

VENU[⚡] SERIES

CNC PLASMA CUTTER



Safety Information!

1. **Before operating**, ensure proper ventilation.
2. **DO NOT** operate this machine without proper training.
3. **DO NOT** operate unattended.
4. **DO NOT** wear jewelry or loose clothing when operating machine.
5. **Wear** proper **eye protection**.
6. **Wear** proper **protective clothing**.
7. **Keep clothing and hair away** from the Torch and hot metals.
8. **Keep all areas around the Torch free of flammable materials**, including but not limited to wood, flammable material scraps, clothing, cleaning solvents, plastic and more.
9. **In case of emergency**, have fire extinguishing equipment available.
10. Make sure the **Ground Clamp (Work Lead)** is **connected** to material being cut.
11. **Before servicing**, disconnect **all** power sources.

This document will provide a quick guide to the set up and operating procedure of the Techno WinCNC 2136 Tabletop Plasma Cutter.

631-648-7481

www.technocnc.com

Techno **CNC** Systems

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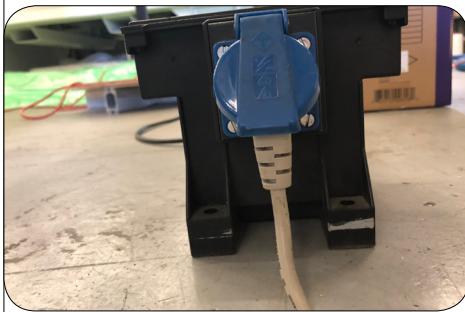
WARNING! READ, FOLLOW AND UNDERSTAND THE TORCH MANUAL BEFORE BEGINNING USE.

- 1) *Use a welding screen when operating Plasma Torch.*
- 2) *Wear proper eye protection.*
- 3) *Wear proper protective clothing.*
- 4) *Disconnect all power before adjusting, loading, or replacing any materials or consumables on the machine table or torch.*
- 5) ***CUT MATERIAL AND MACHINE WILL REMAIN HOT FOR MANY MINUTES AFTER PLASMA TORCH HAS BEEN SHUT OFF. LET COOL ACCORDINGLY. ALWAYS USE GLOVES TO AVOID BURNS AND SHARP EDGES.***
- 6) *Disconnect all power before servicing the CNC machine or torch. The machine may have multiple power sources, disconnect all power sources.*
- 7) *Ensure proper ventilation is setup and used during operation of Plasma Torch.*
- 8) *Install Plasma Cutter on a non-flammable surface only.*
- 9) *Keep all areas around the Plasma Torch free of flammable materials, including but not limited to wood, flammable material scraps, clothing, cleaning solvents, plastic and more.*
- 10) *Keep clothing, hair, and jewelry away from the Plasma Torch and hot metals.*
- 11) *Do not operate unattended.*
- 12) *Have appropriate fire extinguishing equipment available in case of emergency.*
- 13) *Refer to MSDS for material being cut for material-specific safety instructions. Stainless steel can be particularly dangerous.*

DANGER!

MULTIPLE POWER SOURCES
Disconnect All Power
Sources before Servicing

This Equipment has 2 Power Sources
To Disconnect Power:
Unplug power cord to this panel from receptacle.
And Disconnect and lock out
power to Plasma Torch.



The Techno CNC Plasma
System is powered by 220 volt
single phase power.

WORK LEAD TERMINAL



Make sure the Ground Clamp
(Work Lead) is connected to
the material being cut.



Please make sure the CNC Plasma
is properly grounded using the
grounding lug provided on the rear
leg of the machine.



Have a licensed electrician perform
all electrical connections based on
your electrical codes!

II. Techno CNC Plasma Installation

Machine and Controller Connections

1.1 The Electronics are housed in the large controller box as shown in Figure 1.1. When unpacking the machine, avoid twisting the plastic conduit that guides the cables to the motors.

1.2 Open the front and back of the controller box

1.3 Unpack the computer and monitor and mount them on the controller. The PC fits on the side shelf and the monitor rests on top.

1.4 Plug the labelled cables into their proper places. 2 labelled interface cables, 1 monitor and 2 USB for mouse and keyboard.



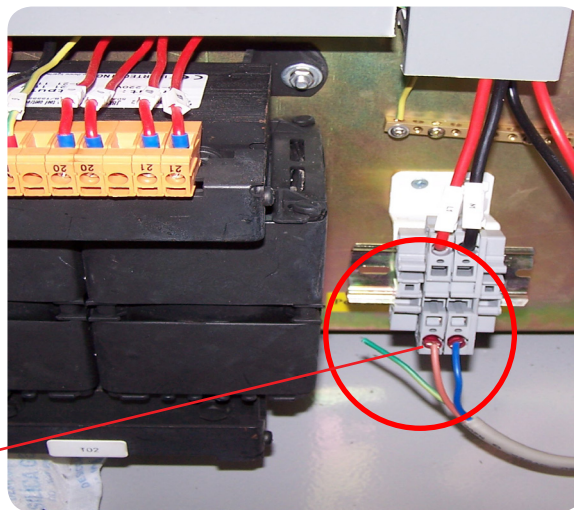
Fig. 1.4

See PC and Controller Interface Connections on page 25.

1.5 The power terminal (220 V single phase) for the 2136 Plasma is located at the back of the machine as shown in figure 1.5.



Fig. 1.5



Have a suitably qualified person connect the 220V to the terminals. Make sure that all local electrical codes are obeyed.

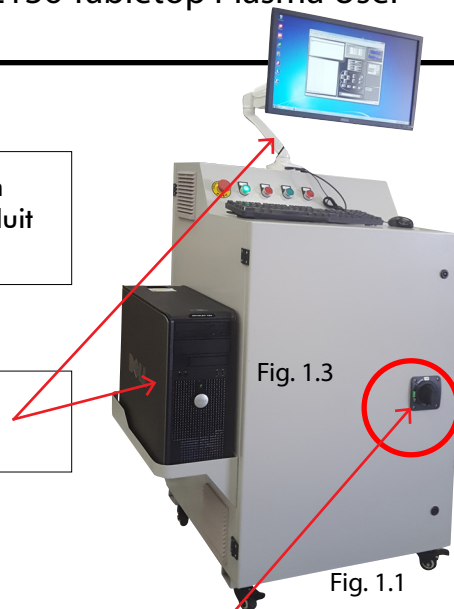


Fig. 1.3

Fig. 1.1



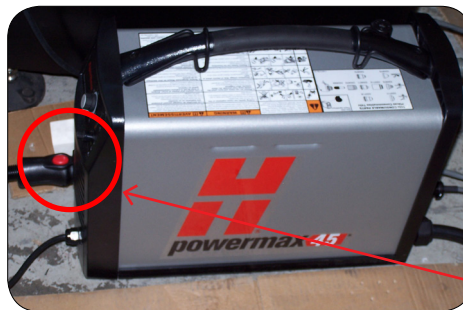


WARNING: Read this setup thoroughly before running the machine. Have a licensed electrician perform all electrical connections based on your local codes!

IIb. Plasma Torch Connections

When hooking up the plasma torch, be sure to use appropriate power. See Hypertherm documentation or refer to quote for details.

Please read and understand the Hypertherm torch manual before operating the machine.



Make sure the torch is plugged in.

Hypertherm Machine Interface Cable from
Controller box



Make sure grounding
clamp is plugged in.

Both the Hypertherm torch need compressed air to operate.

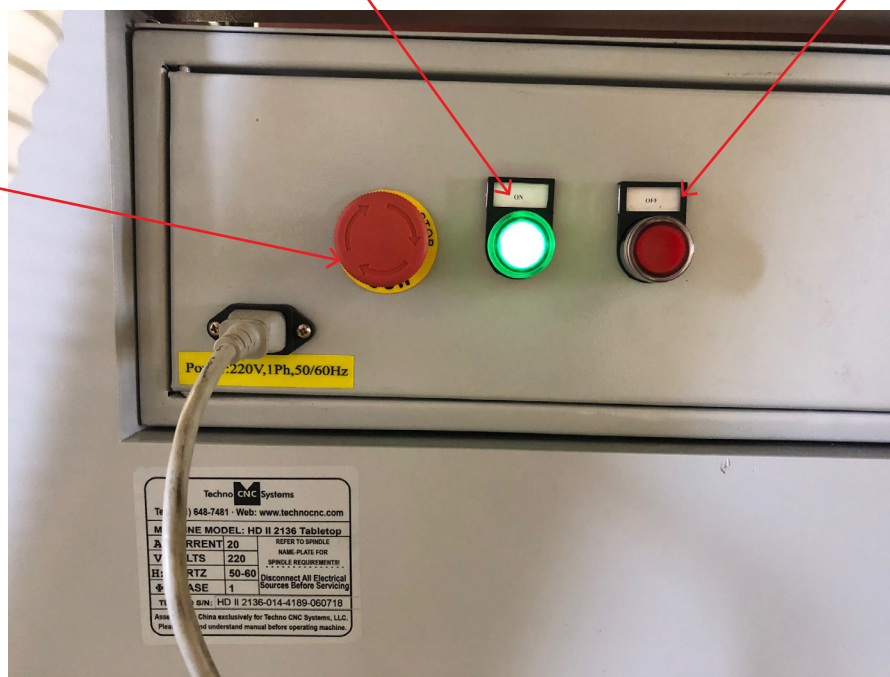
III. Controller Functionality

Machine Controls

Power Button - Turns the machine on and off when the machine has power and the power breaker is in the on position.

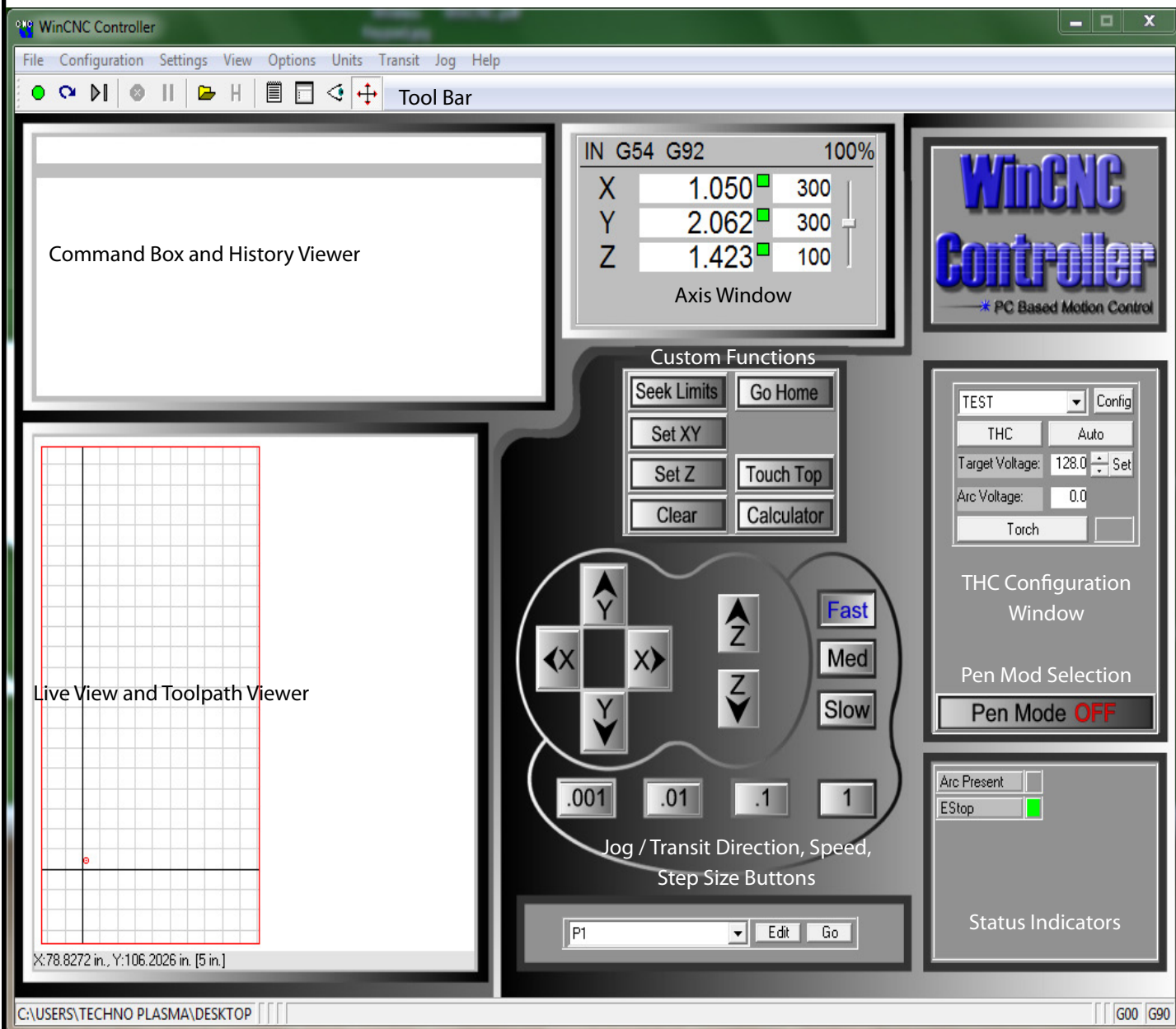
Power Off Button - Turns the machine off

Emergency Stop - Cuts off the power to the machine.



IV. Controller Screen Layout

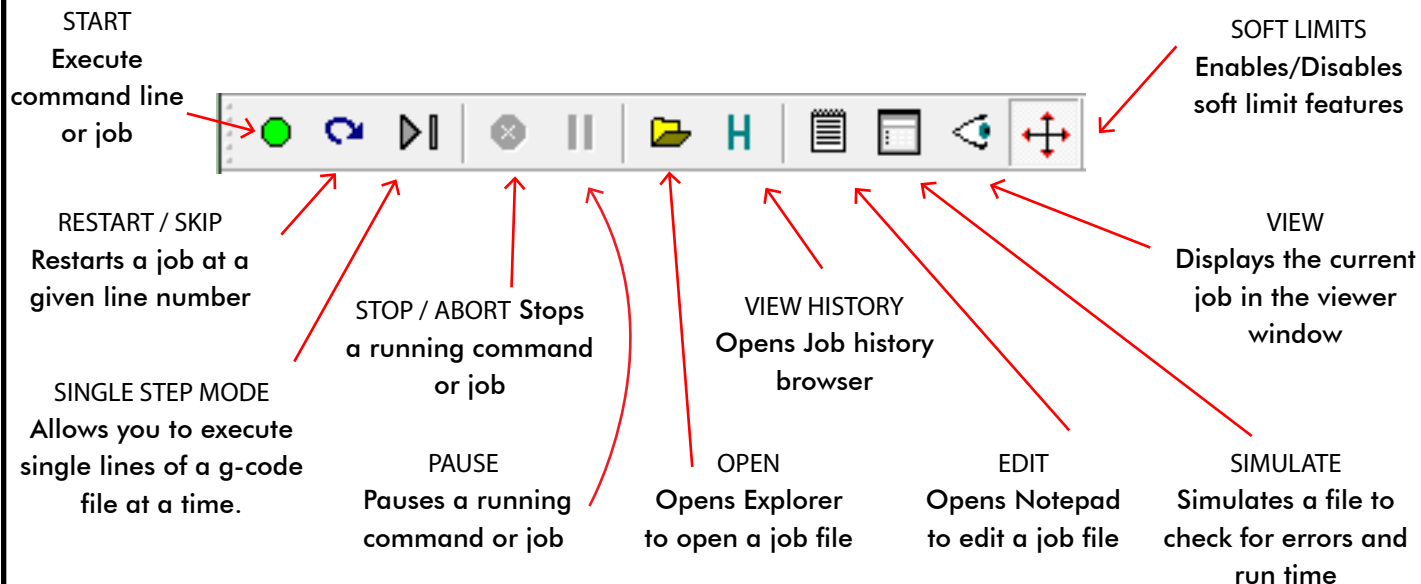
Main Layout Controls and Description



V. Controller Button Functions

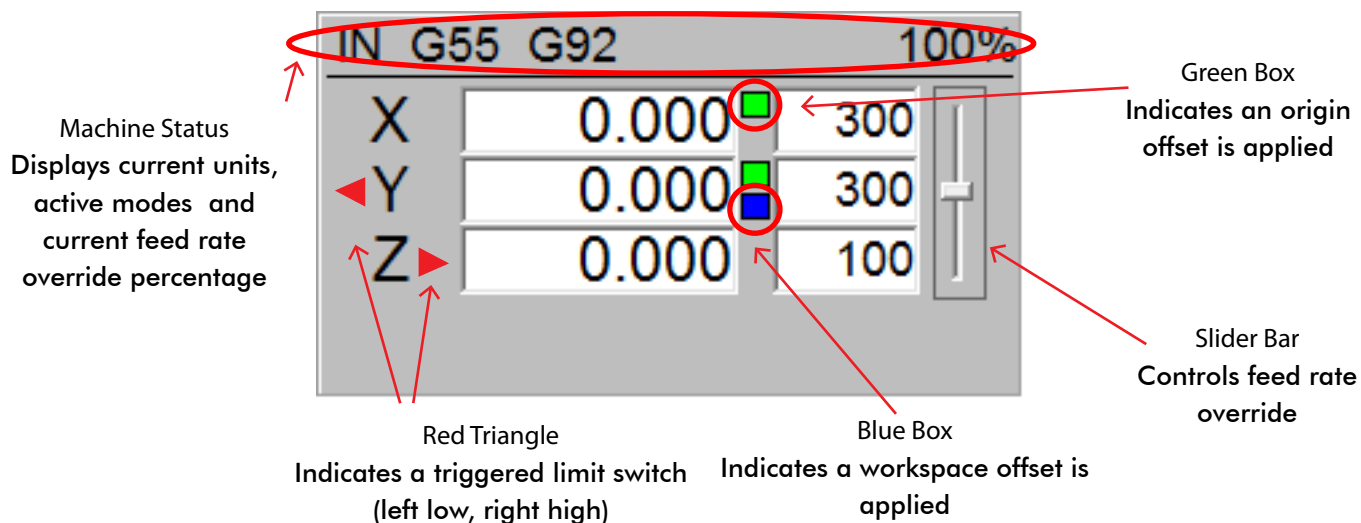
Tool Bar

The tool bar is a collection of shortcut buttons that perform specific actions.



Axis Window

The axis window is the primary display for current information about each axis on your machine. The current positions and velocities for each axis are displayed in the text boxes.

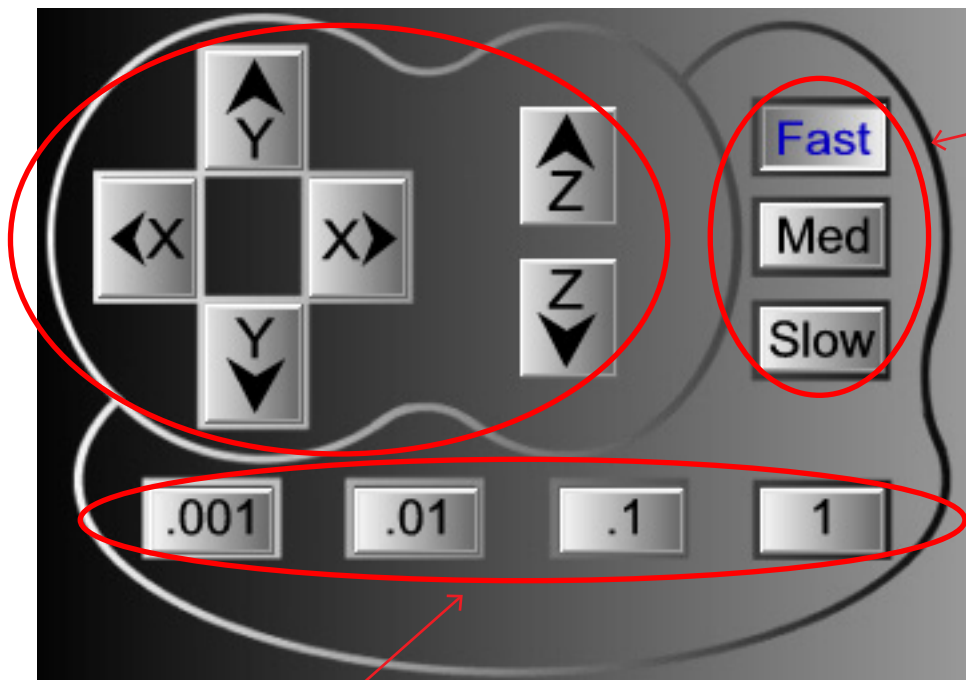


Jog and Incremental Buttons

These buttons are what allow you to initiate a manual jog or incremental movement. In jog mode, holding the button down will continuously move the machine. In incremental mode, each time a button is pressed the machine will move according to the jog increment that has been selected. Holding the button down in incremental mode will move the machine only once.

Movement Direction Buttons

When pressed, these buttons allow the machine to move in selected direction in the selected mode.
(Jog or Incremental)



Jog Speed Buttons

When pressed, these buttons allow the machine to move at predetermined continuous speeds.

Jog Increment Buttons

When pressed, these buttons allow the machine to move in steps of the selected increment.

Viewer

WinCNC contains a built in viewer window that will allow you to display the output of G-Code files before the job is actually run. By default, the viewer can also display a G-Code file line by line as it is run.

G0 rapid moves are shown as a black dashed line. G1 feedrate moves are displayed as a solid blue line.

To view a file before you run it, open the file in the command line and then press the viewer button on the toolbar.

Once the object is loaded into the viewer the following controls can be used:

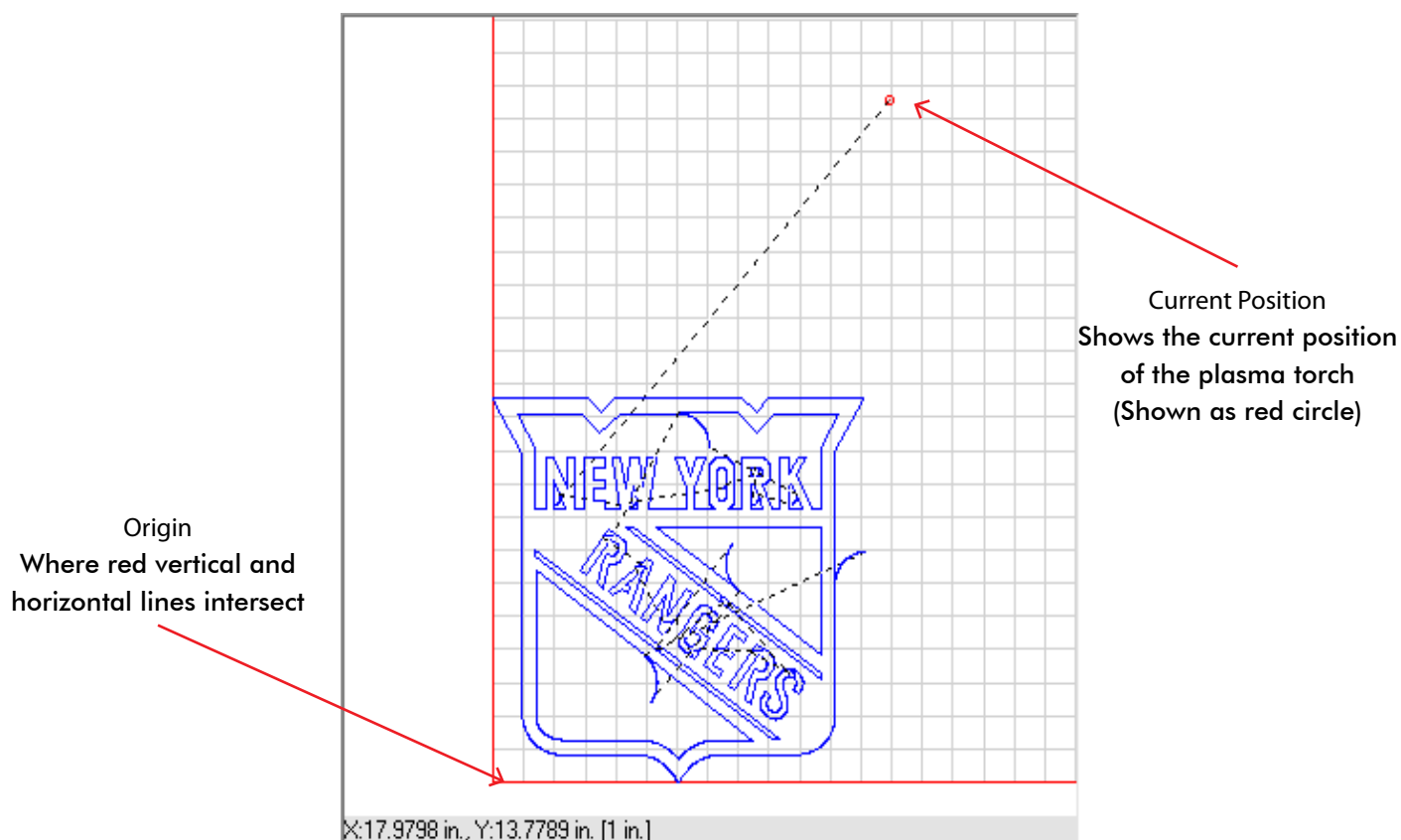
Zoom In - click the left mouse button.

Zoom Out - click the right mouse button.

Selected Zoom - hold down the left mouse button and drag the box around the area to zoom in on.

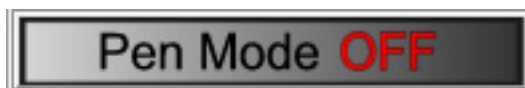
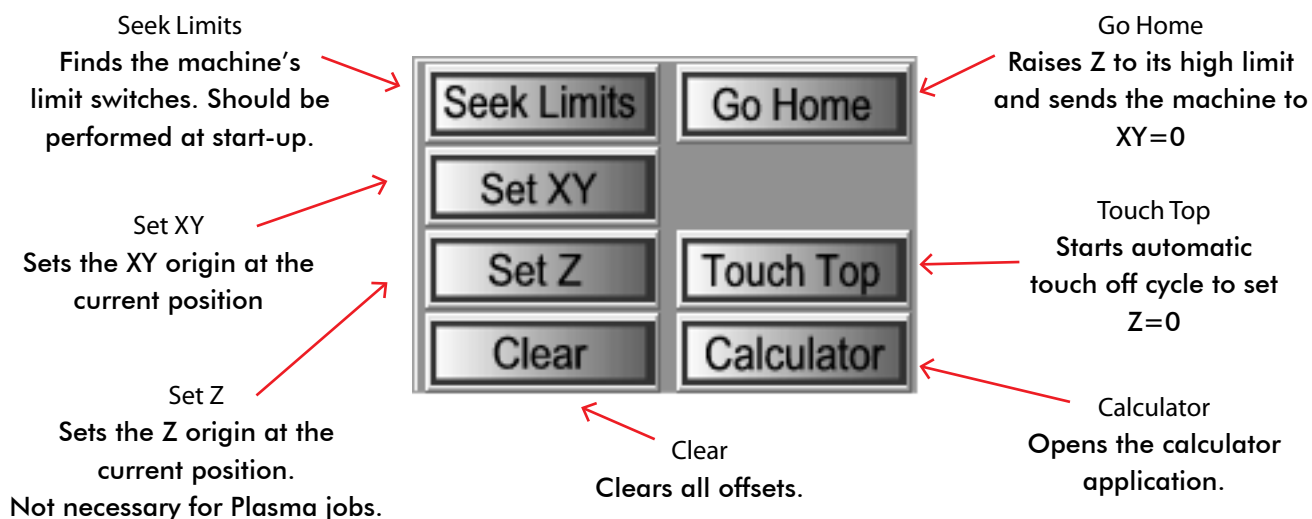
Pan or Re-Center Object - hold CTRL and click either mouse button.

Reset Image - hold shift and click either mouse button



Function Buttons

These buttons perform preset functions. They are used as shortcuts for many G-code operations.



Pen Mode is unique to the CNC Plasma. It is a mode that allows the machine to use a pen to draw the given job onto the material. Click to turn on and off. Button shows current mode

Pen mode:

Disables Touch-Off

Disables Torch On

Applies Pen Offset (Blue Box on Y-axis Coordinates)

User must set Z using "set Z" for pen on material

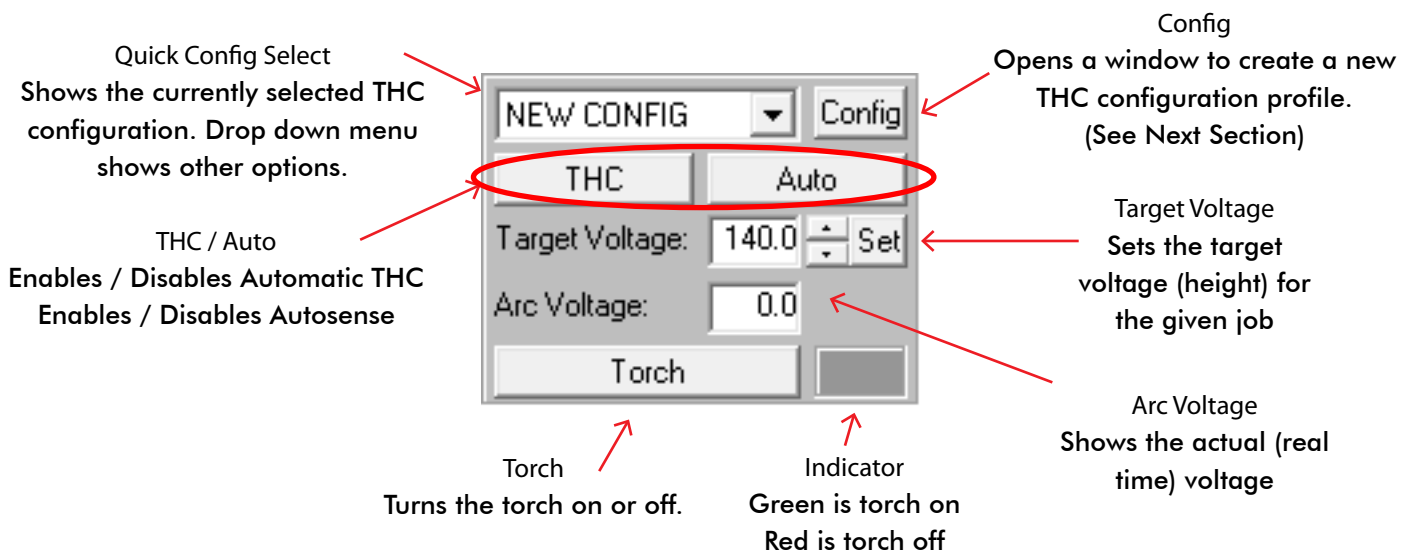
Status Indicators

This window shows certain machine inputs and outputs.



Torch Height Control (THC) Quick View

This window allows the user to select preconfigured THC modes as well as perform basic commands.



THC Configuration Window

This window allows the user to save THC profiles for future usage. We recommend saving a new configuration profile for each material type and thickness used.

The highlighted variables should always be used. All values are taken directly from the Hyperthem Manual's Cut Charts.

See section V to learn how to set these values

Material Name
Configuration name

Torch Amps

Feed Rate

Target Voltage

Pierce Delay

Piercing Height

THC Mode
3 Options

Default
New Config

Config List Shows a list of THC profiles. Select one to edit it.

Cutting Height

Disabled - No THC, maintains a fixed height

Automatic - THC On, maintains a fixed height above the material based on voltage (recommended)

Auto Sense - Uses voltage from initial touch off as fixed height

VI. Using the Cut Charts

Setting the Plasma Cut Parameters:

Please refer to your Hypertherm Powermax Manual's cut chart to ensure proper settings
Maximum cut speeds are the fastest speeds possible to cut material without regard to cut quality.
Recommended cut speeds are a good starting point for finding the best quality cut. You will need to adjust the speeds for your application and your table to obtain the desired cut quality.

					Recommended		Maximum		
Arc current (amps)	Material thickness	Torch-to-work distance (in)	Initial pierce height		Pierce time delay (sec)	Cut Speed (ipm)	Voltage (V)	Cut Speed (ipm)	Voltage (V)
30	0.018 in (26 Ga)	0.06	0.15 in	250%	0.0	360	117	400*	118
	0.030 in (22 Ga)					340	116	400*	117
	0.036 in (20 Ga)					320	115	400*	117
	0.060 in (16 Ga)				0.2	225	111	280	115
	0.036 in (20 Ga)				0.0	380	115	400*	112
	0.060 in (16 Ga)				0.0	350	116	400*	115
45	0.075 in (14 Ga)	0.06	0.15 in	250%	0.1	280	117	360	115
	0.3				190	117	240	115	
	0.4				140	117	175	115	
	0.5				85	118	110	115	
	0.6				60	120	75	116	
	0.9				32	122	40	116	
	0.500 in (1/2 in)	Edge start recommended				20	132	25	125
	0.625 in (5/8 in)					11	138	14	127
	0.750 in (3/4 in)					8	140	10	131
	1.000 in (1 in)					4	146	5	142

The cut chart on the previous page is being used as an example. It is from the Hypertherm PowerMax manual. It represents the cut chart for shielded consumables on Mild Steel with English Units.

In this example, we will be cutting 16 Ga mild steel and we will use the recommended settings. These are merely recommended settings, you will need to adjust accordingly.

We will use the cut chart from left to right.

First, we need to open the WinCNC controller and open the THC config window.

Name the Material "16 Ga - 45 amps"

We will start with "Torch Amps". For our given setup, we will be using 45 amps. Input 45 into the "Torch Amps" box and make sure the Hypertherm torch is set to 45 using the front knob.

Next, we choose our material thickness. In this example, we will be using 16 Ga.

As we move from left to right, we can use and set various parameters.

Torch-to-work distance is our "Cutting Height" value. Enable "Cutting Height" and set the value to .06"

Initial Pierce Height is our "Piercing Height" value. Enable "Piercing Height" and set the value to .15"

Now we will set our Pierce delay, under "Pierce Delay" enter 0.0.

For the best cut results, we will use the "Recommended" settings for feed rate and voltage.

Our cut speed will be 350 inches per minute. Put 350 in the spot marked "Feed Rate"

Our voltage will be 116. Put 116 in the spot marked "Target Volts"

Finally, choose a THC mode. In cases of flat sheet material, you can choose "disabled". If there may be any chance of variation of material thickness or height or the material may be warped, choose "Automatic"

Click "Save" to save the profile and "Done" to exit

VII. Plasma Quick Start Guide

This guide will assume all machine, controller, plasma and PC connections have been made and that you are ready to run a file.

Step 1 - Power Up

Turn on power to the machine, plasma torch and PC. Ensure the torch and machine have an adequate air supply and the ground clamp is properly on the material being cut.



Step 2 - Seek Limits

Once powered up, please choose "Seek Limits" from the controller screen. This will ensure proper positioning.

WARNING: Before seeking limits, ensure that the plasma table is free from obstruction.



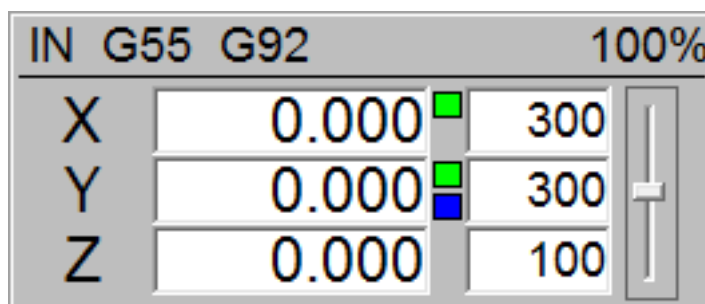
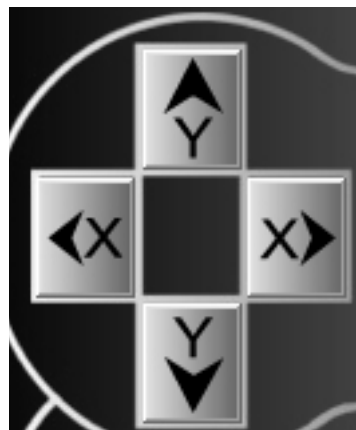
Step 3 - Setting the Origin

Jog the machine to the desired X/Y start position by pressing the X and Y directional keys.

Once located, press "Set XY".

The display should now show X and Y coordinate values of 0.000 with green boxes as indicators that the origin has been set.

Z may have a non zero number.



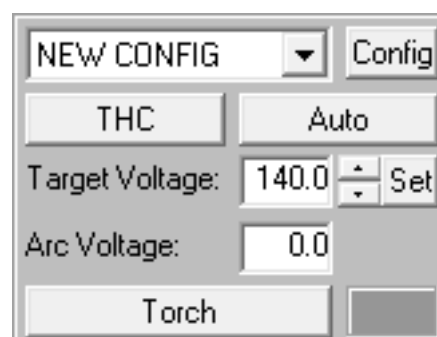
Step 4 - Testing the Touch Off

Before running a file, we want to test the torch touch off. Make sure the material is under the torch for this test and the work lead is attached to the raw stock. Press "Touch Top" button. The torch should lower to the material, touch off, and retract.



Step 5 - Choosing the THC profile

Choose a THC config from the Quick Config menu. Ensure all settings are consistent with Hypertherm Cut Charts.



Step 6 - Load and Simulate G-Code file

Press "Open" and navigate to and select the file you would like to run. Once selected, choose "Simulate" to check for errors. You may also choose "View" to show the tool paths in the Viewer window.



OPEN



SIMULATE



VIEW

Step 7 - Start the File

Press play.

The machine will automatically touch off and set the height for cutting then proceed to execute the G-code program.



PLAY

VIII. Pen Quick Start Guide

This guide will assume all machine, controller, plasma and PC connections have been made and that you are ready to run a file.

Step 1 - Power Up

Turn on power to the machine, plasma torch and PC. Ensure the torch and machine have an adequate air supply and the ground clamp is properly on the material being cut.



Step 2 -Go home

Once powered up, please choose "go home" from the controller screen. This will ensure proper positioning.



WARNING: Before seeking limits, ensure that the plasma table is free from obstruction and the front door is closed

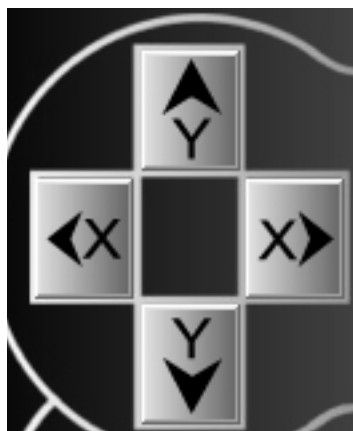
Step 3 - Setting XY=0

Jog the machine to the desired X/Y start position by pressing the X and Y directional keys.

Once located, press "Set XY".

The display should now show X and Y coordinate values of 0.000 with green boxes as indicators that the origin has been set.

Z may have a non zero number.



Step 4 - Setting Pen Mode

Press the "Pen Mode" button. It should now say "ON" and the Y axis should move and have a blue box next to its position.



IN G55 G92			100%
X	0.000	300	
Y	0.000	300	
Z	0.000	100	

Step 5 - Setting Z=0

Place the Pen in the pen holder. Carefully lower the Pen down using the Z down button. Once the tip is touching the material, press "Set Z".



Step 6 - Load and Simulate G-Code file

Press "Open" and navigate and select the file you would like to run. Once selected, choose "Simulate" to check for errors. You may also choose "View" to show the tool paths in the Viewer window.



OPEN



SIMULATE



VIEW

Step 7 - Start the File

Press play.

The machine will proceed to execute the G-code program.



PLAY

IX. Supported Code

G-Code	Description	Usage
G0	Rapid Movement	G0 X# Y#
G1	Feed Movement	G1 X# Y# F#
G2	Clockwise Movement at Feed (IJ or R)	G2 X# Y# I# J# / G2 X# Y# R#
G3	Counter Clockwise Movement at Feed (IJ or R)	G3 X# Y# I# J# / G3 X# Y# R#
G4	Dwell	G4 m (m is time in seconds)
G20	Units are in inches	
G21	Units are in centimeters	
G22	Units are in millimeters	
G28	Return to machine zero (all axes if none specified)	G28 Z / G28 XY / G28
G90	Absolute mode	
G91	Relative mode	

L-Code	Description	Usage
L36	Torch Height Control On	
L36.1	Auto Voltage Set Mode On	
L36.2	Reset Auto Voltage Set Status	
L37	Torch Height Control Off	
L37.1	Auto Voltage Set Mode Off	

X. Error Codes

Error	Description
Line Too Long	Input line longer than 256 characters
Unsupported G Code	G Code in input line not support / recognized
Unsupported L Code	L Code in input line not support / recognized
Unsupported M Code	M Code in input line not support / recognized
Multiple Commands	Input line contains more than one command
Command or File Not Found	Non-supported Code / Invalid File Name Entered
Arc Radius	Distance from start point to center is not equal to distance from end point to center. Check G2 vs G3 and G91 vs G90
Soft Limit Exceeded	Specified move would result in exceeding soft limits
Boundary Exceeded	Specified move would result in exceeding workspace
Acceleration Out of Bounds	Acceleration exceeds maximum resolution
Illegal Value	The specified value is invalid
Unknown Position Specified	The specified position is invalid
Subprogram Nesting Too Deep	Too many nested subprogram calls
L10 in Subprogram	L10 command not allowed in subprograms
File Not Found	The specified file name cannot be found
Parameter Not Specified	A required parameter is missing
Unknown	Unknown error has occurred
Memory Error	Insufficient or bad memory
Parameter Out of Range	Specified Parameter is out of range
Arc Too Small	Specified Arc is below resolution
Could Not Open File	File cannot be opened. May be used by another device
Limit Switches	Limit Switch encountered while running
Aborted by User	E-Stop or Escape used by user
Error Reading File	File may be corrupted

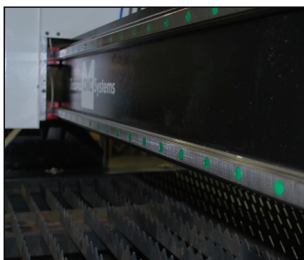
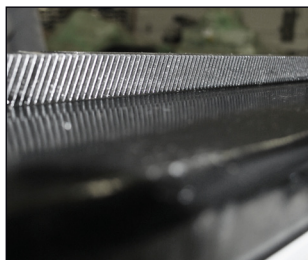
XI. Machine Lubrication.

Lubricating the X-Y Rack and Pinion.

Lubrication is important with rack and pinion gearing systems. A thin film of grease should always be present on the contacting tooth flanks to minimize metal to metal contact.

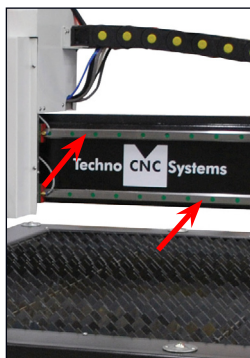
Lithium grease lubrication is recommend over oil, as the oil lubrication will flow away from tooth flanks.

The grease should be applied to the rails at regular intervals, depending on the usage of the machine. Use a small brush to coat both rails on the side of the Y-axis and the single rail across the X-axis.

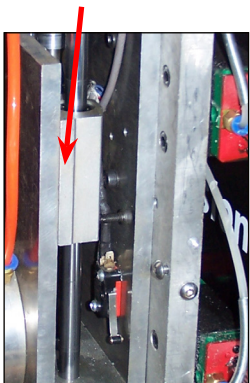


Lubricating the X-Y-Z Rails

The rail carriage bearings are sealed and protected with wipers. The rails should be lightly oiled to allow smooth operation. Avoid a build up of debris on the rails by blowing them off with air, or wiping them down with a rag. The rails do not need to be lubricated as often as the rack, once a month should be sufficient.



X Axis



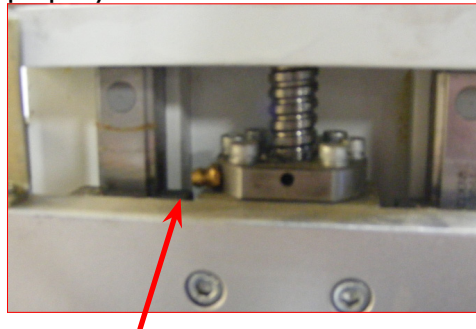
Z Axis



Y Axis

Lubricating Z Ballscrew

The Z axis uses a ballscrew and ballnut instead of a Rack and Pinion. You must apply oil directly to the ballscrew to properly lubricate the mechanism.



Lithium grease is pumped into the lubrication point with the application gun.



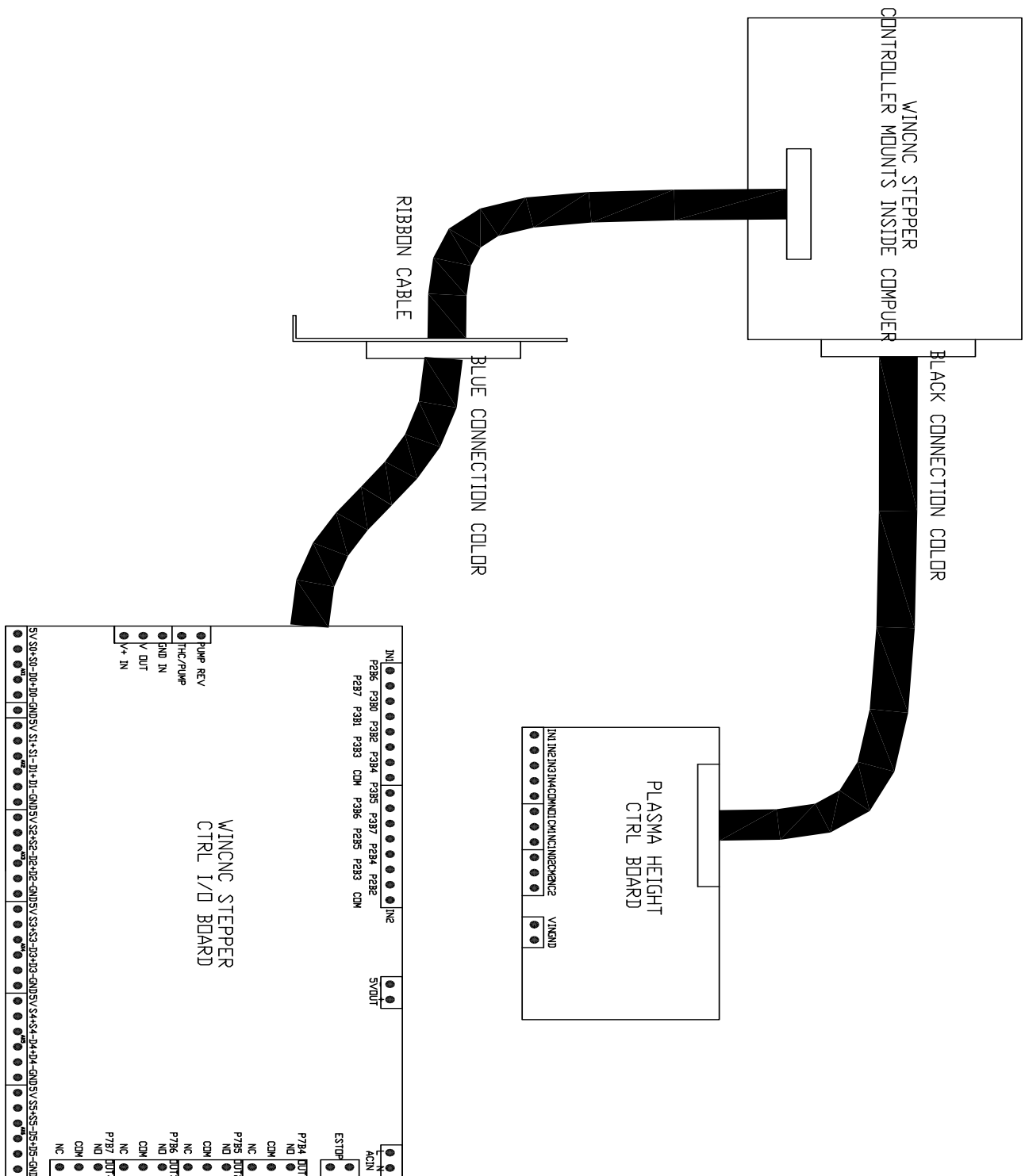
Recommended Lubricants.

Lithium Based Grease:
Alvania Grease No. 2(Shell)
or Equivalent.
Techno Part No.
H90Z00-8670T8

NOTE: AVOID A BUILD UP OF DEBRIS ON MOVING PARTS. CLEAN OFF ANY DEBRIS TO AVOID DAMAGING THE MACHINE.

XII. Diagrams

PC and Controller Interface Connections



XIII. Cut Quality

Reading the cut

There are four basic measurements used to determine good cut quality:

- Bevel angle
- Dross levels
- Appearance of cut
- Lag lines
(Mild steel – O₂ cutting only)

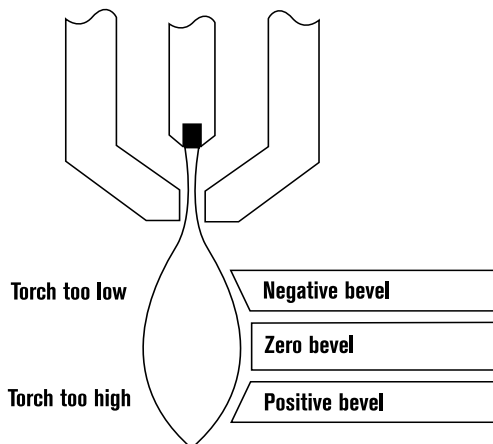
The adjustments that the operator can make to improve these qualities are:

- Torch height or arc voltage
- Cut speed

Remember: the cut charts are the place to start, but cut speed and torch height may need to be adjusted on some materials.

Bevel angle

- By increasing or decreasing the height of the torch, the bevel angle can be changed.
- This is done by adjusting the Arc Voltage setting on plasma systems with arc voltage torch height control (THC). If the plasma system is not equipped with THC, then it must be manually adjusted.
- If the angle is not equal on all sides of a cut part, then the torch may not be square to the plate and will need to be adjusted.



EFFECTS OF TORCH HEIGHT

Decreasing dross (slag)

Top dross

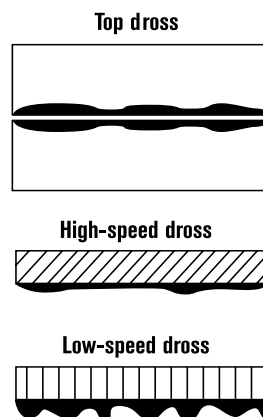
Splatter appears on the top edge of both pieces of the plate. Lower the voltage in increments of 5 volts (maximum) until top dross disappears. Usually only seen with air plasma.

High-speed dross

Fine, roll-over dross that welds to bottom edge. Cleaning requires chipping or grinding. Reduce cut speed to decrease high-speed dross.

Low-speed dross

Globular dross that forms in large deposits. Comes off very easily, in large pieces. Increase cut speed to decrease low-speed dross.



More on dross

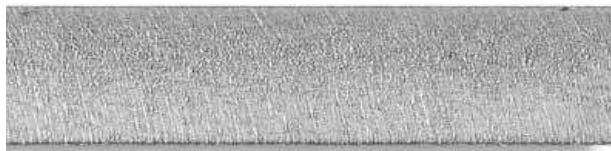
- Some types of metal inherently cut with more dross than others. Some of the more difficult plates and treatments are:
 - High carbon content ■ Clean metal surfaces
 - Shot-blasted plate ■ Aluminum
 - Hot-rolled steel ■ Warm or hot metal
 - High silicon steel
- Some of the easier types are:
 - Cold-rolled steel
 - Oil-pickled steel
- If plate has an oily, scaly or rusty surface, cut with this side down.
- A water muffler or underwater cutting will tend to increase dross levels.

Appearance of cut

- When cutting metals besides mild steel with O₂, lag lines are not a good indicator of cut speed.
- Bevel angle, dross levels and appearance of the cut must be factored together. The smoothness or roughness of the face and the dross levels will determine correct speed.
- Concave cut face is due to torch-to-work distance being too low or consumables are worn.
- Convex cut face is due to torch-to-work being too high or consumables are worn.



Good quality stainless steel cut

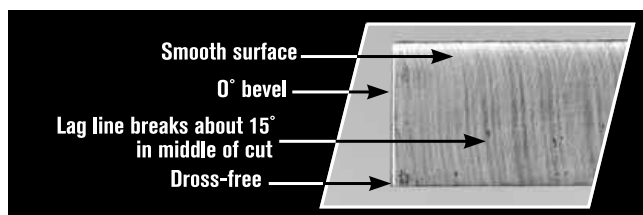


Good quality aluminum cut

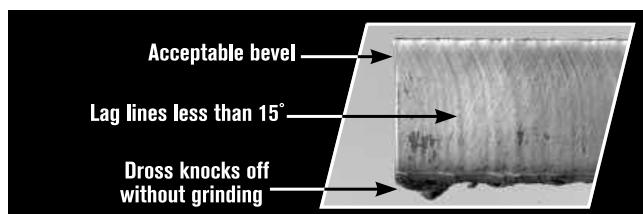
Reading lag lines

Mild Steel, O₂ cutting only

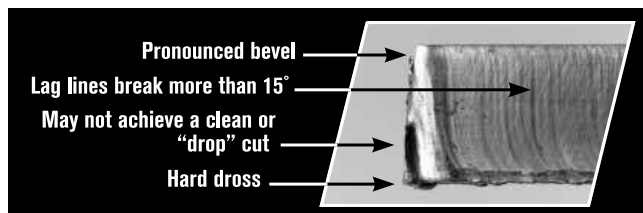
- Using the lag lines of a cut are an excellent way to determine proper cut speeds.
- The lines should generally trail the cut by approximately 10–15 degrees.
- When the lines are more vertical, the speed is too low.
- When the lines are more trailing, the speed is too high.



Correct speed



Too slow



Too fast

Effects of cutting speed on arc voltage

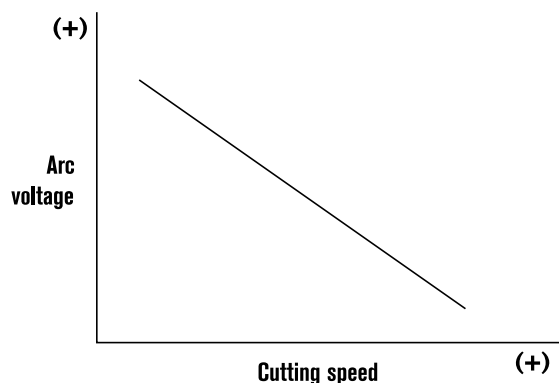
- As cutting speed *increases*, arc voltage *decreases* and vice versa.
- Cutting speed changes:
 - When going in and out of corners*
 - At beginning and end of a cut*
 - When cutting circles and contours*

* This will cause dross in corners and contours.

Reaction of THC

- Torch will dive as speed decreases**
- Torch will rise as speed increases**

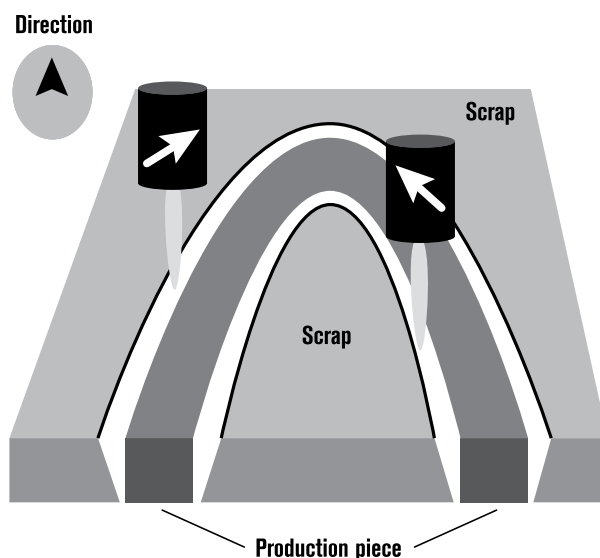
** THC must be turned off or "Locked Out" when speed decreases.



Note: Graph is independent of system and metal thickness.

Cutting direction

- Due to the swirling action of the plasma gas, one side of the cut will always have a bevel angle. This is called the "bad side" of the cut.
- In order to get the minimum amount of bevel on your production pieces, the torch must travel in the proper direction. The "good side" is on the right as the torch is traveling away from you. Refer to picture.
- The swirl direction can be reversed, by using different swirl rings on some models to achieve the opposite results (Used for cutting mirror image parts).



What drives cut quality?

The cut sample can be an excellent way to visually represent the capabilities of metal cutting equipment. By evaluating the smoothness of the cut, bevel angle and dross levels an accurate depiction of the potential success of this process can be observed. However, the cut sample cannot and should not be the sole determining factor in the purchasing decision. Many parameters directly impact the quality of the cut part. An understanding of all the factors that contribute to a successful cut is critical before a purchasing decision should be made.

The plasma cutting process is directly influenced by four primary factors:

- Cutting machine (XY table, punch press, etc.)
- Motion control device (CNC)
- Process variables (gas purity, travel speed, material variability, etc.)
- Plasma cutting system (power supply, torch, etc.)

There are numerous manufacturers of metal cutting systems in the marketplace today producing a variety of different types of machines. Consequently, results may vary. Cut samples provided by Hypertherm represent cut quality attainable on **one type** of cutting machine and in no way indicate expected results on other cutting equipment.

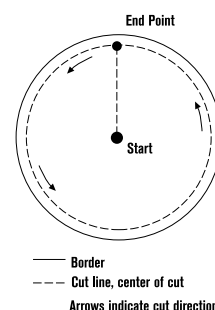
Hypertherm strongly recommends that you obtain a cut sample that has been made on equipment representative of the cutting machine being considered. Only then can a more accurate determination of expected results be possible.

Cutting holes

- Cutting internal holes can be very difficult with plasma. The minimum hole sizes, assuming excellent motion control characteristics are:

- HyPerformance/HyDefinition (O₂ on mild steel)
 - 1/8" (3 mm) plate and less: 3/16" (4.7 mm)
 - Above 1/8" (3 mm): 1.5 times material thickness
- Conventional (O₂ on mild steel)
 - 1/8" to 1/2" (3 – 13 mm) plate: 2 times material thickness
 - Above 1/2" (13 mm): 1.5 times material thickness
- For best results:
 - Turn THC off.
 - Reduce speed.
 - Make lead-in perpendicular to side.
 - Minimize lead-out.
Only enough for part to drop out.

PLATE WITH INTERNAL HOLE



Operator troubleshooting

Status LEDs

The green or amber lights on the front of the power supply are good indicators of common problems. If the LEDs are green then they should be on; if they are amber they should be off. Check your Instruction Manual to see how to troubleshoot with these LEDs.

Note

- HyPerformance plasma has no indicator lights on the power supply.

Tips

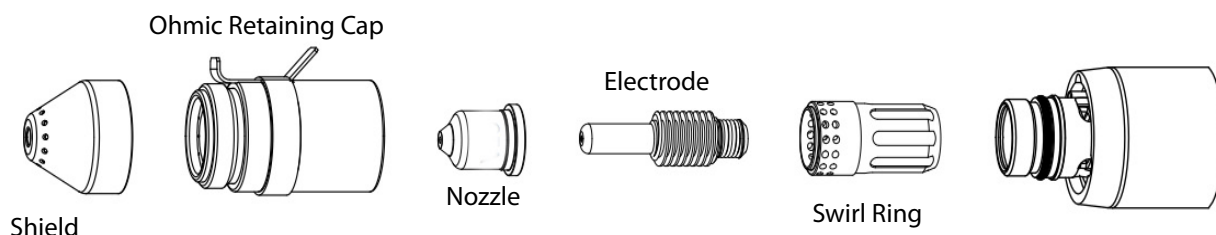
- System shuts off during cut or when trying to cut: Hold down on the Start button to see which LED “flickers”. This may be the one causing the system to shut down.
- Constant bevel: Check for the proper direction of cut, torch height, cut speed, condition of consumables and torch alignment (perpendicular to plate). If all appear to be correctly set and in good condition, have maintenance check for any leak or restriction. If no other problems are found, it may be necessary to replace the torch.

XIII. Consumable Information

Troubleshooting consumables




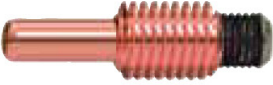
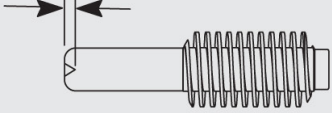

Learning how to evaluate consumables will allow the experienced operator to quickly evaluate the operation of his system and find any problem that may arise. The chart below shows common problems and solutions:

Problem	Possible cause	Solution	Notes
Electrode quickly erodes	Gas restriction, low gas flow	1. Verify proper flow setting and supply pressure/flow	Torch will dive if equipped with THC
		2. Verify proper consumables are installed	This problem could also cause misfiring
		3. Check swirl ring for blockage and proper amount of lubrication	
		4. Check for hose blockage or kink	
		5. Check for malfunctioning valve	
	High coolant temperature or low coolant flow	1. Verify proper temperature if equipped with external chiller 2. Perform coolant flow test	
	Excessive errors	Make programming changes to allow system to ramp up/down properly	
Electrode pit wearing is non-concentric	Blocked or defective swirl ring	Replace swirl ring	Excessive lubricant can block swirl rings
	Defective torch	Replace torch main body	
Nozzle orifice wears out of round or orifice wears from the outside in	Excessive pilot arcing	1. Verify proper pierce height	
		2. Check work cable connection	Excess slag on table can cause this problem
		3. Shorted torch	Measure resistance of torch
		4. Pilot arc relay is staying closed	
Nozzle erodes on the inside	Contamination	Check gas supply or check for leak	A leak when cutting with O ₂ can cause contaminants to enter the plasma gas line
	Double arcing	Verify proper pierce height	Electrode and nozzle will be black. Torch will rise if equipped w/THC



Troubleshooting
Consumable wear



Part	Condition	Action
Nozzle Check center hole 	Good 	No action required.
	Worn 	If out of round, replace
Electrode Examine center surface 	Maximum 1 mm 	Replace
Swirl ring Examine external surfaces 	Damage or debris	Replace
Examine gas holes	Blocked holes	Replace

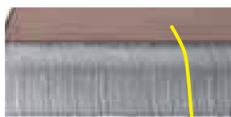
Troubleshooting

Cut quality

Optimum cut

What to look for

1. Well defined lag lines with an angle of 10° - 15°
2. Minimal dross
3. Square edges
4. No top splatter
5. No discoloration



Lagline

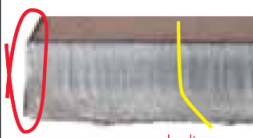
Excess bevel angle

Possible cause

1. Torch not square
2. Amperage too low
3. Speed too fast
4. Worn nozzle

Solution

1. Square torch to workpiece
2. Increase amperage
3. Decrease speed
4. Replace nozzle



Lagline

Hardened dross

Possible cause

1. Speed too fast
2. Amperage too low

Solution

1. Decrease speed
2. Increase amperage



Lagline

	PowerMax 45	PowerMax 65	PowerMax 85	PowerMax 105
45 Nozzle	H25XHY-220671	H25XHY-220941	H25XHY-220941	H25XHY-220941
65 Nozzle		H25XHY-220819	H25XHY-220819	H25XHY-220819
85 Nozzle			H25XHY-220816	H25XHY-220816
105 Nozzle				H25XHY-220990
Electrode	H25XHY-220669	H25XHY-220842	H25XHY-220842	H25XHY-220842
Shield	H25XHY-220674	H25XHY-220817	H25XHY-220817	H25XHY-220817 (45, 65, 85) H25XHY-220993 (105)
Retaining Cap	H25XHY-220719	H25XHY-220953	H25XHY-220953	H25XHY-220953
Swirl Ring	H25XHY-220670	H25XHY-220857	H25XHY-220857	H25XHY-220994

TECHNO CNC SYSTEMS LIMITED WARRANTY & COVERAGE

Limited Warranty On Techno Brand Products

Subject to the terms and conditions set forth in this warranty document, Techno CNC Systems LLC (“Techno”) warrants its Techno brand products (“Product” or “Products”) to the original purchaser for a period of one (1) year against defects in material and workmanship under normal use and conditions (“Product Limited Warranty”). The Product Limited Warranty commences on the date of Product shipment from Techno facilities and expires one (1) year from the ship date (“Product Warranty Period”).

Spare or replacement parts (“Part” or “Parts”) for Techno Products are warranted to the original purchaser for a period of ninety (90) days against defects in material and workmanship under normal use and conditions (“Parts Limited Warranty”). A Parts Limited Warranty commences on the date of a Part shipment from Techno facilities and expires ninety (90) day from the ship date (“Parts Warranty Period”).

A Product Limited Warranty may be validly transferred to one additional party by the original purchaser provided that a reregistration fee is paid to Techno within seven (7) days of transfer of the Product and prior to the expiration of the Warranty Period. Reregistration of any Product warranty does not extend the Warranty Period. A Parts Warranty is not transferable.

Product Limited Warranty and Parts Limited Warranty are hereinafter referred to collectively as “Limited Warranty.” Product Warranty Period and Parts Warranty Period are hereinafter referred to collectively as “Warranty Period.”

What Is Covered Under The Limited Warranty

During the Warranty Period, Products and Parts that Techno deems validly subject to a warranty claim will be repaired or replaced, in Techno’s sole discretion, without charge. Repaired items may include new or refurbished replacement parts. Replaced items may be new or may be manufactured from serviceable used parts. Items that have been repaired and/or replaced will be warranted only for the unexpired portion of the applicable Warranty Period to the original purchaser.

As a condition to this Limited Warranty, customers shall have read the operator’s manual and registered the Product or Part with Techno within 30 days of purchase.

What Is Not Covered Under The Limited Warranty

Events That Are Not Covered Under This Limited Warranty Include:

- * Normal maintenance services as outlined in the operator’s manual or other operational instructions provided by Techno (such as oil change, cleaning, lubrication and adjustments).
- * Replacement of consumable items such as oil, lubricants, belts, router bits, or other items subject to normal service replacement.
- * Product/Part damage resulting from third-party parts, accessories or systems connected to or used in conjunction with the Product/Part that have adversely affected its operation, performance or durability.
- * Product/Part damage caused by normal wear, accidents, improper maintenance, improper use or abuse, alterations, or failure to follow operation and maintenance instructions contained in the operator’s manual.

- * Products/Parts purchased from any supplier, distributor or dealer not authorized by Techno.
- * Labor costs including, but not limited to, such costs as the removal and reinstallation of a component or assembly.
- * Insurance and packing costs for a defective items returned to Techno by the customer.
- * Product/Part damage caused by electrical surges, improper venting, flooding, fire, freezing, corrosive atmospheric elements, abnormal external temperature, or any event of force majeure such as riot or act of war.
- * Noise or vibration unless it is the result of defective material or workmanship of the Product/Part.
- * Claims of defective Products or Parts not made in conformance with Techno's return policy as set forth below.
- * Transport costs for defective items that require more than one (1) shipping to remedy a claimed defect.
- * Claims for personal injuries, incidental or consequential damages, or economic loss (profit or revenue), however caused. i.e. any other incidental, consequential, indirect, special and/or punitive damages, whether based on contract, warranty, tort (including, but not limited to, strict liability or negligence), patent infringement, or otherwise, even if advised of the possibility of such damages. Some states do not allow the exclusion or limitation of certain damages, so the above exclusion or limitation may not apply to a particular customer depending on location.
- * CLAIMS FOR PRODUCT COMPONENTS OR PARTS THAT ARE WARRANTED SEPARATELY BY THEIR RESPECTIVE MANUFACTURER(S) OR SUPPLIER(S). Available warranties covering those components are furnished with each Product and Part. Techno CNC Systems does not assume any warranty obligation or liability for components covered exclusively by the stated warranty of a component's respective manufacturer(s) or supplier(s).

Techno's Limited Warranty Shall Be Void In The Event Of An Occurrence Of Any Of The Following:

- * Failure by the Original Purchaser to register the Product within thirty (30) days of its purchase.
- * Where applicable, failure to validly reregister the Product within seven (7) days of transfer of the Product and prior to the expiration of the Warranty Period.
- * Improper installation of the Product, including but not limited to, installation in violation of applicable rules, laws or building codes, and installation for non- recommended uses.
- * Accident, abuse or misuse of the Product.
- * Failure to follow or comply with the user's operational manual.
- * Modification, alteration, addition of non-approved components, or misapplication of the Product or Part in any manner.
- * Repairs and service conducted by personnel unauthorized by Techno.
- * Modifications to, and tampering with, the Product or Part.

Warranty inspections and repairs are performed at Techno's New York facility, where all necessary diagnostic and repair equipment is available. This equipment is difficult to transport and field service is accordingly severely limited and will only be supplied at Techno's sole discretion. If field service is required, all service call expenses, including transportation, travel time, subsistence costs, and the prevailing cost per hour (eight hour minimum) are the responsibility of the customer.

In the event that support diagnostics of a covered Product or Part requires an item to be shipped more than one (1) time for any given claimed warranty defect, then the customer shall bear all transport costs.

If an out-of-warranty situation exists, the customer will be notified of the repair or replacement cost. At such time, the customer must issue a purchase order to cover the cost of the repair/replacement or authorize the item to be shipped back to the customer at the customer's expense. In all cases, a restocking charge of twenty (20%) percent will be charged to the customer on all items returned to stock.

Warranty claims will not be reviewed or remedied unless the warranty registration is received by Techno within thirty (30) days of the purchase date. All warranty issues must be handled through Techno.

Techno customer service can be reached by calling 631-648-7481.

Additional Terms & Conditions

TECHNO RESERVES THE RIGHT TO CHANGE DESIGNS, SPECIFICATIONS, PRICES AND ANY APPLICABLE DOCUMENTATION WITHOUT NOTICE TO THE CUSTOMER.

Techno is not liable for delay or failure to perform any obligation hereunder by reason of circumstances beyond Techno's reasonable control. These circumstances include, but are not limited to, accidents, acts of God, strikes or labor disputes, laws, rules, or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials, and any other event beyond Techno's control.

No legal action arising out of any claimed breach of this Limited Warranty may be brought by the more than one (1) year following date of purchase of a Product or Part. This Agreement shall be governed in all respects by the laws of the State of New York, United States of America. Any legal action brought by a customer against Techno must be brought in the state courts of the State of New York, Second Judicial Department. Some states do not allow the contractual limitation of time periods for bringing suit so the limitations set forth herein may not apply to all customers in all locations.

Once an order is placed by the purchaser, in no event shall purchaser cancel payment or any portion thereof (e.g. reverse charges on a credit card or stop payment on a check) without prior express written authorization from Techno. Failure to obtain prior express written authorization from Techno shall be an event voiding Techno's Limited Warranty on the Product or Part and purchaser shall be subject to liability for any damages sustained by Techno.

The terms and conditions contained herein shall constitute the entire agreement concerning the Limited Warranty described herein. No oral or other representations are in effect. No dealer, distributor, or individual is authorized to amend, modify, or extend this Limited Warranty in any manner and only the warranty expressed in this warranty document is extended herein by Techno. Statements made outside this warranty document, such as in dealer advertising or presentations, whether oral or written, do not constitute warranties by Techno and should not be relied upon.

Section headings contained in this warranty document are for informational purposes only and may not be used to limit the terms and conditions set forth in this warranty document. If any portion or provision contained in this Limited Warranty & Coverage shall to any extent be found to be invalid or unenforceable, the remainder of this coverage or the application of such portion or provision in circumstances other than those in which it is held invalid or unenforceable, shall not be affected thereby, and each remaining portion or portion of this Limited Warranty shall be valid and enforceable.