for a greener tomorrow

MITSUBISHI ELECTRIC
Changes for the Better

FACTORY AUTOMATION

MITSUBISHI NC EDM SYSTEMS
SG Series

SG
series

Maisart

D-CUBES

iQ Care Remote 4U

Global Partner. Local Friend.

SG Series

Visit us on

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO 14001 (standards for environmental management systems) and ISO 9001(standards for quality assurance management systems)

ISO 14001 JACO EC 98 J 2017 UKAS MANAGEMENT SYSTEMS 0051

ISO 9001 BUREAU VERITAS Certification UKAS MANAGEMENT SYSTEMS 0008

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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.

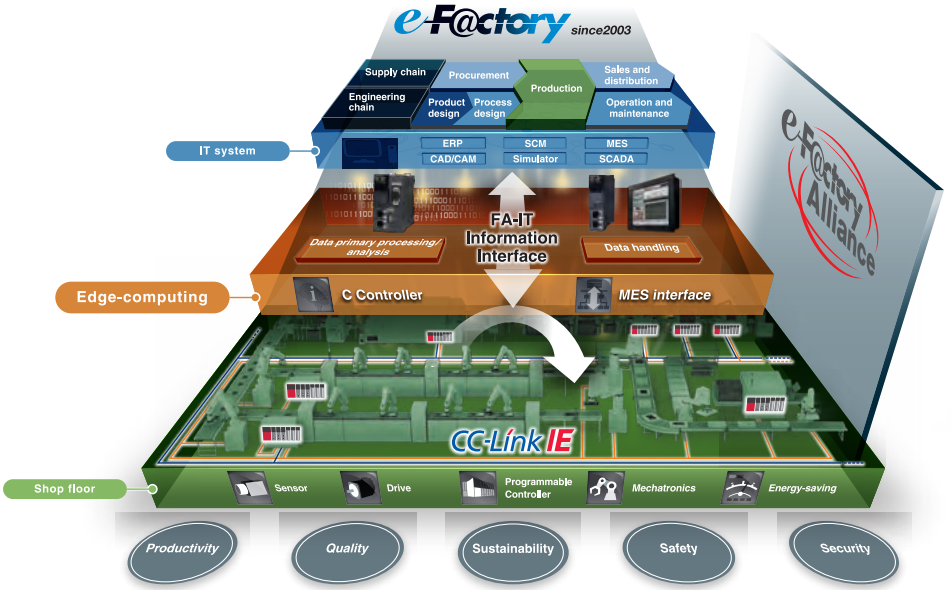
Electronic Devices
A wide portfolio of cutting-edge semiconductor devices for systems and products.

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.

INDEX

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

1964~

1964
DM201
Production started 1964
Thyristor power supply
Hydraulic servo system

1965
DM500+DE90T
Began shipment in Nov. 1965

1967
DM250+DE30T
Began shipment in Feb. 1967
Transistor pulse power supply

1971
DM100
Began shipment in Dec. 1971

1972
DM300N+EP120M
Began shipment in Jul. 1972

1974
DK700
Began shipment in Oct. 1974

1980~

1980
DK360NC
Began shipment in May 1980

1982
M30
Began shipment in Jan. 1982
Motor servo system

1982
M35C2
Began shipment in May 1982

1982
M55
Began shipment in Dec. 1982

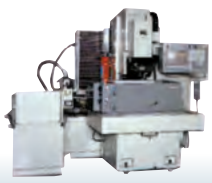
1982
M25C3
Began shipment in Dec. 1982

1982
M55C6
Began shipment in Dec. 1982
Equipped with 16bit CNC

1990~

1990
M65E
Began shipment in Mar. 1990

1991
V35F
Began shipment in Feb. 1991
Equipped with 32bit CNC and FUZZY Control



1992
VP35F
Began shipment in Jun. 1992
NS powder specifications

1994
ADMAQ-E
Began shipment in Oct. 1994

1994
VX10
Began shipment in Dec. 1994

1995
VX20
Began shipment in Jan. 1995

2000~

2001
VA10
Began shipment in Apr. 2001

2001
MA2000
Began shipment in May 2001
Equipped with thermal displacement compensation

2004
EA8P
Began shipment in Feb. 2004

2004
EA12V
Began shipment in Apr. 2004
Equipped with V power supply (tungsten carbide circuit standard equipment)

2006
EA8PV
Began shipment in Jun. 2006
Equipped with ultrafine matte finish circuit (NP circuit)

2007
EA28V
Began shipment in Jan. 2007

2010~

2014
EA8S
Began shipment in Feb. 2014

2015
EA12S
Began shipment in Mar. 2015

2016
EA8PS
Began shipment in Feb. 2016

2016
EA12PS
Began shipment in Feb. 2016

2018
SV12P
Began shipment in Aug. 2018

1976

DK280
Began shipment in Apr. 1976

1978

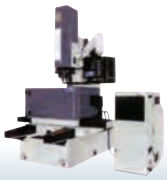
DK140
Began shipment in Sep. 1978

1986

M25KC4
Began shipment May 1986
Equipped with ultralow-wear power supply (slope control system)

1986

M35K
Began shipment in May 1986



1987

M85KW
Began shipment in Feb. 1987

1988

M115K
Began shipment in Jan. 1998

1988

EML20
Began shipment in Aug. 1988

1989

M35J
Began shipment in May 1989

1989

M35S
Began shipment in Dec. 1989

1995

EX8
Began shipment in Jan. 1995

1996

EX30
Began shipment in Jun. 1996

1996

EDSCAN8E
Began shipment in May. 1996

1999

EA12E
Began shipment in Aug. 1999
Equipped with 64bit CNC

1999

EA8
Began shipment in Oct. 1999

2008

EA12V ADVANCE
Began shipment in Feb. 2008
Equipped with ADVANCE control device

2008

EA28V ADVANCE
Began shipment in Feb. 2008

2008

EA8PV ADVANCE
Began shipment in Feb. 2008

2020

SG12

Next-generation machine incorporating the Mitsubishi and control unit (D-CUBES) to pursue both high accur

"Challenge!" with "AI technology"

High performance machine

SG Series

Maisart

D-CUBES

iQ Care Remote 4U

Electric's AI technology (Maisart)
acy and high productivity

Die-sinker EDM pursuing both high performance and high productivity

Maisart

D-CUBES

iQ Care Remote 4U

SG Series

NC-EDM Systems

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

High precision machine
SV-P Series

High-end model incorporating the AI technology (Maisart) to pursue both accuracy and productivity

Maisart

D-CUBES

iQ Care Remote 4U

High precision machine
EA-PS Series

High-grade model compatible for various uses

ADVANCE PLUS

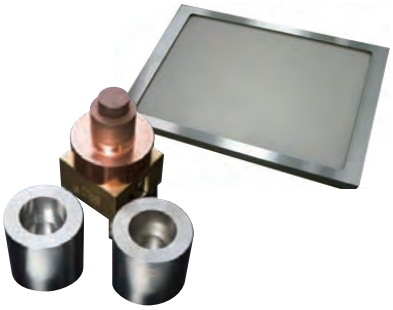
High performance machine
SG Series

Pursuing both high performance and high productivity

Maisart

D-CUBES

iQ Care Remote 4U



Productivity machine
EA-S Series

Supports various machining needs in pursuit of higher productivity

ADVANCE PLUS

Large-size high performance machine
EA-V ADVANCE Series

Standard model pursuing high performance and high productivity

Line up

Equipped with the latest IoT-compatible control unit for stable machining and higher productivity.

High performance machine
SG8

Maisart
D-CUBES
iQ Care Remote 4U

Automatic elevation working tank specification (standard)

High performance machine
SG12

Maisart
D-CUBES
iQ Care Remote 4U

Automatic elevation working tank specification (standard)

Standard function

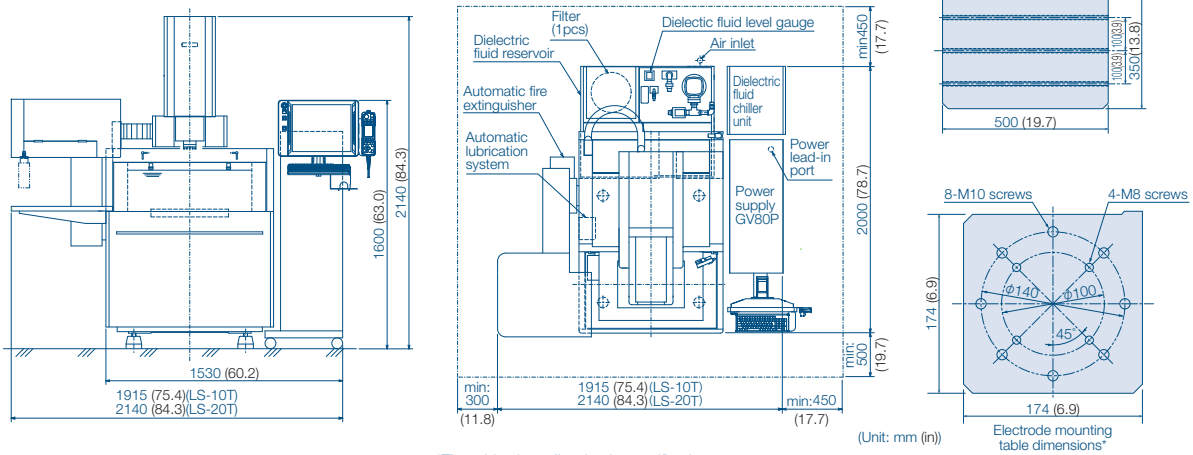
- Adaptive control (Maisart/IDPM3)
- HGM2 circuit
- Z axis Liner scale*1
- Thin LCD operation box
- Automatic elevation working tank
- SS Jump
- Built-in scheduler
- Machining Monitor Screen

Option

- Z axis Liner scale
- Z axis Liner scale*2
- High-rigidity C-axis*
- High-accuracy built-in spindle
- Automatic clamp
- LS tool changer
- Programable flushing function
- Dielectric fluid suction function
- Dielectric fluid distributor
- GV120P power supply*1
- SP power supply*3
- Lotus Leaf Texture (LLTX)
- 3D data import
- External signal output
- Warning light (Tower/Built-in)
- Anti-virus protection

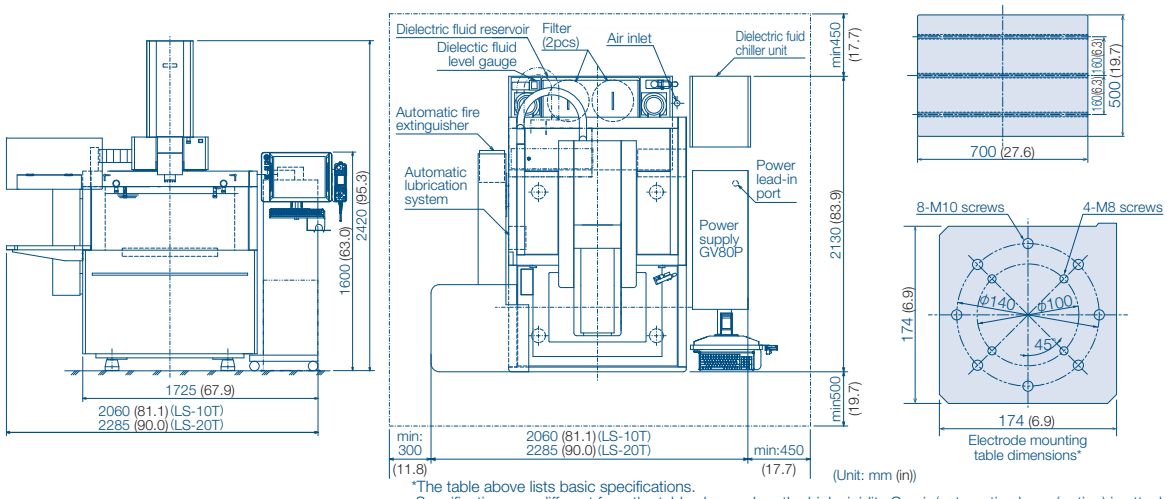
*1 Only SG12 *2 SG12 is standard *3 When the SP power supply is used, machine installation dimensions differ. Detail on the other page

SG8



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

SG12



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

Machine main unit (standard specifications)

Model			SG8M	SG12M
Machine main unit	Dimensions (W x D x H)	[mm(in)]	1530×2000*×2140 (60.2×78.7×84.3)	1725×2130*×2420 (67.9×83.9×95.3)
	Total system weight	[kg(lb.)]	2000(4409)	3500(7716)
Axial travel	(X×Y×Z)	[mm(in)]	300×250×250 (11.8×9.8×9.8)	400×300×300 (15.7×11.8×11.8)
Spindle	Distance between table and electrode mounting surface	[mm(in)]	150-400(5.9-15.7)	200-500(7.9-19.7)
	Max. electrode weight	[kg(lb.)]	25(55)	50(110)
Working tank	System		Automatic elevation system	
	Inner dimensions (W x D x H)	[mm(in)]	800×520×300 (31.5×20.5×11.8)	950×700×450 (37.4×27.6×17.7)
	Fluid level adjustment range (from top of table)	[mm(in)]	60-250(2.4-9.8)	65-400(2.6-15.7)
Table	Dimensions (W x D)	[mm(in)]	500×350 (19.7×13.8)	700×500 (27.6×19.7)
	Max. workpiece dimensions (W x D x H)	[mm(in)]	770×490×200 (30.3×19.3×7.9)	900×650×350 (35.4×25.6×13.8)
	Distance between floor and top of table	[mm(in)]	900(35.4)	900(35.4)
	Max. workpiece weight	[kg(lb.)]	550(1213)	1000(2205)
	T-slot		12-100mm pitch 3slots	12-160mm pitch 3slots
Dielectric fluid reservoir	Capacity (initial dielectric fluid supply amount)	[ℓ(gal.)]	260(68.6)(270(71.3))	360(95.0)(470(124.1))
	Filtering system		Paper filter 1pcs	Paper filter 2pcs
	Dielectric fluid chiller unit		Unit cooler	

* Without Dielectric fuid chiller uni.

Distance between table and electrode mounting surface

			EROWA ITS	3R MACRO	3R Combi MACRO	3R Combi Jr
SG8M	High-rigidity C-axis	[mm(in)]	150 to 400 (5.9 to 15.7)	133 to 383 (5.2 to 15.1)	133 to 383 (5.2 to 15.1)	143 to 393 (5.6 to 15.5)
	Spindle	[mm(in)]	150 to 400 (5.9 to 15.7)	133 to 383 (5.2 to 15.1)	133 to 383 (5.2 to 15.1)	143 to 393 (5.6 to 15.5)
	Automatic clamp	[mm(in)]	150 to 400 (5.9 to 15.7)	148 to 398 (5.8 to 15.7)	148 to 398 (5.8 to 15.7)	158 to 408 (6.2 to 16.1)
SG12M	High-rigidity C-axis	[mm(in)]	200 to 500 (7.9 to 19.7)	183 to 483 (7.2 to 19.0)	183 to 483 (7.2 to 19.0)	193 to 493 (7.6 to 19.4)
	Spindle	[mm(in)]	200 to 500 (7.9 to 19.7)	183 to 483 (7.2 to 19.0)	183 to 483 (7.2 to 19.0)	193 to 493 (7.6 to 19.4)
	Automatic clamp	[mm(in)]	200 to 500 (7.9 to 19.7)	198 to 498 (7.8 to 19.6)	198 to 498 (7.8 to 19.6)	208 to 508 (8.2 to 20.0)

C-axis/ATC (Option)

				3R MACRO	3R Combi	EROWA ITS	EROWA COMBI
C-axis		Max. electrode weight	10(22)|SG8| 50(110)|SG12| *1 [kg(lb.)]	○	○	○	○
		Speed (rpm)	1~30 [min-1]				
	Spindle type	Max. electrode weight	10(22) *1 [kg(lb.)]	○	○	○	○
		Speed (rpm)	1~1500 [min-1]				

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

				3R MACRO	3R Combi	EROWA ITS	EROWA COMBI
ATC	LS-10T	Max. electrode dimensions	54×54×200 [mm(in)] (2.1×2.1×7.9)	○	○*3	○*4	○*5
		Max. electrode weight	5kg (11lb.)/electrode*2 Magazine total: 20kg (44lb.)				
	LS-20T	Max. electrode dimensions	54×54×200 [mm(in)] (2.1×2.1×7.9)	○	○*3	○*4	○*5
		Max. electrode weight	10kg (22lb.)/electrode*2 Magazine total: 40kg (88lb.)				

*2 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.
*3 For 3R Combi Macro and Macro Jr can be used each other.
*4 Only the ITS50 specification is available, and the centering plate 50 can be used.
*5 Centering plate 50 and the Compact can be used each other.

Delivery machine size

[mm(in)]

		SG8M Width[mm]	SG8M Height[mm]	SG12M Width[mm]	SG12M Height[mm]
Without ATC		1080(42.5)	2140(84.3)	1280(50.4)	2420(95.3)
LS type	10T	1465(57.7)	2140(84.3)	1615(63.6)	2420(95.3)
	20T	1690(66.5)	2140(84.3)	2175(85.6)	2420(95.3)

Functions and Features

New functions to further innovate machining performance.

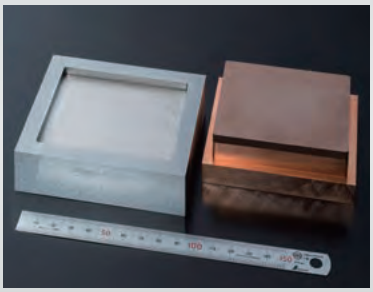
Maisart D-CUBES iQ Care Remote4U

Machining accuracy

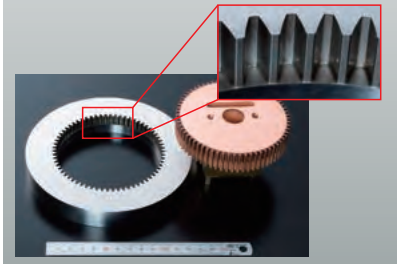
Refer to P14 ▶

Respond to diversifying manufacturing requirements. Mechanical structure that realizes stable production performance

- High rigidity construction is realized by structural change of cast and Middle-Large area machining performance is improved (machining time,electrode weak).



- Automatic depth recognition and stable servo control using "Maisart" make uniform surface finish.



Productivity

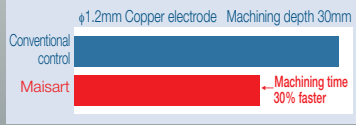
Refer to P15-16 ▶

IDPM3

- Machining speed is up to 50% faster with the combination of highly accelerated (1.6G) jump control and adaptive control "IDPM3".
- Suppresses edge wear enables single electrode machining. Electrode cost, setup and machining time are significantly reduced.

Maisart

- Optimize the jump length according to the machining dimension and shape.
- Automatically recognizes distinct depth of machining to improve stability.
- Plunge machining reduces machining time by up to 30%.



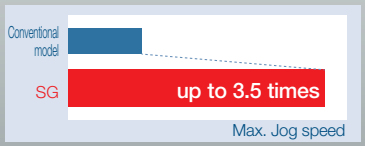
Workability

Refer to P17-18 ▶

- The machine has a large working tank and optimum layout suitable for automation systems (universally designed).
- Visualization of the machine's operation status with the built-in warning light (option).
- The elevation tank provides high accessibility to the machine for setup, and is easily automated.
- Working fluid emitting time is shortened.

Automatic elevation working tank

- Setup time reduced by faster jog speed. Jog speed is customizable.



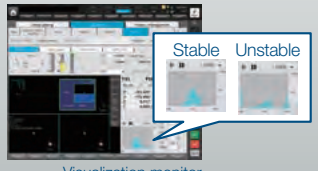
Operability

Refer to P19-22 ▶

- 19 inch touch screen.
- HOME Screen is like a smartphone. you are able to reach various screen by "short-cut menu".
- The Navigation menu supports operation from setup to machining.
- New thin operation box is a standard equipment.
- The best condition is selected by factor selection and narrow down search. Adjustment bar for choosing "Speed" or "Uniformity".

HOME monitor

New operation box



Visualization monitor

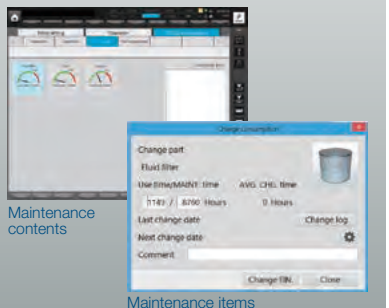
Condition search screen

NUI Natural User Interface LLS Long Life System

- "Action menu" helps your operation. Table form programing display "ESPER D-CUBES".

ESPER

- Centralized management of consumables. The consumables screen manages usage time and replacement log of consumables.
- Power saving function to reduce power consumption. Reduces standby power consumption during idling at night, etc.



Maintenance contents

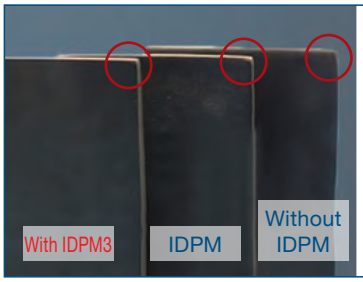
Maintenance items

e-F@ctory

Maisart

D-CUBES

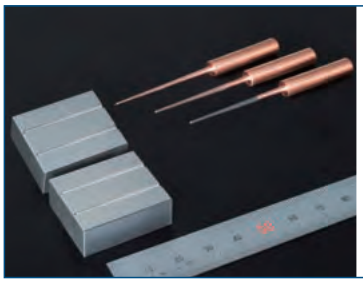
Samples



High speed machining with low electrode wear by IDPM3+SS jump

Model	SG12
Electrode	Graphite (TTK5)
Workpiece	Steel (SKD61)
Surface Roughness	Rz12.0μm/Ra2.0μm
Machining accuracy	±0.010mm(.0004")

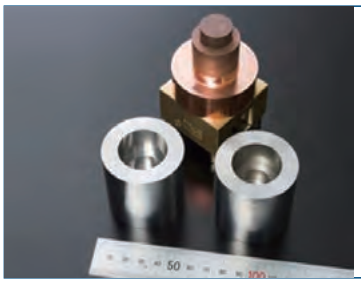
- High speed machining using Maisart. (machining depth: 40 mm, rough machining: 1.6 hours).
- Ultimate Low wear machining with IDPM3. (Electrode wear length: reduction by 50% or more compared with the conventional model)



Up to 30% faster submarine gate machining

Model	SG8
Electrode	Copper (ϕ1.2mm(.047"))
Workpiece	Steel (STAVAX)
Surface Roughness	Rz4.0μm/Ra0.6μm
Machining accuracy	±0.003mm(.00012")

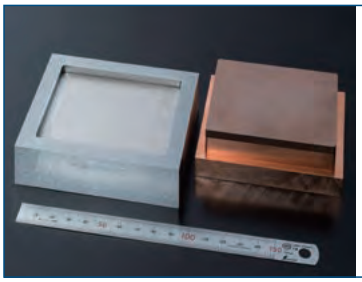
- Automatic depth recognition and stable servo control using Maisart improve machining stability.
- Jump control according to the machining progress raises the discharging efficiency of sludge, shortening machining time (reduced by up to 30% compared with the conventional model).



Machining time reduced by 30% by machining stabilization control

Model	SG12
Electrode	Copper (ϕ20(.79")/ϕ30mm(1.18"))
Workpiece	Steel (STAVAX)
Surface Roughness	Rz4.0μm/Ra0.5μm
Pre-machining left margin	±0.15mm(.0059")

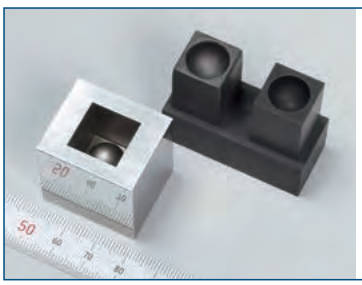
- Stable finish surface machining is possible with the newly installed stabilization control.
- Achieving both stabilization of machining and shortening of machining time by AI technology "Maisart"



70×80mm cavity machining

Model	SG12
Electrode	Copper (70×80mm(2.76"×3.15"))
Workpiece	Steel (S-STAR)
Surface Roughness	Rz5.0μm/Ra0.7μm
Machining accuracy	Bottom flatness 5μm(.0002") or less

- Automatic depth recognition and stable servo control using Maisart make uniform surface finish, reduction copper electrode low wear, reduction of burr and shortening of machining.
- Bottom of large area is machinable to a flatness within 5μm,Copper electrode wear and burrs are reduced thanks to higher rigidity and the thermal buster function.



Machining time reduced by up to 25%

Model	SG12
Electrode	Graphite (TTK9)
Workpiece	Steel (SKD11))
Surface Roughness	Rz10μm/Ra1.4μm
Machining accuracy	±0.010mm(.0004")

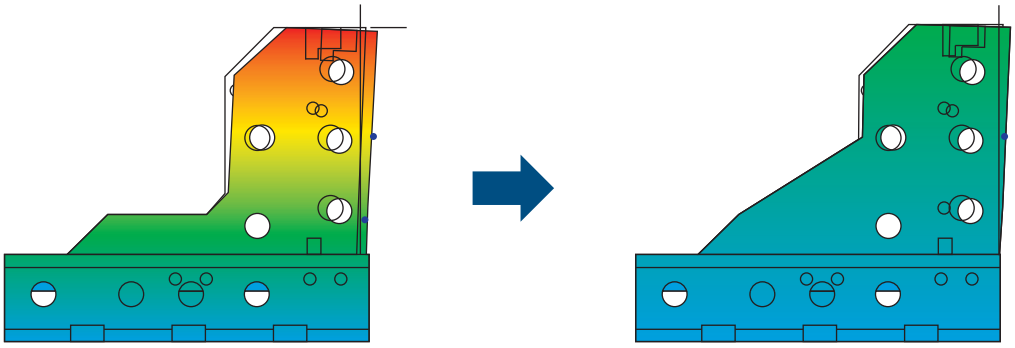
- Maisart's automatic depth recognition / discrimination function and servo stability control reduce machining time by up to 25%
- Electrode length wear of up to 50% with IDPM.

Machining Accuracy

Machining from the fine shape to large size shape can be achieved with high accuracy and high productivity.

High Rigidity Construction

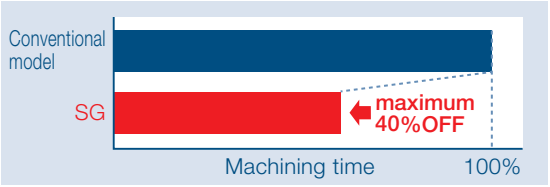
High rigidity construction is realized by structural change of cast.
⇒Middle-Large area machining performance is improved.

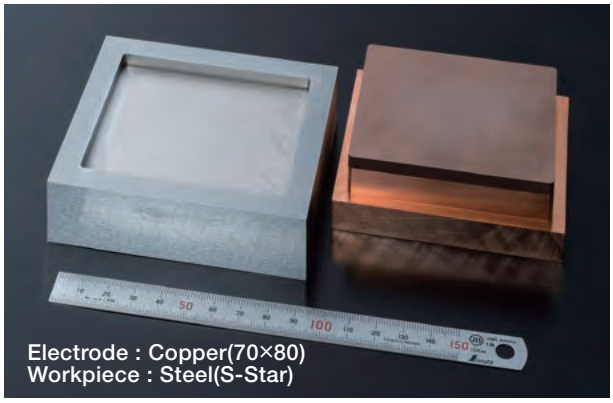


Conventional model　　SG12 series

●Automatic depth recognition and stable servo control using Maisart make uniform surface finish, reduction copper electrode low wear, reduction of burr and shortening of machining.

●Lower flatness and electrode wear
Lower flatness : 5μm





High-rigidity C-axis/High-accuracy spindle

●Highly accurate helical machining and index machining are possible.

●High-accuracy, high-rigidity C-axis with increased permission moment of inertia.

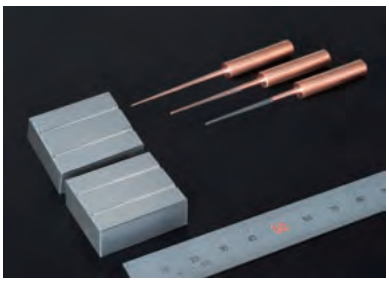
Productivity

Sensing technology (D-CUBES) and AI technology (Maisart) optimize machining in real time.

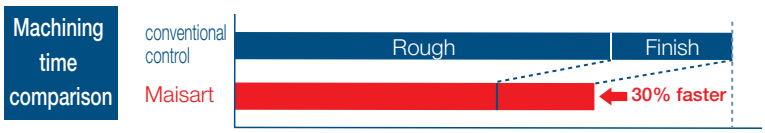
AI adaptive control:Maisart

Automatic depth recognition improves stability in deep machining such as gate machining.

- Optimal machining control using AI and high-speed jump both significantly improve machining efficiency.



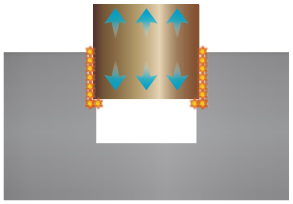
AI adaptive control that enables stable gate machining at high speed



Machining stabilization control

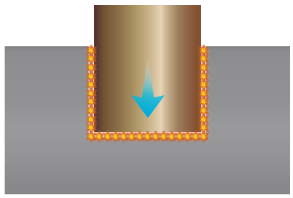
- Stable machining control for workpieces with pre-cutting (roughing)
- Monitor abnormal discharge status with AI,Improves machining stability on the cutting surface.

conventional control

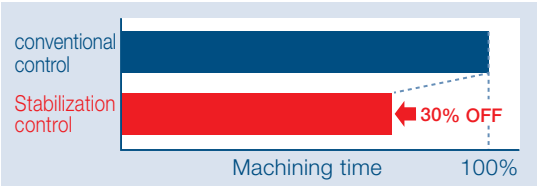


Since the facing area during machining changes rapidly, it tends to fall into abnormal discharge.

Stabilization control



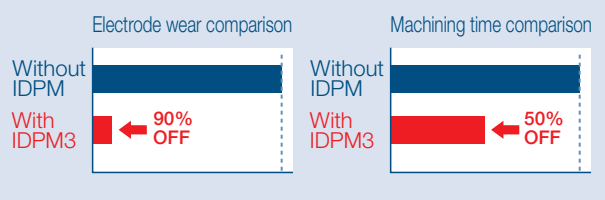
Since the servo control is changed while monitoring the presence or absence of abnormal discharge, the machining proceeds stably.



Machining adaptive control:IDPM3

High-speed/Low-wear machining with graphite electrodes

- High speed and low wear improve productivity even when machining with multiple electrodes.
- Suppresses edge wear, enables single electrode machining.

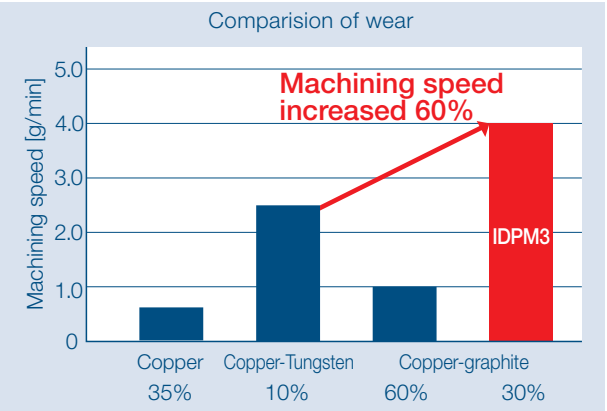


Conventional model:EA-V ADVANCE

Workpiece
Steel (SKD11)
Electrode
Graphite (TTK5)
Machining depth
30mm
Surface roughness
Rz12μm/Ra2.0μm

Tungsten carbide high-speed machining

- Machining speed is improved up to 60% with copper-graphite electrode by IDPM3.

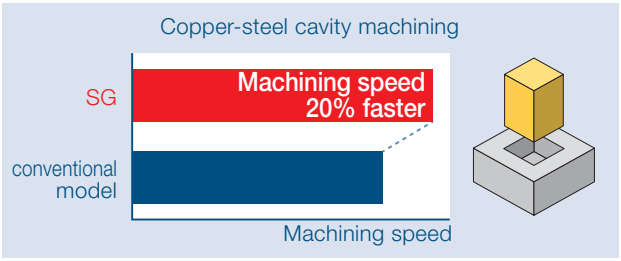


*Machining performance may vary depending on machine specifications and electrode materials.

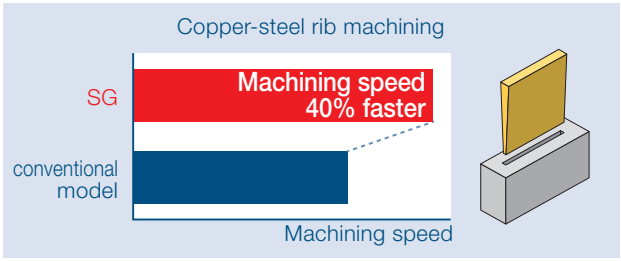
Machining speed improved with IDPM3 advanced adaptive control and SS Jump jump control

- Mitsubishi Electric's IDPM3 adaptive control is utilized not only for graphite electrode machining, but widely applied for copper electrode machining as well.
- Machining speed increased up to 40% by raising the speed and acceleration of the SS Jump jump control function.

▶SS Jump comparison video



Machining speed for □30mm:depth 9mm machining



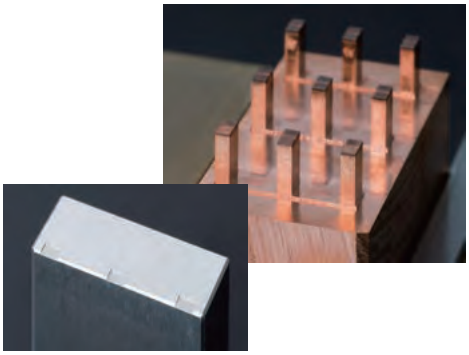
Machining speed for width 20mm:thickness 1mm:depth 20mm machining

New glossy mirror-finish circuit (HGM2 circuit)

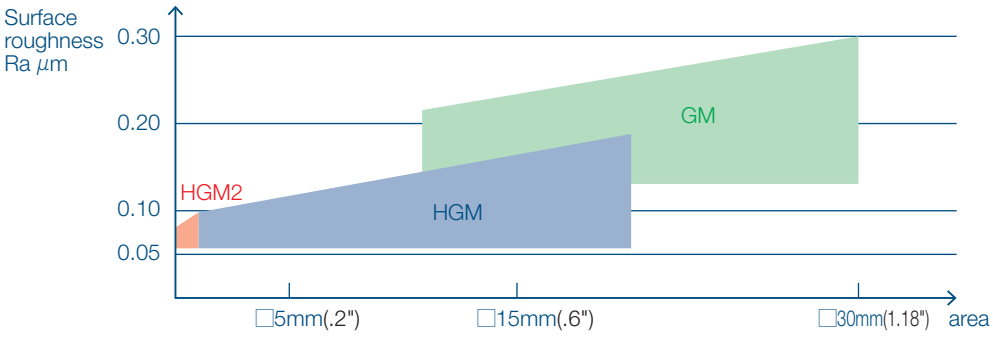
- Uniform surface finish with minimized pit by the smaller single spark diameter.

Conventional (GM circuit)
surface roughness: Ra0.1μm
Single spark diameter: 25 to 30μm(.0010~.0012")

New circuit (HGM2)
surface roughness: Ra0.06μm
Single spark diameter: 9 to17μm(.0004~.0007")



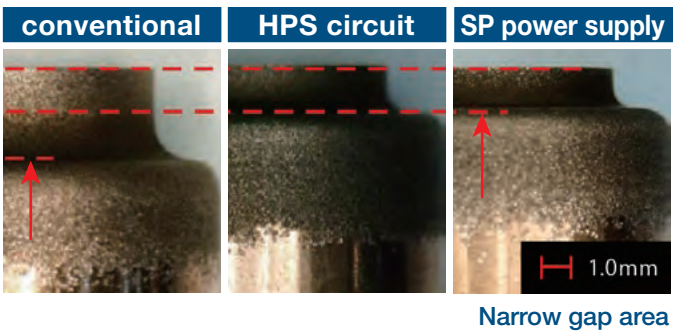
Workpiece	STAVAX
Electrode	Copper 1×0.8mm 3×3
Under size	0.05mm/side×6
Machining depth	0.2mm
Surface roughness	Rz 0.5μm Ra 0.06μm
Machining accuracy	In-corner R0.03mm



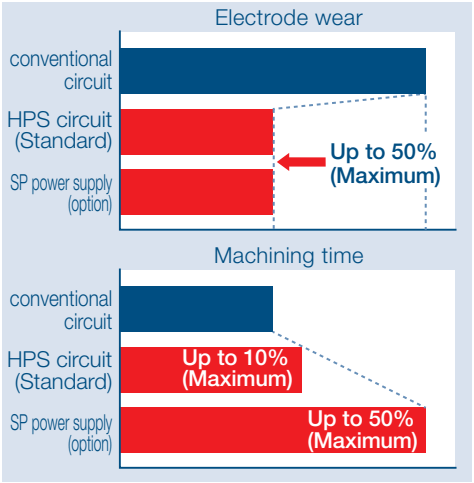
Wide range of glossy mirror-finish machining

Tungsten carbide machining (HPS circuit:Standard,SP power supply:option)

- Electrode wear of copper electrode dramatically improved.
- Improve tungsten carbide machining at most 50 % by a SP power supply.



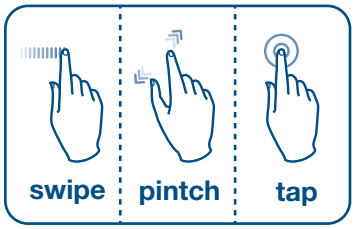
Narrow gap area



Operability

Control unit

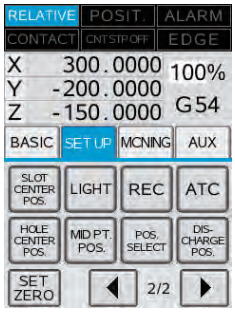
●Information is displayed on a new large19-inch touch screen.
●Keyboard and mouse are standard.
●Intuitive operation is performed by gestures on a multi-touch supporting panel.



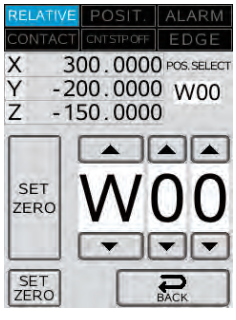
Thin LCD operation box

●The new design of the thin liquid crystal manual pendant box improves workpiece setup and saves time.
●The hand-held operation box is equipped with an LED flash light on the back.

●Magnified view of coordinates



●Various setup functions
●Screen customization



●Teaching function

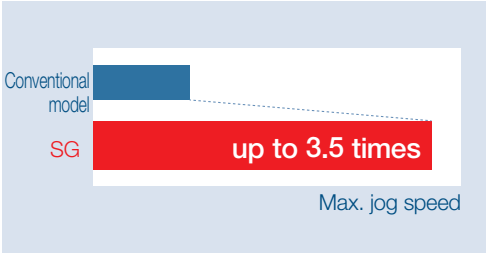
Setup

●Increase the number of T-slots on table for easier workpiece setup.

SG8

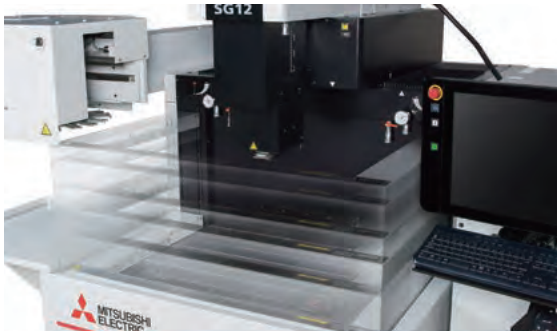
SG12

●Setup time reduced by faster jog speed.
Jog speed can customizable.



3-sided automatic elevation tank

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



Built-in scheduler

●Continuously run multiple programs on a schedule.
・Automatic multiple programs operation just by a single machine even without an external controller or machine.
・Easy to check if no multiple times usage of electrode.

●Schedules can be added and edited during machining.
・Schedules can be skipped and the registered status (such as waiting) can be changed easily.

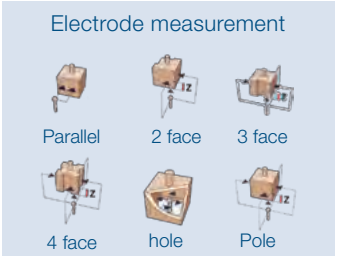
Electrode/Workpiece measurement

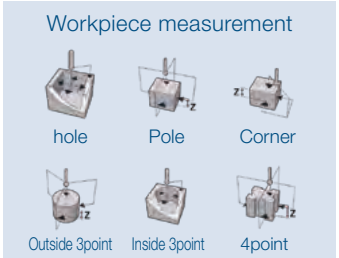
●Electrode alignment by electrode measurement screen.

●Workpiece alignment by workpiece measurement screen.

Electrode measurement screen

Workpiece measurement screen





Operability

D-CUBES

"Fast" and "Ergonomic"operation
Excellent performance with "Easy operation","human error reduction" and "connect ability" supporting productivity improvement for customers.

Operation

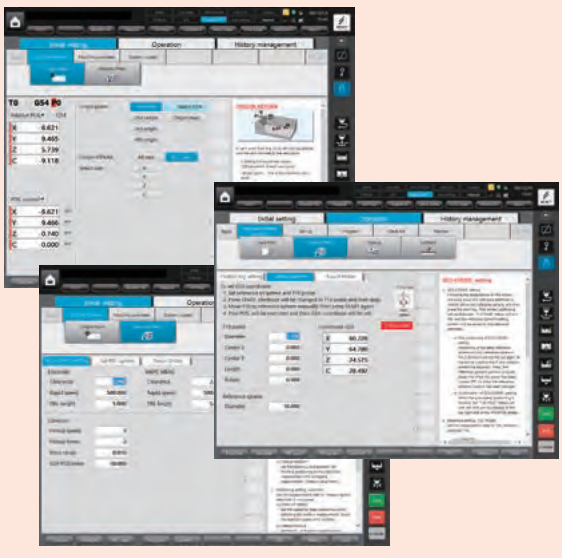
■Pre-machining preparation
●The maintenance manual as well as maintenance log are supported.
●Reduction in machine down time from insufficient maintenance.

■Setup
Changing electrodes, moving axes, and setting the working tank height.
●**Workpiece measurement**
Positioning workpieces, measuring workpiece offset, and checking dimensions.
●**Electrode measurement**
Measurement of electrode center, dimension check.

■Program
●"Action menu" helps your operation. Table form programing display "ESPER D-CUBES".

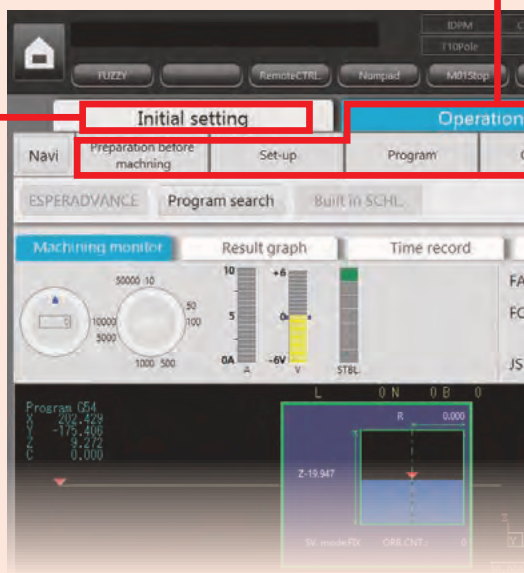
Initial setting

To set items which do not change daily like probe information, origin position, jog movement speed e.t.c.
●Basic machine settings, such as axis movement speed, measurement operation, and ATC operation.



Main menu

Navigate you by three tabs to set and check the setting quickly. This enables anyone to use information easily without any confusion about operating procedures and operation methods.



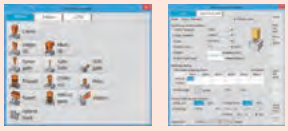
HOME

Easy to understand machining progress and screen selection.

- The machining progress status can be understood at a glance. (machining path, remaining time,consumables)
- Operation screens are intuitively selected by one-touch on screen buttons.

Search machining condition

- The suitable condition is selected by factor selection and narrow down search.
- Adjustment bar for choosing "Speed" or "Uniformity".



Machining time estimation function

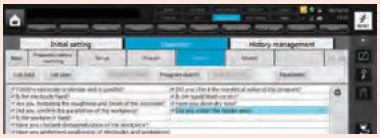
- Simply estimates machining time.
- Corrects the estimated time for improve estimated accuracy.

■Check list

All necessary operations to be performed before machining can be checked.

Check list

- The pre- machining checklist is displayed.
- The machine cannot be started if any checklist item has been skipped.
- Errors by operators who are not accustomed to using the machine are prevented.



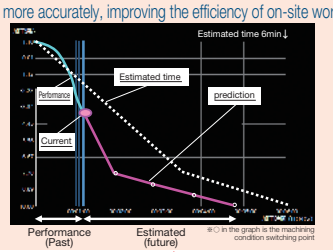
■Machining Monitor Screen

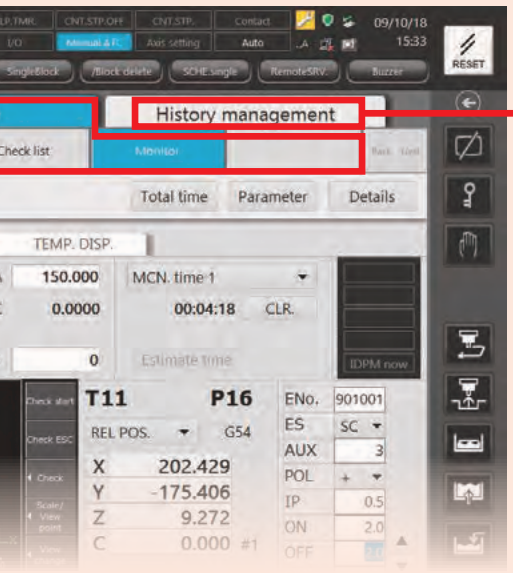
Maisart realized the visualization of operation status on screen.

Automatic setting of adaptive control

- Our EDM know-how optimizes machining through automatic control settings.

- As machining progresses, the machining end time is updated more accurately, improving the efficiency of on-site work.



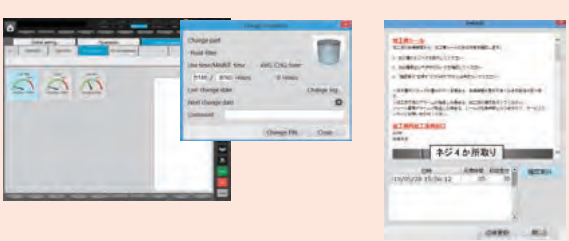


Machine log management

The operation event log, inspection and maintenance log consumables, and cost can be managed.

■Consumables management

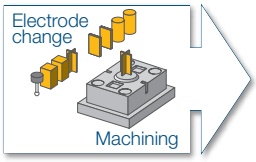
- The consumables screen manages usage time and replacement log of all consumables.
- Machine supports management of consumable usage time and replacement history
- Prevent forgetting replacement at screen message
- Predict machining tank seal life on screen



Automation Support e-F@ctory

LS-10T/20T Tool changer

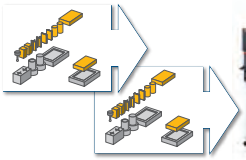
●Automatic electrode change enables continuous operation.



▼LS-ATC operation

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

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



Peripheral equipment/System extension options

Scheduling system

E.S.P.E.R SCHEDULE

●Execute continuous schedule operation of EDMs with job management(*) . (manage up to five EDMs)
●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

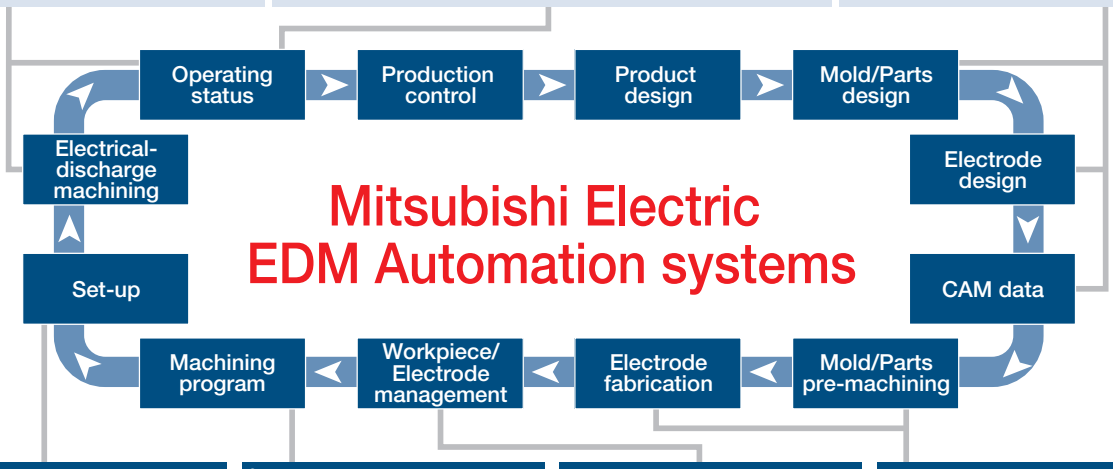
Machine remote monitor

●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

Cam Magic AD

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



Touch probe

Workpiece touch probe

●Support in-line setup
Reduces core alignment measurement*3 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 are possible(*) .
●Same screens and operability as ESPERADVANCE, and compatible with 64-bit models. (MA, EA Series machining condition search is also available)
●Import data from AD or EPX compatible CAD/CAM.

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

ID tag system

ID tag system

●Mounting status of carrier device robot is managed by ID tag which mounted electrode and workpiece pallets.*2
●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

Coordinate measuring machine

●Supports setup operation at machine offline, and setup time can be reduced.*1
●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.

MEMO

Power Supply / Control Specifications and Options

Power Supply and Control Specifications

	Model	SG8M	SG12M
Power supply unit	Power supply model	GV80	GV80 (option GV120)
	Maximum machining current peak [A]	80	80 (option 120)
	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 (HGM, HGM2 circuit), Narrow gap circuit, SS Jump, AI Adaptive control (Maisart/IDPM3)	
	Power supply system	Compact, resistor-less, low-heat generation, power regenerating energy-saving method	
	Cooling system	Indirect cooling	
Control unit	Control unit	C41EA-2	
	Input method	Keyboard, USB flash memory, Ethernet	
	Pointing device	Touch panel, mouse	
	Display	19-in color TFT-LCD	
	Display characters	Alphanumeric characters	
	Number of control axes	Four axes (max.)	
	Setting (command) unit	XYZ···0.0001mm, C (rotary axis) ···0.0001deg	
	Minimum drive unit	XYZ···0.0001mm, C (rotary axis) ···0.0001deg	
	Manual feed	High-speed, low-speed, inching 0.001mm/0.01mm, extension mode (high-speed, low-speed), maximum feedrate: 7,000mm/min(XYZ)	

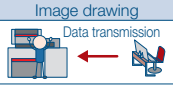
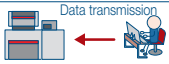
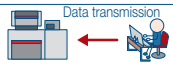
Power Facilities Capacity

Model	SG8M		SG12M	
Power supply	GV80	GV120	GV80	GV120
Maximum machining current average [A]	60	100	60	100
Maximum machining current peak [A]	80	120	80	120
Dielectric fluid chiller unit [kW]	1.74	3.5	1.74	3.5
Total input capacity [kVA] *1	6.5	9.5	7.0	10.0
Machine-generated heat value [kW] *2, *3	3.9	5.7	4.2	6.0

*1 Please add 5[kVA] for total input capacity with SP power supply specification.
*2 Reference value (heat value (kW) = Total input capacity (kVA) × 0.6)
*3 Please add 3[kW] for machine-generated heat value with SP power supply specification.

Network connection specifications (DNC, FTP)

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

Required specifications	Image drawing	Required option	Supplement
Operate on the EDM side and receive data from personal computer.		LAN/W (standard)	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 data area.		FTP (standard)	Data can be received only using data I/O operation.
Operate on the personal computer side and send data to the EDM.		LAN/W (standard)	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 data area.		DNC (standard)	Commercially available DNC software must be installed on the personal computer side. Refer to DNC specifications operation for details.
Automatically send data from machining machine to FTP server		Operating status data output	Customer should prepare FTP server

Options

Options and retrofit specifications 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				SG8M	SG12M
Machine main unit	Lubricant	Automatic lubrication unit		◎	◎
	Scale	Scale feedback specification	Z-axis	●	◎
			XY-axis	●	●
	Thin LCD operation box			◎	◎
Dielectric fluid system	Fluid system	Dielectric fluid emission automatic control function		●	●
		Dielectric fluid suction function		○	○
		Programable flushing function		●	●
		Dielectric fluid distributor		○	○
Power supply	Main power supply	GV80		◎	◎
		GV120		×	●
	Special power supply	NP2 circuit		×	×
		Narrow gap circuit		◎	◎
		Glossy mirror-finish function (LLTX)		○	○
		Mirror-finish circuit (HGM2)		◎	◎
		Machining circuit for difficult-to-machine materials (HPS)		×	×
		SP power supply (exclusive for tungsten carbide machining) *10		●	●
		EDCorting		×	×
Head-side tooling	High-rigidity C-axis *4			●	●
	High-accuracy built-in spindle *4			●	●
	Automatic clamp *4			●	●
	Removable holder (3R-16M-MACRO-R specification)			●	●
ATC	LS	10T	3R MACRO	●	●
			3R Combi	●	●
			EROWA ITS 50 *5	●	●
			EROWA ITS Combi *6	●	●
		20T	4R MACRO	●	●
			4R Combi	●	●
			EROWA ITS *5	●	●
			EROWA ITS Combi *6	●	●
	MVH	20T	3R MACRO	×	×
			3R Combi	×	×
			EROWA ITS	×	×
		40T	3R MACRO	×	×
			3R Combi	×	×
			EROWA ITS 50	×	×
Control unit	Commu-nication	External signal output (M code)		●	●
		External signal input/output (M code with answer) *7		●	●
		LAN, DNC H/W *10, S/W, FTP *8		◎	◎
		ESPERADVANCE PRO lite *9		×	×
		ESPERADVANCE PRO *9		○	○
S/W	3D data import			○	○
	3D check function			○	○
	e-manual (electronic instruction manual)			○	○
	Built-in scheduler			◎	◎
	Anti-virus protection			○	○
Display	Run timer			○	○
	Warning light (Tower type)			○	○
	Warning light (Built-in type)			●	●
Miscellaneous	Simple operation manual in English			◎	◎
	Operation manual (paper)			○	○
	LED type working lamp DC24V			○	○
	Tool and tool box			○	○
	Workpiece clump setting fixture			○	○

*4 Select the chuck from the following types. (3R-MACRO, 3R-Combi, EROWA-ITS50)
*5 For 3R Combi Macro and Macro Jr can be used.
*6 Only the ITS50 specification is available, and the centering plate 50 can be used.
*7 External signal output (M code with answer) is necessary for attaching external equipment that requires an answer signal.
*8 LAN cables should all be straight wiring with shielding connector, Category 5 (100BASETX compliant), STP (four-shielded twisted-pair). A switchable hub capable of supportin shielded LAN cables should be used.
*9 Proprietary personal computer is to be acquired separately.
*10 When selected, the machine installation dimensions will change.

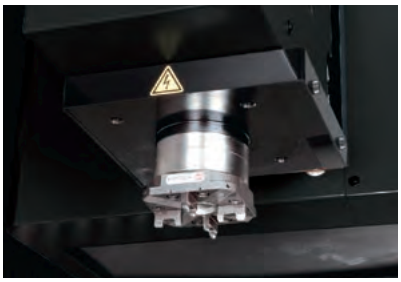
Head-side tooling

* Tooling should be selected

Removable holder

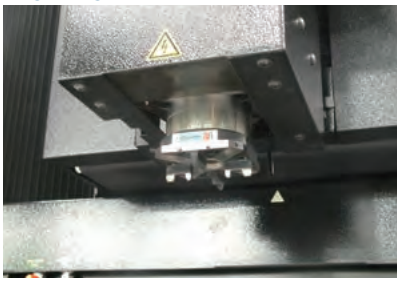
3R-16M-MACRO-R specifications

Automatic clamp



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

High-rigidity C-axis



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

ATC

LS type 10T (Auto Tool Changer)

Change up to 10 electrodes
Supports continuous machining using many electrodes

LS type 20T (Auto Toll Changer)

Change up to 20 electrodes
Supports continuous machining using many electrodes

Display

Warning light (Built-in type)

Machine operating status

Warning light (Tower type)

Machine operating status

LED type working lamp

The power supply specification of LED lighting is 24V DC

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

Tooling

EROWA System Chart

Z axis

Chuck

■C-axis/Spindle/Automatic clamp


(Combi specifications)


(ITS specifications)

ITS

Chucking plug

Compact


ER-029098


ER-015465


ER-010755

Electrode/Pallet holder (common for electrode and workpiece)


ER-029015


ER-034045


ER-017532

ITS50 (Centering plate 50)


ER-009214


ER-010793


ER-009219


ER-009222


ER-009226


ER-008458


ER-009235


ER-008566

ITS100 (Centering plate 100)


ER-011599


ER-036658
Centering plate G


ER-008519
MS palette ϕ115

Measuring

■Measurement probe


EJ-1433


EJ-1424(ϕ5mm)


EJ-1427(ϕ2mm)

■Master


ER-008617


ER-010723


ER-032819

■Microscope


ER-032464

Table chuck


ER-029391 (power chuck)


ER-024312 (power chuck)

MC
Die-sinker


ER-036345


ER-037970


ER-012299

WEDM


ER-007852


ER-022583

Lathe


ER-029391 (power chuck)


ER-037970

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

System 3R System Chart

Z axis

Chuck

■C-axis/Spindle/Automatic clamp


(Combi specification)


(MACRO specification)

■Removable holder


3R-16M-MACRO-R

(Adaptor plate : 3R-A400-12
Pallet holder : 3R-600.24-S
3R-605.2 included)

Draw bar

Junior MACRO


3R-405.11

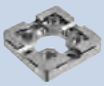

3R-405.16

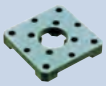

3R-605.1


3R-605.2

Electrode/Pallet holder (common for electrode and workpiece)


3R-491E


3R-651.7E-XS(S)(P)


3R-601.7E-P


3R-658.2E-S


3R-658.4ES


3R-653

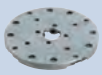

3R-659.16-P
3R-659.20-P
3R-659.32-P


3R-322.50E

MAGNUM


3R-681.51

MAGNUM


3R-681.71

Measuring

■Measurement probe


3R-656.21-SP01(ϕ1mm)


3R-656.21-SP03(ϕ3mm)

■Master


3R-606


3R-606.1

■Microscope


3R-4.650

Table chuck

 3R-602.10-1	 3R-610.46	MAGNUM  3R-680.10-2	MC Die-sinker	 3R-600.24-S	 3R-610.21-S	MAGNUM  3R-680.24-S
 3R-600.24-4RS	 3R-622.2		WEDM	 3R-602.27	 3R-602.27-1	
		 3R-90588	Lathe	 3R-600.22	 3R-600.20	 3R-612.6

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

Preparation for Machine Installation / Cautions

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 × width)	(m)	
3) Constant-temperature dust-proof room entrance dimensions (height × 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 (Installation in Japan)

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 (Shell Lubricants Japan Paraol 250)

Table of dielectric fluid properties

Item \ Product brand	Shell Paraol 250
Density g/cm³ (@15℃)	0.797
Flash point ℃ (PM)	92
Kinematic viscosity mm²/s (@40℃)	2.42
Appearance	Clear and colorless

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

■Dielectric fluid example <JXTG Nippon Oil & Energy Corporation Metal Work EDF-K2>

Table of dielectric fluid properties

Item \ Product brand	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

*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)
· 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).

②Tolerable vibration of floor
EA8S/12S, EA28V ADVANCE, EA40/EA50 ADVANCE specification, SG8, SG12
· 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.
SV8P, SV12P, EA8PS, EA12PS
· 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.

③Foundation
· The floor should be concrete with a thickness of 400mm (15.7") or more so it can sufficiently withstand the system's weight.

④Room 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.

⑤Ventilation 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 SG12 + GV80, 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 25 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
~11.9	NF50-CV (50A)	NV50-CV (50A)
12~21.9	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 [mm²]
~8.9	5.5
9~11.9	8.0
12~14.9	14.0

Total facility capacity [kVA]	Cable size [mm²]
15~20.9	22.0
21~28	30.0

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 14mm² grounding wire.

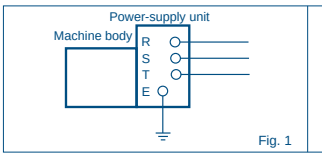


Fig. 1

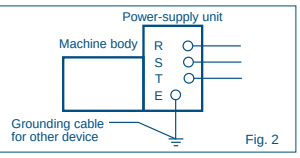


Fig. 2

5. Primary air equipment

The standard SV-P 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: 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 : 27 ℓ/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.

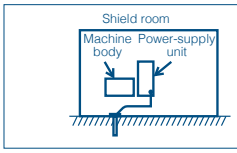


Fig. 3

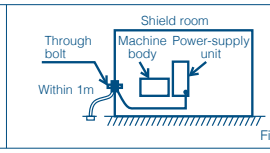


Fig. 4

Precautions for selecting earth-leakage breaker

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

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 measures.

Recommended sliding surface lubricants

Use the following lubricant for sliding surface

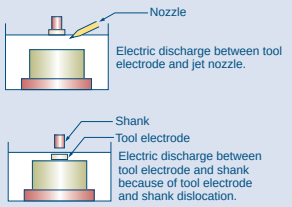
As of Febraly 2020

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 GV80P or 100mm (3.94in) or more GV120P 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 2,000ℓ, tanks which have passed a voluntary water leakage test). Note that the safety devices must be periodically inspected. Refer to the instruction manual (safety manual) when using the EDM.

Automatic fire extinguisher

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

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.

2. Coverage

(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).
Coverage exceptions:
①When a failure occurs that was caused by a machine modification that directly affects the machine's functioning or accuracy.
②When a failure occurs caused by the use of non-standard parts, consumables or lubricants.
③When a failure occurs caused by a natural disaster such as lighting, earthquake or storms and flooding.
④When 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

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:
①Damages caused by any cause found not to be the responsibility of Mitsubishi.
②Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
③Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
④Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

(3)Information regarding what should be revised or improved acquired during product support may be used to improve product quality or services.

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

①Nagoya Works
Programmable controllers, display panels (HMI), AC servos, inverters, industrial robots, CNCs for power distribution transformers, EDMs, laser processing machines

②Kani Factory
Electromagnetic switchgear

③Shinshiro Factory
3-phase motors, IPM motors

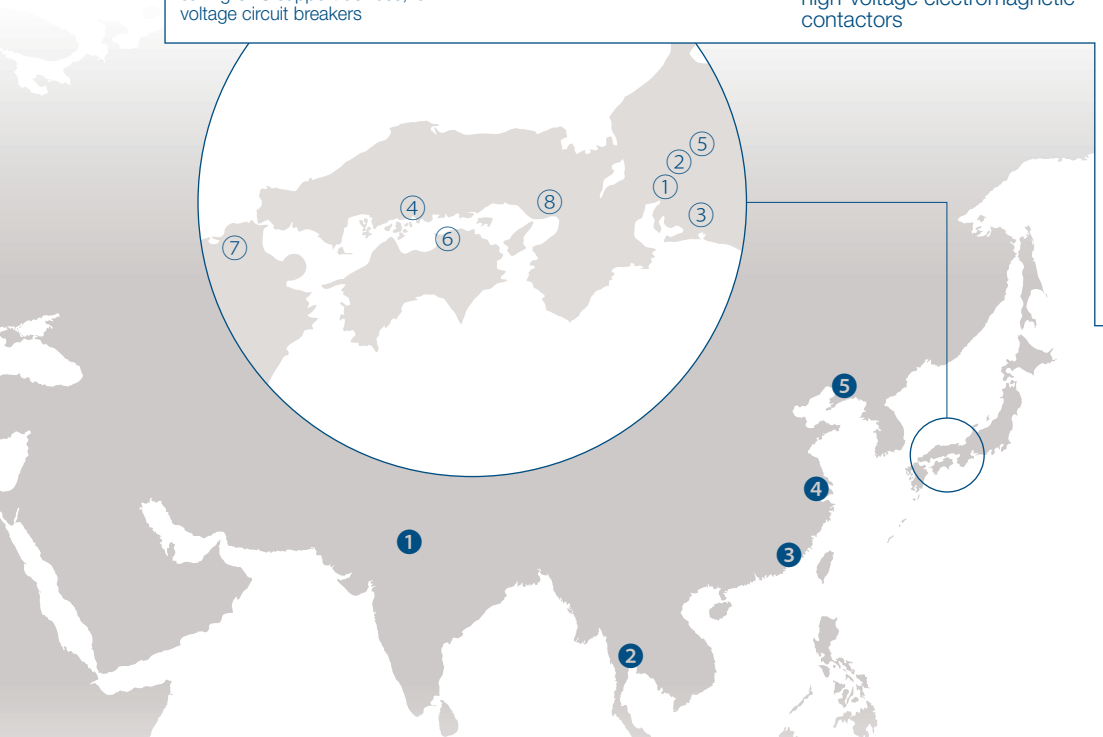
④Fukuyama Works
Power management meters, energy-saving UPS support devices, low-voltage circuit breakers

⑤Nagatsugawa Works
Pressurized ventilators

⑥Power Distribution Systems Center
High-voltage circuit breakers, high-voltage electromagnetic contactors

⑦Mitsubishi Electric Factory Industrial Products Corporation
Geared motors

⑧Tada Electric Co., Ltd.
Electron-beam processing machines



❺China (Dalian)

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

❶India (Pune)

Mitsubishi Electric India Pvt. Ltd.
Inverters

❷Thailand (Bangkok)

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

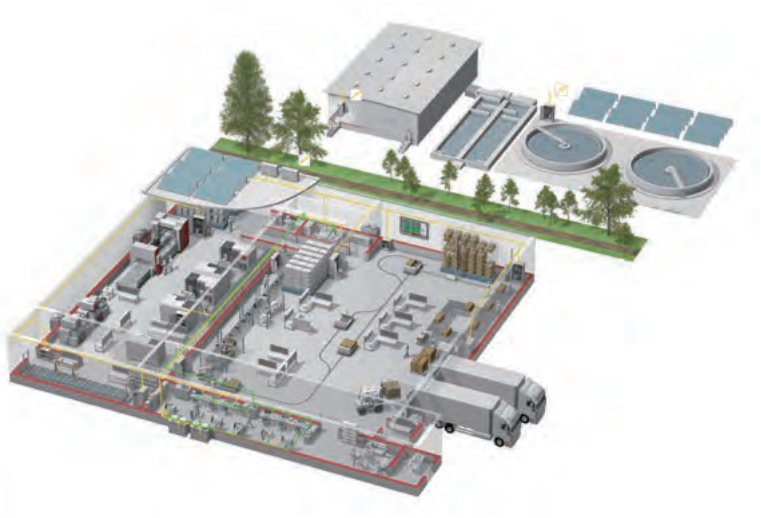
❸China (Xiamen)

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

❹China (Changshu)

Mitsubishi Electric Automation 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.

Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

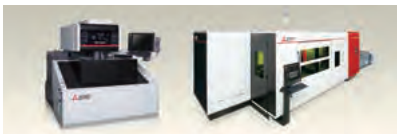
Compact and Modular Controllers

Inverters, Servos and Motors

Visualisation: HMIs

Numerical Control (NC)

Robots: SCARA, Articulated arm



Processing machines: EDM, Lasers, IDS

Transformers, Air conditioning, Photovoltaic systems

* Not all products are available in all countries.