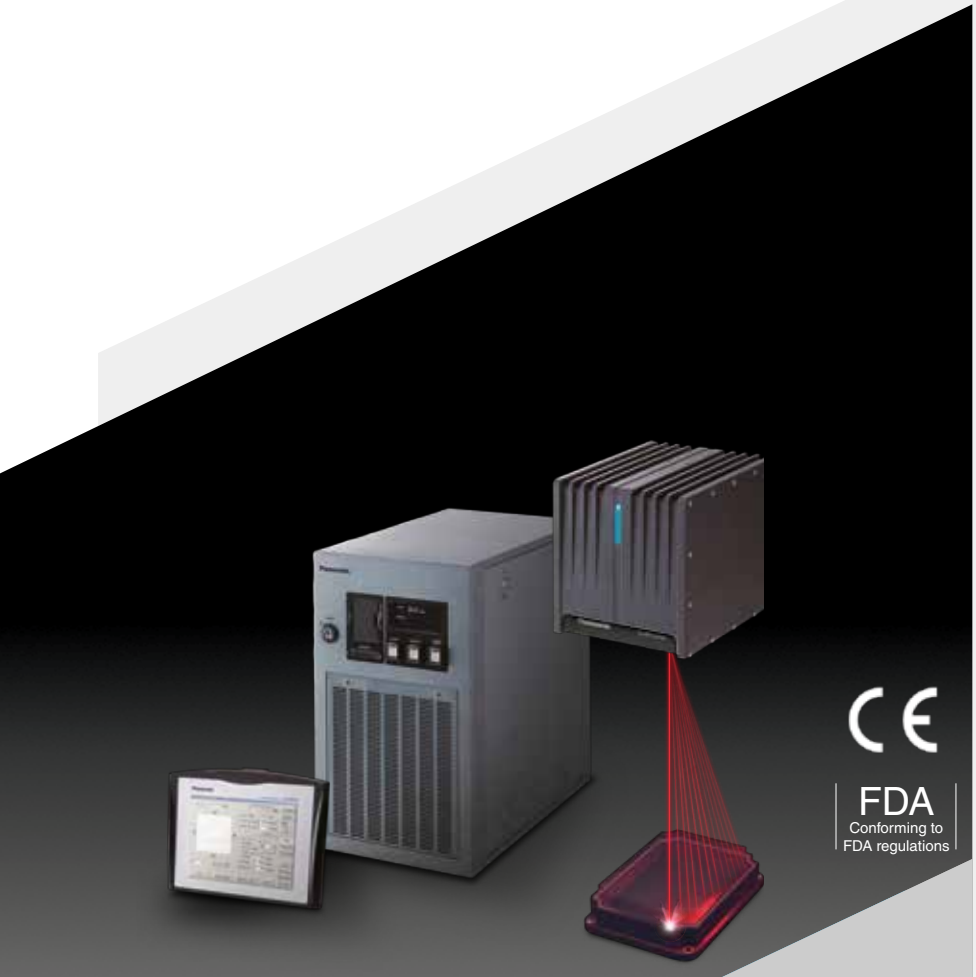
Panasonic
INDUSTRY

VL-W1

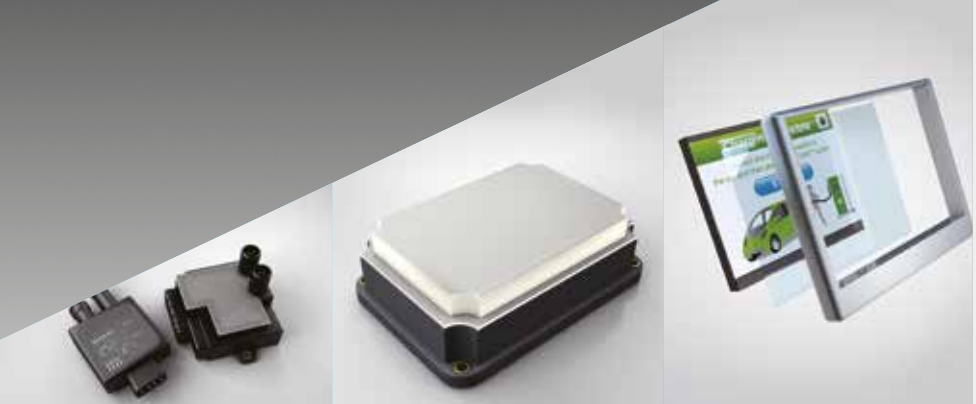
Laser Welding System VL-W1 series

Plastic Welding



CE

FDA
Conforming to
FDA regulations



Smart and effortless plastic welding

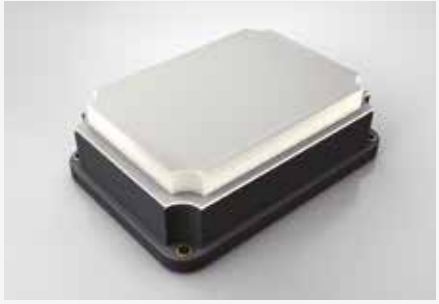
We are introducing a new plastic welding system with a galvano scanner which neither requires a robot or X-Y stage for moving the laser source, the optical part, and the laser emitting unit nor a control system to coordinate the three parts.

The VL-W1 series incorporates all necessary components. Our all-in-one system reduces the resources for installing and operating a complex system.

The VL-W1 series proves that using a laser plastic welding system can be smart and effortlessly.

Applications of the laser welding system VL-W1

Electrical sensors



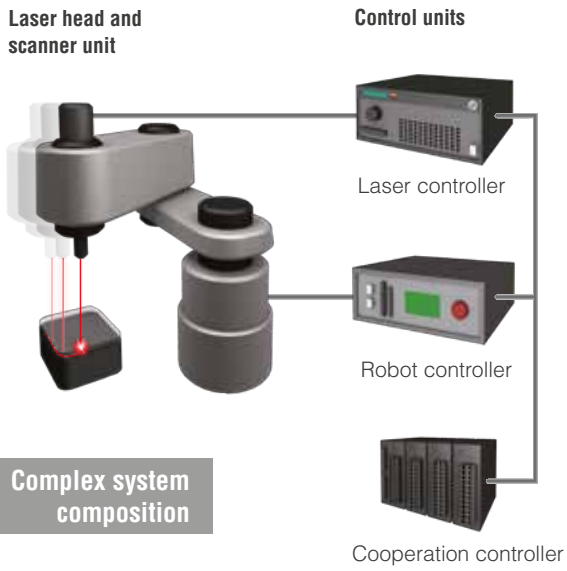
Electronic control unit

Waterproofed display device

Equipped with galvano scanner

The VL-W1 offers compact dimensions. Furthermore, the galvano scanning system uses the galvano mirror built in the laser head to scan the laser, thus eliminating the need to move the head. It does not require a robot or X-Y stage and therefore reduces the need for resources when designing a complex system.

Conventional laser plastic welding system



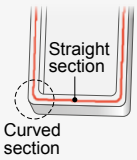
Complex system composition

Galvano scanning laser plastic welding system

ALL in ONE

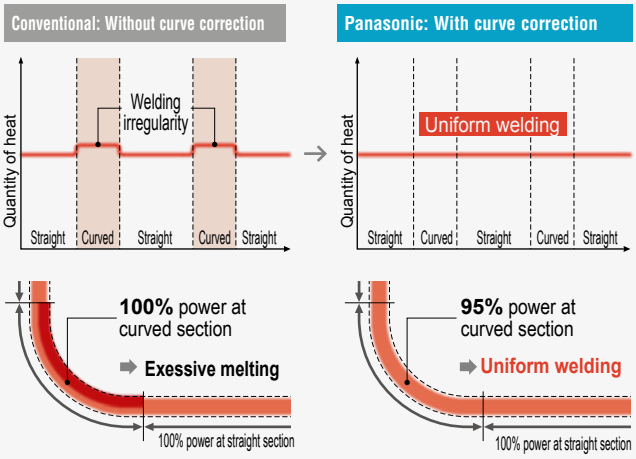
Power correction for curved sections

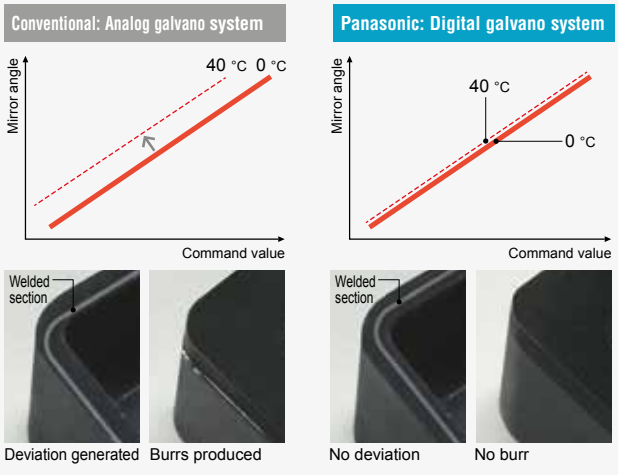
With normal laser output, the heat tends to accumulate more at curved sections than at straight sections. This may lead to uneven welding results. The VL-W1 series optimizes the laser output at curved sections to achieve a uniform welding result even at complex welding patterns.



Digital galvano system

The digital galvano system boasts significantly better temperature characteristics than the analog systems. A change in the surrounding temperature does not lead to deviations of the beam position as with analog galvano systems. This way, a stable production quality is ensured.





High-quality welding

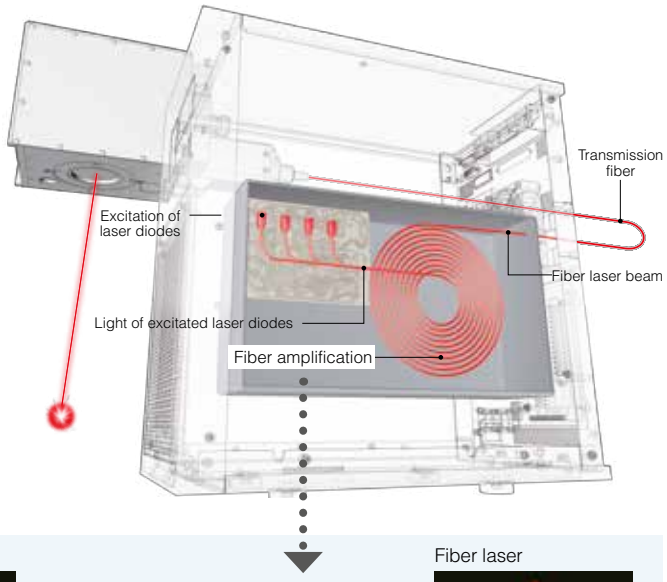
The VL-W1 series is equipped with our original, high-performance fiber laser developed based on the technologies we have accumulated through the manufacture of laser marking systems. This fiber laser achieves high-quality welding results.

Laser quality $M^2 < 1.1$

The VL-W1 series has achieved $M^2 < 1.1$ using original fiber laser technology. M^2 is a numeric value which indicates the quality of the laser beam. The closer this value is to 1.0, the higher the quality of the laser beam.

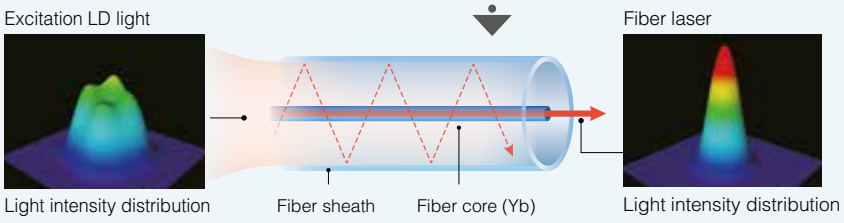
Laser output stability within ±3%

The fiber laser emits a beam with stable output regardless of the temperature fluctuation of the laser diodes. The laser output stays stable immediatly after power ON until production operation halt. Thus, a high production quality is ensured.



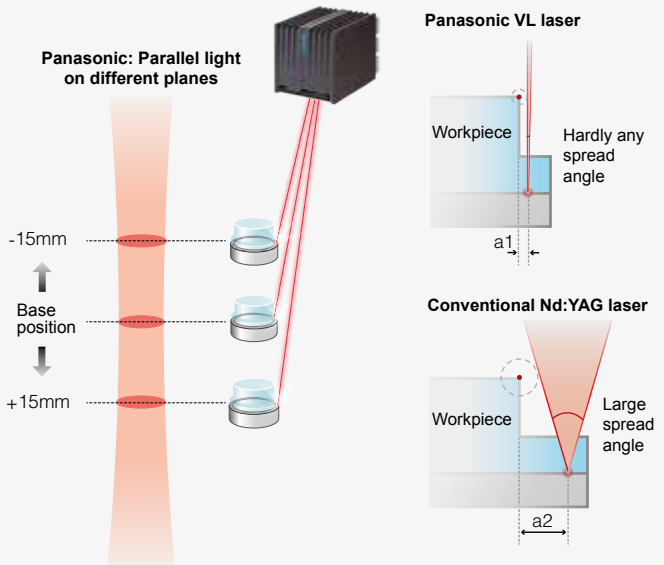
Fiber laser oscillation principle

The fiber laser is a type of solid-state laser that uses an optical fiber as an amplification medium. Since light can be amplified inside an extremely thin fiber core, a laser light with a high beam quality can be obtained.



Parallel light

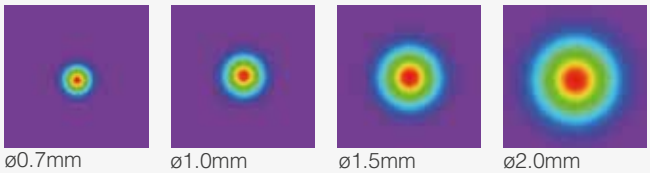
The combination of the high-quality $M^2 < 1.1$ beam and our proven optical design has realized a parallel light beam with minimal beam widening. This allows working on different planes and enables a precise laser beam emission even very close to the edge of parts.

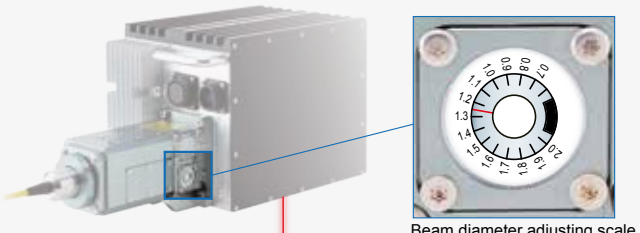


Variable beam diameter

The variable beam diameter mechanism enables the adjustment of the beam diameter between 0.7 and 2.0mm. Therefore the desired welding width can be set without replacing the optical parts.

Different beam diameters





Laser output power monitoring

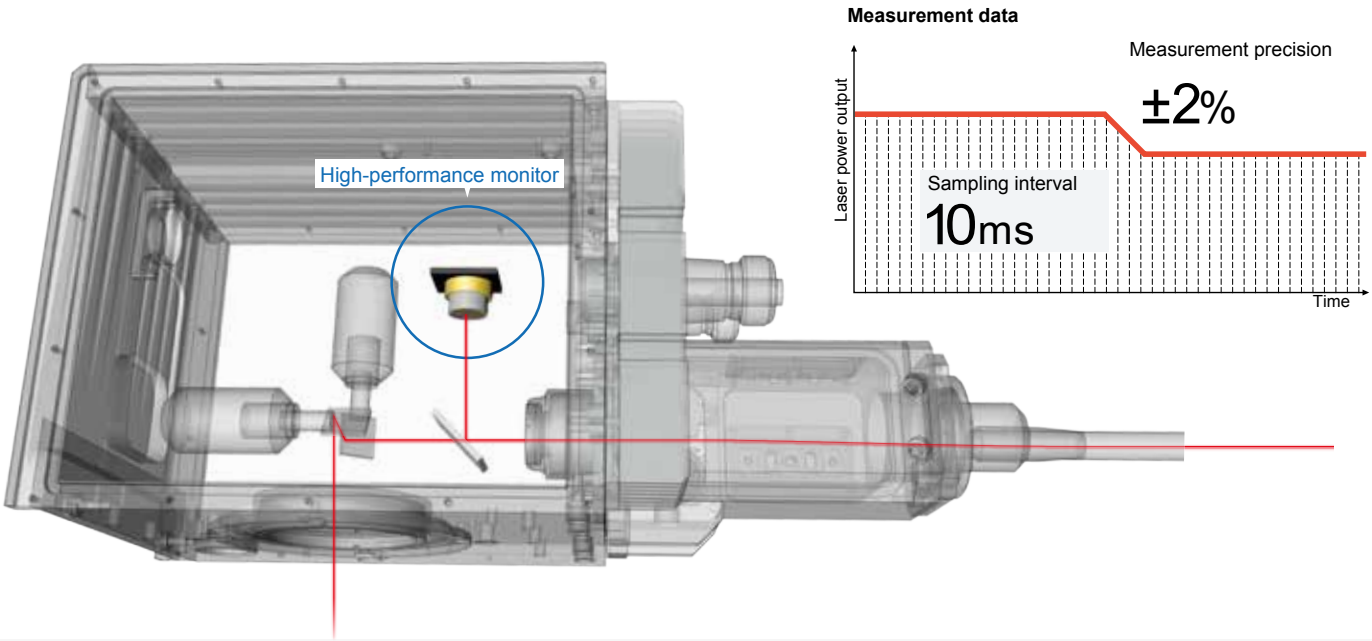
The VL-W1 series features a high-performance monitor in its head. It monitors the laser output power accurately at real time during welding. This is extremely useful for recording and managing the laser output power.

High-speed sampling: 10ms

The laser output power can be captured and read out in 10ms intervals immediately after the emission starts.

Measurement precision: ±2%

Our high-performance components ensure a high measurement precision of ±2 %.

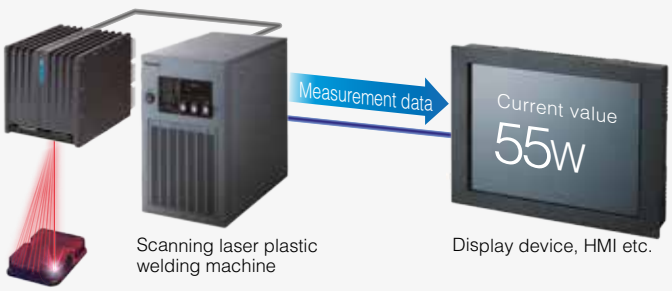


Real-time power meter

The data measured by the high-performance power meter can be output in real time in three different ways. This function is useful for production and quality management.

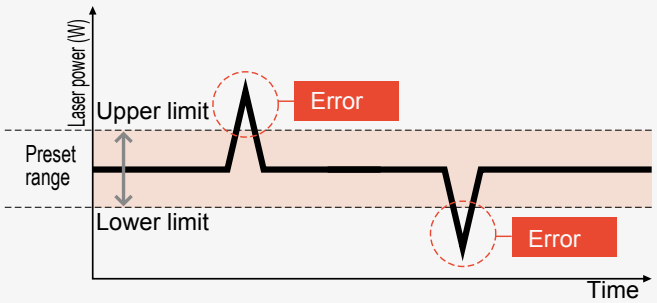
Voltage output	Current output	Serial output
1 to 5 V	4 to 20 mA	Ethernet

Example of system configuration



Quality management with measurement results

This functionality sends a notification to an external device when the laser power exceeds the preset upper or lower limit during emission. It supports you in adhering to the required quality standards.



Easy operation

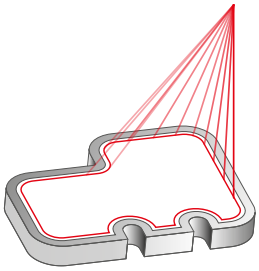
The operation with the color touch panel (optional) is easy to use. The LC display allows an intuitive operation.

Step 1: Draw welding seam

You can draw a workpiece's contour easily on the special screen. Patterns such as "Line," "Circle," "Arc" or "Rectangle" can also be combined.

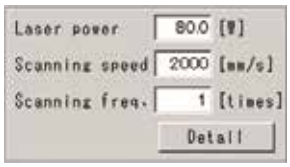
Step 2: Check position

The laser position can be checked with the red pointer. This function ensures accurate positioning.



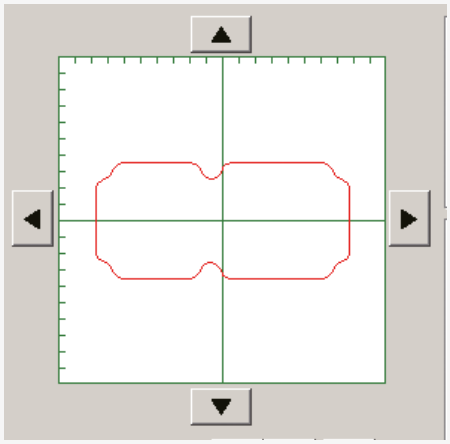
Step 3: Set parameters

There are three basic parameters to be set: "Laser power," "Scan speed" and "Scanning frequency." With "Detail," you can make fine adjustments.



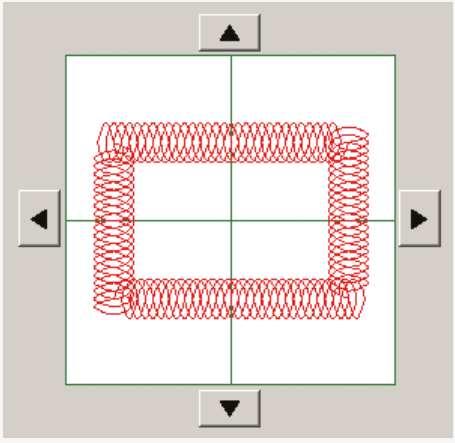
CAD data import function

Complex patterns can be produced with CAD software and imported to the VL-W1. If you need a quick response to a change in design this is the right answer.



Spiral function

The spiral width can be flexibly changed in the longitudinal or transverse direction. An appropriate pattern can be easily set according to the workpiece and the required laser energy. Even thick welding seams are no problem with the spiral function.



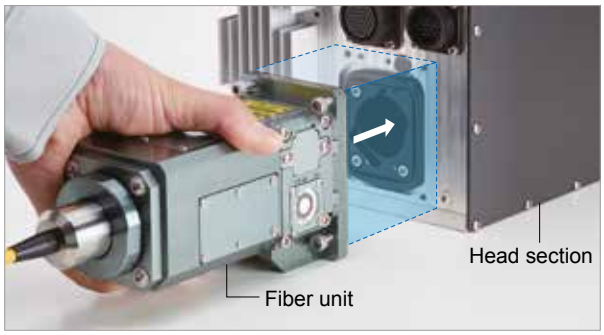
Enhanced safety functions

ISO 11553-1 compliance

A shutter blocks the laser beam and an interlock terminal shuts off the power supply of the laser oscillator. Both are implemented as separate interfaces to configure a double safe system.

Removable fiber unit

The fiber unit can be detached and removed from the laser head. This allows easy installation of the equipment and facilitates the maintenance.



Comfortable maintenance functions

Error log display

The error log data can also be saved.

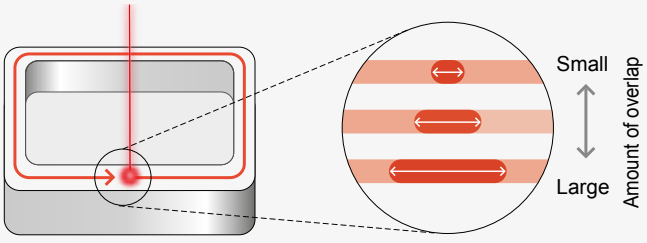
I/O monitor function

You can check the I/O states during the welding process in real time.

Convenient onsite adjustment

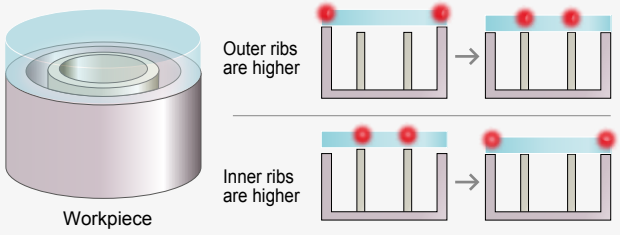
Adjustment of overlapping start and end points

This function adjusts the overlap amount at the start and end points of the laser beam.



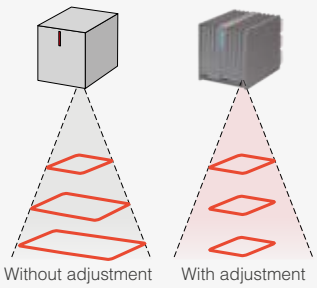
Sequence editing

If part sections warp or show sink marks, the welding sequence can be changed.



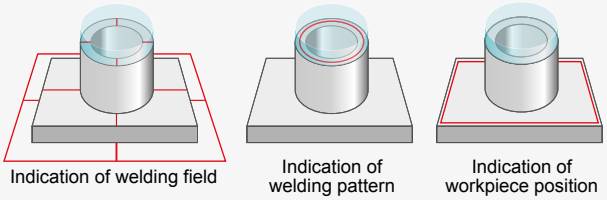
Adjustment of distance between workpieces

The distance between workpieces can be adjusted using the software. This is especially useful when welding parts with different heights use the same welding pattern.



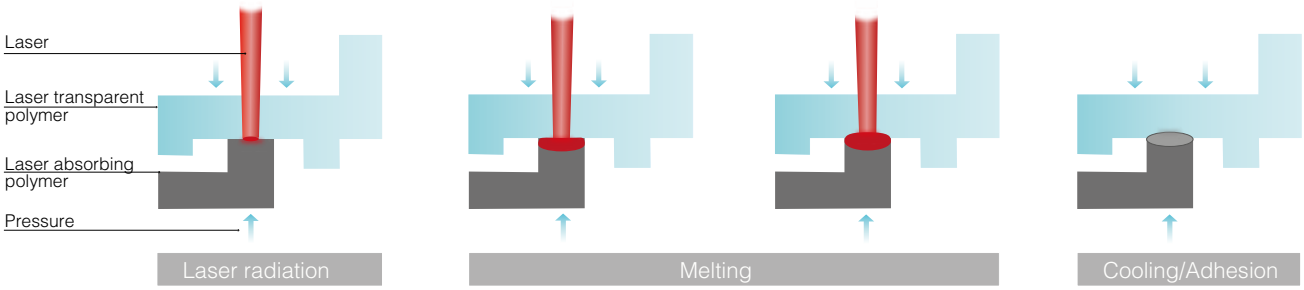
Guide laser

The red visible beam of the guide laser helps to confirm the welding position in different ways.



Laser plastic welding principle

Laser welding joins plastic pieces by emitting laser radiation and generating heat at the boundary surface without using any adhesive. The laser beam must pass through the laser transparent (upper) material, and then will be absorbed by the laser absorbing (lower) material.



Laser welding in Panasonic products

Laser welding machines achieve excellent seals and produce no powder dust and minimal burrs. Our company uses the laser welding equipment in its own product manufacturing processes. Some examples are shown below.

Panasonic: Ultra-slim light curtain SF4C series

Welded part	Large front panel
Plastic materials	PC
Benefits	Slimmer product dimension, cost reduction

Panasonic: Digital fiber sensor FX-500 series

Welded part	Infrared communication window
Plastic materials	PC
Benefits	Improvement of dust- and water-proofness

Compatible plastic materials

Strong weld Weak weld No weld

	ABS	ASA	MABS	PA6	PA66	PA12	PBT	PBT/ASA	PC	PC/ABS	PE-LD	PE-HD	PEEK	PES	PET	PMMA	POM	PP	PPS	PS	PSU	PVC	SAN
ABS	■	■	■				■	▒	■	■				▒	■	■				▒	▒	■	■
ASA	■	■					■	■	■	■						■					■	■	■
MABS	■		■																				
PA6				■	■	■																	
PA66				■	■	■																	
PA12				■	■	■																	
PBT	■	■					■	■	■					▒	■	■				■	■	■	■
PBT/ASA	▒	■					■	■	■					▒							▒		
PC	■	■					■	■	■	■				■	■	■				▒	▒	■	■
PC/ABS	■	■							■	■						■							
PE-LD											■				▒	▒		■	▒	▒			
PE-MD											▒	■				▒		■					
PEEK											▒		■	■		▒					▒	▒	▒
PES	▒						▒	▒	■				■	■							■		
PET	■						■		■	■	▒	▒	▒		■								
PMMA	■	■					■		■	■	▒	▒	▒			■				▒	■	■	■
POM																	■						
PP											■	■						■					
PPS																			■				
PS	▒						■		▒		▒					▒				■	▒	▒	▒
PSU	▒	■					▒	▒	▒				▒	■		■				▒	■	▒	■
PVC	■	■					■		■				▒		▒	■				▒	▒	■	■
SAN	■	■					■		■				▒		▒	■				▒	■	■	■

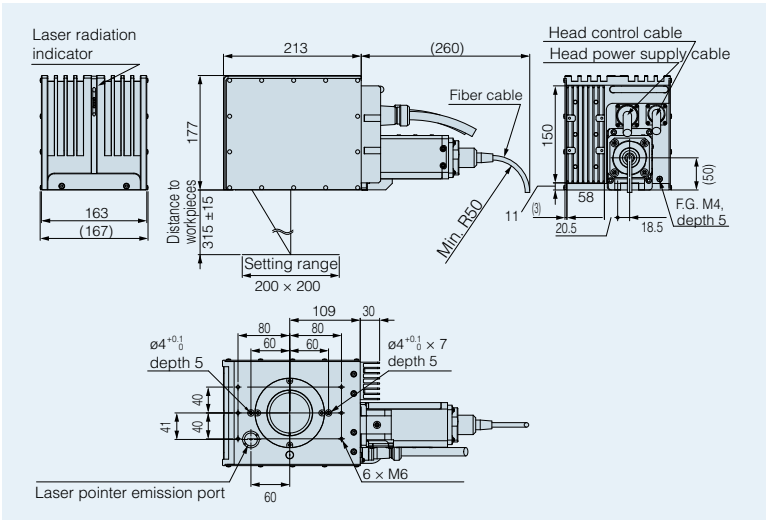
Note: Natural material on beam transparent side; black-colored (carbon black) material on laser absorbing side.

Plastic materials that can be laser-welded are primarily thermoplastic materials. Even if the materials are divided in laser transmitting and laser absorbing materials, both can be welded, provided the laser transparent side has a laser transmittance of at least 15% to 20%. The material on the laser transparent side does not necessarily have to be translucent.

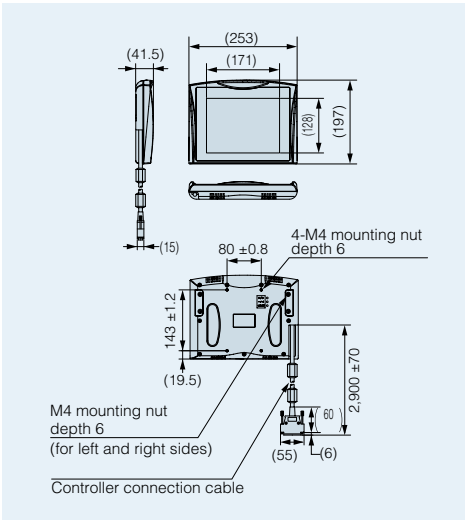
If you have any questions regarding the compatibility of materials, please consult our company.

[Unit: mm]
*The CAD data can be downloaded from our website.

Head

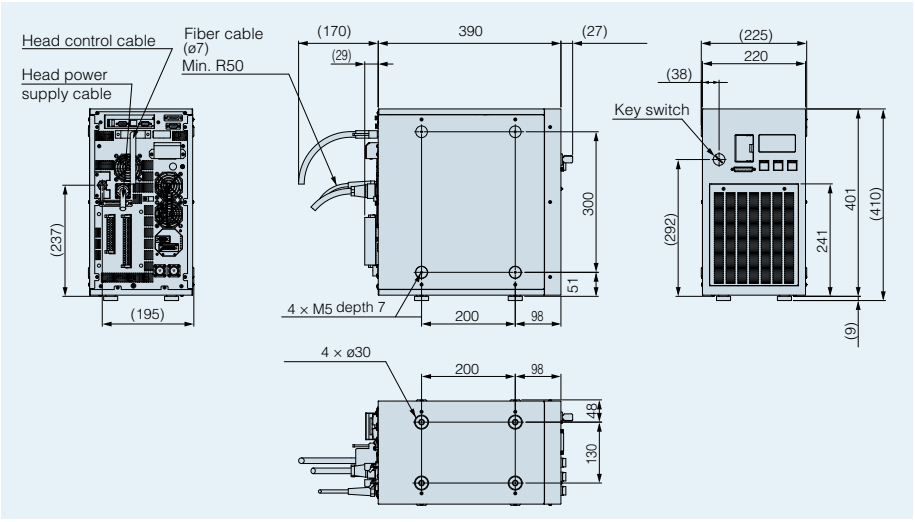


Touchpanel LP-ADP40 (sold separately)

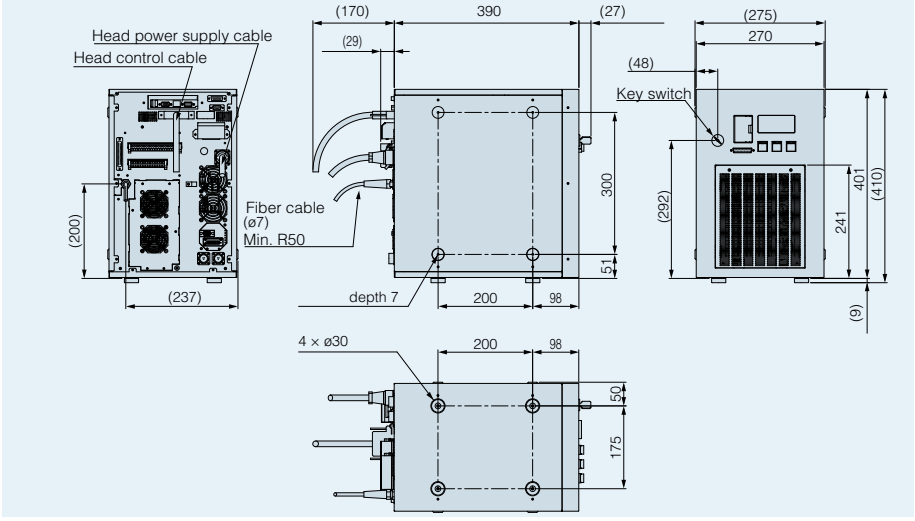


Controller

VL-W1500 / VL-W11506



VL-W1A00 / VL-W1A06



Specifications

Item \ Model No.		VL-W1500	VL-W1A00	VL-W1506	VL-W1A06
Laser output power		50W	100W	50W	100W
		Yb fiber laser; λ = 1070nm, class 4, CW oscillation			
Output power at workpiece		45W ±5%	90W ±5%	45W ±5%	90W ±5%
Guide laser, pointer		Red semiconductor laser; λ= 655nm; class 2 laser: Maximum output 1mW or less			
Scanner		Digital galvano scanner			
Setting range (X, Y)		200 × 200mm		400 × 400mm	
Working distance (base position ± preset range)		315 ±15mm		685 ±15mm	
Scan speed		Maximum 3000mm/s			
Registration files		2048 files			
Importable graphic data (file format)		VEC, DXF, HPGL, BMP, JPEG			
Welding geometry		Straight line, circle, arc, quadrilateral, fixed point			
External memory device		USB media			
I/O ports		I/O terminal block, I/O connector, interlock connector, power data output (RS232C)/shutter closing output terminal			
Serial communication interface		RS232C (for system control, for power data), Ethernet (for system control)			
Cooling method		Head: air cooling, controller: forced air cooling			
Power supply		90–132V AC or 180–264V AC, 50/60Hz (automatic switching)			
Power consumption		max. 580VA (at 100V AC), max. 720VA (at 200V AC)	max. 740VA (at 100V AC), max. 830VA (at 200V AC)	max. 580VA (at 100V AC), max. 720VA (at 200V AC)	max. 740VA (at 100V AC), max. 830VA (at 200V AC)
Ambient temperature		0 to +40°C (head, controller)			
Storage temperature		-10 to +60°C (head, controller)			
Ambient humidity		35 to 85% RH (head, controller)			
Degree of protection		IP54 (IEC) (only for connected head section)			
Supplied cable		› Controller power supply cable: 3 ±0.1m, ø7mm for CE standard, ø9mm for PSE/CSA/UL standards › Head power supply cable: 5.5 ±0.1m, ø11mm › Head control cable: 5.5 ±0.1m, ø12mm			
Fiber cable		5 ±0.2m, ø7mm, minimum bend radius: 50mm			
Net weight	Head	≈ 12kg			
	Controller	≈ 28kg	≈ 35kg	≈ 28kg	≈ 35kg
Main unit display language		Japanese/English			
Supplied software		Laser Processing Utility_VL-W1 (logo data conversion software, logo data editing software)			
Supported OS		Microsoft® Windows® 7 Professional (32bit/64bit) (Japanese/English/Simplified Chinese)			

Reliable support in all stages

Panasonic conducts preliminary tests with the customer's application and offers support in developing clamping units. We provide extensive support to ensure safe and reliable laser welding from the developing stage to the serial production.

Preliminary test

Verification of laser welding results using test pieces

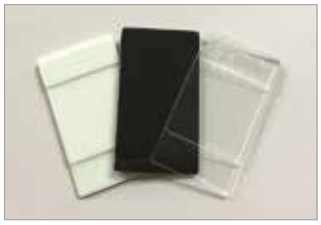
Installation and operation

Support until first start-up of operation

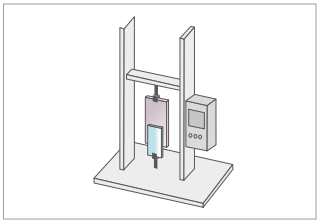
Production test

Laser welding test during current production

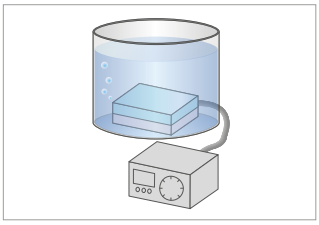
Test piece



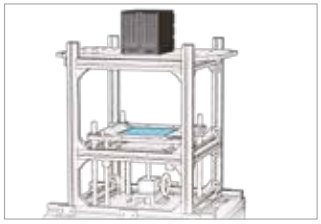
Tensile test



Airtightness test



Test equipment



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▸ **Italy**	**Panasonic Industry Italia srl**	Via del Commercio 3-5 (Z.I. Ferlina), 37012 Bussolengo (VR), Tel. +39 0456752711, Fax +39 0456700444, www.panasonic-electric-works.it
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	Panasonic Fire & Security Europe AB	Jungmansgatan 12, 21119 Malmö, Tel. +46 40 697 7000, Fax +46 40 697 7099, www.panasonic-fire-security.com
▸ **Poland**	**Panasonic Industry Poland sp. z o.o.**	Ul. Dowborczyków 25, 90-019 Lódź, Polska, Tel. +48 42 2309633, www.panasonic-electric-works.pl
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