
Pulsar NT 1212 & 2415

Laser Machine
User Pre-installation Guide
June, 2006

PRODUCTION
laser
Systems

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Warning

**All work must be completed by qualified personnel.
DO NOT apply power to the machine until an AMADA SERVICE ENGINEER
is present and has instructed you to do so.**

**Applying power to the machine without removing all wrapping paper and
protective coatings may damage the machine.**

A note on dimensions:

Dimensions in this document use the following units unless otherwise stated:

Length	inches
Weight	pounds

Contents

A note on dimensions:	2
Introduction	5
Description of the Major Components	6
Major Components	7
Size and Weight of Major Components	8
Basic Specifications	9
Laser and Production Cutting Specifications	10
Electrical Requirements	11
Other Requirements	12
Laser Pre-mix Gas	13
Laser Pre-mix Gas Specification	14
Assist Gas Recommendations	15
Oxygen Purity	15
Machine Dimensions - Pulsar 1212, 1212XL Front View	16
Machine Dimensions - Pulsar 1212, 1212XL Side View	17
Machine Dimensions - Pulsar 1212, 1212XL Plan View	18
Machine Dimensions - Pulsar 2415XL Front View	19
Machine Dimensions - Pulsar 2415XL Side View	20
Machine Dimensions - Pulsar 2415XL Plan View	21
Planning The Location of the Machine	22

Components to be Positioned	23
Lifting the Machine	24
Lifting the Machine (cont.)	25
The Chiller	26
Chiller Dimensions	27
Dust Collector	29
Dust Collector Dimensions	30
Machine Foundations	32
Machine Foundations J Bolt Detail	33
Foundations Plan View, Pulsar 1212, 1212XL	34
Foundations Cross Section, Pulsar 1212, 1212XL	35
Foundations Plan View, Pulsar 2415XL	36
Foundations Cross Section, Pulsar 2415XL	37
Machine Mounting Procedure	38
Installing The Electrical Power Supply	40
Electrical Connections (cont)	41
Electrical Connections (cont)	43
Installing The Air Supply	44
Removing the Protective Coating	45
Location Of Paper Wrapped Components	46
Pre-Installation Checklist	47
Pre-Installation Checklist (Cont.)	48

Introduction

This manual describes the tasks that you must complete, before the service organization is called to complete the installation and operator maintenance training.

An overview of the preparations is as follows:

- ❑ Order the laser oscillator gas and laser cutting assist gases. (see pages 14 , 15)
- ❑ Order the distilled water for the laser chiller and laser optics cooling. (see page 12)
- ❑ Plan the location of the machine, gas bottles, chiller, dust collector and any other accessory equipment. Take into account all the maintenance areas indicated on the floor plan.
- ❑ Prepare the machine foundation as required.
- ❑ Install the electrical supplies.
- ❑ Install the air supply.
- ❑ Uncrate the machine. See note below.
- ❑ Place the machine on the foundation, but do not fill the anchor bolt holes (required) until after the initial installation is complete and an Amada service engineer has authorized it.
- ❑ Plumb air and water supplies, and connect electrical supplies as outlined in this document.
- ❑ Remove the paper wrapping and protective coating from the surface of the machine.
(see pages 45, 46)

It is the purchaser's responsibility to install necessary safety devices.

Note: If your machine will be used with a loader system, DO NOT PLACE THE MACHINE until you verify whether “risers” are necessary. The machine may need to be placed on riser blocks to put the table at the level of the material handling system. The riser blocks are (usually) shipped separately from the machine.

Description of the Major Components

Your laser systems will arrive in several crates. The machine, and accessories are packaged in one crate. The chiller, dust collection system, gas regulators, and any optional equipment (such as transformers or safety mats) will be crated individually.

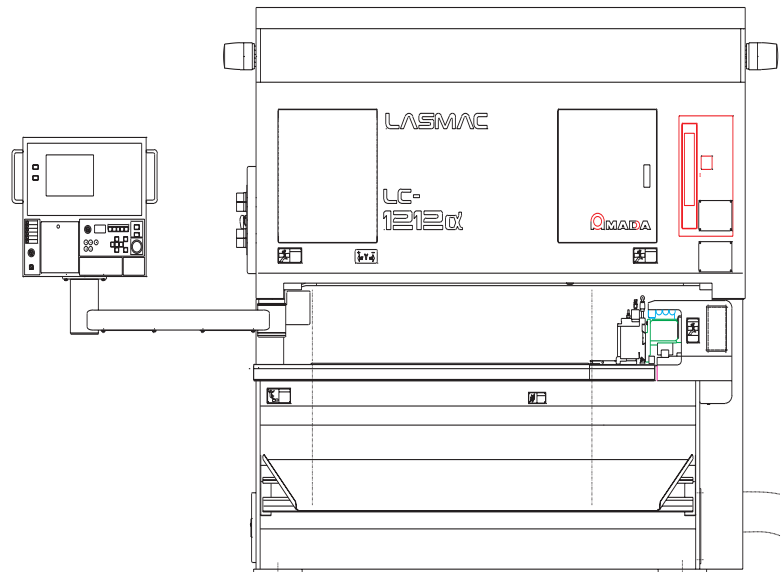
The major components are:

- ❑ The **machine** - note that several parts including the laser cutting head, external optics, lenses and nozzles are inside the accessory crate and pre-installation kit package.
- ❑ The **chiller** - this controls the running temperature of the laser oscillator. Flexible hoses and fittings are provided to connect it to the oscillator. The chiller can be positioned anywhere within a reasonable distance from the machine. See detailed specifications for exact distance limitations.
- ❑ The **accessory crates** - these crates contain many small pieces of equipment required to install and operate the machine.
- ❑ The **dust collector** - all lasers need some kind of dust collection system to filter fumes and particles from the cutting process.
- ❑ The **gas connection kit** - this kit contains regulators, hoses, and fittings to connect the laser and assist gas bottles to the machine.
- ❑ The **optional transformer** - The system requires 200~220 VAC 3 phase. If your supply is 230V, 460V or other voltage, a step down transformer will be required.
- ❑ optional **riser blocks** ("line spec" machines with certain loader systems)

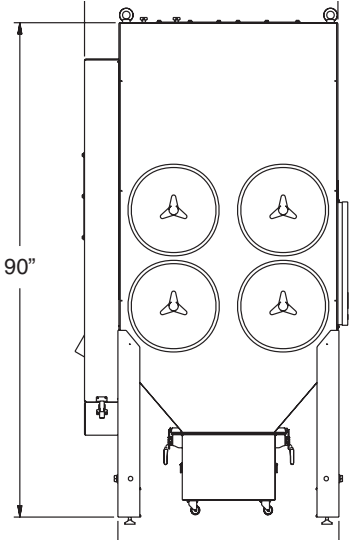
Major Components



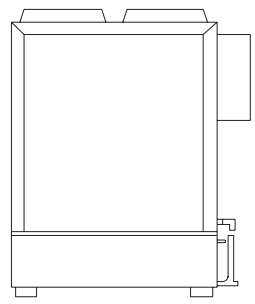
Gas Connection Kit



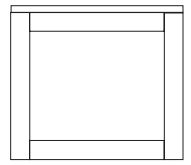
Machine



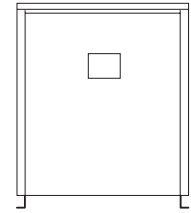
Dust Collector (model may vary)



Chiller (model may vary)



Accessory Crate



Transformer (Optional)

Size and Weight of Major Components

Ensure that you discuss the following dimensions and weights with your selected rigger, before the delivery of the machine.

Item	Approximate Dimensions (Length x Width x Height)	Approximate Weights
1212 Machine	123" x 100" x 86.5"	12,000 lb. ¹
2415 Machine	221.5" x 112" x 86.5"	14,000 lb. ¹
Chiller - Koolant Koolers	60" x 31.5" x 64.3"	935 lb.
Chiller - CKD	36" x 54" x 85"	1100 lb.
Dust collector - SDF	41" x 34" x 87"	1000 lb.
Dust collector - ADF	90" x 48" x 54"	660 lb.
Optional 75 KVA transformer (for AF1500, AF2000 lasers)	31" x 33" x 27"	600 lb.
Optional 112 KVA transformer (for AF3000, AF4000A lasers)	32" x 27" x 36"	698 lb.

¹ Includes standard laser resonator. Also see page 25, on Lifting the Machine

Basic Specifications

FEATURE	SPECIFICATION	
	1212	2415
NC unit	Fanuc 160iL (32 bit)	
Available Lasers	see table on page 10	
Carriage & table travel	50.00" (Y) x 50.00" (X)	61" (Y) x 99" (X)
Z axis motion (laser cutting head)	11.8"	
Maximum worksheet size (1 reposition)	50" (Y) x 100" (X)	61" (Y) x 198" (X)
Maximum worksheet weight	484 lb.	728 lb.
Maximum material thickness	see table on page 10	
Maximum table speed	3149 in/min. single axis (4454 in/min. at 45 degrees) ²	
Maximum cutting speed	787 in/min.	
Positioning accuracy	0.0004" / 20"	
Positioning repeatability	0.0004"	
Work chute	21" (X) x 66" (Y)	21" (X) x 78" (Y)

² Machines prior to May '98 production: 1575 in/min. single axis (2227 in/min. at 45 degrees)

Laser and Production Cutting Specifications

FEATURE	SPECIFICATION	
(Laser used)	Fanuc AF2000	Fanuc AF 4000
CW Power	2,000 Watts	4,000 Watts
Peak pulse power	2,700 Watts	5,000 Watts
Maximum material thicknesses:⁴ (maximum sheet size according to weight limitation)		
Carbon steel:	0.5"	0.5"
Stainless steel:	0.25" CleanCut™	0.375" CleanCut™
Aluminum	0.187"	0.25"

4 Clamping thickness limit is ½". Table rated for ½" . (up to 20.4 lbs per square foot)

Electrical Requirements

The equipment comprising the Pulsar-NT has varying voltage specifications. The following specification will satisfy all of them, and permits running your sub-panel from a single transformer or power source. See the table below for KVA ratings.

System Voltage: 200~220 VAC 3 phase.

Note: This is a min-max specification, and there is no additional \pm tolerance.

The following table lists the individual units and respective ratings.

UNIT	Rating	
	2000 Watt Laser	4000 Watt Laser
Machine (CNC)	200V3ph \pm 10%, 60Hz (28 Amp, 10 KVA)	
Laser	200V3ph \pm 10%60 Hz (92 Amp, 33 KVA)	200V3ph \pm 10%60 Hz (160 Amp, 55 KVA)
Chiller- Koolant Koolers	208V 3ph \pm 10% 60 Hz (HCV 7500: 50 Amp, 18 KVA)	
Chiller- Orion		200V 3ph \pm 10% 60 Hz RKL-15000: 97 Amp, 36 KVA,
Chiller - CKD	200V3ph \pm 10%60 Hz HYW7023U: 13 KVA, 70 Amp breaker	
Dust collector Torit ADF4	7.5 Hp, 208V 3ph \pm 10% 60 Hz, (9 KVA)	
Dust collector Torit SDF-6	10 Hp, 208V 3ph \pm 10% 60Hz 34 Amp (12 KVA)	

Other Requirements

Air supply

UNIT	Pressure, Volume	Other
Machine	80 psi at 10.6 ft ³ /min.	2 micron max particulate 100 ppm max hydrocarbon content 40°F max dewpoint.
Cutting gas for Aluminum	200 psi at 22 ft ³ /min. (optional)	
Dust collector	80 psi at 1.5 ft ³ /min. ⁵	40 micron max. particulate

Gases

Item	Requirement
Laser Oscillator Gas	see laser pre-mix gas specification (p. 14)
Assist gases	see assist gas recommendations (p. 15)

Coolant

Item	Requirement
Distilled water	approximately 70 gallons
Corrosion inhibitor ⁶	1 gallon provided with machine

In addition to the supply requirements, hoses must be provided by the customer to connect air supplies to the machine and dust collector.

⁵ See page 44 regarding air line requirements.

⁶ Additional quantities available from Amada Service, at (714) 670-2111

Laser Pre-mix Gas

Laser gas quality is critical to the performance and reliability of the laser. Based on our experience, we recommend BOC's LASERSHIELD F or AGA's LaserMix 21.

Call either of these national 800 numbers to locate the supplier closest to you.

AGA Gas Inc.: 1-800-837-7226

BOC GASES: 1-800- 742-4726 [HTTP://www.boc.com](http://www.boc.com)

IMPORTANT - The installation of your machine can not be completed without the correct laser gas. Be sure to obtain at least two bottles prior to scheduling installation.⁷

A two stage regulator and twenty-five feet of hose with 3/8" fittings is provided to connect the gas bottle to the laser. If the installation requires a longer length, use Teflon/polyethylene hose only.

⁷ The typical gas bottle will hold 220 ft³ of usable gas, enough for several months on a single shift basis. However, during installation, additional gas is usually required.

Laser Pre-mix Gas Specification

Laser gas quality is critical to the performance and reliability of the laser. Based on our experience, we recommend AGA's LaserMix 21 or BOC's LASERSHIELD F. If you choose a supplier other than AGA or BOC, use the following laser gas specification.

NOTE: If the gas is not mixed to the required specifications, the laser will not run correctly. The laser uses a mix of carbon dioxide (CO₂), Nitrogen (N₂) and Helium (He) at 28 psi. Give this specification to your gas supplier.

Laser Oscillator Gas Mixture			
Gas	CO2	N2	He
Pre-mix ratios	5% ±0.25%	55% ±2.75%	40% ±2.0%
	4.75% - 5.25%	52.25% - 57.75%	38% - 42%
Purity	99.99%		
Moisture	5 ppm total maximum		
Hydrocarbon (C_nH_m)	1 ppm total maximum		

We recommend that you purchase gas that is certified to meet these specifications when drawn from the gas bottles.⁸

⁸ This means that any impurities from the bottle are included in the certified purity

Assist Gas Recommendations

The machine has provision for three kinds of assist gases, with inputs at the left rear of the machine. The inputs are labeled OXYGEN, CLEAN CUT, and AIR.

Oxygen is normally used to cut steel and stainless steel.

Nitrogen is used to Clean Cut™ stainless steel and aluminum with an oxide free edge.

Shop air can be used to cut aluminum at reduced cost (see page 44).

Two-stage regulators and hoses are provided in the gas connection kit for the oxygen and the nitrogen. For high-volume/frequent use, cutting gases should be purchased in liquid form. Two bottles may be connected together using a “T” manifold to maintain pressure under constant high-pressure use. Note that the liquid gases will “boil-off” at some minimum rate, even if not used. Gases which are used in low volume or infrequently should be bought in high-pressure bottles rather than in liquid form.

An evaporator is required for sustained high-pressure Nitrogen use.

GAS ASSIGNMENT	INLET PORT
Oxygen	OXYGEN
Nitrogen	CLEAN CUT
Shop air	AIR

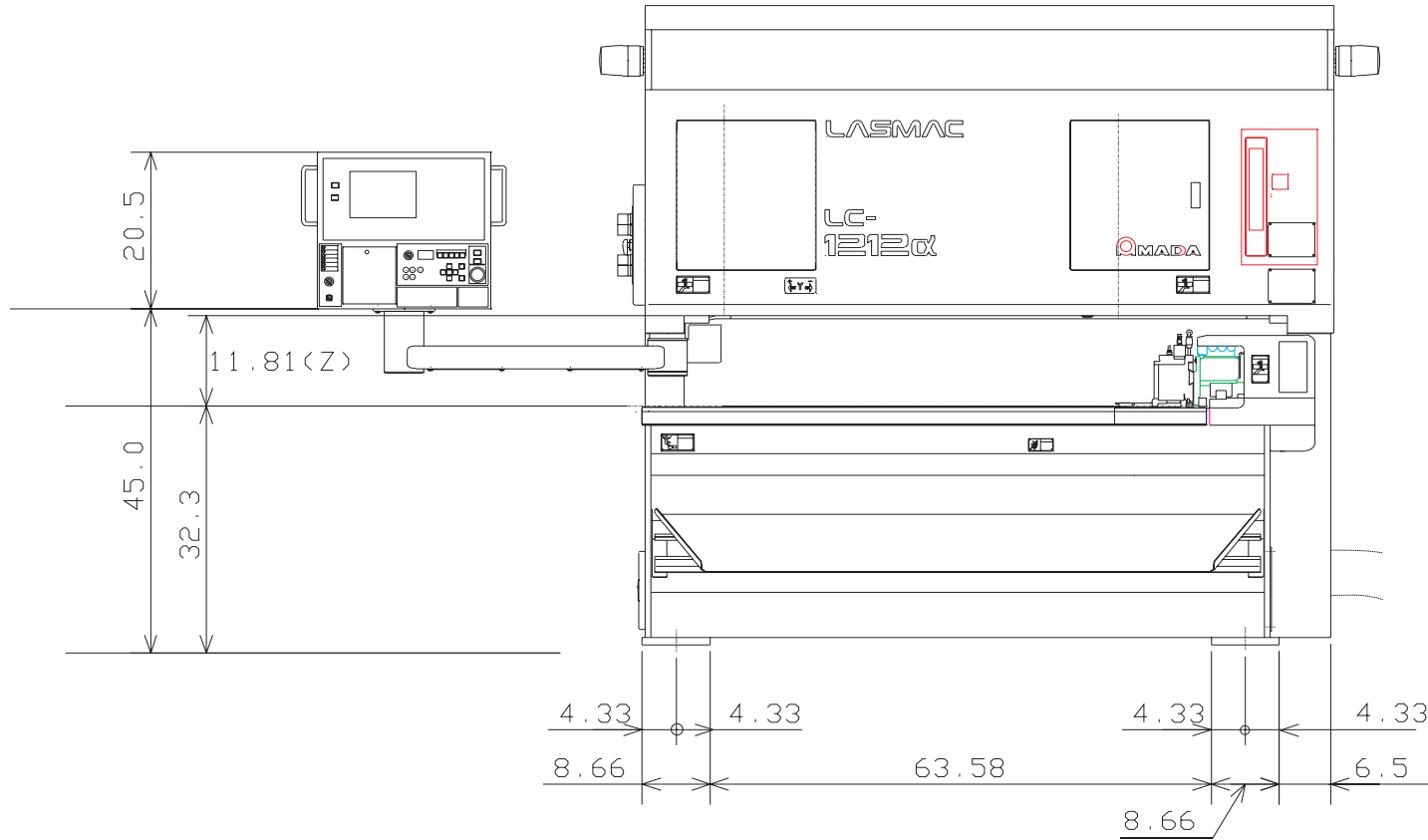
Oxygen Purity

When cutting carbon steel with oxygen, higher purity means higher speed.

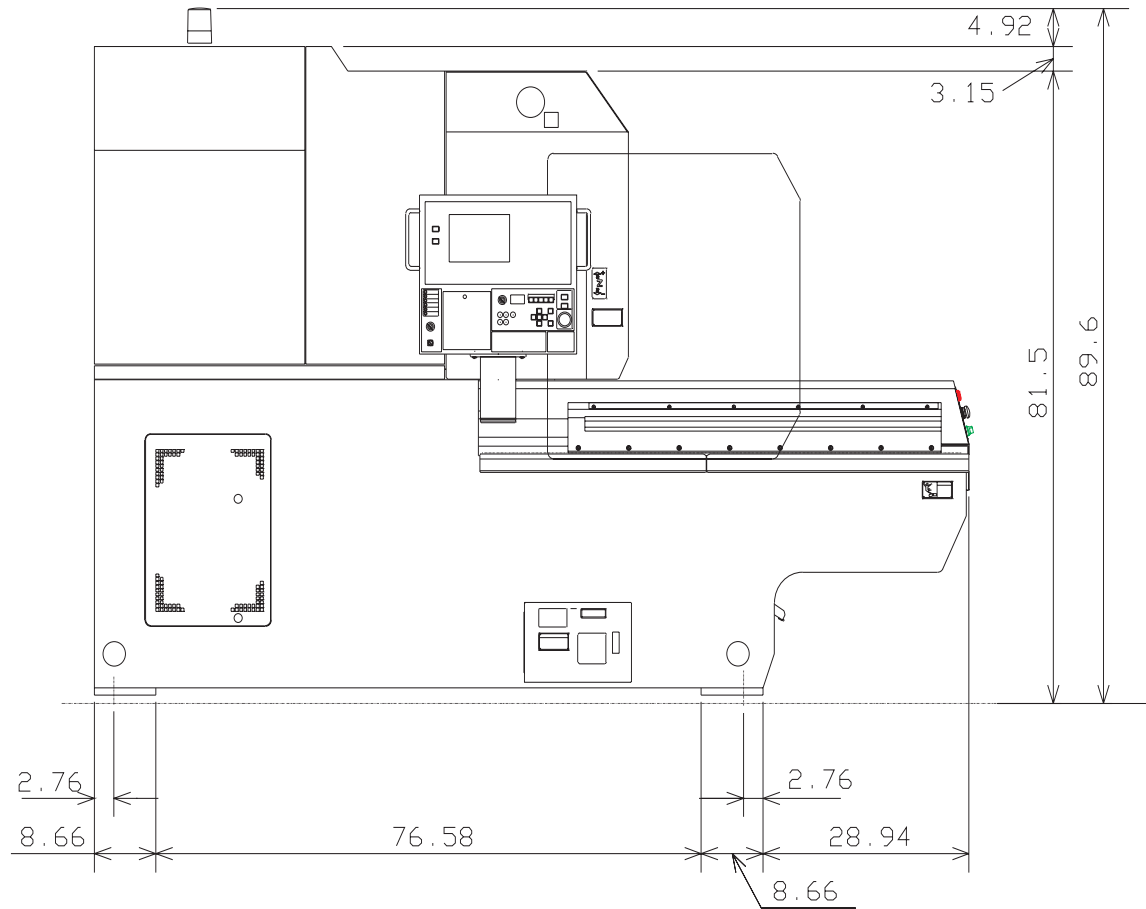
“Increasing the oxygen purity from 99.7% to 99.9% resulted in a cutting speed increase in excess of 10%.” according to the BOC article referenced below.

For a great discussion on assist gas purity, see [BOC article - gases and lasers](#) J T Gabzdyl & D Sullivan - Presented to Lumonics User Group, Minneapolis USA, May 1996

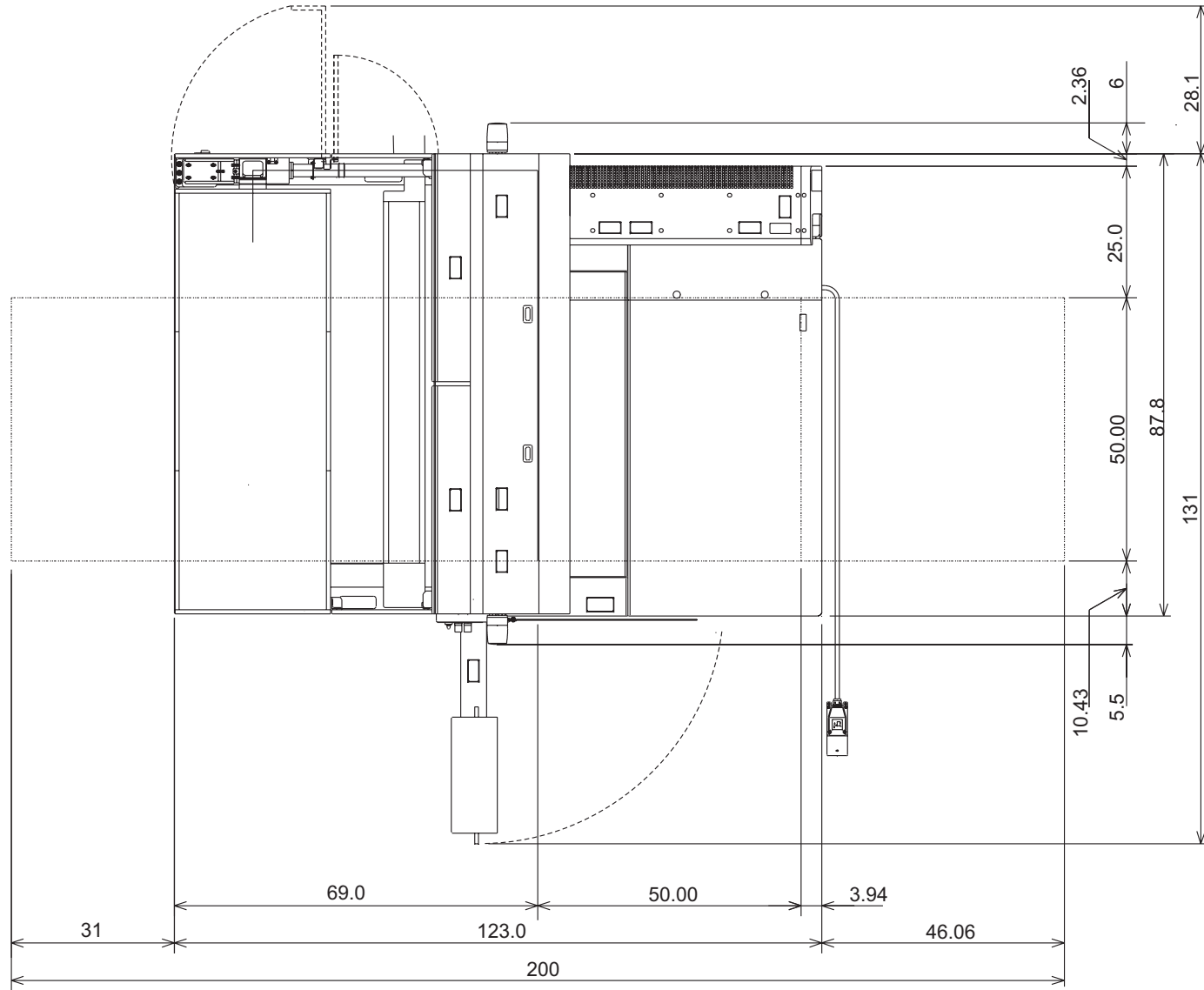
Machine Dimensions - Pulsar 1212, 1212XL Front View



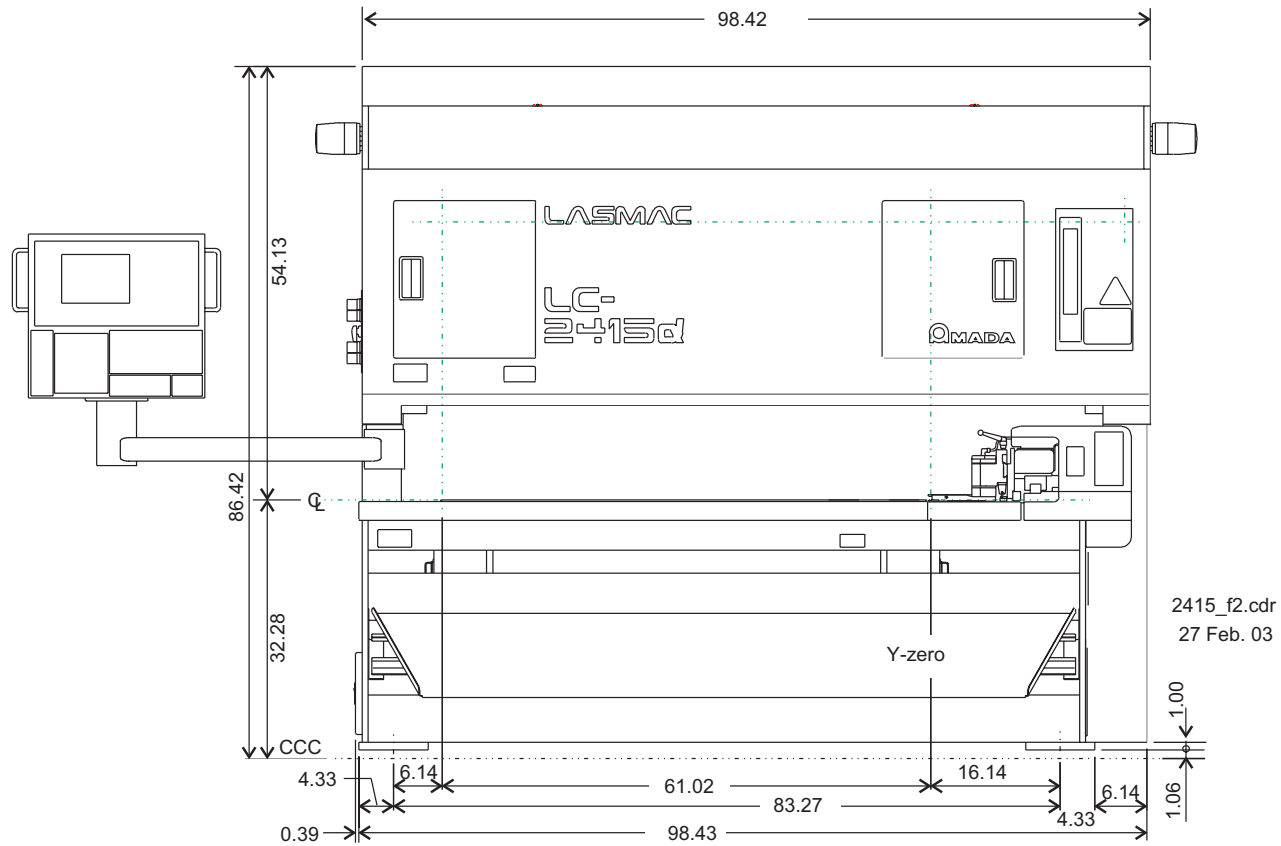
Machine Dimensions - Pulsar 1212, 1212XL Side View



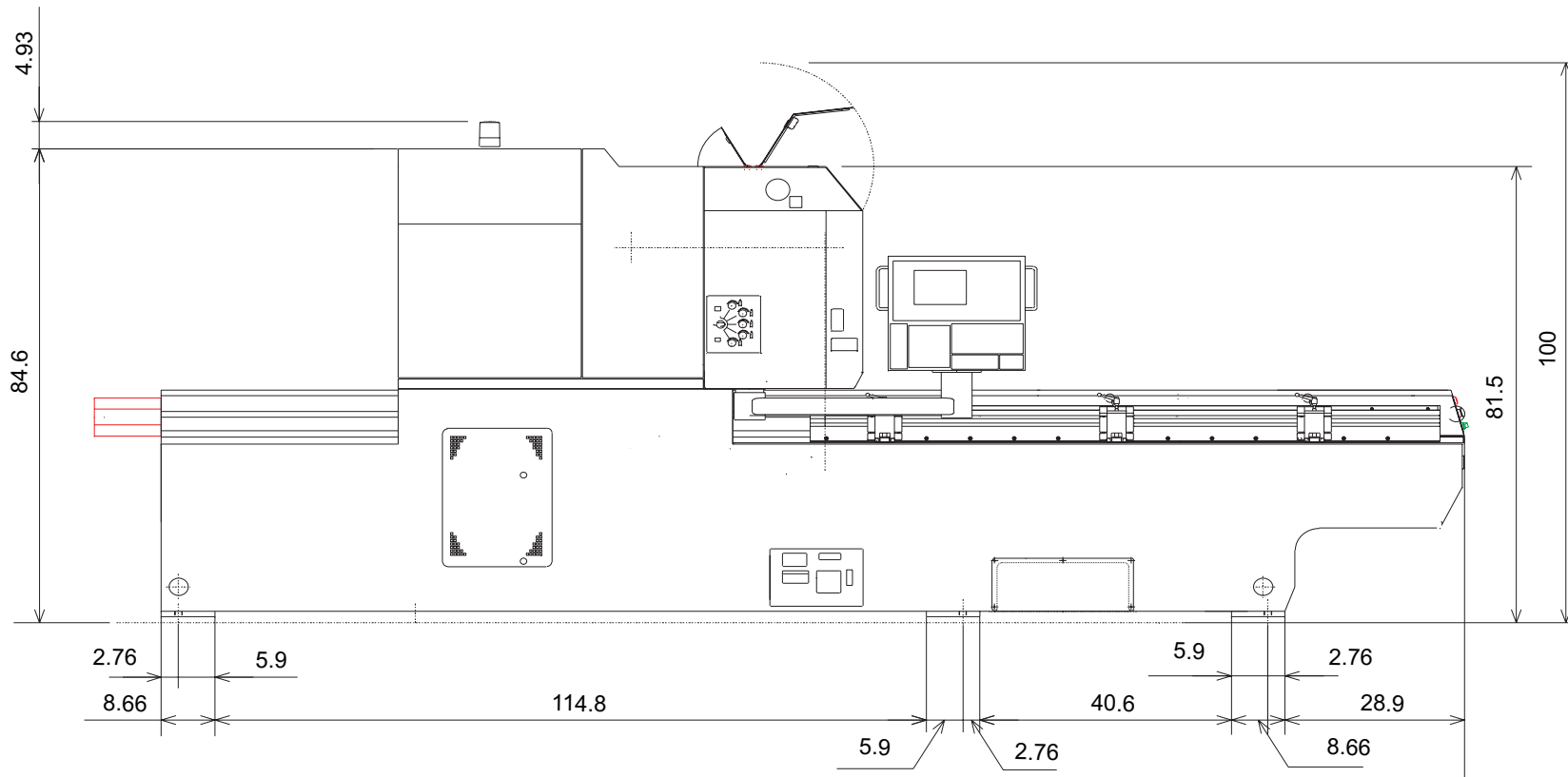
Machine Dimensions - Pulsar 1212, 1212XL Plan View



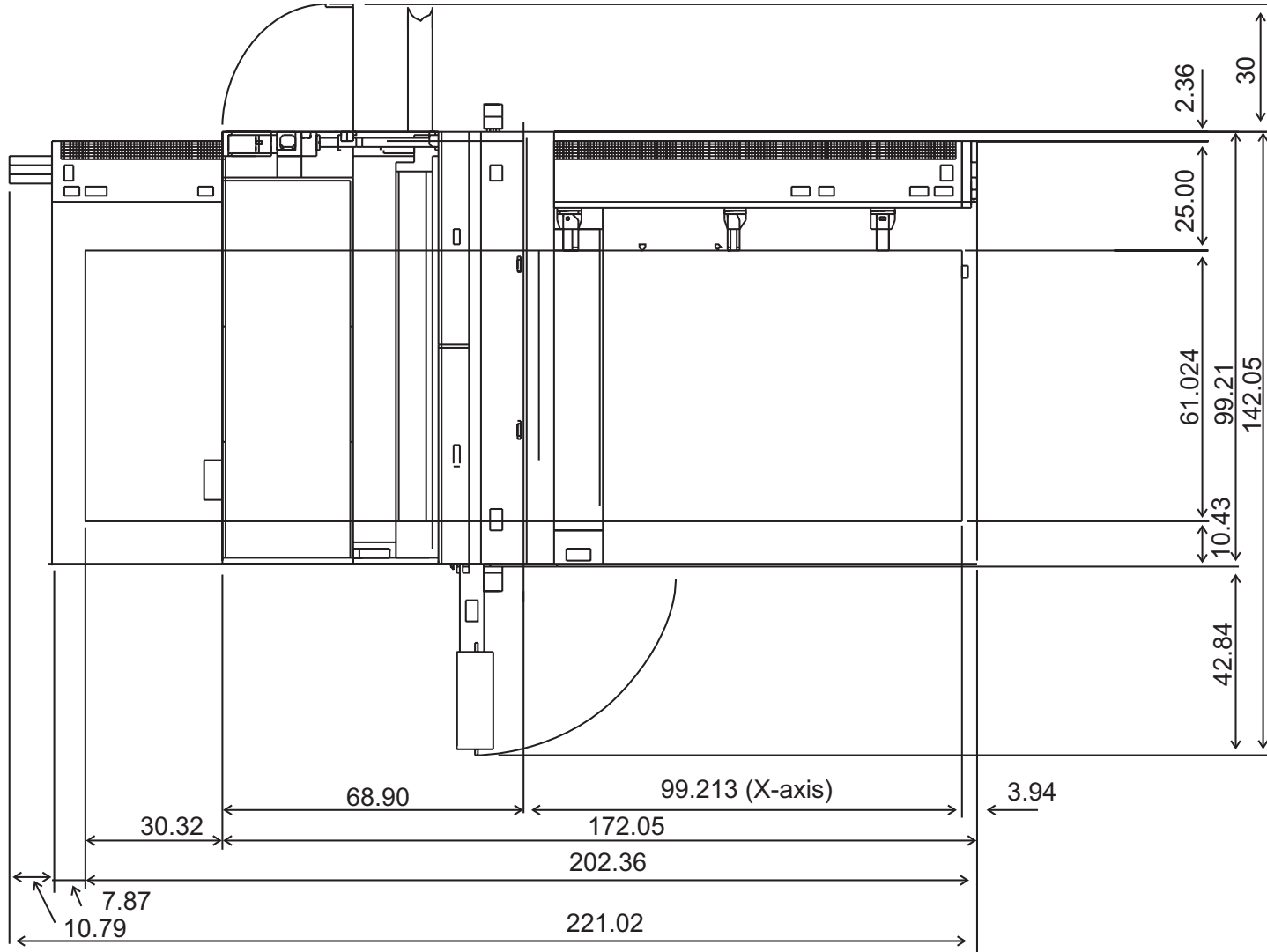
Machine Dimensions - Pulsar 2415XL Front View



Machine Dimensions - Pulsar 2415XL Side View



Machine Dimensions - Pulsar 2415XL Plan View

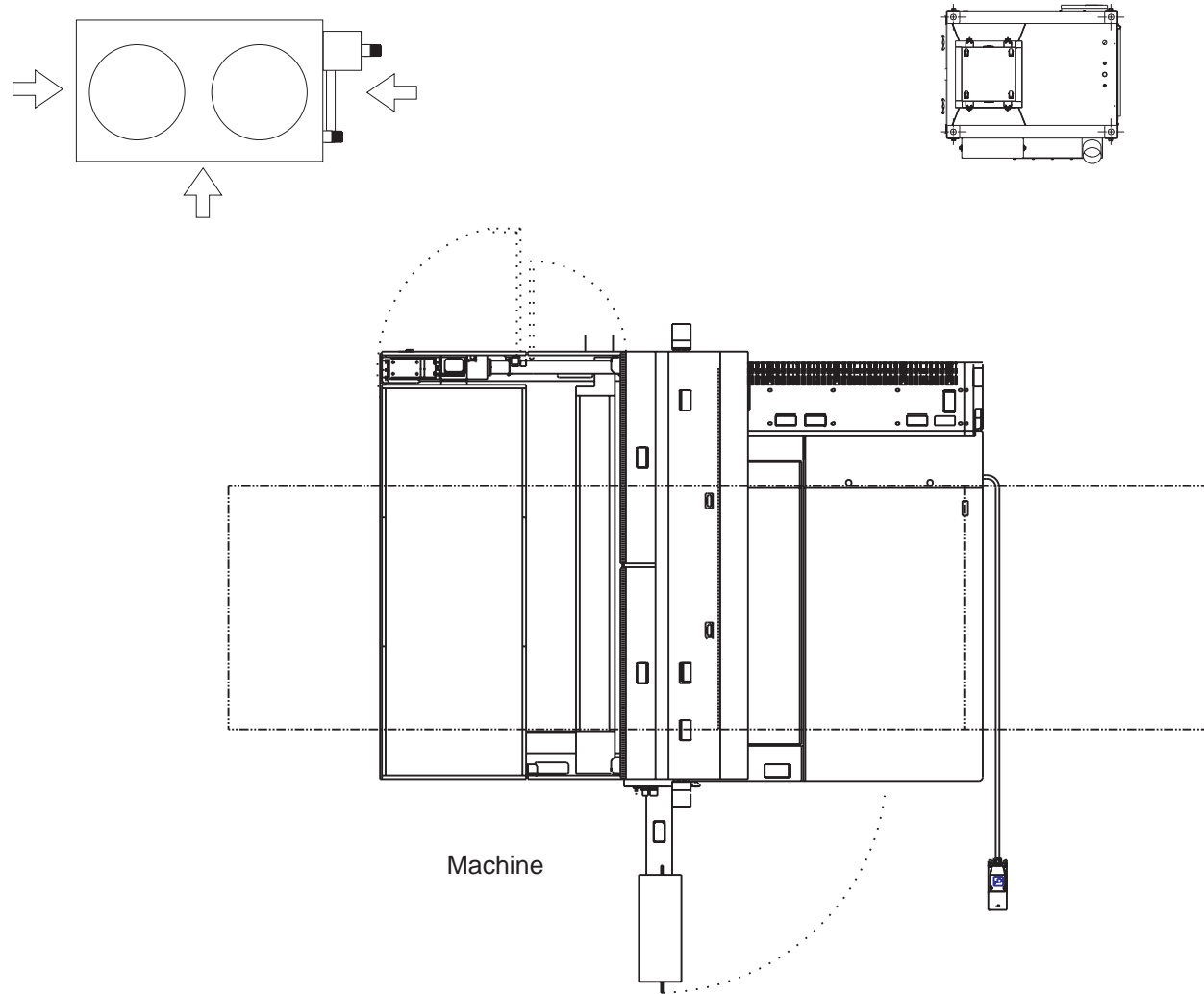


Planning The Location of the Machine

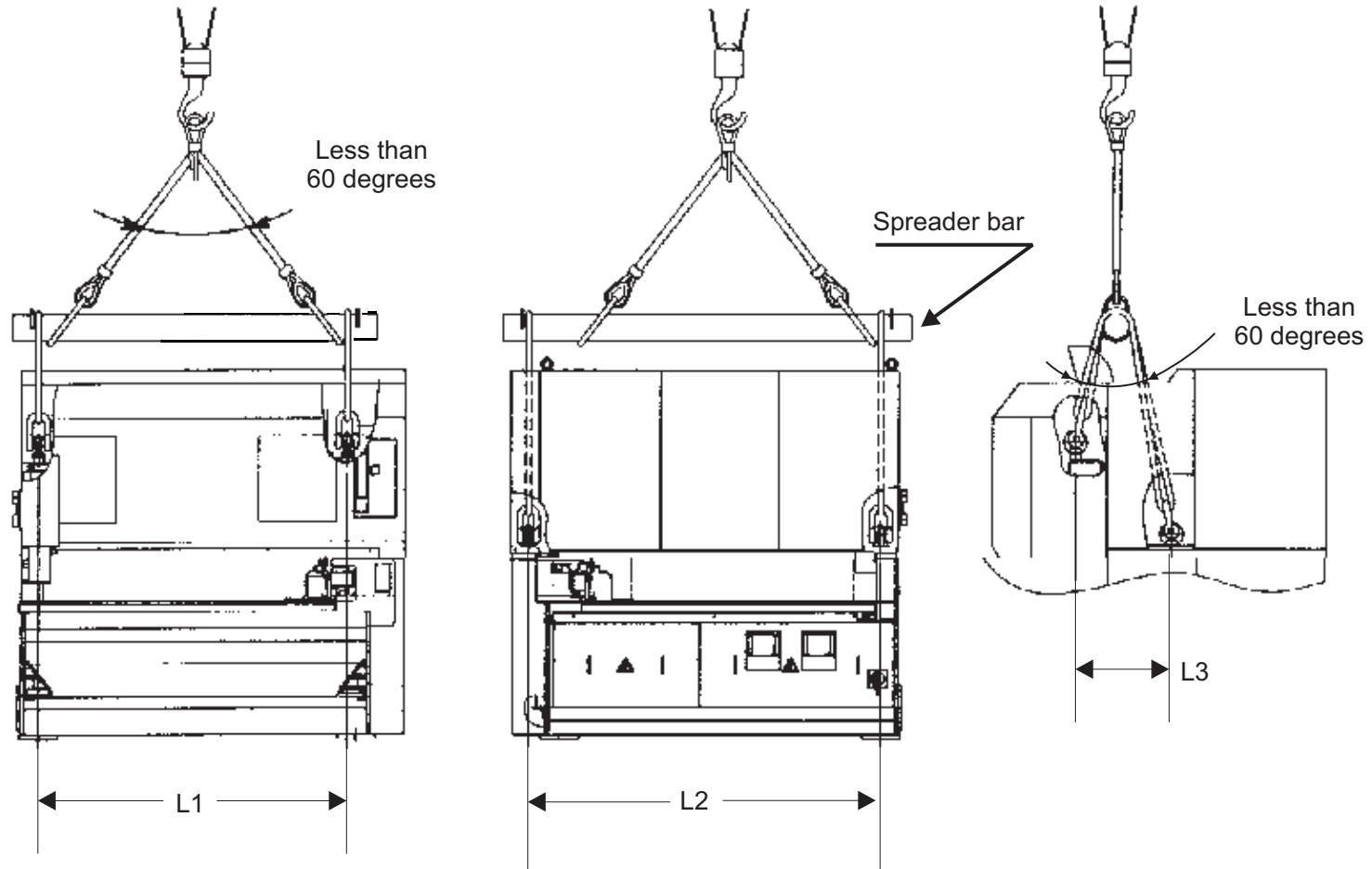
The diagrams following provide the details for positioning your new machine.

- ❑ No obstacles are allowed in the worksheet travel area, and the machine must be at least 3 feet from any wall or obstruction, and the ceiling must be at least 40" above the top of the machine.
- ❑ The machine must be placed on a single continuous foundation (see Machine Foundations section).
- ❑ All of the maintenance areas recommended should be provided, but you must at least ensure that (1) the doors of the NC and Laser cabinets can be opened, (2) the chiller airflow is unobstructed, and (3) the NC unit is protected from direct sunlight.
- ❑ The positioning of the chiller and dust collector are flexible. Please see the appropriate section in this booklet.

Components to be Positioned



Lifting the Machine



Lifting the Machine (cont.)

Model	Weight	L 1	L 2	L 3
LC1212NT, AF2000	4900 kg / 10803 lb	70"	79.3"	21.8"
LC2415NT, AF2000	6300 kg / 13889 lb	80.7"	90.7"	22"
LC2415NT, AF4000	Approx. 14,000 lb			

The Chiller

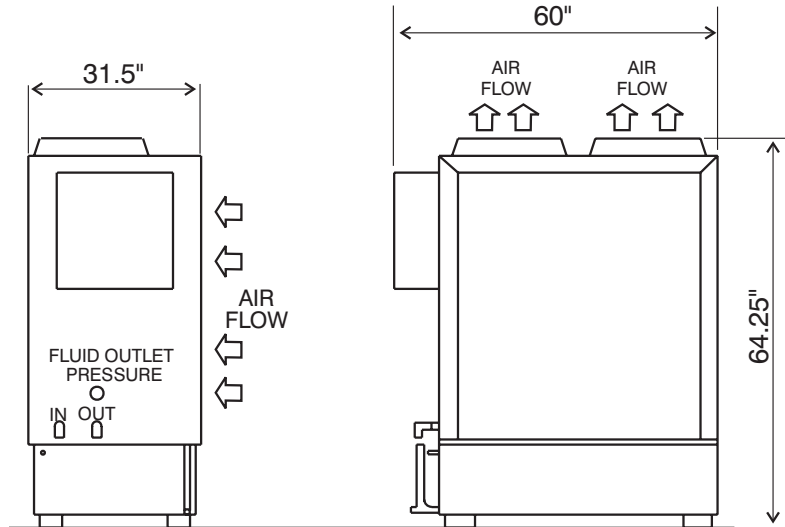
The chiller is very important to the reliable operation of your laser cutting machine.

- ❑ The chiller must be placed so that an adequate flow of air is maintained.
- ❑ The positioning of the chiller is flexible. Two lengths of flexible hose and appropriate fittings are provided for connection to the system.
- ❑ If you plan to hard plumb the system, we recommend a minimum of 1" I.D. PVC, copper or brass pipe with a working pressure of 150 psi. Connections to the chiller and laser must be flexible to prevent vibration from being transmitted to the laser. Galvanized or black-iron pipe **MUST NOT** be used under any circumstances.
- ❑ The chiller is a closed loop system, but requires periodic addition of water and/or additives to replace evaporative losses.
- ❑ The chiller must be filled with proper coolant mixture. See page 12 for details.

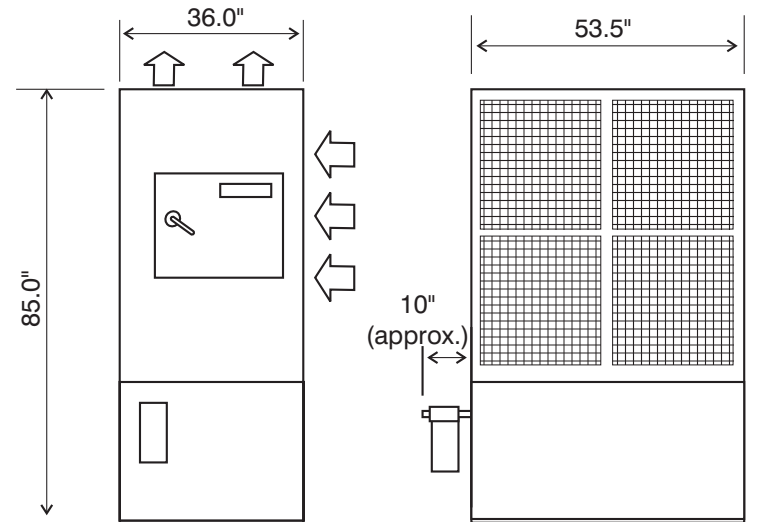
DO NOT FILL THE CHILLER WITH CITY WATER, OTHERWISE SERIOUS AND EXPENSIVE DAMAGE MAY BE INFLICTED ON THE LASER OSCILLATOR

Chiller Dimensions

Chillers from either Koolant Koolers, CKD, or Orion are used on the Pulsar series machines.

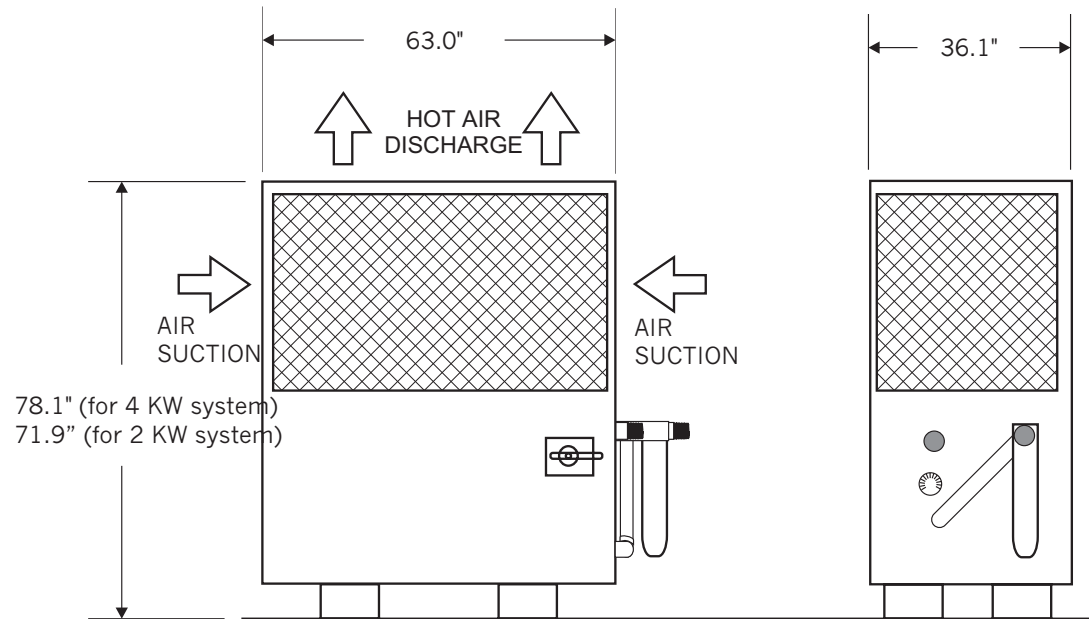


Koolant Koolers models HCV 7500, HCV 10000



CKD models HYU 7032, HYU 7035

Chiller Dimensions (cont.)



Orion model RKL-15000

Dust Collector

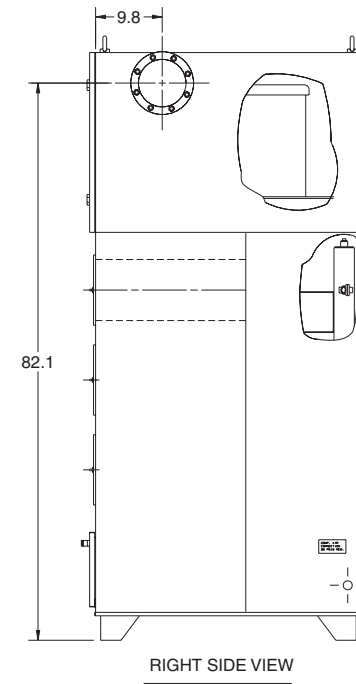
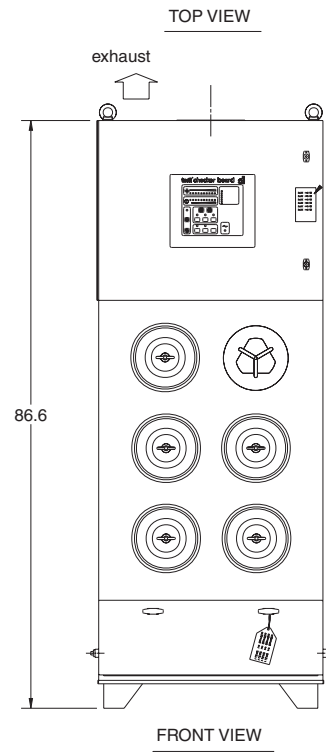
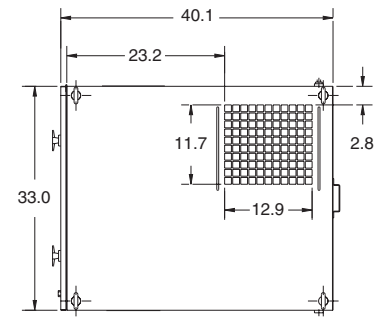
The dust collector is very important to the safe operation of your laser cutting machine. It will collect fumes and particulate generated by the laser cutting process.

The dust collector supplied is suitable for cutting most metallic materials. It is not suitable for cutting many non-metallic materials for an extended period, and additional filters may be required.

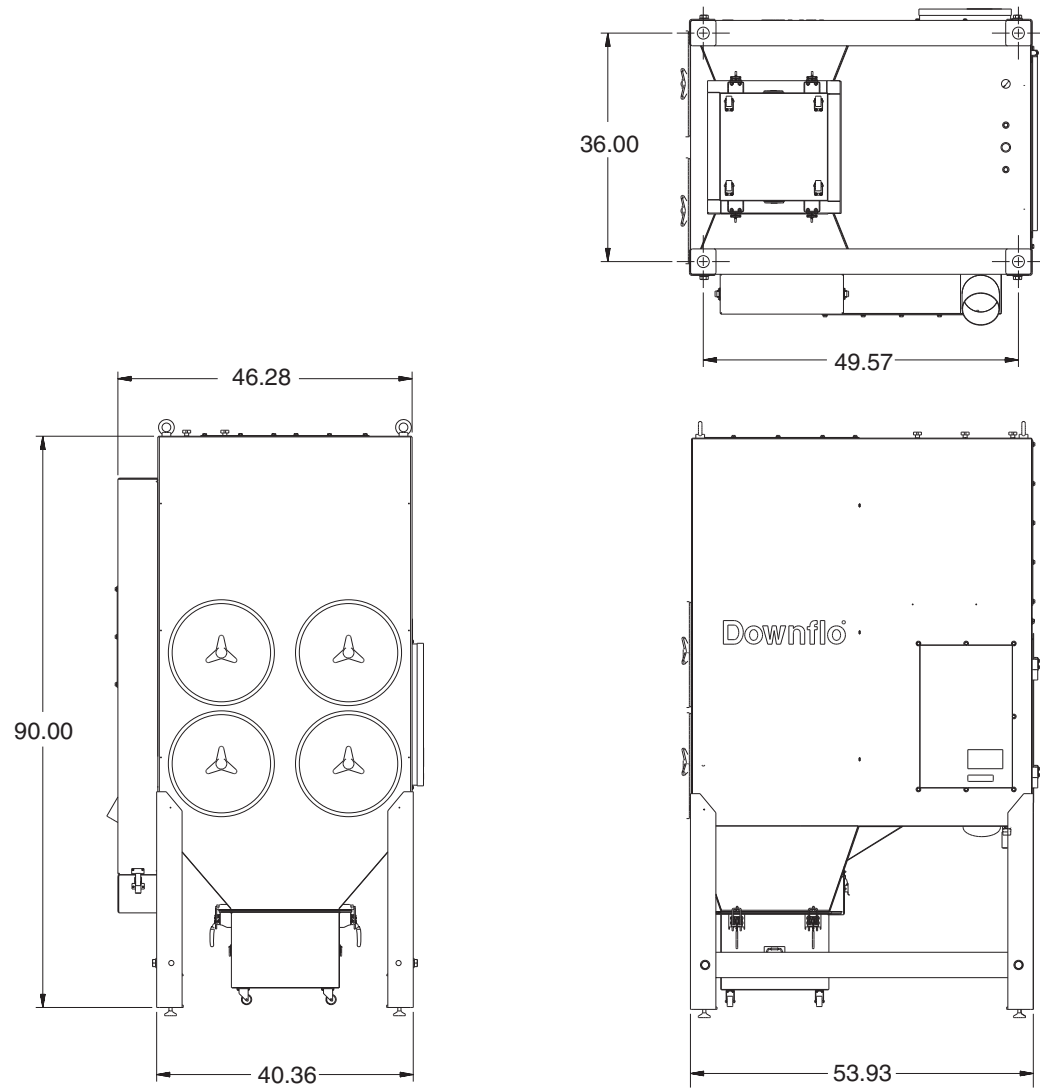
- ❑ The dust collector must be placed so that an adequate flow of air is maintained .
- ❑ The positioning of the dust collector is flexible. The dust collector is connected with twenty-five feet of flexible hose and appropriate fittings.

Dust Collector Dimensions

Either a model SDF-6 or model ADF-4 dust collector may be provided with the machine



Torit SDF-6 Dust Collector



Torit ADF-4 Dust Collector

Machine Foundations

The machine must be properly secured to a good floor or suitable foundation for best results. Amada recommends that the foundation has a minimum load bearing capacity of 0.5 ton/ft². It is the purchaser's responsibility to determine the necessary thickness of the foundation concrete to assure this requirement.

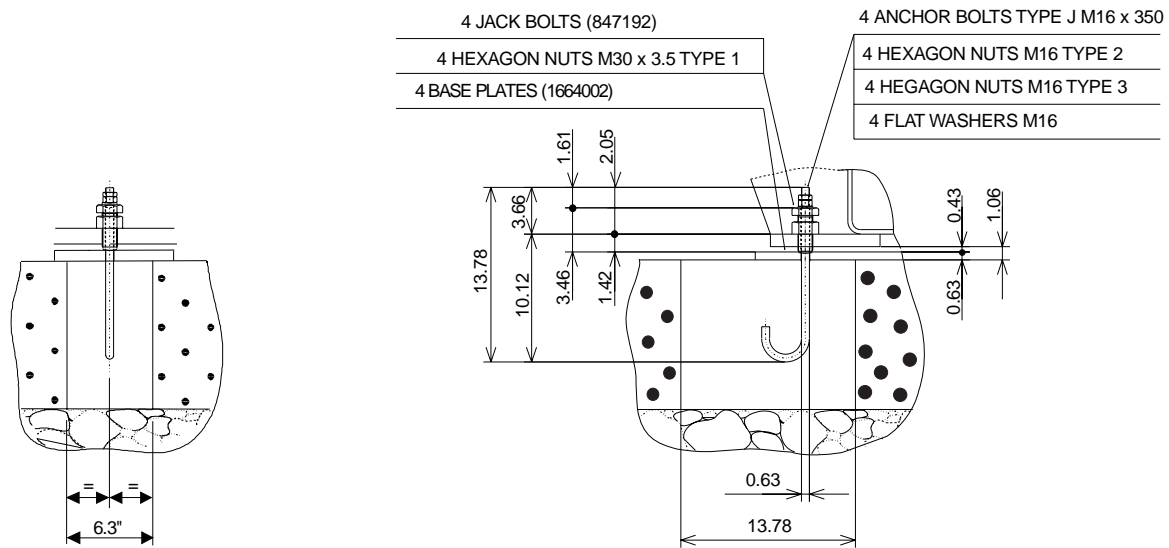
- ❑ **External vibration must not exceed 0.05G acceleration, at maximum amplitude of 5 microns.**

NOTE: The machine does not require any special foundation to produce accurate parts, but the laser and machine may not stay properly aligned if not properly supported and anchored. An ideal foundation is given on the following pages. However, many machines have been installed using the existing foundations with the addition of the four J bolt pads.

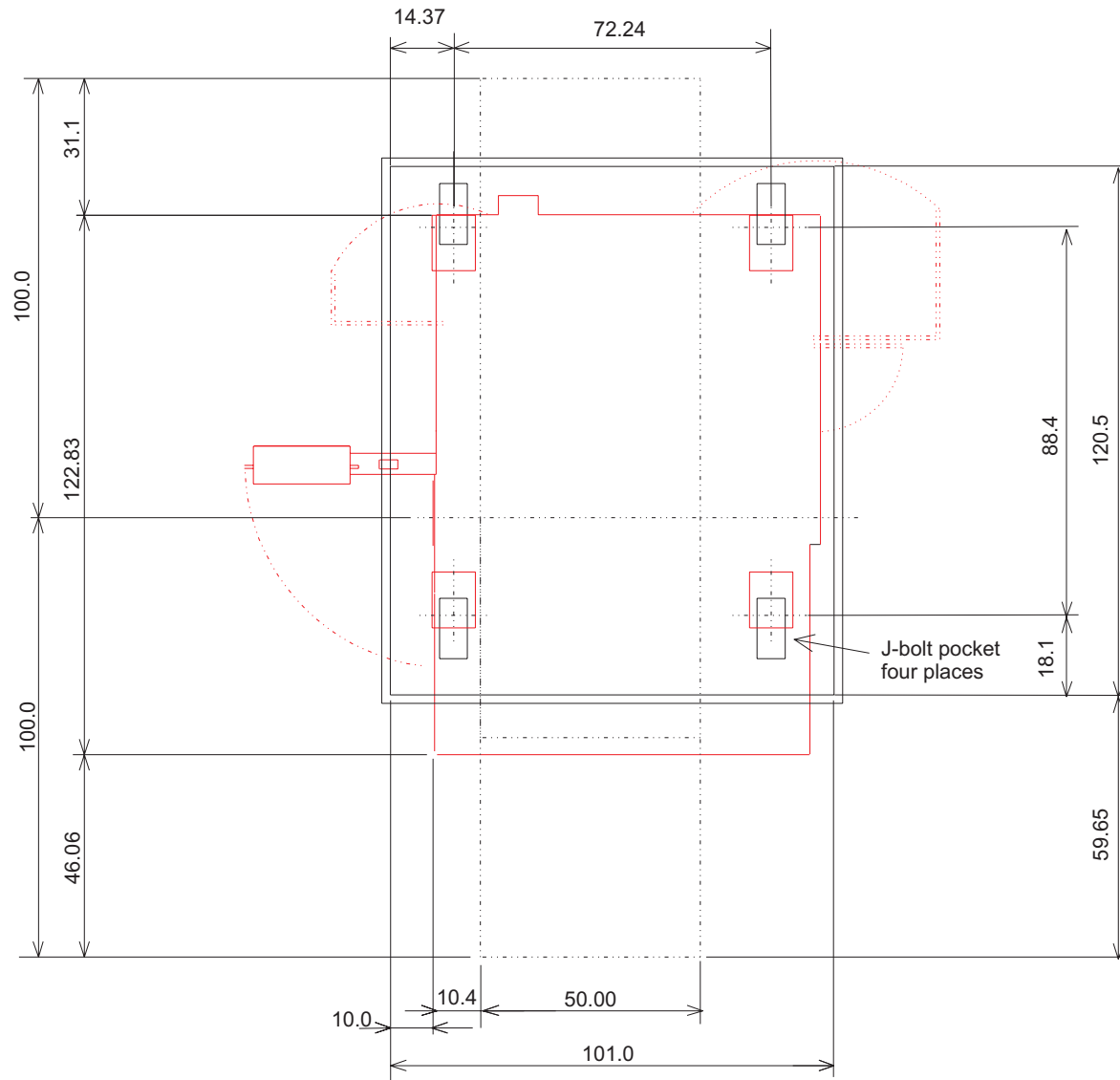
Please note the following:

- ❑ The machine must be placed on a single continuous foundation
- ❑ The base plates, shims, anchor bolts, nuts and washers for the machine are provided in the accessory crate.
- ❑ The four concrete J bolt pads should be filled after the installation of the machine is completed by Amada Service.
- ❑ Make sure that the machine will not be exposed to excessive external vibration. If the machine is located near a punch press, stamping press, large shear or other vibration source, it may be necessary to cut the foundation around the laser to provide isolation.
- ❑ Do not install the machine where it is exposed to direct sunlight or any other heat source.
- ❑ A ten ton step jack must be available during installation to level the machine.

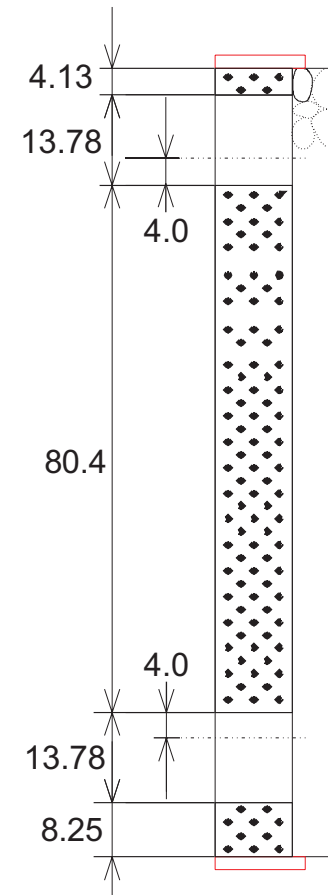
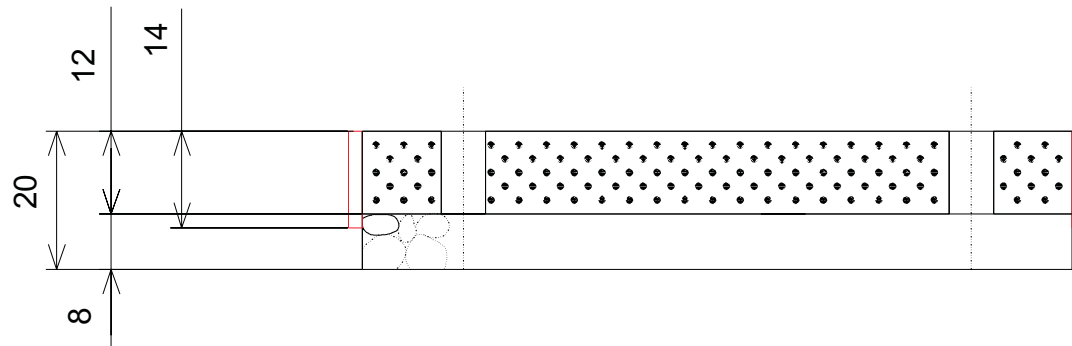
Machine Foundations J Bolt Detail



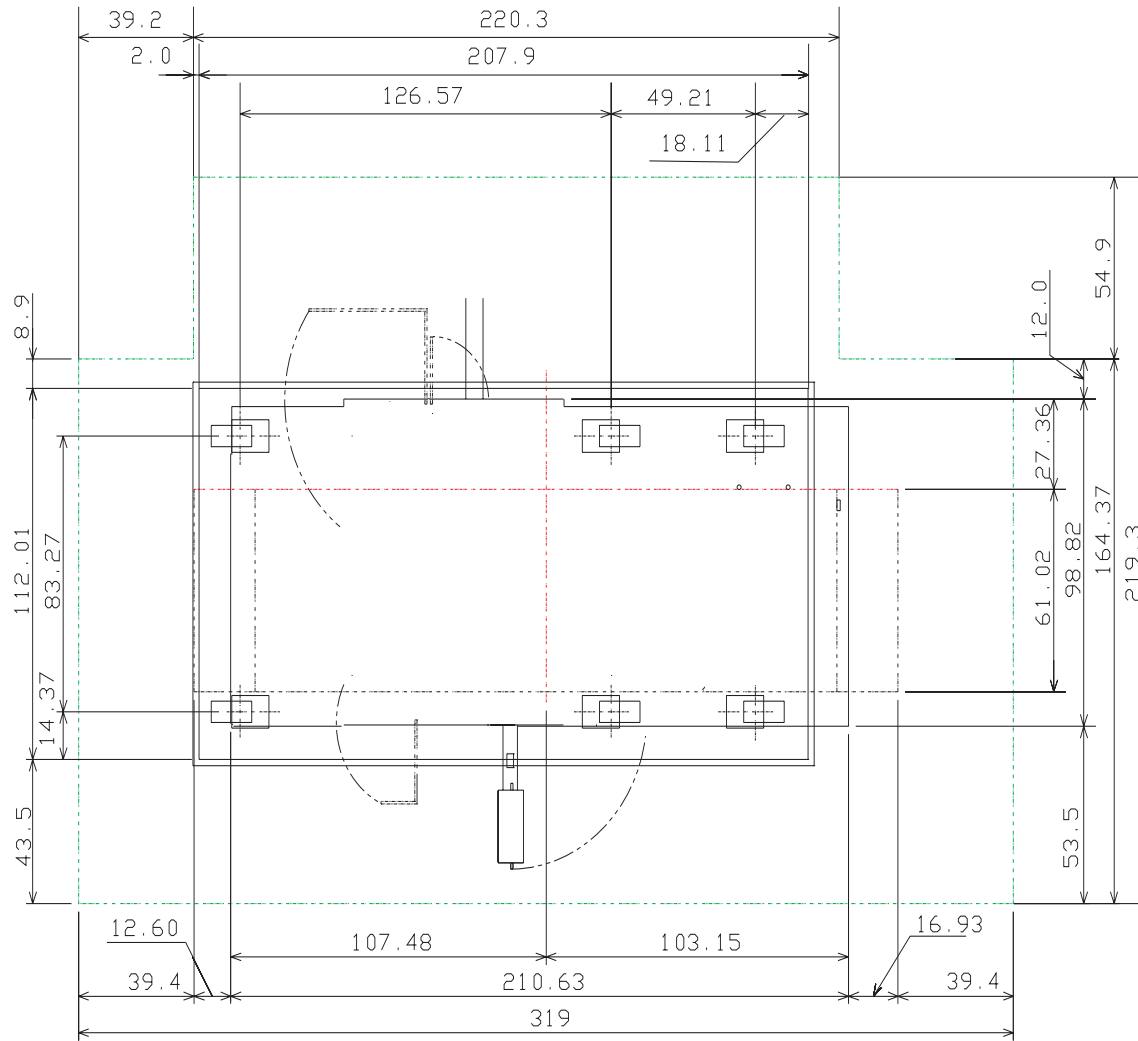
Foundations Plan View, Pulsar 1212, 1212XL



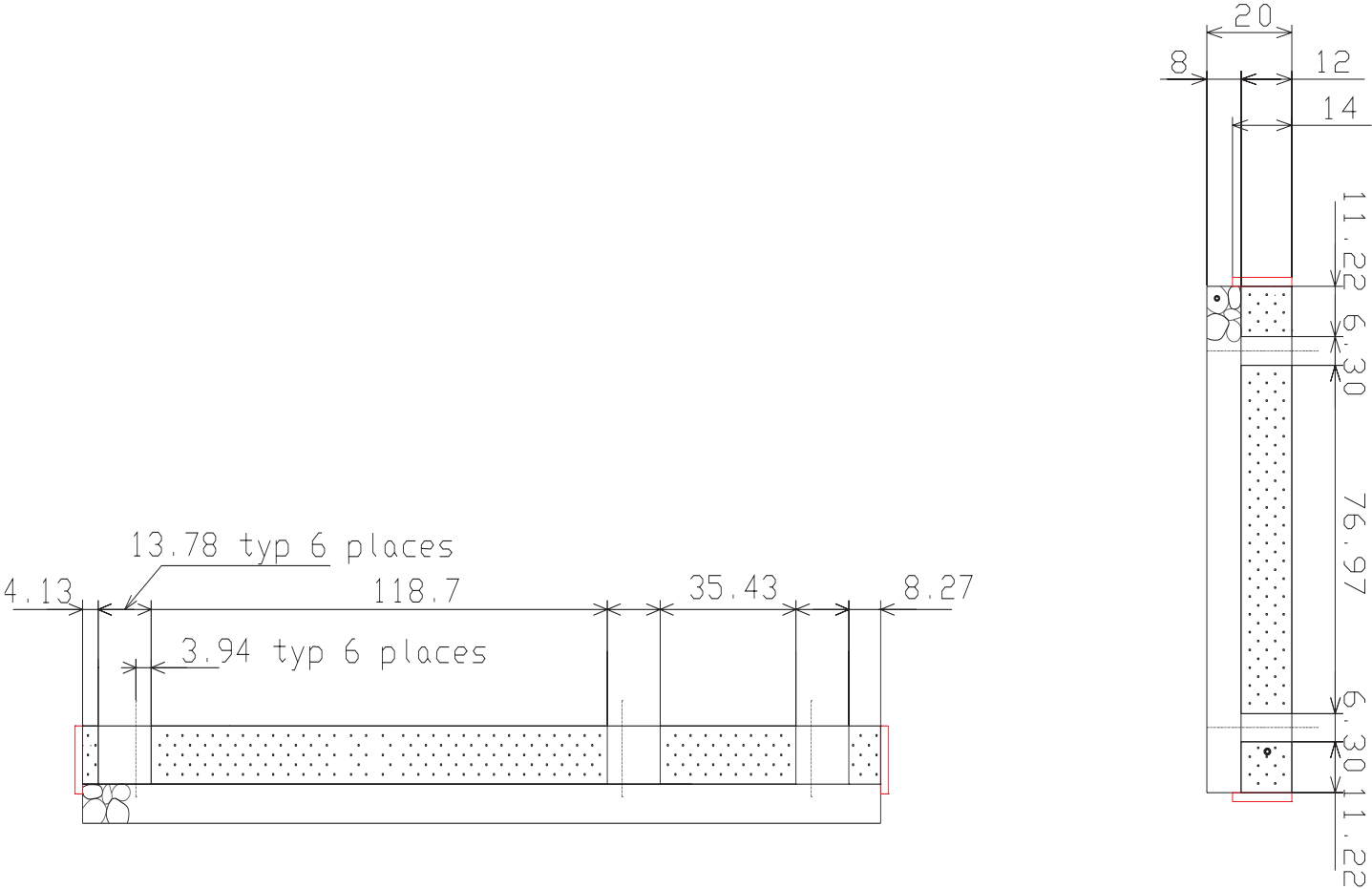
Foundations Cross Section, Pulsar 1212, 1212XL



Foundations Plan View, Pulsar 2415XL

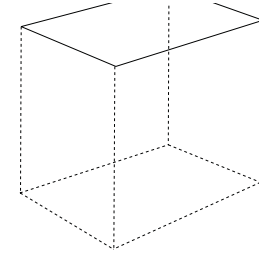


Foundations Cross Section, Pulsar 2415XL

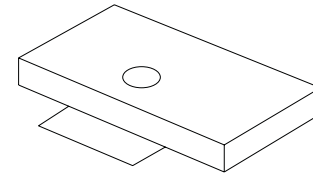


Machine Mounting Procedure

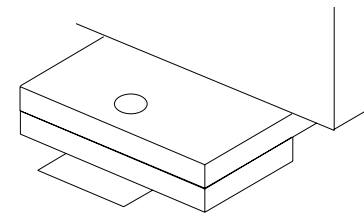
Step 1. Cut/dig the holes in floor.
(if existing foundation is to be used)



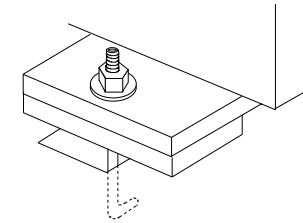
Step 2. Put the base plates over the holes.



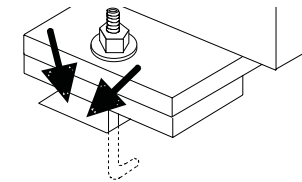
Step 3. Set the machine on the base plates.



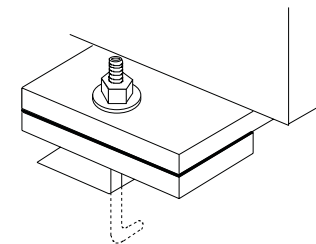
Step 4. Set a J-Bolt through the hole in each baseplate.



Step 5. Fill each hole with concrete .



Step 6. To level the machine, place shims between the base plate and the machine as needed.

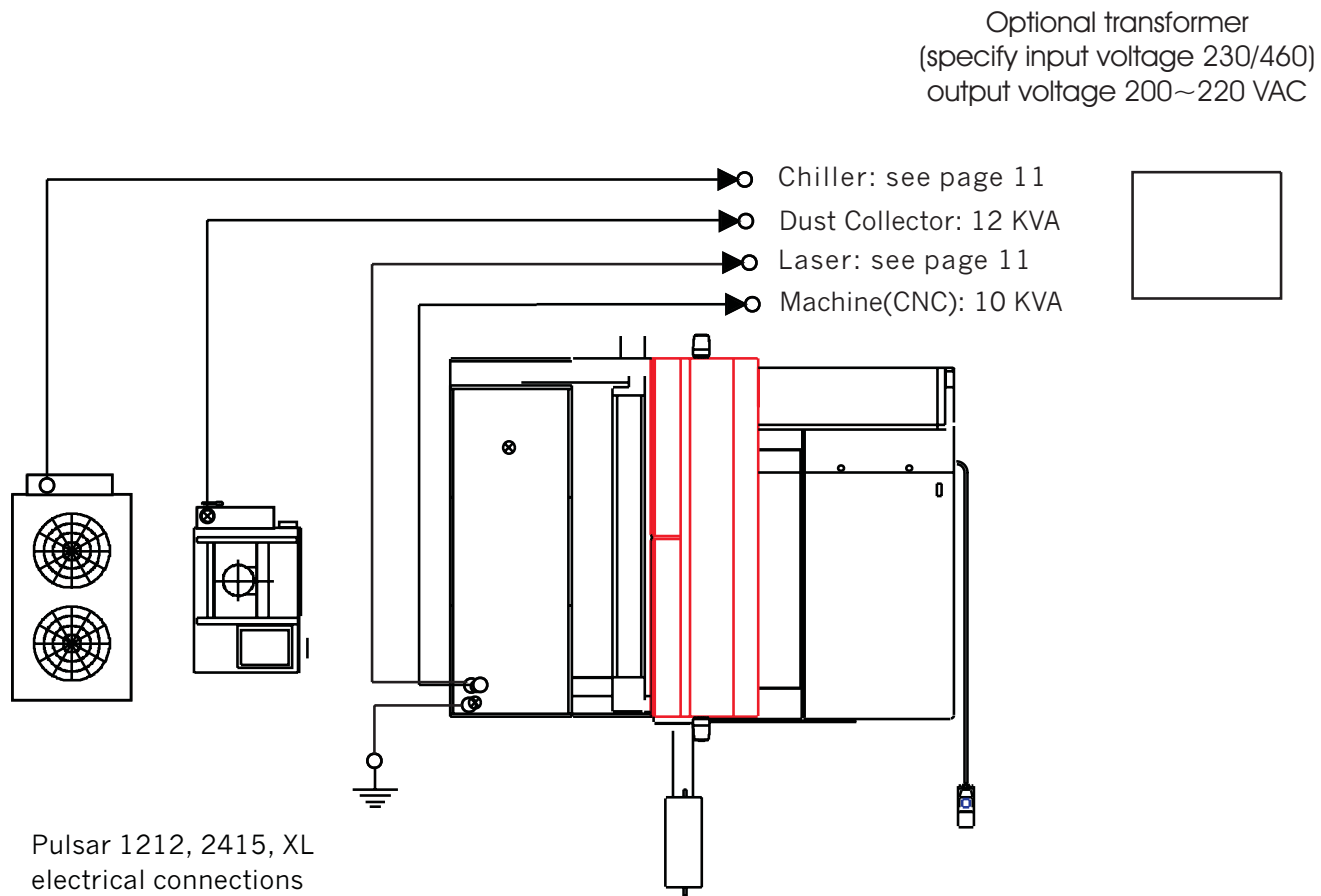


Installing The Electrical Power Supply

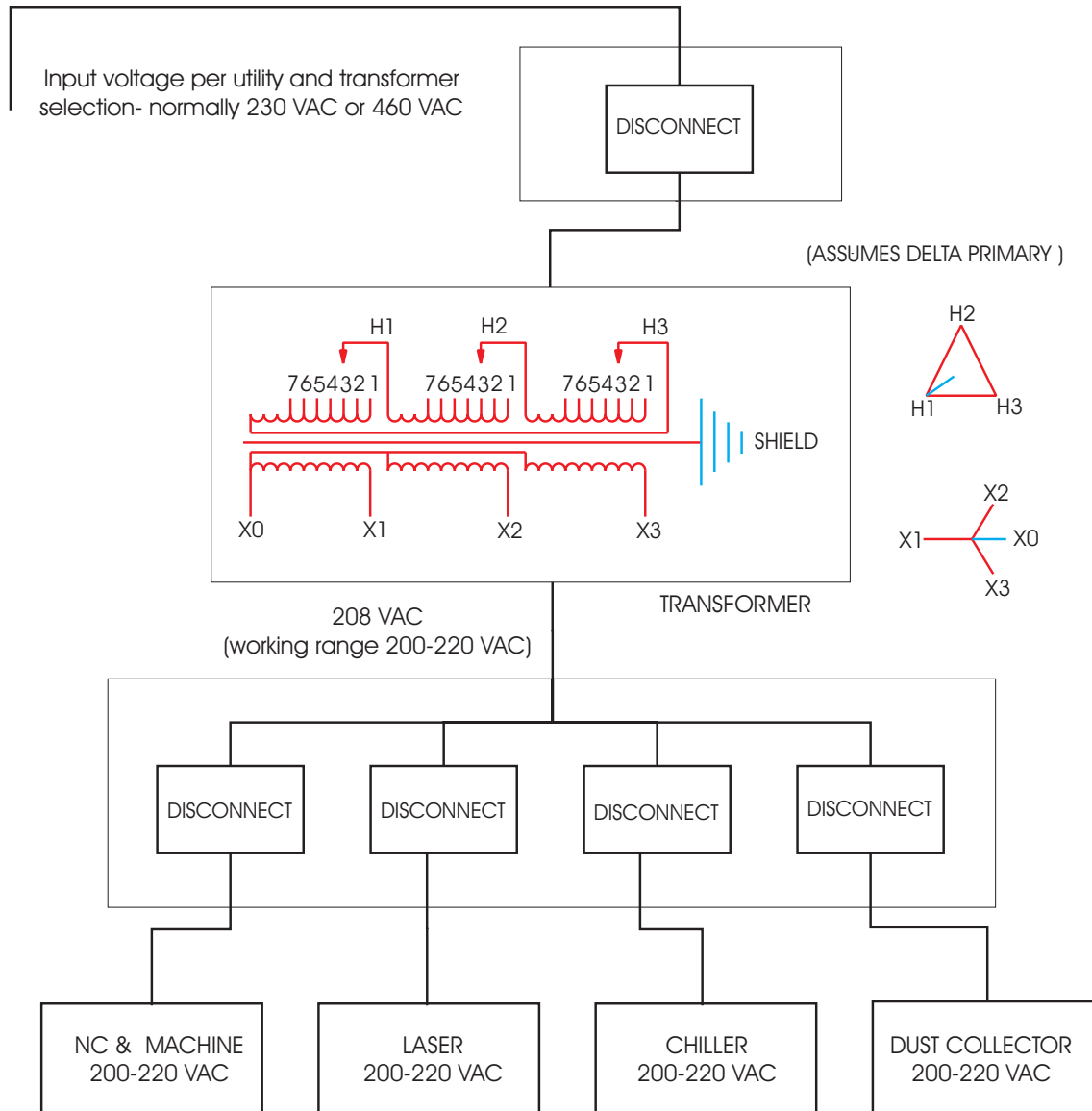
The system voltage is 200~220 VAC 3 phase. Four separate power inputs are required: Power must be supplied to the CNC unit, the laser, the chiller and the dust collector.

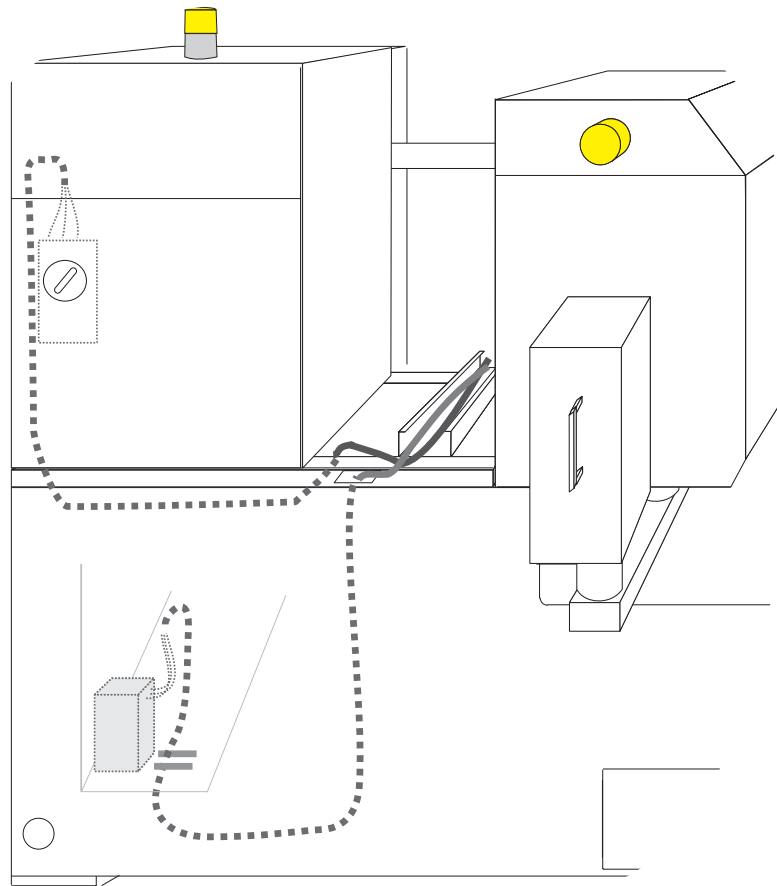
Power should be supplied from a line separate from those for welding machines and other processes that produce electrical noise.

A ground rod must be installed next to the CNC cabinet.

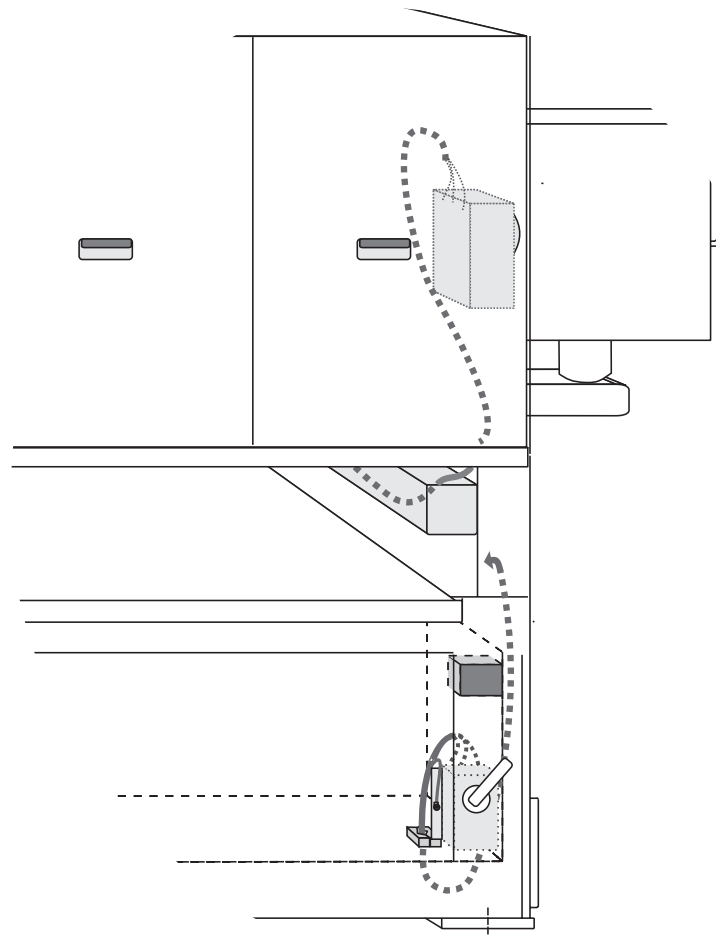


Electrical Connections (cont)





Electrical Connections (cont)



Installing The Air Supply

The machine must be connected to a compressed air system by hose or pipe. The compressed air must be clean and dry. It may be necessary for you to purchase an air drier/filter.

Please note the following:

- ❑ See page 12 for compressed air specifications.
- ❑ The minimum inner pipe diameters to the machine and the dust collector is $\frac{1}{2}$ ".
- ❑ The machine and dust collector must have separate air lines to protect the machine from the pulsing of the dust collector. These should be separate for 20' or back to a main branch of the air line.
- ❑ Clean dry shop air can be used as an assist gas for cutting some materials.
To cut aluminum with air you need at least 22 ft³/min. at 200 psi. in addition to the machine and dust collector usage.
- ❑ The air inlet is at floor level at the rear of the machine.

Removing the Protective Coating

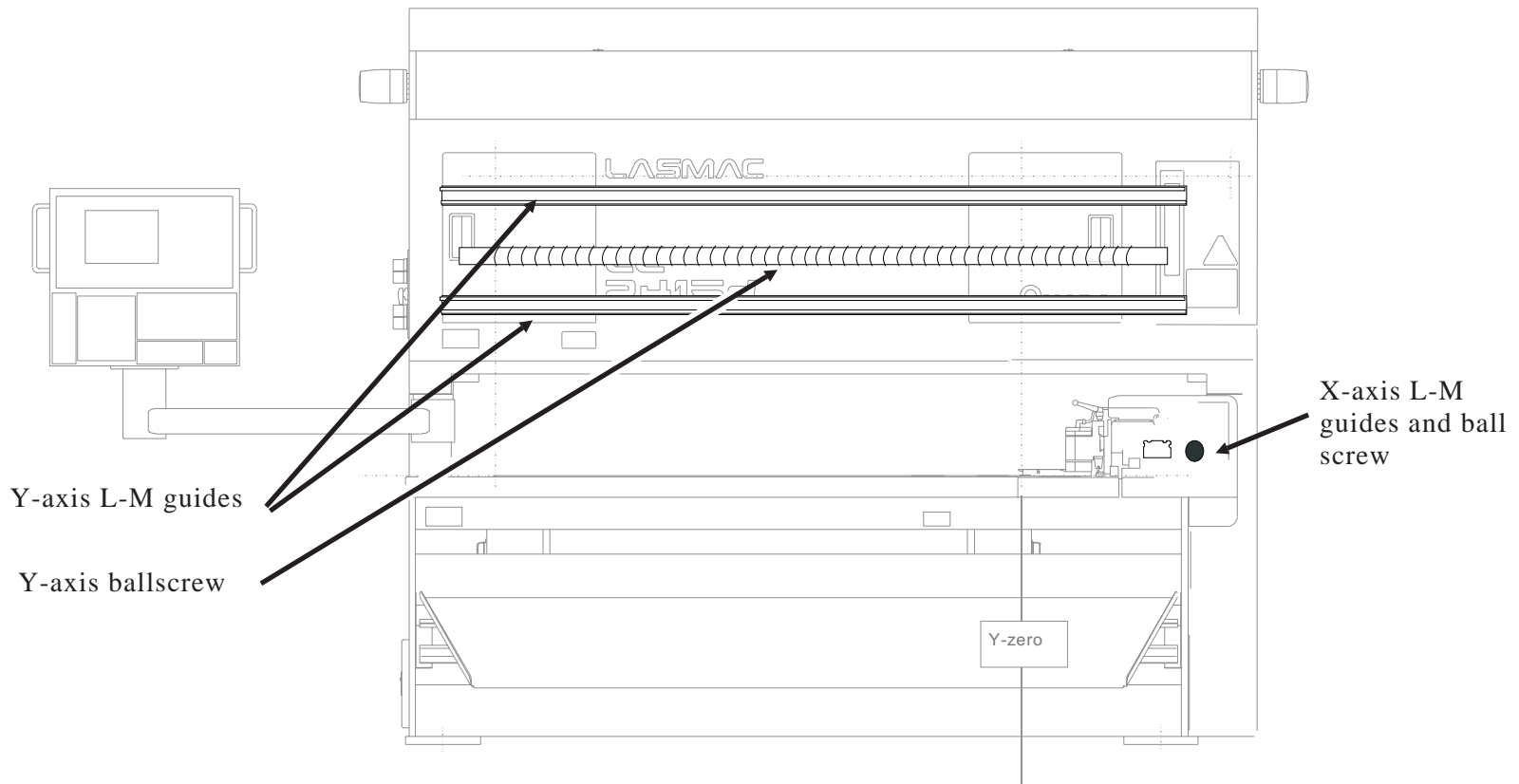
The machine must be thoroughly cleaned of protective coating.

*** Never attempt to move the machine axes with the wrapping paper in place.**

Please note the following:

- Remove the wrapping paper from the X and Y axes ball screws, then remove the protective coating.
- Remove the wrapping paper from the X and Y LM guides, then remove the protective coating. Make sure that you remove the paper from both sides of the carriage.
- A suitable solvent such as kerosene may be used to remove the protective coating.

Location Of Paper Wrapped Components



Pre-Installation Checklist

Each of the following items must be completed prior to scheduling a service engineer for final installation. Please contact the Laser Service Department if you have any questions on completing these steps.

1. Preparation of floor and surrounding area

- The floor has been cleared of obstructions and is clean and free of debris
- Mounting holes, if necessary, have been cut
- Floor slab has been cut for isolation or foundation is complete, as necessary

2. Cleaning

- Protective coverings removed. Ball screws and machine cleaned up

3. Placement of the equipment

- Each system component has been placed per the layout

4. Electrical connections

Electrical connections of the correct voltage, current capacity, circuit breaker capacity and wiring size has been connected to the following components

- Machine
- Laser power supply
- Chiller
- Dust collector
- Any optional transformers

Pre-Installation Checklist (Cont.)

5. Laser Gas

Laser pre-mixed gas, to the correct specification (see page), has been connected with hoses and regulators.

- Gas bottles available
- Regulators connected
- Hoses connected

6. Assist Gases

All required assist gases have been connected to the machine with hoses and regulators (see page 15)

- Oxygen (minimum requirement)
- Nitrogen

7. Compressed Air

- Machine supply (note additional requirements when air is used as an assist gas)
- Dust collector supply

8. Chiller Water

- Water lines between laser and chiller have been connected
- Chiller tank has been filled with proper coolant mix (see page 12).



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Revisions	
Date	Revisions
5/27/99	Wording on evaporator requirement p. 15 Darken illustration p.43 Add lifting information - illustration, table PP 25-25 Revise weights p. 8 Migrate publication from Ventura 7 to Ventura 8.
8/31/99	Correct dust collector information on page 28 (remove references to dual/multi voltage)
12/99	Add new chiller, dust collector
11/00, 12/00	compressed air specs, revised drawings of chiller and dust collectors, misc. updates
3/01	
6/01	System voltage spec, misc.
2/03	Add AF-4000 laser and related. Revise drawings for consistency. Edit AESI > Amada Service.
6/06	Updated wattage options and added NT spec

Revised June, 2006