1. Machine Information

Gather the information about each axis of your machine.
Drive timing is in nano seconds. If you're unsure about the timing many popular drives are included in the stepper configuration wizard. Note some newer Gecko drives have different timing than the original one. A list is also on the user maintained LinuxCNC wiki site of more drives.

Axis	Drive Type	Step Time (ns)	Step Space (ns)	Dir. Hold (ns)	Dir. Setup (ns)
X	HY-DIV168N-3.5A	5000	1000	1000	20000
Y	HY-DIV168N-3.5A	5000	1000	1000	20000
Z	MA860H				
A					
B					

The max velocity was negotiable, my particular setup would not be repeatable (lose steps) in one axis if I go over .4 in/sec but just for testing would run up to about 1.5 in/sec. (One of my axis just goes smoother than the other)

Maximum Jitter: 15224 ns

2. Pinout Information

Gather the information about the connections from your machine to the PC parallel port.

Output Pin	Typ. Function	Invert	Input Pin	Typ. Function	Invert
1	A Step		10	X Limit/Home	
2	X Step		11	Y Limit/Home	
3	X Direction	✓	12	Z Limit/Home	
4	Y Step		13	E-Stop In	
5	Y Direction		15	Probe In	

6	Z Step				
7	Z Direction	✓			
8	Spindle PWM				
9	(Broken)				
14	A Direction	✓			
16	B Step				
17	B Direction				

Parport Base Address: 0x0278
Second parport: 0x027b

Note any pins not used should be set to Unused in the drop down box. These can always be changed later by running Stepconf again.

PLC info:
Number of digital in pins: 15
Number of digital out pins: 8

3. Mechanical Information

Gather information on steps and gearing. The result of this is steps per user unit which is used for SCALE in the .ini file.

Axis	Steps/Rev.	Micro Steps	Motor Teeth	Leadscrew Teeth	Leadscrew Pitch
X	200	16	1	1	20 mm
Y	200	16	1	1	14.5 mm
Z	1000	1	1	1	5 mm
A	200	16	1	8	360 deg/rev
B	200	16	1	1	360 deg/rev

Axis	Maximum Velocity	Maximum Acceleration	Home location	Home Search Vel	Table travel range

X	120 mm/s	5000mm/s^2	0	100	0~270 mm
Y	120 mm/s	5000 mm/s^2	0	100	0~300 mm
Z	40 mm/s	1000 mm/s^2	0	-10	-65~0 mm
A	475 deg/s	2000 deg/s^2	-1.09	30	-13.30 ~ 28.92 deg
B	475 deg/s	2000 deg/s^2	0	30	-85 ~ 85 deg

- *Steps per revolution* - is how many stepper-motor-steps it takes to turn the stepper motor one revolution. Typical is 200.
- *Micro Steps* - is how many steps the drive needs to move the stepper motor one full step. If microstepping is not used, this number will be 1. If microstepping is used the value will depend on the stepper drive hardware.
- *Motor Teeth and Leadscrew Teeth* - is if you have some reduction (gears, chain, timing belt, etc.) between the motor and the leadscrew. If not, then set these both to 1.
- *Leadscrew Pitch* - is how much movement occurs (in user units) in one leadscrew turn. If you're setting up in inches then it is inches per turn. If you're setting up in millimeters then it is millimeters per turn.

The net result you're looking for is how many CNC-output-steps it takes to move one user unit (inches or mm).
Example 1. Units inches
Stepper = 200 steps per revolution
Drive = 10 micro steps per step
Motor Teeth = 20
Leadscrew Teeth = 40
Leadscrew Pitch = 0.2000 inches per turn
From the above information, the leadscrew moves 0.200 inches per turn. - The motor turns 2.000 times per 1 leadscrew turn. - The drive takes 10 microstep inputs to make the stepper step once. - The drive needs 2000 steps to turn the stepper one revolution. So the scale needed is:

$$\frac{200 motor steps}{1 motor rev} \times \frac{10 microsteps}{1 motor step} \times \frac{2 motor revs}{1 leadscrew rev} \times \frac{1 leadscrew revs}{0.2000 inch} = \frac{20{,}000 microsteps}{inch}$$

Example 2. Units mm
Stepper = 200 steps per revolution
Drive = 8 micro steps per step
Motor Teeth = 30
Leadscrew Teeth = 90
Leadscrew Pitch = 5.00 mm per turn

From the above information: - The leadscrew moves 5.00 mm per turn. - The motor turns 3.000 times per 1 leadscrew turn. - The drive takes 8 microstep inputs to make the stepper step once. - The drive needs 1600 steps to turn the stepper one revolution. So the scale needed is:

$$\frac{200\,full\,steps}{1\,rev} x \frac{8\,microsteps}{1\,step} x \frac{3\,revs}{1\,leadscrew\,rev} x \frac{1\,leadscrew\,rev}{5.00\text{mm}} = \frac{960\,steps}{1\,mm}$$

4. Axis Information

The machine coordinate is defined by the homing position, which is set to be (x,y,z) = (0,0,0). The point at which the two rotary axes coincide is (-130 mm, -129.5 mm, 77.85 mm). The distance between this coincident point to the mounting platform is 78.2 mm.

The total height distance from the plate to the laser head is 263 mm.

Some Useful Links:

- **Stepper Configuration Wizard:** http://linuxcnc.org/docs/2.7/html/config/stepconf.html
- **TB6560 Stepper Driver Configuration:** http://wiki.linuxcnc.org/cgi-bin/wiki.pl?TB6560
- **Morgan's EMC2 Config for TB6560 driver:** http://wiki.zentoolworks.com/index.php/Morgan's_EMC2_Config_for_TB6560_driver

EMC2Arduino: https://github.com/dewy721/EMC-2-Arduino