=TITAN
Series CNC Router Manual

This document will provide a quick guide to the set up and operation of the Techno Titan Series CNC router equipped with the NCstudio G3 controller.

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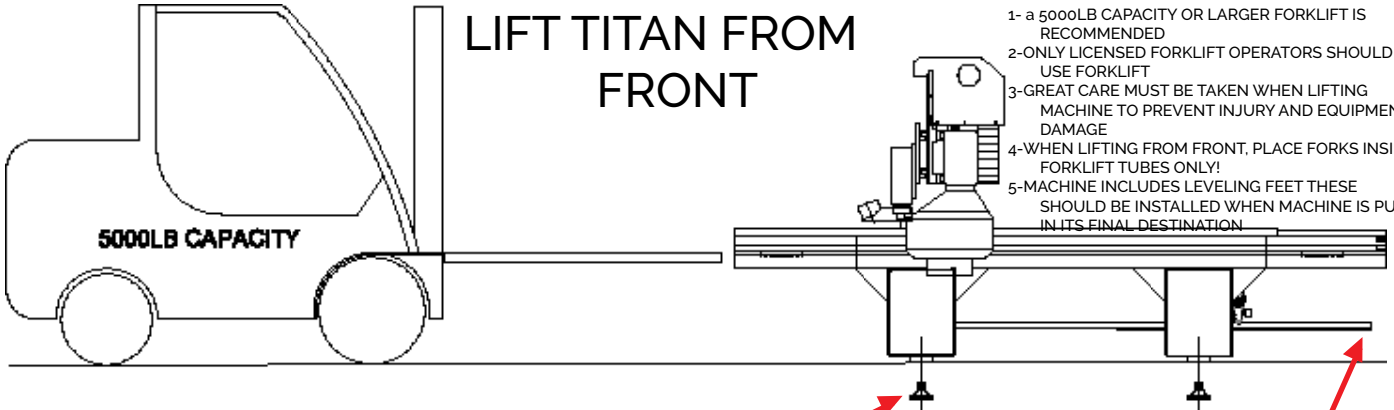
Techno CNC Systems Titan Series Forklift Guide

LIFT TITAN FROM FRONT

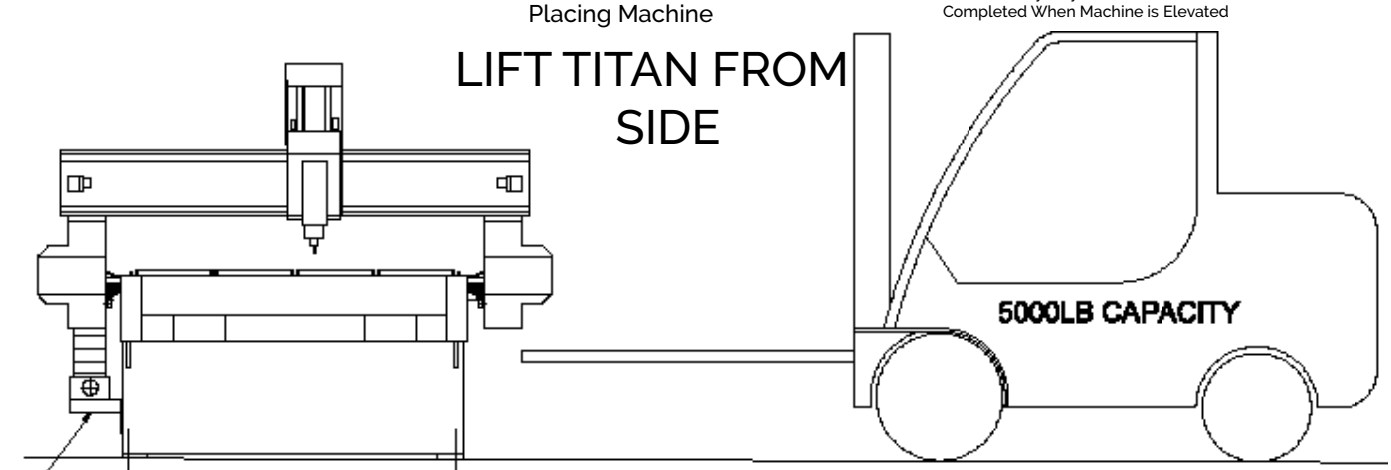


1- a 5000LB CAPACITY OR LARGER FORKLIFT IS RECOMMENDED
2-ONLY LICENSED FORKLIFT OPERATORS SHOULD USE FORKLIFT
3-GREAT CARE MUST BE TAKEN WHEN LIFTING MACHINE TO PREVENT INJURY AND EQUIPMENT DAMAGE
4-WHEN LIFTING FROM FRONT, PLACE FORKS INSIDE FORKLIFT TUBES ONLY!
5-MACHINE INCLUDES LEVELING FEET THESE SHOULD BE INSTALLED WHEN MACHINE IS PUT IN ITS FINAL DESTINATION

Install Leveling Feet When Placing Machine

Cable Carrier Tray May Not Be Bolted To Frame. This SHould Be Completed When Machine is Elevated

LIFT TITAN FROM SIDE



1- a 5000LB CAPACITY OR LARGER FORKLIFT IS RECOMMENDED
2-ONLY LICENSED FORKLIFT OPERATORS SHOULD USE FORKLIFT
3-GREAT CARE MUST BE TAKEN WHEN LIFTING MACHINE TO PREVENT INJURY AND EQUIPMENT DAMAGE
4-IT IS RECOMMENDED TO HAVE FORK LIFE EXTENSIONS.
5- WHEN LIFTING MACHINE FROM SIDE PLACE WOOD BLOCKS BETWEEN THE FORK AND STEEL FRAME TO PREVENT DAMAGE TO VACUUM PIPING. GREAT CARE MUST BE TAKEN WHEN LIFTING FROM SIDE TO PREVENT DAMAGE TO WIRING. FORKS MUST EXTEND ALL THE WAY THROUGH FRAME.
WARNING: WHEN LIFTING FROM SIDE WEIGHT MAY BE UNBALANCED.
6- MACHINE INCLUDES LEVELING FEET! THESE SHOULD BE INSTALLED WHEN MACHINE IS PUT IN ITS FINAL DESTINATION

SAFETY WARNING:

DO NOT LIFT MACHINE OR MOVE MACHINE BY THE GANTRY

For safety and to prevent damage to the machine, Lift Machine Using The Forklift Tubes or Frame ONLY

** The side of the Titan Series CNC Router may NOT have forklift tubes. Make sure forklift blades enter through the frame of the machine only. Use blocks when lifting machine to prevent damage to the vacuum table plumbing **

Safety Instructions

READ THESE INSTRUCTIONS THOROUGHLY BEFORE OPERATING MACHINE. DO NOT OPERATE MACHINE IF YOU ARE UNFAMILIAR WITH THESE SAFE OPERATING INSTRUCTIONS. DO NOT OPERATE MACHINE WITHOUT KNOWING WHERE THE EMERGENCY STOP SWITCH IS LOCATED.

WARNING: IMPROPER OR UNSAFE OPERATION OF THE MACHINE WILL RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE EQUIPMENT.

1. Keep fingers, hands, and all other objects away from machine while power is on.
2. Disconnect power to all system components when not in use, when changing accessories, and before servicing.
3. Do not loosen, remove, or adjust machine parts or cables while power is on.
4. Exercise care with machine controls and around keyboard to avoid unintentional starting.
5. Make sure voltage supplied is appropriate to specifications of components.
6. Machines must be plugged into three-pronged grounded outlets. Do not remove the grounding plug or connect into an ungrounded extension cord.
7. Keep cables and cords away from heat, oil, and sharp edges. Do not overstretch or run them under other objects or over work surfaces.
8. Use proper fixtures and clamps to secure work. Never use hands to secure work.
9. Do not attempt to exceed limits of machine.
10. Do not attempt to use machine for purposes other than what is intended.
11. Use machine only in clean, well-lit areas free from flammable liquids and excessive moisture.
12. Stay alert at all times when operating the machine.
13. Always wear safety goggles.
14. Do not wear loose-fitting clothing when operating machine. Long hair should be protected.
15. Always maintain proper balance and footing when working around the machine.
16. Maintain equipment with care. Keep cutting tools clean and sharp. Lubricate and change accessories when necessary. Cables and cords should be inspected regularly. Keep controls clean and dry.
17. Before using, check for damaged parts. An authorized service center should perform all repairs. Only identical or authorized replacement parts should be used.
18. Remove any adjusting keys and wrenches before turning machine on.
19. Do not operate the machine unattended.
20. Follow all safety instructions and processing instructions in the MSDS for the material being processed.
21. Use proper precautions with dust collection systems to prevent sparks and fire hazards.
22. Make sure to have proper fire extinguishing equipment on hand at all times.

PREVENT FIRE HAZARDS by using the proper feeds, speeds, and tooling while operating your Techno machine. For example, setting feeds and speeds too low and/or using dull tool bits creates friction at the material. The friction generates heat which can result in a fire that can be drawn through the vacuum table or dust collector without warning. Fire hazard from friction heating caused by dull tools is possible when cutting certain materials, especially composite material such as wood composites, MDF and Particleboard.

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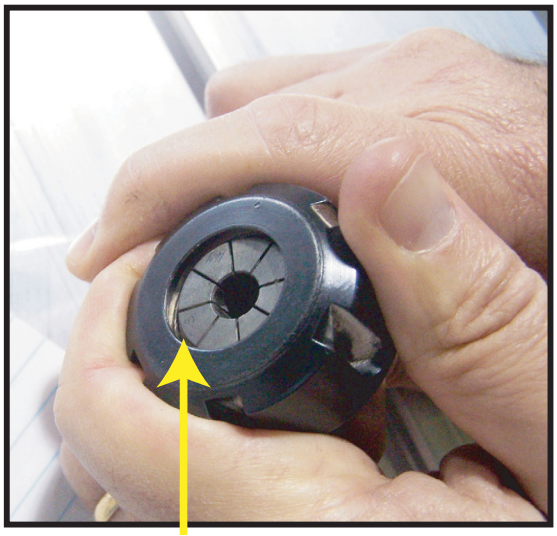
WARNING!
THE SPINDLE WILL BE DAMAGED
IF UNBALANCED EQUIPMENT IS USED.

AIR SUPPLY MUST BE FILTERED AND DRY.

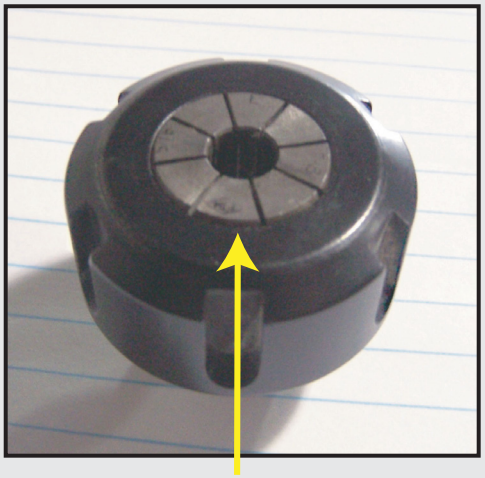
COLLETING GUIDELINES

WRONG!



This picture shows an improper assembly. Notice the gap and angle of the collet in relation to the nut. The collet is not flush to the end of the collet nut. Correct this assembly before using.

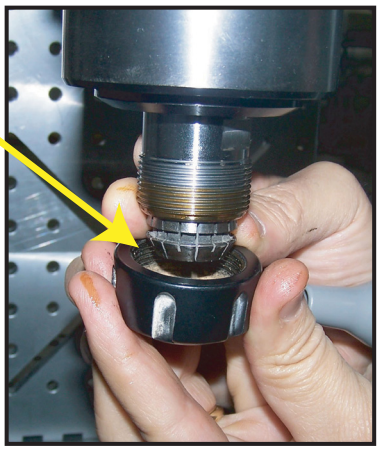
RIGHT!



The picture above is how your collet nut assembly should look: the end of the collet is flush with the bottom surface of the collet nut. You will hear and feel a "SNAP" as the collet properly goes into the collet nut. Once it is assembled, then "SCREW" the nut onto the threaded spindle end.

DO NOT PUSH THE COLLET INTO THE SPINDLE AT ANY TIME!

Only the proper assembly should be screwed onto the spindle.



FOR TOOLCHANGE AND FIXED COLLET SPINDLES:

ONLY USE TOOLHOLDERS, COLLET NUTS AND TOOLS THAT ARE BALANCED TO MEET OR EXCEED THE MAX RATED SPEED OF THE SPINDLE.

I. TECHNO TITAN SERIES QUICK SETUP

The Techno Titan Series CNC Router is powered by 220 Volt AC. Unless specially requested, the electronics require 3-phase power.

1.1
The Electronics are housed in the large NEMA enclosure as shown in Figure 1.1. When unpacking the machine avoid twisting the cable carrier that guides the cables to the motors.

Fig. 1.1

1.2
Open the rear of the controller using the provided key located around the emergency stop button or inside of the tool box.

You will now have access to the electronics that drive the CNC. They will be identical or like depending on the model issued. (shown in Fig. 1.2).

The terminals for the 220 volt connection are located at the bottom of the box (shown in Fig.1.3)

Fig. 1.2

1.3
Have a suitably qualified person connect the 220V to the shown terminals. Make sure that all local electrical codes are obeyed. For single phase machine, connect power to L1 and L3 only.

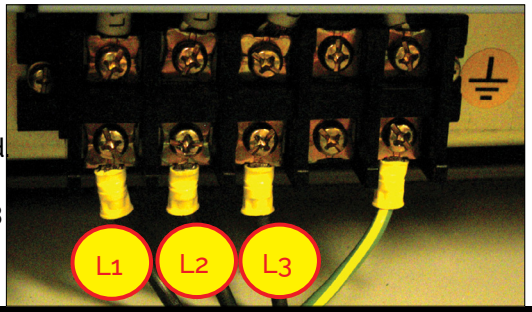


Fig. 1.3

1.4
Unpack the hand-held controller (shown in Fig 1.4) and carefully attach this to the controller board. (shown in Fig 1.5).

Fig. 1.4

1.5
Guide the cable through the hole on the side of the enclosure and attach the hand-held controller to the DB 15 terminal.

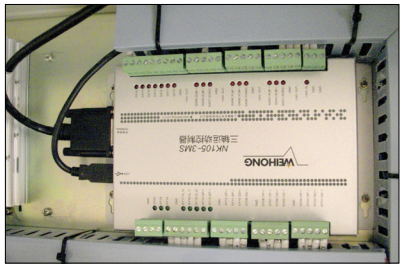


Fig. 1.5

1.6
If the machine has a vacuum hold down pump, there is a matching connector that will plug into the controller box (shown in Fig.1.6).

Fig. 1.6

I.I Techno Titan Series Installation

Carefully remove the Titan from its wood pallet. Be sure to remove the bolts from its four leveling feet insertion holes, as well as anything stowed under the Titan during shipping.

Remove all bubble wrap, foam and strapping from the machine.

Attached the provided leveling feet to the six legs and adjust accordingly until the table is level.

2.1

Remove the controller and place it on the floor to the left of the machine.

When unpacking the controller, avoid twisting the cable carrier that guides the cables to the motors.

Fig.1.1a

2.1a

Remove the four brackets used to stabilize the gantry during shipping using metric allen wrenchs. (Fig. 1.1a)

2.2

Open the back of the controller box (shown in Fig 2.2a) with the key provided. The electronics will now be exposed and components identified in Fig 2.2b.

A- Controller Board.
B- 24Volt PSU.
C- Stepper Driver.
D- 220Volt In.

Fig. 2.2a

Fig. 2.2b

2.3

Take the black connector coming from the Handheld controller (fig 2.3a,) and guide it through the hole in the side of the control cabinet.

Locate the controller board (fig 2.3b) and attach the block connector as shown by the red arrow.

Fig. 2.3a

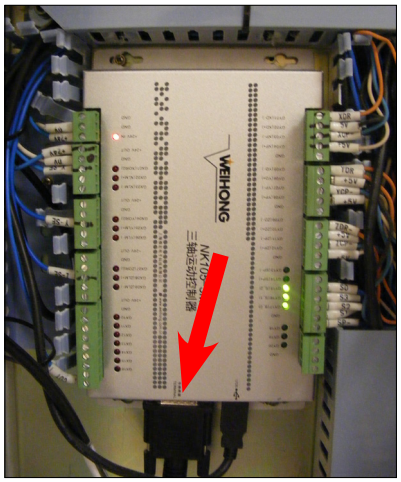


Fig. 2.3b

2.4
Have a qualified electrician attach 208-230 Volts, 3-phase to the terminal on the bottom of the box (Fig 2.4.)

If the machine has been modified for single phase operation, then L1, L3 and GND are used, and nothing is attached to L2.

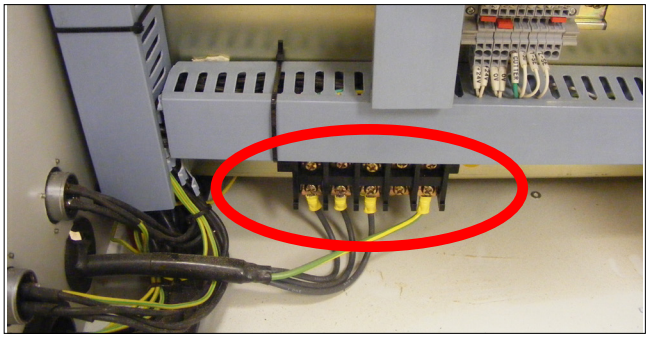


Fig.2.4

2.5
If the machine has a vacuum table, the Vacuum Pump should be wired to 208-230V, 3-phase or 440V (depending on what is specified on the Unit,) by a qualified Electrician. (Fig 2.5a)

Fig. 25a

The starter box will have a round silver connector attached to a grey cable coming out of it, (Fig 2.5b).

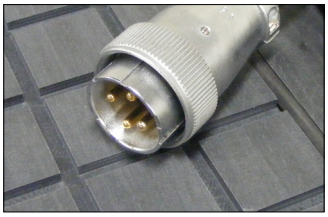


Fig. 2.5b

This connector plugs into the socket on the side of the machine, (Fig 2.5c).
This cable provides 220 volts to the starter coil to turn on the vacuum.

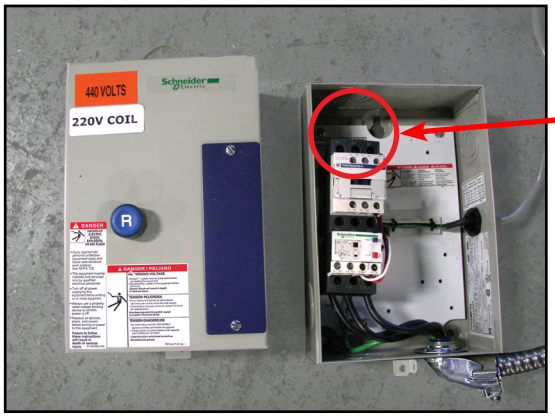
Fig. 2.5c

III. Vacuum Pump Installation

Pump/Blower Motor
Starter Box & Connector

NOTE:
The cover was removed from Motor Starter.

3 Phase Control Box



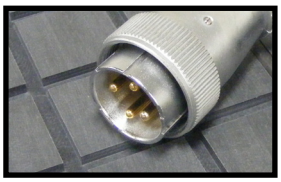
L1,L2,L3

You will need to have the electrician connect AC power (208-230V 3PH) as specified on the unit to the Motor Starter at L1, L2, L3 and Ground (PE).

The starter box will have a round silver connector attached to a black cable coming out of it.

This connector plugs into the socket on the side of the machine,

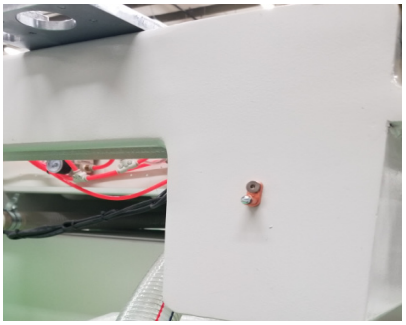
This cable provides the signal to the starter coil to turn on the vacuum.



Matching connector that will plug into the controller box (shown left)

WARNING: Direction of Pump Rotation is critical. Briefly start Pump and check rotation (arrow on casing). Exchange phases if rotation is incorrect. IF YOU RUN THE PUMP/BLOWER CONTINUOUSLY IN THE WRONG DIRECTION,
THE VANES WILL BE DAMAGED.

Make sure wire conduit is properly attached as shown in photos - any exposed wiring could be damaged and cause harm to the machine



Make sure to attach a ground wire from the ground lug on the back of the machine to a grounding rod.

To check vacuum pump rotation and test on and off, first ensure power is connected to both the vacuum pump starter box as well as the controller cabinet.

Once power is connected, turn the machine on by turning the main power disconnect switch to the vertical, “ON”, position.

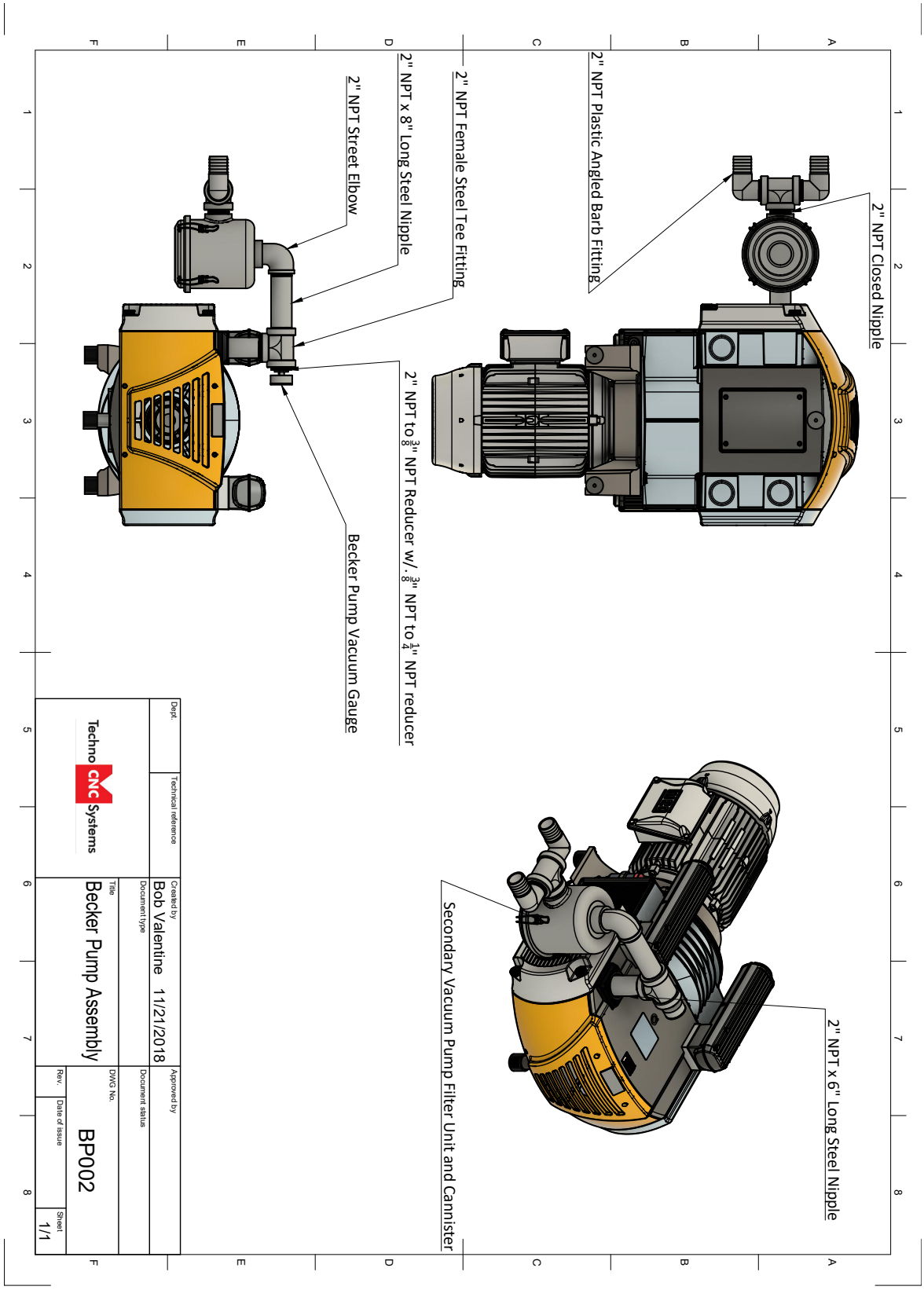
Power is now applied to the controller box. The red light on Power OFF will now light up indicating the machine is powered, but the controller and motors are not yet enabled.

Press the Vacuum Pump button to turn on the vacuum pump. The operator can usually tell by the sound of the pump whether its rotating in the correct direction due to the sound of the pump. If the pump sounds like it is clicking and not making a humming noise then it is most likely running in the wrong direction.

Flow of vacuum from the pump to the table is controlled by the gate valve button(s) on the front of the machine.

When the gate valve is pressed, the operator should be able to feel air being pulled through the ports on the table. Please remove black plugs before operation.

If the air blows out after pressing the “Gate Valve” button, this means that the pump is wired backwards. Please exchange any two power leads. (Swap L1 with L2)


2" NPT Closed Nipple
2" NPT Plastic Angled Barb Fitting
2" NPT Female Steel Tee Fitting
2" NPT x 8" Long Steel Nipple
2" NPT Street Elbow
2" NPT to 3/8" NPT Reducer w/ 3/8" NPT to 1/4" NPT reducer
Becker Pump Vacuum Gauge
Secondary Vacuum Pump Filter Unit and Cannister
2" NPT x 6" Long Steel Nipple
Dept.
Technical reference
Created by
Bob Valentine 11/21/2018
Document type
Approved by
Document status
Title
Becker Pump Assembly
DWG No.
BP002
Rev.
Date of issue
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IV. Enabling the Titan Series Machine

4.1 Control Panel Functions

Figure 4.1a shows the buttons and their functions.

IMPORTANT: DOORS MUST BE CLOSED FOR POWER TO ENABLE.

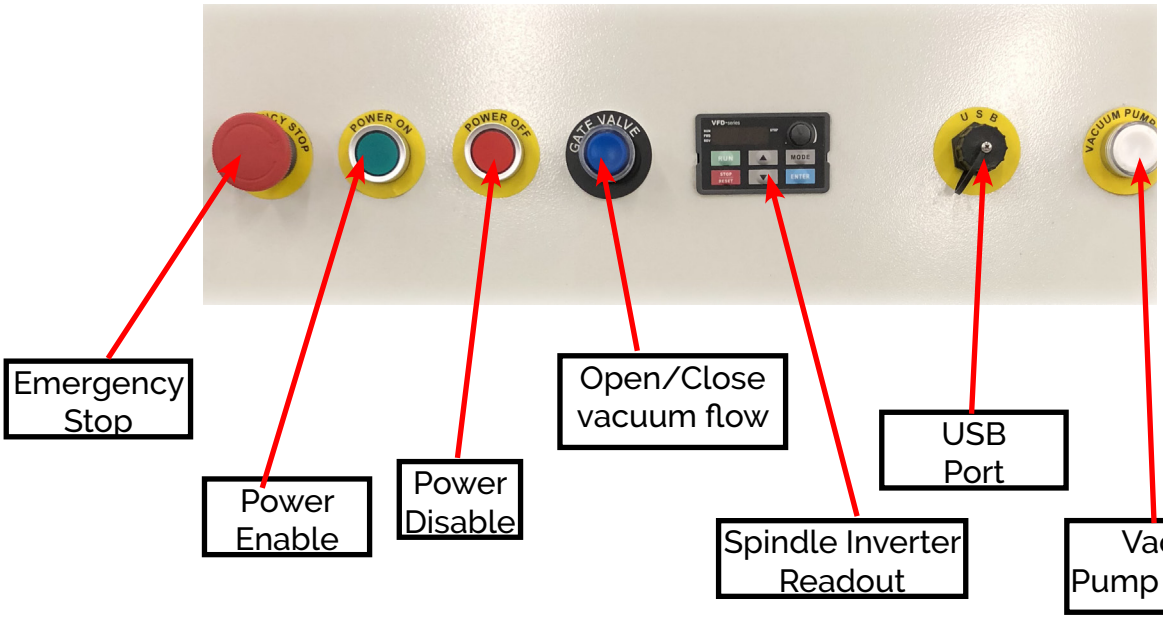


Fig. 4.1a

Once the main power switch has been engaged the controller is activated by pressing the green on switch on the front of the controller.

4.2 Powering On

Turn the machine on by turning the main power control switch to the upright position (Fig 4.2a)

Fig. 4.2a

(Note that the red POWER button will remain lit if the Emergency Stop is pressed during operation.)

Power is now applied to the controller box. The red light will now light up indicating the machine is powered, but nothing is enabled such as the controller and motors(Fig 4.2b)

Fig. 4.2b

Press the green button to apply power to the controller and enable the motors. (Fig 4.2c)

Fig. 4.2c

4.3 Titan Startup

When the machine first powers on, the display on the controller will light up and say "Starting System". (Fig. 4.1a)

Once the system has booted it will ask the user "Back to reference point?" Fig 4.2b

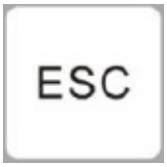
Fig. 4.1a

Fig. 4.2b

This is also known as 'homing' the machine. It refers to the process of the machine finding its mechanical home position.

From this point, the user has two options;
Home the machine or cancel the homing process. We recommend that you home the machine every time you start up.

Pressing "OK" will initiate the homing process. The machine will first move the Z-axis to the top of travel and then the X and Y axis will move simultaneously until both are at the home / reference position at the front left corner of the machine bed.



Press "ESC" will skip the homing process.
WARNING: There will be no reference position and break points, offsets and all functions that rely on a reference position will be invalid.

NOTE: The homing procedure can be aborted at anytime by pressing ESC.

Once the machine has moved to the its home position on each axis, it will stop and enter an IDLE state and will be ready to use.

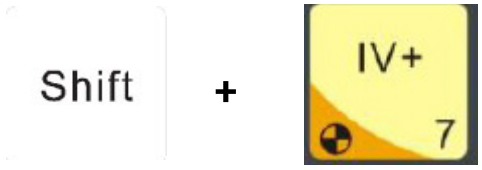
You should test all machine functions before beginning to cut. The functions are displayed in the next section.

ADVANCED HOMING:

If you hit "ESC" by accident, or would like to reindicate the axes, there are two ways to "Home" again.

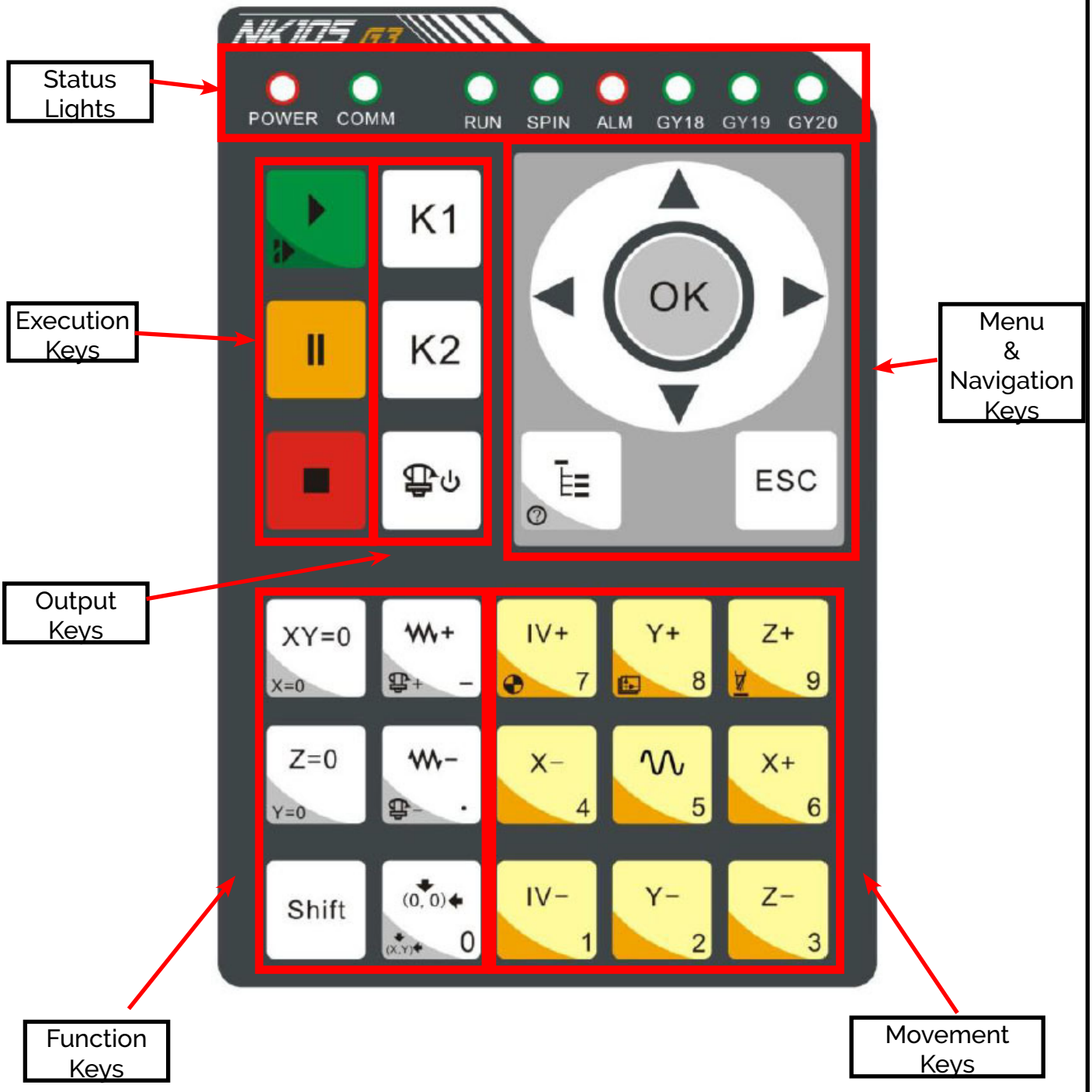
1) Press Menu > 3. Operations > 1. Back REF Point > 1. All Home

2) Shortcut

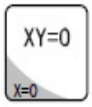
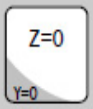


5. NK105G3 Controller

Handheld Controller Layout
The layout of the NK105G3 handheld controller.



Single Keystroke Functions on the Handheld Pendant

Key icon	Key name	Function
	Spindle On / Off	Manually Turn Spindle On / Off
	Menu	Opens Controller Menu
	Escape	Escape or Back
	XY=0	Set XY Origin
	Z=0	Set Z Origin
	Shift	Shift / Secondary Function Key
	Override +	Increase Feedrate Override
	Override -	Decrease Feedrate Override
	Origin	Send to Origin
	K1	Manually Clamp / Unclamp Tool
	K2	Dust Shroud Up / Down
	OK	OK; Enter Manual Parameters Screen Change High / Low Speed and XYZ Step Increment

Movement Keys

All the movement type keys are colored yellow. They will work in both Jog and Stepping modes.

Key icon	Key name	Function
	X-	X Axis Negative Movement; Input 4
	X+	X Axis Positive Movement; Input 6
	Y+	Y Axis Positive Movement; Input 8
	Y-	Y Axis Negative Movement; Input 2
	Z+	Z Axis Positive Movement; Input 9
	Z-	Z Axis Negative Movement; Input 3
	Speed switchover	Change Between High / Low Jog Speeds; Input 5
	Positive	4th Axis Postive Movement; Input 7
	Negative	4th Axis Negative Movement; Input 1

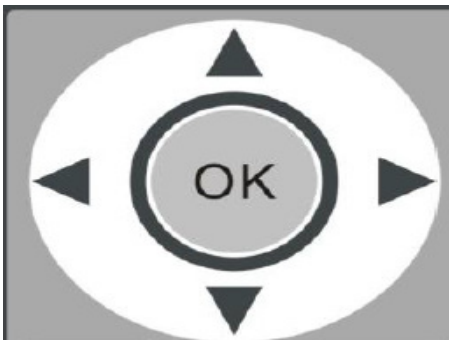
Shift Commands / Combination Keystrokes

To use the shift commands, you must press and hold the shift key and then select a second key.

Key icon	Function
Shift + ▶	Resume from Breakpoint
Shift + ☰	Show Tips / Help Screen
Shift + XY=0	Set X Origin
Shift + Z=0	Set Y Origin
Shift + W+	Increase Spindle Speed
Shift + W−	Decrease Spindle Speed
Shift + 0	Send to Clearance Position
Shift + IV+ 7	Send to Home Position
Shift + Y+ 8	Switch Between Absolute and Relative Coordinates When it reads X1 Y1 Z1, that is relative. When it reads X* Y* Z*, that means absolute.
Shift + Z+ 9	Set Z Origin Using Touchpad
Shift + ⏸	Jiggle in at Pause
Shift + X+ 6	Measure Tool Length
Shift + IV− 1	Manually Clamp / Unclamp Tool

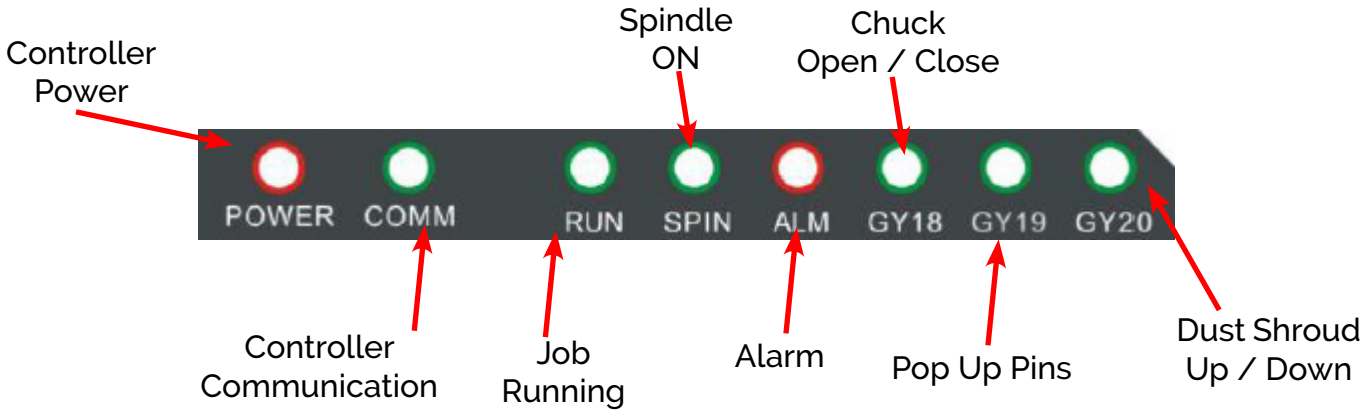
Execution Keys and Menu Navigation

Key icon	Key name	Function
	Start	Start key
	Pause	Pause during machining
	Stop	Stop machining



Use the arrows to navigate menus, move cursors and in conjunction with other keys to perform specific functions.

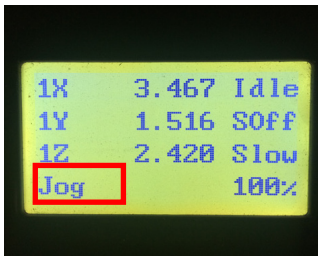
Status Lights and Indicators



6. Operating Tutorials

6.1 - Switching Movement to Step or Jog.

There are two modes that allow the user to control the movement of the machine: Jog and Step. To switch between these modes press the “Shift” button. The mode will be displayed on the bottom left of the screen.



Jog- Also known as continuous mode. When a directional arrow is pressed, the machine will move in that direction until the button is released.

Stepping- Also known as step mode. When a directional arrow is pressed, the machine will move an exact amount, as dictated by the manual parameters page. To move again, you must release the button and press it again.

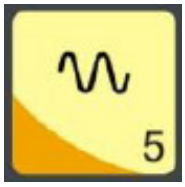
6.2 - Jogging the machine and changing from High/Low Jog Speed.

To Jog the machine, hold down one of the Yellow directional keys on the keypad while in Jog mode. The keypad has X+,X-,Y+,Y-,Z+,Z- printed on the keys to indicate direction.

The machine has two speeds, High and Low.
When the machine starts it will be in the Low speed.

To toggle between low and high speed press the Jog Speed Select Button. You can only toggle speed when in Jog Mode.
The LCD will display High or Low on the right of the screen.

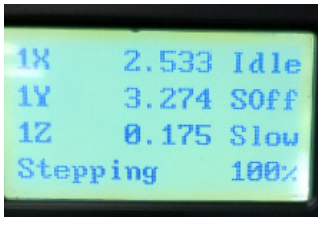
Press ‘OK’ to change high and low speeds, see section 3.3.



Select between high and low Jog speeds

6.3 - Stepping the machine.

To move the machine in increments, press down one of the Yellow directional keys on the keypad while in Stepping mode. The keypad has X+,X-,Y+,Y-,Z+,Z- printed on the keys to indicate direction.



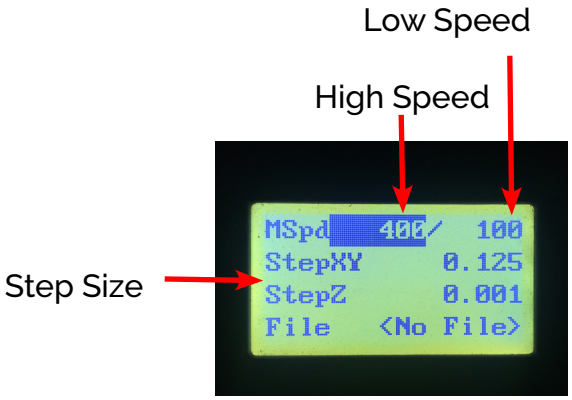
This will move the machine in predetermined increments in the axis selected.
By default, the X and Y axes will move in .005 inches and the Z axis will move in .001 inches.

Press ‘OK’ to change step size, see section 3.4

6.4 - Modifying the Jog Speed and Step Size

The machine can be jogged at two speeds, low and high. You can also change the increments in which the machine will move in Step mode. These speeds are set in the Manual Parameters page.

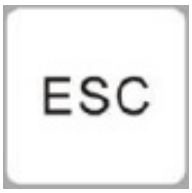
To access the Manual Parameters page press OK from the Main Screen



To move the cursor, use the Up and Down directional arrows.
Enter a new value.
Press OK to accept that value.

Set the High and Low speed to a suitable value.
Adjust the Step value as needed.

To Exit out of this screen and return to the main menu press ESC.



Warning: Adjust the step size carefully. If you set the step size to an excessive value, the machine will move by that value and could damage the machine.

When inputting a decimal increment, you must enter the value as 0.###
Zero+decimal+(your increment)

6.5 - Feedrate Override

While running a G-Code file, the user can manually override the feedrate or cutting speed of the program. The range of the override goes from 10% to 120% of the original feedrate.

The user can override the feedrate using the following keys:

Increase Feedrate

OR

Decrease Feedrate

6.6 - Adjusting the XYZ Zero position/WCS/User Origin

XYZ zero position, Working Coordinate System (WCS), and User Origin are all the same thing.

Different CAM systems and users just name the concept differently. For convenience, XYZ zero position will be used in the rest of this manual.

XYZ zero position is the location point on a drawing in a CAD/CAM package where X,Y and Z all equal zero.

Generally, XY zero is on the bottom left corner and Z zero is the top of the part. In fig 3.3a the letters are located away from the XY zero, all points representing positive integers.

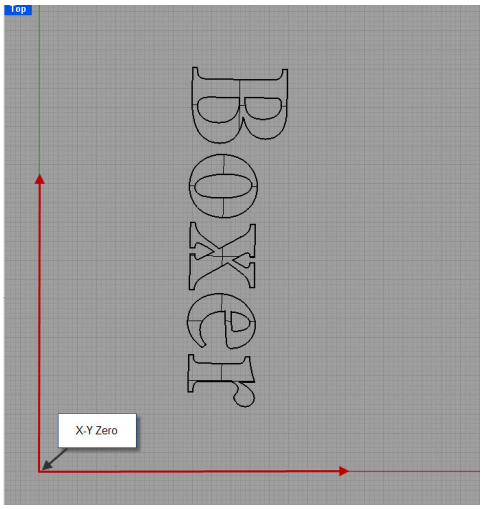


Fig. 3.3a

In Fig 3.3b the object represents the material the letters will be cut from. The machine should be jogged to the corner of the material by using the directional arrows on the keypad.
Once the machine is in location press to set XY zero. The coordinates on the controller will change to 0,0.XY zero is now set.

The Titan origin can also be set on individual axes. For example, the operator can set just X=0 or just Y=0 through the use of the "shift" key and the associated button, shown below.

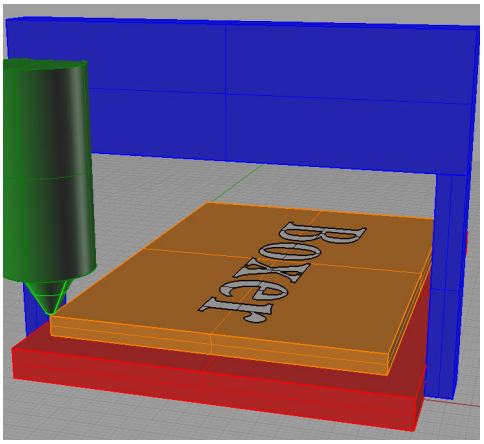
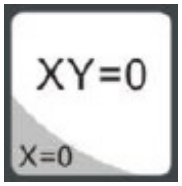


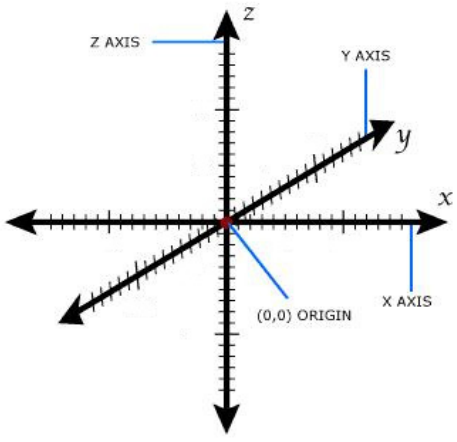
Fig.3.3b

Zero X Axis



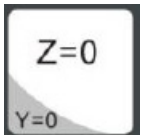
Zero both X and Y Axes

Zero Y Axis



There are two methods for setting the Z-axis zero position:

1. Manual Method: Use the Z-axis directional arrows on the keypad to move the router to the top of the material. Switch to Step Mode to slowly move the machine into position. When the router bit is in position press shift/aux and the Z=0 button as shown.

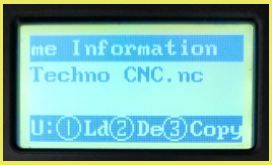


Zero Z-axis

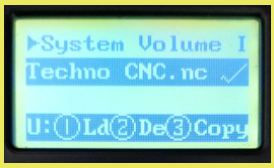
2. Tool Calibration Block: Place the touch off block on top of the material and under the cutter. Press shift/aux and 9 simultaneously. The spindle will slowly move down until it touches the touchpad. The Z axis will now be set to the top of the material.

Activate Z-Touch off procedure.

The Z coordinate will now read 'Z 0.000'



Loading G-Code file: Before pressing OK (notice that there is no checkmark)



Loading G-Code file: Notice the check mark next to the file I want to work with. The check mark appears after pressing OK. Finally, press 1 to load file, 2 to delete the file, or 3 to copy it.

6.7 - Loading a G-code File

Press the Menu button.

Select "2.USB files" to access the flash drive.
Only a G-code file with an "nc" extension with show.

Scroll through the files with the arrows keys

Select file by pressing OK.

Then load the file by pressing 1.

Note:
Files can be copied from this USB to the controller using the "2" button
Local disk space is limited!

Once a file is copied locally, it can also be selected from the jog speed /step size screen

6.8 - Running a G-code file

Once the XYZ origin has been set as per section 6.6 and the file has been loaded as per section 6.7 the operator is now ready to run the G-code file.

To run the G-code file simply press the start button

Once the spindle has reached speed the machine will move into position to start the first cut.

The file can be paused while running by pressing

To resume the file press

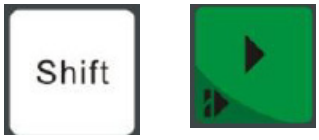
To abort the file at any time press .

Note:
When the machine pauses, the spindle will stop and the Z axis will move to the Z clearance/ Safe height to allow inspection of the part.

If the machine is jogged off the part during a pause, it will lose its position and when the file is resumed it will start from the new position.

The last file can be resumed at a breakpoint by pressing.

+



7. Advanced Tutorials

7.1 - Alternating between Override and Programmed Feedrates

The controller can run G-code files with speed set by the user on the keypad, override speed, or with speed set in the CAM package/G-code file, programmed speeds.

To determine what speed protocol will be used, do the following:

In the main screen, press menu to enter the menu screen .

Use the arrow key to scroll the cursor and highlight 4. oper param

Press OK to select.

Use the arrow keys to scroll the cursor and highlight 8. ignore F code

Press OK to select.

9. ignore S code

Note: F stands for Feed rates, and S stands for Spindle RPMS.

"No" means speed in the G-code file will be obeyed.

"Yes" means speed will be overrode by the controller.

7.2 - Setting the Override Speed for a G-Code file

From the main screen, press Menu to access the Menu screen.

4. Oper Params

Use the arrow keys to move the cursor and highlight

Press OK to select this option and enter the Operations Parameters screen

Use the arrow keys to move between each option and press enter to select the option.

Press OK to edit the data and use the number keys to enter data.

1. G00 Speed

Press OK to save data and Cancel to exit out of the screen.

Keep pressing cancel until you return to the main screen. 2. GXX Speed

G00 Speed is the rapid speed, or the speed the machine moves when the cutter is above the material.

GXX Speed is the speed the machine moves when the cutter is in the material. This speed will vary with cutter size, material, cutter type, etc.

7.3 - Manually Changing Tools

The Titan Series CNC Router is equipped with an HSD automatic Tool Changer spindle. This spindle allows the operator to save time by allowing the machine to change tools during a job, however, the operator may need to change tools manually.

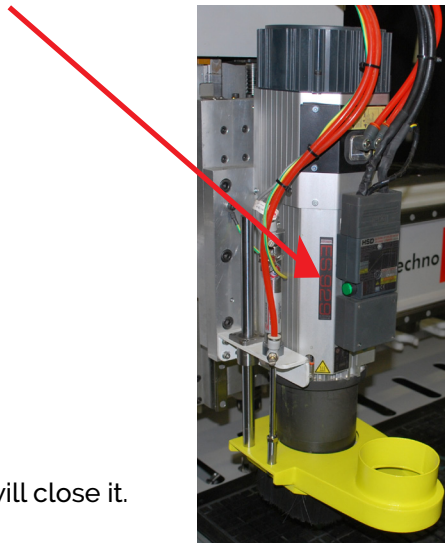
To manually change tools, the operator can either remove and insert a new tool directly into the spindle or instruct the machine to pickup a tool from the linear tool rack.

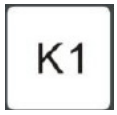
7.3.1 - Removing and Inserting tools into the Spindle

There are a few ways to open and close the chuck of the spindle, allowing the operator to quickly and easily change tools.

The easiest way to do this would be the press and release the green override button on the front of the spindle.

While one hand holds the tool currently in the spindle, press and hold the green button with the other hand. The chuck will remain open for however long the green button is pressed for.





You may also open and close the chuck using the K1 key.

When using the K1 key, you will be prompted

“Are you sure you want to clamp / unclamp the tool?”.

Pressing “OK” will immediately open the chuck. Pressing K1 again will close it.

In addition, you may also press “Shift” + “1”, and like pressing the green button, the chuck will open unprompted.

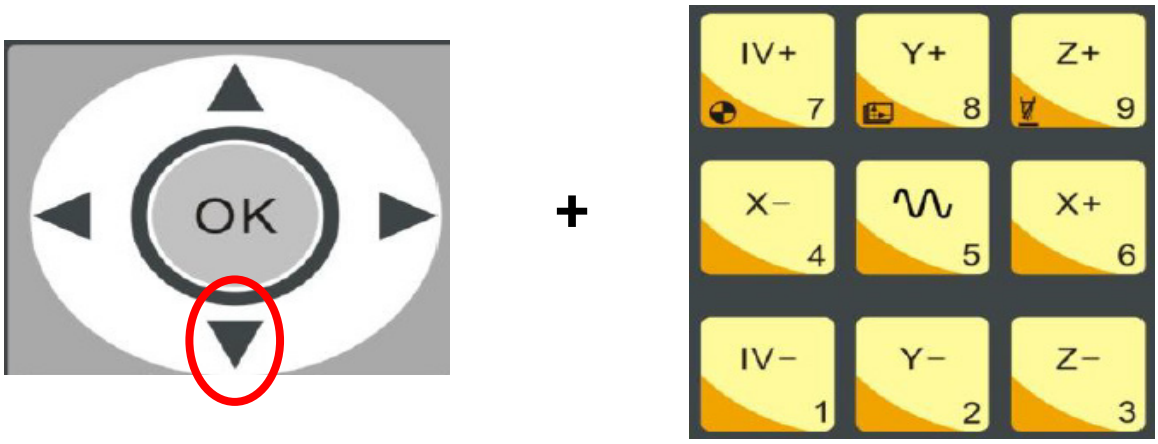
You may use any combination of these buttons to open and close the chuck.

7.3.2 - Using The Automatic Tool Changer Function

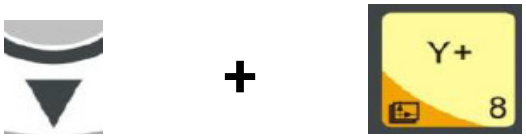
Besides manually removing and inserting a tool into the spindle of the machine, you may tell the machine to drop off and pick up new tools in the linear rack.

To perform an automatic tool change, first ensure that the tool clip for the tool currently in the spindle is empty and that there is a tool in the position you would like to change.

Once these checks have been completed, you may now change tools.



To change to a selected tool (1 - 8), Press and hold the “Down Arrow” key while simultaneously pressing the key associated with the tool you would like to change to.



For example, you have tool number 1 in the spindle and you want to change to tool number 8.

1) Check to make sure tool clip 1 is empty. Tool clip 1 is the furthest to the left of the linear rack.

2) Check to make sure tool clip 8 has a tool in it. Tool clip 8 is the furthest to the right of the linear rack.

3) Press and hold the “Down Arrow” Key

4) While holding the “Down Arrow” Key, press and release the “8” button.

5) The machine will now home, put tool number 1 away and then pick up tool number 8.

7.3.3 - Tool Change Parameters and Settings

The Titan Series CNC Router is shipped and set up with all tool change parameters pre-set. The operator may choose to change some of these settings.

To find these settings, press "Menu" and then navigate to "4. Oper Params" and then "15. Tool Change"

Parameter	Settings Range	Function
ATC Capacity	1 - 20 **(8)**	Number of Tools in the Toolchange Rack
CurrentToolNo.	1 - ATC Capacity	Tool Number of the Currently Loaded Tool in Spindle
Tool Offset	X / Y / Z Stroke Limits	Tool Offset in Each Axis
ToolChangeTip	Yes: Prompt **No: No Prompt**	Whether to Prompt for Tool Change During G-Code Execution
Cali Coor	Varies based on touch pad	Absolute Coordinates of Fixed Touch Pad
Cut Up Pos	Varies	Absolute Coordinates of Tool Change Upper Position
Change Speed	Varies **(400)**	Speed of Tool Change Operation in in/min
Pre-TC Pos	**X = 0** **Y = 6** **Z = 0**	Absolute Coordinates of Pre Tool Change Position
Tool Position	Varies	Absolute Coordinates of Tool Stand Locations
Calibrate Tool	Yes: Measure **No: No Measure**	Whether to Measure Tool Length After Every Tool Change
Back Pre_Pos	Yes: Return **No: No Return**	Whether to Return to Previous Position After Tool Change
Change Delay	0 - 600000 ms **(500)**	Delay time for Tool Change in milliseconds

7.4 - Setting Tool Lengths

To properly utilize the automatic toolchanger function of the Titan Series CNC router, the operater must measure and store the lengths of all the tools that the machine will be using. This process is easy and automated, with a few options depending on the operator's needs.

Once the tool that needs to be measured is currently in the spindle (see section 4.3 for changing tools), the operator can choose the measure the tool's length.

To bring up the tool length offset menu, press and hold "Shift" and then press the "6" key.

This will bring up the "Measure Tool Length" Menu. This menu has three options;

1) Manual set:

Used for irregularly shaped or oversized tools such a spoilboard cutter

Measure tool length of the tool in the spindle based off current position. To use the feature, manually lower the tool's lowest point to the white surface directlty in front of the fixed touch pad and then select "Manual Measurement". The tools length will be recorded. This is often used for tools with offset cutting surfaces (surfacing bit).

2) Single Measure

Automatically measure the length of the tool in the spindle using fixed touch pad. The controller will prompt "Successfully measured tool length" when completed.

3) All Measure (not recommended)

Automatically changes to and measures the length of all tools using fixed touch pad.

Highlight the option you would like to use and press the "OK" key. The machine will perform the selected operation.

TOOL LENGTHS MUST BE LEARNED BEFORE RUNNING A PROGRAM.
TOOL LENGTHS WILL BE SAVED AFTER SHUT-DOWN.

7.4.1 - Tool Length Measuring Settings

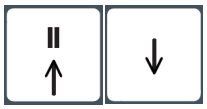
To change the height that the spindle retracts after a tool change,

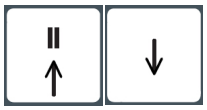
Press "Menu", Go to "4. Oper Params", Select "17. Calib Height"

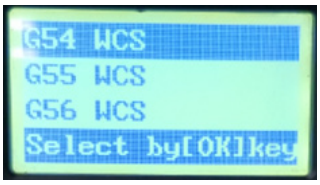
7.5 How to Use all 6 Work Coordinates

This controller allows a user to have up to 6 work coordinates saved at a time. They are labeled as G54, G55, G56, G57, G58, and G59. The controller should be automatically set for G54 (work coordinate system 1) because next to X, Y and Z on the main screen should be a number 1. In order for the controller to use another coordinate system like G55 (work coordinate system 2), there needs to be another number next to X, Y, and Z, and in this case that would be number 2. In order to change between each coordinate system go to the Main Menu, 3.Operations, and finally 6.Select WCS.

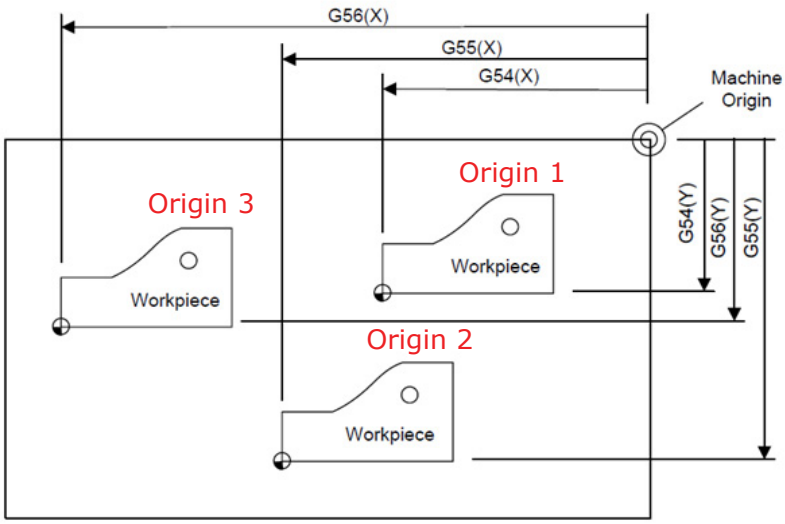
From the main screen, press Menu to access the Menu screen.

Use the up and down  to move the cursor and highlight 3. Operations

Use the up and down  to move the cursor and highlight 6. Select WCS



Scroll through each of the WCS and press OK to the work coordinate system that needs to be used.

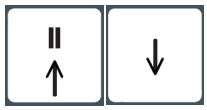


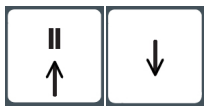
Labeled here is the multiple work coordinate origins that can be saved for certain parts or fixtures. G54 represents Origin 1, G55 represents Origin 2, and G56 represents origin 3, etc

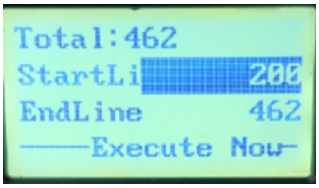
7.6 How to Use the Select Line Number Function

A file that is currently loaded to the machine may be ran using only certain line numbers of the G-Code if the operator chooses to do so. If the operator accidentally presses STOP, they can use this function to run from the last ran G-code line number (For ex: N100). This can be done by using the select line number function on the controller.
First, go to the Main Menu, then go to the 3.Operations, then go to 3.Select Line No., and then type in the corresponding line numbers you would like to start and stop at.

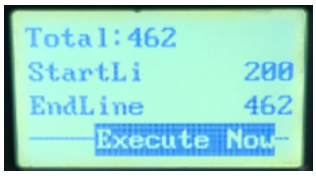
From the main screen, press Menu to access the Menu screen.

Use the up and down  to move the cursor and highlight 3. Operations

Use the up and down  to move the cursor and highlight 3. Select Line No.



Go to the Start Line and End Line and enter in where you would like to start and end the file. The End Line will automatically be set as the last line in the G-Code unless you decide to change it. Scroll down to Execute Now and press OK for the file to run from the Start Line to the End Line.



If we take a look at this G-code, we can see that we will be starting from Line 200 and ending the G-code file at 463

USING THE 4TH AXIS ON THE TECHNO TITAN MACHINES:

Note: The 4th axis on the Techno Titan machine is not a true 4th axis. You can only use this to do "wrapping" tool paths. This means that the file is designed as a regular, flat, 3-axis file, which is scaled so that the width matches the circumference of round stock. Then, instead of cutting flat, the rotary is substituted for the X-axis and the cut follows the circumference of the stock, as if it is being "wrapped" around it.

To change from normal 3-axis operation to rotary operation, you must change some settings in the controller:

1. Press the menu button on the keypad. Go to and press OK to select "5. MFR Param". The password is 33587550.

5. MFR Param

2. Go to and press OK to select "3. Pulse Equiv". Make note of the X-axis value, it should be 0.0075.

3. Pulse equiv

3. Calculate the new pulse equivalent value based on the diameter of the cylindrical stock being used through the following equation:

Rotary Pulse Equivalent = (25.4 * π * D) / 39,700

Where D is the diameter of the rotary stock in inches.

4. Enter the calculated value for Rotary Pulse Equivalent in the location for X under Pulse Equiv. To input a decimal number, please press 0 (zero) first, then the button for the decimal point and then the numbers.

5. Exit the menu and restart the machine. The new settings will now be applied.

6. Now jog to your starting point and set your X and Y origin. This position should be above the rotary part. Note: The X-axis will most likely move at a different speed than normal and the coordinates will not look right.

7. Flip the switch in the front of the machine into Rotary mode.

8. Run your part

To revert back to normal 3-axis operation, follow the first two steps and then put the original value, 0.0075, into the X-axis pulse equivalent variable, then reboot the machine to apply the changes.

8. Maintenance Information

The Techno Titan CNC Router will provide years of productive service if it is maintained properly. Based on a 40-hour work week, there are daily, weekly, monthly, quarterly, and yearly maintenance steps required for proper upkeep.

Daily
- Wipe down rails and clean out racks
- Blow or vacuum any chips off the machine

Weekly
- Complete all daily tasks
- Clean the machine thoroughly and remove any excess grease and grime
- Blow out any build-up in the rails or racks
- Lubrication of the XYZ axes linear bearings
- Lubrication of the Z axis ball screw

Monthly
- Complete all weekly tasks
- Clean all racks (XY) and screws (Z) with a scrub brush and degreaser
- Clean all vacuum pump filters both inline and onboard.
- Dispose of all dust in any dust collection units

Quarterly
- Complete all monthly tasks
- Grease any racks using lithium grease (XY)
- Check rack and pinions for wear
- Check bolts and screws, tighten if needed
- Check the machine for squareness and reindicate if necessary

Bi-Annually
- Complete all quarterly tasks
- Turn off power and vacuum out any debris in the controller cabinet
- Clean the filter elements inside the controller cabinet

8.1 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. Fig 8.1

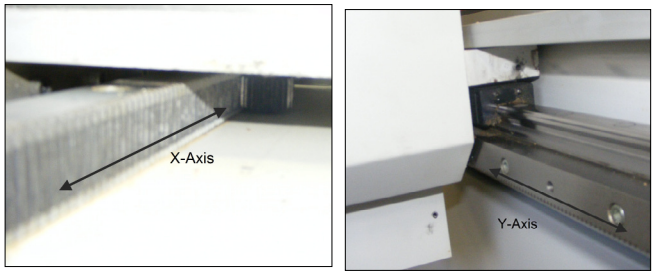
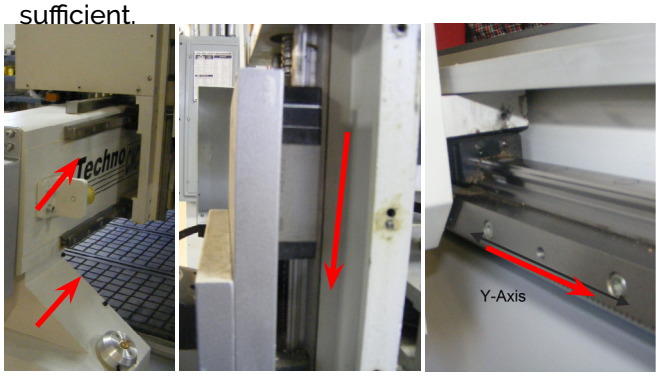


Fig 8.1

8.2 Lubricating the X-Y-Z Rails

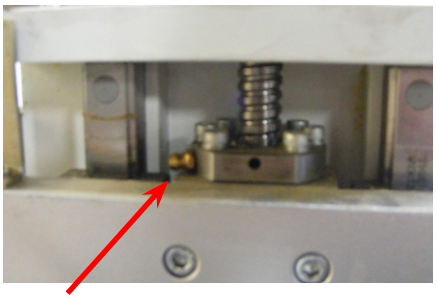
The rail carriage bearings are sealed and protected with wipers. The rails should be lightly oiled to allow smooth operation. Avoid a build up of debris on the rails by blowing them off with air, or wiping them down with a rag. The rails do not need to be lubricated as often as the rack, once a month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



X-Axis Z-Axis Y-Axis Fig 8.2

8.3 Lubricating the Z Ballscrew

The Z axis uses a ballscrew and ballnut instead of a Rack and Pinion. The ballnut has a nipple for applying lubrication to the mechanism. Fig 5.3a



Lubrication Point. Fig 8.3a

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

Fig 8.3b

8.4 Recommended Lubricants

Lithium Based Grease:
Alvania Grease No. 2(Shell)
or Equivalent.
Techno Part No.
H90Z00-8670T8
Oil:
Vactra No. 2s(mobile)
Tonner Oil or Equivalent.
Techno Part No.
H90200-LUBE002

Oil and Grease Kit:
Techno Part No.
H90Z00-LUBEKIT2

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

9. Parameter and Settings

Note: All settings with "" on screen requires reboot to take effect.*

1. LOCAL FILES
2. USB FILES
3. OPERATIONS
    1. Back to REF Point
        1. All Home
        2. Z Home
        3. X Home
        4. Y Home
    2. Rect Machining
        1. Params Setting
            1. EngrDpth
            2. EachDpth
            3. ToolDia
            4. NoseGap
            5. Height
            6. Width
            7. X Init
            8. Y Init
            9. Mode
                1. Horiz Mill
                2. Long Mill
            10. LOAD NOW
        2. Load the Last
    3. Select Line No
        Total: ____
        StartLine: ____
        EndLine:_____
        EXECUTE NOW
    4. Machining Info
        Time
        X: _____
        Y: _____
        Z: _____
    5. Park MCS Site
        1. Park Mode
            1. Not Move
            2. To Park Site
            3. To WCS Origin
        2. Park Site
            1. Input Site
                Input Park Site
                X: _____
                Y: _____
                Z: _____
            2. Select Site
                Select Current Position As

Park Pos by [OK] Key
Return by [ESC] Key

6. Select WCS
    1. G54 WCS
    2. G55 WCS
    3. G56 WCS
    4. G57 WCS
    5. G58 WCS
    6. G59 WCS
7. Array Process
    1. File
    2. Rows
    3. Columns
    4. RowSpace
8. Origin List
    1. X 0.000 Y0.000 Z0.000 *(settings repeat through 8)*
9. Nearby Process

4. Oper Param
    1. G00 Speed 800.00 in/min
    2. GXX Speed 400.00 in/min
    3. Back REF First YES
    4. Lifts on Pause* 0.25 inch
    5. Offset
        1. Public Offset
            1. X
            2. Y
            3. Z
        2. Work Offset
            1. G54 Offset
                1. X
                2. Y
                3. Z *(settings repeat through G59)*
    6. Cycle Process
        1. Cycle Process
        2. Cycle Times
        3. Cycle Interval
        4. S-Off in Intev
    7. G73-G83 Retract 0.0 inch
    8. Ignore F Code NO
    9. Ignore S Code NO
    10. Spindle Stop
        1. S off at Pause* YES
        2. S off at Stop* YES
        3. S off at End YES
    11. Ratio on Manu* YES
    12. DXF Params
        1. Lifting Height*
        2. Process Depth*

3. 1st Point as 0*
4. Shape Process*
5. Bottom Process*
6. Metric Size*

13. ENG Params
    1. Lifting Height*
    2. Tool Change Tip*
    3. Cycle Times*
    4. Deep Hole Mode*
    5. Retract Amount*
    6. Select Tool No*
14. Plt Params
    1. Lifting Height*
    2. Plt Unit*
    3. Tool step*
    4. Process Depth
15. Tool Change

1. ATC Capacity*	8
2. Current Tool No	(varies by tool in chuck)
3. Tool Offset	(varies by tool)
4. ToolChangeTip	NO
5. Cal Coor	(XY varies, Z=-1)
6. Cut Up Pos	-0.039
7. Change Speed	400.000 inch/min
8. Pre-TC pos	X0, Y6, Z0
9. Tool Position	(varies by tool)
10. CalibrateTool	NO
11. Back Pre_Pos	NO
12. Change Delay	500.000 ms

16. ProcessEndTip — NO
17. Cali. Height After Tool Length — 0.500 inch
18. Eng Unit — Yes
19. User Param
    1. user param 1 — 0 mm

5. MFR Param — PASSWORD: 33587550
    1. Velocity

1. Decel Dist	0.394 inch
2. Approach Speed	25.00 in/min
3. Single Axis Acc	25.00 in/sec^2
4. Dry Run Acc.	20 in/s^2
5. Max Turn Acc	40.00 in/sec^2
6. Jerk	5900.00 in/sec^3
7. Max Speed	
1. X	900.000 in/min
2. Y	900.000 in/min
3. Z	150.000 in/min
8. Short Seg Spd Lmt	YES
9. SPDLMT Length	0.1 inch

10. Z Down Option 0
11. Z Plunge Cut Spd 12.000 in/min
12. REF Circle Radius 5.0 inch
13. REF Circle Speed 120.00 in/min
14. Jump Speed 0.0 in/min
15. LookAheadDis 0.0 in

2. Axis Output Dir *
   - X: (Varies by model)
   - Y:
   - Z:
3. Pulse Equiv *
   - X: (Varies by model)
   - Y:
   - Z:
4. Machine Stroke
   1. Strk Upper Lmt
      - X: (Varies by model)
      - Y: (Varies by model)
      - Z: 0
   2. Strk Lower Lmt
      - X: 0
      - Y: 0
      - Z: (Varies by model)
5. Change Stroke
   1. Strk Upper Lmt
      - X: (Varies by model)
      - Y: (Varies by model)
      - Z: 0
   2. Strk Lower Lmt
      - X: 0
      - Y: 0
      - Z: (Varies by model)
6. Ref Point Set
   1. RefP Speed
      - X: 80 in/min
      - Y: 80 in/min
      - Z: 60 in/min
   2. RefPDir
      - X: Negative
      - Y: Negative
      - Z: Positive
   3. Retract Dist
      1. X Retract Dist 0.079 inch
      2. Y Retract Dist 0.079 inch
      3. Z Retract Dist 0.079 inch
7. Spindle Set
   1. Spindle Gears* 7
   2. On/Off Delay 5000 ms

	3. Initial Gear*	6	
	4. Max Spdl Speed*	24000	
8.	Y Rotary Axis		
	1. Y as Rotary Axis*	NO	
	2. Rotary Y Pulse		
	3. MM as Unit		
	4. Rev Work Radius		
	5. Rotary Takeoff		
	6. Rotary Y Acc		
	7. Max Rotary Vel		
9.	Backlash Set		
	1. Screw Error Compensation	NO	
	2. Compensation on	NO	
	3. Axis Backlash *		
	X: 0.0		
	Y: 0.0		
	Z: 0.0		
10.	Calib Thickness	1.860 inch	*(varies)*
11.	Algorithm	1	
12.	Arc Increment	YES	
13.	Arc Tolerance	0.079 inch	
14.	Forward Look Seg	50	
15.	Sign of BK REF	YES	
16.	Safety Height*	1.000 inch	
17.	Lube		
	1. Enable Auto Lube	NO	
	2. Time Interval	5000s	
	3. Duration	5s	
18.	G00 Feed 100%*	YES	
19.	Smoothing Time	0.0 s	
20.	Corner Option	0	
21.	Corner Tolerance	0.004 inch	
22.	Control Cycle	No	
23.	Soft Time Limit	0.500 s	
24.	User Param		
	1. user param 2	Yes	
6.	Param Upkeep		
	1. Backup Params		
	2. Restore Params		
	3. Factory Params		
	4. Export Params		
	5. Import Params		
	6. Import ErrData		
7.	System Upkeep		
	1. Language		
	1. Chinese		
	2. English		
	2. Export Log		

3. System Update
4. Register
5. Help
6. Reboot
7. Exit
8. Delete Log
9. Disk Space
10. Delete Info
11. Modify Code

8. Diagnosis
    1. System Info
        1. Software Version
        2. Card No
        3. Remaining Time
        4. Register Times
    2. Port List

1.	GX01	X-Origin	N
2.	GX02	Green Button Release	N
3.	GX03	X-Limit NEG	P
4.	GX04	Y-Origin	N
5.	GX05	Air Pressure	N
6.	GX06	Y-Limit NEG	N
7.	GX07	Z-Origin	N
8.	GX08	Z-Limit POS	P
9.	GX09	Shroud Position Sensor	N
10.	GX10	Chuck Open/Close Sensor	P
11.	GX11	Tool Present Sensor	N
12.	GX12	N/A	N
13.	GX13	N/A	N
14.	GX14	Floating Touch Pad	N
15.	GX15	Touch Pad E-STOP	N
16.	GX16	Fixed Touch Pad	P
17.	ALAM	N/A	N
18.	GY13	N/A	N
19.	GY14	SPINDLE+	N
20.	GY15	Speed Select 2	N
21.	GY16	Speed Select 1	N
22.	GY17	Speed Select 0	N
23.	GY18	Chuck Solenoid Output	N
24.	GY19	Pop up Pins Solenoid Output	N
25.	GY20	Shroud Solenoid Output	N

    3. Keypress Diag
    4. Import Diag
    5. Outport Diag
    6. LED Diag

Notes On the G-code File

If a part requires multiple tools, it is best to output a different file for each part.

If the G-code file references a tool number higher than T10, then the controller will give an error at the start of the file. M6 T1 to M6 T10 are allowed.

In general it is best to remove T commands by telling the CAM package that the machine is not a tool changer machine, or insuring that the Tool number does not exceed 10.

G92 is the Axis presetting command, when this command is encountered in the G-code file the XYZ zero position is set at the position the machine is in at that time.

In general it is best to remove this from the G-code file, or if it is in the G-code file, make sure the machine is at the origin before you press start.

The controller will recognise G54 to G59 offset commands.

Acceleration Set

Under the menu MFR Params, there is a sub menu called Velocity.

This menu controls the acceleration and cutting motion of the machine.

The Defaults for these parameters are:

Jerk	310
Single Axis Acc	25
Max Turn Acc	100

A low Max Turn Acc will result in arcs that move in a jerky motion or at a slow speed.

TLF 2.250-2.500
Internal Filter Inspection

-Tools required-

Flashlight

ATTENTION

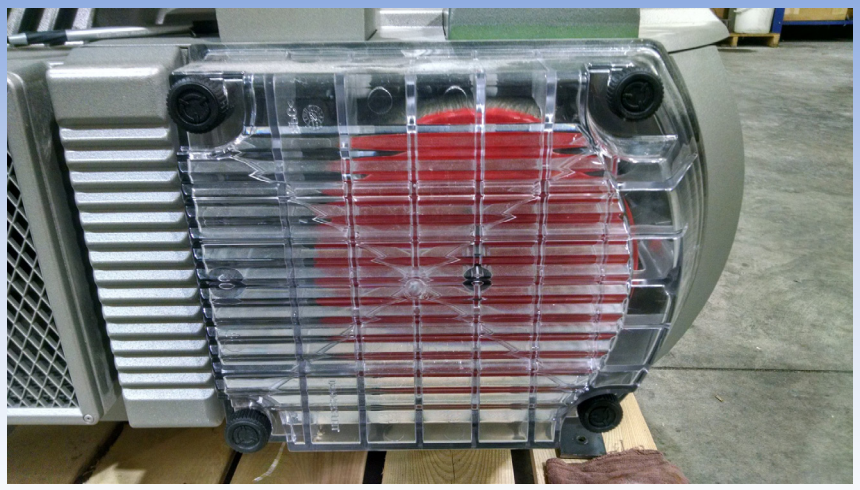
VISUAL CLUES REGARDING VTLF 2.250 FILTER MAINTENANCE SHOULD NOT ALWAYS BE THE SOLE INDICATOR OF WHETHER A FILTER IS "CLEAN".

THOUGH THE FILTER HAS TREMENDOUS SURFACE AREA, THE DEEP PLEATING OF THE FILTER MAY DISGUISE WHETHER THE FILTER IS CLOGGED.

A PERIODIC PHYSICAL INSPECTION SHOULD BE PERFORMED TO MAKE SURE THERE IS A GOOD FLOW OF AIR THROUGH THE FILTER.

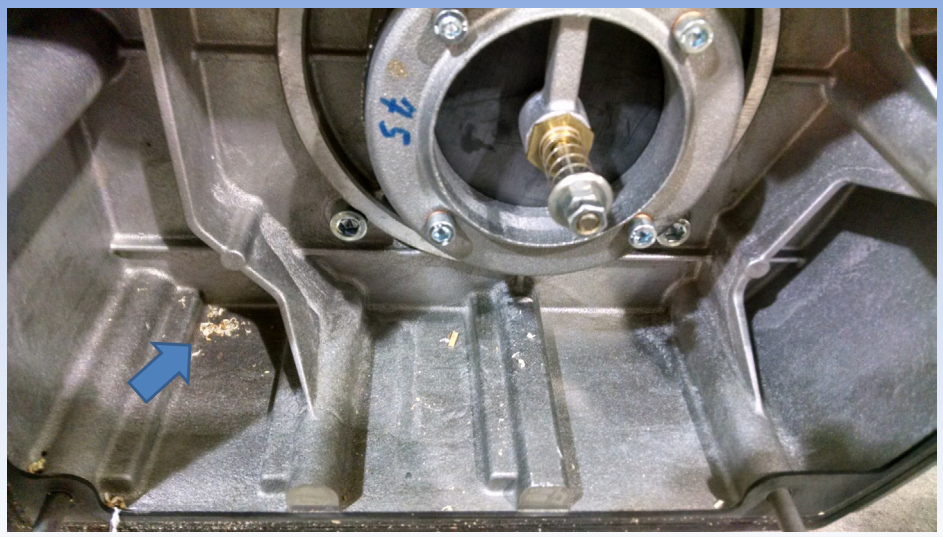
A CLOGGED FILTER IS ALMOST ALWAYS THE CAUSE OF PRE-MATURE VANE WEAR OR IN SOME CASES, PUMP FAILURE

-Remove the (4) black knobs by hand-



-Remove the internal filter and look for debris-

-Check for large debris deposits. This is an indicator that the filter caught the smaller particles-



-Use a flashlight on the outside of the filter-

If light **cannot** be seen on the inside, the filter is clogged and needs replaced.

-If you **can** see light, then blow out the filter using compressed air and replace-

- This needs to be a modest amount of light.
- Light should be present through each pleat.

Greasing TLF 2.200-2.360

-Tools required-
X1 – 7433050000
(50 gram grease gun)

BECKER

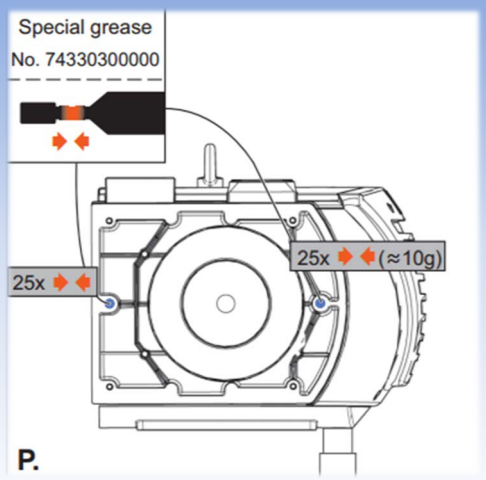
Author: Mike Ruff
Becker Pumps Corp.

Greasing instructions

The greasing instructions can be found on step "P." in the operation manual sent with each pump.

Or they can be found at www.Beckerpumps.com

Bearings are to be grease every 3000 – 4000 hours

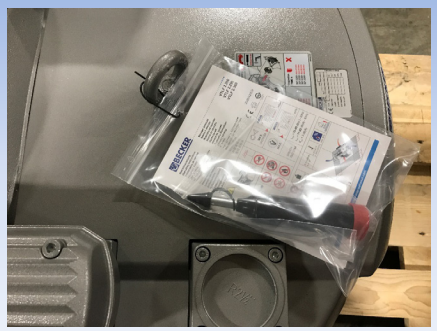


BECKER

Author: Mike Ruff
Becker Pumps Corp.

All new units come with new grease guns.

(Found in either of the two places below)



BECKER

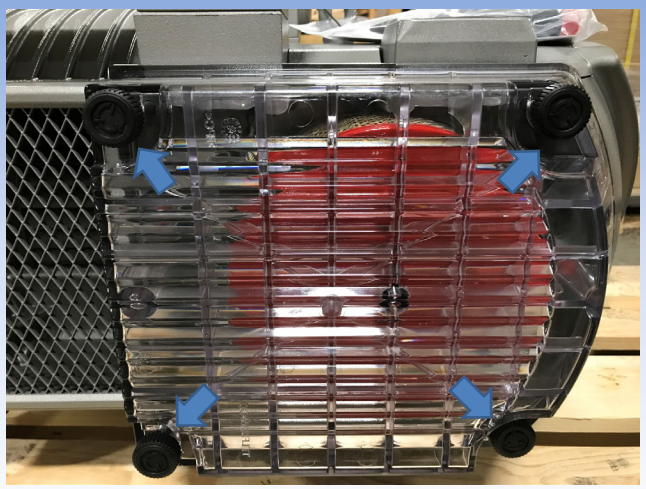
Author: Mike Ruff
Becker Pumps Corp.

GREASING PROCEDURE

BECKER

Author: Mike Ruff
Becker Pumps Corp.

Remove the filter cover by loosening the black hand knobs.



BECKER

Author: Mike Ruff
Becker Pumps Corp.

Remove the internal filter and replace if needed.

Grease fittings are found next to the filter.
(Remove the red caps.)

BECKER

Author: Mike Ruff
Becker Pumps Corp.

Remove the black cap from the grease gun

BECKER

Author: Mike Ruff
Becker Pumps Corp.

Prime all new grease guns by placing them at an angle against a hard surface.

Pump a few times until the grease is visible at the tip.

BECKER

Author: Mike Ruff
Becker Pumps Corp.

Place the grease gun against the push fitting

Pump 10x into each bearing

(New or dry bearings = 25 times per bearing)

BECKER

Author: Mike Ruff
Becker Pumps Corp.

Once the pump is ran, the grease will evenly distribute between the rollers and ball bearings.

BECKER

Author: Mike Ruff
Becker Pumps Corp.

IX. Titan Troubleshooting

Problem	Solution
Hand held controller display is blank with no power	Ensure the machine has power and is turned on. Ensure that the 24V power supply has its green LED indicating it is on. Make sure the NK105 controller has power. Make sure the handheld conroller is plugged in. Make sure the Emergency stop switches are not pushed in Make sure the wire harness from enclosure is plugged in.
Machine will not jog or move	If the handheld controller say “ESTOP” in the top right hand corner, the machine has moved beyond its limit. Shut down and manually push the machine off its limit switches Ensure the feedrate override is not set to 0%
Machine crashes during homing process	To confirm the limit switches are working properly, place a metal screw driver over any of the (3) axis limit switches, and the LED light on the switch itself should turn on and off. When the machine is moving, ensure its metallic striker plate is passing close enough to the switch for it to trip.
Axis motor has loud bang or grinding sound	Motor has stalled, lower speed, re-home
Spindle will not turn on	Ensure enclosure is closed Ensure VFD display does not display error, if so, full power restart
Touchpad is no working, spindle crashes down	Ensure touchpad works by touching pad to ground on machine and showing GX16 input tripping Wire may be broken Spindle may have worn bearings Tool may not be suitable for touchpad

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:

* 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. 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).

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.
* Use of non-standard parts or accessories without prior written approval from Techno.
* Use of Product or part for purposes for which the item was not designed or intended.

Warranty Limitations

Techno's maximum liability hereunder is limited to the original purchase price of the Product or Part.

Techno assumes no responsibility for the selection of any Product or Part for a specific application absent Techno's written approval of such application, and makes no general representations whatsoever in respect to any such selection.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED. ALL OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHETHER EXPRESSED, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING, ARE HEREBY DISCLAIMED. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE OF THISE WARRANTY DOCUMENT.

TECHNO SHALL NOT BE LIABLE FOR INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL, PUNITIVE OR OTHER SIMILAR DAMAGES THAT MAY ARISE, INCLUDING LOST PROFITS, DAMAGE TO PROPERTY OR INJURIES TO A PERSON, LOSS OF USE, INCONVENIENCE, OR LIABILITY ARISING FROM THE INSTALLATION, SERVICE OR USE OF THE PRODUCT OR PART.

UPON THE EXPIRATION OF THE LIMITED WARRANTY PERIOD, TECHNO'S LIABILITY UNDER THIS WARRANTY SHALL TERMINATE.

Some states do not allow the contractual exclusion or limitation of incidental or consequential damages or personal injury, so the limitations set forth herein may not apply to all customers in all locations.

How To Obtain Warranty Repair/Replacement

All defective items covered under the Limited Warranty must be properly returned to Techno for inspection. Techno reserves the right to not accept returns unless the returned item is accompanied by proof of original purchase, a return authorization number ("RAN") from Techno, and shipped in accordance with packaging and

shipping instructions given to the customer by Techno. Claims and requests for a RAN must be made within seven (7) days of discovery of a defect. Proper packaging and insurance for transportation is solely the customer's responsibility. All returned items must be sent to the Techno facility located in Ronkonkoma, New York (or such other place as Techno specifically designates to the customer) with a statement of the problem and transportation prepaid. If, upon examination, Techno determines that a warranted defect exists, the returned item will be repaired or replaced in Techno's sole discretion at no charge, and shipped prepaid back to the customer. Return shipment will be by common carrier of Techno's choosing. If rapid delivery is requested by customer, then such transport expense shall be borne by the customer.

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 6316487481

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.

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.