

LW500A Series – Facility Requirements

Effected Models: LW500A(E) and LW600A(E)
ML-2651B(-CE) and ML-2650B(-CE)

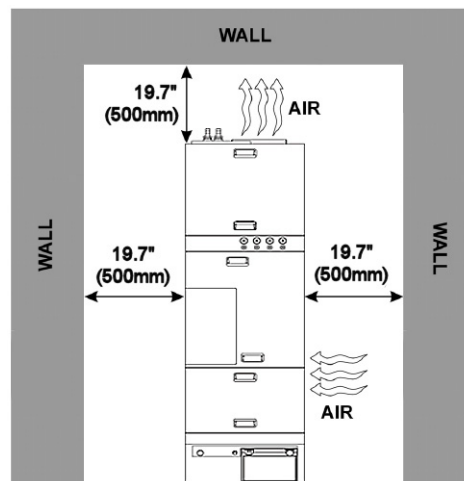
Purpose

The purpose of this document is to describe the facility requirements for proper installation of the LW500A(E) and LW600A(E) Laser(s). For the rest of this document all laser models will be simply referred to as the **LW500A Series Lasers**. This document supplements the information found in the AMYA # 990-539 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 $\leq 85\%$ (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:



Power Supply Requirements

All LW500A Series Lasers operate on 3-Ø (three-phase) power of 200 / 220 / 240VAC (+10%/-15%).
All LW500AE Series Lasers operate on 3-Ø (three-phase) power of 380 / 400VAC (±10%).

*Note: All 400VAC models are noted with an **E** (or **-CE**) suffix in the model number.*

Parameter	220VAC Models	400VAC Models
	LW500A, LW600A	LW500AE, LW600AE
Service Voltage	200/220/240 VAC +10/-15%	380/400 VAC ±10%
Frequency	50/60Hz	50/60Hz
Phase(s)	3	3
Max. Apparent Power	31.1 kVA (@ 220VAC)	32.9 kVA (@ 400VAC)
Idle Power Consumption	2.3 kW (@ 220VAC)	2.4 kW (@ 400VAC)
Max Power Consumption	25.4 kW (@220VAC)	25.6 kW (@400VAC)
Maximum Input Current	84 A (@ 220VAC)	48 A (@ 400VAC)
Breaker Rated Current	100 A	60 A
Recommended Service	100 A	60 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 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). The power transformers can be very heavy and extremely expensive to ship. The best option is to contact an electrical supply house in your area to find a suitable power transformer for your facility.

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.

Power Supply Configuration – 220VAC Models only (LW500A Series)

All LW500A 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. Depending on the date of manufacture, the 240 VAC option may not be available.

The input voltage selection is accomplished by:

1. Setting the input voltage loop-back jumper on all six Charge Units.
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 all six ME-1924 Charge Control PCB’s located on each of the six Charge Units. All six Charge Units are located on the right side of the laser as shown below.

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

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. Transformer T2 is mounted to the chassis located at the top rear of the laser (behind 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:



Power Supply Configuration – 400VAC Models only (LW500AE Series)

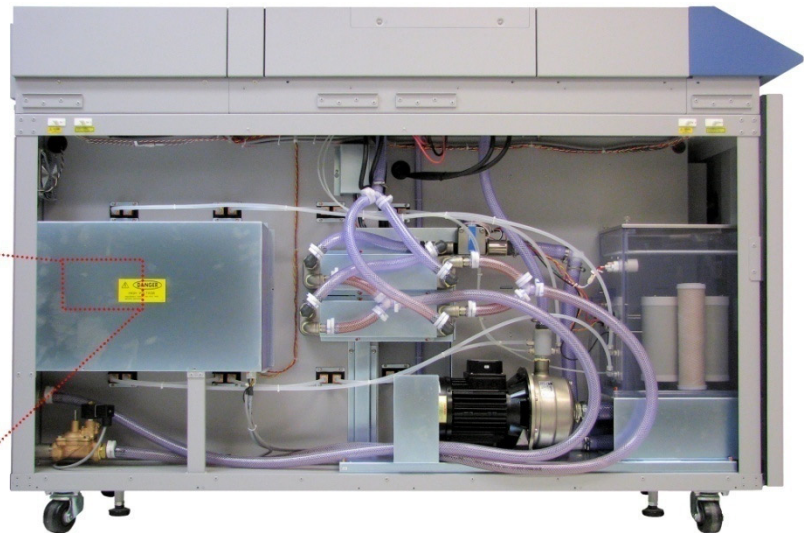
All LW500AE Series Lasers are shipped from the factory configured to operate on 400VAC $\pm 10\%$, 50/60Hz. The laser may also be configured to operate on 380VAC ($\pm 10\%$, 50/60Hz) for locations where the available A.C. service voltage is less than 400VAC.

In order to operate on 380 VAC, the voltage taps on step-down transformer (T1) need to be changed as illustrated below. Transformer T1 is located on the left side of the laser behind the high voltage access panel:

Configure T1 as follows:

Vin	Red	Wht	Blk
400VAC	U3	V3	W3
380VAC	U4	V4	W4

Transformer T1 is located behind the High Voltage access panel.



Notes:

1. Step-down transformer (T1) also has a 440 and 480 VAC transformer tap. These taps should never be used because other line connected components are not rated at these voltages.
2. Low-voltage transformer T2 is factory set to 200 VAC.
3. The input voltage loop-back jumpers on the Charge Units are factory set to 200 VAC.
4. The AC voltage tap on the E-Stop transformer (T3) is factory set to 400 VAC.

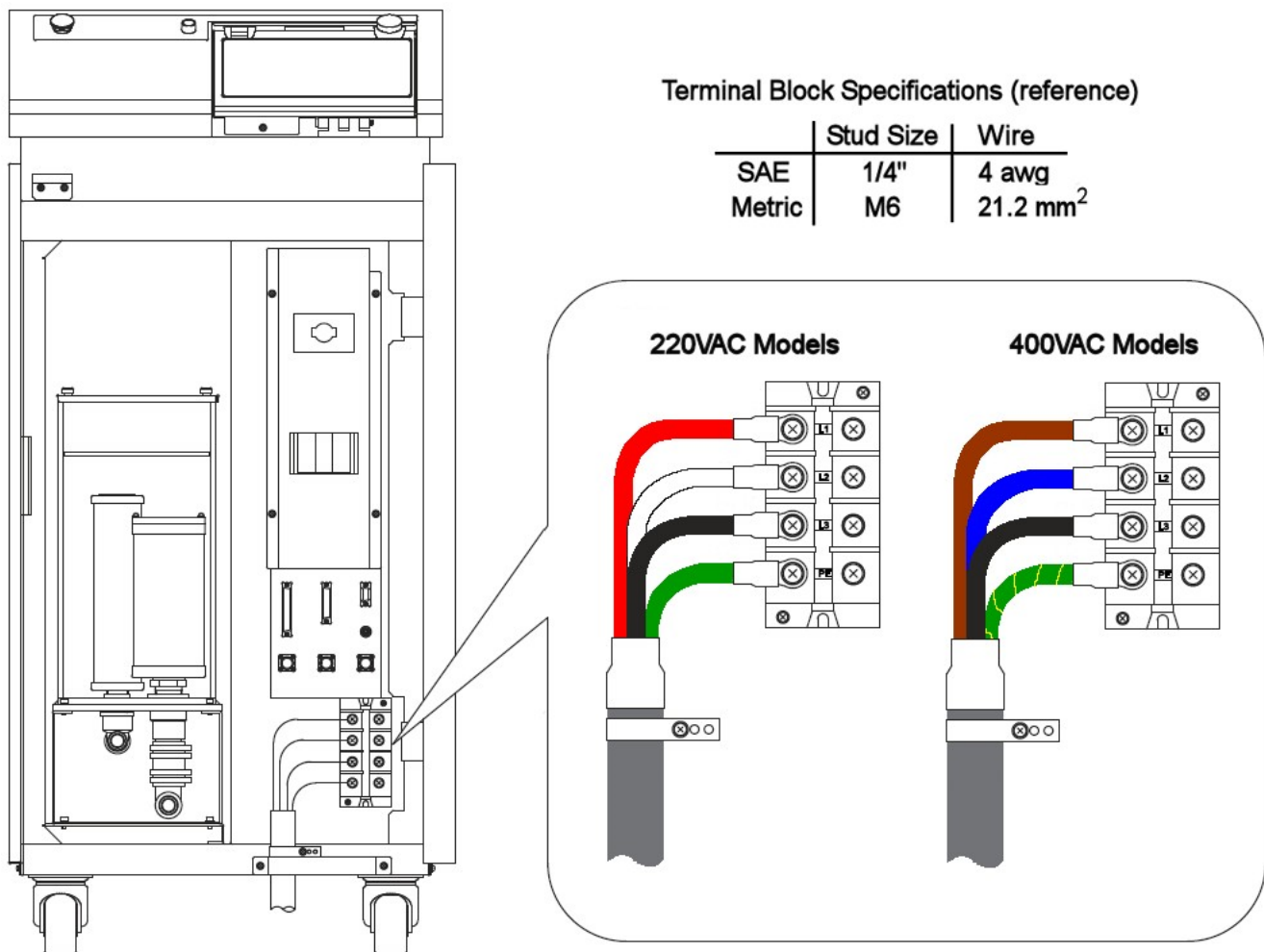
Typical Wiring

The standard wiring color codes vary from country to country. No matter what color the wires are, it is important to connect power such that all 3-phases are oriented correctly on terminals **L1**, **L2** and **L3**. If the laser exhibits an **E05: Phase Trouble** error code, then the phases are not oriented correctly. In this case simply reversing two of the input connections will correct the problem.

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.

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

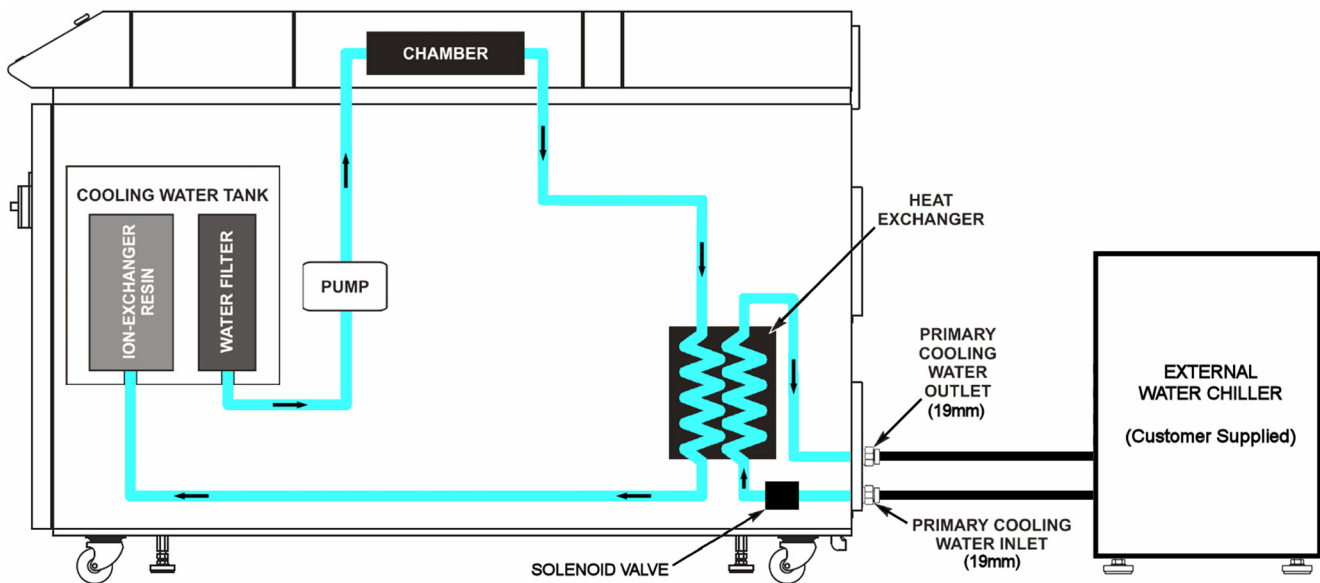


Note: The power cable shipped with the laser is terminated with ring terminals.

Cooling Requirements

All LW500A Series Lasers are water-cooled. The LW500A 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.



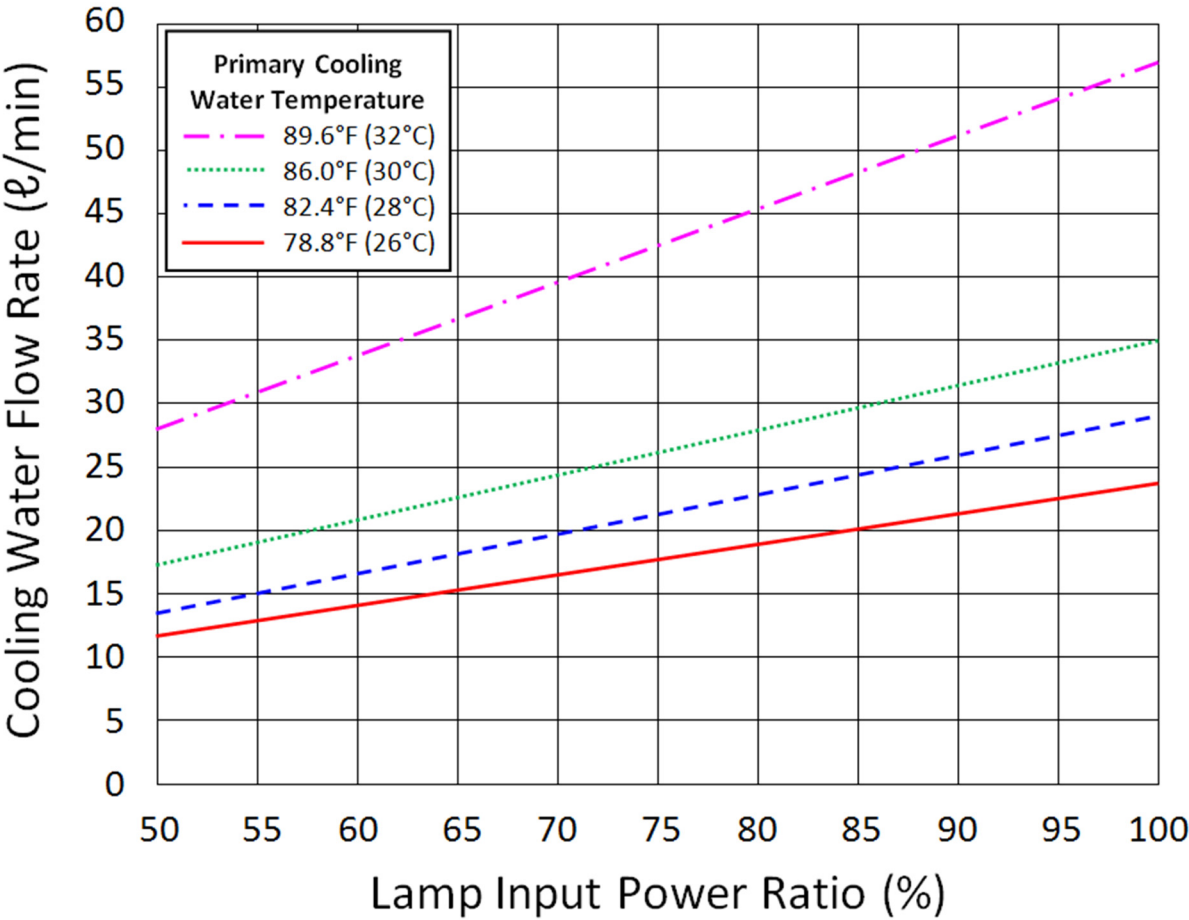
Temperature is maintained by allowing the primary cooling water to cycle through the laser. Once the secondary cooling water reaches a predefined temperature set-point, the *Solenoid Valve* is energized which allows the primary cooling water to flow through the *Heat Exchanger* (radiator). Once the secondary 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	LW500A(E), LW600A(E)
Minimum Cooling Capacity	6.66 ton
	20,160 kcal/hr
	25.4 kW
	79,948 BTU/hr
Water Temperature Range (°C)	5°C ~ 32°C
Minimum Flow Rate (at maximum output)	24 L/min (@ 26°C)
	57 L/min (@ 32°C)
Differential Pressure	14.2 psi ~ 42.6 psi (98 ~ 294 kPa)
Maximum Pressure	42.6 psi (294 kPa)
Water Inlet Diameter	19 mm

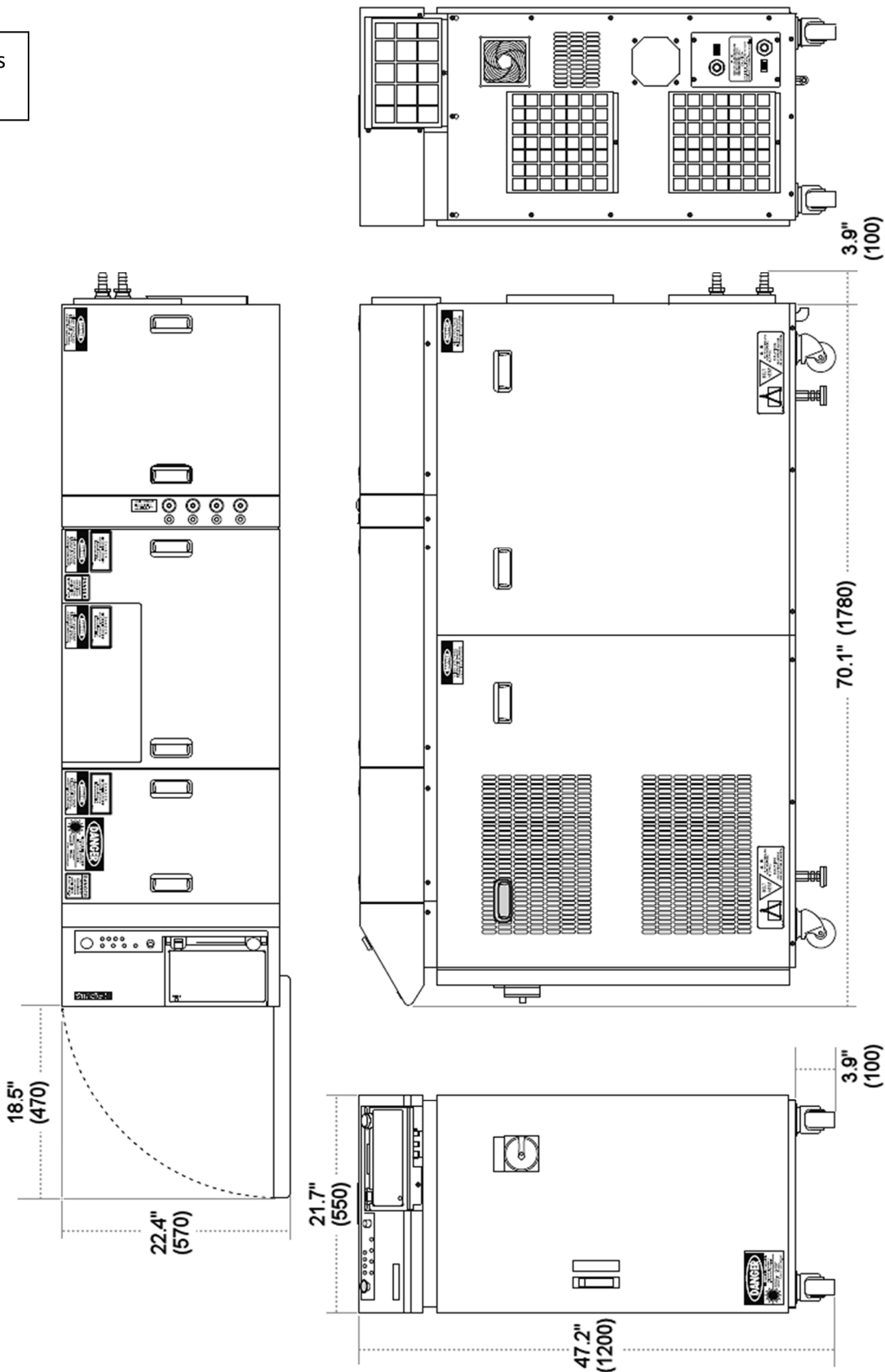
Required Flow Rate of Primary Cooling Water

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).



Dimensions

Inches
(mm)



Mass (Weight)

Laser Model		Mass (Weight)	
LW500A/600A	220VAC Model	1190 lbs	540 kg
LW500AE/600AE	400VAC Model	1301 lbs	590 kg

CDRH Accession

The LW500A 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 LW500A Series Lasers 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 #
LW500A(E)	ML-2651B(-CE)	1064nm	500W	0122213-02
LW600A(E)	ML-2650B(-CE)	1064nm	600W	0122213-02

- 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. At this point in time, the LW500A Series Laser cannot be converted for CSA compliance.

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 (MLD-0602) – (qty. 2 required)	435-138
Guide Beam Assembly	4-60301-01
Flowtube, Flashlamp	Z-01981-003
Flowtube, Nd:YAG Rod	Z-02390-001
Nd:YAG Rod O-Ring, 12mm I.D. (qty. 2 required)	P12-C70
Chamber Cover O-Ring, 260 mm I.D.	G260-C70
Ion-exchange Resin Kit (includes resin powder + cartridge) – (qty. 2 required)	318-027
└ Ion-exchange resin powder	318-026
└ Ion-exchange cartridge	318-025
Ion-exchange cartridge wrench	451-082
Water Filter	4-60081-01
Floating Panel (used in cooling tank)	Z-02362-001
Water Hand Pump	PH-10
Case of Steam-Distilled Water (6 gallons)	900-241
Air Filter (170 × 270 × 15t mm) – Rear Panel	451-136
Air Filter (265 × 250 × 20t mm) – Rear Panel	HR1320TX265X250
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 ($\lambda = 1064\text{nm}$)	475-118
Over-the-Glasses IR Safety Glasses ($\lambda = 1064\text{nm}$)	475-160
IR Safety Glasses ($\lambda = 532\text{nm} + 1064\text{nm}$)	475-156
Laser Safety Manual	990-502