

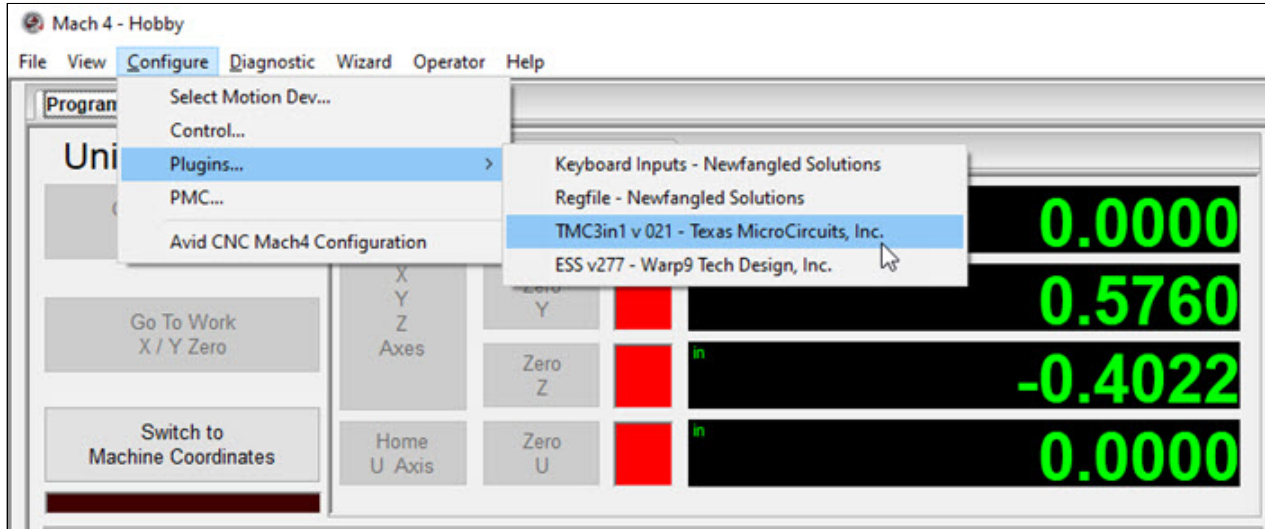


# TMC3in1 Plugin Configuration Guide

*v2021Q4.1*

# Configuring the TMC3in1 Plugin

There are additional TMC3in1 settings that can be accessed in the TMC3in1 plugin configuration menu shown below. Settings that will be used routinely in the operation of your PRO CNC Plasma system can be accessed directly in the Mach4 screen. These are detailed in the Mach4 Plasma Users Guide.

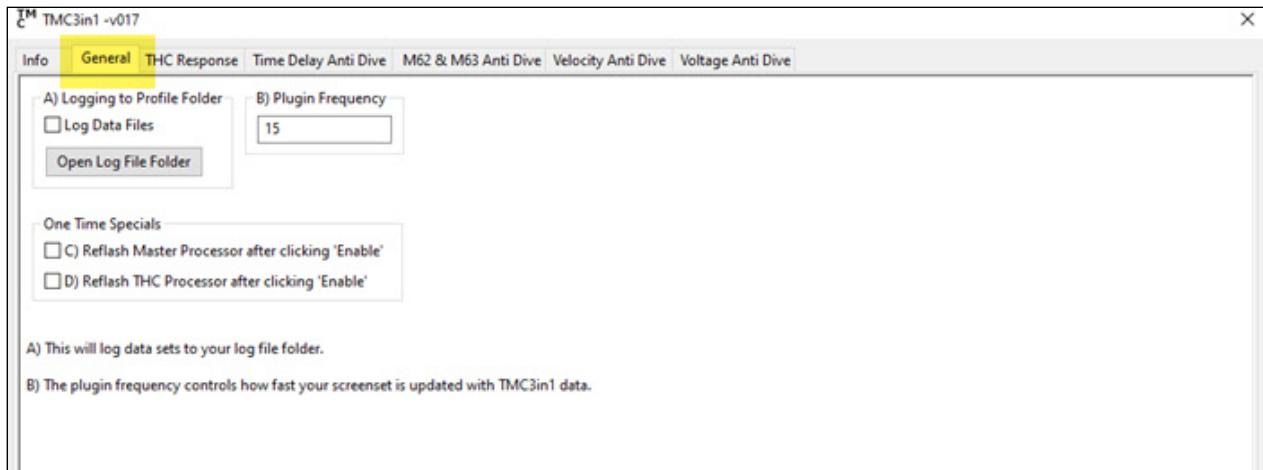


To access the TMC3in1 Plugin configuration navigate to TMC3in1 in the Plugins menu under the Configure pull down menu. **Any settings changes made from the TMC3in1 Plugin menu will be saved as defaults.**

## Info

Mach4 must be disabled to access the TMC3in1 Plugin Configuration menu.

# General



- **(A) Logging to Profile Folder** - This checkbox is the same as the toggle on the mainscreen diagnostics tab. The button will open the default logging file location (C:\Mach4Hobby\W9\_HC).
- **(B) Plugin Frequency** - This setting should not be changed without consulting Avid CNC support or Warp9 Tech Design support.
- **One Time Specials** - These settings should not be used without consulting Avid CNC support or Warp9 Tech Design support.

# THC Response

A) Tip Voltage Divider Ratio: 50:1

B) Tip Voltage Source: Negative Tip Volts, J7 Pin4 (+) NEG, J7 Pin3 (-) POS [Hyper Therm] REVERSED

C) Target (Dead) Band (Volts): 0.5

D) Linear Response Band (Volts): Above Target Voltage: 40, Below Target Voltage: 40

E) THC Offset (Volts): 0.001

A) Tip Voltage Divider Ratio: This is the divider ratio matching the one set in the plasma power supply.

B) Tip Voltage Source: The TMC3in1 has two tip voltage polarities. Choose "Positive Tip Volts" or "Negative Tip Volts" based upon your plasma system.

C) Target Band: This is the +/- voltage band that no THC action occurs within. This is also sometimes called a Dead Band, because of no new movement. DEFAULT = 1.0V

D) Linear Response Band: This is the +/- voltage band that proportionally reduces the Z axis commanded velocity response above and below the target voltage. Smaller values are faster and more aggressive (5V or 10V would be the smallest recommended) Larger values are slower, calmer and less likely to overshoot or oscillate. (50V on the larger side)

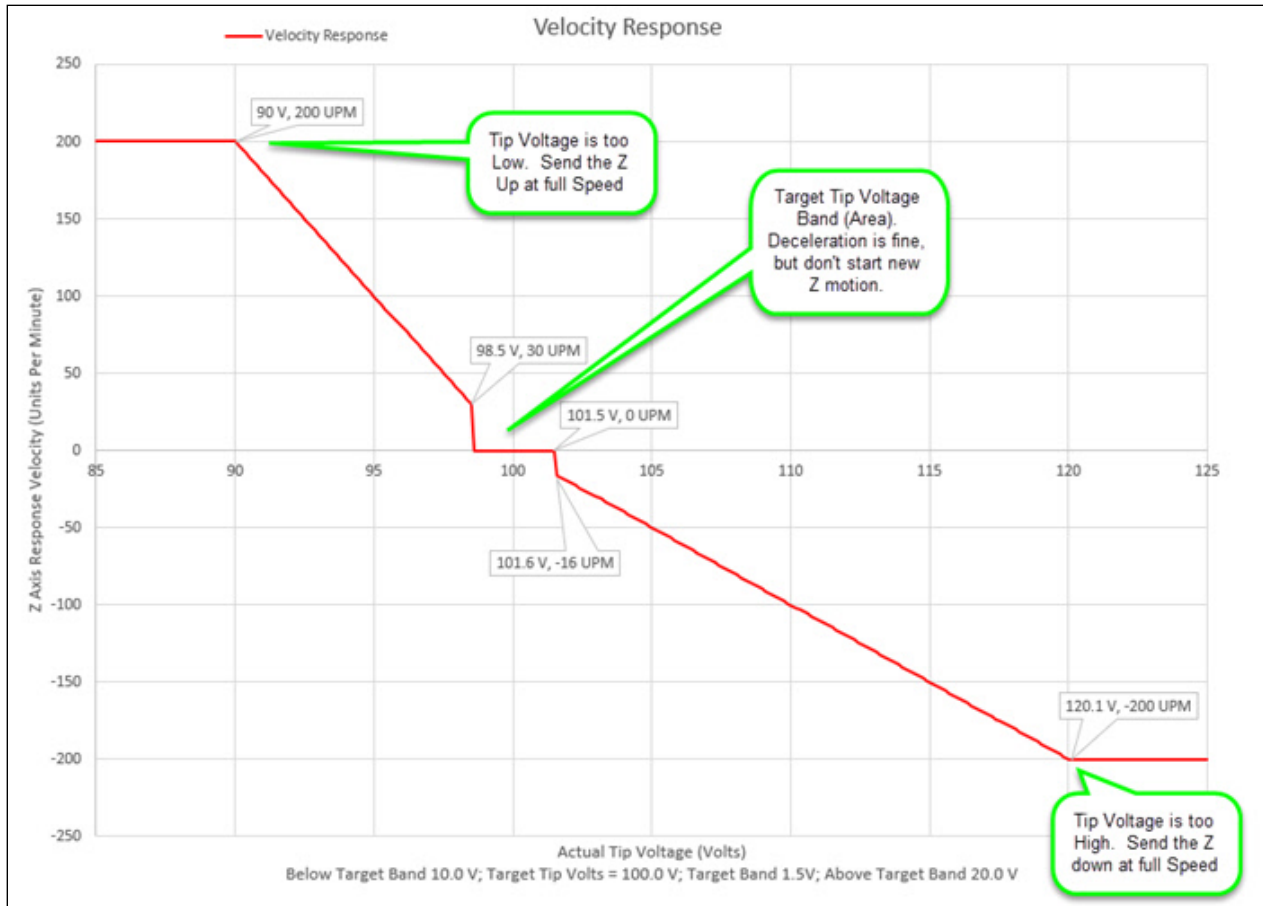
I usually make the ABOVE Target Voltage value a little LARGER, so it will try to approach the work piece a little slower and not crash if it were to overshoot. I usually make the BELOW Target Voltage value a little SMALLER, so it will try to get away from the work piece FASTER.

DEFAULT = 30V Above, 25 V Below

E) THC Offset: Used to "trim" THC tip volts to better match with cut height. This is normally not needed. DEFAULT = 0.001  
If the torch is off and the voltage displayed is significantly off from 0V you can use this voltage to have the screen display near 0V when the torch is off.

- **(A) Tip Voltage Divider Ratio** - This setting is based on the brand of plasma torch in use. Hypertherm torches always output a 50:1 divided arc voltage.
- **(B) Tip Voltage Source** - This setting is based on the brand of plasma torch in use. Hypertherm torches always output "Negative Tip Volts."
- **(C) Target Band** - This setting changes the "width" of the target voltage band. When the actual voltage is within this target band there will be no THC motion. (See next section).
- **(D) Linear Response Band** - This setting controls the +/- distance from the target tip volts which will produce a linearly proportional THC motion response. Above or below these set limits the THC motion will be commanded at maximum speed.
- **(D) THC Offset** - This setting is only useful in specific applications as a 'trim' adjustment and should not be used without consulting Avid CNC support or Warp9 Tech Design support.

# THC Velocity Response

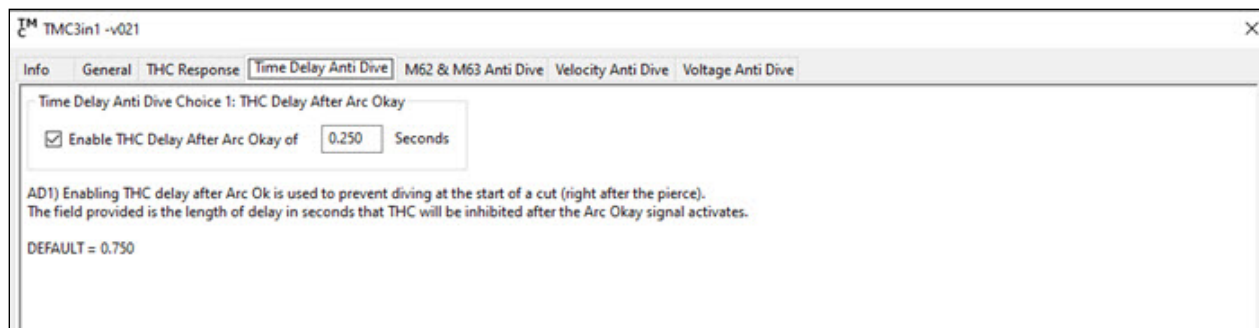


The above is a graphical representation of the THC motion (Z Axis Response Velocity - Y axis of graph) produced as a result of the incoming tip voltage signal from your plasma torch (Actual Tip Voltage - X Axis of graph). Reading the graph left to right, the data represents the following scenarios:

- **Z Axis Response Full Positive** - From 85 to 90 tip volts the actual voltage is below the target tip voltage by more than the negative linear response band setting. THC commanded Z-axis motion is positive at maximum velocity (in this example 200 units per minute).
- **Z Axis Response Linearly Positive** - From 90 to 98.5 tip volts the THC motion is commanded in the positive direction at a speed which is linearly proportional to the difference between the actual and target tip voltage.
- **Target Tip Voltage** - The target tip voltage is set to 100 volts in this example and the target tip voltage band is 3. From 98.5 to 101.5 (3 volt band) there is no commanded THC velocity as the actual voltage is within the target tip voltage band.
- **Z axis Response Linearly Negative** - From 101.5 to 120 tip volts the THC motion is commanded in the negative direction at a speed which is linearly proportional to the difference between the actual and target tip voltage.
- **Z Axis Response Full Negative** - From 120 to 125 tip volts the actual voltage is above the target tip voltage by more than the positive linear response band setting. THC commanded Z-axis motion is negative at maximum velocity (in this example 200 units per minute).

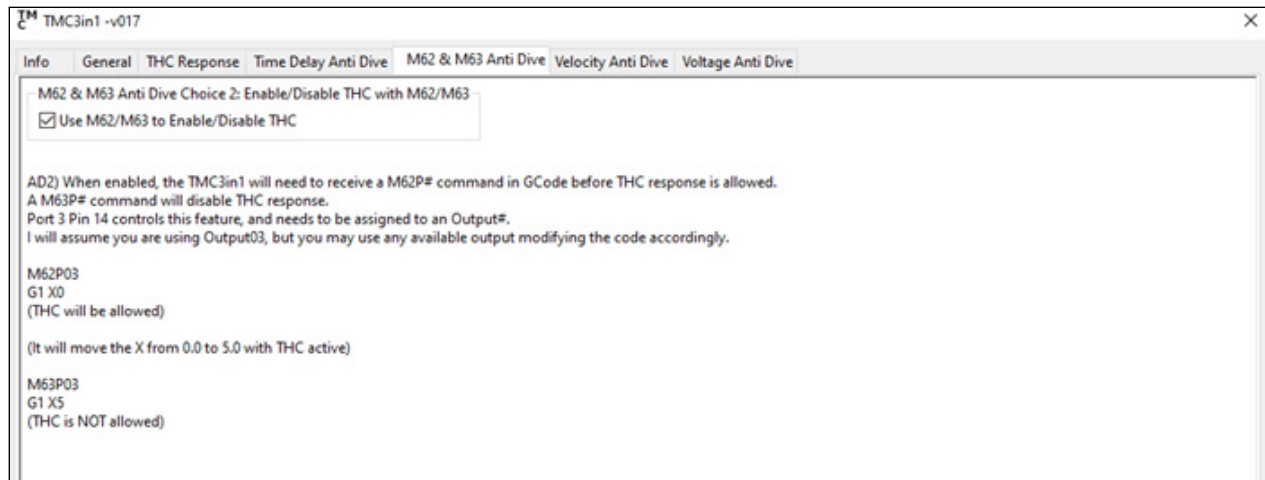


## Time Delay Anti Dive



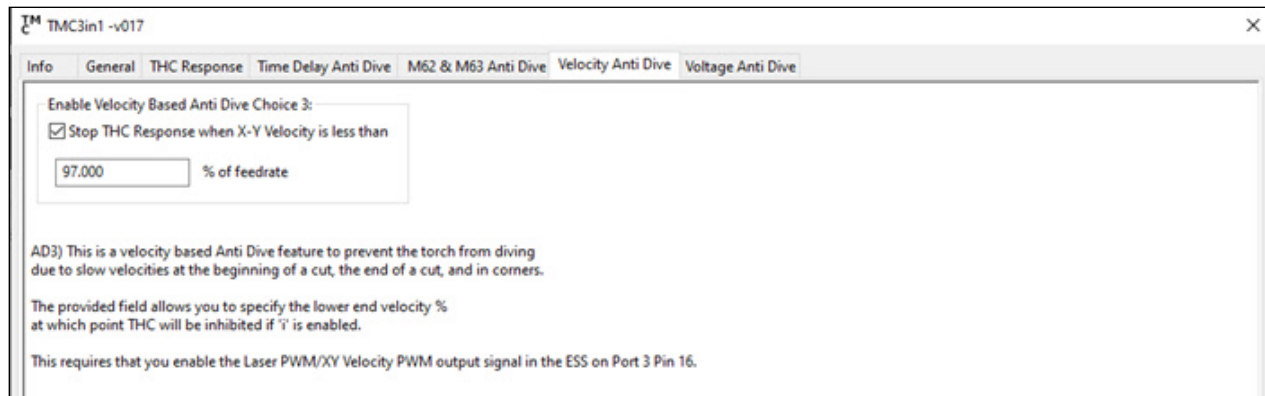
These anti-dive settings are the same as the THC main screen THC Anti-Dive tab. Changes made in the TMC3in1 plugin menu will be saved as default and overwrite defaults set by the THC main screen "Save as Default Anti-Dive Settings" button.

## M62 & M63 Anti Dive



When enabled, the TMC3in1 will need to receive M62P4 commands in your GCode before THC response will be allowed. M63P4 commands can then be used to disable THC response. This type of anti-dive should not be disabled without consulting Avid CNC support.

# Velocity Anti Dive



These anti-dive settings are the same as the main screen THC Anti-Dive tab. Changes made in the TMC3in1 plugin menu will be saved as default and overwrite defaults set by the THC main screen "Save as Default Anti-Dive Settings" button.



# Voltage Anti Dive

TMC3in1 --v021

Info General THC Response Time Delay Anti Dive M62 & M63 Anti Dive Velocity Anti Dive **Voltage Anti Dive**

Voltage Anti Dive Choices 4, 5 & 6:

A)  Enable These Anti Dive choices based on Averaged Tip Volts (ATV)

B)  ms of ATV (Averaged Tip Volt) buffer (800 ms max)

C) Precondition: Allow Voltage based Ant Dives once ATC is within  % of Target Tip Volts

AD Choice 4) Throttle THC response to  % of normal speed when AD5 or AD6 activates

AD Choice 5) Throttle THC if ATV is  % Above Current (Actual) Tip Volts

AD Choice 6) Throttle THC if ATV is  % Below Current (Actual) Tip Volts

A) Enable Voltage Based Anti Dive Choices 4, 5 and 6. When Enabled, Voltage based Anti Dive is disabled until precondition C) is met once, after the Arc Okay turns on at the beginning of each cut.

B) Averaged Tip Volts (ATV) Buffer size, 1 ms to 800 ms. DEFAULT = 800  
This ATV value is used for Anti Dive Choices 4, 5 and 6.  
A longer buffer reacts slower to changes in tip voltage.

C) When the torch is first lit, voltage based Anti Dive is not allowed.  
This is so the pierce can complete and THC can move to the target tip voltage.  
This precondition will wait until after the Arc Okay signal turns on and then watch the ATV (average tip volts) value until it comes with the desired percentage of Target Tip Volts, and at this point Voltage Based Anti Dive will be allowed for the rest of the cut. This precondition only needs to be satisfied once per cut. The expected range is between 3% and 20%. DEFAULT = 4%

AD4) If Anti Dive choices 5 or 6 activates, THC is throttled to this response rate percentage:  
100% will give normal THC speed response. (This effectively disables Voltage based Anti Dive.)  
50% means THC will be throttled to half speed.  
0% will disable THC response. DEFAULT = 0%  
This choice throttles the change in Z height, when the Actual Tip Voltage changes rapidly for a short period of time. This will prevent diving into pre-cut lines, but allow for responding to inclined or bent metal.

AD5) This prevents the torch from rising when the material warps up towards the torch or if surface contamination is present. If the ATV is this percentage (in volts) below the current tip volts, the THC response speed will be throttled. DEFAULT = 15%

AD6) This prevents diving when crossing a pre-cut line or if surface contamination is present. If the ATV is this percentage (in volts) above the current tip volts, the THC response speed will be throttled. DEFAULT = 3%

These anti-dive settings are the same as the main screen THC Anti-Dive tab. Changes made in the TMC3in1 plugin menu will be saved as default and overwrite defaults set by the THC main screen "Save as Default Anti-Dive Settings" button.