

PRICECNC™

CNC Plasma Torch Height Controller Operation Manual



Model: AVHC10

Revision: 1.3

SAFETY NOTICE

WHEN THIS DEVICE IS IN OPERATION, VOLTAGES HAZARDOUS TO HEALTH AND HUMAN LIFE ARE PRESENT INSIDE THE ISOLATION MODULE.

This device should only be connected by a qualified and authorized person. Improper connection can cause serious injury or death. Prior to installation and operation, carefully read the entire manual and be absolutely sure that you fully understand and are able to make the sole decision to determine if you are capable of a safe and proper installation. Remember that inside the Isolation Module, voltages hazardous to health and life may be present.

There must be no physical contact with any electrical connections while this device or any connected device is powered. Do not operate this product with wet hands, wet gloves, or any wet clothing. Before turning the unit on, secure the safety of others, and read and understand all instructions. If you have any questions or concerns, do not continue.

Warning: Provide adequate protection for all risks associated with plasma cutting. For more detailed information of the risk associated with plasma cutting, refer to your plasma cutter's owner manual.

This device must be earthed/grounded in accordance with this installation guide, earthing of non-electrified conductive parts (including device housings) is an essential part of electrical safety.

Touching non-insulated and non-grounded elements can be fatal. Provide a safe place for your device. After installation, securely protect against any physical contact between the terminals on the Isolation Module and any person(s).

It is strictly prohibited to perform any repairs or modifications to this product, performing either one of these actions could lead to serious injury or death to yourself and/or others.

Terms of Use: By proceeding with the installation and use of this product, you fully understand and agree that PRICECNC and their distributors are not liable for any incident or event resulting in direct loss, indirect loss, injury to self or others, damage to property, or loss or damage of any kind and that the end user assumes all risks. If you do not agree to these terms in their entirety, proceed no further, and return this product for a full refund.

If you have any questions or are unsure about anything stated in this manual, please contact a PRICECNC dealer or service centre for assistance.

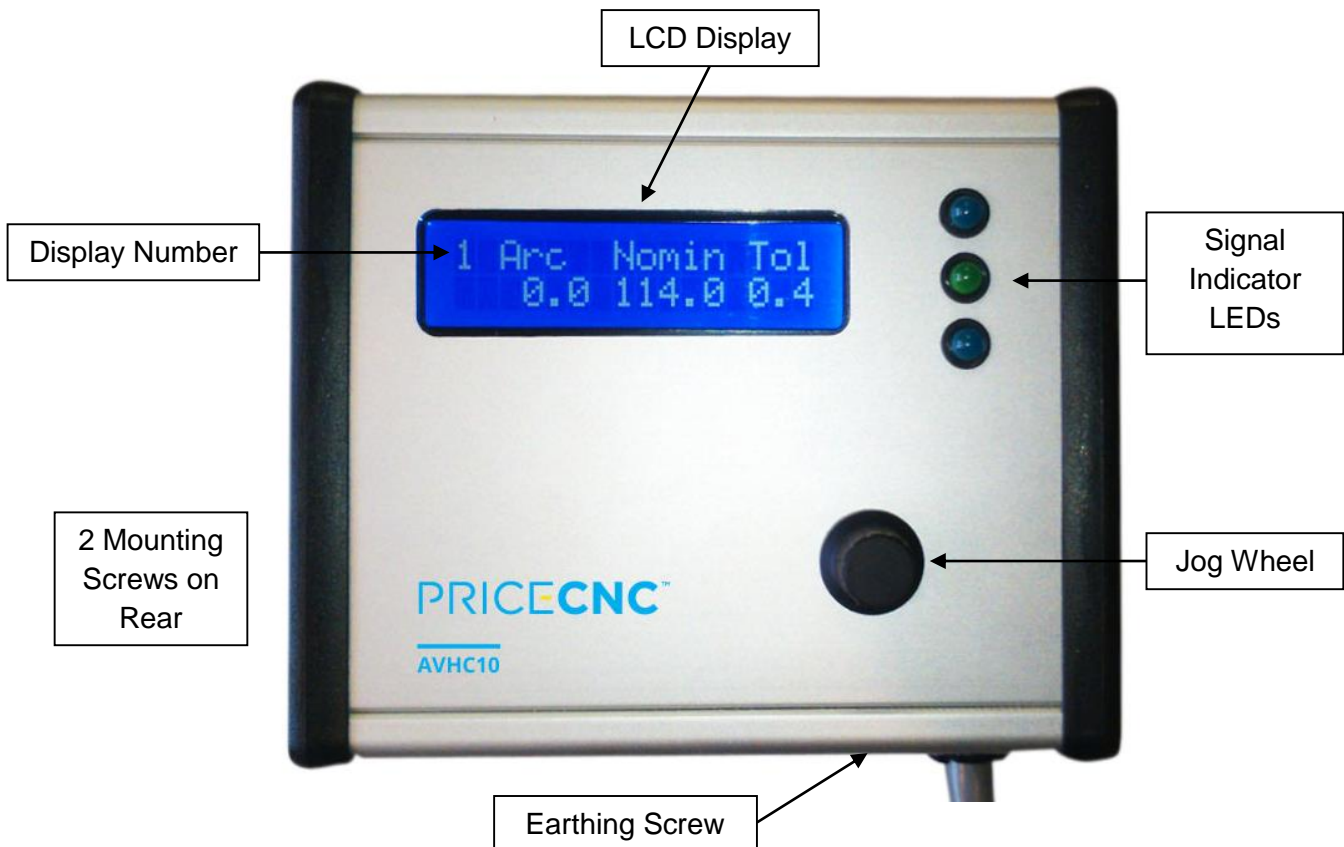
Introduction

When using a CNC Plasma cutting table, good cut quality can only be achieved by maintaining a consistent distance between the cutting torch and the material being cut. This can be difficult to achieve as heat from the cutting process can warp the material being cut or the material that is being cut may not be level or flat. To overcome these problems during cutting, the cutting torch needs to be raised and lowered to compensate for changes in the height of the sheet.

The PRICE**CNC** Arc Voltage Height Controller measures the voltage between the plasma torch and the material being cut, this is known as the 'Arc Voltage'. As the distance between the torch and the material changes during a cut, the voltage also changes. The greater the distance, the higher the voltage and the smaller the distance the lower the voltage. By measuring the changes in the Arc Voltage, the AVHC10 can continuously adjust the arc length for optimum cutting performance.

Different materials types and thicknesses require different height controller setting. For convenience, up to 30 different material or thickness settings can be saved on the AVCH10.

AVHC10 Operation



The AVHC10 is always ready to work when powered on, minimising the need to interact with the device. The way the AVHC10 operates can be set by the user by using the Jog Wheel to navigate through the simple menu structure.




The recommended sequence of events for Plasma Cutting using the AVHC10 is:

1. Prepare G-code that uses a floating Z axis to find a new Z axis zero at the start of each cut and also activates Anti-Dive on certain types of cut operations like tight radius cuts and corners.
2. Run the cut job.
3. The Torch moves over the first pierce point.
4. The Torch lowers until the floating Z axis switch is triggered by the torch touching the material to be cut. (G31).
5. The Z axis position is reset to *Zero minus the switch offset* (G92).






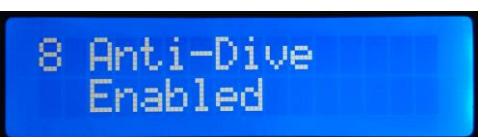
6. The Torch is raised to the pierce height and Plasma is turned on.
7. After the (G-code) pierce delay, the torch is lowered to the cut height.
8. The torch moves along the cut while the AVHC10 monitors the Arc Voltage and issues raise and lower commands to Mach 3 via the Breakout Board.
9. The torch comes to a tight radius bend during the cut which contains an M11P2 (Turn off THC) command which turns on the output signal that activates the AVHC10 Anti-Dive. Both the Up and Down LEDs on the AVHC10 turn on to signify Anti-Dive is operating.
10. The torch comes from the end of the tight radius bend to a straight section of the cut which contains an M10P2 (Turn on THC) command which turns off the output signal that activated the AVHC10 Anti-Dive. Both the Up and Down LEDs on the AVHC10 turn off and the AVHC10 resumes torch Height Control.
11. The torch moves along the cut while the AVHC10 monitors the Arc Voltage and issues raise and lower commands to Mach 3.
12. The cut finishes and Mach 3 turns off the torch.
13. The AVHC10 recognises the voltage is now outside the Arc OK range and stops issuing any commands.



If the Arc OK signal is utilised and the Plasma Arc fails during a cut for longer than the Arc Fail duration that is set on the AVHC10, the Arc OK LED will go out and the Arc OK signal to Mach 3 will change. This will make Mach 3 pause the job until the Arc OK signal resumes, which may happen if your plasma cutter automatically tries to re-fire an arc.

Display List

AVHC10 Display	Use	Operation
	Displays the measured Arc Voltage. Displays and edits the Nominal and Tolerance Voltages.	<ol style="list-style-type: none"> 1. Press Select (Nomin flashes) 2. Use Jog Wheel to edit Nominal Voltage 3. Press Select (Tol flashes) 4. Use Jog Wheel to edit Tolerance Voltage 5. Press Select
The Nominal Voltage is the Voltage the Plasma cutter operates at when cutting at the correct height. The Tolerance Voltage is amount that the Arc Voltage is permitted to differ from the Nominal Voltage before the AVHC10 will issue Raise or Lower Commands.		
	Displays and edits the Pierce Delay	<ol style="list-style-type: none"> 1. Press Select (Seconds Flashes) 2. Use Jog Wheel to edit the Pierce Delay 3. Press Select
The Pierce Setup is the delay that is used to give the Plasma Torch time to pierce and achieve a stable voltage, before the AVHC10 starts issuing Raise and Lower Torch Commands.		
	Displays and edits the Arc OK Range.	<ol style="list-style-type: none"> 1. Press Select (+ flashes) 2. Use Jog Wheel to edit Upper Range Voltage 3. Press Select (- flashes) 4. Use Jog Wheel to edit Lower Range Voltage 5. Press Select
The Arc OK Range is the Voltage above and below the Nominal Voltage that decides		

<p>if the measured Arc Voltage is acceptable. If the measured Arc Voltage is within this range, the Arc OK Signal will be issued and the AVHC10 will issue Raise and Lower commands as needed. Outside this range, no signals are sent.</p>	
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AVHC10 Display	Use	Operation
	Hides or Shows the Advanced Settings Displays	<ol style="list-style-type: none"> 1. Press Select to change Show to Hide 2. Press Select again to change back.
For normal operation, the Advanced displays are not usually necessary and can be hidden using this Display.		
	Displays and edits the Arc fail Duration	<ol style="list-style-type: none"> 1. Press Select (Seconds Flashes) 2. Use Jog Wheel to edit the Arc fail Duration 3. Press Select
The Arc Fail Duration is the length of time that the Measured Arc Voltage is permitted to be outside the Arc OK range before the Arc OK signal is stopped. This is to prevent short duration Arc Voltage spikes or dips from causing problems.		
	Tests the output signals	<ol style="list-style-type: none"> 1. Press Select (Screen Changes)
	Selects the Signal to Test	<ol style="list-style-type: none"> 2. (Up Flashes) 3. Use Jog Wheel to select other outputs 4. Press Select (Screen Changes Back)
This display is used to Test the Output signals of the AVHC10 and is useful for verifying that Mach 3 is receiving the signals. The Diagnostics Screen in Mach 3 displays all active inputs and the signals they represent. See section 3.1 for details.		
	Displays and edits the Period of measurement. (How quickly the unit responds to Measured Voltage Changes)	<ol style="list-style-type: none"> 1. Press Select (Seconds Flashes) 2. Use Jog Wheel to edit the Measure Period Duration 3. Press Select
The Measure Period selects how long the AVHC10 output signals take to react to changes in the Measured Voltage. This is used to tune the AVHC10 response time to best suit your system. (0.1 recommended for beginners, but this value should be raised and lower to find the response time that best suits your equipment.)		
	Enables or Disables the response of the AVHC10 to an Anti-Dive command	<ol style="list-style-type: none"> 1. Press Select to change Enable to Disable 2. Press Select again to change back.
If the AVHC10 Anti-Dive is enabled but the G-code that is running the cut job does not use Anti-Dive commands, Mach 3 may leave the Anti-Dive signal in the on (high) state which would stop the AVCH10 from sending Raise and Lower commands. To prevent this problem, Anti-Dive can be Disabled on this Display.		

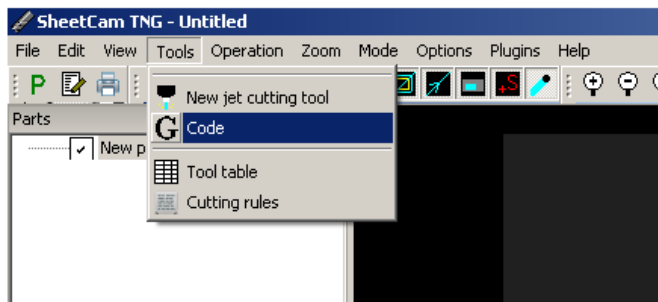
AVHC10 Display	Use	Operation
	Selects whether to save present settings or load saved settings.	<ol style="list-style-type: none"> 1. Press Select (SAVE, LOAD or CANCEL) flashes. 2. Use Jog wheel to highlight the required option. 3. Press Select
Settings can be saved in any of the 30 memory slots on the AVHC10. The memory slot that contains the setting for cutting a particular material or thickness should be referenced in the name of the SheetCAM tool that is used for that material or thickness.		
	Selects the Memory slot to save to or load from.	<ol style="list-style-type: none"> 1. Use the jog wheel to scroll to the required memory slot. 2. Press Select to confirm the memory slot. (Settings will be saved or loaded)
The number that is initially displayed is the number of the last saved or loaded memory slot.		

Setting up the AVHC10 in SheetCAM

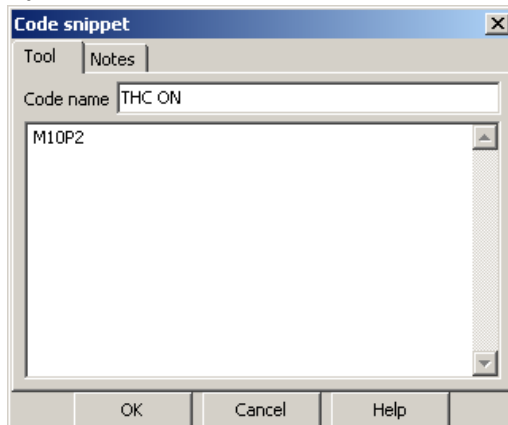
SheetCAM has a useful feature where you can set rules for cutting different types of shapes. This is a great aid to improving cut quality and can also be used to activate and deactivate torch height control during different parts of a cut.

To set a rule in SheetCAM that will turn off torch height control during part of a cut, open SheetCAM and follow these steps:

1. From the menu bar, click on 'Tools' and then click on 'G Code.



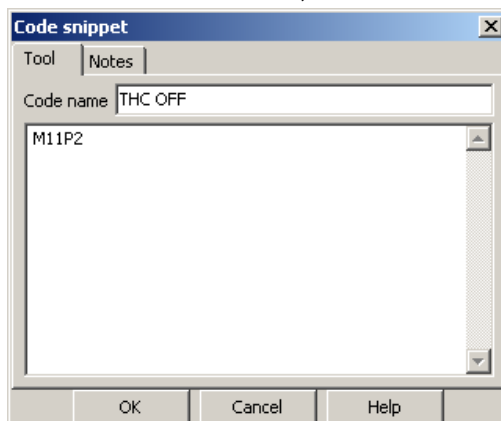
2. Type 'THC ON' and 'M10P2' as show here, then click OK.



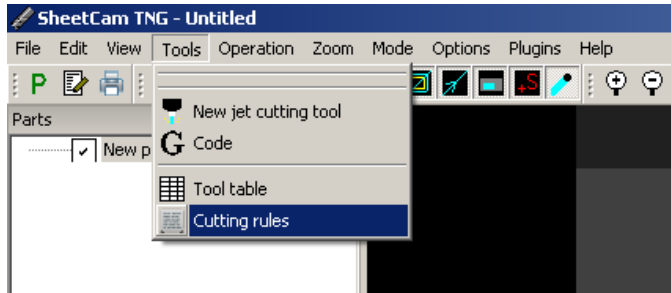
TIP

M10/M11 are on/off commands for external outputs. P2 refers to which output channel is selected. In Mach 3, P2 will be allocated to a specific pin in the LPT port which will operate a digital out on the Breakout Board.

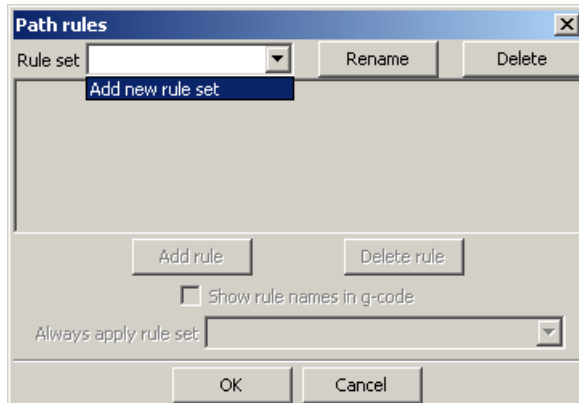
3. Repeat step 1 and make another Code snippet called 'THC OFF' using the code M11P2 as shown here, then click OK.



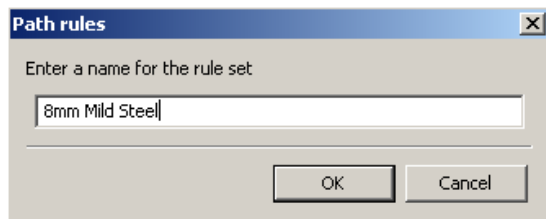
4. From the menu bar, click on 'Tools' and then click on 'Cutting rules'.



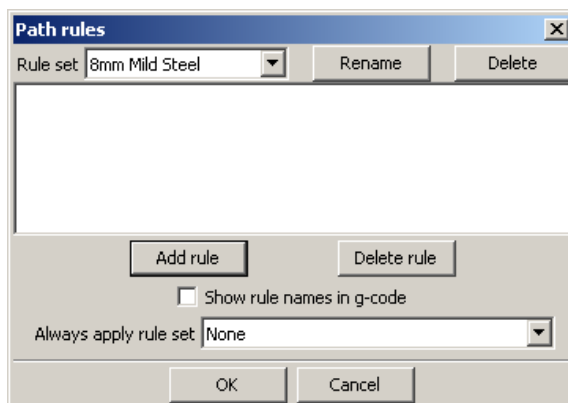
5. From the dropdown beside 'Rule set', select 'Add new rule set'



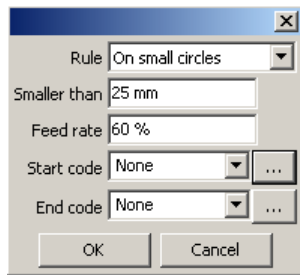
6. Create a new name for the rule and click 'OK'



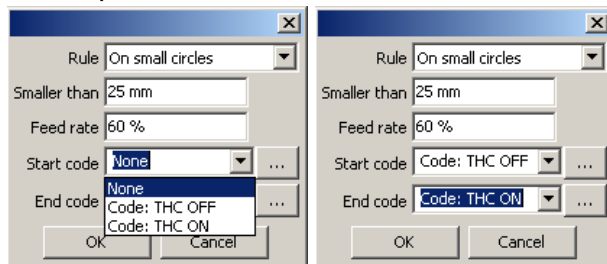
7. Click 'Add rule'



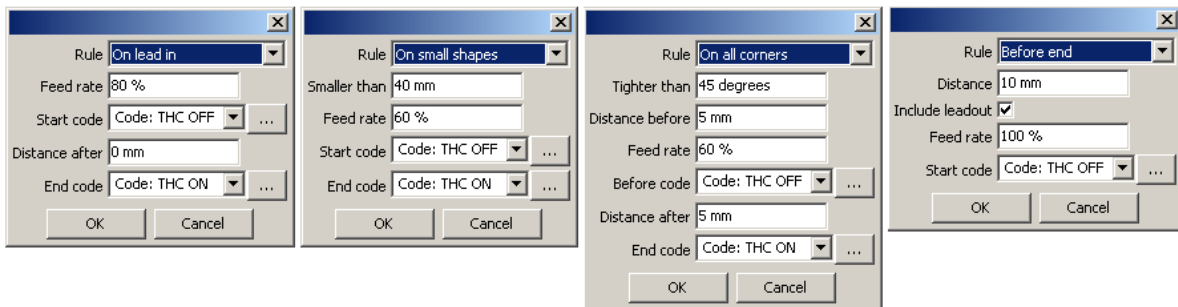
- Click on the first dropdown to see what part or type of cut you want to apply the rule to. Here, I have selected to make a rule that affects small circles.



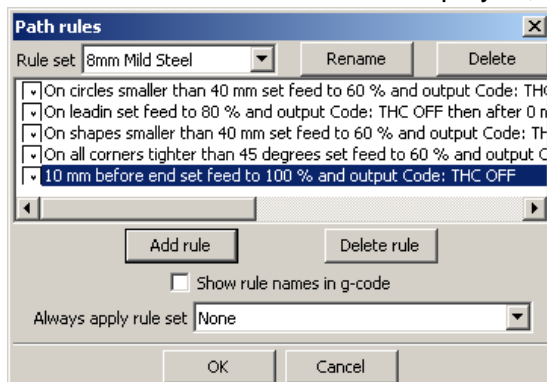
- Click on the drop-down beside 'Start code' and select 'THC OFF', then click on the drop-down beside 'End code' and select 'THC ON'. Click OK.



- Repeat steps 7 to 9 to make more rules. Additional rules like the ones show here may further improve cut quality.



- The new Path rules should be displayed, click OK to close this window.



12. When creating a Jet cutting operation in SheetCAM, select the required rule from the 'Path rules' drop-down. This will use improved cut techniques and turn the height control on and off when required. If the rules are working correctly, the M10P2 and M11P2 commands should appear in the G-code file.

