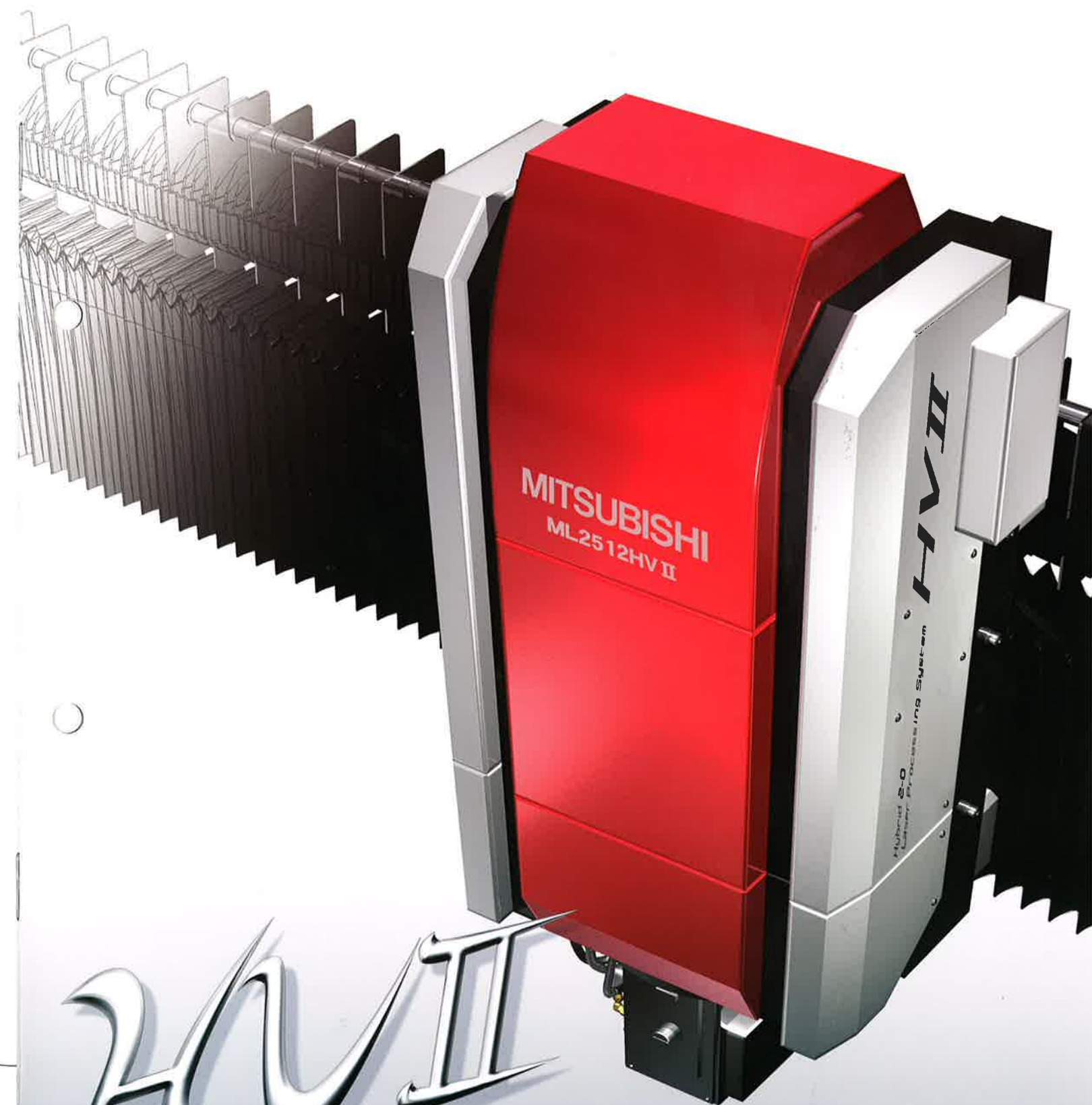




**MITSUBISHI
ELECTRIC**

2D CO₂ LASER PROCESSING SYSTEMS
HVII Series



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



⚠ Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
<http://Global.MitsubishiElectric.com>



2D Laser Processing Machine



Specifications



Processing Capabilities

Resonator	Material	Assist gas	Plate thickness (mm)													
			2	4	6	8	10	12	14	16	18	20	22	24	26	
ML40CF-R	Mild steel (SS400)	Oxygen														
		Standard nitrogen														
	Stainless steel (SUS304)	High-pressure nitrogen	When using f190.5mm (f7.5") lens													
		Standard air	When using f254mm (f10") lens*													
	Aluminum alloy (A5052)	High-pressure air														
		High-pressure nitrogen														
ML20CF3	Mild steel (SS400)	Oxygen														
		Standard nitrogen														
	Stainless steel (SUS304)	High-pressure nitrogen†														
		Standard air														
	Aluminum alloy (A5052)	High-pressure air*														
		High-pressure nitrogen†														

* The above are processing capabilities based on special conditions. Approved conditions are as stated in the specifications.
 * Even if the item to be processed is equivalent to a standardized product, variations in processing performance/quality may occur depending on the surface condition and components included.
 * Variations in processing performance/quality may occur depending on the processing shape.
 * Regarding mild steel (SS400) with a thickness over 19mm, capacities listed in this catalog are for the LS material (steel plate for laser cutting) of Chubu Steel Plate Co., Ltd.
 * Optional

Processing Machine Specifications

Model name			ML2512HVII	ML3015HVII	
Drive system			Hybrid (X-axis: table transfer, Y-axis: optical transfer)		
Control system			3 axes simultaneously (Z-axis emulation control possible)		
Performance specifications	Workpiece dimensions (mm)		2,440×1,220	3,050×1,525	
	Built-in table weight (kg)*1		600	930	
	Work support height (mm)		850		
	Stroke	X-axis (mm)	2,500	3,100	
		Y-axis (mm)	1,250	1,550	
		Z-axis (mm)	300		
	Speed	Rapid travel speed	Maximum 50		
			Maximum 65		
	Accuracy	Max. processing feedrate (m/min)		30	
		Positioning precision	XY-axis (mm)	0.01/500	
			Z-axis (mm)	0.1/100	
		Repeatable accuracy (mm)		±0.005	
Processing head			Auto-focus preset processing head		
Adaptable resonator			ML20CF3, ML30CF-R, ML40CF-R		
Power input (processing machine main unit) (kVA)			4.8		
Weight (processing machine main unit) (kg)			Approx. 7,600	Approx. 9,600	

*1 When combined with ML40CF-R resonator

Resonator Specifications

Model name		ML20CF3	ML40CF-R
Excitation system		3-axis, SD excitation, orthogonal	
Laser output characteristics	Rate output (W)	2,000	4,000
	Beam mode	Lower order (TEM ₀₁ * Main components)	
	Output rating (%)	Less than +1 during output control (rated output)	
	Output variation limit (%)	0-100	
Laser gas composition		CO ₂ : CO : N ₂ : He = 8 : 4 : 60 : 28	
Laser gas consumption (ℓ/hr)		Approx. 1	Approx. 3
Power input (resonator main unit) (kVA)		26.4	50.4
External measurements (mm)		2,040×450×1,620	2,500×800×1,811
Weight (resonator main unit) (kg)		Approx. 1,200	Approx. 2,200
Attachments		Beam shutter, visible-light laser equipment and high-speed power sensor are standard equipment	

Cooling System Specifications

Item		Specifications	
Applicable resonators		ML20CF3	ML40CF-R
Water-cooled	Model name	LCU10WIX	LCU20WIX
	Power input (cooling system main unit) (kVA)	14.4	20
	External dimensions (mm)	1,790×735×1,722	2,350×735×1,722
	Weight (cooling system main unit) (kg)	Approx. 800	Approx. 1,000
	Model name	LCU10AIX	LCU20AIX
Air-cooled	Power input (cooling system main unit) (kVA)	16	32
	External dimensions (mm)	1,970×1,010×2,027	2,980×1,010×2,027
	Weight (cooling system main unit) (kg)	Approx. 800	Approx. 1,100

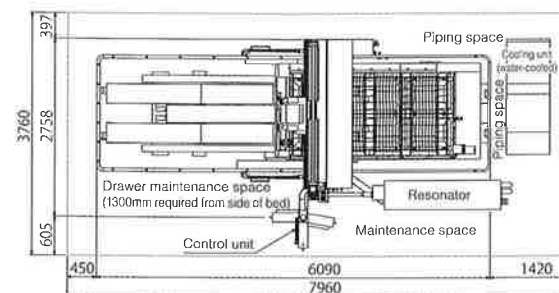
Control System Specifications

Model name		LC30BV
CPU		64-bit
Display monitor		15-inch TFT (touch screen operation)
Hard-disk drive/memory capacity (GB)		20
Program input method		Screen creation, USB (ver.1.1), Ethernet
Operation method		Memory operation, HD direct operation

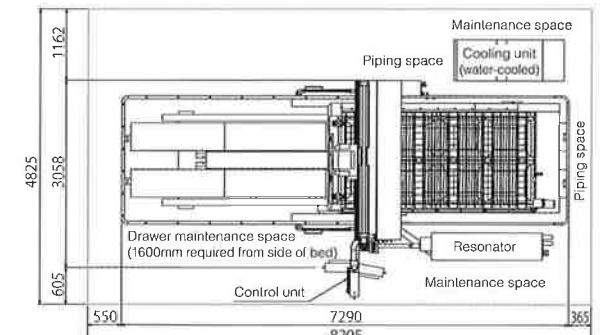
Layout



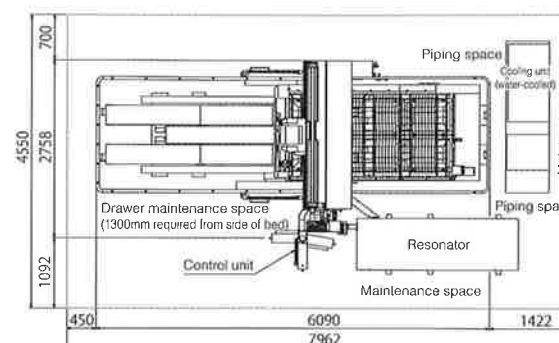
ML2512HVII-20CF3



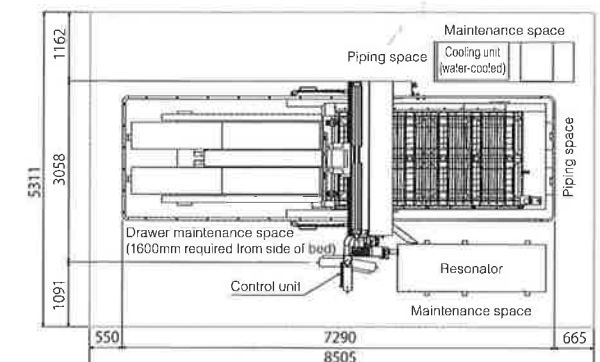
ML3015HVII-20CF3



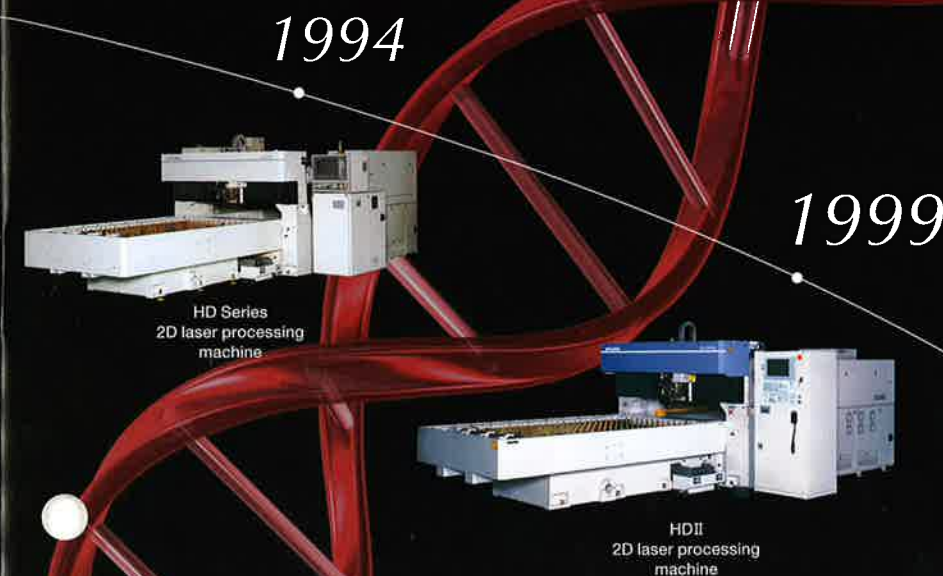
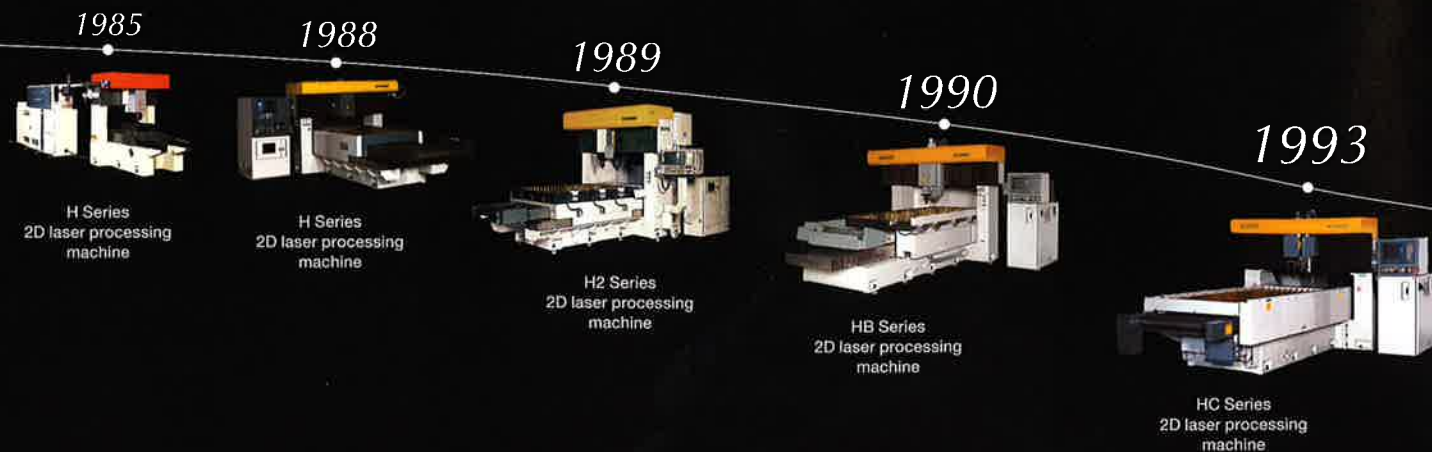
ML2512HVII-40CF-R



ML3015HVII-40CF-R



* Maximum installation height: 2,315mm. *Please contact us regarding piping for the cooling unit.



Devoted to Continuous Refinement – That's Mitsubishi Electric DNA

A standard laser processing machine developed by the comprehensive Japanese manufacturing technology, Mitsubishi Electric's HVII Series. Reflecting the voices of our customers, the evolution continues.

3 Elements of Evolution

High productivity

High-speed Z-axis height control and the latest piercing technology drastically reduces cutting time of all materials.

Processing performance

Optimum beam technology ensures high-quality processing performance for a wide range of materials.

Operability/ Stability

New control system simplifies set-up and maintenance.



2009

2003

1999

1994

1993

1990

1989

1988

1985

HVIP Inherits the DNA of Best-Selling Processing Machines

Offers maximized production efficiency of laser processing

Utilizing the pallet changer system, productivity and efficiency is fully maximized. The HVIP Series raises the performance of the HVII to impressive new heights.

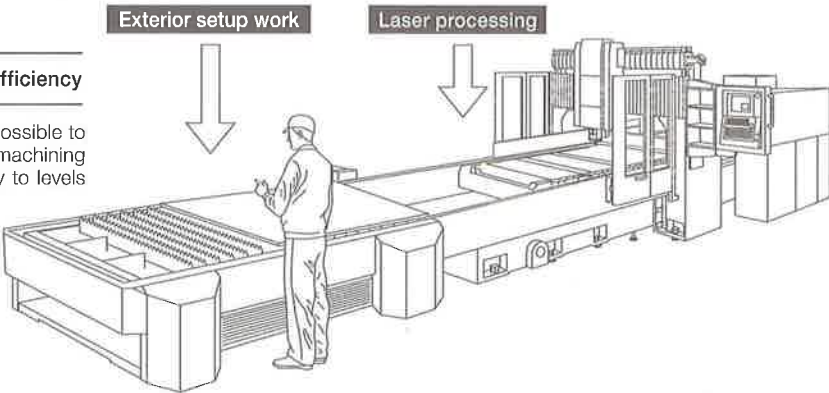


HVIP Series

Features

Dramatic increase in productivity and efficiency

The addition of a pallet changer makes it possible to insert and remove workpieces during the machining process, raising productivity and efficiency to levels never before imagined.



Specifications and Layout

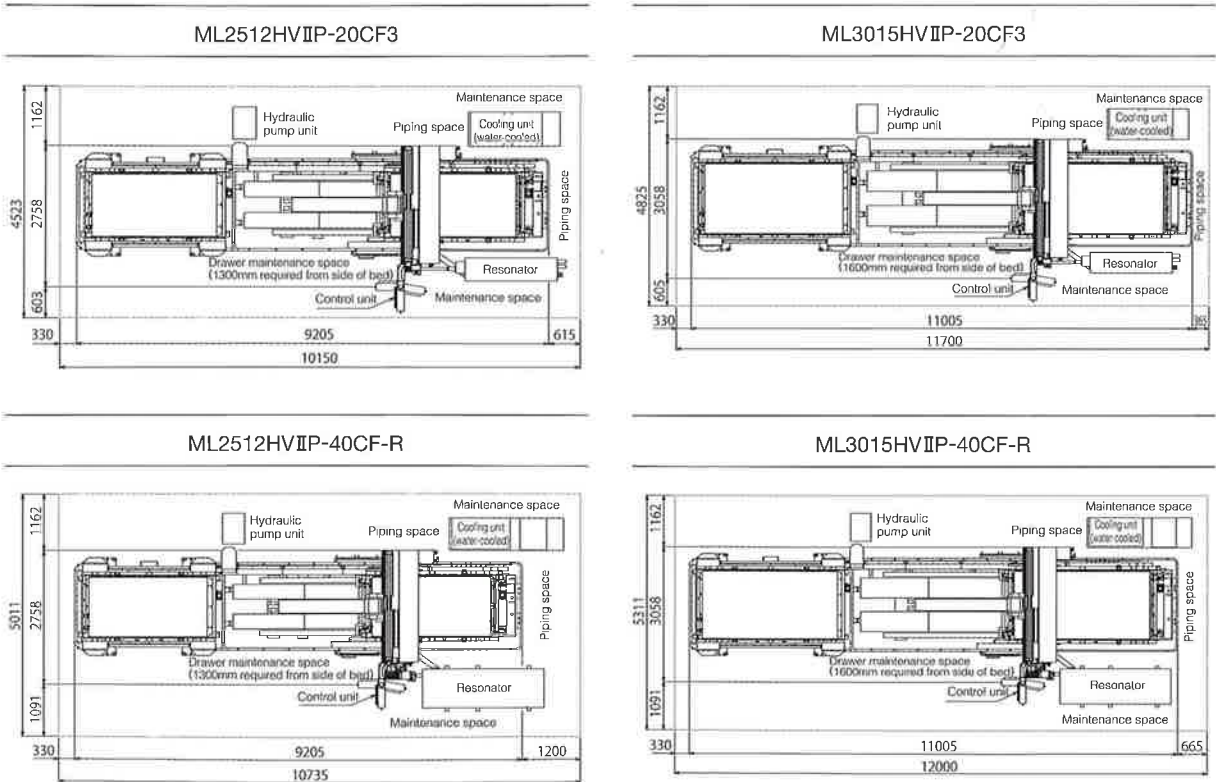


Processing Machine Specifications

Model name				ML2512HVIP		ML3015HVIP		
Drive system				Hybrid (X-axis: table transfer, Y-axis: optical transfer)				
Control system				3 axes simultaneously X-Y-Z (Z-axis emulation control possible)				
Performance specifications	Workpiece dimensions			2,440×1,220		3,050×1,525		
	Built-in table weight (kg)*1			600		930		
	Work support height (mm)			920				
	Stroke			X-axis (mm)	2,500		3,100	
				Y-axis (mm)	1,250		1,550	
				Z-axis (mm)	230			
	Speed	Rapid travel speed	XY-axis (m/min)		50 max.			
			Z-axis (m/min)		65 max.			
			Maximum processing feedrate (m/min)		30			
	Accuracy	Positioning precision	XY-axis (mm)		0.01/500			
			Z-axis (mm)		0.1/100			
			Repeatable accuracy (mm)		±0.005			
Processing head				Auto-focus preset processing head				
Adaptable resonator				ML20CF3, ML30CF-R, ML40CF-R				
Power input (processing machine main unit) (kVA)				7.2				
Weight (processing machine main unit) (kg)				Approx. 9,100		Approx. 11,400		

*1 When combined with ML40CF-R resonator

Layout

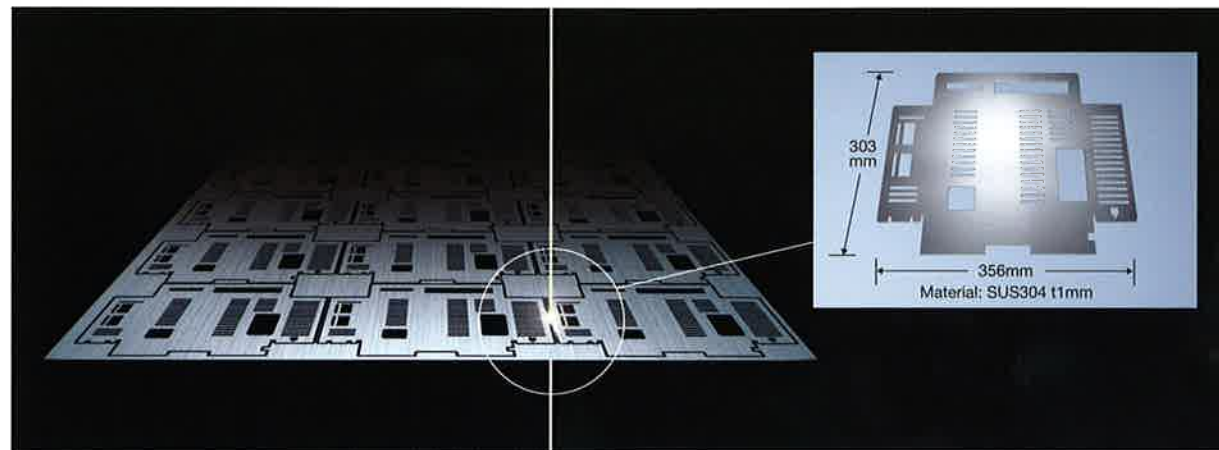


* Maximum installation height: 2,315mm. * Please contact us regarding piping for the cooling unit.

High productivity

High-speed cutting of thin materials

High-speed cutting with feedrates up to 50m/min (65m/min for Z axis) and the latest control technology are combined to achieve a dramatic improvement in productivity. In addition, Dross Reduction (DR) Control contributes to high-quality corner processing at high speed.



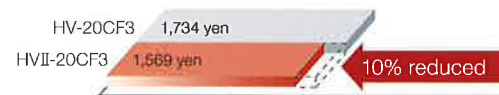
■ Comparison when cutting 21 pieces of the sample above.

Processing time (SUS 304 t1mm)



Running costs above are calculated based on the electricity and gas prices in Japan. Please refer to the prices in your country.

Operating cost (SUS304 t1mm)



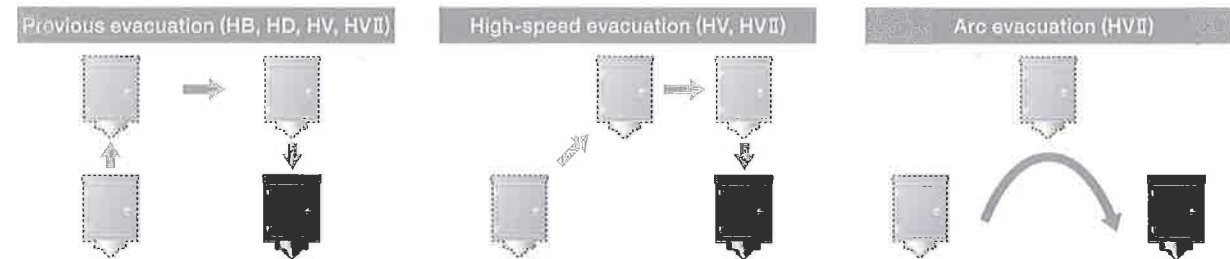
Conditions for calculation

Electricity cost	Laser-gas cost	Assist-gas (N ₂) cost
20 yen/kwh	8.94 yen/ℓ	0.15 yen/ℓ

Technologies supporting high-speed cutting of thin sheets

Evacuation method

The evacuation method can be chosen according to the material and sheet thickness. Processing time and stability can be considered when selecting the optimal method.



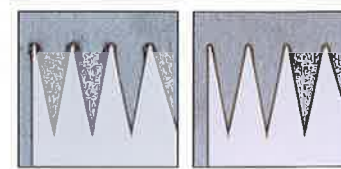
Z-axis speed increased

In addition to the adoption of the latest control technology, the Z axis transfer speed and acceleration are approximately two and five times faster (compared to previous model), respectively.



Dross Reduction (DR) Control

DR Control reduces the accumulation of dross which is commonly generated during high-speed corner processing. This realizes high-speed, high-quality processing.

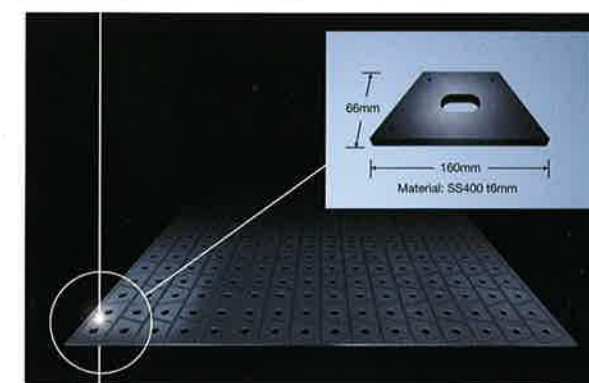


Raising productivity through faster, high-quality processing

Mild-steel cutting

Establishment of high-speed cutting technology using a small-diameter nozzle and development of various piercing technologies have resulted in a remarkable improvement in productivity and impressive reduction in operating cost compared to the previous model.

Cutting mild steel of medium thickness



■ Comparison when cutting 316 pieces of the sample above.

Processing time (SS400 t6mm)

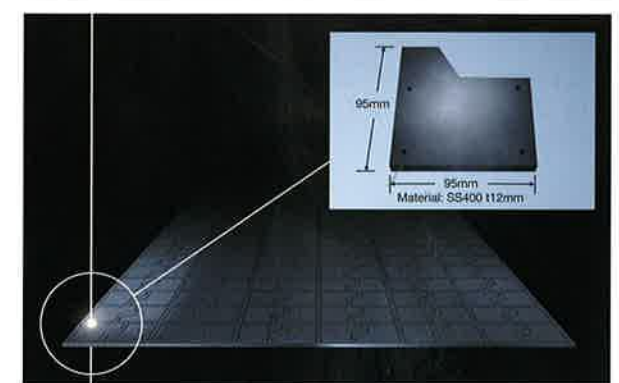


Operating cost (SS400 t6mm)



Running costs above are calculated based on the electricity and gas prices in Japan. Please refer to the prices in your country.

Cutting thick mild steel

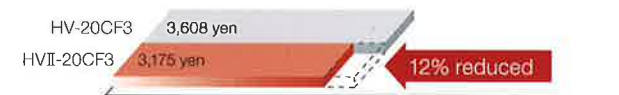


■ Comparison when cutting 128 pieces of the sample above.

Processing time (SS400 t12mm)



Operating cost (SS400 t12mm)



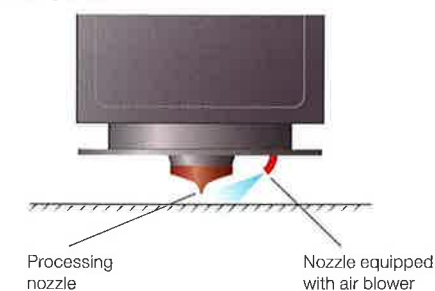
Conditions for calculation

Electricity cost	Laser-gas cost	Assist-gas (O ₂) cost
20 yen/kwh	8.94 yen/ℓ	0.13 yen/ℓ

Technologies supporting high-speed cutting of medium-thick mild steel

Blow piercing

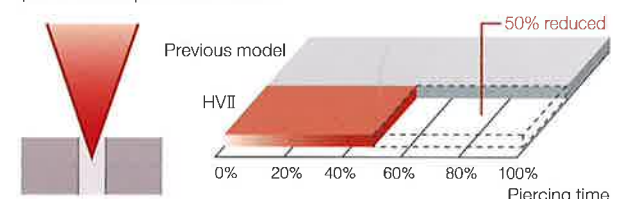
Controlling the oxidation reaction phenomenon realizes small-diameter piercing in a short time.



Technologies supporting high-speed cutting of thick mild steel

Beat piercing

High peak output control realizes a cut quality equivalent to the conventional slope pierce while simultaneously shortening the piercing time of t9mm-t16mm thick mild steel by up to 50% compared to the previous model.



Material: SS400 t9mm
Time comparison with conventional previous piercing time being 100

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

Processing performance

Increased freedom and expanded processing possibilities

Tube processing

The optional turntable offers a wide range of profile cuts.

Square-tube processing

The optional turntable enables cutting of notched parts.

*Special CAD/CAM software is required to create NC data.

Turntable processing



Additional processing of boxed objects



Processing using 300mm Z-axis stroke

Additional processing of boxed objects

The long stroke of the Z axis simplifies cutting of box-shaped parts.

Brilliantcut



SUS304 t12mm

The high beam-quality of the CF-R Series realizes a suitable cut-surface roughness equivalent to a standard machined finish ($\nabla\nabla$: less than Rz25 μ m) when cutting non-oxidized stainless steel sheets.

Model	Resonator	Maximum plate thickness
HVJ Series	ML40CF-R*	12mm

*Using a f254mm (f10") lens (option)

Thick-plate processing

SS400 t25mm

The beam quality and gas flow are optimized, increasing the maximum thickness of mild steel that can be cut with 40CF-R from t22mm to t25mm.

Wide and varied processing range

Acryl t10mm

Comes with acryl processing conditions, pre-installed as standard. Special set-up information can be referenced on the processing help screen.

Chrome steel plate t1mm

Equipped with processing conditions and processing know-how of colored steel, chrome steel and painted steel plates. Significantly reduces preparation time.

Pure aluminum

Pre-installed with processing conditions for highly reflective pure aluminum.

Example processing help screen

Processing Help: Special Materials Conditions (Reference) List	
*After selecting the special material to be processed, reference conditions and processing help can be referenced	
*Confirm the items of caution and adjust conditions according to the specified procedure.	
■ Type of steel	
Ferrite stainless steel (SUS430, SUS405, etc.)	Martensite stainless steel (SUS440C, SUS440A, etc.)
High-tensile steel (60kg, hi-ten)	Carbon steel, carbon tool steel (S45C, SK5, etc.)
Chrome steel plate, nitrogen cutting (SEHC, galvalume steel plate)	CHROME steel plate; oxygen cutting (SEHC, galvalume steel plate, etc.)
■ Non-ferrous metals/Non-metals/Others	
Aluminum (A1100, A1050, etc.)	Titanium, titanium alloys
Acryl resins	Corrugated steel plate (SS400, SUS304, A562, etc.)
Return to Menu	

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

*Even if the item to be processed is equivalent to a standardized product, variations in processing performance/quality may occur depending on the surface condition and components included.

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

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

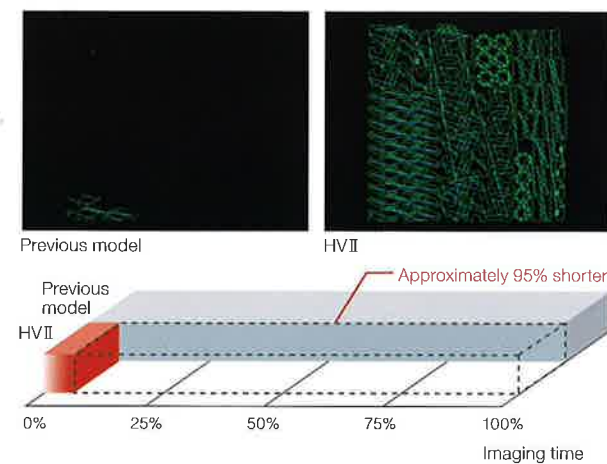
Operability/Stability

More assuring, comfortable operation raised to new heights

Further improvements in operability

Production drawings illustrated in seconds

Time required to check the geometries before processing is shortened (1/20 compared to previous model)



Automated support

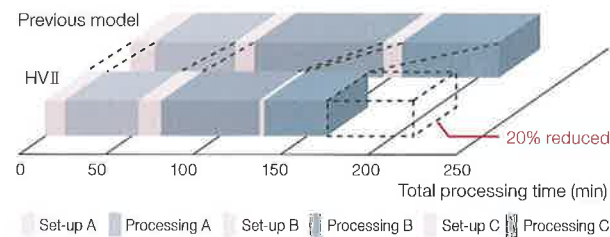
The auto-focus preset head and high-pressure-gas NC control* are standard equipments.

*Only 40CF-R

Set-up time reduced by expanding the range of plate thicknesses compatible with single nozzles

Nozzle replacement time drastically reduced during continuous processing of various materials and thicknesses.

E.g., Total processing time reduced when processing three workpieces of various materials and thicknesses.



	Shape	Material	Plate thickness	No. of Processes
A		SUS304	t1mm	30
B		SS400	t6mm	30
C		SUS304	t3mm	30

Resonator: ML20CF3

Processing Help Screen

The NC provides full support of reference conditions for special materials, modification method and processing know-how.

Processing Help: Special Materials Conditions (Reference) List

- After selecting the special material to be processed, reference conditions and processing help can be referenced.
- Confirm the precautions and adjust conditions according to the specified procedures.

Processing Help: Ferritic stainless steel (14)

Processing Help: Ferritic stainless steel (20)

Processing Help: Ferritic stainless steel (30)

Further improvements in stability

Work Help Screen

The main tasks of each component are explained using photos and diagrams.

E.g., Changing the vacuum pump oil

HVII USER HELP SCREEN

Resonator HELP

Vacuum pump oil replacement

Touch screen with one-touch operation

Self-check function

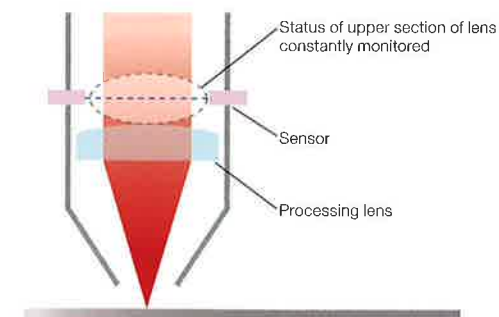
The main components are periodically checked, and the diagnostic results are reported. This supports continuous operation.



Processing lens monitoring function

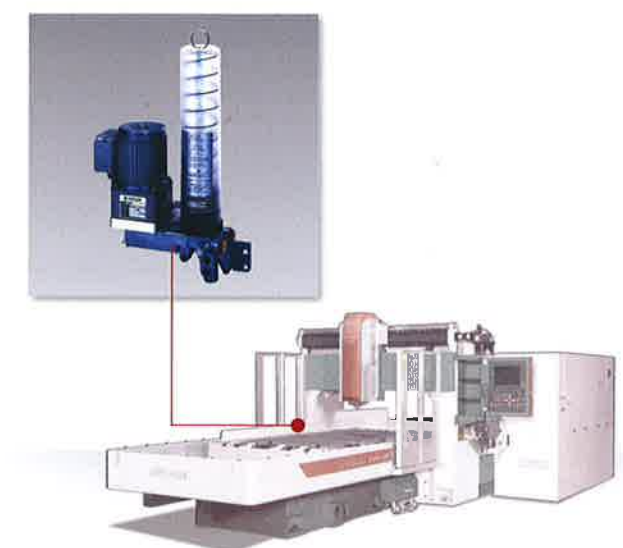
Status of the processing lens is constantly monitored, contributing to stable processing.

*Standard only for 40CF-R



Automatic oil supply mechanism

An automatic oil supply mechanism has been adopted, contributing to significantly enhanced maintenance performance.



Equipment Main Features/Options

Simple contact type height sensor (option)
Contact-type emulator enables the processing of non-metal materials such as resins and wood.

Auto-focus preset processing head (standard)
The NC command automatically controls the focal point. The processing head does not have to be readjusted when the work-piece is replaced.

f254mm (f10") lens (option)
Improves the processing capability of non-oxidized cutting of stainless steel.

Chip conveyor (option)
Carries out pieces and scraps that fall off the processing table out of the processing machine, improving the efficiency of removal.

Lens cartridge
f127mm (f5.0") lens (option)
"One-touch" operation makes exchanging cartridges easy.

NC data table (option)
Used for cutting tubes.

CamMagic LA (option)
CAD/CAM system for CO₂ laser processing machines, compatible with Windows Me, Windows 2001, Windows XP and Windows Vista.
Equipped with diverse functions and knowledge unique to Mitsubishi Electric such as the "high-speed free nesting function" which ensures a high yield rate at high speed.
Windows® is a registered trademark of Microsoft® Corporation in the U.S.A. and other countries.

ME (MEL'S EYE) function (option)

■ Plasma detection
Detects plasma generated during the non-oxidized cutting of stainless steel. Processing conditions are automatically adjusted to suppress plasma generation.

■ Burn-out detection
Detects burn-outs generated when cutting mild steel, enabling continuous processing.

■ Pierce detection
Piercing penetration is detected in plates of intermediate thickness. Compared to previous timer-style piercing control, stable piercing is enabled.

■ Auto-focus extraction
Together with the auto-focus preset head, the processing machine automatically aligns the focus.

* There may be cases where detection is not possible depending on the material, plate thickness or surface condition. Please make a separate inquiry when the f254mm (f10.0") adapter is attached.

Option Compatibility Chart

Model name		HVII/HVIP	
		ML20CF3	ML40CF-R
Processing machine	Auto-focus preset processing head	Standard equipment	Standard equipment
	f127mm (f5.0") lens specifications	○	○
	f254mm (f10.0") lens specifications	—	○
	Beam optimizer unit	—	Standard equipment
	Simple contact emulation	○	○
	High-pressure gas NC control	○	Standard equipment
	Air/high-pressure gas specifications	○ (see above)	Standard equipment
	X-axis work clamp	○	○
	NC turntable	○ (*1)	○ (*1)
	Chip conveyor	○ (*2)	○ (*2)
	Foot switch (for work clamp)	○ (*3)	○ (*3)
	Pilot pin	○ (*3)	○ (*3)
	Processing table tool specifications	○ (*3)	○ (*3)
	High-speed piercing	—	○ (*1)
	Fine-piercing	○ (*1) (*2)	○ (*1) (*2)
	Work lifter *4	Standard equipment	Standard equipment
	ME (MEL'S EYE) function	○	○
	Processing lens monitoring function	○	Standard equipment
Type of control	Network contact unit	Standard equipment	Standard equipment
	Network download function	○	○
	Exterior I/O extension	○	○
Solution	CamMagic LA (CAD/CAM exclusively for lasers)	○	○
	RemoteMagic (alarm mail notification, etc.)	○	○
	BANKIN Navigator (production management support)	○	○

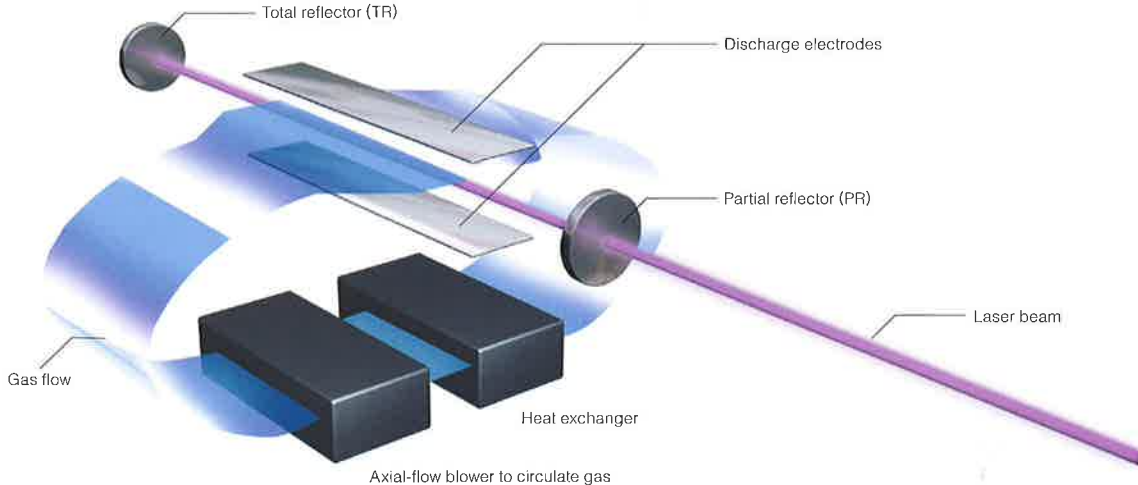
*1 When the NC data table is installed, fine piercing and high-speed piercing specifications cannot be installed at the same time.
*2 Fine piercing and the chip conveyor cannot be installed at the same time.
*3 Palette changer specifications are not included.
*4 The maximum nominal processing thickness for the combined resonators.

Resonator Triple-axis SD Excitation Orthogonal Resonator



Unique technologies supporting highly reliable processing

High reliability is synonymous with Mitsubishi Electric, born from its innovative technologies and attention to quality. Advancements in our resonator series have resulted in further improvements in processing performance.



High-speed power sensor

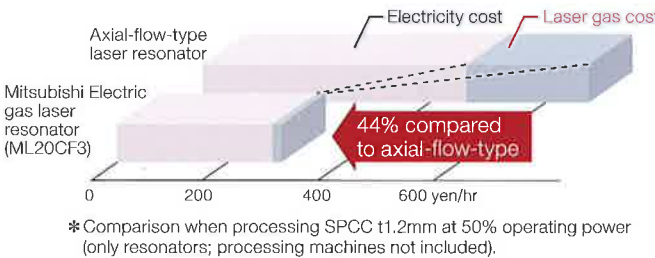
A high-speed power sensor developed by the company is installed as standard equipment to monitor laser output in real time. Output true to the desired setting is stably maintained, with the degree fluctuation being less than ±1%. As a result, continuous processing of highly reflective materials such as aluminum and copper is possible.

Stable control of output
Output is monitored as needed

Patent no. 1836228
Japanese published
examined application
4-56479

Sealed laser-gas cutting operation

To ensure that the composite gas does not easily escape during the sealed-gas cutting operation, each gas tank is designed to last for one year (ML20CF3 operating for 2400hr/yr). One injection of composite gas is sufficient for 24 hours of continuous operation at the rated output, with no need for additional injection. This significantly reduces the operating cost and eliminates the need to exchange tanks.



Just-in-time discharge

The adoption of just-in-time discharge method which reduces the power consumption during beam OFF substantially reduces the overall power consumption.

