



Changes for the Better

for a greener tomorrow 

CO₂ 2-Dimensional Laser Processing Systems eX Series



2-Dimensional Laser Processing Systems

Next-Generation 2-D
Laser Processing System



for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

MITSUBISHI ELECTRIC CORPORATION
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Specifications are subject to change without notice.

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1982 MH Series

1983 MX Series

1986 L Series

1994 LB Series

1995 LX Series

1998 LZ Series

2001 LV Series

2008 LVPlus Series

The Revolutionary New *eX* series High Speed Flying Optic CO₂ Laser



eX Series
2-Dimensional Laser Processing Systems

Advanced Solution for Productivity and Environmental Requirements

The eX delivers maximum productivity and incorporates 2 Action Cutting which provides extremely simple operation. It also features an ECO mode that reduces power consumption during standby by up to 99%*. *In-house comparison

e **xcellent** [high performance]

The faster processing speed and optimized control system of the eX Series reduces thin-plate processing time by approximately 20%*. The cutting-edge piercing technology allows for about a 30% reduction* in processing time of mid-thick and thick mild steel plates. *In-house comparison

e **cology** [energy-saving]

When not processing, the system switches to ECO mode and the resonator stops idling. Minimizes energy consumption, reducing running costs by up to 99%* during standby. Quickly resumes normal operation.

Mitsubishi Electric's original resonator reduces CO₂ emissions by approximately 30% compared to standard high-speed, axial-flow resonators.

*In-house comparison

e **asy to use** [simple operation]

2 Action Cutting allows for the entire process, from job setup to parts cutting, to be completed in two simple actions. Delivers easy operation and stable performance. CAD/CAM computer, connected via network, is a great aid for operators on the shop floor.

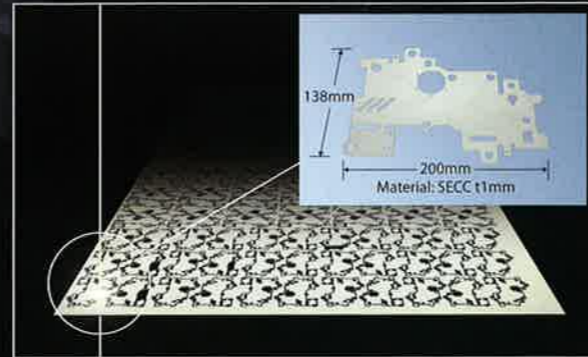
 **MITSUBISHI**
ML3015eX

Faster Moving Axes

Increased machine tool rigidity, Helical Rack and Pinion on the X and Y axes and optimized path-control technology result in approximately 1.2 times faster movement and 2 times faster acceleration speeds compared to previous model. The result is amazingly short processing times.

Thin-plate High-speed Cutting

Productivity has been dramatically enhanced owing to improved acceleration and the latest control technologies exclusive to Mitsubishi Electric. An example is Dross Reduction (DR) Control, which contributes to high-speed corner processing while maintaining high quality.



■ Comparison when cutting 159 parts of the above sample

Processing time (SECC t1mm)



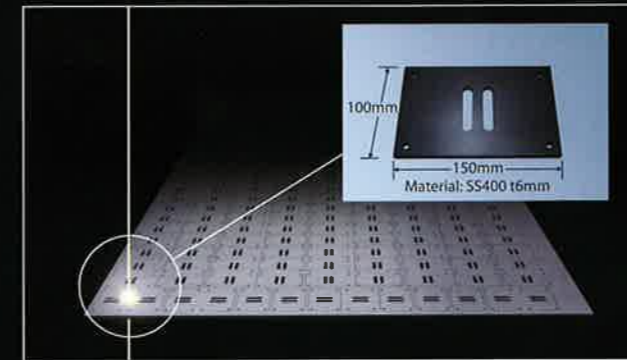
Operating cost (SECC t1 mm)



Mild-steel Cutting

Less time is required for piercing and changing conditions, resulting in substantially reduced operating cost and enhanced productivity when cutting medium and thick mild steel plates.

Mid-thick mild steel



■ Comparison when cutting 247 parts of the above sample

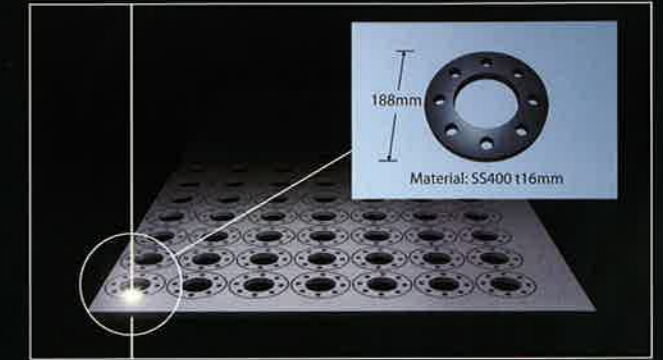
Processing time (SS400 t6mm)



Operating cost (SS400 t6 mm)



Thick mild steel



■ Comparison when cutting 105 parts of the above sample

Processing time (SS400 t16mm)

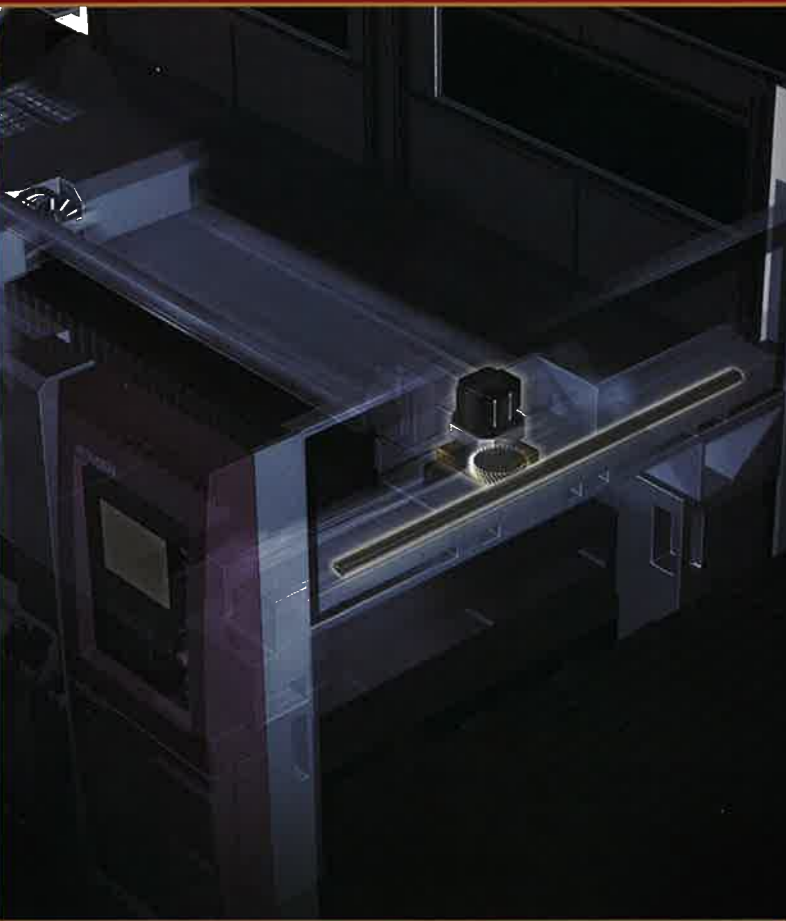


Operating cost (SS400 t16mm)



Calculation conditions

Electricity cost	Laser-gas cost	Assist-gas (N ₂) cost	Assist-gas (O ₂) cost
20 yen/kWh	8.94 yen/L	0.15 yen/L	0.13 yen/L

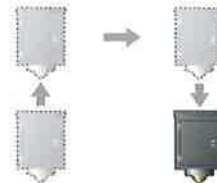


Technologies Supporting Thin-plate High-speed Cutting

Head retraction method

The optimum retraction method may be set according to the material and plate thickness. Minimize processing time and achieve better stability by selecting the best retraction method.

Normal retraction (LZ/LV/eX)



Diagonal retraction (LV/eX)



Arc retraction (eX)



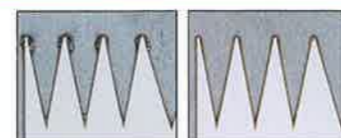
Faster Z-axis

In addition to the latest control technologies, travel in the Z-axis is 3 times faster and has twice the acceleration speed (compared to previous model), enabling shorter processing times.



Dross Reduction (DR) Control

DR Control reduces dross adhesion at corners, realizing high-speed processing while maintaining high quality.



Outstanding Productivity for Thin & Thick Plates

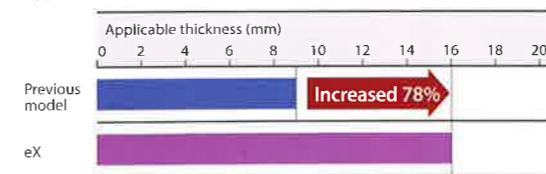
High-speed Cutting Technology for Mid-thick Mild Steel Plates

Blow piercing

Produces smaller piercing holes faster in mild steel up to t16mm in thickness by controlling the oxidation reaction and optimizing beam quality.



Applicable thickness of blow piercing



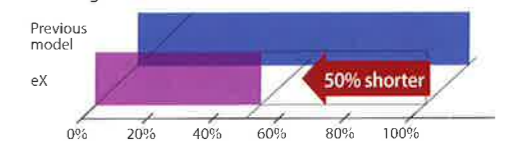
High-speed Cutting Technology for Thick Mild Steel Plates

Beat piercing

High-peak power control realizes the same level of quality as the previous slope piercing while reducing the piercing time of mild steel up to t25mm by a maximum of 50% compared to the previous model.



Piercing time



* Material / Thickness: Mild steel / t25mm Piercing time on eX as compared to previous model which is taken as 100%

* Data in this catalog is for reference only, and may vary from actual values.

excellent
ecology

[simple operation]
easy to use

Barcode reader (handle box shown on left)

Step 1
① Read barcode

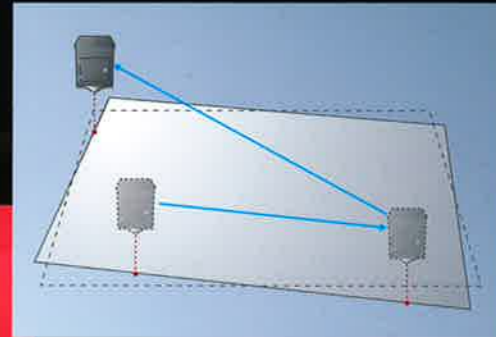
② Automatically loads onto NC

Simple 2-action Processing

Automatic setup realizes simple operation in two effortless actions. This not only prevents operation and setup errors, but also contributes to enhanced productivity.

Step 2

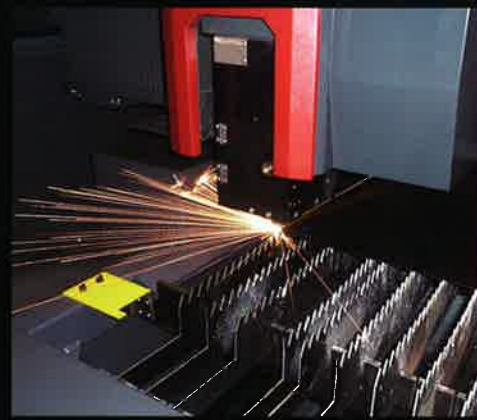
③ Press the start button



⑤ Automatic tilt measurement
Automatically measures the tilt of the workpiece on the work table



④ Automatic nozzle change and height calibration



⑥ Starts cutting

The f10 specifications shown in the photo are optional.
*The nozzle changer is optional.

Extremely Versatile - From Simple 2-Action Processing to Advanced Applications

Easy to Use, Even for Beginners

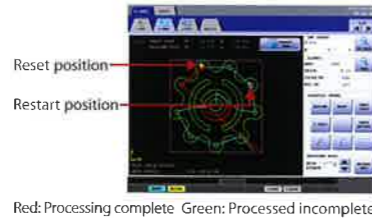
Simple Nesting

Allows for rectangular nesting at the laser's NC control to meet urgent needs for additional parts.



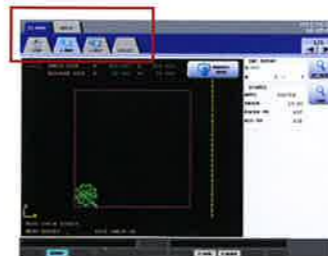
New Reset - Restart Function

If the system resets in the middle of processing, it will easily restart cutting once the cause of stoppage is eliminated. Allows the operator to check and adjust the restart position quickly and easily on the control.



E-Processing mode

A novice-friendly operating environment can be created by hiding the advanced settings screen.



Features Designed for Experienced Operators

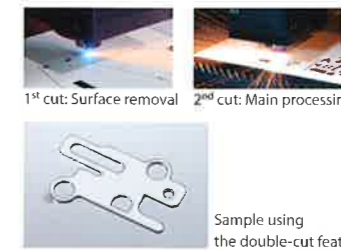
Pro-Processing mode

The advanced settings screen can be displayed for advanced laser applications.



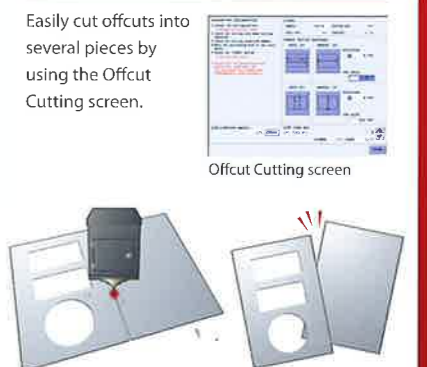
Double-cut function

Allows high quality cutting of poor quality material and protected sheet metal, which often causes cutting defects, in two runs.



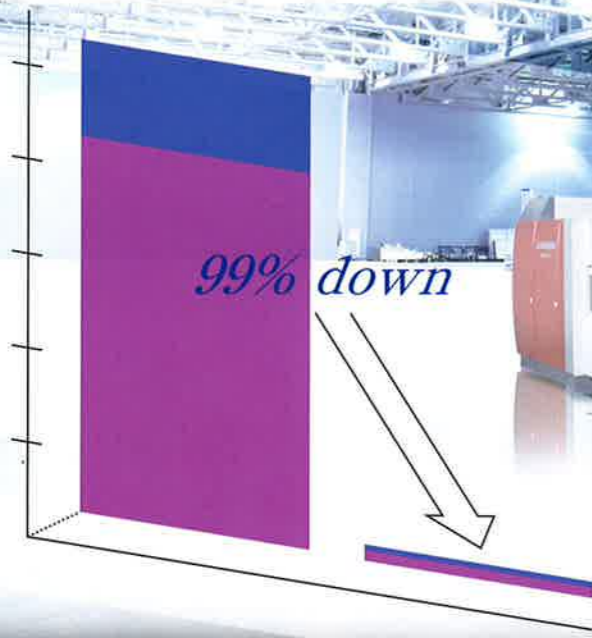
Offcut Cutting

Easily cut offcuts into several pieces by using the Offcut Cutting screen.



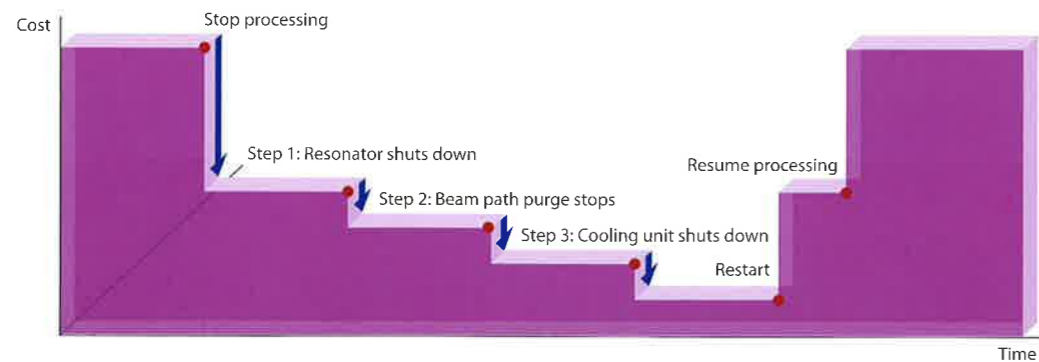
ECO mode available for increased energy savings

Costs during standby have been dramatically reduced by incorporating Mitsubishi's original just-on-time discharge method. ECO mode allows the processing machine to quickly resume operation.



Eco mode

After processing, equipments automatically shut down one by one.
 Step 1: Resonator shuts down ▶ Step 2: Beam path purge stops ▶ Step 3: Cooling unit shuts down
 This process reduces costs during standby by up to 99%.
 Processing machine will resume processing in 1 to 3 minutes* after pressing the LASER key.
 * Time required for equipments to resume operation varies depending on the equipment and the conditions of use.



Energy-saving/Low Operating Cost

Reduced assist gas usage (ECO conditions)

A technology that optimally controls assist-gas conditions has realized a large reduction in the consumption of nitrogen gas.



■ Comparison when cutting 45 parts of the sample on left

Processing time (SUS304 t12mm)

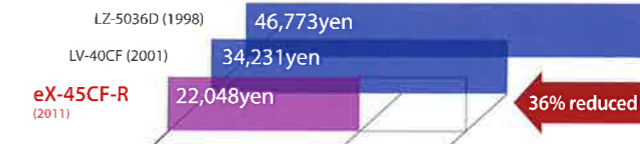


■ Calculation conditions

Material	SUS304
Thickness	t12mm
Electricity cost	20 yen/kWh
Laser-gas cost	8.94 yen/L
Assist-gas cost	0.15 yen/L



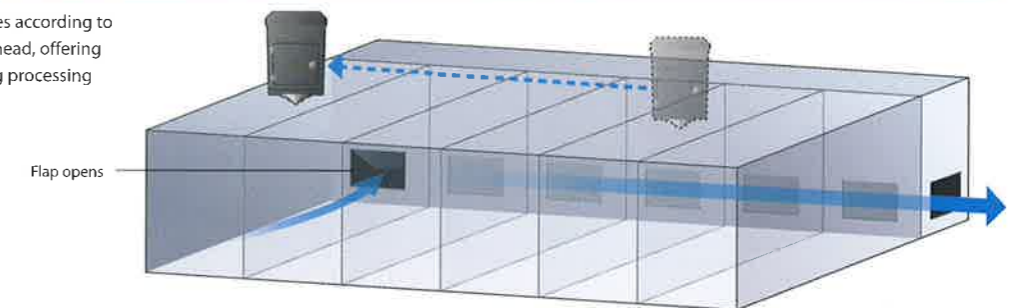
Operating cost (SUS304 t12mm)



Work Environment

Partitioned dust-collection function

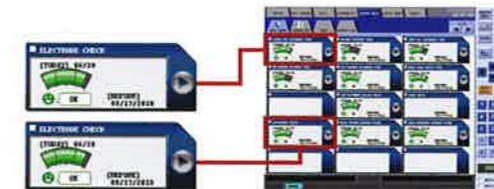
An automatic flap opens and closes according to the movement of the processing head, offering on-the-spot dust collection during processing



Ease of Maintenance

Self-check

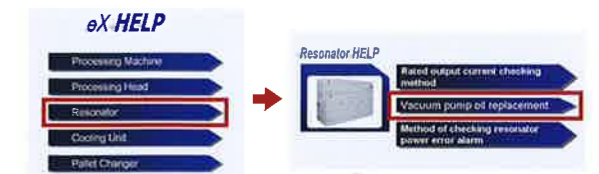
Monitors the main components on a regular basis and displays results on the screen. Supports continuous operation and preventive maintenance.



Help screen

Step-by-step instructions are given with pictures and illustrations to help operators perform important tasks for each component.

E.g.: Vacuum pump oil change



Vacuum pump oil replacement

Aging oil will cause the operation of the pump to deteriorate. Disable laser gas replacement and have negative influence on beam quality.

1. Turn the main breaker of the resonator OFF.

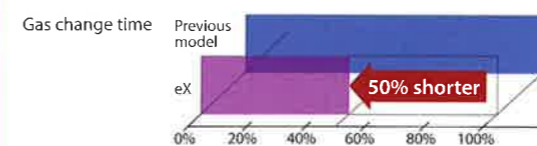
Resonator: 45F-R/35CF-R Lubrication: Ultra grade 15

2. Remove the cover at the bottom left corner of the resonator.



Laser-gas change

Gas change time is improved by 50% over previous model.

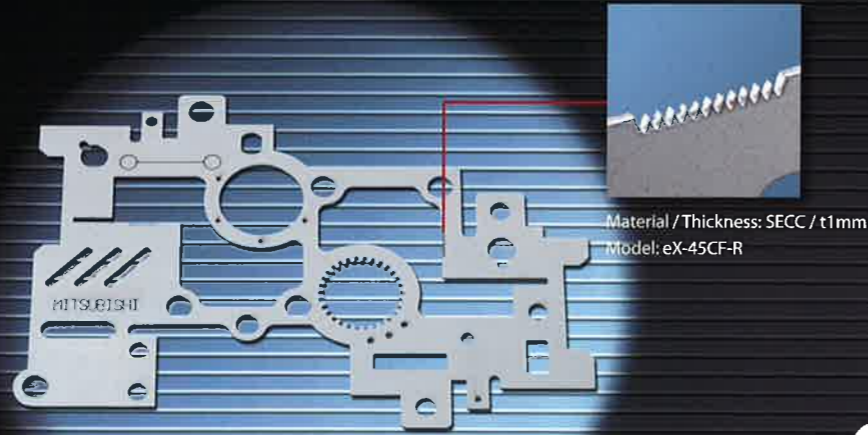


Lower Operating and Maintenance Costs

Cutting performance

Greater Flexibility Increases Cutting Capabilities

Thin plate



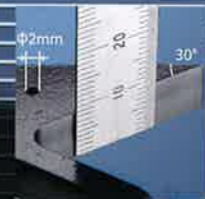
Material / Thickness: SS400 / t6mm
Model: eX-45CF-R



Mid-thick plate



Material / Thickness: SUS304 / t9mm
Model: eX-45CF-R

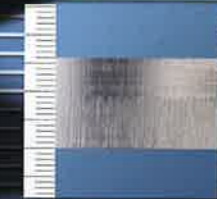


Material / Thickness: SS400 / t9mm
Model: eX-45CF-R

Thick plate



Material / Thickness: SUS304 / t25mm
Model: eX-60XF



Material / Thickness: SUS304 / t16mm
Model: eX-60XF
Brilliantcut



Material / Thickness: SS400 / t25mm
Model: eX-45CF-R



Material / Thickness: A5052 / t15mm
Model: eX-60XF

* The above are processing capabilities based on special conditions. The acceptance criteria are as stated in the specifications.

* The actual performance/quality may vary depending on the surface condition and deviation in the material composition even if materials are of the same specifications.

* Variations in processing performance/quality may occur depending on the part geometry.

* Regarding mild steel (SS400), capacities listed in this catalog are based on LS material (steel plate for laser cutting) of Chubu Steel Plate Co., Ltd.

* Optional features may have been used in the above cut samples.

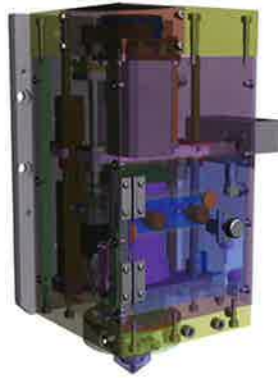
Key Technologies Ensuring High Stability and High Productivity

Mitsubishi Electric's cutting-edge technologies provide ultimate stability to ensure non-stop operation, realizing higher productivity and ease of maintenance.

Auto Focus Preset Head

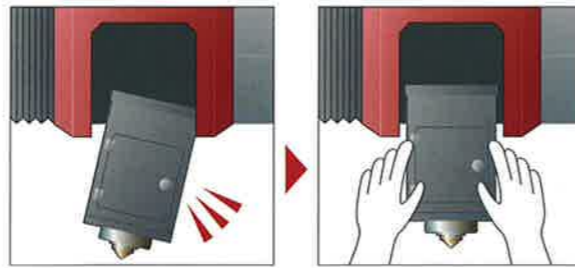
Automatically controls the focus according to the given NC command. Lens movement is five times faster*, realizing reduced piercing and processing times.

* Compared to previous model.



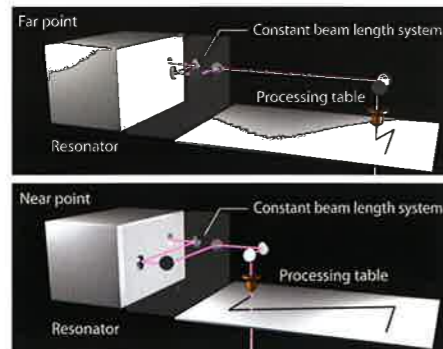
Magnetic Damage Reduction Mechanism

Incorporates a magnetic part to hold the processing head in position which allows recovery in less than 1 minute after collision.



Constant Beam Length System

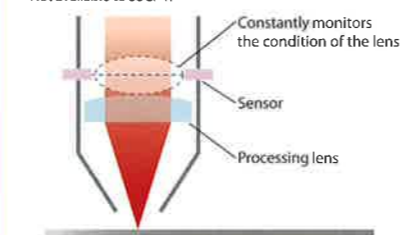
Maintains consistent beam quality by fixing the system's beam path length regardless of the position of the processing head. Provides stable and superior cut quality.



Processing Lens Monitor

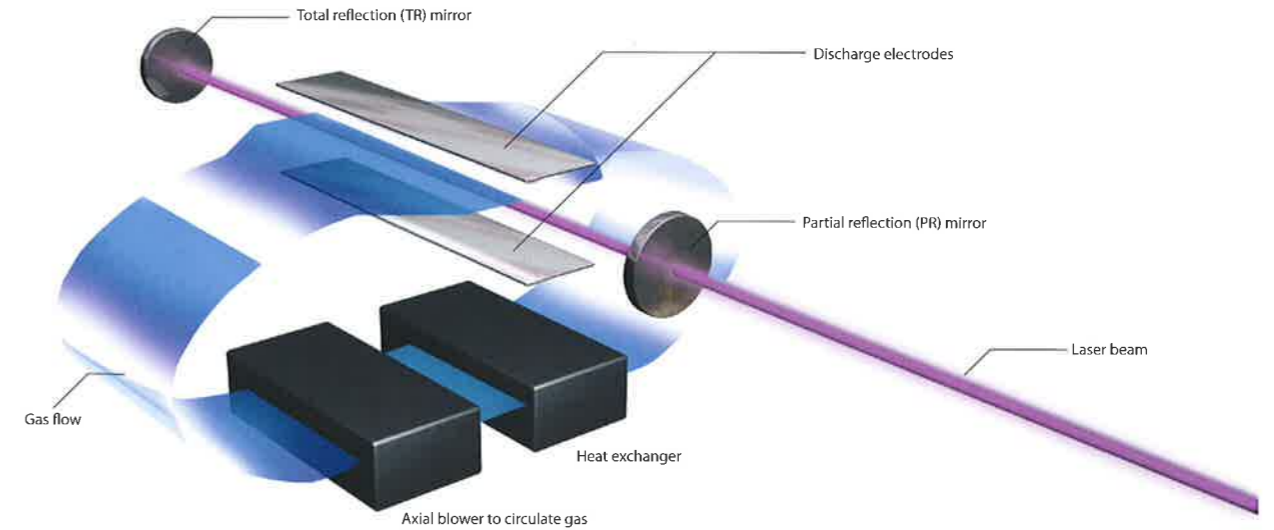
Monitors the condition of the processing lens at all times, contributing to stable performance.

* Not available to 35CF-R



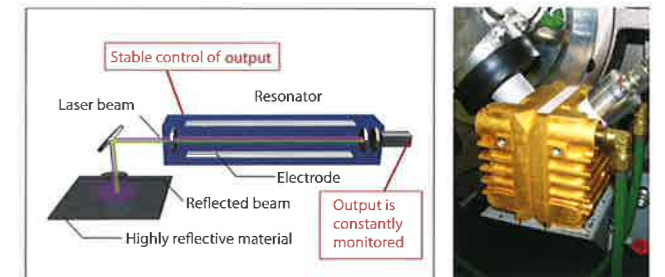
Unique Technologies Supporting Highly Reliable Processing

Mitsubishi Electric's resonator series realizes further enhancements in performance and stability, and incorporates original technologies that ensure high reliability.



High-speed power sensor

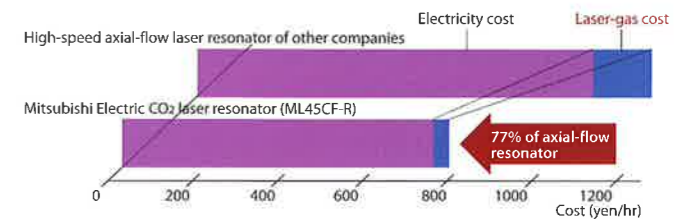
Mitsubishi's high-speed power sensor, which comes standard on the eX, monitors the laser output in real time. Maintains an output true to the desired setting with a power variation less than $\pm 1\%$. Allows processing of highly reflective materials such as aluminum and copper.



Patent No. 1836228
Kokoku
(examined patent publication)
No. 4-56479

Gas-sealed resonator

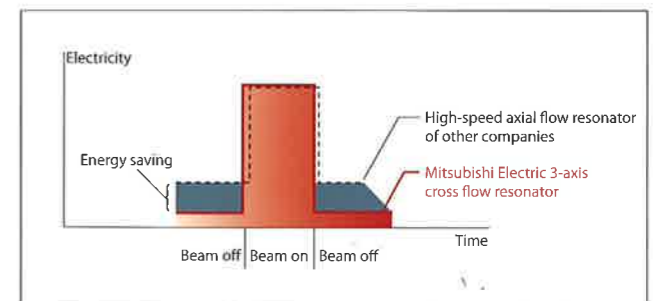
The seal-off operation reduces gas consumption to only about four gas cylinders per year (operating 250 days per year). Allows 24 beam on hours at rated power between gas changes. Significantly reduces operating cost and eliminates the need to change gas cylinders on a frequent basis.



* Comparison when processing a 16mm mild steel at a 50% operating ratio (resonator only, does not include processing machine)

Just-On-Time discharge method

The Just-on-time discharge method significantly reduces power consumption when the beam is turned off.



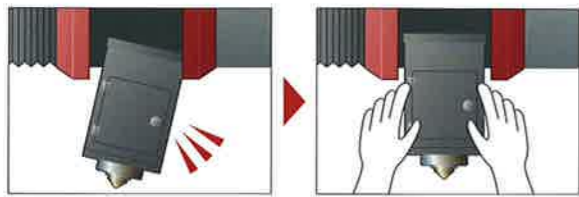
f254mm (f10") lens

Improves the processing capability when cutting stainless steel with nitrogen.



Magnetic damage reduction mechanism

Protects the head and eliminates the need for nozzle centering in the event of a crash. Allows quick recovery.



Automation pack

This combined package includes the magnetic damage reduction and a nozzle changer, realizing shorter setup times and higher productivity.

Magnetic Damage Reduction Mechanism

Nozzle Changer

These features reduce setup time and allow automated high-mix, low volume production, while maximizing productivity.



Optional Features

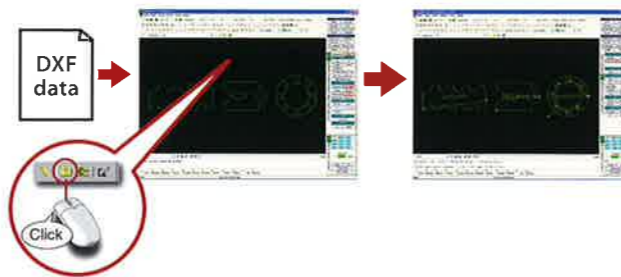
Options	eX			
	ML35CF-R	ML45CF-R	ML60XF	
Processing machine	f127mm (f5") lens	Standard	Standard	Standard
	f254mm (f10") lens	-	○	Standard
	Oil spray	○	○	○
	Magnetic damage reduction mechanism	○	○	○
	Automation pack (magnetic damage reduction + nozzle changer)	○	○	○
	Work lifter	○	○	○
Control unit	Processing lens monitor	-	Standard	Standard
	Network download	○	○	○
Solutions	CamMagic LA (CAD/CAM exclusively for lasers)	○	○	○
	Linked nesting	○	○	○
	Linked DXF conversion	○	○	○
	Linked e-mail notification additional features	○	○	○

CamMagic LA

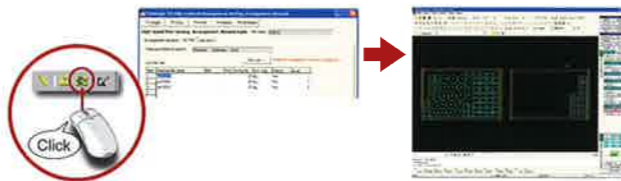
A CAD/CAM system designed for 2D CO₂ laser processing machines.

Simple "One-click" Operation

After loading the DXF/IGES data, register parts and diagrams, and create NC programs with a single click.



Nest parts and create NC nesting programs with a single click.



Optimum Conditions Setting

Load cutting conditions from the eX series laser processing machine using LAN or a USB storage device and easily create NC programs with optimal conditions*.

* Hole-diameter detection and piercing conditions are set automatically.

CAD/CAM Link Functions

CAD/CAM link allows remote access to CAD/CAM software, compatible with the link functions, from the processing machine. Operators can create and download nesting programs at the shop floor according to need, leading to improved work efficiency.

Linked nesting

Linked Barcode Reader

Read the barcode on the instruction sheet to automatically load NC program onto NC from a linked CAD/CAM computer and perform program search.

* NC programs in the control unit and network drive may be searched by the barcode reader without this option.

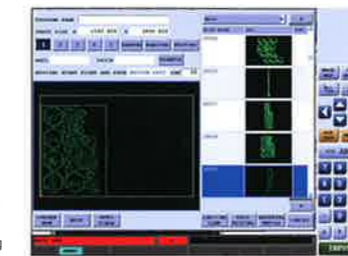


Barcode reader

Linked Nesting

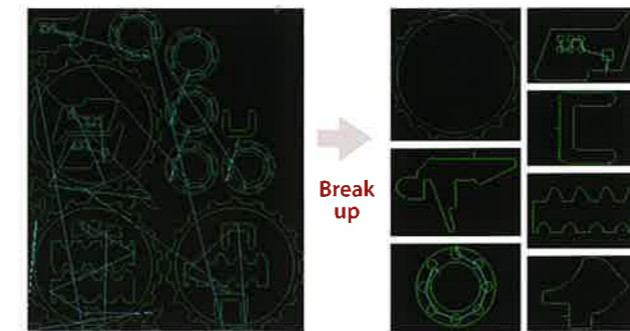
Set necessary parts and the required quantities of each part to create nesting program on the CAD/CAM computer connected via LAN, load onto NC and perform program search.

* The linked nesting function delivers higher yield compared to simple nesting which treats all parts as rectangles.



CAM/CAM linked nesting

Nesting program may be broken up into individual parts, allowing the operator to add additional parts if necessary.

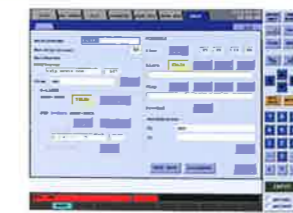


Nesting program

Component thumbnails

Linked e-mail notification additional features

Setup e-mail notification to notify the recipient of the status of the laser processing machine. (Time of day to notify recipient, Alarms to notify / not notify, Process complete notification e-mail setting, Multiple e-mail setting).

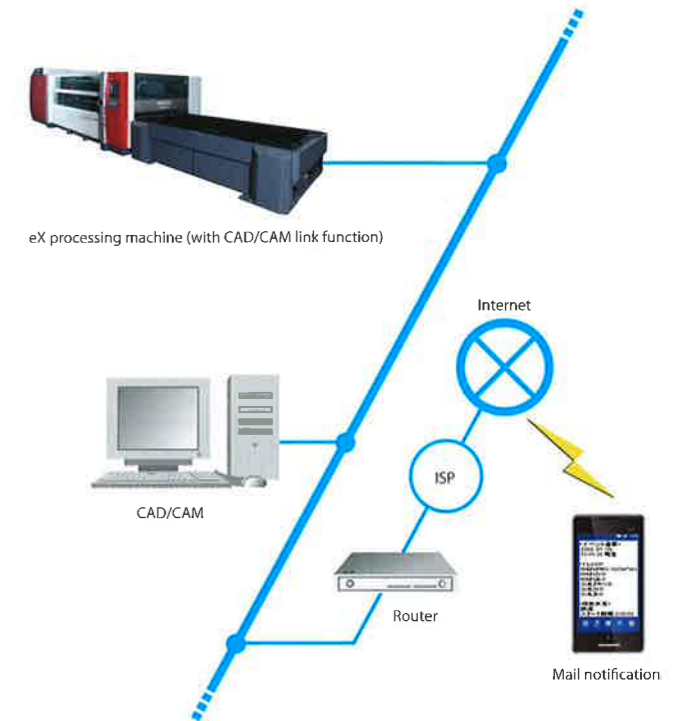


E-mail notification settings

Linked DXF conversion

Load DXF files onto NC, create NC programs on the CAD/CAM computer connected via LAN, and perform program search.

Example System Configuration



Functions/Options Chart

Options	Function
Linked nesting	Linked nesting + Linked barcode reader
Linked DXF conversion	Linked DXF + Linked barcode reader
Linked mail notification expansion function	Additional e-mail notification settings

CAD/CAM link software installation requirements

- *1 A CAD/CAM software compatible with link functions is required in order to use the CAD/CAM link functions (nesting, DXF conversion).
- *2 The processing machine must be connected to a LAN. Additionally, the link function on the processing machine must be turned on.
- *3 The customer is responsible for preparing hardware such as computers, mobile phones and LAN cables.
- *4 Link functions can be used free of charge during a 90-day trial period (assuming that the requirements in 1 to 3 above have been met). To use the link functions after the expiration of the trial period, users are required to purchase the optional product.

Cutting Capability

Resonator	Material	Assist gas	Thickness (mm)												
			0	2	4	6	8	10	12	14	16	18	20	22	24
ML35CF-R	Mild steel (S5400)	Oxygen	[Progressive bar chart]												
	Stainless steel (SUS304)	Nitrogen	[Progressive bar chart]												
	Aluminum alloy (A5052)	Air	[Progressive bar chart]												
		Nitrogen	[Progressive bar chart]												
ML45CF-R	Mild steel (S5400)	Oxygen	[Progressive bar chart]												
	Stainless steel (SUS304)	Nitrogen	[Progressive bar chart]												
	Aluminum alloy (A5052)	Air	[Progressive bar chart]												
		Nitrogen	[Progressive bar chart]												
ML60XF	Mild steel (S5400)	Oxygen	[Progressive bar chart]												
	Stainless steel (SUS304)	Nitrogen	[Progressive bar chart]												
	Aluminum alloy (A5052)	Air	[Progressive bar chart]												
		Nitrogen	[Progressive bar chart]												

* The above are processing capabilities based on special conditions. The acceptance criteria are as stated in the specifications.
 * The actual performance/quality may vary depending on the surface condition and deviation in the material composition even if materials are of the same specifications.
 * Variations in processing performance/quality may occur depending on the part geometry.
 * Regarding mild steel (S5400) with a thickness over 119mm, capacities listed in this catalog are based on LS material (steel plate for laser cutting) of Chubu Steel Plate Co., Ltd.
 ※ Optional

Processing Machine Specifications

Model name	ML2512eX-45CF-R	ML3015eX-35CF-R	ML3015eX-45CF-R	ML3015eX-60XF	
Drive system	Flying optic (3-axis beam movement)				
Control system	X-Y-Z simultaneous 3-axes (Z-axis height control is also possible)				
Dimensions and Performance	Target workpiece dimensions (mm)	2,440x1,220	3,050x1,525		
	Max. workpiece weight (kg)	610	950		
	Table pass height (mm)	880			
	Stroke	X axis (mm)	2,500	3,100	
		Y axis (mm)	1,250	1,565	
		Z axis (mm)	150		
	Speed	Rapid travel speed	Maximum 100		
		Maximum processing feedrate (m/min)	Maximum 65		
		Maximum processing feedrate (m/min)	50		
	Accuracy	Positioning accuracy	X, Y axis (mm) 0.05/500		
		Z axis (mm) 0.1/100			
Repeatability (mm)		±0.01			
Processing head	Auto focus preset head				
Power requirement (including processing machine, resonator) (kVA)	77	68	77	98	
Weight (kg)	Machine weight (including resonator)	Approx. 10,100		Approx. 10,800	
	Pallet changer weight	Approx. 1,800		Approx. 2,100	

Cooling System Specifications

Model name	LCU20WIX	LCU20AIX	LCU30WIX	LCU30AIX
Applicable resonator	ML35CF-R, 45CF-R		ML60XF	
Cooling method	Water	Air	Water	Air
Power requirement (cooling unit) (kVA)	32	40	51	64
Cooling capacity (kW)	60	60	90	90
External dimensions (mm)	2,350x735x1,720	2,980x1,010x2,027	1,852x1,670x1,720	3,990x1,010x2,027
Weight (kg)	Approx. 1,000	Approx. 1,100	Approx. 1,300	Approx. 1,500

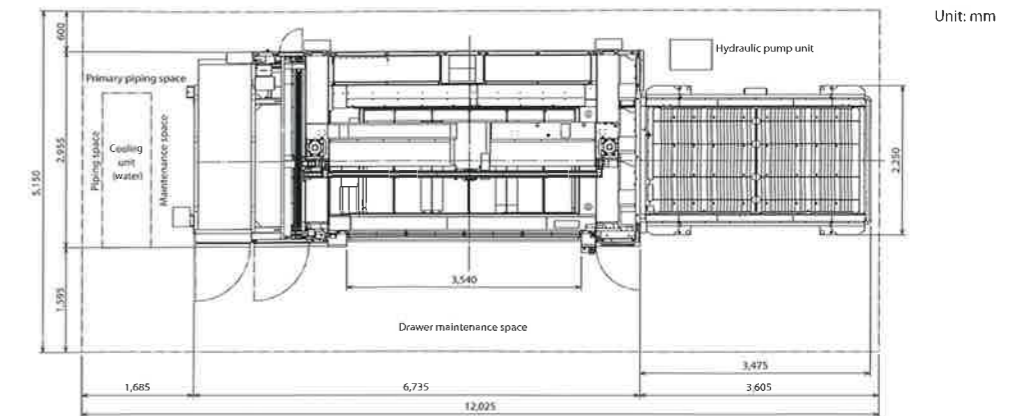
Resonator Specifications

Model name	ML35CF-R	ML45CF-R	ML60XF	
Excitation method	3-axis SD excitation cross flow resonator			
Laser output characteristics	Rated output (W)	3,500	4,500	6,000
	Beam mode	Lower order (TEM ₀₁) *main component		
	Power stability (%)	±1 or less during power control (relative to rated output)		
	Output power adjustable range (%)	0 ~ 100		
Laser gas composition	CO ₂ :CO:N ₂ :He=8:4:60:28			
Laser gas consumption (L/hr)	Approx. 3			
Power requirement (resonator) (kVA)	60	69	90	
External dimensions (mm)	2,500x800x1,810		2,600x800x1,960	
Weight (kg)	Approx. 2,200		Approx. 2,250	
Standard features	Beam shutter, Visible laser, High-speed power sensor			

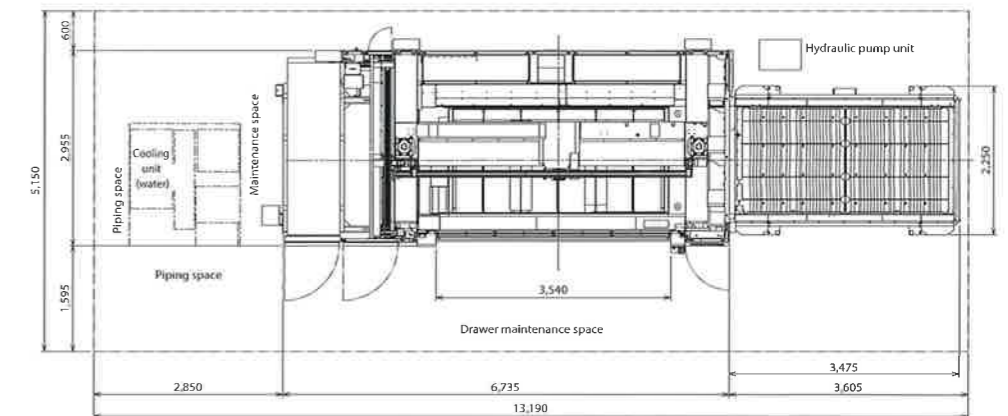
Control System Specifications

Model name	LC30BX
Display screen	15" TFT (touch panel)
Hard disk (GB)	20
Program input method	Screen creation, USB (ver. 2.0), Ethernet
Operation method	Memory operation, HD direct operation

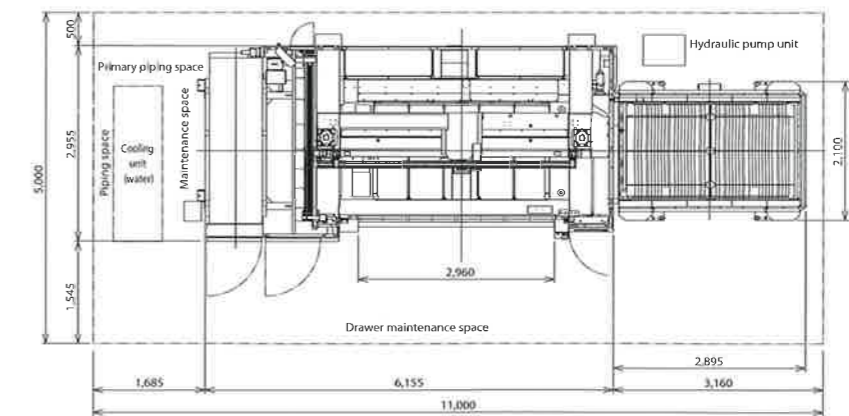
ML3015eX-45CF-R ML3015eX-35CF-R



ML3015eX-60XF



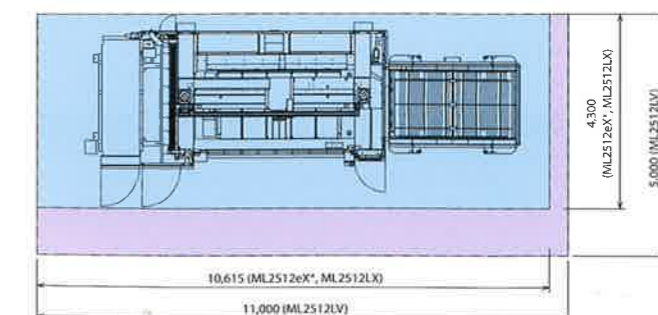
ML2512eX-45CF-R



* Maximum height: 2,260mm (35CF-R, 45CF-R), 2,410mm (60XF)
 * Please contact a Mitsubishi Electric representative regarding installation space for the cooling unit.

Space Saving

The eX has a small footprint, even smaller than our previous LX and LV series.



* Installation space including optional features.

Unit: mm