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ArcShine

PROFESSIONAL TORCH HEIGHT CONTROL



OPERATION MANUAL

ARCSHINE THC

Plasma torch height controller | UP / DOWN / OK



The ArcShine THC measures plasma arc voltage and sends UP or DOWN commands to the CNC or Z-axis control system to maintain torch height. Its OK output indicates the permitted continuation of cutting after the configured pierce delay.

ArcShine THC is designed for professional use in industrial environments, with a focus on dependable operation, electrical safety and smooth torch-height control. Its fast-response algorithm helps maintain stable cutting height for consistent results.

The **1:1, 1:50 and 1:100** plasma-voltage measurement inputs are optically isolated from the CNC breakout board, computer and other sensitive electronics. Install and wire the system according to the specified safety procedures.

If you need guidance on electrical connections, setup or operation, please contact AQTRONIC before proceeding.

Technical Support

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Safety Warning - High Voltage

Read all electrical safety instructions before installation or operation.

Electric shock can cause serious injury or death. Plasma cutting uses hazardous DC voltages. The torch, workpiece and other conductive parts can be live during operation.

• Do not touch the torch, workpiece, arc-voltage terminals or exposed conductors while the plasma equipment is energized.

• Disconnect power to both the plasma source and CNC before wiring, maintenance or inspection. Follow the required isolation procedure and allow all capacitors to discharge.

• A control switch set to OFF does not guarantee the absence of voltage inside the equipment. Only qualified personnel should work on the plasma electrical circuits.

• When available, use the manufacturer-provided divided voltage output. Direct 1:1 arc-voltage connections require high-voltage-rated insulation, wiring and protection.

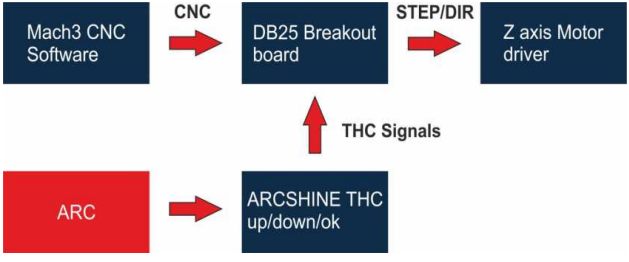
• Keep equipment, hands and work area dry. Use suitable electrical grounding, protective equipment and the plasma manufacturer's specified installation practices.

• Install and service the controller only with properly trained personnel. Follow the plasma power-source safety instructions and all applicable regulations.

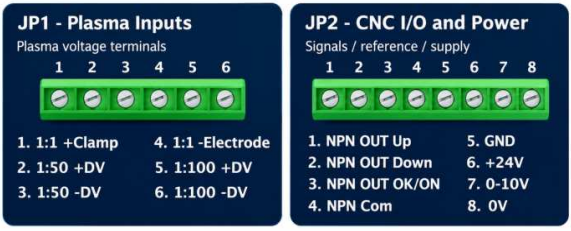
Technical Specifications

Supply Voltage	9-36 VDC typical; 48 VDC maximum
Current Draw	110 mA
Plasma Voltage Input	0-350 VDC typical; 600 VDC maximum
Plasma Voltage Interface	Photoelectric isolation
Control Outputs	Active-LOW, optically isolated
Supported Ratio	1:1 / 1:50 / 1:100
Analog Reference Input	0-10 V (external Target Voltage control)
Display	6 x 7-segment digits, split into 3 + 3
Dimensions (L x W x H)	135 x 105 x 52 mm
Weight	250 g

Signal Path



Connector Reference



Display, Target Voltage and Settings

ArcShine has one six-digit display divided into two groups of three digits. Each group changes its meaning when you enter the parameter menu.

Left three digits

Shows measured Plasma Voltage during cutting, **---** when voltage is absent, or a menu parameter name such as HyS or PCL.

Right three digits

Shows Target Voltage or a menu parameter value. Target Voltage is set by the rotary knob (POT) or by the CNC / breakout-board 0-10 V analog output (SRC).

Target Voltage - What it means

Target Voltage is the arc-voltage reference for the desired torch height. Arc voltage rises as the torch moves away from the metal and falls as it approaches. The THC compares measured Plasma Voltage with Target Voltage to decide whether UP or DOWN is needed. Make small adjustments during a stable cut.

Common Settings

HyS - Hysteresis

Range: 1-15 V | **Factory setting:** 1 V. Creates a no-adjustment band around Target Voltage. A lower value makes corrections more sensitive; a higher value reduces repeated small movements.

dLy - Pierce Delay

Range: 1-15 s | **Factory setting:** 1 s. Suspends all automatic height corrections during piercing, when Plasma Voltage is unstable. Control resumes after the delay when the arc is settled; the OK signal also follows dLy.

LCU - Low Voltage Cut

Range: 40-99 V | **Factory setting:** 40 V. Ignores readings below LCU. They can indicate an idle plasma source or residual leakage voltage. Ignoring them prevents false THC corrections; set LCU below normal cutting voltage.

Ant - Anti-Dive

If voltage rises sharply as cutting ends, Ant prevents an unwanted torch dive. Height corrections are ignored when Plasma Voltage exceeds Target Voltage + Ant.

tSt - Test

Runs an output test sequence with a countdown. Press the button to finish, or allow the test to stop automatically.

ESC - Escape

Exits the menu; the main display also returns automatically after a short timeout.

Additional ArcShine Functions

PCL - Plasma Calibration

The PCL function calibrates only the Plasma Voltage - displayed as the three digits on the left - so that it matches the reading of a properly calibrated external voltmeter or multimeter. This is an optional display adjustment; it does not alter the actual voltage or the operation of the Torch Height Control (THC) system.

ACL - Analog Calibration

ACL calibrates the external 0-10 V analog-voltage reading. It may be useful when precise analog measurement is important, such as with SEL = SRC and a CNC breakout-board output. Compare against a reference multimeter; ACL does not calibrate the plasma-voltage display.

ALT - Target Memory

When the ALT setting is enabled (ALT = TRU), once the pierce time has elapsed, the now-stabilized measured Plasma Voltage is copied to the Target Voltage value. This value is retained until the next pierce and can reduce the need for manual adjustments when switching between different material thicknesses. Use an appropriate CAM/CNC sequence and ensure that the arc is stable before relying on the recorded value.

SEL - Target Selection

SEL chooses how Target Voltage is set. POT uses the rotary encoder on the controller; SRC uses an external 0-10 V analog signal from the CNC or breakout board. Choose POT for local adjustment or SRC for machine-controlled adjustment.

Ant - Anti-Dive: High-Voltage Protection

As cutting ends, the arc voltage may rise sharply. The THC could interpret this spike as a height error and command the torch downward. Ant prevents an unwanted dive by setting a high-voltage margin relative to Target Voltage.

Plasma Voltage > Target Voltage + Ant

Whenever this condition is met, ArcShine ignores the high-voltage reading for height correction. Set Ant above normal voltage fluctuations so it acts when the cut ends, not during stable cutting.

Troubleshooting and Quick Setup

Make small adjustments, check that the plasma arc is stable, and verify the selected control mode before automatic cutting.

Plasma or menu display

The left three digits show --- when voltage is absent, measured Plasma Voltage during cutting and the parameter name in the menu. The right digits show Target Voltage or the selected menu value.

Target Voltage / SEL

If the rotary knob does not change Target Voltage, check SEL = POT. With SEL = SRC, verify the external 0-10 V command and wiring. SEL selects the source.

Target Voltage / Height

If the torch is too low during a stable cut, increase Target Voltage gradually. If it is too high, decrease it. First confirm the recommended cutting height.

HyS - Hysteresis

If Z motion oscillates repeatedly near target, increase HyS slightly. Excessive hysteresis may reduce control accuracy.

dLy - Pierce Delay

If unwanted corrections occur during piercing, increase dLy until automatic height control remains suspended while the arc stabilizes. The OK output follows the delay.

LCU - Ignore Low Voltage

Set LCU above any residual reading while the plasma source is idle, but below normal cutting voltage. Persistent leakage should be checked.

Ant - Prevent Torch Dive

If voltage rises sharply at cut end, Ant suppresses correction when Plasma Voltage > Target Voltage + Ant. Set a margin that ignores end-of-cut spikes, not normal changes.

PCL - Plasma Measurement

If the displayed voltage differs consistently from an appropriate reference, verify the divider ratio and wiring before optional display calibration with PCL.

ACL - Analog Measurement

With SEL = SRC, verify the external 0-10 V signal. Use ACL only for a demonstrated analog reading error, not incorrect source selection.

ALT - Automatic Memory

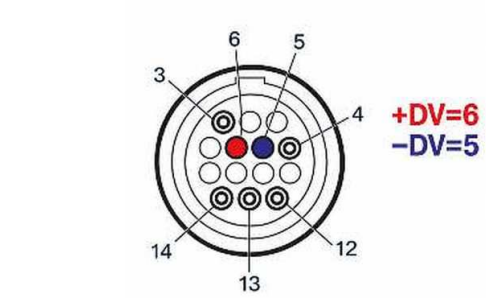
If the saved reference does not refresh after piercing, confirm ALT = TRU and a valid plasma reading at the time of capture. ALT is independent of SEL.

Arc-Voltage Connections

Choosing raw or divided voltage inputs.

ArcShine THC supports a raw 1:1 arc-voltage connection as well as 1:50 and 1:100 divided-voltage signals. Where your plasma cutter provides a manufacturer-approved divided output, it is generally the preferable interface. Match the THC input terminals to the selected ratio.

Example: Hypertherm Powermax45



Illustrated 1:50 connector assignment: **+DV = pin 6** and **-DV = pin 5**. This is a model-specific example, not a universal pinout. Confirm

your cutter connector and hardware revision in its official manual.

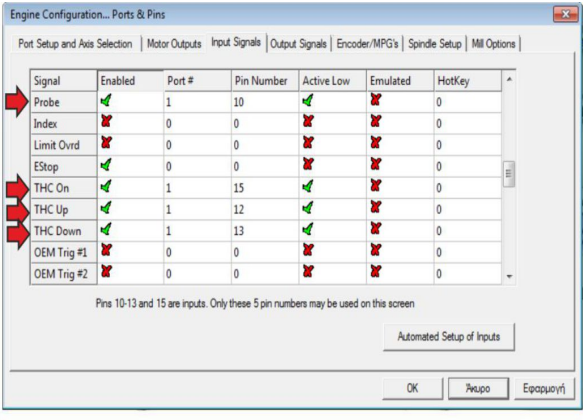
Before connecting

Keep the positive and negative leads of the chosen divided pair together. Do not mix a raw arc-voltage connection with divided-voltage terminals. Make all connections with the plasma equipment safely de-energized; raw arc voltage is hazardous.

Mach3 Input Configuration

Port and pin assignments shown in the supplied example.

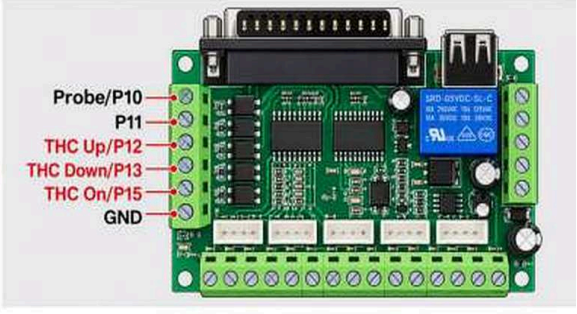
Open the Mach3 input-signal configuration screen through **Config > Ports and Pins > Input Signals**. Enable the signals used by the THC and set the port, pin number and active state to match your breakout board.



Example pin assignments

Probe	P10
THC Up	P12
THC Down	P13
THC On	P15

Example: Port 1 with active-low THC inputs. Pin positions depend on your breakout-board wiring. Verify the selected inputs and their signal polarity before operation.



Mach3 THC Travel Limits

Setting a useful height-correction window

Mach3 uses minimum and maximum THC correction limits to restrict how far the Z axis may move during automatic height control. If these limits are too narrow, a controller can reach the limit before the required correction is completed.



Example from an older Mach3 profile

The illustration changes THC Max from +5 to +50 and THC Min from -3 to -50. These are sample profile values, not recommended settings for every machine. Set safe limits for your Z-axis travel, units and torch clearance.

Profile configuration

Some Mach3 versions store THC limit fields in the active profile XML, illustrated here by the THCMAX and THCMIN entries. If configuration-file editing is required, back up the profile first and close Mach3 before editing. Use built-in settings wherever available.

Plasma.XML

```
            <BacklashOn>0</BacklashOn>
            <PathMode>2</PathMode><ThrottleFunc>2</ThrottleFunc>
<JoyOn>0</JoyOn>
            <PWMBase>5000</PWMBase><JogSpeed>100.</JogSpeed>
<m_SafeZ>0.</m_SafeZ>
            <JogInc>100.</JogInc><JogSlide>0.1</JogSlide>
            <THCMax>5.</THCMax><THCMin>-3.</THCMin><RadiusA>0.
</RadiusA>
            <RadiusB>0.</RadiusB><RadiusC>0.</RadiusC>
<LaserXGrid>0.</LaserXGrid>
            <LaserYGrid>0.</LaserYGrid><JogInc0>100.</JogInc0>
```

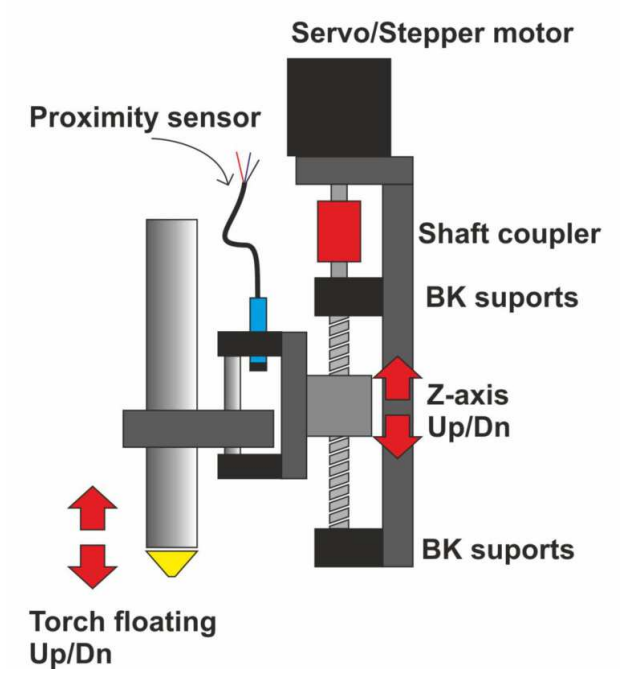
Use values appropriate to your actual machine. Excessively large limits can allow unwanted Z-axis travel; verify settings with a controlled dry run before cutting.

Probing and Floating Z Axis

Finding the material surface before a cut

Before piercing, the CNC can perform a probe sequence to locate the top of the metal sheet. This improves starting-height consistency when the workpiece is not perfectly flat. A floating Z assembly allows the torch carriage to move slightly relative to its probe sensor.

Typical floating-axis arrangement



How it works

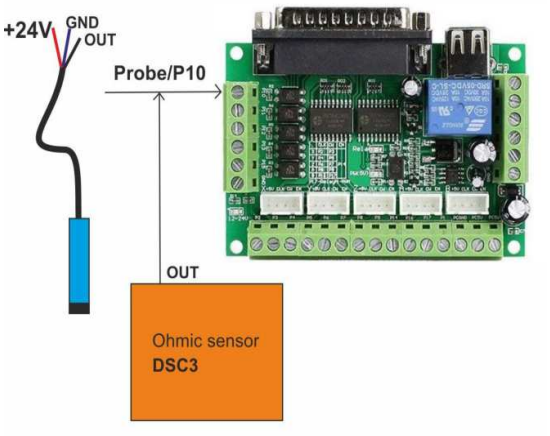
The torch approaches the sheet until a mechanical switch or proximity sensor detects the floating motion. Mach3 uses that input to establish reference position, then moves to pierce height.

CAM / CNC setup

The probe sequence and any correction for the floating-switch offset belong in the CAM post-processor or CNC control setup. Probe frequency and pierce height must be chosen for the torch, material and cutting process.
The source illustration depicts an example mechanical system, not a dimensioned fabrication drawing. Test the probe response and confirm that the Z axis retracts safely before live cutting.

Ohmic Probing and Z-Axis Design

Alternative sensing for thin sheet material
An ohmic probe senses electrical contact with the plate and can improve the surface-location step, particularly where very thin sheet may deflect under a mechanical floating torch. A mechanical or proximity probe may remain available as an additional reference.



Shared probe input: illustrated example

The diagram shows a proximity sensor and an ohmic sensing module feeding the same Mach3 Probe input (P10). This is possible only when the sensor output types, reference/common wiring and required isolation are compatible. Do not connect unlike outputs together without confirming the electrical design.

Z-axis responsiveness

Fast torch-height correction requires a responsive Z axis. A 10 mm-lead ballscrew such as the SFU1610 can be paired with a NEMA 23-class stepper motor. As an example, the motor driver may be set to 400 input pulses per motor revolution. Configure the corresponding Steps per Unit in Mach3 to match the ballscrew lead, and verify travel, speed and acceleration on your actual machine.

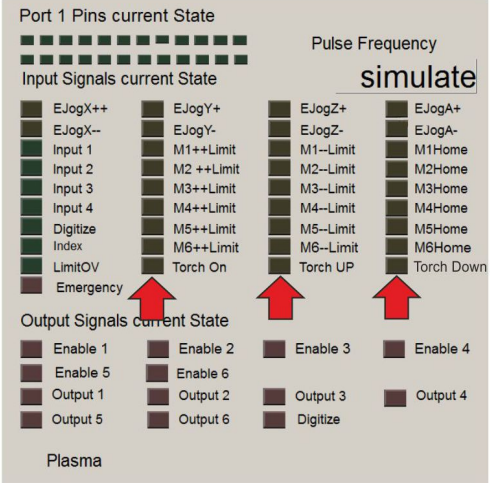
Testing and Commissioning

Check the outputs before enabling automatic cutting.

After wiring is complete, use the THC tSt function to check the UP and DOWN outputs. During the sequence, the corresponding status LEDs should respond in turn. Finish with the button or let the test stop automatically, as described in the parameter menu.

Confirm the CNC receives each signal

Open **Mach3 > Diagnostics** and check the indicators associated with Torch On, Torch Up and Torch Down. The intended input should change state when the related THC output is activated. Use a controlled test with the torch disabled.



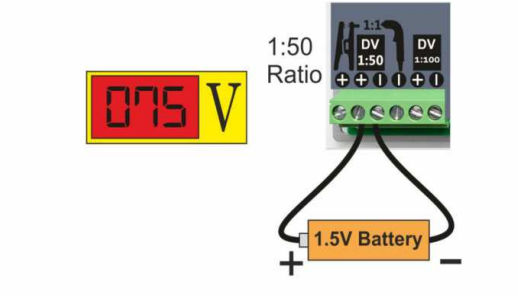
If a signal does not respond, check its terminal, breakout-board input assignment, common/reference and active-low configuration. Verify Z-axis movement direction separately and without an energized plasma arc.

Checking Voltage Readings

Optional reference checks for the Plasma Voltage display

The Plasma Voltage display can be checked against a known low-voltage reference when the selected divider input and measurement ratio are understood. This check concerns the displayed measurement, not the cutting-height setpoint.

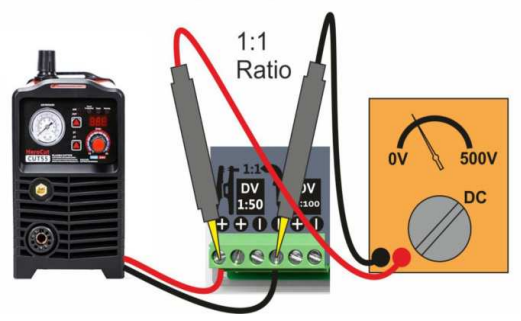
Illustrated 1:50 reference check



The source example applies a 1.5 V battery to a 1:50 measurement input. At that ratio, the corresponding display value is about 75 V (1.5 x 50). The diagram is a low-voltage functional illustration, not an instruction to apply raw arc voltage.

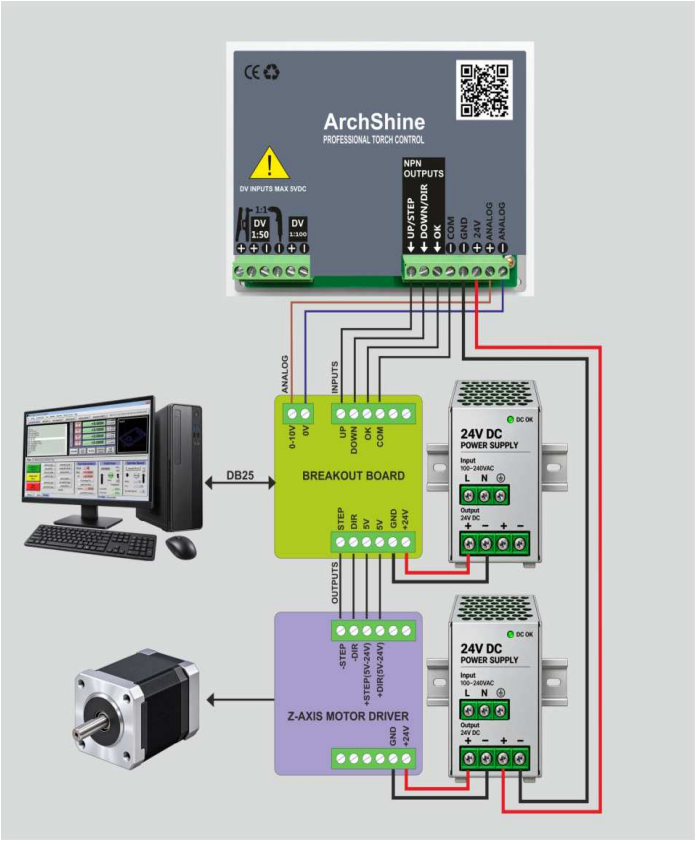
PCL - display calibration

If an appropriately rated reference meter and the THC display do not agree, the PCL setting can align the displayed Plasma Voltage with that measurement. This adjustment is optional: it does not change the actual plasma voltage or the THC height-control behavior.



Wiring Diagram

Reference connection diagram for ArcShine THC integration





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