LW50A Series – Facility Requirements

Effected Models: LW50A(C)(E), LW70A(C)(E) and LW150A(E) ML-2351A(F)(-CE), ML-2350A(F)(-CE), ML-2450A(-CE)

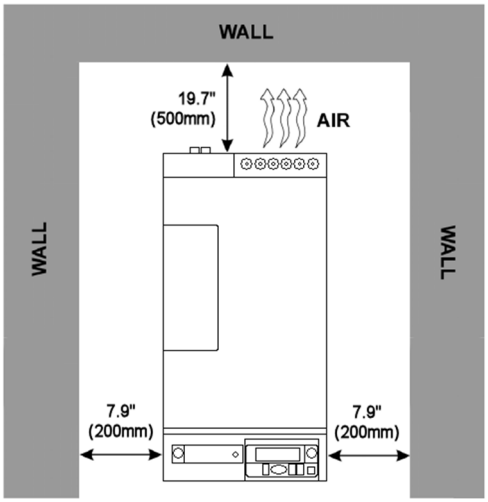
Purpose

The purpose of this document is to describe the facility requirements for proper installation of the LW50A(C)(E), LW70A(C)(E) and LW150A(E) Laser(s). For the rest of this document all laser models will be simply referred to as the ***LW50A Series Lasers***. This document supplements the information found in the AMYA # 990-535 Laser Operator Manual. The contents of this document are subject to change without notice.

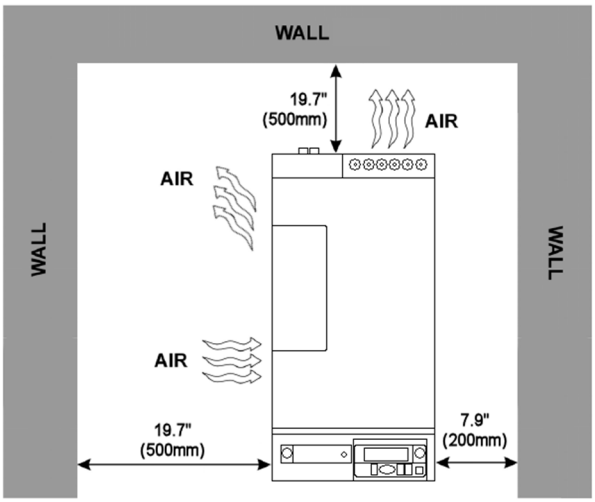
Planning

When planning for the installation of the Laser, verify that the following conditions are met:

- ☐ Install the laser in an isolated "laser operation area" away from common work areas (*unless the laser is used with a Class I workstation*).
- ☐ Appoint a Laser Safety Officer (LSO) to be responsible for the "laser operation area".
- ☐ The LSO should be responsible for controlling the Laser Operation key-switch.
- ☐ Post warning signs to keep unauthorized personnel away from the "laser operation area".
- ☐ Install the laser on a firm, level floor that is free from vibration or impact.
- ☐ Do not operate the laser where there is considerable dirt, dust, oil mist, chemicals, fumes, moisture, or near a high-frequency noise source.
- ☐ Use the laser only when the relative humidity ≤ 85% (non-condensing).
- ☐ Operate the laser where the ambient temperature is above 41°F (5°C).
- ☐ Do not operate the laser where sudden temperature fluctuations can occur.
- ☐ Never operate the laser where the ambient temperature falls below 32°F (0°C). The water inside the laser can freeze and damage the unit.
- ☐ Do not operate the laser in a confined space. Allow sufficient space around the laser:



LW50A(E) / 70A(E) / 150A(E)



LW50AC(E) / LW70AC(E)

Power Supply Requirements

All LW50A Series Lasers operate on 3-Ø (three-phase) power of 200 / 220 / 240VAC (+10%/-15%).
All LW50AE Series Lasers operate on 3-Ø (three-phase) power of 380 / 400VAC (± 10%).

- All 400VAC models are noted with an **E** or **-CE** suffix in the model number.
- All Air-Cooled models are noted with a **C** or **F** suffix in the model number.

220VAC Models – (200/220/240VAC +10/-15%, 50/60Hz)
LW50A, LW50AC, LW70A, LW70AC, LW150A

Parameter (@220VAC)	Laser Model				
	LW50A	LW50AC	LW70A	LW70AC	LW150A
Max. Apparent Power	3.5 kVA	3.5 kVA	3.5 kVA	3.5 kVA	6.5 kVA
Idle Power Consumption	0.45 kW	0.45 kW	0.45 kW	0.45 kW	0.50 kW
Maximum Input Current	10 A	11 A	10 A	11 A	22 A
Breaker Rated Current	20 A	20 A	20 A	20 A	30 A
Recommended Service	20 A	20 A	20 A	20 A	30 A

400VAC Models – (380/400VAC ±10%, 50/60Hz)
LW50AE, LW50ACE, LW70AE, LW70ACE, LW150AE

Parameter (@400VAC)	Laser Model				
	LW50AE	LW50ACE	LW70AE	LW70ACE	LW150AE
Max. Apparent Power	4.2 kVA	4.2 kVA	4.2 kVA	4.2 kVA	7.8 kVA
Idle Power Consumption	0.49 kW	0.49 kW	0.49 kW	0.49 kW	0.60 kW
Maximum Input Current	7 A	8 A	7 A	8 A	13 A
Breaker Rated Current	10 A	10 A	10 A	10 A	20 A
Recommended Service	10 A	10 A	10 A	10 A	20 A

The United States, Canada, Mexico, Brazil, Venezuela, Taiwan, South Korea and the Philippines operate off of a 60Hz power source. Virtually the rest of the world operates off of 50Hz power. Prior to connecting power to the laser, measure the service voltage and verify that it falls within the acceptable voltage range of 200, 220, or 240VAC +10/-15% (for 220VAC Models) or 380 or 400VAC ± 10% (for 400VAC models). The service voltage can be measured across any two phases and should be within 5% of each other.

Grounding

To ensure safety and optimal operation, the laser must be properly grounded. A Neutral connection is not required or used on this laser. However a **PE** (protective earth) *Ground* is provided and MUST be used. It is important to note that the Neutral and PE Ground are **NOT** the same. *DO NOT* connect the Neutral line to the PE terminal.

If the laser is being used in conjunction with a workstation or system, verify that the potential (voltage) between the Laser PE Ground and the Workstation/System PE Ground is at or near zero volts. In practice, it is best to measure this potential at multiple times throughout the day to verify that no other equipment is causing a potential difference due to leakage current. For more information on proper grounding techniques, consult an electrician that is familiar with the laws and regulations in your area. An improperly grounded system can damage the electronics in your equipment.

Power Supply Configuration – 220VAC Models only (LW50A Series)

All LW50A Series Lasers are shipped from the factory configured to operate on 220VAC +10/-15%, 50/60Hz. The laser may also be configured to operate on 200VAC or 240VAC (+10/-15%, 50/60Hz) for locations where the available A.C. service voltage is less than or greater than 220VAC respectively. The 240VAC option is not available for lasers manufactured prior to 11-2007.

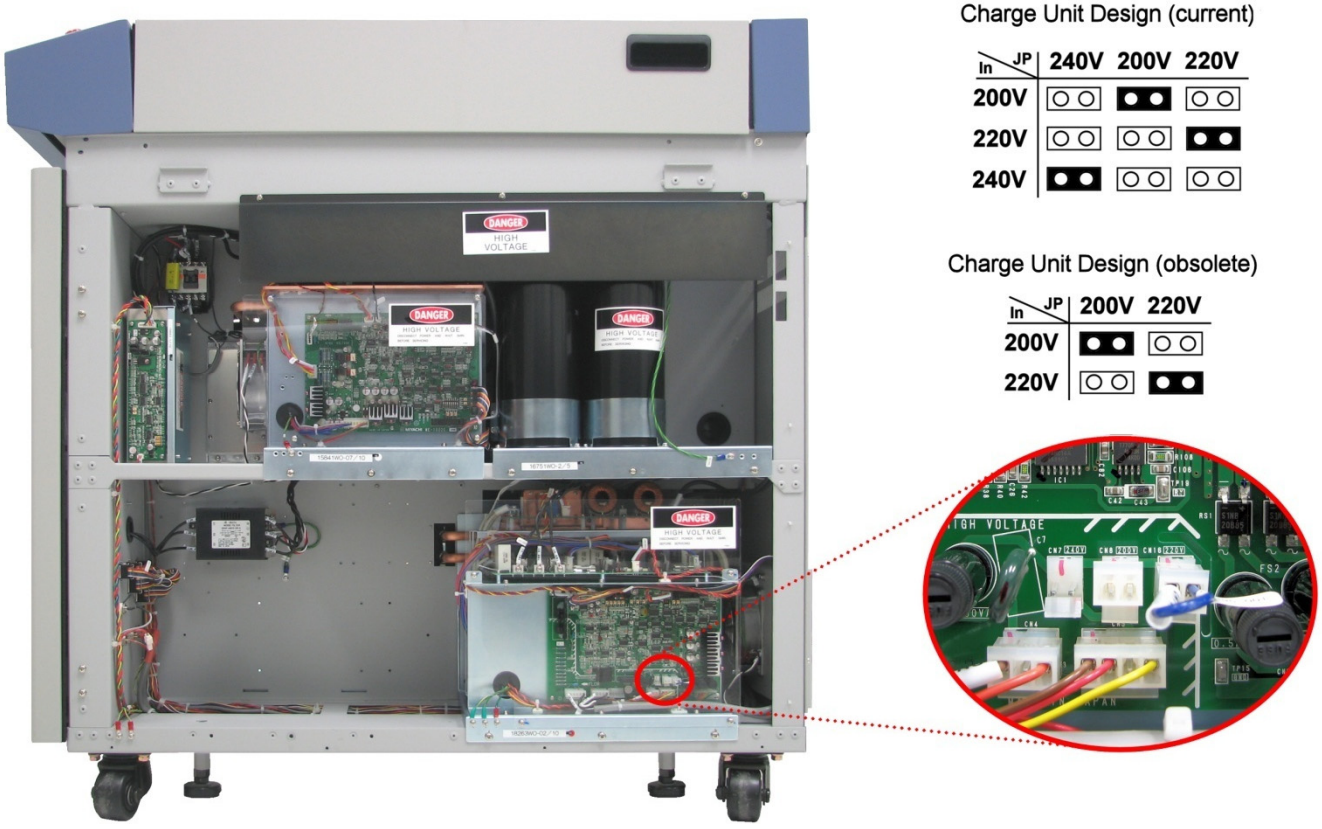
The input voltage selection is accomplished by:

1. Setting the input voltage loop-back jumper on the Charge Unit.
2. Setting the AC voltage tap on the low-voltage power transformer.

Charge Unit Input Voltage selection:

The first step in selecting the input voltage is accomplished by setting the “input voltage jumper” on the ME-1924 Charge Control PCB located on the Charge Unit. The Charge Unit is located on the right side of the laser.

Note: If the Charge Unit does not have a 240 VAC jumper position, the laser cannot operate off of 240 VAC.



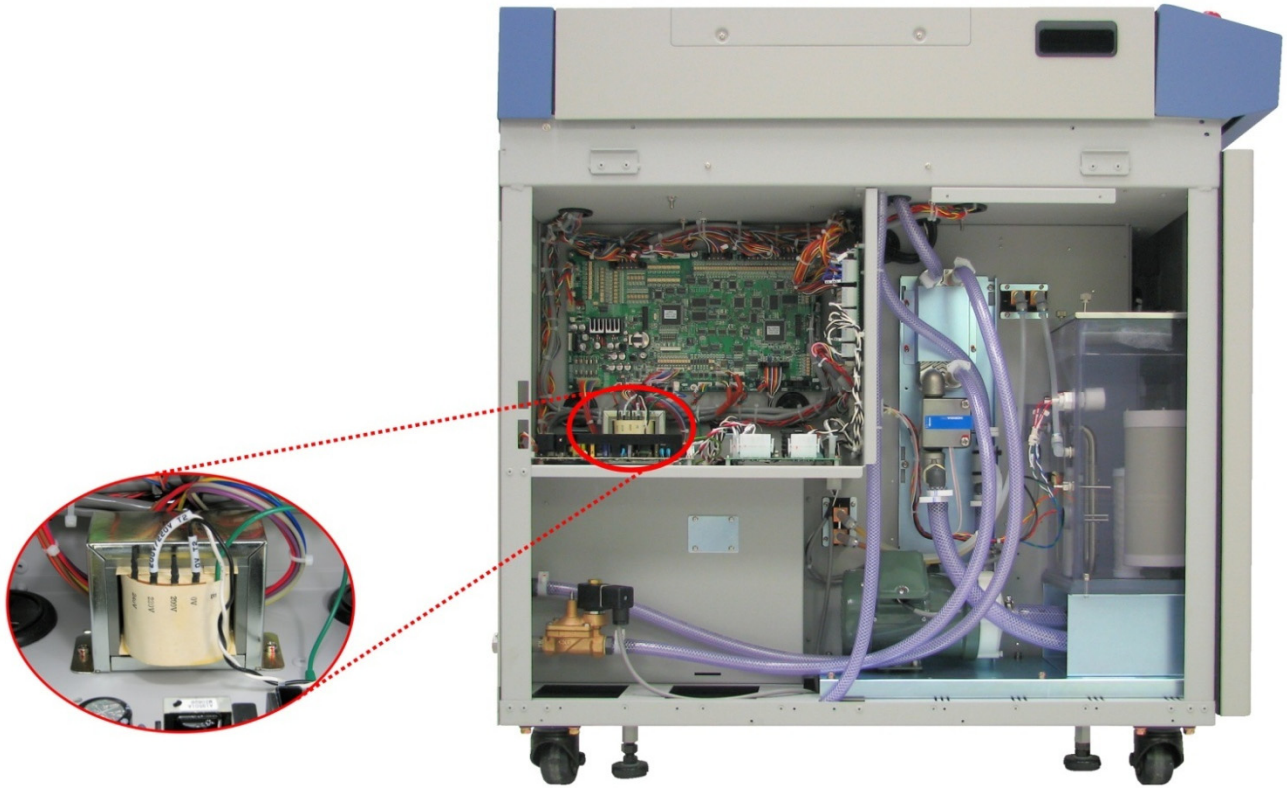
Power Supply Configuration – 220VAC Models only (*continued*)

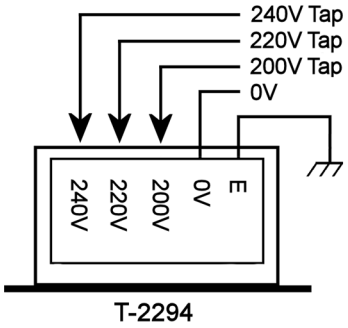
Transformer Voltage Tap (T2):

The second step in selecting the input voltage is accomplished by setting the proper voltage tap on the low-voltage power transformer T2. The low-voltage power transformer T2 is mounted to the chassis on the left side of the laser near the ME-1958 / ME-3024 Main PCB.

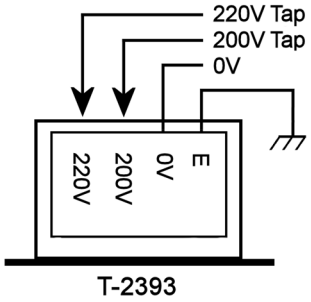
Depending on the date of manufacture of the Laser, the taps available for transformer T2 will differ as described below:

T-2294	200/220/240V	Manufactured after 11-2003 (*current design*)
T-2393	200/220V	Manufactured up through 11-2003





T-2294



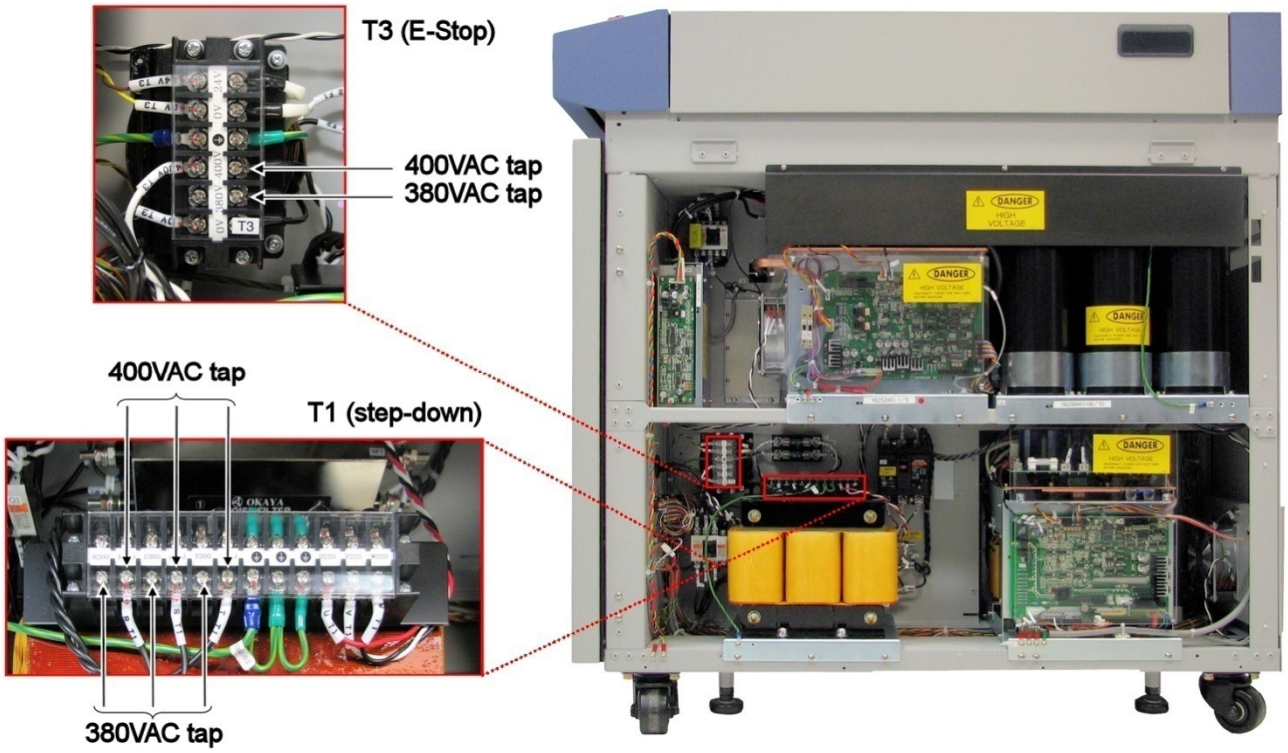
T-2393

Power Supply Configuration – 400VAC Models only (LW50AE Series)

All LW50AE Series Lasers are shipped from the factory configured to operate on 400VAC ±10%, 50/60Hz. The laser may also be configured to operate on 380VAC (±10%, 50/60Hz) for locations where the available A.C. service voltage is less than 400VAC.

In order to operate on 380 VAC, the voltage taps on the Step-Down transformer (T1) and the E-Stop transformer (T3) need to be changed as illustrated below. Both T1 & T3 are located on the right side of the laser in the lower left corner.

Note: Lasers manufactured prior to 11-2003 cannot operate on 380 VAC because E-Stop transformer does not have a 380 VAC voltage tap.



Notes:

1. Step-down transformers (T1) manufactured prior to 11-2003 were also equipped with a 440 VAC transformer tap. This tap should never be used because other line connected components are not rated to operate at 440 VAC.
2. Low-voltage transformer T2 is factory set to 220 VAC.
3. The input voltage loop-back jumper on the Charge Unit is factory set to 220 VAC.

Power Transformation and Protection

If the available A.C. service voltage in your area does not fall within the required voltage range, a step-up or step-down transformer may be required. Choose a transformer with a kVA rating at or greater than the maximum apparent power rating for your laser (as listed in the tables above). These power transformers can be very heavy and extremely expensive to ship. The best option is to consult a local electrician and they can recommend a suitable power transformer for your facility from a local electrical supply house.

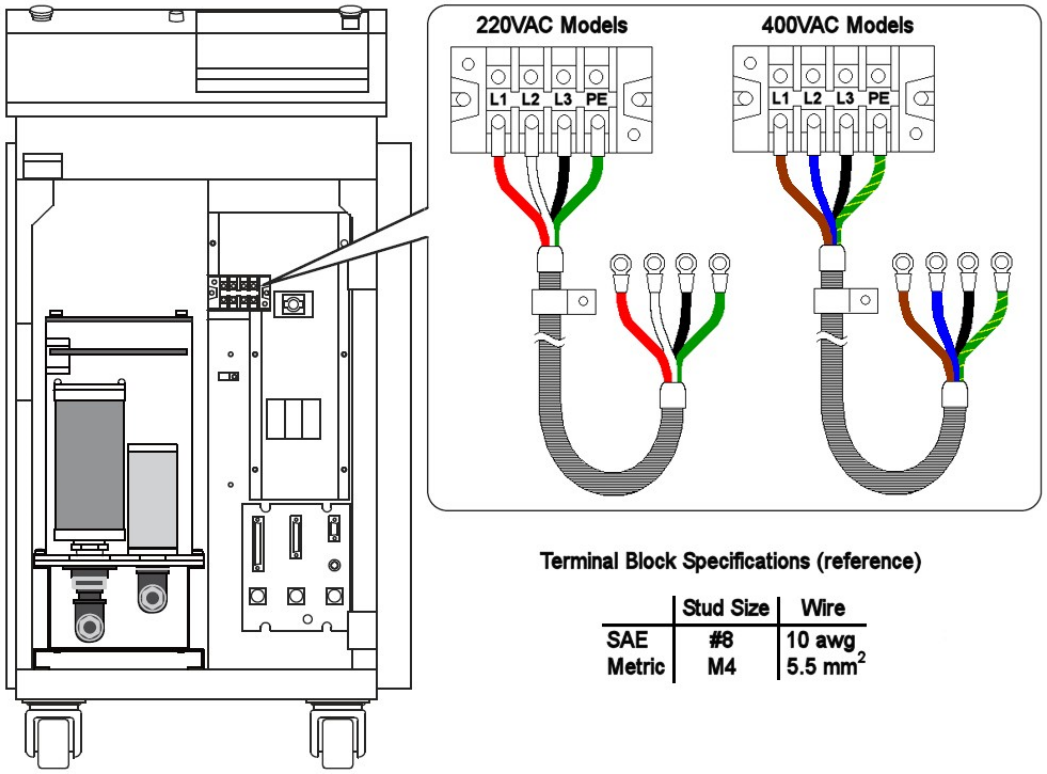
The laser itself is fairly immune to power disturbances but is not immune to power surges due to electrical storms. In these areas, the use of an isolation transformer and noise filter may be needed to help suppress the large power transients. Consult with a local electrician for ways to protect the laser from lightning transients.

Typical Wiring

The standard wiring color codes vary from country to country. Depending on which version of laser you are connecting the supplied A.C. Power cable will differ:

- 220VAC Models are shipped with a "**Red – White – Black – Green**" power cable.
- 400VAC Models are shipped with a "**Brown – Blue – Black – Green/Yellow**" power cable.
- CSA Laser Models are shipped with a CSA approved power cable (custom configuration).

The Power Cable connects to the terminal block located behind the front door of the Laser. Connect the power cable to the laser as follows:



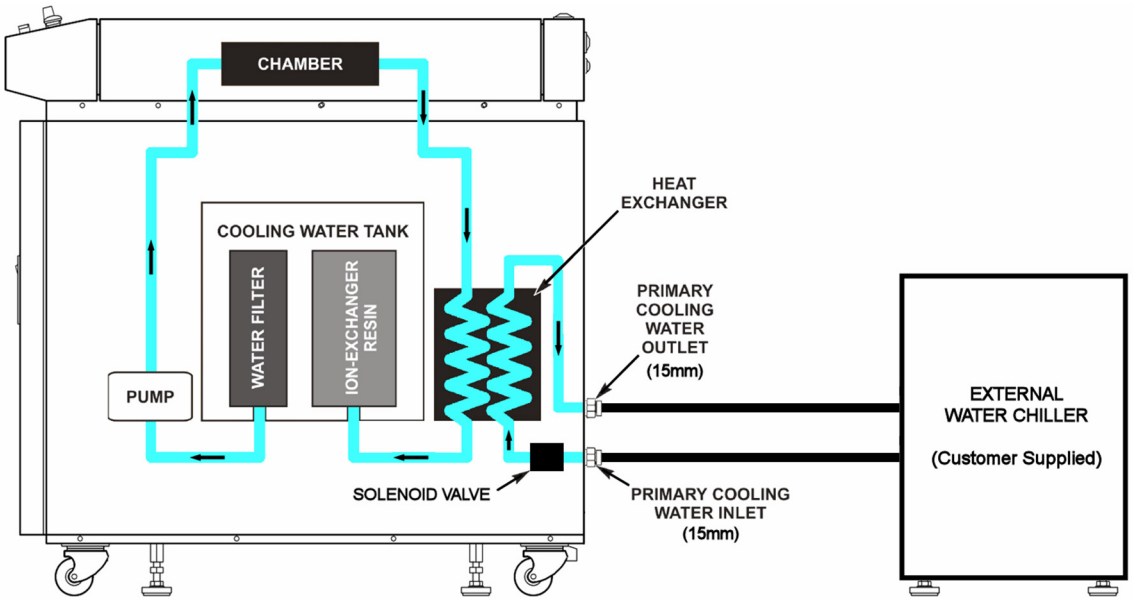
Terminal Block Specifications (reference)

	Stud Size	Wire
SAE	#8	10 awg
Metric	M4	5.5 mm^2

Cooling Requirements – Water-Cooled Models

The standard LW50A Series Lasers are water-cooled. The LW50A Series Lasers maintain a specific operating temperature through the use of two independent water systems.

Primary Cooling Water	External water system that draws heat from secondary cooling water system.
Secondary Cooling Water	Internal water system that keeps the electronics and optics cool.



Temperature is maintained by allowing the primary cooling water to cycle through the laser. Once the secondary cooling water reaches a predefined high temperature set-point, the *Solenoid Valve* is energized which allows the primary cooling water to flow through the *Heat Exchanger*. Once the secondary cooling water reaches the low temperature set-point, the Solenoid Valve is turned off. The primary cooling water supply should be connected to the hose barbs on the rear panel of the laser.

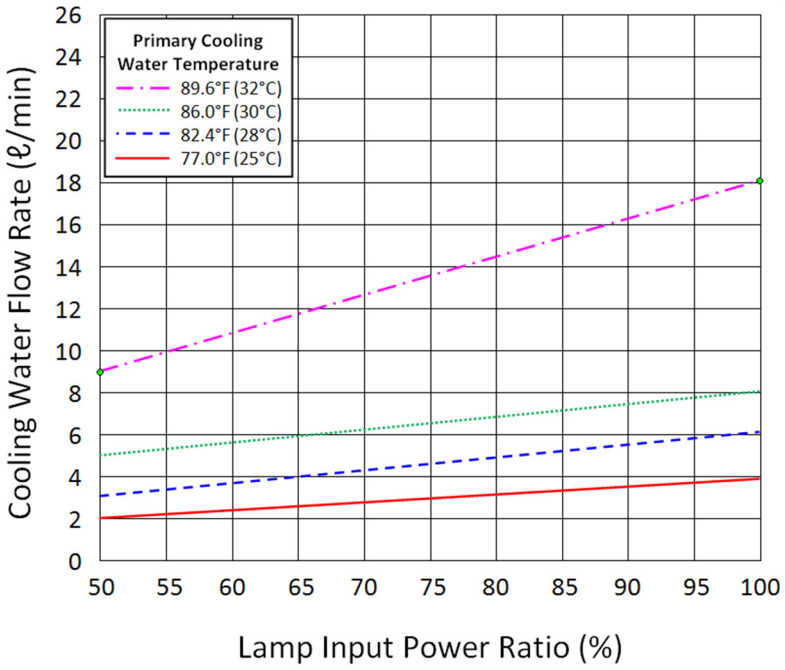
Primary Cooling Water Specifications

Parameter	Laser Model	
	LW50A(E) / LW70A(E)	LW150A(E)
Minimum Cooling Capacity	0.71 ton	1.56 ton
	2150 kcal/hr	4730 kcal/hr
	2.50 kW	5.50 kW
	8,526 BTU/hr	18,758 BTU/hr
Water Temperature Range (°C)	5°C ~ 32°C	5°C ~ 32°C
Water Temperature Range (°F)	41°F ~ 89.6°F	41°F ~ 89.6°F
Minimum Flow Rate (at maximum output)	4 L/min (@ 25°C / 77.0°F) 18 L/min (@ 32°C / 89.6°F)	9 L/min (@ 25°C / 77.0°F) 25 L/min (@ 32°C / 89.6°F)
Differential Pressure	14.2 psi ~ 42.6 psi (98 ~ 294 kPa)	
Maximum Pressure	42.6 psi (294 kPa)	
Water Inlet Diameter	15 mm	

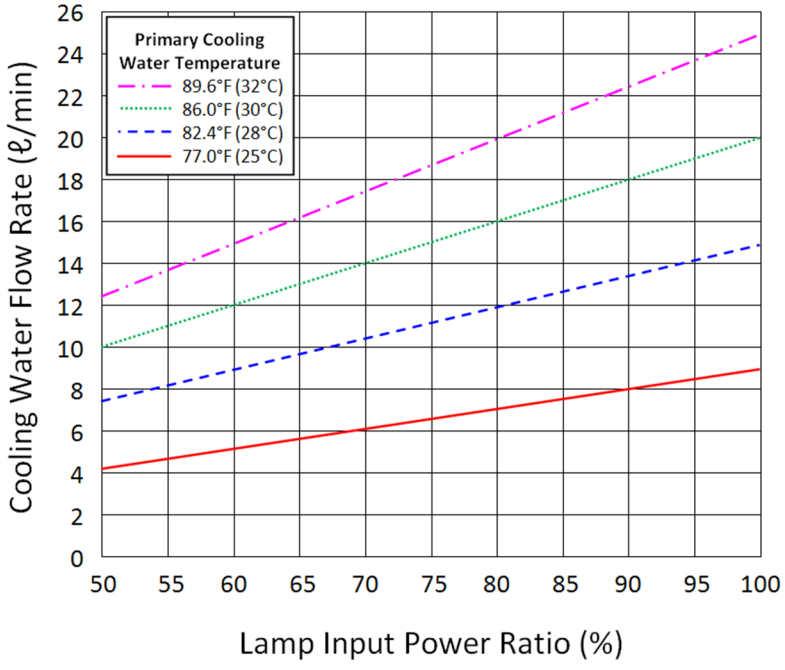
Required Flow Rate of Primary Cooling Water

The required "Flow Rate" of the primary cooling water will vary depending on the cooling water temperature and the effective "Lamp Input Power". In general, the higher the water temperature, the higher the flow rate needed to keep the laser cool. Verify that the maximum primary cooling water pressure is ≤ 42.6 psi (note: add restrictors and/or bypass lines for pressures higher than 42.6 psi).

LW50A(E) / 70A(E):



LW150A(E):



Cooling Requirements – Air-Cooled Models [LW50AC(E) / LW70AC(E)]

The LW50A/70A Laser Welders are available with an air-cooled option (denoted by a "C" or "F" suffix). The temperature in an air-cooled laser is maintained by a series of internal cooling fans. In order to maintain proper operating temperature, there must be adequate space around the laser (*see the "Planning" section above for exact requirements*). If the laser cannot maintain a proper operating temperature, the laser will produce a temperature alarm and will not operate until the laser is able to maintain a proper operating temperature.

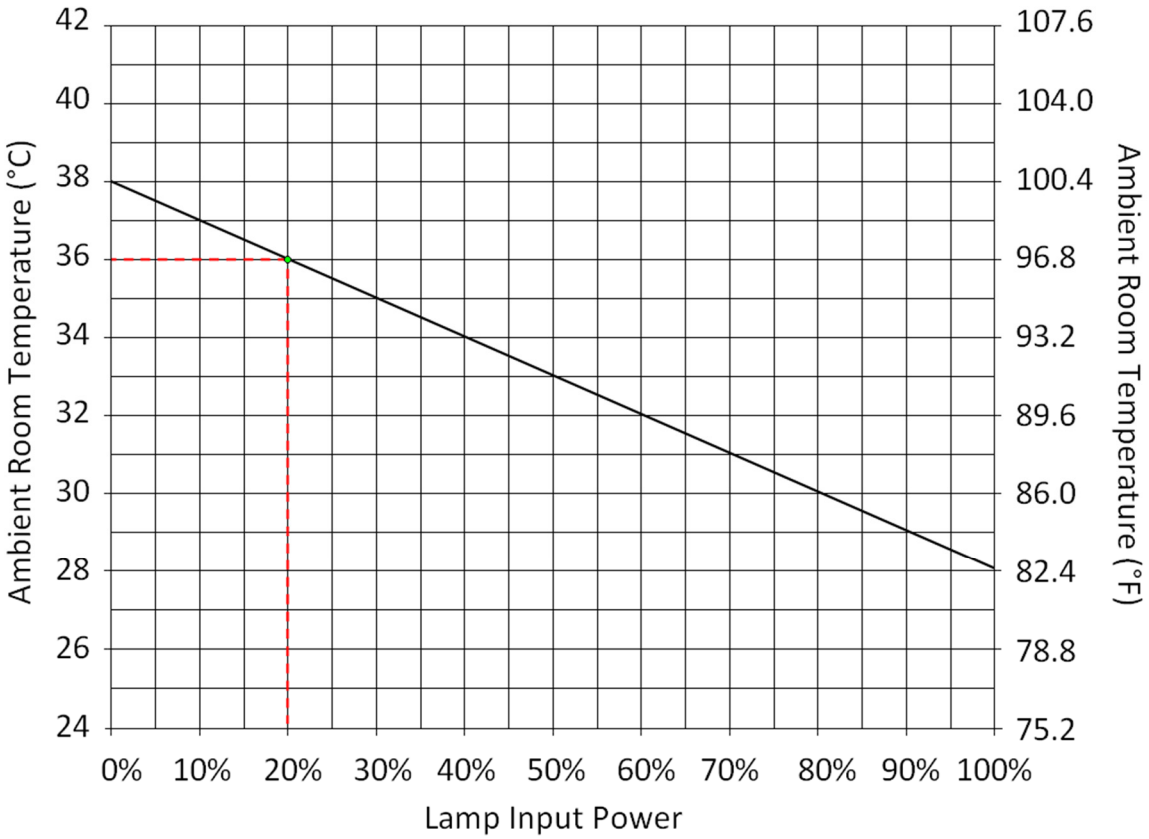
There is a limitation on the available output power in an Air-Cooled laser that is directly affected by the ambient room temperature. The graph below shows the absolute maximum ambient room temperature allowed for any given Lamp Input Power setting.

Example (illustrated in red on the graph below):

If the **LAMP INPUT PWR** setting is 60% and the laser is cycled 10mS **ON** and 20mS **OFF**, then the effective "Lamp Input Power" would be:

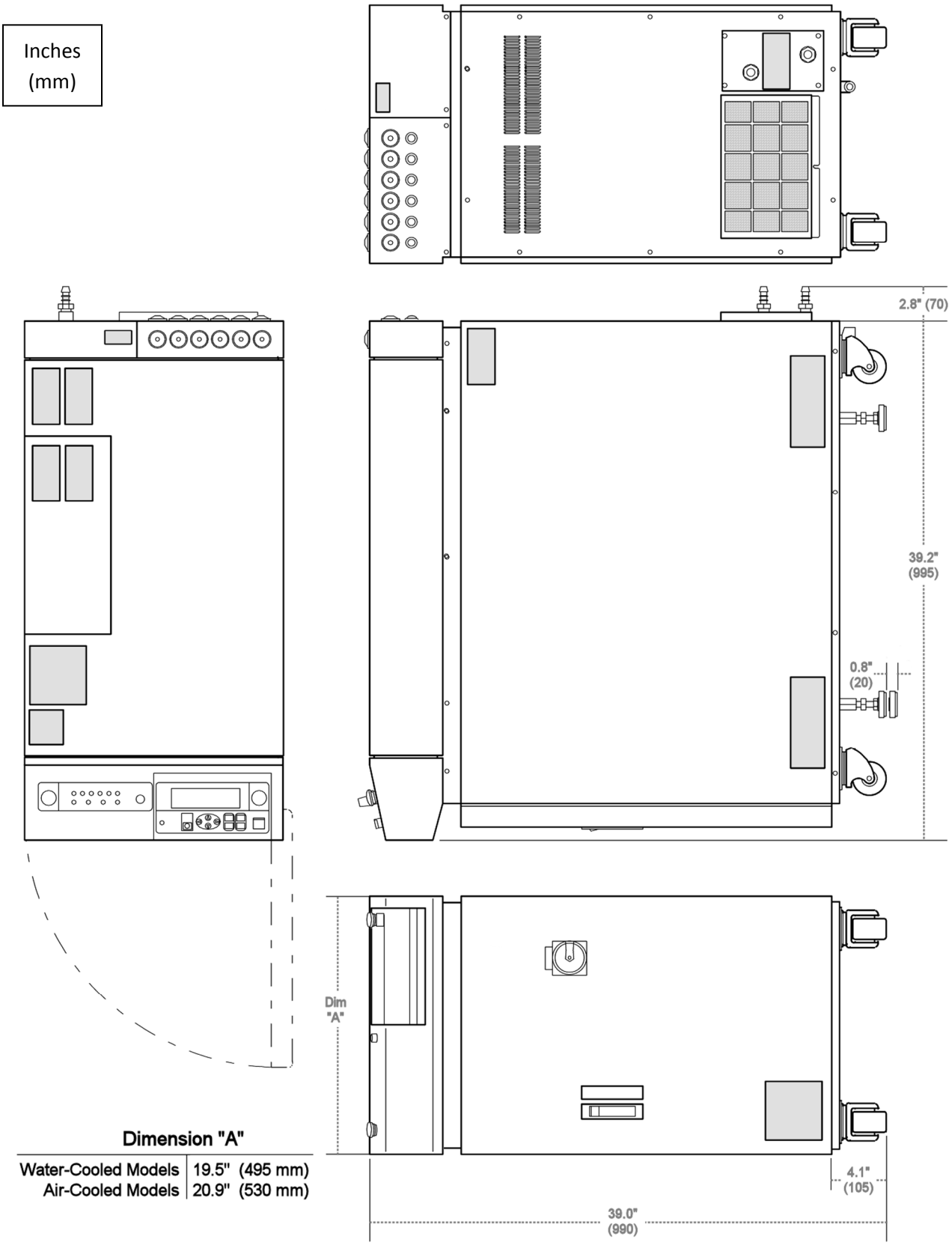
$$\text{Lamp Input Power} = 60\% \times \frac{10\text{mS}}{30\text{mS}} = 20\%$$

According to the graph below, the maximum allowable Ambient Room Temperature with a 20% effective lamp input power is 36°C (or less).



Dimensions

Inches
(mm)



Dimension "A"	
Water-Cooled Models	19.5" (495 mm)
Air-Cooled Models	20.9" (530 mm)

Mass (Weight)

Laser Model		Mass (Weight)	
LW50A/70A	220VAC Models	463 lbs	210 kg
LW50AC/70AC		485 lbs	220 kg
LW150A		507 lbs	230 kg
LW50AE/70AE	400VAC Models	529 lbs	240 kg
LW50ACE/70ACE		551 lbs	250 kg
LW150AE		551 lbs	250 kg

CDRH Accession

The LW50A Series Lasers are sold worldwide under two different Model Numbers, **LW** and **ML**. The **LW** Series are sold by Amada Miyachi America (AMYA) and the **ML** Series are sold by Amada Miyachi Japan (AMY). All LW50A Series Lasers are Class IV devices that are fully compliant with all applicable standards and regulations as set forth by the United States of America's Health and Human Services (HHS), Food and Drug Administration (FDA), Center for Devices and Radiological Health (CDRH), standard 21 CFR 1040.10 for Class IV laser devices. The CDRH Accession Number is issued for both **LW** & **ML** model numbers. The Accession Numbers are as follows:

AMYA Model [1]	AMY Model [1]	Wavelength	Average Output Power	Accession #
LW50A(E)	ML-2351A(-CE)	1064nm	50W	0122213
LW50AC(E)	ML-2351AF(-CE)	1064nm	50W	0122213
LW70A(E)	ML-2350A(-CE)	1064nm	70W	0122213
LW70AC(E)	ML-2350AF(-CE)	1064nm	70W	0122213
LW150A(E)	ML-2450A(-CE)	1064nm	150W	0122213

1. Both the AMYA and AMY models are functionally equivalent and differ only in labeling

CSA Compliance

If the Laser is to be used in Canada, the laser must be CSA compliant. All laser welders manufactured by the Amada Miyachi Corporation are not CSA compliant. In order to be CSA compliant the laser can be converted for CSA compliance at the factory. This request should be made at the time of order. In addition, the laser can also be CSA certified by a CSA approved agency at an additional cost.

Service

If the Laser produces an Error Code or is in need of service, contact the Amada Miyachi America at (626)-303-5676 during normal business hours (7:00 am – 5:00 pm PST).

For after-hours support, please call: **(866) 751-SERV (7378)**

Spare Parts

Description	AMYA Pt #
Flashlamp	4-62325-01
Guide Beam Assembly	4-60301-01
Flowtube, Flashlamp	Z-01629-001
Flowtube, Nd:YAG Rod	Z-01629-002
Nd:YAG Rod O-Ring, 11.2mm I.D. (*qty. 2 required*)	P11.24SHUC70
Chamber Cover O-Ring, 42mm I.D.	WG42-C70
Water Solenoid Valve (RSV-15A-210W-2G211-AC200V)	720-133
Ion-exchange Resin Kit (*includes resin powder + cartridge*)	318-027
├ Ion-exchange resin powder	318-026
└ Ion-exchange cartridge	318-025
Ion-exchange cartridge wrench	451-082
Water Filter	318-019
Floating Panel (*used in cooling tank*)	Z-00869-001
Water Hand Pump	PH-10
Case of Steam-Distilled Water (*6 gallons*)	900-241
Air Filter (170 × 270 × 15 t mm) – Rear Panel	451-136
Air Filter (Air-Cooled models only) – Side Panel	Z-01641-001
Lithium Battery, 3.0v Lithium Coin Cell (CR2450)	145-014
Ext I/O (1) Connector (DB-37M)	250-409
Ext I/O (1) Connector Backshell	250-537
Ext I/O (2) Connector (DB-25M)	250-479
Ext I/O (2) Connector Backshell	250-536
Ext I/O (3) Connector (DB-9M)	250-193
Ext I/O (3) Connector Backshell	250-535
Ext I/O (4) Connector (DB-25F)	250-480
Ext I/O (4) Connector Backshell	250-536
Remote Interlock Connector (2-pin)	451-035
RS-485 (1) or RS-485 (2) Connector (5-pin)	451-052
RS-232 to RS-485 Converter	270-205
Optical Lens Cleaner (RoHS compliant)	900-342
Lens Cleaning Tissue (7.75" × 4")	900-314
Fiber Inspection Scope (EC-0002)	4-60091-01
Fiber Alignment Scope Assembly	4-63134-01
├ Fiber Scope	FOS-04
├ FOS-04 Mounting Bracket	Z-01360-001
└ Mounting Bracket Thumbscrew	AP-176-3
IR Safety Glasses (λ = 1064nm)	475-118
Over-the-Glasses IR Safety Glasses (λ = 1064nm)	475-160
IR Safety Glasses (λ = 532nm + 1064nm)	475-156