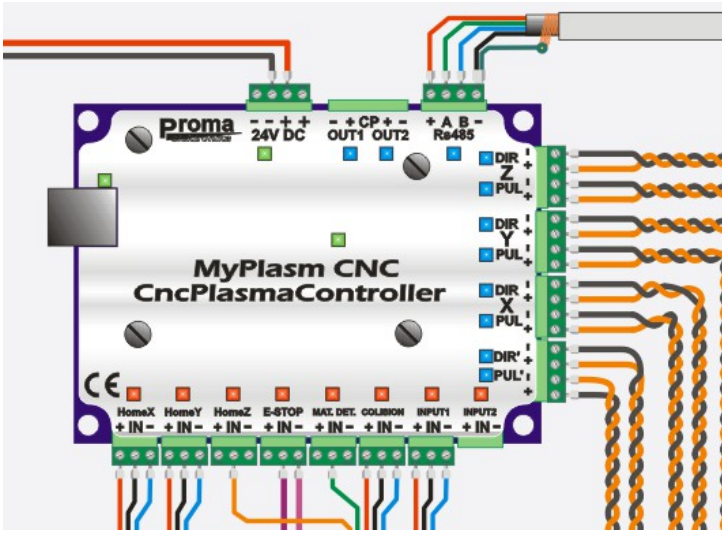
www.proma-elektronika.com



MyPlasm CNC System

Installer's manual:
Assembly and commissioning*

v1.2.mont.
Łukasz Prokop

**This manual is not a manual for the program,*
User manual can be downloaded from proma-elektronika.com

Table of contents

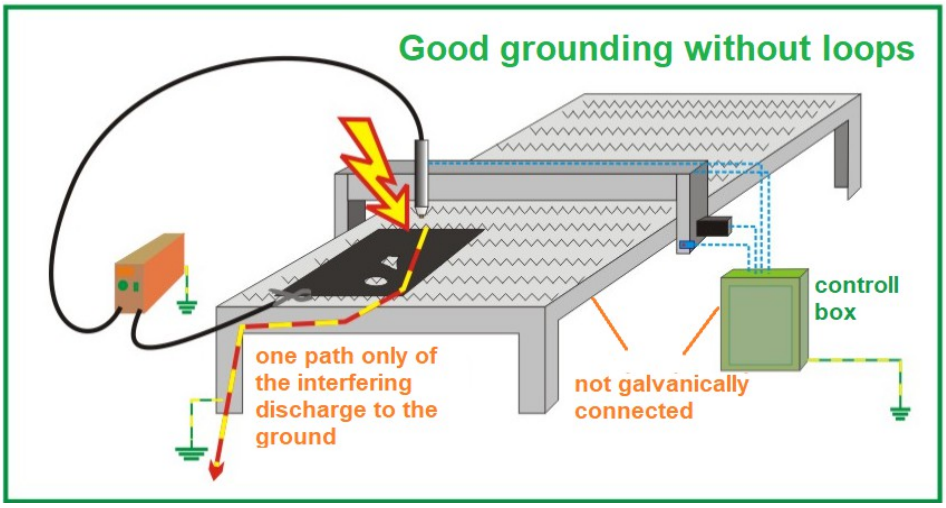
1.0 Safety.

Caution: Plasma cutters are a source of life-threatening voltage (in HF/HV models it can exceed 10,000V) and generate very high interference which can disturb or damage the electronics (computer, controller, controllers). **Assembly and connection should be carried out by a person with electrical qualifications.**

Failure to make good contact between the material/ground clamp terminal and the material to be cut can lead to irreparable damage to electronic equipment.

1.1 Grounding, shielding

Protective earthing is used to discharge the dangerous potential of the plasma arc to earth. The **resistance to earth of the structure should not exceed 6 Ω.** It is important not to make a ground loop. The disturbance/overvoltage should have only one way of escaping to earth and it is unacceptable for it to have an output to earth through electronic components. This can be implemented by electrically separating the control part from the machine structure and connecting it to earth via a separate conductor (usually the PE protective earth of the mains supply - via the electronics supply cable).



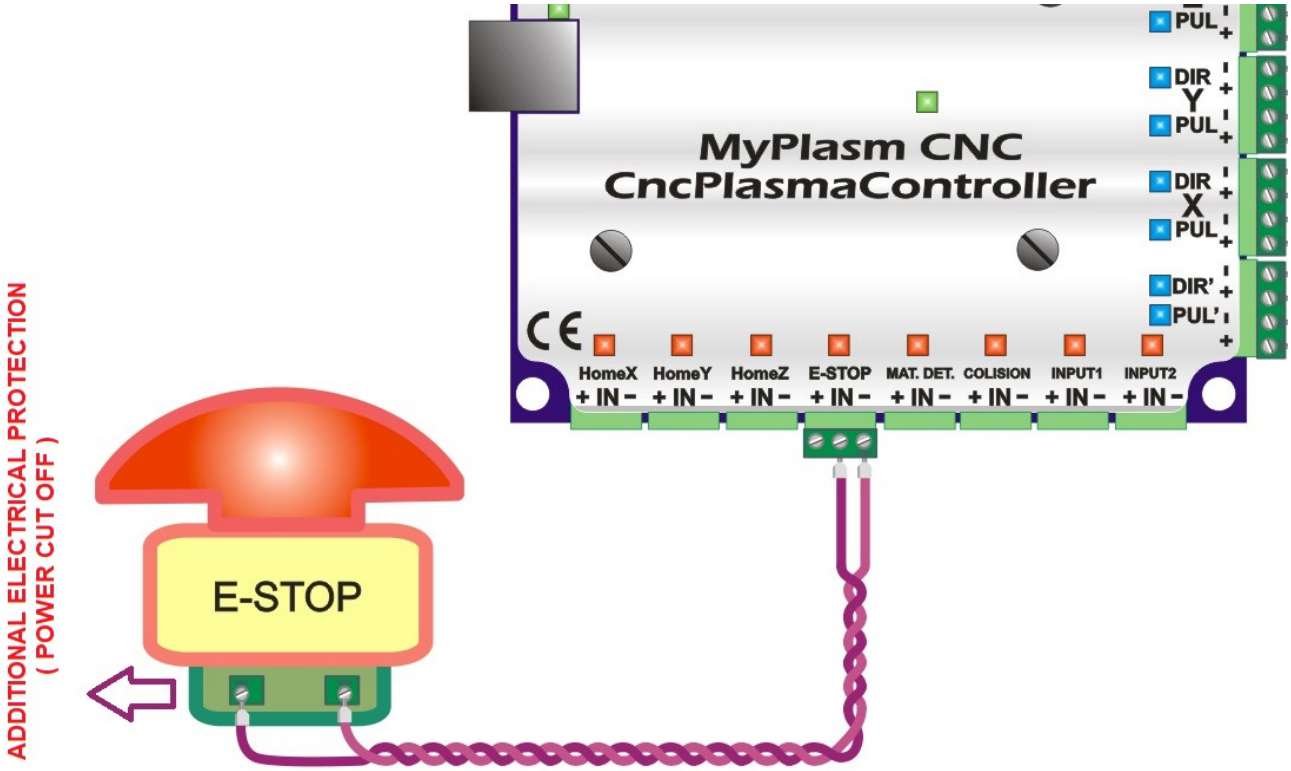
– When connecting the protective earthing of the control box to the machine structure (i.e. using the same earthing as the structure), do not use any other earthing source that could create a ground loop.

In order to minimise the influence of interference, the plasma source as well as the torch cable should be placed as far as possible from the control cables and the computer. The use of shielded cables, the shields of which are connected to the earth bar only on the control box side, will considerably reduce the influence of interference on the operation of the machine ***(see example diagram 2.0)***.

1.2 Emergency stop

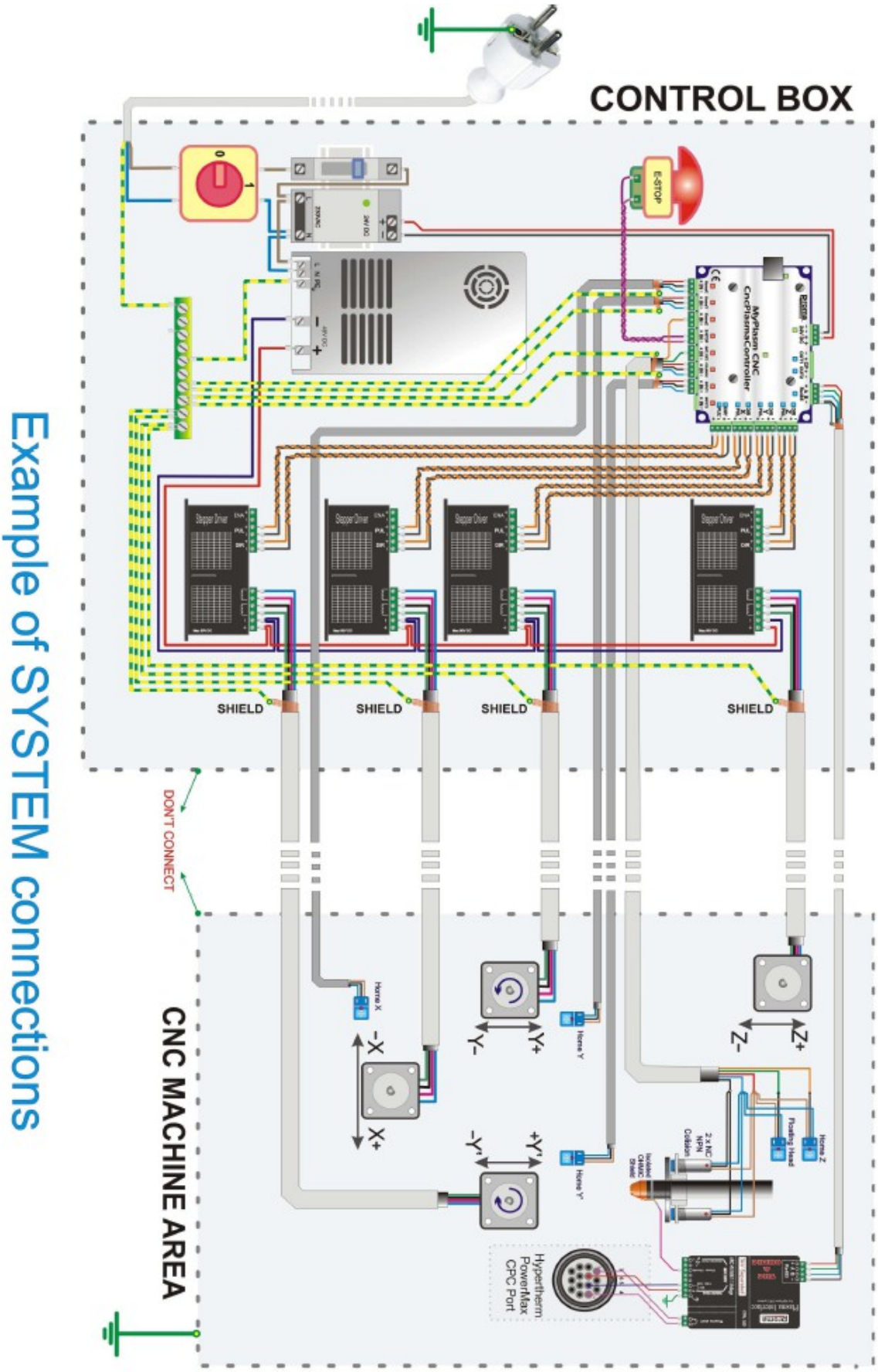
The controller has a emergency stop push=buton input labeled as **E-STOP**, which interrupts the controller's operation, disables all optional outputs as well as blocks the possibility of restarting until the emergency button is unlocked. At all times - especially when commissioning the system - be prepared to press it quickly in case of any problems.

NOTE : The controller input interrupts the operation of the controller. For full protection, the auxiliary contacts must be used to disconnect the power supply to the machine, which is not part of this manual and should be carried out by the installer. This description refers to stopping the operation of the MyPlasm CNC system.



The E-STOP button should short-circuit the **IN input** (middle terminal) to the MINUS (right terminal) of the controller's E-STOP input. In the programme configuration it is possible to select the type of **NC / NO** contacts (described later).

2.0 Example diagram.



→ Click to download in high resolution ←.

3.0 Basic parameters and requirements

The **MyPlasm CNC** control system is managed via **USB 2.0 via the Windows** control software, which can be downloaded for free from the manufacturer's website:
proma-elektronika.com → "download".
The software has a **freeware** licence which does not exclude use **for commercial purposes**.

The control software works correctly on **Windows XP, 7, 8, 10, 11**. The additional modules **MyMiniCAD** and **3D Viewer** require at leastWindows 7. The software has very low requirements and works with any **PC / Laptop** hardware configuration.

- Power supply for the controller: **24V DC (22 - 26V DC)**
- Maximum current consumption : **0.6A (600mA)**
- Number of axes : **4**
- Motor driver output signals : **TTL 5V STEP (PUL) / DIR** 40mA
- Motor frequency: **0.02 - 250kHz**
- Limit sensor inputs (8 x 24V) : **NPN NO, NPN NC, Contacts,**
  - active state : LOW
- Dimensions of CNC Controller : **120 x 100 x 15 [mm].**
- Dimensions of the Plasma Interface: **115 x 60 x 25 [mm].**
- Measuring voltage ARC / THC max : **300V DC (test 1000V DC)**
- HF / HV protection : 10kV AC (15kV AC test)
- Optical isolation : **2 x 3kV**
- PC communication : **USB**
- Plasma Interface Communication : **RS485**
- Optional outputs (2) : **OC 0.5A 5-30V**

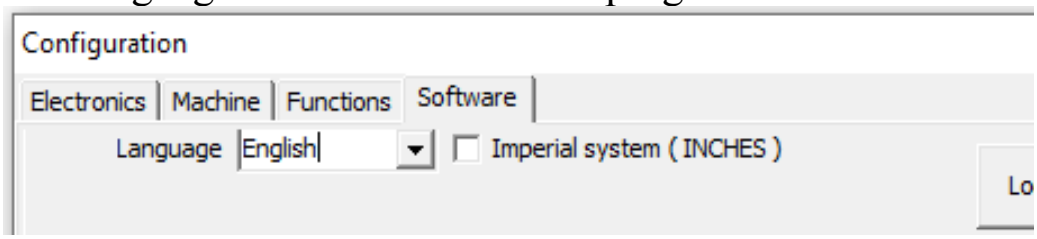
4.0 Commissioning the controller

Initial commissioning should be carried out **STEP by STEP as outlined** in this manual. If something does not work correctly in one step then there is no point in moving on to the next step without finding and solving the problem. If user connects and configures everything at once, it can be very difficult to find a possible error.

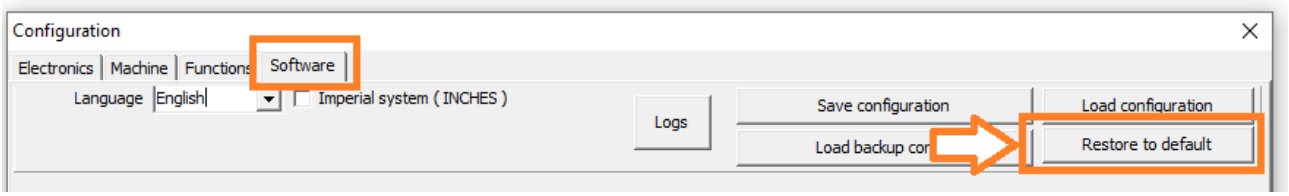
4.1 Software installation

DO NOT CONNECT THE CONTROLLER TO THE COMPUTER BEFORE INSTALLING THE SOFTWARE AND USB DRIVERS !!!

The latest software version can be downloaded from the manufacturer's official website: **proma-elektronika.com** → tab "download". When installing the software, the USB drivers are automatically installed. At the time of writing this manual, this is version **1.2.0** and the description applies to this version. During the first start-up, select the language and units used in the programme.



The instructions assume that the software has factory settings. If this is not the case, it is recommended to restore them during the first start-up.



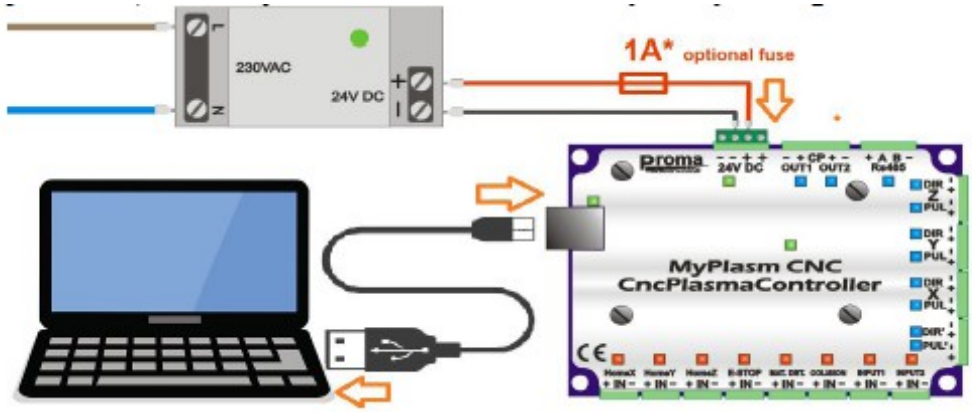
YouTube

Click the link below to go to useful VIDEO instructions :

EN : MyPlasm CNC Step by step

4.2 Power supply and initial start-up

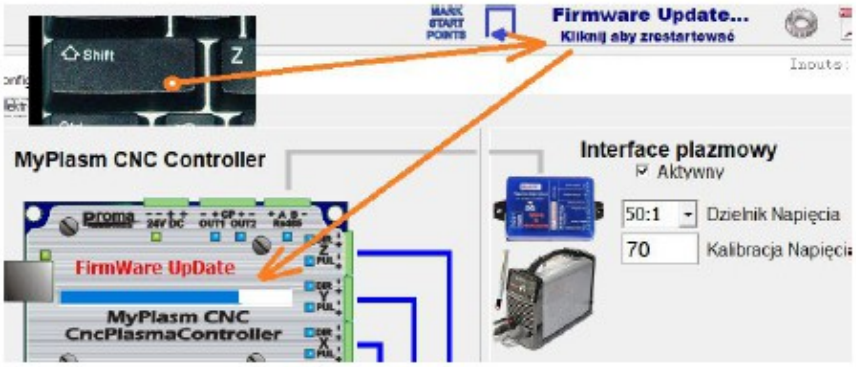
IMPORTANT !!! Use the original USB cable supplied with the system by the manufacturer !!! Do not use USB extensions.



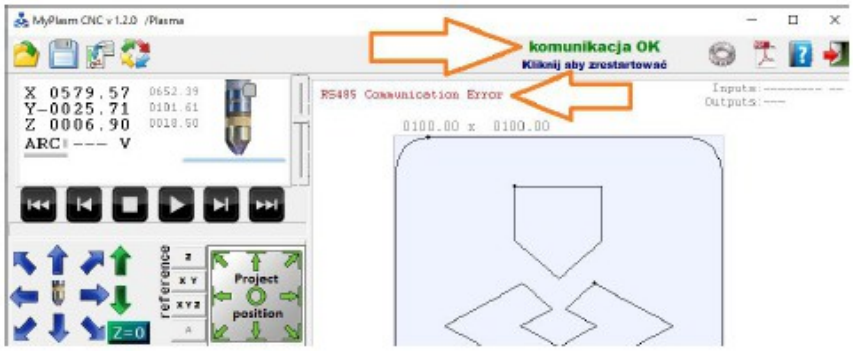
The controller requires a 24V DC power supply to operate (1 - 2A recommended), the controller's current consumption does not exceed 0.6A (600mA). If the power supply is more powerful (more than 1.5A), an external 1A delay fuse should be used.

First connect only the power supply and the USB cable.
The top right corner of the screen displays the status of the connection to the controller as below examples..
Communication OK - Communication correct, controller firmware version compatible with the software installed on the computer.
No USB device : Device not connected to USB port or problem of driver installation in Windows.
Communication error : Device installed and connected correctly but communication error occurred. Problems with the **24V DC** power supply to the controller or incompatibility of the Firmware version with the software version installed on the computer. If this is detected, the software will attempt to automatically upload the correct Firmware version.

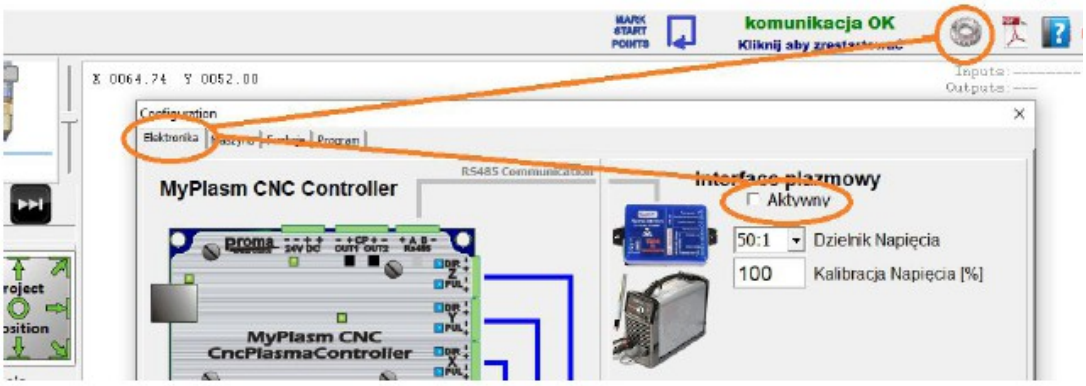
In the event of problems, it is possible to manually force a Firmware update by holding down the SHIFT key and resetting the communication.



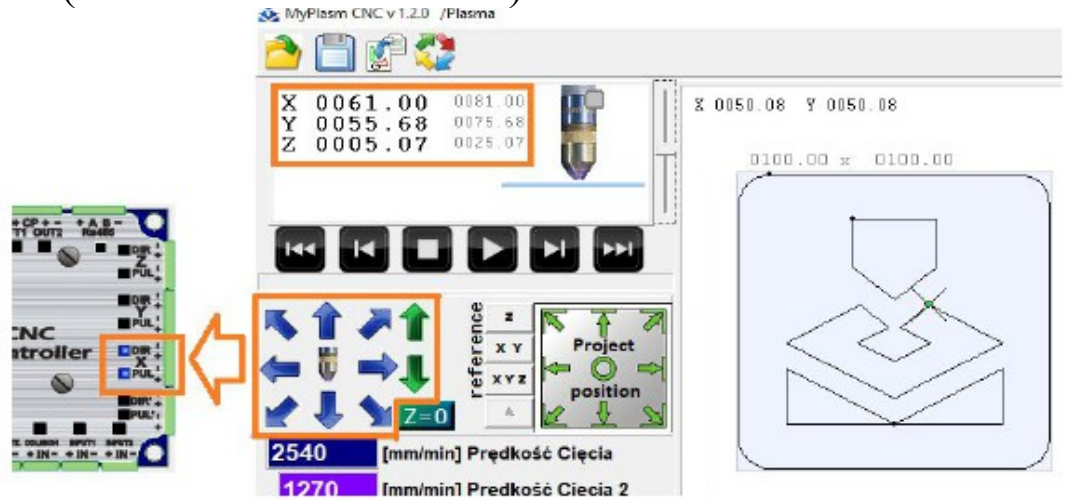
If everything is working correctly the program should display a message about correct communication with the controller. There may be a message about a communication problem RS485 / with the plasma interface (because it is not currently connected).



The message should disappear when the Plasma Interface is deactivated.



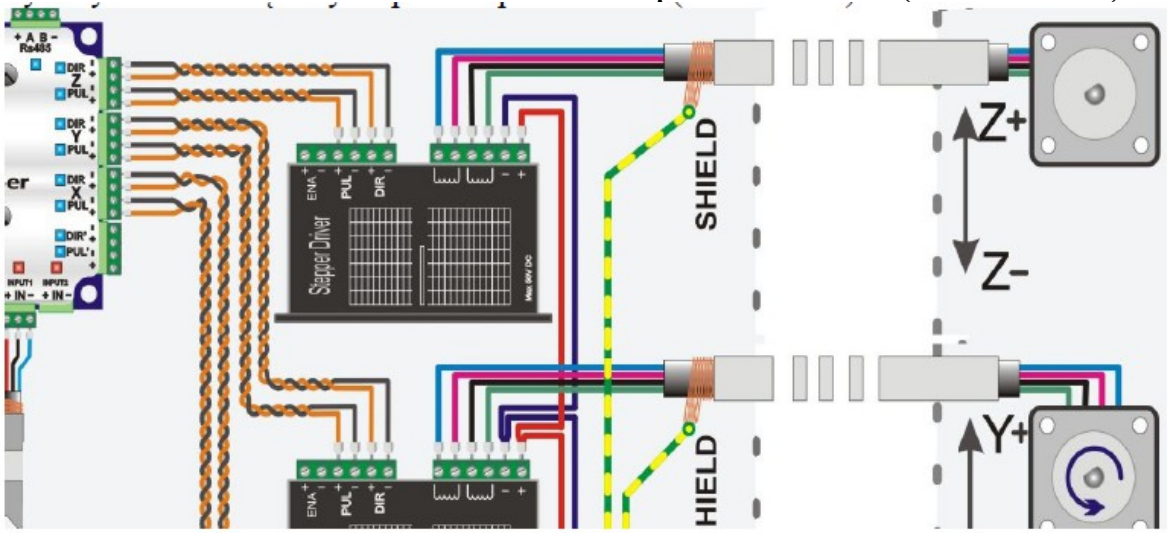
In this state, the software should not display errors. It is possible to control the controller outputs. By clicking the manual control arrows (or keyboard arrows) the XY axis coordinates should change and the blue LEDs on the STEP(PUL)/DIR outputs of the controller should light. The PgUp / PgDown and Green arrow keys are used to control the Z axis. The PUL LEDs light up always during movement and DIR only in one direction (determines the direction).



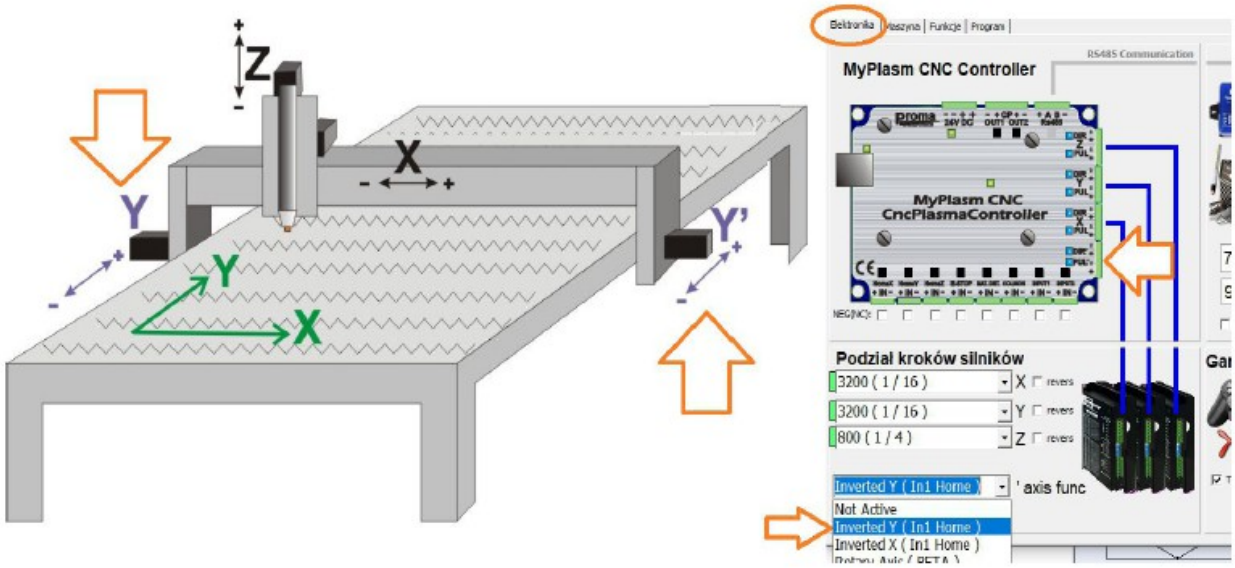
4.3 Connecting the motors

The controller generates **STEP(PUL) / DIR signals** TTL (**5V**). It can work with stepper motor drivers, servo stepper motors and servo drives if they support **5V STEP (PUL) / DIR** signals .

The controller outputs have been designed to drive the opto-isolated inputs of the controllers. In order to minimise the influence of interference, connections should be made with twisted pairs of wires (**max 50cm**).



If the machine is equipped with a second motor on one axis, it can be connected to the auxiliary output **PUL' / DIR'** and configured accordingly in the program in the electronics tab :



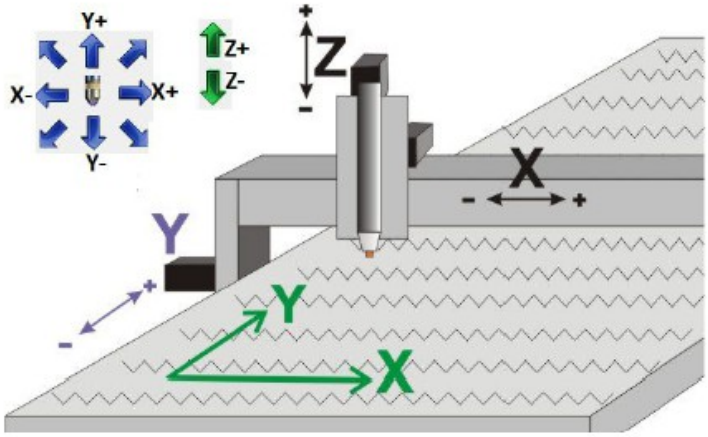
5.0 Configuration of drives

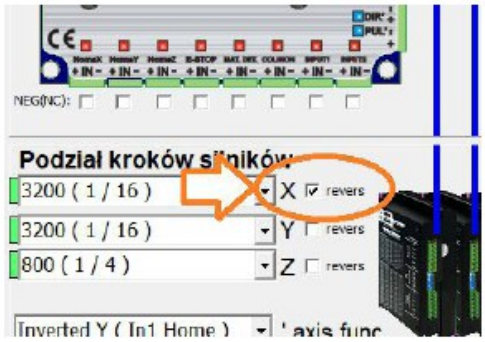
The most important and difficult machine configuration stage is to configure the drives of each axis accordingly. This is an individual stage for different designs. The general principles of configuration will be described here.

5.1 Configuration of axis directions:

The first step is to establish the correct direction of each axis, which must be physically **IDENTICAL** to the one in the program. **That is, by clicking "To the Right" the axis must move to the right !**

To change direction, select **'revers'** on the electronics tab.





5.2 Configuration of gear ratios:

These are the most important parameters on the basis of which the movement of the machine is controlled. It is dependent on the design of the drives. These parameters are information for the control system as to how the rotation of the motor is translated into the movement of a particular axis.

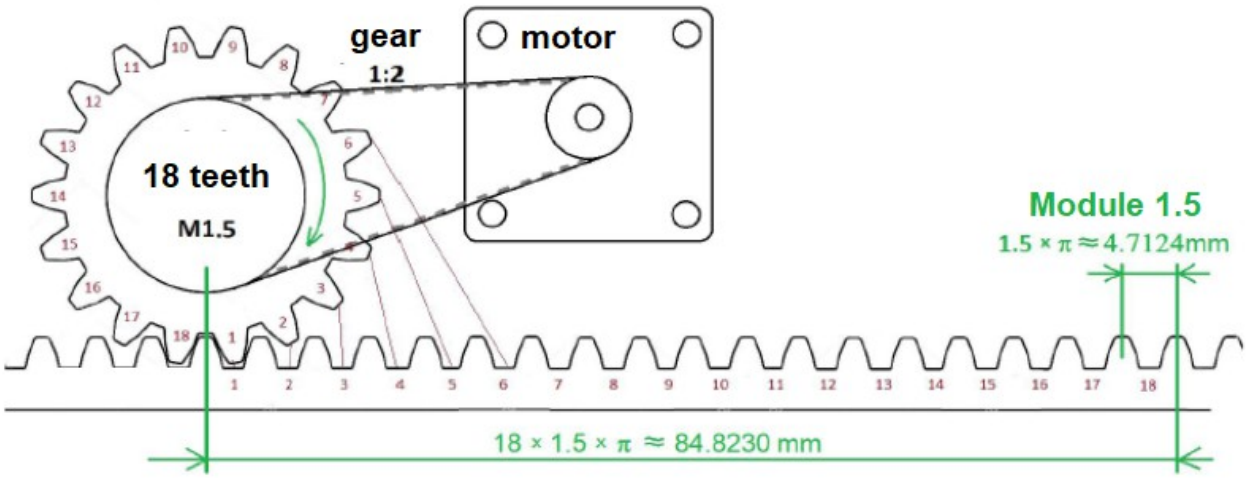
Tip: For drives based on stepper motors, the best results (ratio of positioning precision and dynamics) are obtained if the **X/Y** axis moves between **30-80mm** per motor revolution**.** For the Z axis, the optimum displacement per motor revolution is 4-20mm. If necessary, the use of a suitable gearbox is recommended.

Example for pinion / rack drive

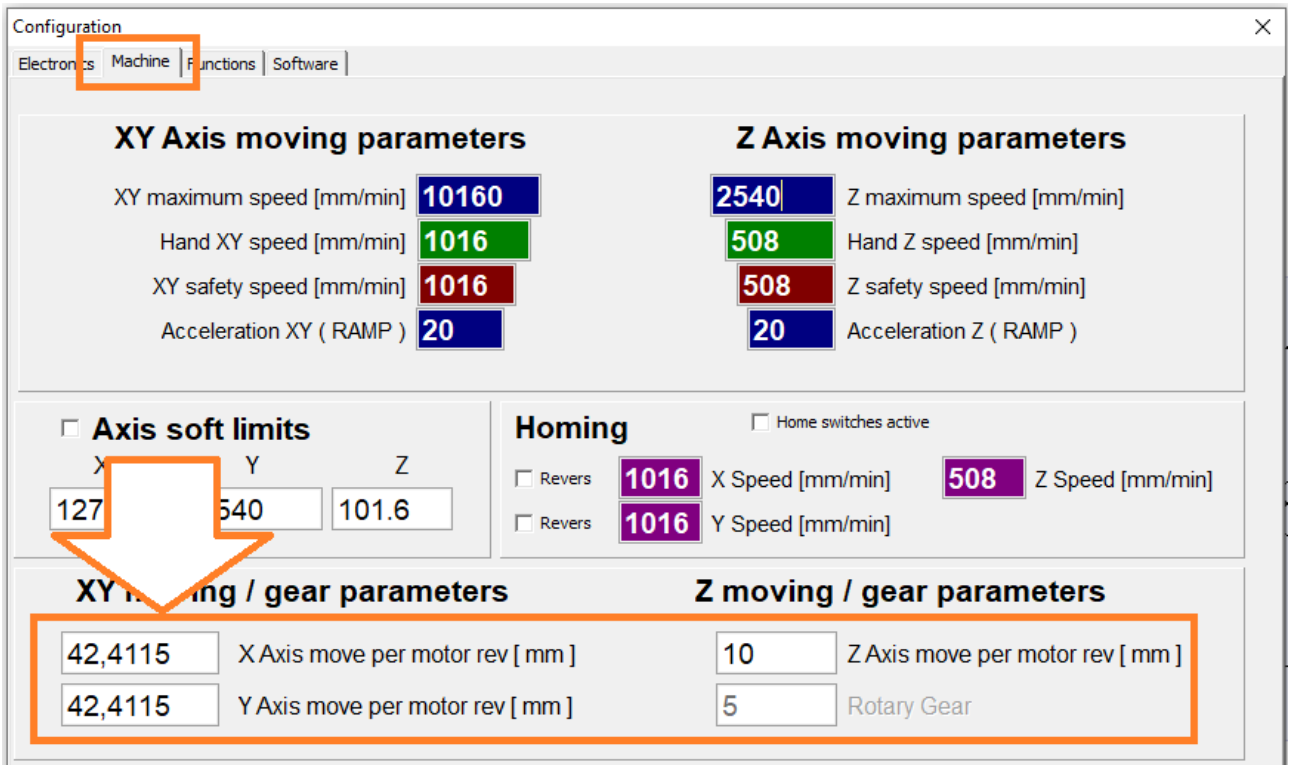
One revolution of the pinion moves the drive by the distance between the number of teeth of the rack.

For rack with straight teeth, the distance between the teeth is determined by the so-called rack modulus where **Module 1** means inter-tooth distance = **π [mm],, Module 2** means **2π [mm];**

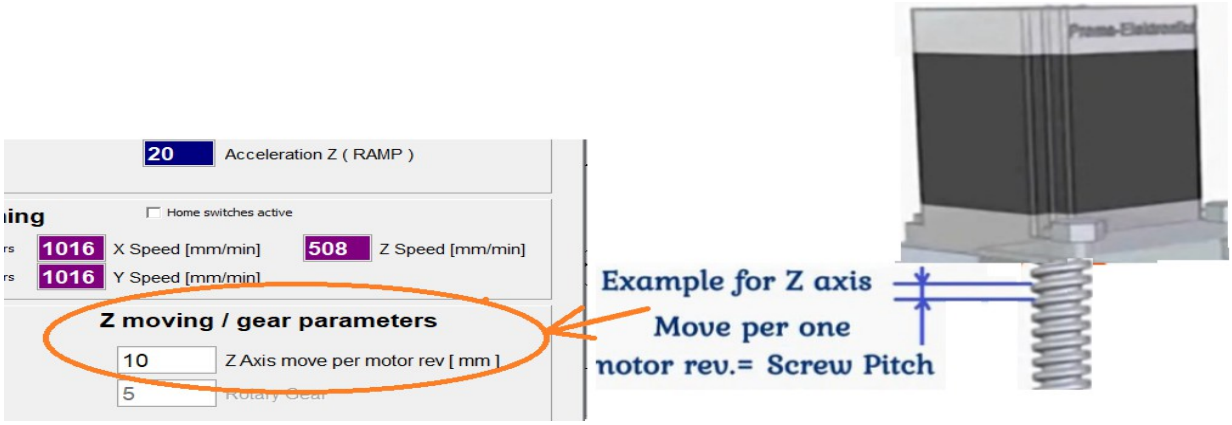
The following example shows a rack and pinion with 18 teeth, Module 1.5



The distance per revolution of the pinion is 84.8230mm - using a ratio of 1:2 gives us (1 : 2) x 84.8230mm = **42.4115mm** per revolution of the motor and this is the parameter to be entered for the axis in the "Machine" tab.



The Z axis is usually driven by a ball screw.



In the case of a screw drive, the feed rate per motor revolution is the pitch of the screw, taking into account the gearing (if used).

5.3 Micro-stepping division

After the gear ratio parameters have been configured (point 4.2), the appropriate stepping division of the motors should be determined - remember that the setting in the program and the configuration of the motor controllers must be IDENTICAL.

Based on the given gear ratio parameters, the software analyses whether the selected stepping division is optimal for the given drive design.

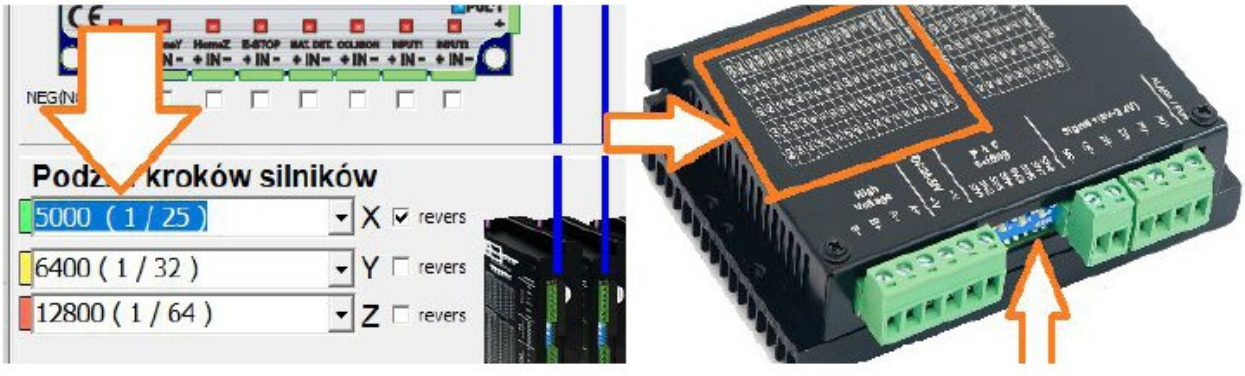
Green colour: Recommended step division

Yellow : Acceptable step division

Red : Division not recommended

Please select the appropriate division (with the up/down keyboard arrows you can conveniently move between different division values) in the electronics tab, then set the division identical to the one in the software on the stepper motor driver.

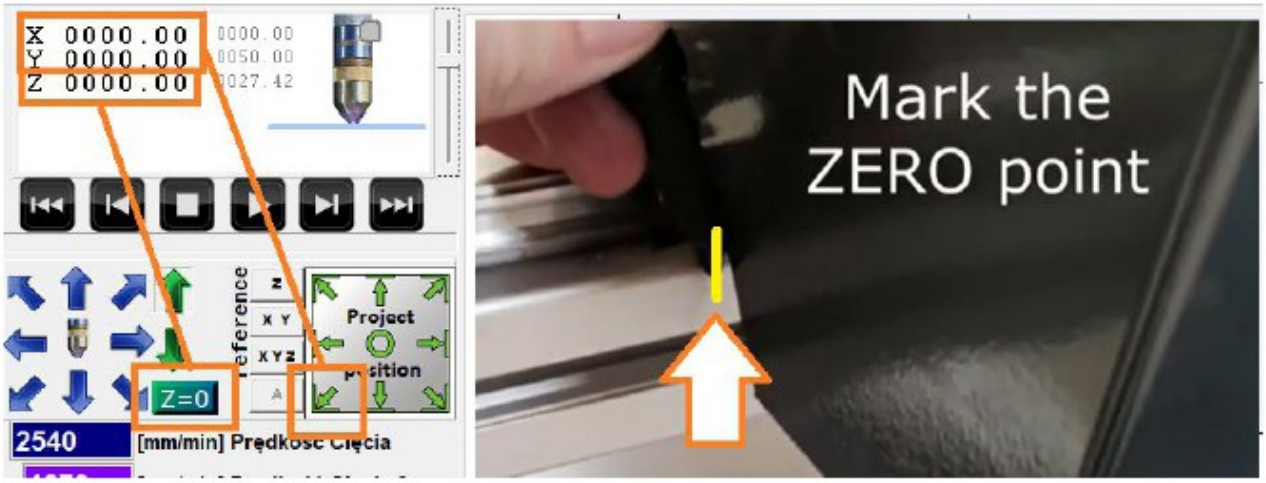
Note : Some motor controllers only accept changes when the power is switched back on.



5.4 Configuration validity test

The most convenient test for the correct configuration of an axis is to zero the X Y position, select the axis position and move it by any value and compare the coordinates on the screen with the actual axis displacement.

1. Reset the position in the software and mark the position of the axis (e.g. with a marker)



2. Move the axis and compare the distance with the indication on the screen :

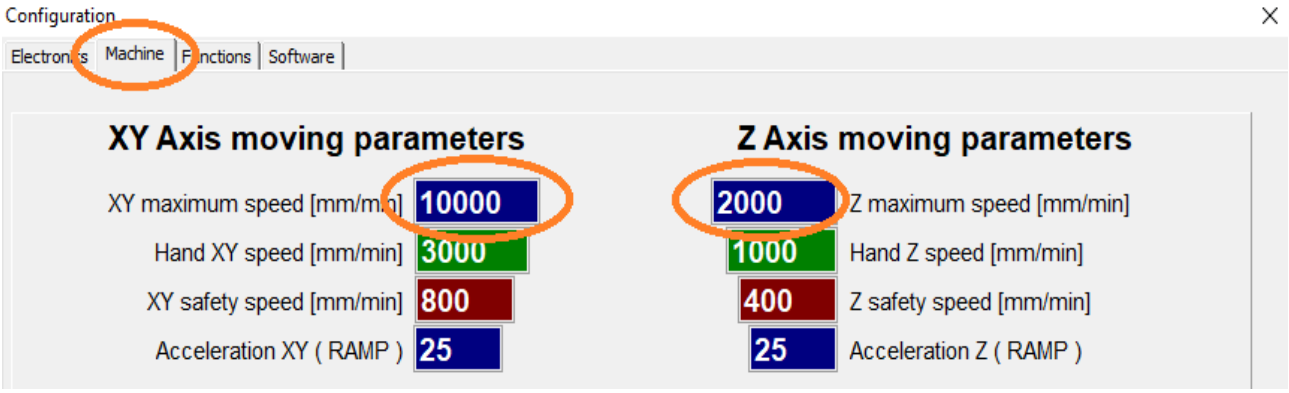
Tests should be carried out for each of the X, Y, Z axes.

ATTENTION !!!
Incorrect setting of drive configuration parameters will prevent correct system operation and further configuration !!!

5.5 Speed and dynamic movement settings

The quality of the cut strongly depends on maintaining the correct cutting speed; excessive slowing down overheats the material. It is important that the machine operates at the highest possible speed while maintaining a high work culture.

The first step is to determine the **maximum speed of** the machine.



To do this, move each axis with the **SHIFT** key held down. Increase the speed gradually up to the expected speed and, to be sure, check the **+25% speed**. If the machine starts to lose steps at any point, it means that the critical speed for the machine has been exceeded. In this case, reduce it by **25%.**

The Hand speed is the speed at which the axis is moved by default with the keyboard arrows, screen buttons or GamePad controller.

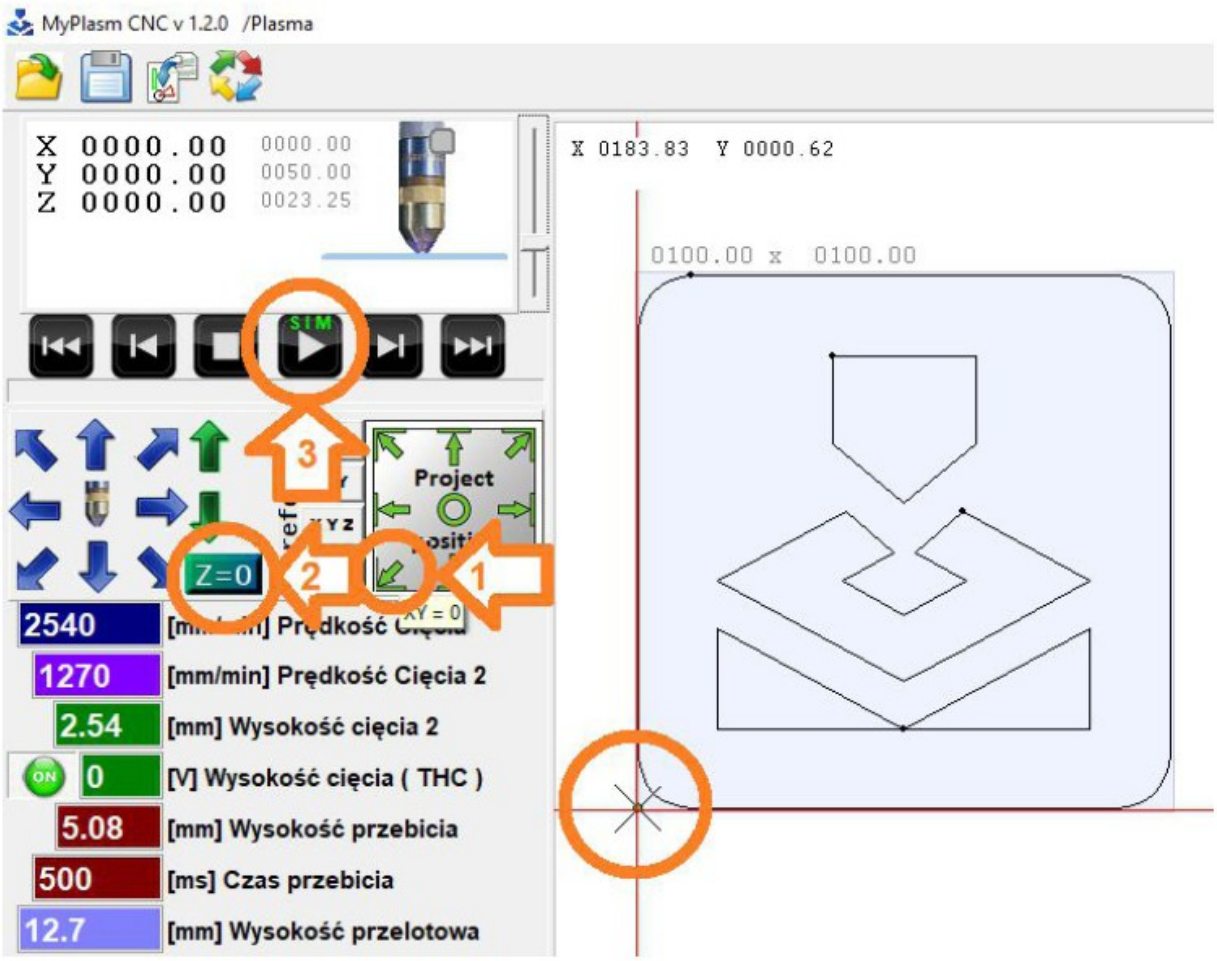
SHIFT key →forces the axis to travel at maximum speed. **CTRL key** → forces axes to be driven at precise speed (10% of manual speed).

upto the safe speed is the speed limit when cutting complex, very small parts and is the speed at which the machine performs at sharp angles. A high value of safe speed increases dynamics at the expense of work culture, in extreme cases the motors may lose steps. A low value will slow down the speed on small workpieces too much, which will worsen the quality of the cut (overheating of the material). Suggested values are **1200mm/min** for light structures, **300mm/min** for very heavy structures.

Acceleration (Ramp up length) - determines the distance (how long) the machine accelerates (and decelerates) between the safe speed and the expected speed. Large values increase smoothness of movements at the expense of dynamics; small values increase dynamics at the expense of working culture in fine / complex details. Suggested value is **15** for light structures , **50** for very heavy structures.

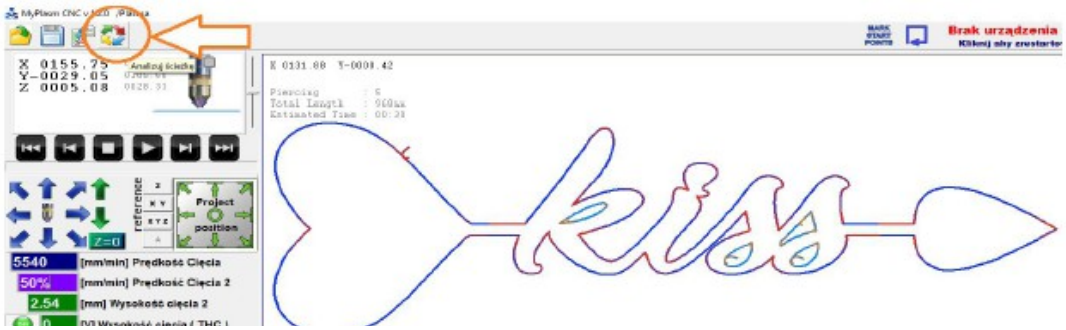
5.6 Dynamic test in automatic operation.

If the working dynamics are satisfactory in manual mode, tests should be carried out for automatic operation (in the air without starting the plasma cutter). To do this, using tool point to "virtual" design position - for example the bottom left corner, and point to the "also virtual" material position Z (height) and reset the coordinates. You can now start the machine in simulation mode by holding down the **SHIFT** key and clicking the **START** button.

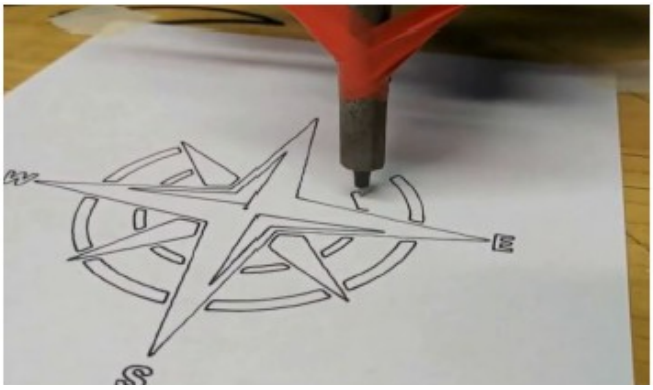


BE PREPARED TO STOP THE MACHINE AT ANY TIME USING THE STOP BUTTON (OR ESC KEY)

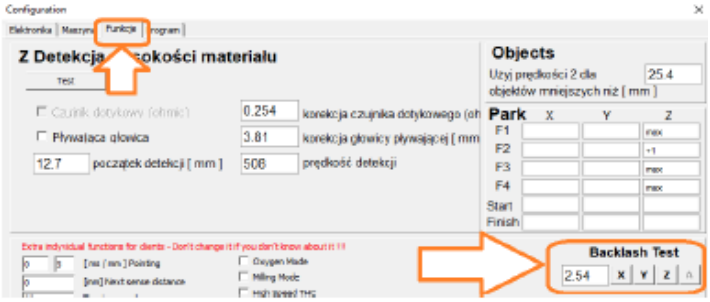
It is recommended to test the machine at different cutting speeds. The dynamic parameters should be adjusted individually for each machine. **The paths analyse button** shows in colour where the cutting speed will be reduced to a safe speed.



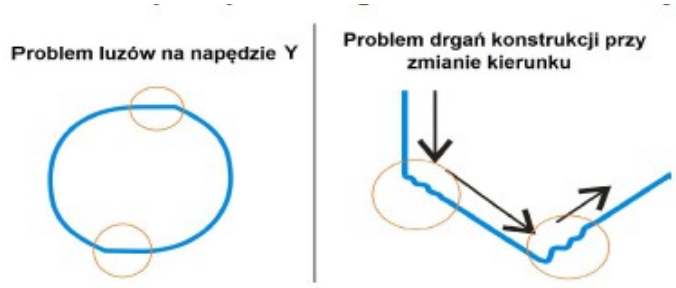
A good solution is to mount a pen and draw designs on paper. It helps to work out the best dynamics as well as locating any mechanical problems.



Axle play can be easily diagnosed using the test option in the special functions (the motor turns gently but the axle does not move).



Mechanical vibration problems become apparent if the operating dynamics are set too high for the machine in question.



6.0 Reference - Home / Limit switches

Although the system can operate without reference sensors (Home / Limit), they are worth using for several reasons. Firstly, they allow a reference run to be made, which enables the system to determine the exact position of each axis. This makes it easy to resume operation after a possible failure (power failure, lost steps, etc.). A second advantage is the hardware protection against exceeding the operating range of an axis.

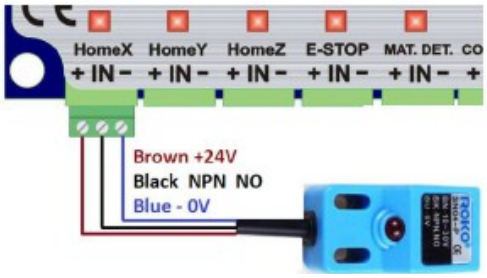
Both functions (Home / Limit) use a common input (same switch), which performs the Home / Limit functions as required.

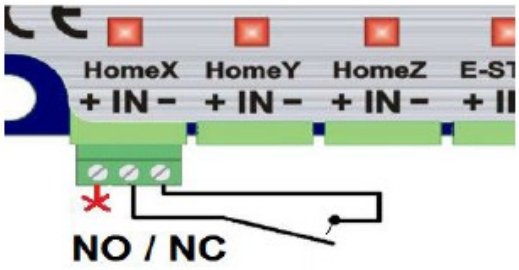
6.1 Connecting the limit switches

PNP type sensors are NOT SUPPORTED.

The IN inputs are internally pulled up to +24V with a 3.9kR resistor.

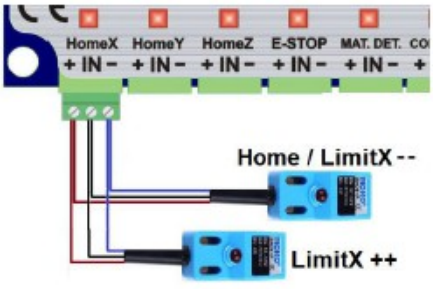
Mechanical limiters (NO or NC contacts) or inductive limiters with **NPN NO** or **NPN NC** output can be connected to the system.

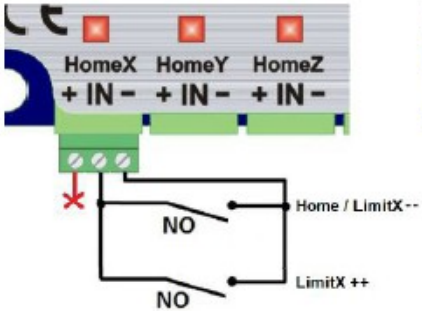


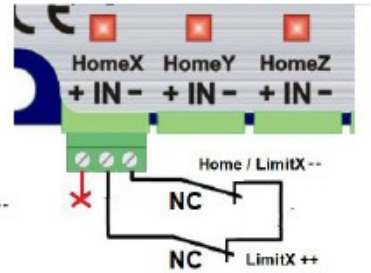


It is possible to connect limit sensors protecting both sides of one axis - for this purpose it is sufficient to connect both sensors of the NPN NO type to one input (in parallel). For mechanical limit switches, connect them in parallel if they are **NO** or in series for the **NC type.** (Limit++ must not be wired to slave side/input1)

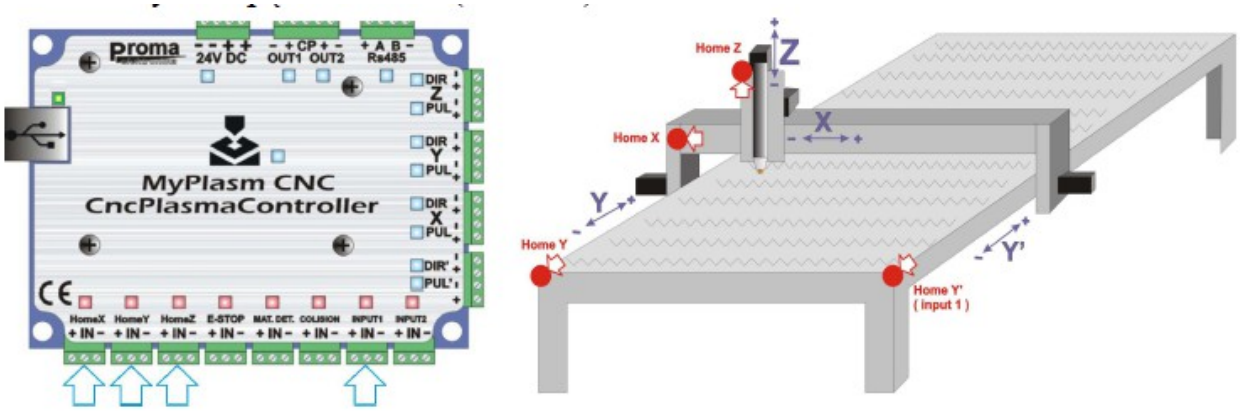
Examples of securing both sides of an axle :







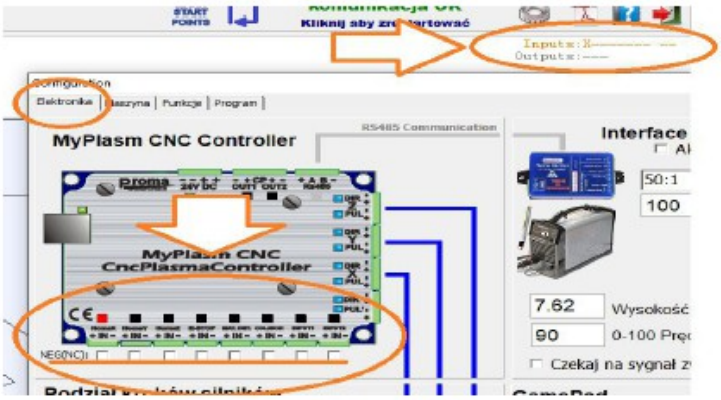
Example of basic sensor arrangement on a machine with a two-sided Y-axis drive (Y + Y').



Separate home switches for the Y + Y' drives allow auto squaring of the gantry during reference travel. The homing switches need to have adjustment to allow the squareness to be set.

The input lights on the motherboard indicate the 'physical' state of the input, which should change depending on whether the sensor is active or not.

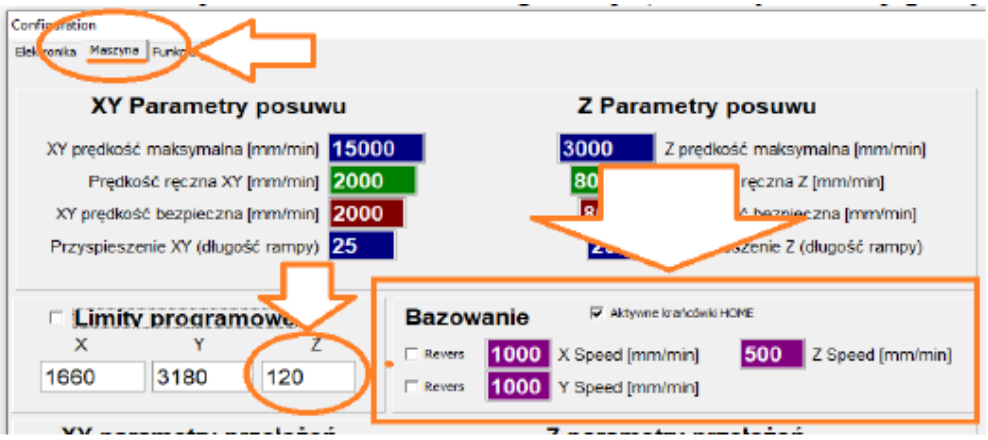
In the case of **NC** sensors/contacts, it is possible to reverse the signal in the "ELECTRONICS" tab in the software, where the correct operation of the inputs can be checked. The input light in the program should light up (**RED**) when a sensor is activated. In the "rest" position **when no sensor is activated all the lights in the program should be inactive** (**BLACK**). The status of the controls is also displayed in the main programme window which makes it much easier to locate any problems.



If the Home/Limit input is activated, operation is stopped in an emergency and further operation is blocked. To ignore the input (e.g. to "downshift" from the sensor), press the manual travel arrows with the RIGHT MOUSE BUTTON.

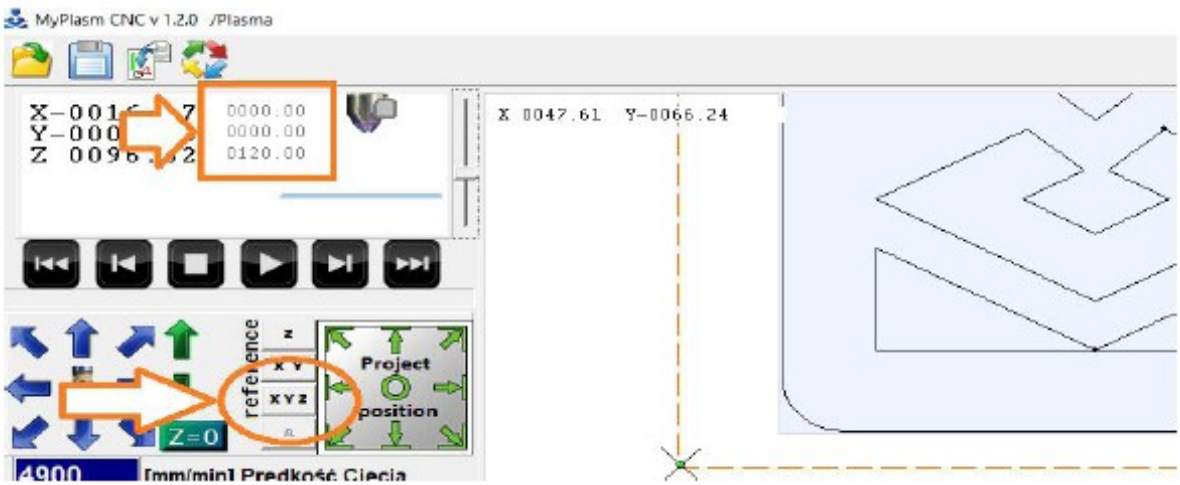
6.2 SETTING THE HOMING

In the "MACHINE" tab, the homing option can be activated and the automatic basing speed can be specified. There is also an option to change the basing direction of the X, Y axis. By default, the X axis is based to the left and the Y axis is based "down" (towards us). The Z axis is always based to the top (maximum LimitZ position).



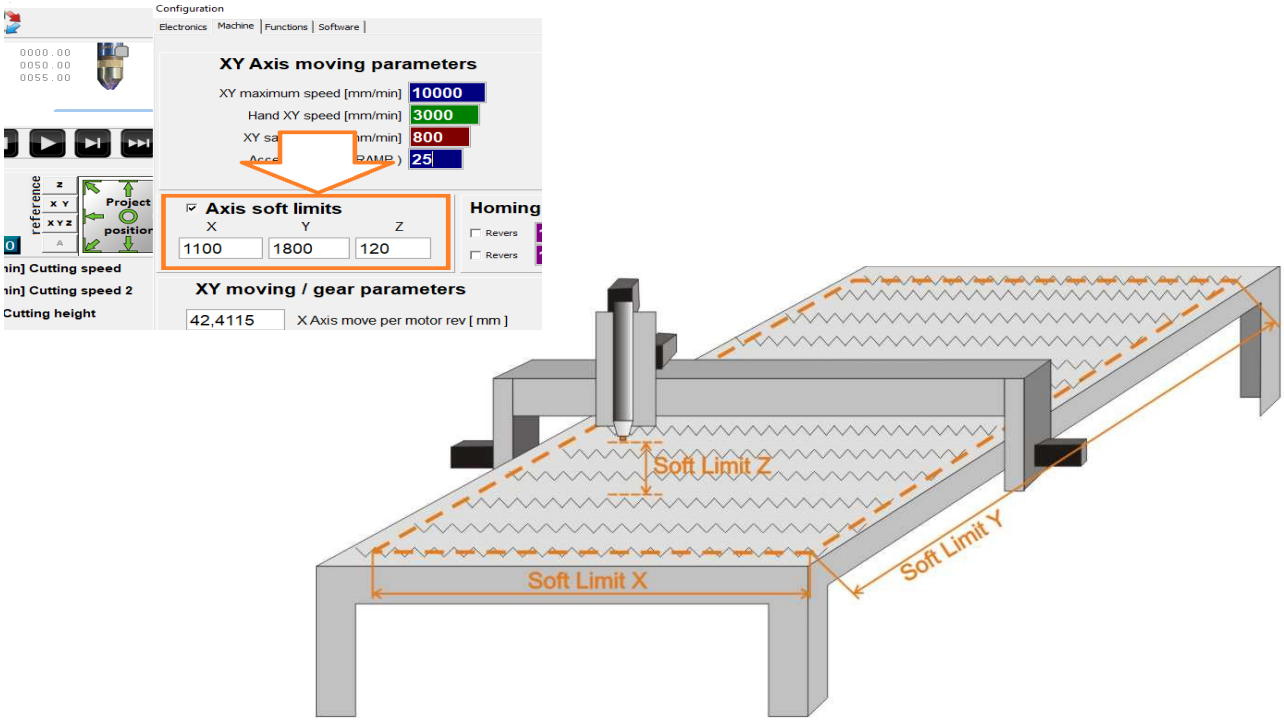
If the limit switches are working correctly, automatic basing can be tested. To do this, click the **Reference XYZ** button in the main programme window, which will start the basing procedure :

1) The Z-axis will be raised upwards (to the sensor), then descend from it and the **machine Z-coordinate ("small coordinates")** will be assigned the maximum value from the **Limit Z** position (120.00 in the example).
2) The X axis drive will be driven to the left (right when "Revers" is selected) until it meets a sensor, after which it will move off and assign **X machine = 0000,00** (or LimitX for "Revers" selected)
3) The Y-axis drive will be run down/up/away (up/away from us when "Revers" is selected) until it meets a sensor, after which it will descend and assign **Y = 0000.00** (or LimitY for "Revers" selected).



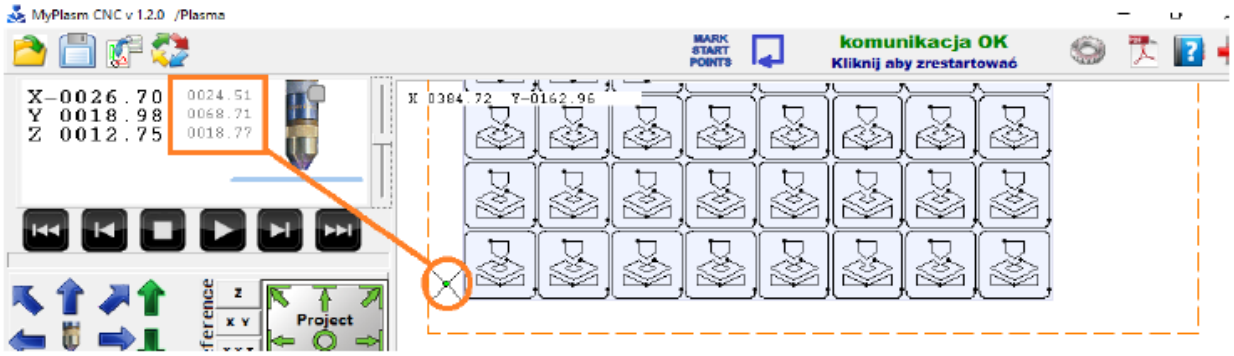
7.0 Soft Limits

Setting software limits allows the movements of the machine to be restricted to the actual working area only. To do this, the actual working ranges of each axis must be specified in the machine configuration, with the range of the Z axis calculated from the top position of the torch nozzle to the material grate.



In order for the function to work correctly, the machine must be base-set (see section 6) The working range of each axis must be entered in the "Machine" tab.

Limits are indicated in the main window by an orange dashed line and the coordinates of the current position in relation to the machine range in small font:



The machine's movements will be limited to the limit values. If you need to force the limits, click on the manual operation arrows with the **RIGHT MOUSE BUTTON.**

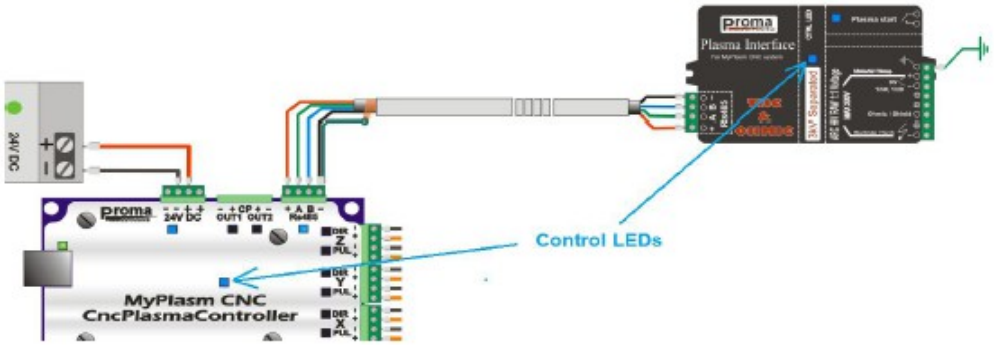
8.0 Connecting the plasma source

ATTENTION : The plasma source generates very high interference and voltages dangerous to health and life. Incorrect connection will irreversibly damage electronic components. The connection should be made by a qualified person. The voltage generated by HF/HV cutters exceeds 10,000V AC and the Blow-Back 200V DC. Poor contact between the clamp terminal and the material can irreparably damage the electronics.

A plasma interface is used to control the plasma source and to read the arc voltage, which isolates and protects the operator and the entire control system (including the computer) from dangerous voltages, as well as filtering out interference generated by the plasma arc.

8.1 Connecting the interface

The plasma module is powered from the controller's connector (**24V DC**) and transmission between the modules takes place via the **RS485** bus. The connection must be made with a four-wire shielded cable no longer than **10m**. The shield must be connected to the minus terminal on the CNC CONTROLLER side. A ground connection is required to eliminate surges and interference.

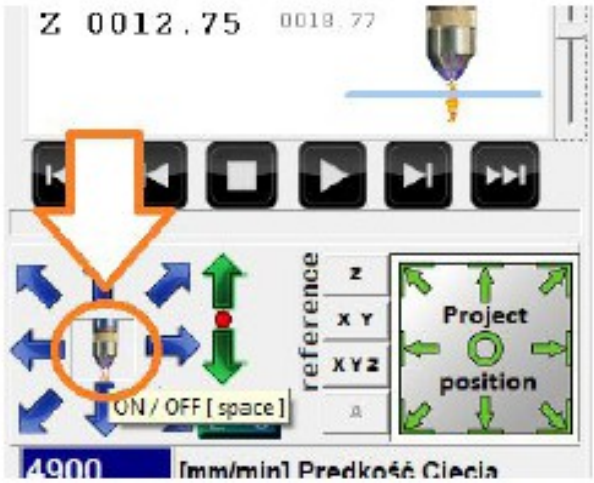


After activation of the plasma interface in the software, the correctness of the transmission between the modules is tested and, if correct, the blue control LEDs on both modules blink steadily for up to 1s (0.5s on, 0.5s off).

In the event of transmission problems, the lights blink in short flashes every 3s. And an RS485 communication error is displayed in the software.

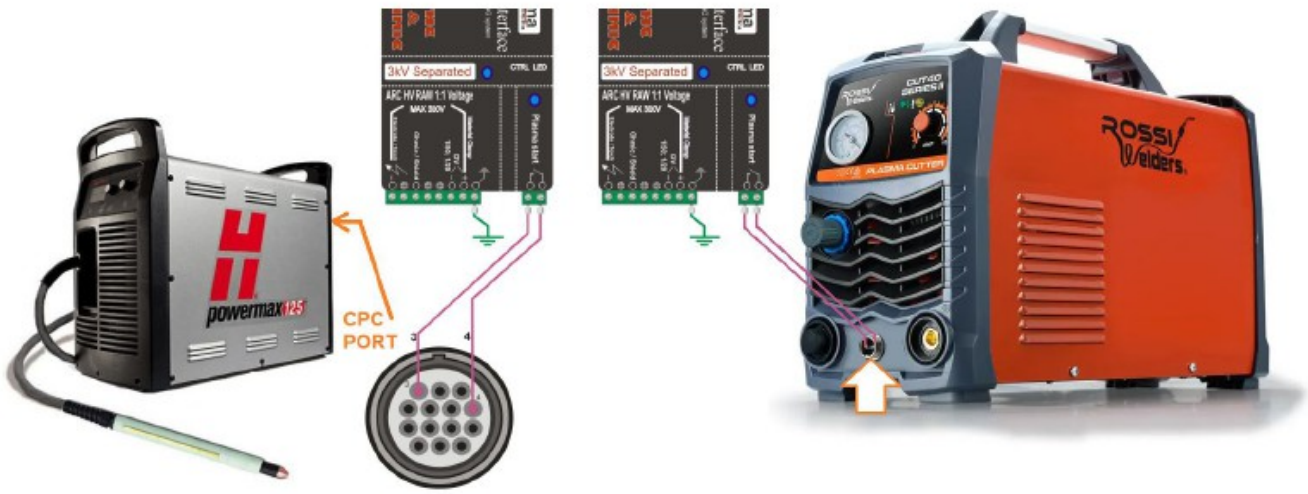
8.2 Arc striking control (Start / Stop)

With the SPACE key or by clicking on the button with the torch symbol, the interface relay responsible for switching on the arc can be activated.



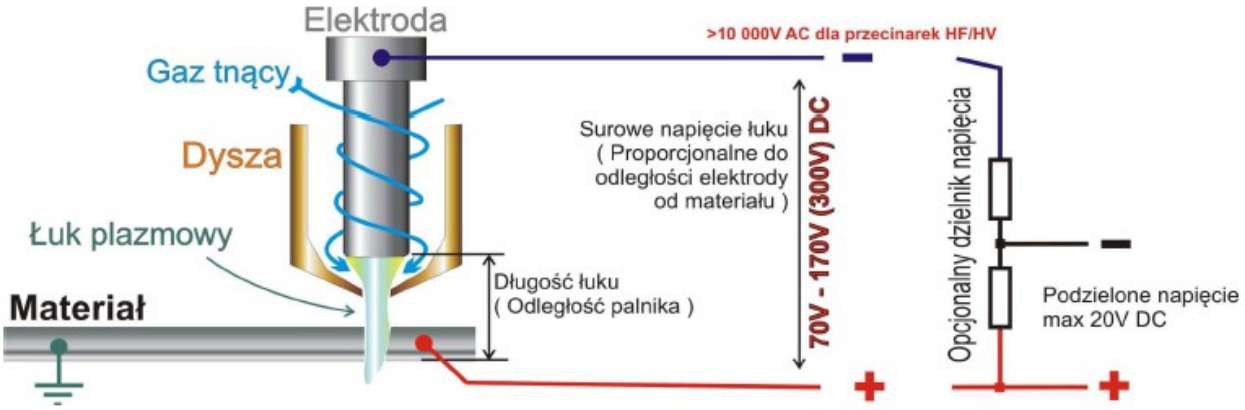
If the cutting machine has a CNC connector, check in the documentation which pins are responsible for switching on the arc (PLASMA START). For example, for the popular **Hypertherm PowerMax** series cutting machines (with **CPC** port) these are pins **3, 4.**

For cutters without a CNC port, these are usually the push button pins. In this case the wires leading to the button in the handle must absolutely be disconnected !



8.3 Measurement of plasma arc voltage.

The plasma arc voltage (70 - 170V DC*) is proportional to the distance of the electrode from the material being cut. This voltage is used by the SYSTEM to control the torch distance during cutting. This makes it possible to maintain a constant height during thermal distortion or uneven material alignment.



Cutters suitable for CNC applications usually have this voltage available at the CNC connector (CPC). Most (but not all) sources for CNC have a built-in voltage divider that delivers a reduced and safe voltage usually divided 1/50 or 1/20 to the connector.

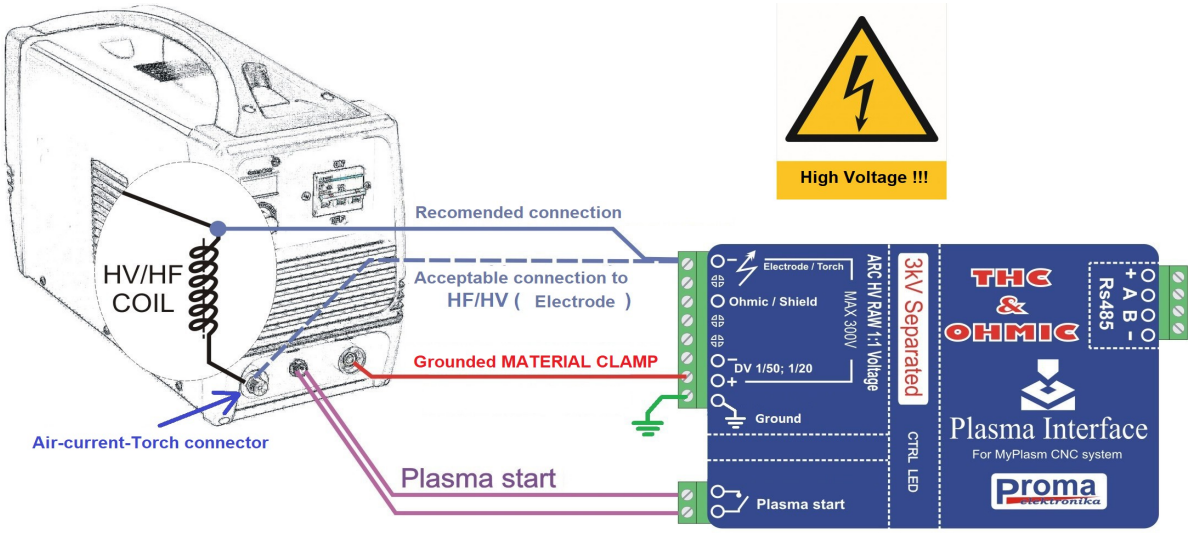
Important !!! Make sure what maximum voltage is present at the measurement connector. Connecting too high a voltage to the **DV connector (Max 20V)** will irreversibly damage the plasma interface.

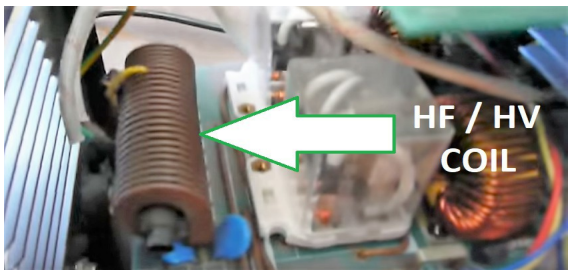
Connecting a plasma sources without voltage divider **(300V MAX)**

Warning !
Applying a 1:1 raw voltage to the DV terminals will damage the electronics.

Connection of plasma sources with voltage divider 1:50 **(20V MAX)**

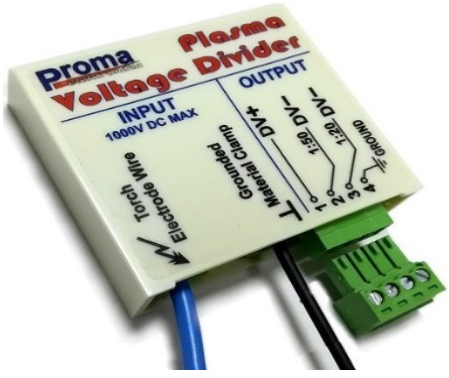
Interface can be connected directly to the external current connectors **to the plasma source, without CNC / Voltage Divider connector** Please note that the **PLUS** potential is the **MATERIAL CLAMP TERMINAL**) and the negative potential (**MINUS**) is fed to the **ELECTRODE of the** torch - usually via an air-current connector. **There may be high voltage on the electrode lead during arc ignition** and this lead should be **double insulated** - one strand of double core cable (2 x 0.75mm2 / 400V) can be used for this purpose leaving the outer insulation. The wires should be as short as possible (Interface mounted inside or at the plasma source). Due to the very high interference and overvoltage generated, it is recommended to connect the MINUS/ELECTRODE measurement cable before the HF/HV ioniser coil - this is usually the closest element to the torch connector.





Example of HF / HV coil

(transformer)

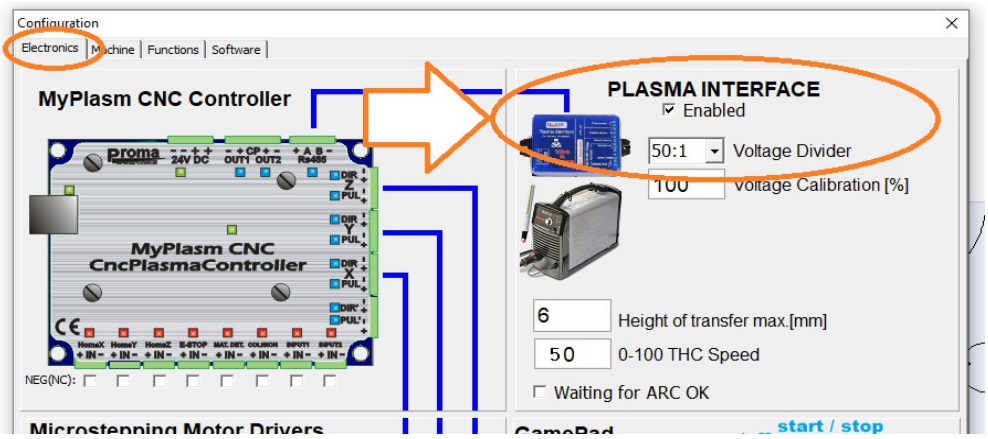


An optional voltage divider can also be fitted to equip the cutter with a low-voltage CNC port.

CLICK FOR MORE INFORMATION

8.4 Interface/source configuration

Depending on the method of connection and voltage division, select the appropriate multiplier value in the "Electronics" tab :



Voltage divider :

1:1 for cutters without voltage divider, raw arc voltage (measurement via high voltage terminals)

20:1 or **50:1** for cutters with voltage divider (measurement via **DV** low-voltage terminals)

Voltage calibration % - Adjustment to non-standard ratios (default 100)

Transfer height max - Determines the ability of the source / torch to initiate an arc - this parameter determines the maximum distance of the nozzle above the material at which the source is able to initiate the main arc. The system will limit the transfer height to this height. For example : when the piercing height of thick material is set to 10mm and the Transfer max is set to 6mm then the arc will be initiated at 6mm and then "stretched" to 10mm. For lower piercing height values the parameter will be ignored.

THC speed - Speed at which the cutting height is corrected by the THC controller (automatic height control based on arc voltage analysis). A value of 0-100 can be assigned rigidly, or by adding the **%** symbol at the end (**50%** for example), the speed will be proportionally calculated from the cutting speed.

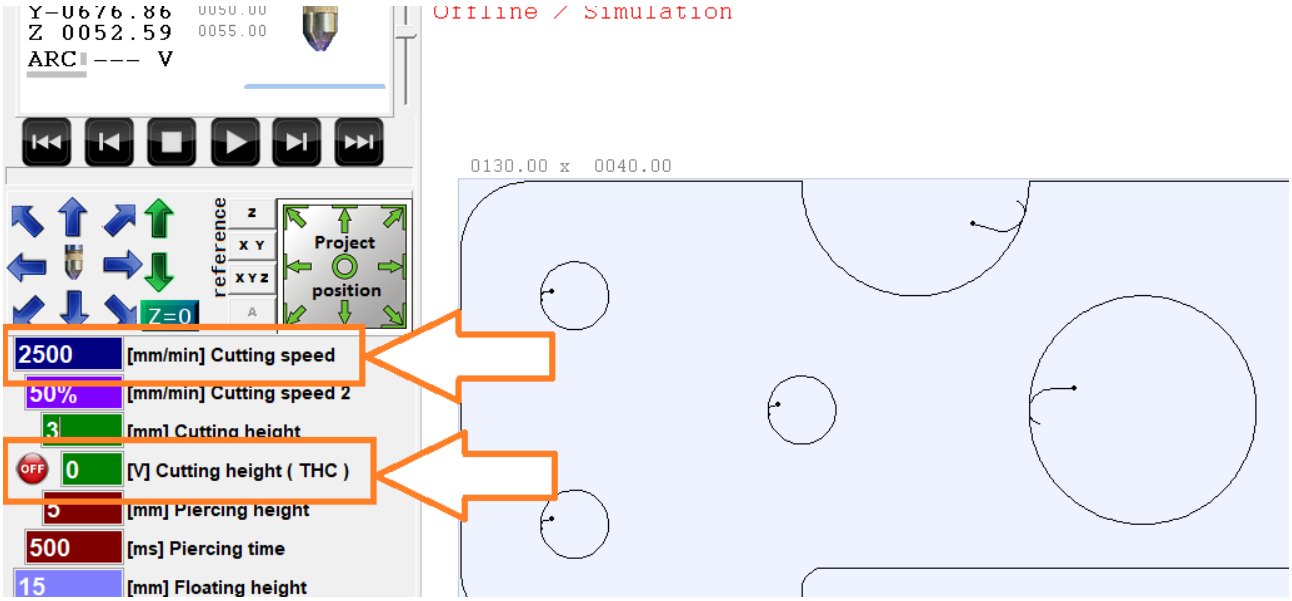
The best cut quality is achieved with as low a THC reaction speed as possible, but sufficient to correct the height of the torch over uneven material.

Wait for ARC OK feedback - When the plasma arc is switched on, the system waits for a stable ARC voltage measurement (detection of the main arc) before starting XY movement. For the first tests - disabled.

8.5 THC arc voltage measurement test.

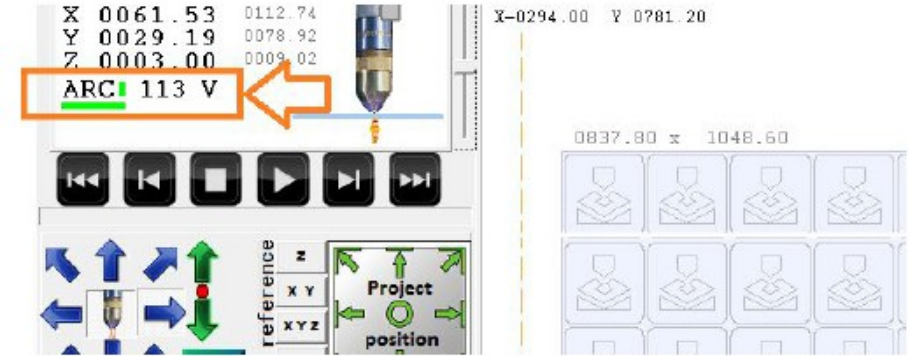
If everything has been connected correctly, the first test of the manual cut can be performed. To do this, please make a long simple "manual" cut and read the measured voltage that will be presented in the main program window under **ARC** :

. Lay the straight material about 2-3mm thick on the table. **REMEMBER TO HAVE GOOD CONTACT BETWEEN THE MASS CLAMP TERMINAL AND THE MATERIAL TO BE CUT.** Set the appropriate cutting parameters for the material such as current, pressure, etc. (according to the plasma source's instructions). In the cutting parameters, specify the cutting speed for the material (according to the source manual) and disable the **THC** height control :



Position the torch nozzle approx. 3mm above the material, switch on the plasma with the **SPACE key** and immediately start the movement (**X** or **Y**) with any arrow of the keyboard. After releasing the arrow key the plasma will be switched off.

When performing the test cut, observe the displayed **ARC** voltage, which should be **70 - 170 V***, other values indicate incorrect configuration and/or incorrect connection - stop the test cut immediately and ensure that everything has been connected and configured correctly (point **8.3 , 8.4**).

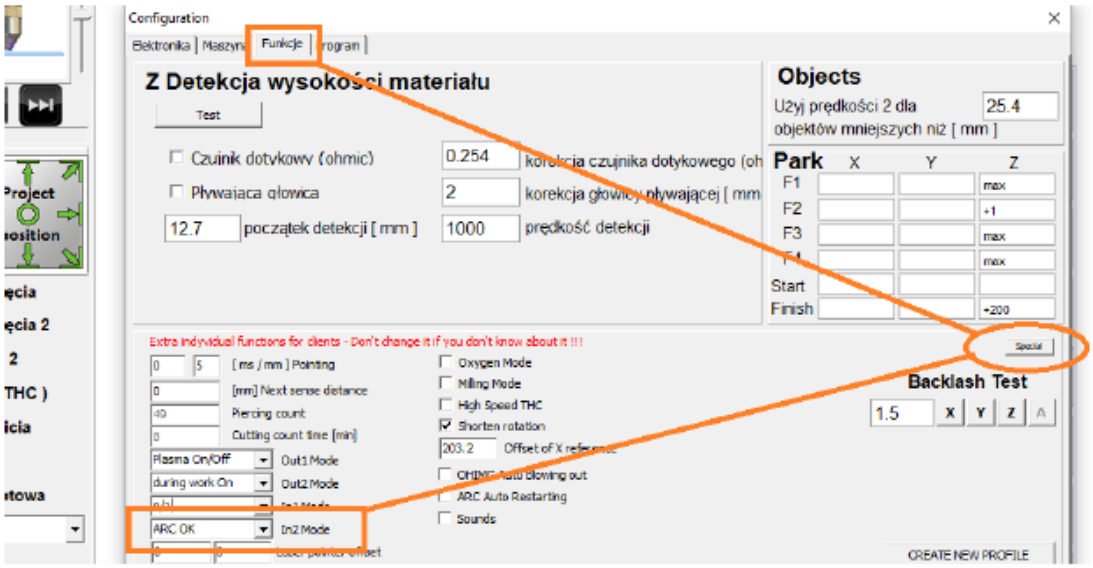


If there is a slight discrepancy in the readings, the readings can be corrected with the actual measurement in the Voltage Calibration parameter.

If everything is working correctly, a wait for the feedback signal can be switched on which will cancel the "delayed" plasma engagement in relation to the XY movement.

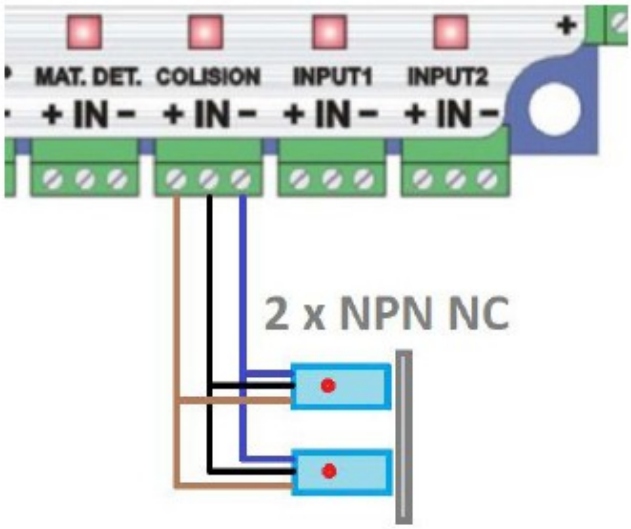
The signal confirming the main arc is generated automatically on the basis of the arc voltage analysis (**ARC**). It is not necessary to provide such a signal externally.

If you have problems with the correct detection of the main arc despite correct measurement, you can use the signal from the cutter (if the source has this option), usually called ARC OK, OK TO MOVE etc. by connecting them to **Input2 of the** MyPlasm CNC controller (**IN and MINUS pins**) and selecting the corresponding option in the special functions.



9.0 Anti-collision system

The MyPlasmCNC system allows the connection of anti-collision sensors, which stop the work if an obstacle is met. The torch should be mounted 'swinging' on the Z-axis to allow it to bend without damaging it and, at the same time, trigger the stop(s) or inductive sensors to be connected to the **COLLISION** input. This input does not require activation or configuration. It is only possible to select the type of **NO / NC** contacts on the electronics tab. The most common solution is 2 or 3 NPN / NC sensors connected in parallel, which are activated when the material (chuck element) is moved away from them, below is an example of a ready-made solution **CTH3T-01** from **ROBOT3T company**

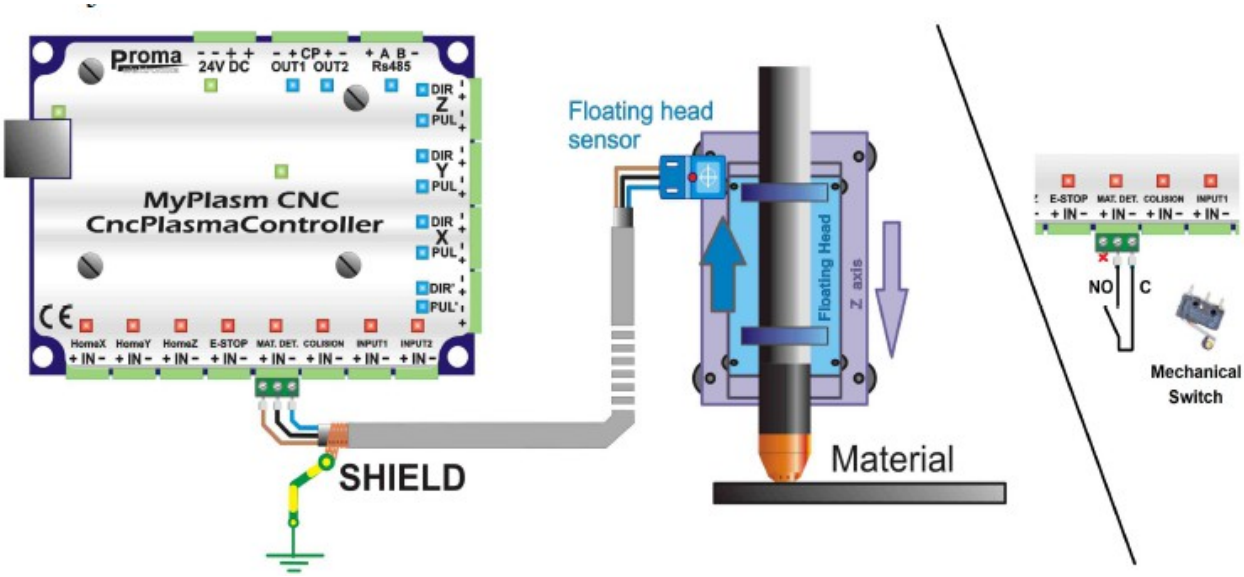


10.0 Material height detection

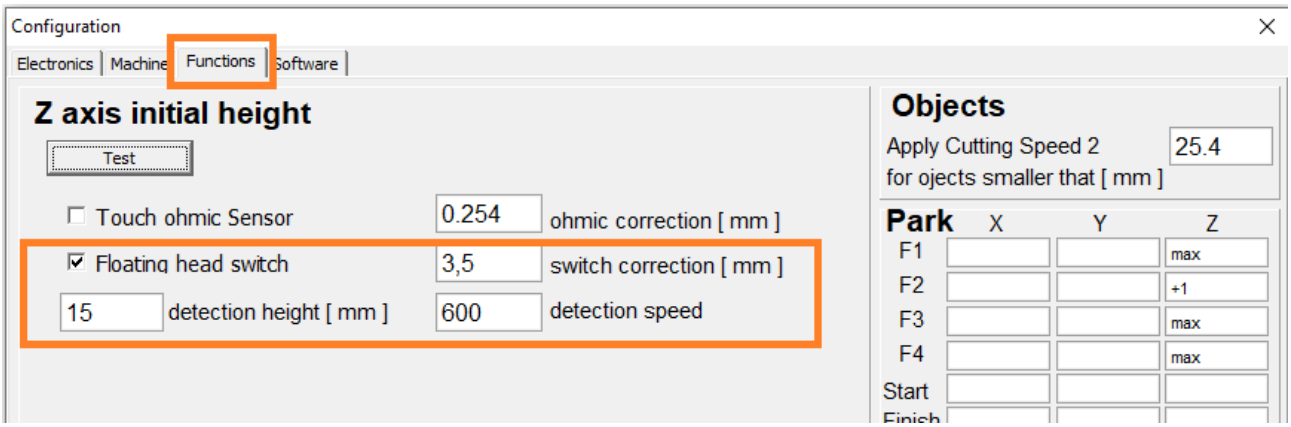
Automatic determination of the pre-set torch height above the material before cutting allows the torch to be set at the pre-set height above the material, even in the case of uneven or unevenly aligned material / thermal deformation, which cannot be taken into account in the programme. Detection can be implemented in two ways:

10.1 Floating Head

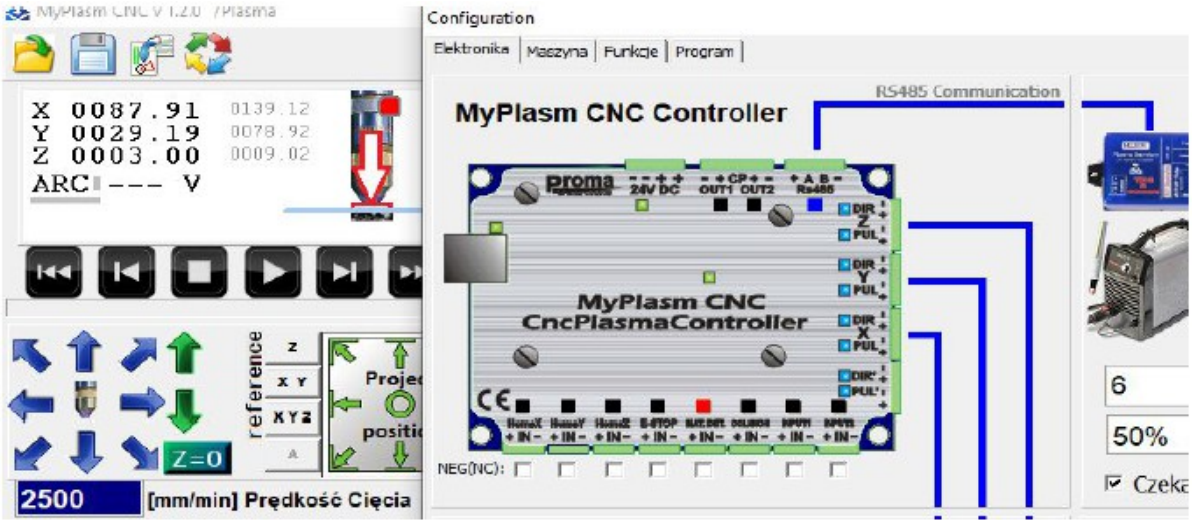
is a mechanical solution - consisting in placing the torch on an additional guide which allows the torch to be raised when it encounters material. This fact can be detected by a sensor/turnout switch connected to the material detection input : **MAT. DET.**



In the configuration tab - functions - select "floating head", enter the limit correction value (distance from the moment the material touches the sensor), the height above the material from which the "material search" will start and the speed at which detection will be performed.

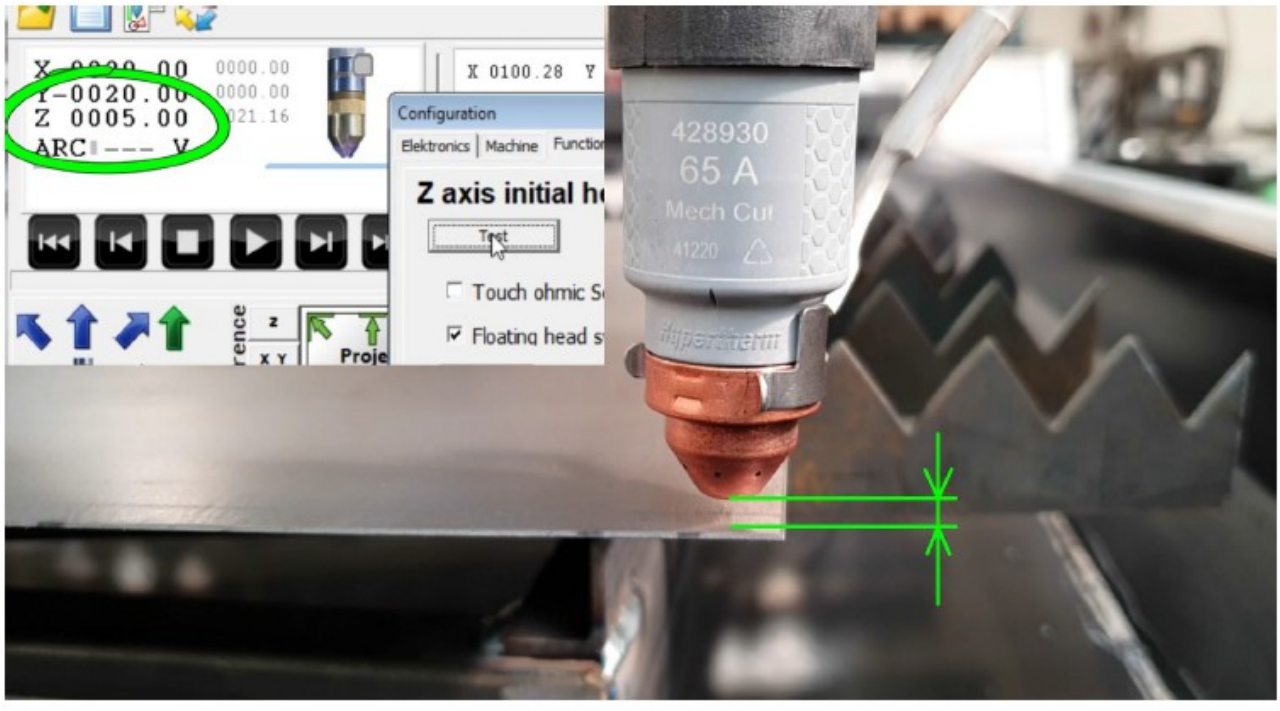


In order to test the correct operation of the function, make sure that the material detection input light lights up when the torch is lifted (sensor activation).



The material Z-coordinate should then be reset to zero - touch the material to the torch and click **Z = 0**,

Then click on the **TEST** button, as a result of which the torch will perform an automatic height detection of the material. Compare the indication of the Z-coordinate with the actual height of the nozzle above the material, which should be identical. If necessary, adjust the correction value.

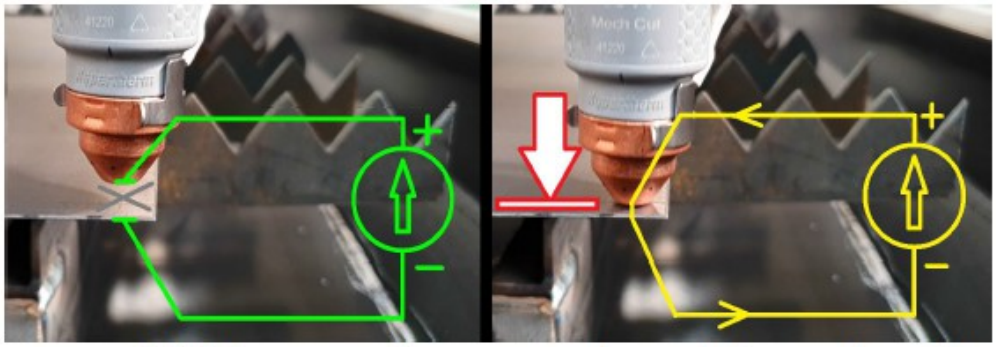


The disadvantage of a mechanical detection system is the relatively high force required to lift the head, which does not work for very thin materials that bend during detection.

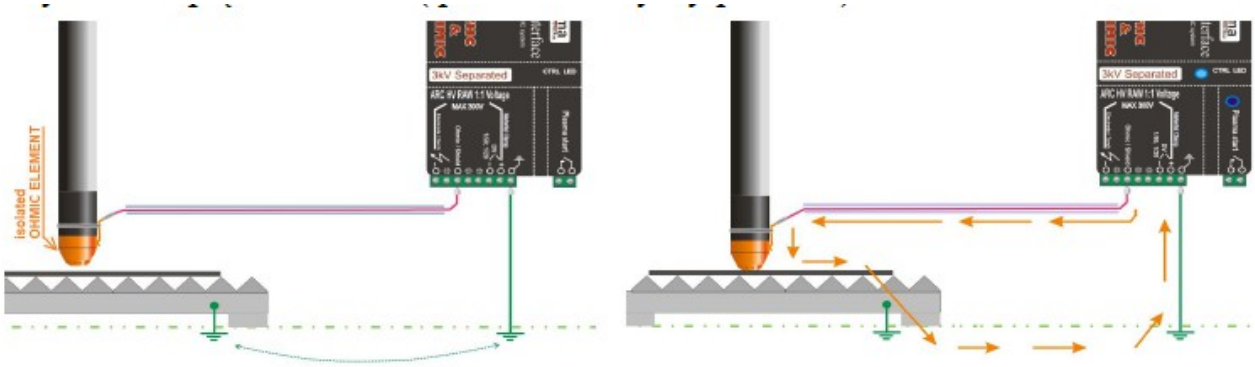
The tactile system (OHMIC) does not have this disadvantage.

10.2 OHMIC – touch / contact system.

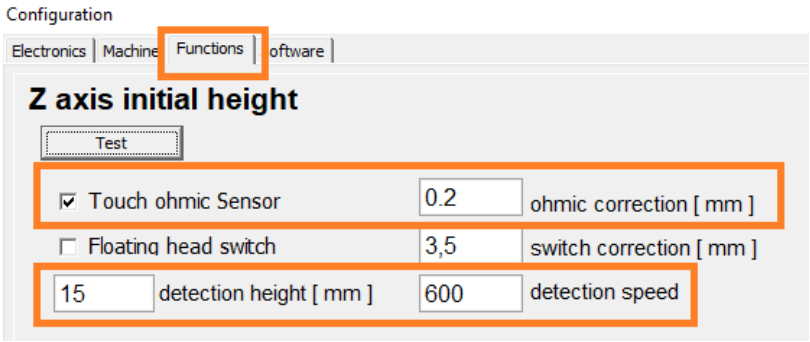
The OHMIC system is based on the closing of an electrical circuit when an **OHMIC** element isolated from the nozzle is touched **(not to be confused with the torch nozzle).**



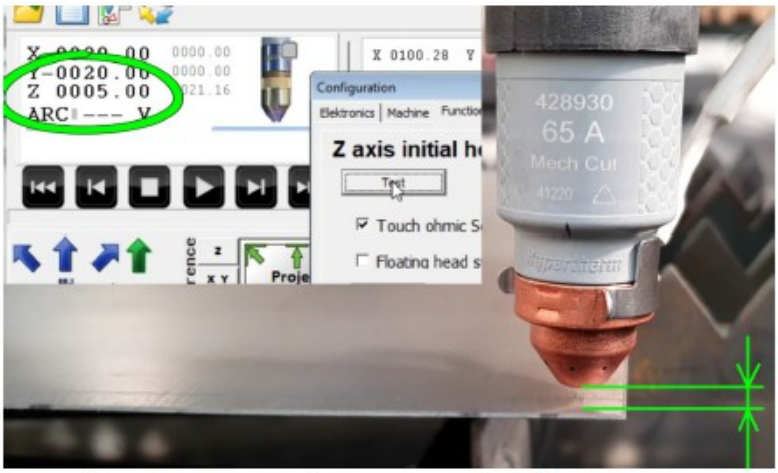
For the system to work correctly the machine (material) and the plasma interface must be earthed so that the circuit can be closed. For HF/HV sources, the cable leading from the OHMIC to the Interface should be adequately insulated (preferably double insulated) because high HF/HV voltages may appear on it (electric breakdown from the torch nozzle).



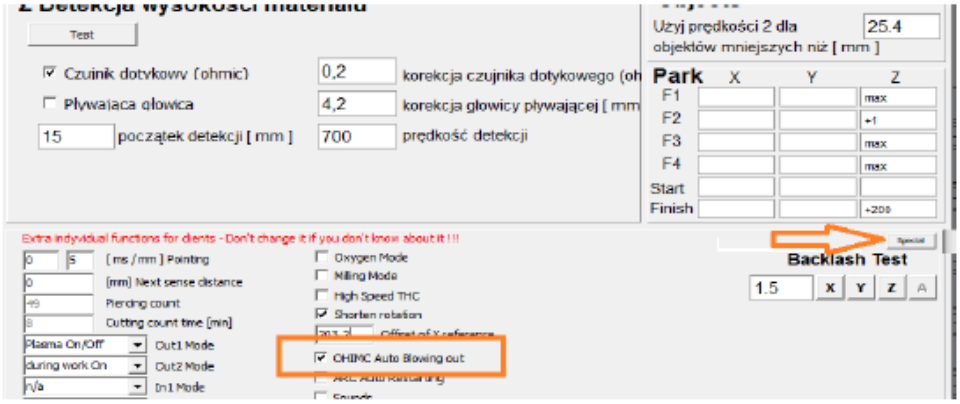
The configuration is similar to that of mechanical detection, and a touch to the material is signalled in the main program window as well as by the rapid blinking of the control LED of the plasma interface :



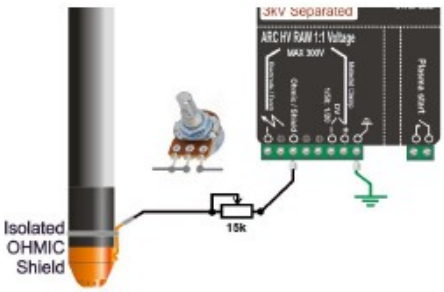
If the OHMIC circuit closure is correctly signalled then the detection function can be tested identically to the floating head:

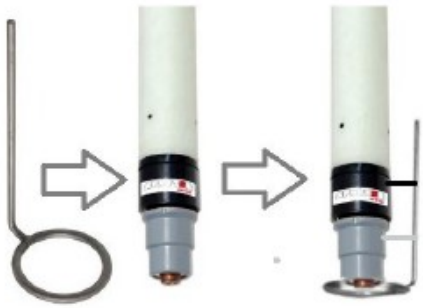


The disadvantages of the touch-trigger system are unreliability in the case of dirty materials and high sensitivity to splashing of the torch with metallic dust (from cutting), which can short-circuit the nozzle, closing the circuit and blocking further operation. The system has the ability to automatically purge the torch if a short circuit is detected before a measurement is attempted. The **OHMIC Auto purging out** function is found in the special functions :



For sources without HF/HV ignition, it is possible to reduce the sensitivity of the OHMIC system by mounting a 15k potentiometer in series.



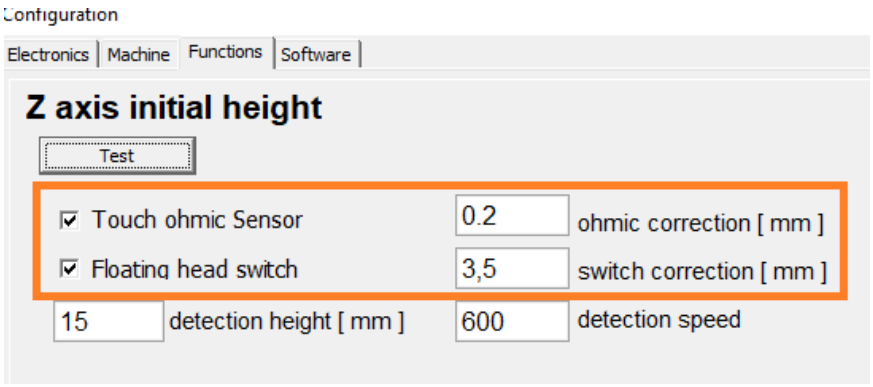


Opcja samodzielnego wykonania OHMIC

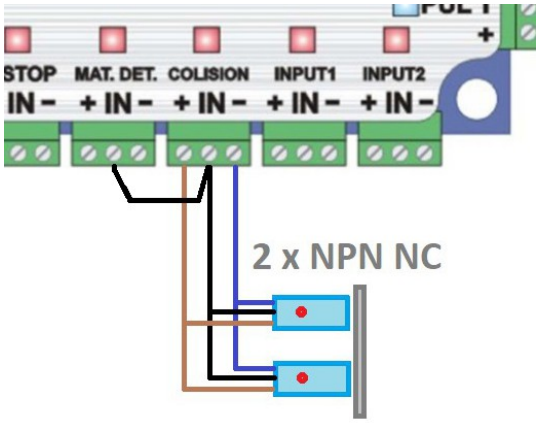
simple option for making an ohmic element

10.3 Combined OHMIC / Floating Head / collision system.

The best solution, which combines the advantages of both systems, is to use the two solutions simultaneously. Then, when the OHMIC sensor fails (no contact on the soiled material) the floating head sensor will work.

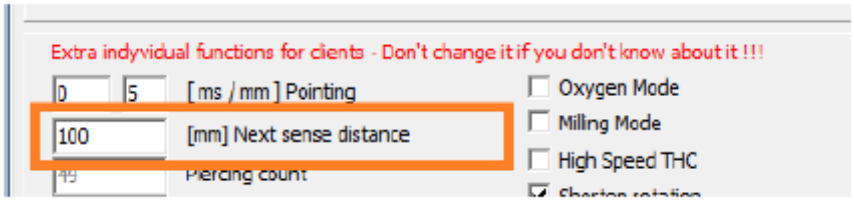


In this case it is possible to use the anti-collision system instead of the floating head (in cases where OHMIC fails) . It is sufficient to combine the **COLLISION** signal with the **MAT.DET**.



10.4 Limitation of detection frequency

In the special functions, it is possible to set the area within which detection will not be carried out in relation to the previous detection, i.e. if you specify a distance of 100mm, after detection within a 100mm radius, material will not be detected again and the system will assume that the material is at the same level as in the previous detection.



*Planned transfer of functions higher (beyond special functions)

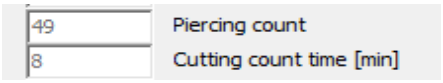
11.0 Special functions

11.1 Pointing

The function allows "pointing" of holes for subsequent drilling - all objects smaller than the defined value in the second box [mm] will be "scored" with plasma for the time [ms] defined in the first box. The effect of the centring (green crosses) can be checked by clicking Path analysis:

*Planned transfer of functions higher (beyond special functions)

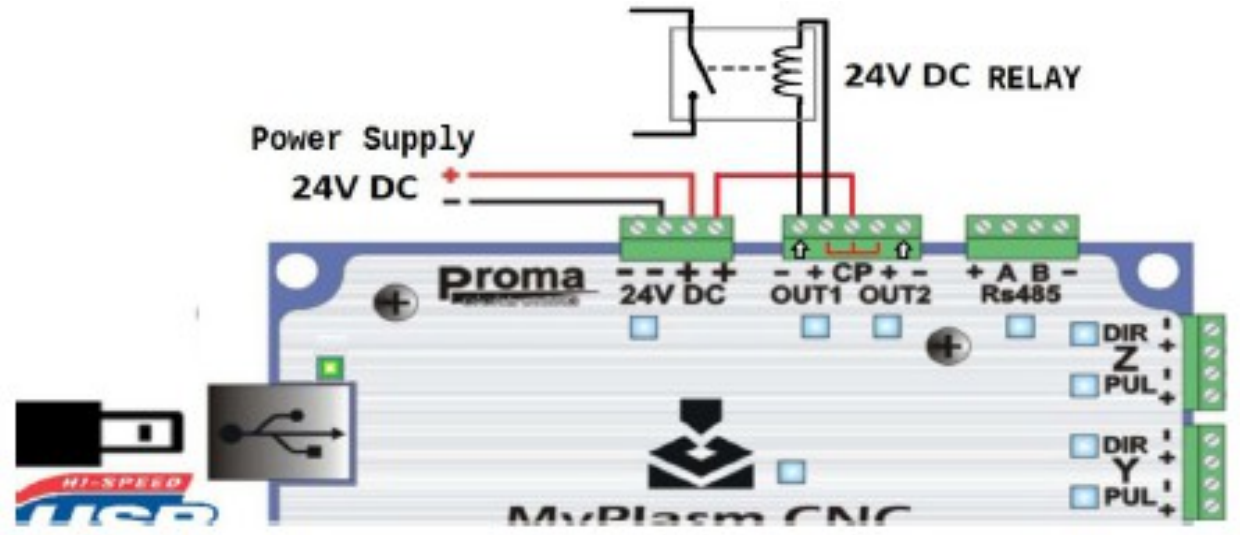
11.2 Running time counters, number of pierces



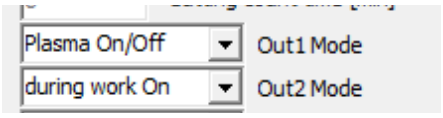
Counters can be reset/modified by double-clicking on the text.

11.3 Out1 / Out2 outputs of additional functions :

The outputs are of type **OC 0.5A / 30V** (active low / negative state) to terminal CP (Common Plus) the required output voltage must be specified, below is an example of the connection of a **24V DC** relay coil to output **OUT1**.



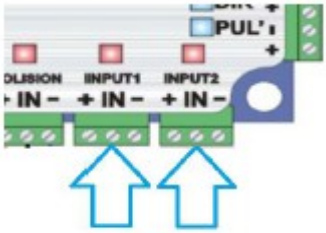
Output options :

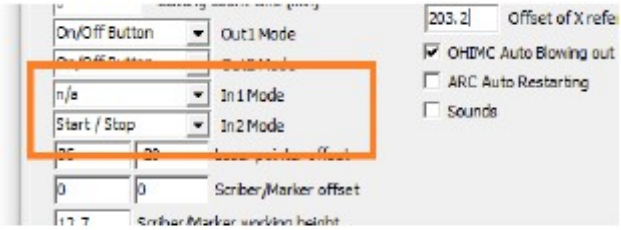


- **n/a** : Inactive
- **Plasma On/Off** : Equivalent output to the plasma switching output. Can use for gas/flame cutting output
- **During work on** : Output active during automatic operation.
- **On/Off button** : Output activated by its own button on the screen (possibility of defining its own button graphics: create file *Out1.bmp* or/and *Out2.bmp* in the profile folder.
- **Z axis down** : Signal of lowering the torch (for pneumatic Z axes)
- **Scribber / Marker** : Activate the engraving/marker function.

11.4 Functions of input1, input2

If the output of the fourth axis is active, input1 is assigned to operate the HOME limit/sensor of this axis.



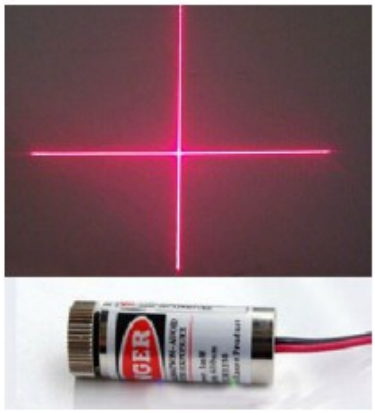


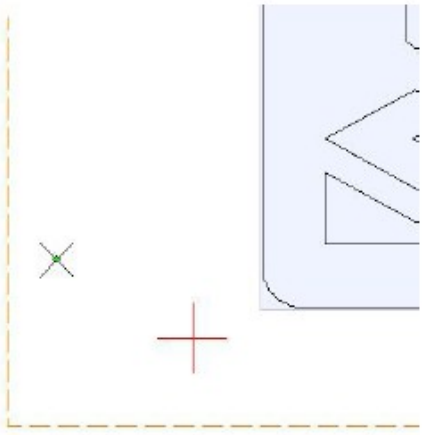
- **n/a** : Input not active
- **TorchUp / TorchDown** : obsolete function of the external THC
- **ARC OK** : Confirmation of main arc ignition from plasma source.
- **Start/Stop** : External push button Start/Stop automatic operation
- **ALARM** : alarm input (possibility to define your own text)

*If the fourth axis is used,
always **Input 1** is the HOME function for that axis.

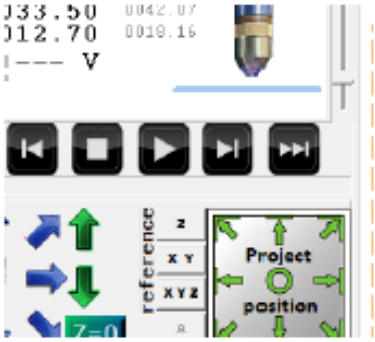
11.5 Laser pointer

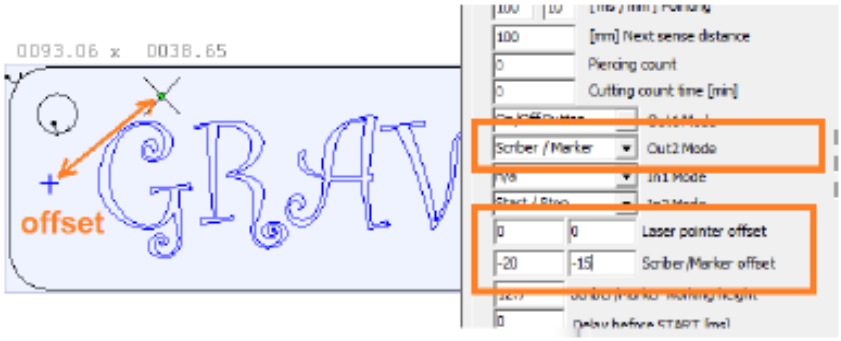
A convenient pointing tool (instead of the torch) is the laser pointer. This function is only for referencing the material position prior to actual cutting. If there is a need to enter an offset of the pointer (crosshair) with respect to the torch **axis, this** can be done in the special functions, which is represented by a red indicator in the project window, from now on positioning takes place with respect to the position of the laser pointer and not the torch .





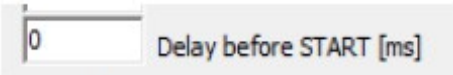
11.6 Engraving / Scribber





Parameters for height of Z-axis and offset (relative to torch axis) of engraving/describing tool - if active at output **Out1** or **Out2** (see section **11.3**) .

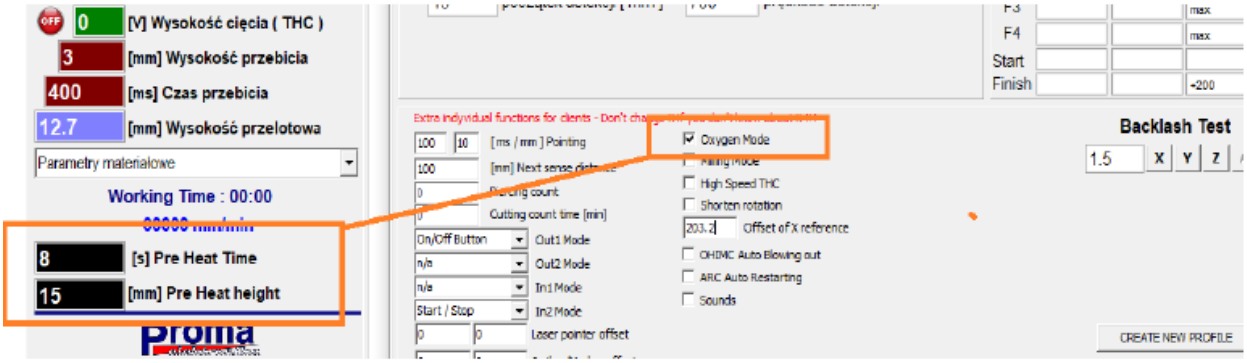
11.7 Start-up delay



The delay time for the start of automatic operation needed for external equipment e.g. smoke extractor fan

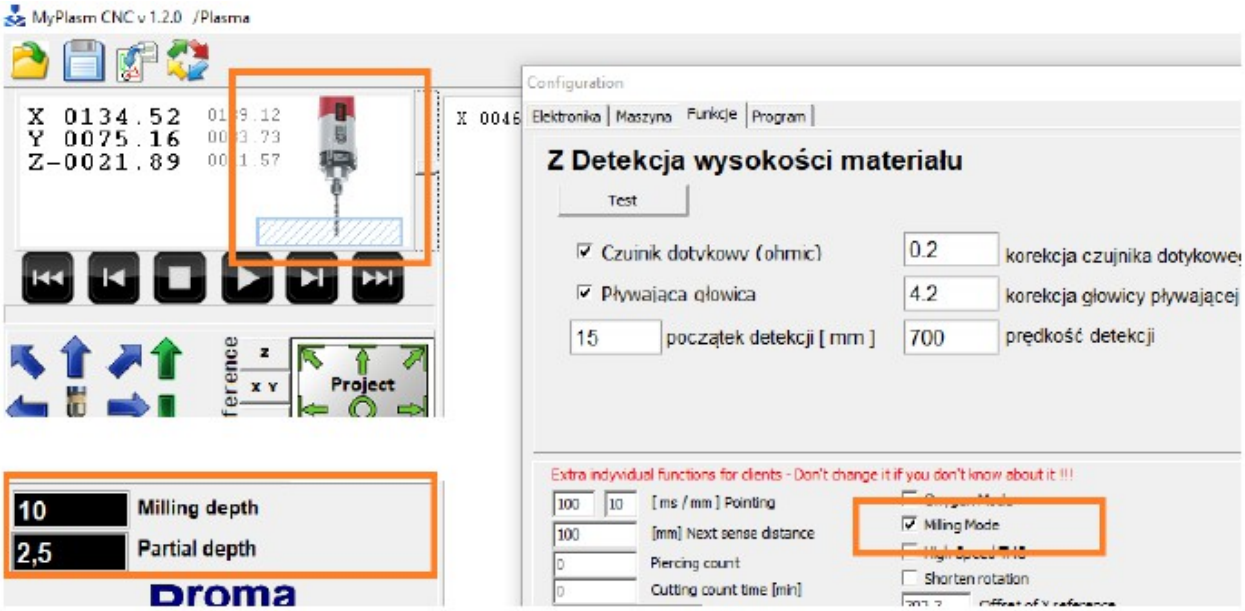
11.8 Gas cutting function

When the function is selected, an additional preheating option is available (to form a pond). Parameters available in the main programme window : Preheating time and height (before breakdown).Use output “plasma on/off” to control relay that manages cutting oxygen on.



11.9 Milling function

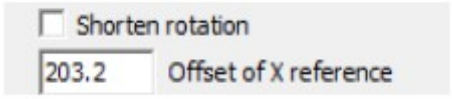
The system allows the operation of a milling machine for straight/flat 2D cutting. By activating the function, additional options such as target milling depth and grooving in a single pass are available.



11.10 Faster of THC response

As the name suggests - speeds up the THC which allows it to cut heavily deformed material or corrugated sheeting, for example. **Not recommended when cutting flat materials.** Slower THC operation = better cut quality.

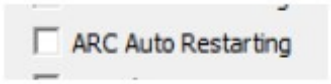
11.11 Rotary axis functions*



At the time of writing this manual, the rotary axis is not supported (BETA version). More info :

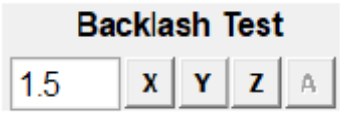
https://proma-elektronika.com/instructions/myplasm-cnc-system-rotary-axis/

11.12 Automatic arc restart



If no main arc is detected (ARC OK feedback signal), the system will retry.

11.13 Backlash testing



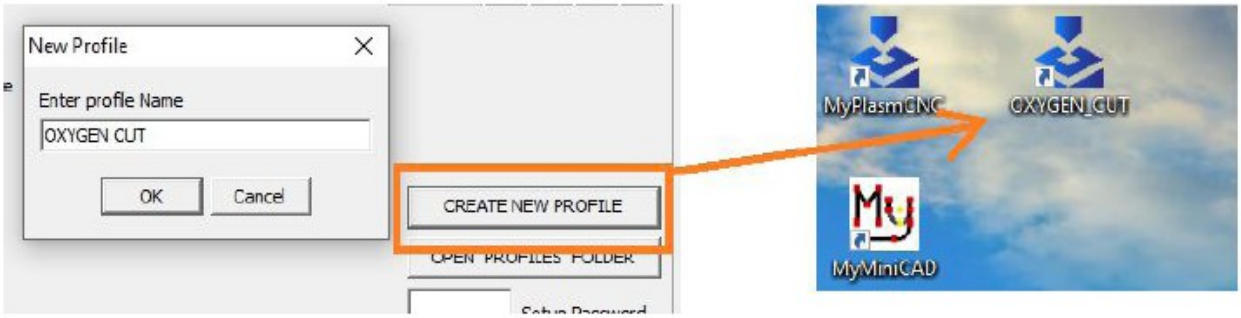
By making small movements with the motor left/right, it is possible to detect any backlash in the machine - the motor rotates but the Axis does not move as programmed. From this you can find mechanical problems to repair.

12.0 Profiles options

The programme allows the use of multiple program profiles, which greatly facilitates the use of the system if the machine is used in different ways. For example, there are separate program profiles for plasma cutting of flat sheets, gas cutting, milling or rotary axis cutting for tubes and sections. The currently used profile is displayed in the program title bar:

12.1 Creating a new profile

The button in the special tab creates a shortcut to a new profile. Starting the software with the new shortcut will create a new profile (all the data of the main “plasma” profile will be copied).

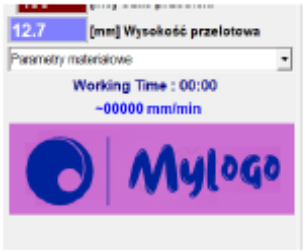


12.2 Configuration and profile data folder

All configuration data is stored in the PromaElektronika → MyPlasmCNC folder, which is located in the system folder **%ProgramData%** (by default, this is a hidden folder on the system drive **C:\ProgramData\PromaElektronika\MyPlasmCNC** .

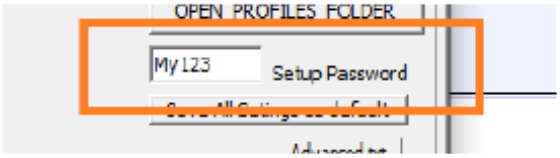
Quick access to profile folders using the button in “special” tab:

In the folder, you can edit the **logo.bmp** graphic for each profile**.**



12.3 Password protection of profile/configuration

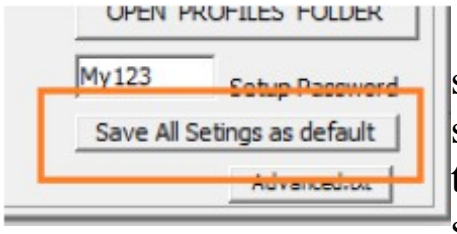
This function allows unauthorised access to the system configuration window to be blocked. Opening the window will require a password.



13 Recovery and data transfer

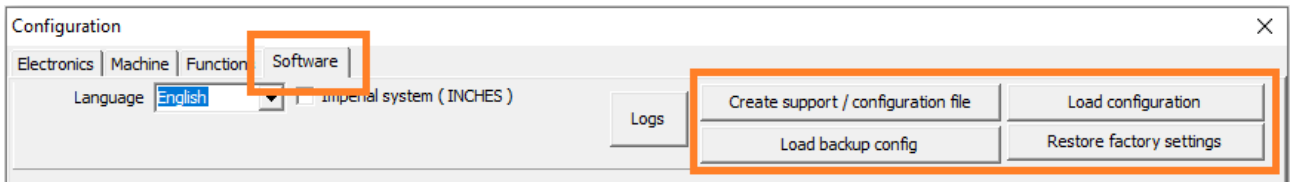
In chapter **12.2** above, the location of all data on the disk is given, which can be used for self-backup on external storage media.

The programme automatically performs backups and has several features to aid data recovery.



The special function saves the current system configuration as the default (factory setting) - the configuration will be restored to this point when the button " Restore factory settings" is clicked (see below).

***Use this feature only when the machine is properly configured.**



Restore factory settings - restores the configuration saved with the "Save All Settings as default" button from the special functions tab. If no such saving has been performed, the default settings of the programme will be restored (as if it had been newly installed). The material parameter database is not modified or deleted.

Create support file - The software configuration data is zipped (ZIP) and saved to the desktop - the file is ready to be emailed to support (contact@proma-elektronika.com).

Open configuration - allows the configuration to be recreated from the support file - both functions are also useful for transferring configuration data between profiles or computers.

Restore from Backup - Allows you to recover from Automatic Backups (by Copy Date) .

THIS IS THE FIRST ACTION THAT SHOULD BE TAKEN WHEN A FUNCTION HAS STOPPED WORKING PROPERLY.