

## FACTORY AUTOMATION

# 2-Dimensional Fiber Laser Processing Systems GX-F Series



MITSUBIC



# 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.

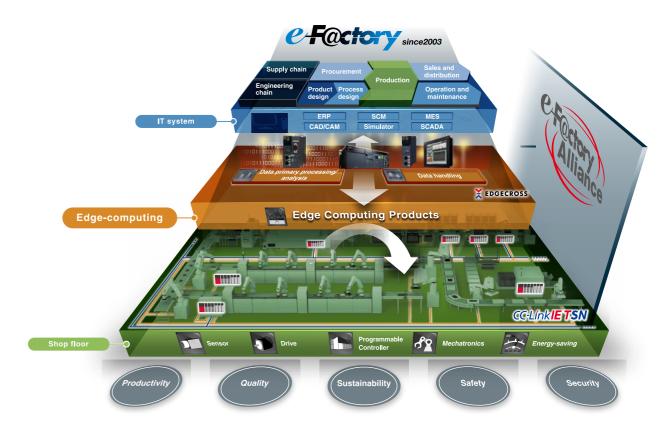
### Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

### Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

# Mitsubishi Electric continues challenge of being only FA supplier delivering highest satisfaction to our customers.



As the world's leading general electric device manufacturer, Mitsubishi Electric Corporation is engaged in a broad range of businesses from home electronics to space equipment. We are globally operating in the following five business domains: Energy and Electric Systems, Industrial Automation Systems, Information and Communication Systems, Electronic Devices and Home Appliances. For over ninety years since we started manufacturing the general-purpose motors, Mitsubishi Electric FA systems business sector has been supporting the manufacturing of not only Japan, China and other Asian countries but also the countries of the world. Through the years of our accumulation and advancement in

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the FA and drive system controls, mechatronics and production technologies, we are expanding the diversity of our product lineup one after another ranging from the controllers, drive units and mechatronics products to power distribution control devices. In addition to such products and units of the factory automation, we are quick in providing solutions such as "e-F@ctory" and "iQ Platform" to innovate the manufacturing scene. From now on also, Mitsubishi Electric as the comprehensive FA supplier is delivering the products that meet our customer needs throughout the world.

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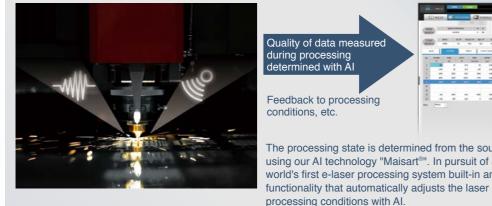
### Laser Processing Systems

Processing head

## **Continuous Processing & Reliability**



### AI Assistance







The processing state is determined from the sounds and light during processing with AI, using our AI technology "Maisart®". In pursuit of a "non-stop processing system", with the world's first e-laser processing system built-in and

\* As of April 2019, internal research

Maisart

### **AI Nozzle Monitor**



When nozzles are replaced with the nozzle changer, the nozzle condition is determined from images using AI.

If the processing state is determined by the AI assistance, the nozzle condition is determined with AI using this function, and the nozzle is automatically replaced with the nozzle changer if necessary.



### **Nozzle Changer**



nozzles\*. Nozzles that are determined to be defective by the nozzle monitor are automatically replaced with new ones to support continuous processing for a long period of time. The ideal nozzle for processing can be selected from various types of nozzles, with more options than have conventionally been available.

Can be equipped with up to 21

For 4kW and 6kW, 9 nozzles are equipped as standard and up to 21 nozzles can be optionally equipped
 For 8kW, 21 nozzles are equipped as standard





### Mitsubishi Fiber Laser Oscillator



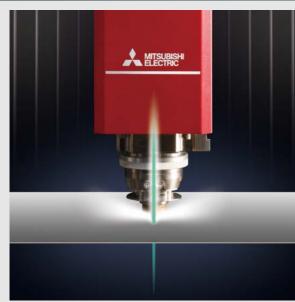


Achieves both high reliability and high productivity with our new fiber laser oscillator built-in. Minimizes the risk of machine breakdowns.

. . . . . . . . . . . .

# Fast Processing & Low Operating Cost

### AGR-eco(Advanced Gas Reduction)



no procooling o	peed an	d cutting su	rface quality	y have beer	1	
nproved for ever	, ,		hick plates*	<sup>2</sup> , providing		T
nprecedented a	dded val	ue.				
Compared to our CO2 las					ACI	2
Applicable plate thicknes Mild steel nitrogen cutting		nm, stainless steel	cutting: t1mm to t	t25mm	AGI	R-eco
<b>.</b>						
Gas consumption	n per uni	time (Mild s	steel: t9mm)			
<conventional> CO<sub>2</sub> 6kW</conventional>						
CO2 6kW <conventional></conventional>						

<conventional> CO<sub>2</sub> 6kW</conventional>						
<conventional> Fiber 8kW</conventional>						
AGR Fiber 8kW						
	0	20	40	60	80	100

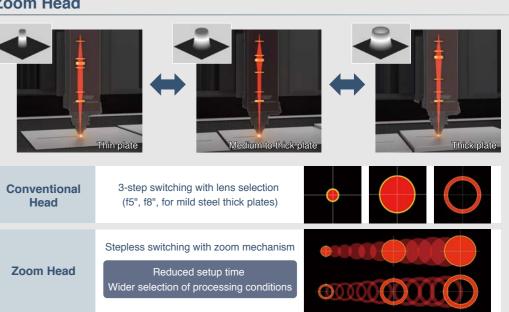




### **High-Peak Piercing**

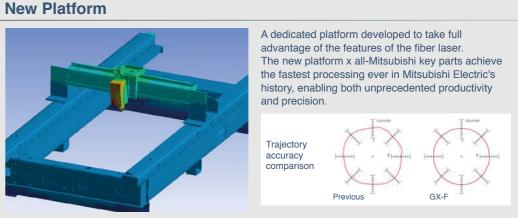


### **Zoom Head**



The "Zoom Head" processing head manufactured in-house utilizes Mitsubishi Electric's proprietary optical system technology and provides optimal control of the beam according to the material and plate thickness. Provides reliable processing for everything from thin to thick plates and supports stable production at the processing site.

Also, the range of selectable processing conditions has been expanded, making it unnecessary to exchange the processing lens according to the plate thickness and material, shortening the setup time.



### Laser Processing Systems



The oscillator adapts to high-peak pulse conditions and optimally controls the beam and focus position, significantly reducing the piercing time. The piercing time for 25mm of mild steel has been reduced to 0.8 seconds, greatly improving the productivity for thick plates.

For 8kW oscillator



## **Operability & Usability**

### **MEL'S AR**







Pre-conversion image from the camera in the processing system.



### Simple Nesting

MEL'S AR enables simple, intuitive nesting of off-cut materials and supports the sudden addition of sheets to be processed.

### **Visible Processing Progress**

Check the elapsed processing time with control equipment, signal towers.



**Newest Control Equipment D-CUBES** 



### Intuitive operation similar to a smartphone with a large, 19-inch screen

Intuitive operation with multi-touch panel Easily swipe to the required screen. Graphics can be easily scaled.

**H** 

### Customizable icons

Users can freely customize the icons on the screen. Delete unnecessary information and include only the necessary information.

### Easily move the processing head with screen operations

Simply touch the destination on the screen and press the movement start switch to move the processing head to the specified position.







### Laser Processing Systems

### Intuitive positioning with MEL'S AR\*

MEL'S AR (Mitsubishi Electric's original AR technology) displays overhead images of the system at all positions without distortion, allowing the positional relationship between the material and processing head to be intuitively recognized. The program shape can be easily placed with a drag operation, significantly reducing the setup time for interrupt processing of off-cut materials.



By superimposing the program shape on the converted image, positioning and workpiece placement for off-cut materials can be intuitively performed.



Press the start button to start processing.

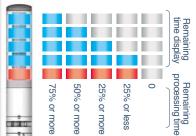


#### Left-over Material Cutting Function

Specify an arbitrary point on the screen, and a route is generated. Then, press the start button to automatically cut the left-over material.

\*Mitsubishi Electric's original AR technology (Augmented Reality) MEL'S AR is an optional product.





## **Processing Performance**

Construction



Kitchen



Device





(11)





Mild steel t

Material. Thickness. Oscillator Output ..



### Mild steel

Material. Thickness ... Oscillator Output..



### Stainless s

Material Thickness. Oscillator Output..



### Pure coppe

Material Thickness ... Oscillator Output..



## Stainless s

Material. Thickness. Oscillator Output..











### Laser Processing Systems

thick p	Oxygen
SS400 :25mm BkW	<ul> <li>Achieves a piercing time of 0.8 seconds with high-output oscillator. Significantly improves productivity.</li> <li>Zoom head automatically changes the beam diameter and beam mode, enabling high-quality processing.</li> <li>Achieves \$\phi3mm small-hole processing with an oscillator manufactured in-house and the optimal control technology.</li> </ul>
mediu	m to thick plate AGR-eco
SS400 :9mm BkW	<ul> <li>Fast processing of mild steel medium to thick plates with the high-output oscillator.</li> <li>Greatly reduces the cost with AGR-eco.</li> <li>With our proprietary gas flow control and zoom head, the beam diameter and beam mode are changed automatically, improving the cutting surface quality.</li> </ul>
steel tl	nin plate AGR-eco
SUS304 11mm 4kW	<ul> <li>Non-stop fast processing of thin plates with F-CUT<sup>®</sup> technology.</li> <li>Greatly reduces the cost with AGR-eco.</li> <li>Fast and accurate processing with the new platform.</li> </ul>
er thic	k plate Air
C1100 t12mm BkW	<ul> <li>Processes highly reflective materials with anti-reflective technology.</li> <li>Anti-reflective material is not required, eliminating the post-processing.</li> </ul>
steel t	nick plate AGR-eco
SUS304 :25mm 6kW	<ul> <li>Zoom head automatically changes the beam diameter and beam mode, enabling high-quality processing.</li> <li>Greatly reduces the cost by AGR-eco.</li> </ul>

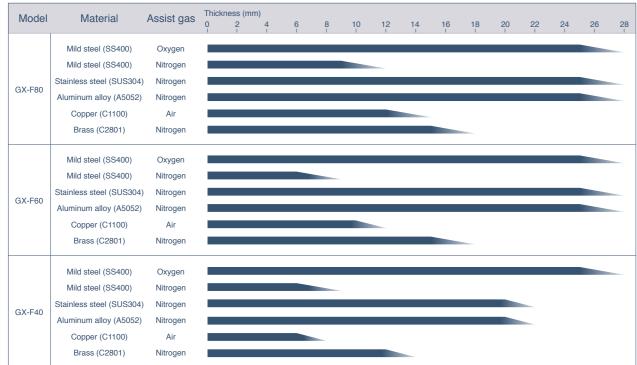
## **Options/Processing Capability**

### Main Functions/Options List

Model	
Zoom Head	Optimally controls the beam according to the material and thickness, supporting continuous processing
High-Peak Piercing	Shortens the piercing time when processing mild steel of 12mm or thicker
Magnetic Damage Reduction Function	Shortens recovery time in case of processing head collision
AI Assistance	Automatically adjusts the processing conditions if defects are found, supporting continuous processing
AI Nozzle Monitor	Checks the state of the nozzles and AI determines the quality, supporting continuous processing
Nozzle Changer (9 pcs.)	Replaces the nozzles automatically
Nozzle Changer (21 pcs.)	Reduces the setup time, supporting continuous processing
AGR-eco	Gas flow control reduces consumption of assist gas
MEL'S AR	AR technology enables intuitive positioning and reduces setup time
Fine Piercing	Reduces pulses that occur when piercing stainless steel or aluminum with nitrogen processing
FRG	Creates NC data with optimal path and supports fast processing of thin plates
Workpiece Lifter	Allows materials to be set more easily and reduces scratches on the backs
Workpiece Clamp	Secures the material and prevents warping of long materials
Additional window and LED	Additional window improves operability

### **Processing Capability**

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\* The values listed in the above processing capability chart are the capabilities under specific conditions. The inspection conditions depend on the specifications. \* Even if workpieces have the same standards, differences in processing performance and quality may occur depending on the surface condition and the composition. \* Differences in processing performance and quality may occur depending on the processing shape.

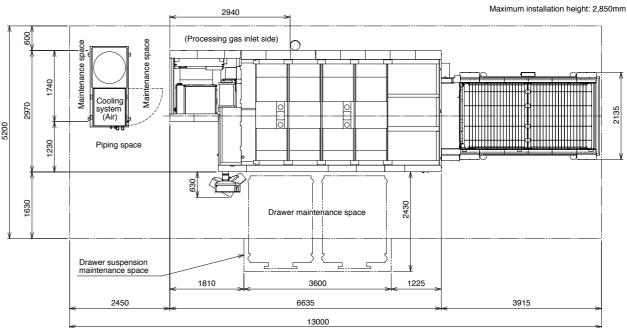
\* For mild steel (SS400) with a plate thickness of t19mm or more, the values describe the capabilities when using steel plate LS (steel plate for laser cutting). \* For the assist gas, gas equipment that meets the pressure/flow rate set according to the target model/gas type is required. For details, check the specifications.

## **Specifications/Layout**

### Specifications

Model		ML3015GX-F40	ML3015GX-F60	ML3015GX-F80
Drive system			Flying optic	1
Control system		X,Y,Z simulta	neous 3-axis control + Z-axis height se	ensing control
Workpiece dimensions	; (mm)		3,050×1,525	
Pallet load weight (kg)			950	
Workpiece support hei	ght (mm)		890	
	X-axis (mm)		3,100	
Stroke	Y-axis (mm)		1,565	
	Z-axis (mm)		120	
Rapid feed rate	XY-axis (m/min)		Max. 170 (combined)	
Desiliaria	XY-axis (mm)		0.05/500	
Positioning accuracy	Z-axis (mm)		0.1/100	
Repeatability	XY-axis (mm)		±0.01	
Oscillator rated output	(kW)	4	6	8
Power input (except pe	eripheral equipment) (kVA)	23	30	36
Installation area (refere	ence value) (mm)		13,000×5,200	
	Processing system main body		Approx. 7,000	
Weight (kg)	Pallet changer		Approx. 2,400	
	Cooling system	Approx. 800		

Layout



\* Cooling method specification differs in the area. Please ask the sales company about layout drawing.

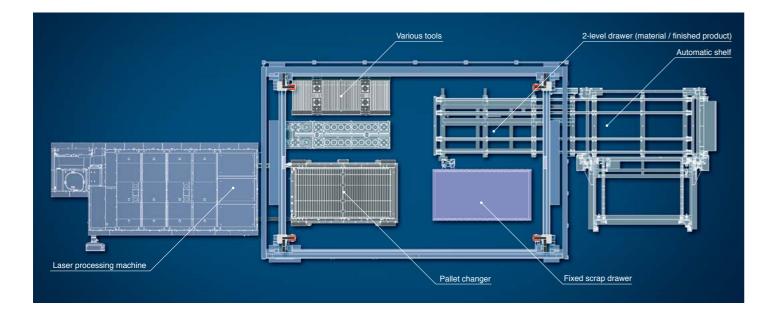
### Laser Processing Systems



Unit: mm

## Laser Automatic Sorting System





### Complete automation of laser production process from material loading to sorting



Complete automation of production processes including material loading / laser processing / sorting / unloading off-cut materials / loading finished products.

Can be operated all day, greatly improving the productivity of the entire laser process. Also contributes to a reduction in costs and human errors caused by manual work.

Mitsubishi Electric's entirely new take on automation in sheet metal processing.



### Material Loading

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Automatically loads materials from packaging materials. In addition to Mitsubishi's original 1-sheet pickup operation, a plate thickness detection sensor prevents the pickup of more than 1 sheet.



Loading of Processed Products Loads finished products that have been picked up onto pallets. A sorting destination pallet can be specified to enable a smooth transition to the next process.



#### Sorting

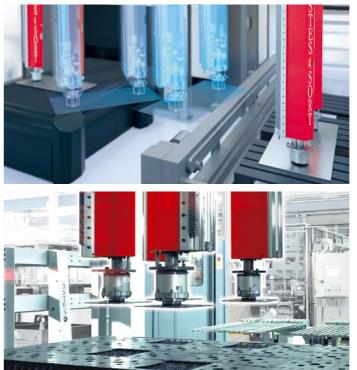
Picks up finished products according to the shape. Eliminates the need for micro-joints and frees operators from time-consuming disassembly work.



**Unloading of Off-cut Materials** Replaces the arm tip with a forklift unit and transfers off-cut materials to the corresponding storage site. After unloading, small off-cut materials on the pallet are removed by the brush unit.

### Broad adaptability with 4 independently controlled arms

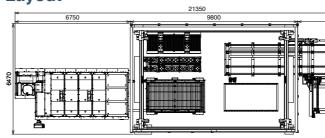
4 independently controlled arms (patented) allow various processed products to be picked up regardless of shape. \* For ASTES4 SORT Enables sorting from 1mm to 25mm regardless of the plate thickness.



## Equipped with intuitive sorting CAM as standard



### Layout



### Laser Processing Systems

### Enables rotary loading and loading long products

The 4 arms move independently, allowing even long products to be picked up. Since it can rotate freely at the time of placement, processed products arranged alternately in the nesting will be loaded in the same orientation.

Enables simultaneous pickup of multiple parts Can pick up a maximum of 4 products simultaneously, minimizing the takt time for sorting. Small finished products can be picked up collectively by attaching micro-joints and nesting them in one place.

### Enables sorting of up to 25mm from thin to thick plates

Both mild steel and stainless steel of up to a thickness of 25mm can be sorted.

### Create sorting program with 4 clicks

Only 4 clicks are needed to achieve everything from reading component data to sending sorting programs. The operations can be easily learned by anyone.





### **Specifications**

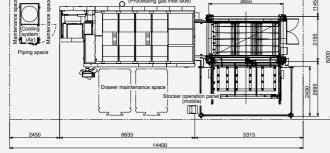
Model	ASTES4SORT
Control system	4 arms Independent control
Sheet size	3000 x 1500mm
Material thickness	0.5~25mm
Total capacity	2000kg
Arm rotation	360°
Installation height	5350mm(Sorting unit)

## **Laser Automation System**

Laser automation systems that improve productivity. Meets onsite needs. Automation achieves high productivity, minimum operator intervention and shorter delivery times. Supports micro-jointless processing and shortens post processing.



Layout



(Ex.) 30PCL-GX-F

### Flexible loader & unloader MA Series

Processing of 2t packaging materials

Continuous processing of 2t packaging material is also possible by combining shelves for materials and finished products Flexibly supports placement and number of carts, enables retrofit and expansion



• Enables interrupt operation • Directly loading to the processing pallet with a crane, forklift, etc. is possible

Model		
	Material	
	Thickness	
Target workpiece	Dimensions	
	Weight	
Treasured and	Load	
Transport unit	Unload	
	Amount	
Material cart	Specifications	
material bart	Maximum loadable height (mm)	
	Maximum loadable weight (kg)	
	Amount	
Finished product cart	Specifications	R
Finished product cart	Maximum loadable height (mm)	
	Maximum loadable weight (kg)	
Automatic operation	Next workpiece preparation time	
Automatic operation	Pallet change time	App
Equipment height (mm)	Pallet change time	-



### Laser Processing Systems


## Laser Processing Systems

# **Overseas Support**

### Service bases are established around the world to provide customer support.



Engineers answer technical questions covering everything from machining to training and after-sale service.



Application Application engineers are available to help optimize your machining processes though technical consultations via telephone, e-mail or fax.

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Show room Industrial m chatronics products of Mitsubishi Electric such as laser processors and EDMs are exhibited. Veteran engineers welco and explain the benefits of our products

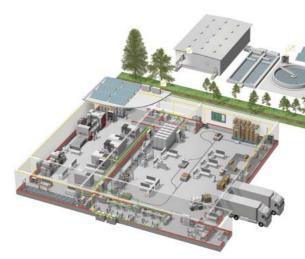


After-sales service We provide after-sales service for machine repair and adjustment by an experienced staff including OEM replacement and accessory parts.



We provide laser trainings from basic operation to advanced programming and setup in support of all levels of laser operators

# **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.

\* Not all products are available in all countries.

### **Automation solutions**



Low voltage: MCCB\_MCB\_ACE Medium voltage: VCB\_VCC Power monitoring, energy managemen Compact and Modular Controllers

Numerical Control (NC







Transformers, Air conditioning, Photovoltaic systems



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### MITSUBISHI ELECTRIC CORPORATION

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

<sup>\*</sup> Not all the models are supported in all the countries and regions.
\* The machine specifications differ according to the countries and regions. Please check with your dealer.
\* The processing data provided in this brochure is for reference only.