1 $^{\circ}$		0	
	0-:	Max. electrode weight	10 ^(Note 3) [kg]				
	Spindle	Speed	1 to 1500 [min-1]	1 0	0		
	LS-10T(Note 10)	Max. electrode dimensions	54×54×200 [mm]				
	LS-101(1000 10)	Max. electrode weight	5kg/electrode(Note 4) Magazine total: 20kg		0	0	-
	LS-20T ^(Note 10)	Max. electrode dimensions	54×54×200 [mm]		0		
		Max. electrode weight	10kg/electrode(Note 4) Magazine total: 40kg	$1 ^{\circ}$			
ATC	MVH20T	Max. electrode dimensions	70×70×200 [mm] ^(Note 5)		0	0	
		Max. electrode weight	10kg/electrode(Note 5) Magazine total: 80kg(Note 6)				(Note 9)
	MANULAGE	Max. electrode dimensions	70×70×200 [mm] ^(Note 8)				(Note 0)
	MVH40T	Max. electrode weight	10kg/electrode(Note 6) Magazine total: 80kg(Note 7)]		U	(Note 9)

Standard machine specifications

Distance between table and

Dimensions (W x D)

and top of table

Max. workpiece weight T-slot Capacity (initial dielectric Dielectric fluid supply amount)

Max. electrode weight [kg

Machine Dimensions (W x D x H)

Method

(W x D x H) Fluid level adjustment range

 $(X \times Y \times Z)$

Distance between table and electrode mounting surface

Dielectric fluid chiller unit [mm] Unit cooler Unit cooler

		3R MACRO	EROWA	3R Combi		
		3H WACHO	ITS50	MACRO	Jr	
C-axis	[mm]	300 to 650	317.5 to 667.5	300 to 650	310 to 660	
Spindle	[mm]	279 to 629	296.5 to 646.5	279 to 629	289 to 639	
Automatic clamp	[mm]	300 to 650	317.5 to 667.5	300 to 650	310 to 660	

(Note 5) Please contact a Mitsubishi Electric representative if the electrode exceeds the specified dime (Note 6) For MACRO of 3R Combi, the weight is 5kg/electrode, is 2.5kg/electrode with MACRO Jr, and Compact of EROWA COMBI, the weight is 2.5kg/electrode.

(Note 7) For MACRO and MACRO Jr of 3R Combi, the magazine total is 40kg.

(Note 8) 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 9) ATC can be used with EROWA ITS50, but not with EROWA Compact (manual only).

(Note 10) LS-10T/LS-20T ATC can not be mounted for the long stroke specifications.

Large-size high-performance machine

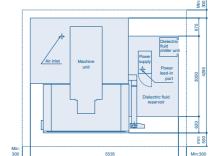
EA40 ADVANCE specifications **EA50** ADVANCE specifications





EA40 ADVANCE specifications EA50 ADVANCE specifications





 High-accuracy built-in C-axis
 Automatic tool changer (Note 1)z 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)

specifications (EA40 ADVANCE)

epresentative for details on the EA40/50 ADVANCE specifications ATC.

Standard machine specifications

EA40 ADVANCE

			EA40M ADVANCE specifications	EA50M ADVANCE specifications
Machine	Dimensions (W×D×H)	[mm]	3050×3633×3140	4280x4295x4100
unit	Total system weight	[kg]	12000	20000
Machine	(X×Y×Z)	[mm]	1000×600×450	1500x600x600
travels	Extra travel for workpiece loading	[mm]	None	X-axis left 600
0 . "	Distance between table and electrode mounting surface	[mm]	450 to 900	500 to 1100
Spindle	Max. electrode weight	[kg]	300(500) (Note 2)	500
	Method		Automatic vertical front door	Automatic vertical front door
Working tank	Inner dimensions (W×D×H)	[mm]	2000×1200×700(XK210A)	2500x1600x850(XK270)
laiik	Fluid level adjustment range (from top of table)	[mm]	310 to 650	400 to 800
	Dimensions (W×D)	[mm]	1400×950	2000 x 1350
	Max. workpiece dimensions (W×D×H)	[mm]	1900×1100×600	2400x1500x750
Table	Distance between floor and top of table	[mm]	860	1300
	Max. workpiece weight	[kg]	5000	10000
	T-slot		Five slots at 14-200mm pitch	Seven slots at 14-200mm pitch
B: 1	Capacity (initial dielectric fluid supply amount)	[1]	2650	5200
Dielectric flui	Filtering method		Two paper filter	Four paper filter
reservoir	Dielectric fluid chiller unit		Unit cooler	Unit cooler
	Thermal displacement compensation function		Standard	Standard
Standard	Operation panel		-	Pendant with turning arm
functions	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 specifications (Note 3) Ensure that the floor is thick enough to install a large-size machine

Special working tank (option)

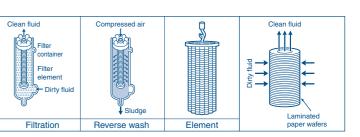
	Model	Working tank	Inner dimensions [mm]	Max. workpiece dimensions [mm]	Table electrode mounting surface distance [mm]	Fluid level adjustment range [mm]	Required column up [mm]	Door method	Dielectric fluid reservoir capacity	Remarks
		XK212A	2000×1200×800	1900×1100×700	550 to 1000	360 to 750	100	Automatic vertical front door	3400 ℓ	
	EA40M ADVANCE	XK240A	2300×1600×700	2200×1500×600	450 to 900	310 to 650	-	Automatic vertical front door	3400 ℓ	Dummy workpiece 400L
		XK261A	2500×1200×800	2400×1100×700	550 to 1000	360 to 750	100	Automatic vertical front door	3400 ℓ	Dummy workpiece 400L
	EA50M ADVANCE	XK291A	2800×1600×1100	2700×1500×1000	700 to 1300	500 to 1050	200	Automatic vertical front door	6300 ℓ	Dummy workpiece 400L

Automatic filter system

- •Long-life laminated paper wafers with outstanding filtering performance are used
- •Reverse washing eliminates filter replacement
- (Option for EA40/50 ADVANCE specifications)

Automatic filter

Туре	Capacity	Remarks
TF50	4000 ℓ	EA40 ADVANCE specifications(XK212A)
TF63	6300 ℓ	EA50 ADVANCE specifications(XK270)

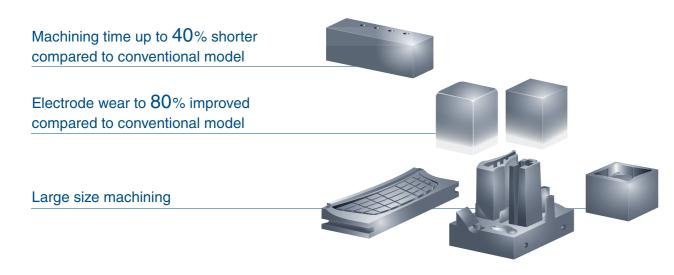


Functions and Features

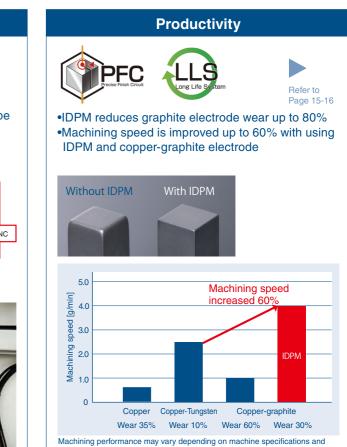
Integration of advanced machining technologies and ADVANCE control equipment Supports various types of EDM machining



Realizes high-speed and low electrode wear machining

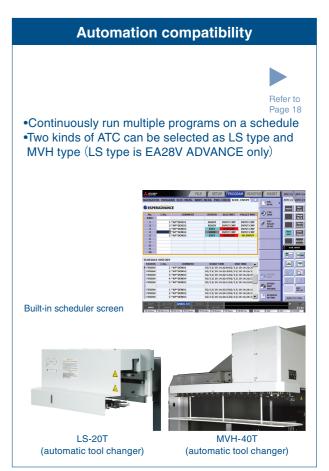


•Thermal displacement compensation system to be reduced thermal displacement caused by temperature changes •Highly rigid and accurate built-in C-axis, which increased permission moment of inertial Pole positioning test in an ambient temperature changes of ±3°C Temperature changes With thermal displacement compensation function Time→



electrode materials

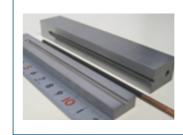




Machining Samples







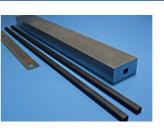
Deep Machining

Model	EA28V ADVANCE
Electrode	copper(ϕ 3.0mm)
workpiece	Steel(NAK80)
Surface roughness	Rz8.0µm/Ra1.2µm
Depth	110mm

•Machining speed 20 to 30% improvement with deep machining of L / D> 30 (With FF mode) (L : depth, D : Electrode diameter)

•SS jump 5 realizes high speed jump in Z axis machining

•Suppression of load and heat influence by optimization of speed and acceleration control



Graphite Deep Machining

Model	EA28V ADVANCE long stroke specifications
Electrode	Graphite(TTK-5)
workpiece	Steel(SKD11)
Surface roughness	Rz15µm/Ra2.0µm
Depth	300mm

- •Maximum workpiece height up to 450 mm by long stroke specifications
- •High Speed and low consumption machining with graphite electrode is realized by IDPM and SS jump 5



Rib Machining with graphite electrode

Model	EA28V ADVANCE
Electrode	Graphite(EX-70)
workpiece	Steel(SKD61)
Surface roughness	Rz10µm/Ra1.5µm
Denth	50mm

- •Graphite electrode achieves a length consumption ratio of 0.04%
- •IDPM control reduces generation of protrusions during low consumption machining •SS jump 5 realizes uniform machining surface even in deep rib machining



Deep Die Casting

Model	ADVANCE specifications
Electrode	Graphite(EX-70)
workpiece	Steel(SKD61)
Surface roughness	Rz15µm/Ra2.4µm
Depth	150mm

•High speed and stable machining is realized for the machining with a complex and complicated electrode



Die Casting for Automobil

Model	EA28V ADVANCE
Electrode	Graphite(EX-70)
workpiece	Steel(SKD61)
Surface roughness	Rz7.9um/Ra1.0um

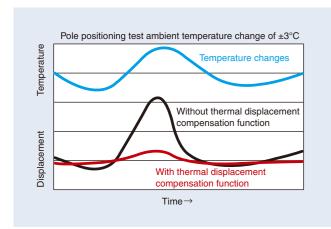
- •Uniform matte surface is realized for even for the large machining area.
- •Low consumable machining with IDPM realizes stable machining and abnormal waste reduction

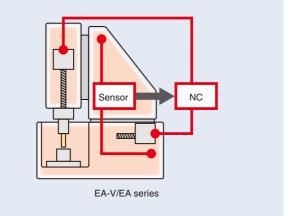
6

Machining Accuracy

Thermal displacement compensation system (EA28V ADVANCE)

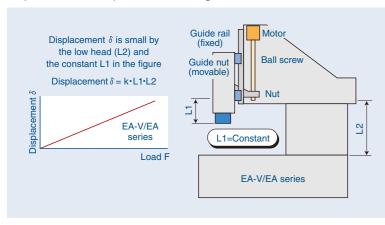
- •Semi-cabin structure reduces the effect of external temperature fluctuation
- •Thermal displacement compensation system to be reduced thermal displacement caused by temperature changes

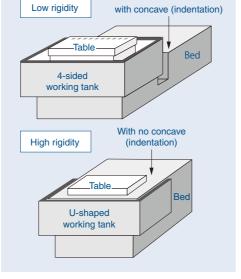




High rigidity construction

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





Low head structure

Bed structure

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

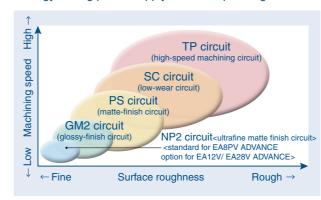
- •Highly accurate helical machining and index machining are possible
- •Highly rigid and accurate built-in C-axis
- with increased permission moment of inertia



Machining Performance

FP-V Power supply (EA28V ADVANCE/EA40 ADVANCE specifications)

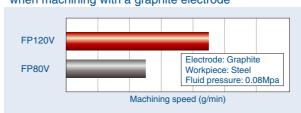
- Circuits suitable for various machining
- •Energy saving power supply reduces operating cost





FP120V power supply (EA40/50 ADVANCE specifications Standard)

Machining speed increased by around two times when machining with a graphite electrode

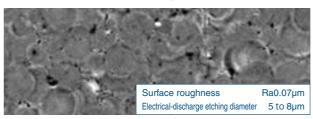


•Machining speed increased by around two times when machining tungsten carbide

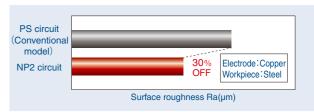


High-quality ultrafine finishing function (NP2 circuit) (EA28V ADVANCE option)

•Improved fine best surface roughness by NP2 curcuit



•Improvement of best surface roughness of steel



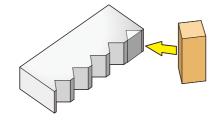
Narrow gap circuit

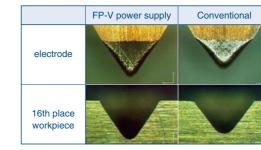
Cu-St 16 pitch

Depth: 1.0mm

Undersize: 0.070mm/side x1

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

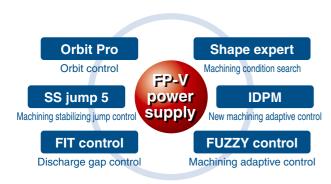


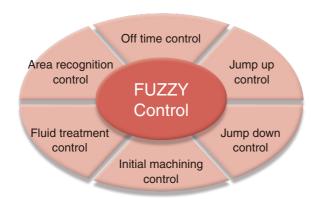


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Productivity

High-speed machining is realized using advanced machining control



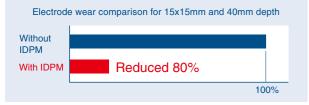


- •Intelligent Digital Power Master: Adaptive control to be integrated ever developed technologies
- •Integrated Discharge Power Monitor: Adaptive control to reduce abnormal discharge with detecting discharge pulse

Machining adaptive control: IDPM

High-speed/Low-wear machining with graphite electrodes

•IDPM reduces graphite electrode wear up to 80%

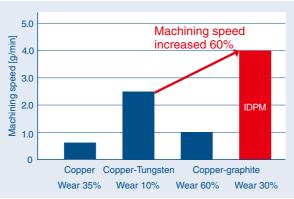


*Above data is a comparison with a conventional Mitsubishi Electric EDM (EA Series)



Tungsten carbide high-speed machining

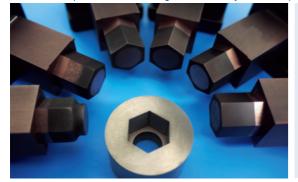
•Machining speed is improved up to 60% with-using IDPM and copper-graphite electrode



*Machining performance may vary depending on machine speci cations and electrode materials.

Improve productivity of tungsten carbide

- •The time required for electrode creation and machining is reduced by 40% compared to the time using copper electrodes and without IDPM.
- •The time required for machining is reduced by 14% compared to the time using copper-tungsten electrodes and without IDPM.

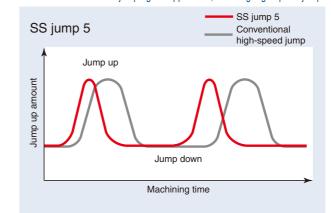


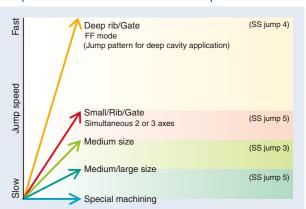


Machining stabilizing jump control (SS jump 5)

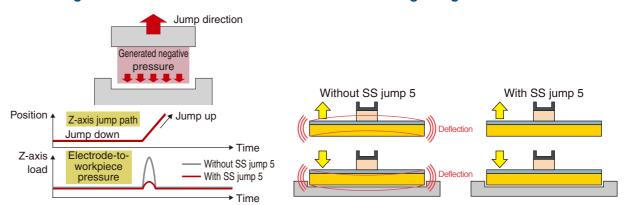
•Jump control suitable for various shapes is realized by optimizing smoothing of jump up operation and speed/acceleration control

Machine vibration when jumping is suppressed, realizing high-speed jump Jump control suitable for various shapes is realized



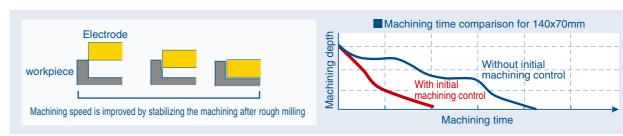


Machining time reduced for the uniform fine finish machining using medium-size electrode

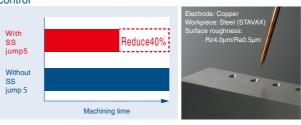


Machining optimization control: Initial machining control

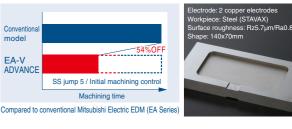
•Faster machining is realized with improved initial machining control for the start of machining after rough milling. Machining time reduced up to 50% for the start of machining after rough milling



Machining time is reduced up to 40% 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-size electrode



Workability / Operability

Easy-to-use control (ADVANCE control unit)









Ergonomic design

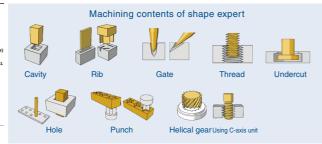
- •Easy-to-view screen(15-inch)
- •Intuitive operation using touch-panel display
- •User-friendly keyboard and mouse

ESPERADVANCE - Easy Programing and machining condition search -

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





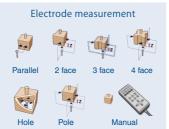


Electrode/Workpiece measurement

- •Electrode measurement screen for electrode alignment
- •Workpiece measurement screen for workpiece alignment

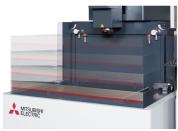


Electrode measurement screen Workpiece measurement screen





3-sided automatic elevation tank (EA28V ADVANCE standard)



AES •3-sided automatic

elevation tank standardized. Improved access for workpiece setup

Phote:EA28V ADVANCE

Automatic filter (EA40/50 ADVANCE specifications option)



- Effective for medium to large-size EDMs which discharge large quantities of sludge.
- Reverse wash function is effective in achieving high performance over a long time.
- •Effective for medium and large die sink EDM with many sludge

Automation

Auto tool changer

LS type (only EA28V ADVANCE)

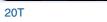




10T

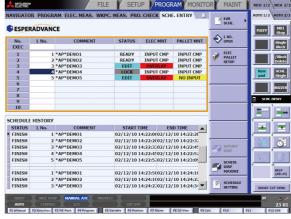








Built-in scheduler



•Continuously run multiple programs on a schedule •Schedules can be added and edited during machining

Power Supply / Control Specifications and Options

Power Supply and Control Specifications

	Model	EA28VM ADVANCE		EA40M ADVANCE specifications EA50M ADVANCE specifications				
≒	Power supply model	FP80V-A	FP120V-A	FP120V-A				
'n	Maximum machining current peak [A]	80	120	120				
Power supply unit	Standard machining circuit and functions		Transfer pulse circuit (TP circuit), Ultralow-wear machining circuit (SC, α - SC circuit), Fine-matte finish circuit (PS circuit), Glossy mirror-finish circuit (GM2 circuit), FUZZY control, SS Jump5, Intelligent Digital Power Master (IDPM, optimum machining control)					
) We	Power supply system	Compact, resis	Compact, resistor-less, low-heat generation, power regenerating energy-saving method					
<u>~</u>	Cooling system		Indirect cooling					
	Control unit		C31E	=A-2				
	Input method	Keyboard, USB flash memory, network						
	Pointing device	Touch panel, mouse						
	Display		15-in color TFT-LCD					
	Display characters			ic characters				
	Control system		F	sed loop				
	Number of controlled axis			n four axis				
	Setting (command) unit			tary axis) 0.0001°				
	Minimum drive unit			tary axis) 0.0001°				
	Maximum command value		±99999.9999mm/±9999.99999 inch					
	Position command format		Incremental/Absolute value combination					
	Interpolation function	Linear, circular, spiral						
_	Orbit mode	Fixed pattern and random path, 3D pattern						
r <u>i</u>	Orbit control system	4 types (free, semi-fixed, fixed, variable)						
<u>0</u>	Scale magnification	0.000001 to 99.999999/0.001 to 99999.999						
Control		X-Y/Y-Z/Z-X plane, solid, table scale,						
O	Graphics	automatic machining path drawing, orbit block drawing						
	Automatic programming	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		3D display compatible, high	gh-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)						
	Network specifications	Eth	ernet port (10/100BaseT (X)	port RJ45 connector) 1 port (Note 1)				
	RS232C interface			-				
	Maintenance functions		Consumption rate of	control (time display)				
(Outline dimensions (W \times D \times H)			peration panel 500 × 175 × 346)				
	[mm]	FP ⁻	120V-A: 500 × 840 × 1610 (O	peration panel $546 \times 170 \times 346$)				
	Weight [kg]	260		300				
/No	lota 1) Refer to below table for the network energifications option combinations							

(Note 1) Refer to below table for the network specifications option combinations.

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	Soft limit (inside/outside prohibit)	e-manual (electronic manual)
designation function	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,	Width center positioning
E.S.P.E.R ADVANCE Navigator	machining results table	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	Lateral machining	Graphics (machining shape drawing)
(106 coordinates)	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
Scales for XY-axis	Contour machining (spindle required)	(Parasolid data display)
Function computations	C-axis machining (C-axis required)	EPX format data read
Corner R command		

Power Facilities Capacity

Model ^(Note 2)	EA28VM ADVANCE		EA28VM ADVANCE Special work tank		EA40VM/50VM ADVANCE specifications
Power supply	FP80V-A	FP120V-A	FP80V-A	FP120V-A	FP120V-A
Maximum machining current average [A]	60	100	60	100	100
Maximum machining current peak [A]	80	120	80	120	120
Dielectric fluid chiller unit[kW]	1.74	3.5	1.74	3.5	3.5
Total input capacity[kVA]	9.0	13.0	10.0	14.0	19.0
Machine's generated heating value [kW][Note 3]	5.4	7.8	6.0	8.4	11.4

Please add 3[kW] for machine-generated heat value with SP power supply specifications

Network Connection Specifications (FTP and DNC S/W)

	One in address must be prepared for each Edwi within the user's in-nouse network.						
	Required speci cations	Image	Remarks				
<u>)</u>	Operate on the EDM side, and receive data from personal computer	Data transmission	Standard (DNC H/W)	Uses Explorer on EDM side and receives data to common HDD on the EDM side. After that, data I/O operation is required.			
	Operate on the EDM side, and send data directly to the EDM's NC	Data transmission	Option (FTP)	Data can only be received via data I/O operation.			
	Operate on the personal computer side, and send data to the EDM	Data transmission	Standard (DNC H/W)	Uses Explorer on personal computer-side and common HDD on EDM-side.After that, data I/O operation is required for the EDM.			
	Operate on the personal computer side, and send data directly to the EDM's NC	Data transmission	Option (DNC S/W)	Commercially available DNC software must be installed on the personal computer-side. Refer to DNC speci cations documentation for details.			

Options

Options and retro t speci cations differ according to country and region; please contact a Mitsubishi Electric representative for details.

Main options correspondence table: ⊚ Standard equipment, ○ Can be added after installation, ● Cannot be added after installation, × Not available

Model				EA28VM ADVANCE	<pre>EA28VM ADVANCE <long specifications="" stroke=""></long></pre>	EA40M ADVANCE	EA50M ADVANCE
	Lubricant	nt Automatic lubrication unit		0	0	0	0
	Scale	Scale feedback	Z-axis	0	0	×	×
	Scale	specifications	XY-axis	•	•	×	×
Machine main unit	Thermal Buster (Thermal displacement correction system)			0	0	0	0
main unit	Column up specifications			●150mm	150mm	100mm	200mm
	Advanced-function	n manual operation box		0	0	0	0
	LED light			0	0	0	0
144 - 42	Automatic elevation tank			0	0	×	×
tank				×	×	0	0
LOUIN	Special working t	ank	nk		(Note 1)	•	•
	0.11.50	Paper filter 2 pc. specifications		×	×	0	×
		Paper filter 3 pc. specifications		0	0	×	×
	fluid filter	Paper filter 4 pc. specifications		×	×	×	0
Dielectric		Automatic filter		×	×	•	•
fluid		Dielectric fluid chiller unit (unit c	poler)	0	0	0	0
system	Cooler	Dielectric fluid chiller unit (for bo	oster power supply)	×	×	×	•
		Dielectric fluid automatic supply	/drain	0	0	0	Ö
	Fluid	Emission/suction automatic cha	ngeover	•	•	×	×
	system	Programmable flushing nozzle (eight nozzl	es) + Automatic changeover	•	•	0	0
		Dielectric fluid distributor		0	0	0	0
	Main Power	FP80V-A		0	0	×	×
	supply	FP120V-A		•	•	0	0
Power		NP2 circuit (Ultrafine matte finis	h circuit)	0	0	×	×
supply	Special	Narrow gap circuit		0	0	×	×
	power	FP-V power supply extension ur	nit	0	0	×	×
	Supply	IDPM		•	•	•	•

(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.

					EA28VM ADVANCE	EA28VM ADVANCE <long specifications="" stroke=""></long>	EA40M ADVANCE	EA50M ADVANCE
		High-accuracy built-	in C-axis (lote 2,3)	0	0	•	•
		High-accuracy built-in spindle (Note 2)		•	•	×	×	
Head-side to	ooling	Automatic clamp (Not	e 2)		0	0	0	0
		Removable holder (3	R-16M-MA	CRO-R specifications)	0	0	0	0
		Large electrode ada	ptor		0	0	0	0
				3R-MACRO	0	0	×	×
			10 T	3R-Combi	0	0	×	×
				EROWA-ITS	0	0	×	×
		LS		3R-MACRO	0	0	×	×
			20 T	3R-Combi	0	0	×	×
ATC				EROWA-ITS	0	0	×	×
AIC				3R-MACRO	0	0	(Note 4)	(Note 4)
			20 T	EROWA-ITS	0	0	(Note 4)	(Note 4)
		10/		3R-Combi	0	0	×	×
		MV		3R-MACRO	0	0	×	×
			40 T	EROWA-ITS	0	0	×	×
				3R-Combi	0	0	×	×
		External signal output (M code) (Note 5)		0	0	0	0	
	trol Communication	External signal output (M code with answer) (Note 6)		0	0	0	0	
Control		DNC H/W (Note 7)		0	0	0	0	
unit		FTP		0	0	0	0	
		DNC S/W		0	0	0	0	
		RS232C interface		×	×	×	×	
NS powder s	specifications				•	•	×	×
	•	Electronic manual (e	e-manual)		0	0	0	0
		Built-in scheduler		0	0	0	0	
0.0		ESPERADVANCE F	PRO (Note 8)		0	0	0	0
Software		Protect mode			0	0	0	0
		Anti-virus protection			0	0	0	0
		Power saving function			0	0	0	0
0.7.1		Infrared flame detec			•	•	•	•
Safety		Double automatic fi		her specifi ations	•	•	•	•
		Run timer			0	0	0	0
Display		3-color warning light			0	0	0	0
Others		Instruction manual (on)	0	0	0	Ö
Paint color designation					•			•

(Note 2) Select the chuck from the following types: 3R MACRO, 3R Combi, EROWA ITS, EROWA COMBI (Note 3) Specifications are slightly different for EA28V ADVANCE and EA40/50 ADVANCE specifications (Note 4) Please contact a Mitsubishi Electric representative for details on the EA40/50 ADVANCE specifications ATC. (Note 5) It is necessary for attaching an automation system (electrode / workpiece (Four shielded LAN cable should be used.

automatic changer unit)

Protect mode

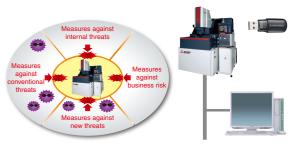
Protecting data from thoughtless changes forbidding data taken out



(Note 8) A personal computer is required for ESPERADVANCE PRO.

Anti-virus protection

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



Options

Head-side tooling

* Tooling should be selected

Removable holder



3R-16M-MACRO-R specications

Automatic clamp



Clamp spindle side holder with air chuck (photo shows EROWA-ITS chuck specications)

High-rigidity C-axis



Supports parallel electrode setup and index machining Supports fluid emission from spindle center (photo shows 3R-MACRO chuck specications)

ATC

LS-10T(automatic tool changer)



Change up to 10 electrodes Supports continuous machining using many electrodes

LS-20T(automatic tool changer)



Change up to 20 electrodes Supports continuous machining using many electrodes

MVH-20T/40T(automatic tool changer)



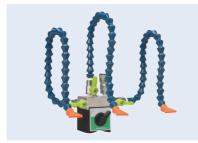
Change up to 20/40 electrodes Supports continuous machining using many electrodes

Dielectric fluid system and others

Dielectric fluid distributor



Sprays dielectric fluid between the workpiece and electrode during pitch machining



Distributes dielectric fluid into three Flows and sprays onto the machining section

Large electrode adapter



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

LED light



Power-supply speci cations for LED light require DC24V.

Infrared flame detector



Catches infrared rays from flames and stops power supply

Specifications are subject to change without notice. and appearance may be different from the photo.

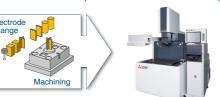
Automation Support



3D CAD/CAM system

LS-10T/20T Tool changer

•Automatic electrode replacement enables continuous operation

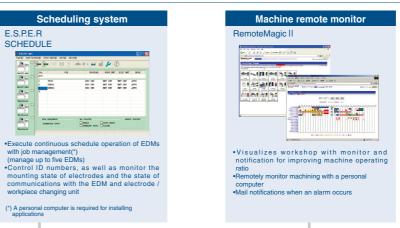


•Robotic transfer devices automatically change electrodes and workpieces, enabling continuous operation

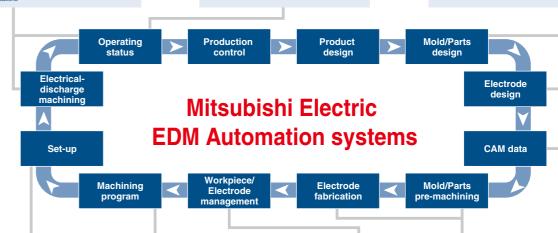


Automatic electrode/workpiece changer(1 robot, 2 EDMs)

Peripheral equipment/System extension options









Offline programming and program

"Same screens and operability as ESPERADVANCE, and compatible with 64-bit models (MA, EA Series machining condition •Import data from AD or EPX compatible CAD/CAM

managed by ID tag which mounted electrode and workpiece pallets (Note 2) Electrode and workpiece pallets can be identified to provide mounting mistakes and program registering mistake
•Workpiece and electrode can be easily

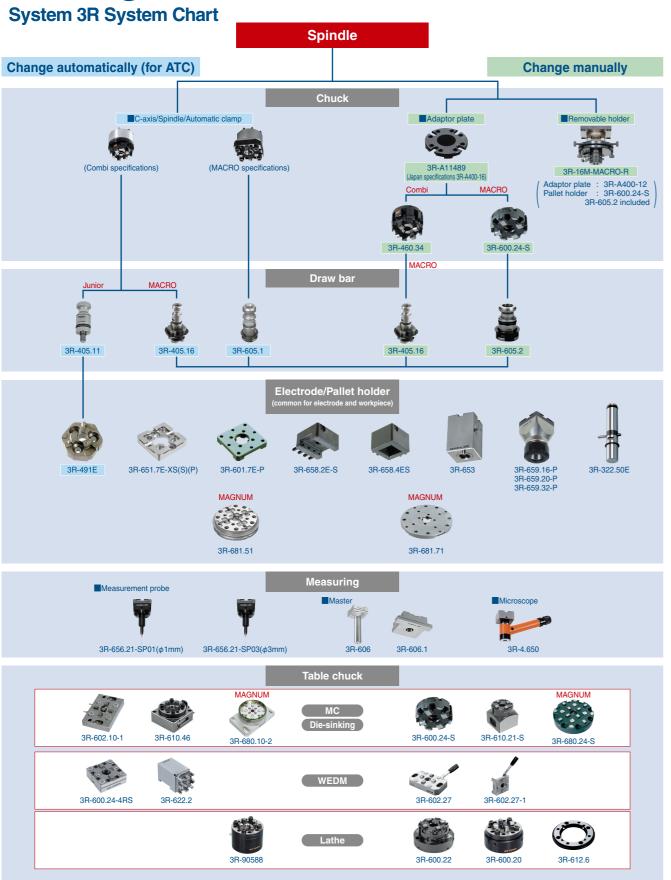
And setup time can be reduced the in the control of the usage of offline setup system will improve machine runtime
 Electrode and workpiece can be easily

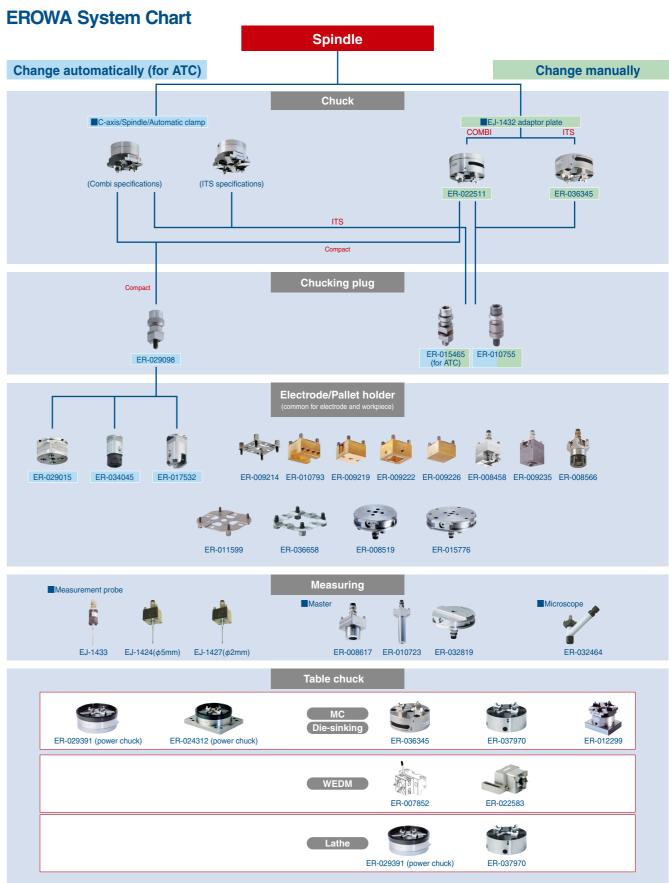
(Note 1) Please contact a Mitsubishi Electric representative for more information regarding the presetters and coordinate measuring machines. (Note 2) Please contact a Mitsubishi Electric representative for more information regarding the ID tag systems.

(Note 3) Please contact a Mitsubishi Electric representative for more information regarding the ID tag systems.

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

Tooling





Preparation for Machine Installation / Cautions

Preparation for Machine Installation

Machine installation checklist

Determining the machining details

	1) Determine the workpiece	
	2) Determine the machining site	
	3) Determine the pre-processing site	
	Determine the post-processing site	

Preparation of installation fixtures

ı	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 ation of tooling and ele

Training of programmers and operators

1) Select the programmers and operators

Confirmation of foundation and power-supply work

if there is any possibility of radio disturbance, investigate it prior to starting wo	IK.
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

official the path molecular detailed the factory to avoid any trouble du	inig donv	Ciy.
1) Traffic restrictions to factory		
Road width		
Entry road		
2) Factory entrance and width of gate in factory	(m)	
Factory building entrance dimensions (height × width)	(m)	
3) Constant-temperature dust-proof room entrance dimensions (height × width)	(m)	

The standard delivery entrance dimensions for standard shipment delivery are given on the product line-up page

The standard delivery entrance dimensions for standard shipment delivery are given on the product inte-up pa if the entrance is smaller than the standard delivery entrance, a machine with different dimensions can be ship * 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

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 400R)	
•Application for "Low volume hazardous material storage and handling	
site" (fluid amount more than 400R and less than 2,000R)	
•Application for "General handling site" (fluid amount 2,000R or more)	

The required applications differ according to country and region: please contact your

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

the state of the s					
Product brand Item	Metal Work EDF-K2				
Density g/cm³ (@15:)	0.770				
Flash point : (PM)	93				
Kinematic viscosity mm²/s (@40:)	2.2				
Appearance	Clear and colorless				
*Places contact the manufacturer for the Material Safety Data Shoot (SDS/MSDS)					

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

the state of the s				
Product brand Item	Shell Paraol 250			
Density g/cm³ (@15:)	0.797			
Flash point : (PM)	92 2.42			
Kinematic viscosity mm ² /s (@40:)				
Appearance	Clear and colorless			
*Please contact the manufacturer:	for the Material Safety Data Shoot (SDS/MSDS)			

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

Installation conditions

1. Installation site

①Constant-temperature dust-proof room · Recommended room temperature 20±1°C (68°F±2)

- Hecommended room temperature 20±1°C (68°±±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 supplicit.
- Dust-free location is recommended.
- Dust-ree 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)
- OTolerable vibration of floor
 EA8S/12S, EA28V ADVANCE, EA40/50 ADVANCE specifications
- EAGST 125, EL22Y ADVANCE, EARWISO ADVANCE specimentors.

 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, EABPS, EA12PS

- Select a floor where vibration or impact will not be conveyed. As a reference, the vibration level should have a max, amplitude of 2um or less at a 10 to
- * Consult with the contractor or vibration measuring instrument manufacturer for details on

The floor should be concrete with a thickness of 400mm (15.7") or more so it can sufficiently

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.

(Shentilation 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 EA12PS + FP80PS, 7.0kVA x 0.6 = 4.2kW

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

3. Power-supply equipment

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

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 21 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

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

Total facility capacity [kVA]	Cable size[mm²]	Ī	Total facility capacity [kVA]	Cable size[mm²]
~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

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 14mm² grounding wire



5. Primary air equipment

The standard EA28V ADVANCE 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: φ9.0 (0.35"))

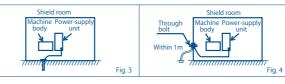
Pressure: 0.5 to 0.7MPa (72.5 to 101.5psi)

(0.6MPa (87) or more when using EROWA tooling specifications) Flow rate: 27R/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 10Ω or less) is recommended for the EDM Even if the sensitivity current is 200mA, the contact voltage will be 2V or less, and no problems will occur in preventing electric shock (application of tolerable contact current

Refrigerant for dielectric fluid chiller

The dielectric fluid chiller unit includes a fluorinated greenhouse gas R407C or R410A (for booster power). Please use only the specified refrigerant (R407C or R410A), when servicing the dielectric fluid chiller unit. The use of any refrigerant other than that specified will cause mechanical failure, system malfunction or unit breakdown. In the worst case, this could lead to a serious impediment to securing product safety.

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

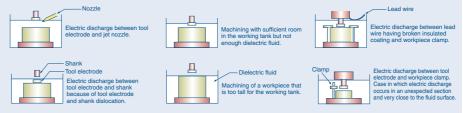
Recommended sliding surface lubricants

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
- 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

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 2.000R. 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 FDM



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:, or when the fluid level drops during machining.

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.

(1)Terms of repairment free of charge
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).

- When a failure occurs that was caused by a machine modification that directly affects the
- The state of the state of
- (4) When the use of non-recommended consumables or aftermarket parts are used such as filters
- or flushing nozzles.
 (2)Exclusion of loss in opportunity and secondary loss from warranty liability
- (c)exclusion of loss in opportunity and secondary loss into Martanty inability Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

 Damages caused by any cause found not to be the responsibility of Mitsubishi.

 Quess in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

 Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

 Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

3. Post Warranty / Expected Service Life

After the warranty period expires, all standard service rates and travel expenses will apply. Normal service life expectancy is 11 years after installation, but there may be some cases where discontinued electrical parts such as semiconductors and motors will reduce this period.

FA Machinery and Automation Products Global Production Bases

Programmable controllers, display panels (HMI), AC servos, inverte industrial robots, CNCs for power distribution transformers, EDMs, ers, display panels (HMI), AC servos, inverters,





5 Nagatsugawa Works Power management meters, energy-saving UPS support devices, low-

4 Fukuyama Works



High-voltage circuit breakers, high-voltage electromagnetic

2Kani Factory



3Shinshiro Factory 3-phase motors, IPM motors



6 Power Distribution Systems Center Industrial Products Corporation Geared motors



GChina (Dalian)



Products Co., Ltd. Inverters, low-voltage circuit breakers, electromagnetic switchgear EDMs, laser processing machines





Mitsubishi Electric Automat Manufacturing (ChangShu) Co., Ltd. Programmable controllers, display panels (HMI), AC servo CNCs

YOUR SOLUTION PARTNER



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

A NAME TO TRUST

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

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

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

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

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























Transformers, Air conditioning, Photovoltaic systems

Mitsubishi Electric India Pvt. Ltd.



Mitsubishi Flectric Automation (Thailand) Co., Ltd. 3-phase motors





Mitsubishi Electric Low Voltage Equipment (Xiamen) Co., Ltd. Low-voltage circuit breakers



* Not all products are available in all countries.

MEMO

