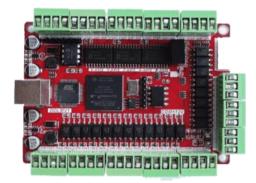
# **DrufelCNC**

DrufelCNC DDLM V1 (DDREAM) Installation Manual



DrufelCNC, 2021

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#### Annotation

This document is the user guide for the DrufelCNC software. The information contained in this document may be modified by employees of the company with the subsequent notification. Your changes are reflected in the document version. The company does not guarantee the absence of errors or typographical errors in this document, but will work to eliminate them, and will also be grateful to everyone who finds them and points to them.

Comments and suggestions to this document are accepted by email: social@drufelcnc.com. Document version - V.1.17.

#### **NOTICE OF LIABILITY**

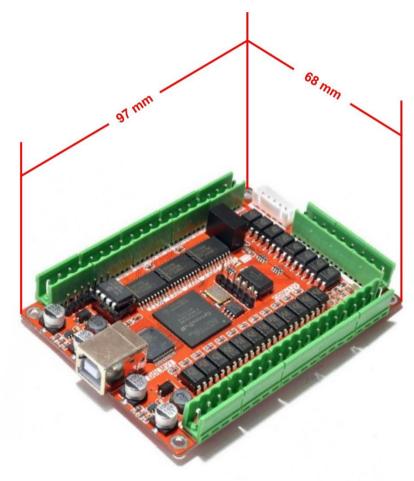
Using any CNC machine is a dangerous operation. All precautions must be taken, as the machines may turn on at any time, the software MAY malfunction at any time, any user of the Software must understand and take this into account, and must immediately uninstall the Software and not proceed with the installation if they are not fully understand all the consequences of the use, as well as the fact that in case of misuse, the wrong code, unexpected movement or any damage caused by the aforementioned consequences mi, there is no legal protection.

#### **1. Features**

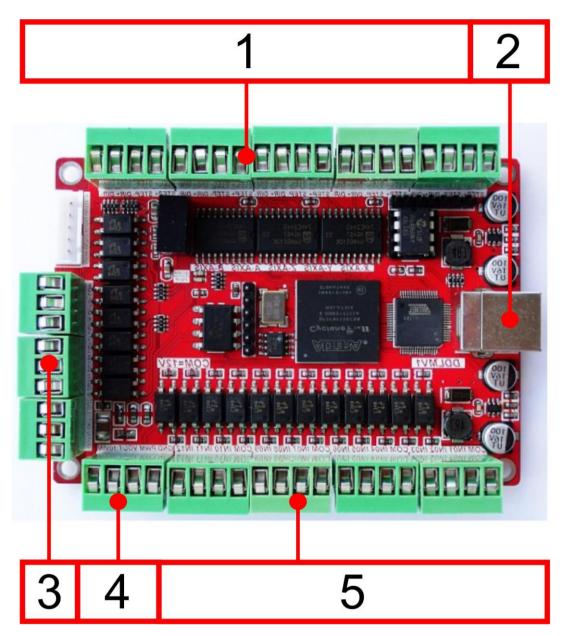
- Support for CNC controlled 5-Axis, can connect five stepper motor drivers or servo drives.
- 12 input interface.
- 8 output interface.
- Support for the operating system Windows XP, Windows 7 (32 / 64bit), Windows 8, Windows 10.
- Applicable to all versions of DrufelCNC software.

## 2. Appearance

The board Size is: 97x68x20mm.

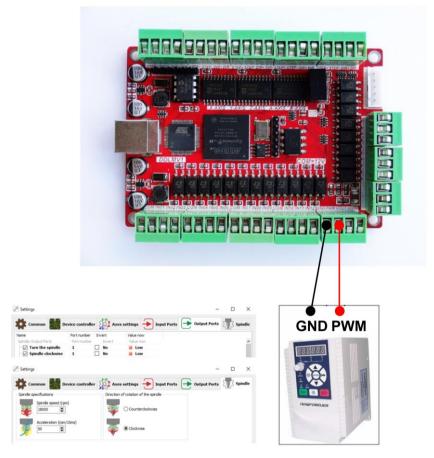


#### 3. Product connection define and method



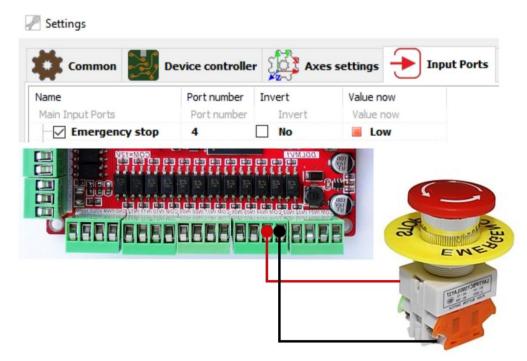
- **1** Stepper motor control interface.
- 2 USB Port.
- 3 Common IO output interface.

#### 4 - Spindle Control Output Port.

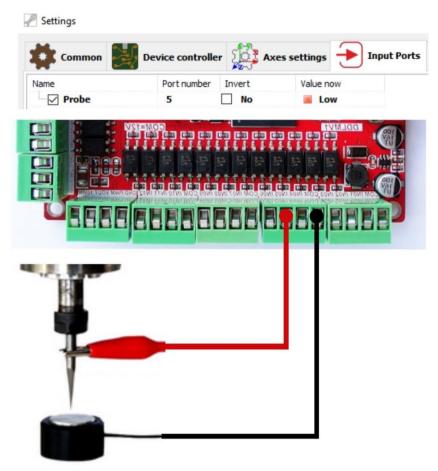


#### 5 - Input Ports.

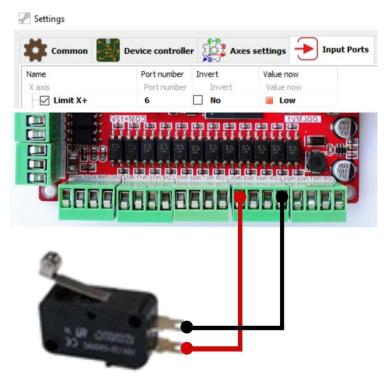
**Estop input connection** 



#### **Probe input connection**

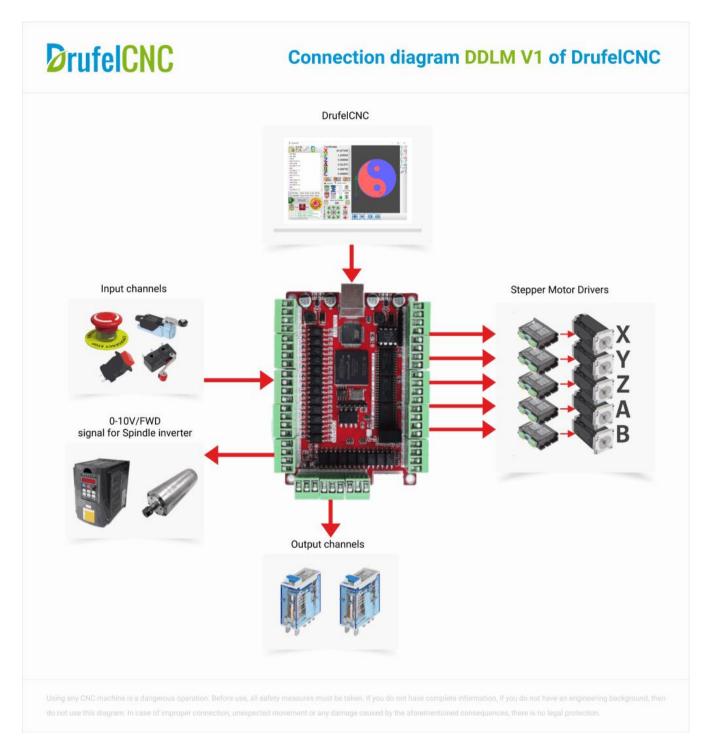


## End switch input connection

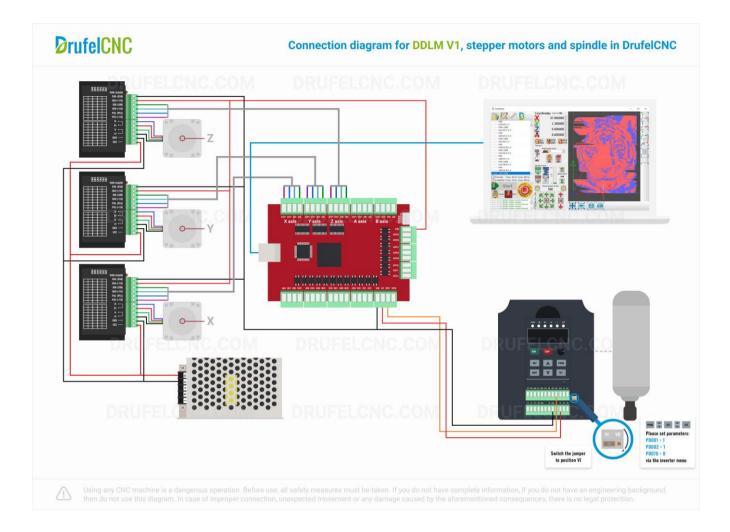


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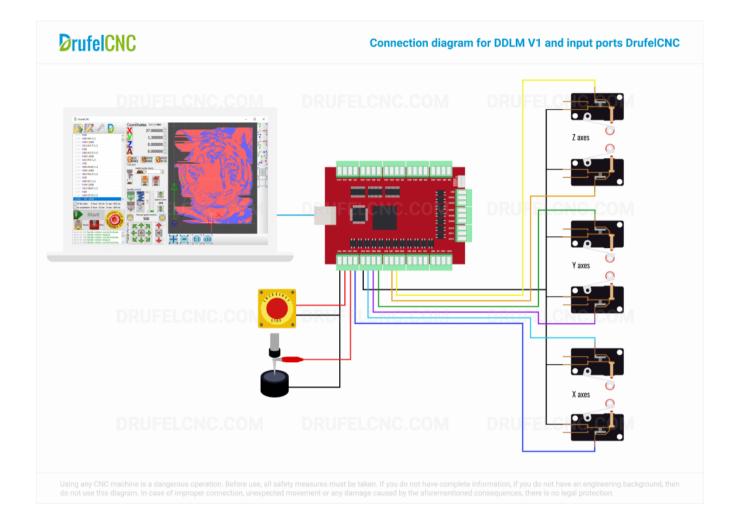
## 4. Basic connection diagram



## 5. Connection diagram stepper motors and spindle



## 6. Connection diagram input ports



## 7. Installing DrufelCNC

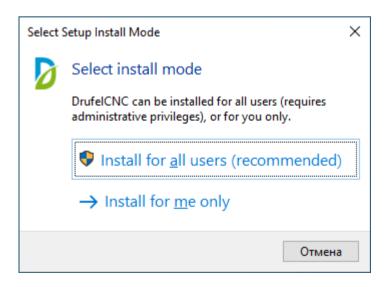
To install the program you need to download the installation files on the official website www.drufelcnc.com. You can use one of the following files:

- DrufelCNC\_installer\_x64.exe, DrufelCNC\_installer\_x32.exe this installation file will automatically install DrufelCNC on your computer documentation and examples of g-codes;
- DrufelCNC.zip archive with DrufelCNC x32 and x64 with examples and documentation.

Run the desired file and follow the installation instructions.

#### **Description of the installation process**

**1**. *Start the installation process.* In this installation window you need to select the program installation mode.



2. *License Agreement.* The License Agreement installation window contains the text of the license agreement for the use of the DrufelCNC software product. Please read the agreement and select "I accept the terms of the license agreement". To continue the installation, click "Next." During the entire installation process, to return to the previous installation step, click the Back button. To exit the installer, click Cancel.

| Setup - DrufelCNC version 1.17 -  |             | ×      |
|---|-------------|--------|
| License Agreement<br>Please read the following important information before continuing.   |             | Ø      |
| Please read the following License Agreement. You must accept the terms of this agreement befo<br>continuing with the installation.  | re          |        |
| LICENSE AGREEMENT<br>DrufelCNC software   |             | ^      |
| NOTICE OF LIABILITY   |             |        |
| Using any CNC machine is a dangerous operation. All precautions must be taken, as the machine turn on at any time, the software MAY malfunction at any time, any user of the Software must understand and take this into account, and must immediately uninstall the Software and not pro with the installation if they are not fully understand all the consequences of the use, as well as fact that in case of misuse, the wrong code, unexpected movement or any damage caused by t aforementioned consequences mi, there is no legal protection. | ceed<br>the |        |
| TO GET THE PERMISSION TO STARTING ON ANY MACHINE, YOU MUST AGREE WITH THE FOLLOWING:  |             |        |
| I agree that no one except the owner of this car will under any circumstances be responsible for<br>operation_safety and use of this machine. Lagree that there is no situation in which I would con  |             | ~      |
| <ul> <li>I accept the agreement</li> </ul>  |             |        |
| ○ I do not accept the agreement   |             |        |
| Next >  | (           | Cancel |

**3.** Select the directory in which the installation will be made. At this stage of the installation, you must specify the directory in which DrufelCNC will be installed. The default installation directory is "C:\Program Filies\DrufelCNC".

If you wish, you can specify any other path. Depending on the version of Windows, the default path may be different. To continue the installation, click "Next."

| Setup - DrufelCNC version 1.17   | _   |      | ×    |
|--|-----|------|------|
| Select Destination Location<br>Where should DrufelCNC be installed?                    |     |      | Ø    |
| Setup will install DrufelCNC into the following folder.                                |     |      |      |
| To continue, click Next. If you would like to select a different folder, click Browse. |     |      |      |
| C:\Program Files\DrufelCNC   | Br  | owse |      |
|  |     |      |      |
|  |     |      |      |
|  |     |      |      |
|  |     |      |      |
|  |     |      |      |
|  |     |      |      |
| At least 15.0 MB of free disk space is required.                                       |     |      |      |
| < Back Nex   | t > | Car  | ncel |

4. *Selection of additional installation parameters.* At this stage of installation, it is necessary to determine the need to create program shortcuts on the desktop. By default, a program shortcut will be created. To continue the installation, click "Next."

| Setup - DrufelCNC version 1.17  |            | _             |       | ×     |
|---|------------|---------------|-------|-------|
| Select Additional Tasks<br>Which additional tasks should be performed?      |            |               |       | Ø     |
| Select the additional tasks you would like Setup to perform while installin | ng DrufelC | NC, then dick | Next. |       |
| Additional shortcuts:   |            |               |       |       |
| Create a desktop shortcut   |            |               |       |       |
|   |            |               |       |       |
|   |            |               |       |       |
|   |            |               |       |       |
|   |            |               |       |       |
|   |            |               |       |       |
|   |            |               |       |       |
|   |            |               |       |       |
|   |            |               |       |       |
| <1  | Back       | Next >        | Ca    | incel |

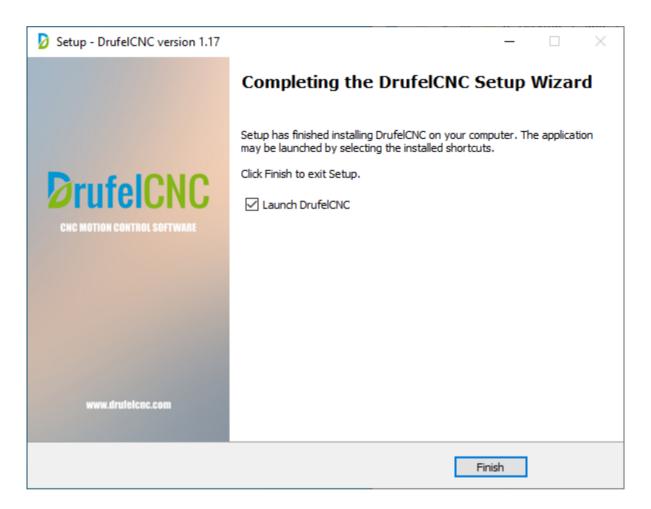
**5.** *Preparing for installation.* A window with information about the selected installation type, selected components and installation directory will be displayed. Check the information and click "Install."

| D Se | etup - DrufelCNC version 1.17 -   | _       |      | $\times$ |
|------|---|---------|------|----------|
|      | ady to Install<br>Setup is now ready to begin installing DrufelCNC on your computer.              |         |      | Ø        |
|      | Click Install to continue with the installation, or click Back if you want to review or change an | y setti | ngs. |          |
|      | Destination location:<br>C:\Program Files\DrufelCNC   |         | -    |          |
|      | Additional tasks:<br>Additional shortcuts:<br>Create a desktop shortcut                           |         |      |          |
|      | <   |         | >    |          |
|      | < Back Install  |         | Car  | ncel     |

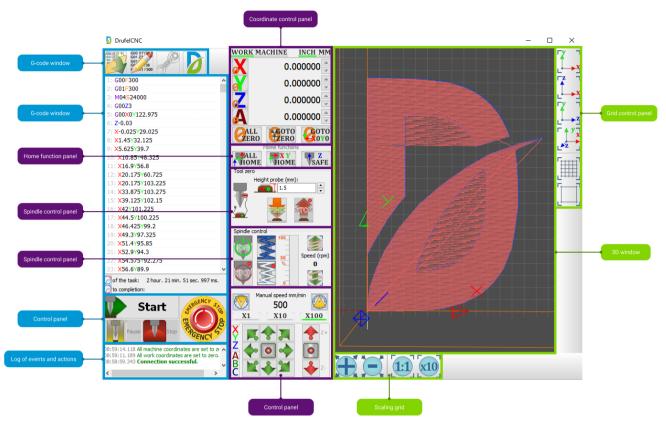
| Setup - DrufelCNC version 1.17  | _ |    | ×     |
|---|---|----|-------|
| Installing<br>Please wait while Setup installs DrufelCNC on your computer.                        |   |    | Ø     |
| Creating shortcuts<br>C: \ProgramData \Microsoft \Windows \Start Menu \Programs \DrufelCNCx64.lnk |   |    |       |
|   |   |    |       |
|   |   |    |       |
|   |   |    |       |
|   |   |    |       |
|   |   |    |       |
|   |   |    |       |
|   |   | Ca | incel |

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**6.** *The final stage of installation.* At the last stage, the installation program will report the result and will offer to start the programs depending on the type of installation selected earlier. By default, you can run the program. To complete the installation, click Finish.



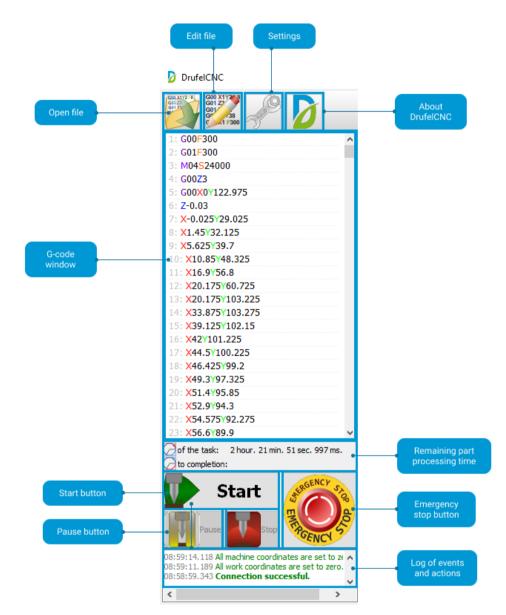
## 8. DrufelCNC interface



The DrufelCNC interface can be divided into three blocks:

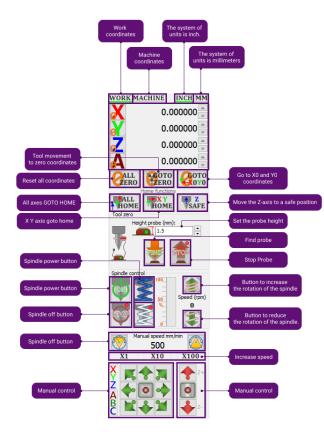
- 1. G-code window
- 2. Base functions
- 3. 3D window

#### G-code-window:



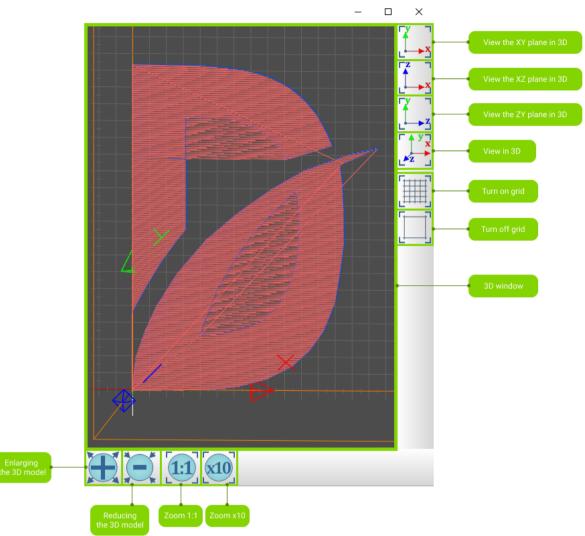
| Functions           | Description             |
|---------------------|-------------------------|
| Open file           | Open file button        |
| Edit file           | Edit g-code file button |
| Settings            | Function setting button |
| About DrufelCNC     | DrufelCNC information   |
|                     | button                  |
| G-code window       | Display of G-code       |
| Start               | Start button            |
| Pause               | Pause button            |
| Remaining time part | Remaining part          |
|                     | processing time         |
| Emergency stop      | Emergency stop          |
|                     | button                  |
| Log of events and   | Log of events and       |
| actions             | actions                 |

#### Base functions:



| Functions            | Description            |
|----------------------|------------------------|
| Work coordinates     | Activating work        |
|                      | coordinate mode        |
| Machine coordinates  | Activating machine     |
|                      | coordinate mode        |
| Inch                 | Activating inch mode   |
| Millimeters          | Activating millimeter  |
|                      | mode                   |
| All zero             | Reset all coordinates  |
| Go to home           | Tool movement          |
|                      | to zero coordinates    |
| Go to X0 Y0          | Go to X0 and Y0        |
|                      | coordinates            |
| All home             | All axes GOTO HOME     |
| X Y home             | X Y axis goto home     |
| Z safe               | Move the Z-axis to a   |
|                      | safe position          |
| Set the probe height | Set the probe height   |
| Find probe           | Find probe             |
| Stop Probe           | Stop Probe             |
| Button to increase   | Button to increase     |
| the rotation of the  | the rotation of the    |
| spindle              | spindle                |
| Button to reduce     | Button to reduce       |
| the rotation of the  | the rotation of the    |
| spindle.             | spindle.               |
| Spindle power        | Spindle power button   |
| Spindle off          | Spindle off button     |
| Turn on cooling      | Turn on cooling button |
| Turn off cooling     | Turn off cooling       |
| runn on cooling      | button                 |
| Panel manual speed   | Panel manual speed     |
| Manual control axes  | Manual control axes    |
| Manual control z     | Manual control z axes  |
| axes                 |                        |
| Increase speed       | Increase speed         |
| Decrease in spindle  | Button to reduce       |
| rotation             | the rotation of the    |
|                      | spindle                |
| Increase spindle     | Button to increase     |
| rotation             | the rotation of the    |
|                      | spindle                |
| Stop Probe           | Stop Probe button      |
| Find probe           | Find probe button      |
| Set the probe height | Probe height button    |
|                      |                        |

## 3D window:



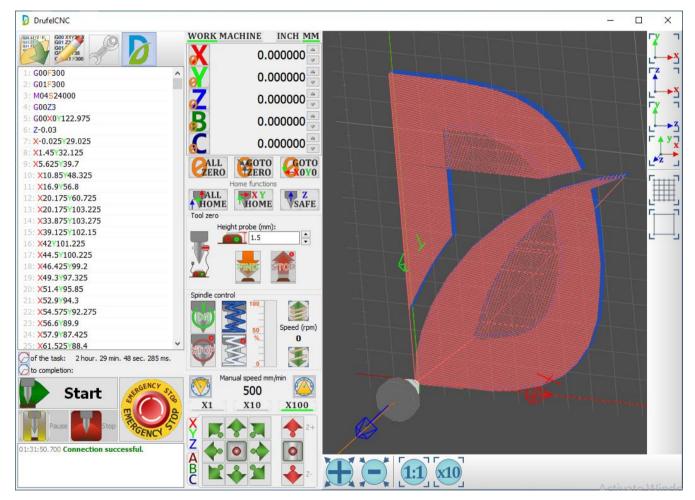
| Functions      | Description             |
|----------------|-------------------------|
| Scale 3D model | Scale 3D model button   |
| Reducing       | Reducing                |
| the 3D model   | the 3D model button     |
| Zoom 1:1       | Zoom 1:1 button         |
| Zoom x10       | Zoom x10 button         |
| 3D window      | Display of 3D-model     |
| нTurn off grid | Turn off grid button    |
| Turn on grid   | Turn on grid button     |
| View in 3D     | View in 3D button       |
| ZY plane in 3D | View the ZY plane in 3D |
| XZ plane in 3D | View the XZ plane in 3D |
| XY plane in 3D | View the XY plane in 3D |

#### 9. Run the program

To run the program, use the version depending on the bitness of your operating system:

- DrufelCNCx32.exe version for 32-bit operating systems
- DrufelCNCx64.exe version for 64-bit operating systems

The main window of the program.



In the lower left corner displays the status of the connection to the USB controller, and other informational messages.

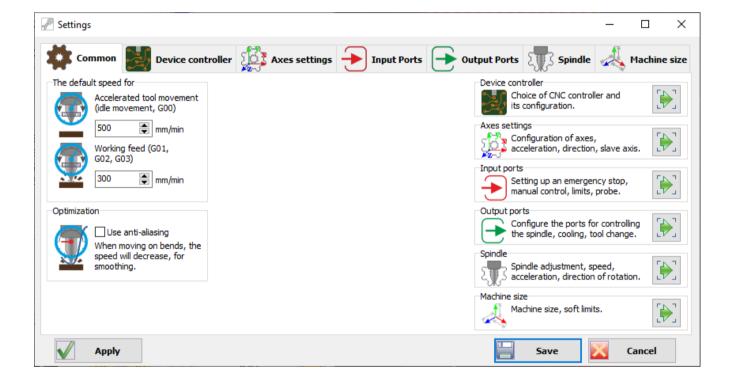
#### 10. Customization

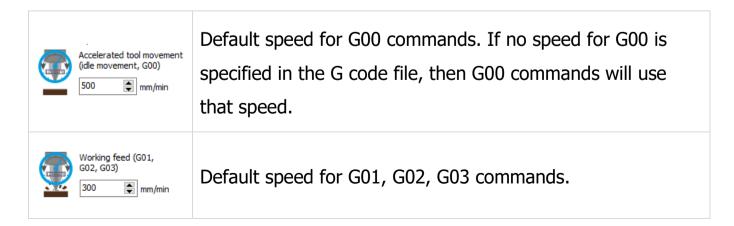
To configure DrufelCNC you must click on the button with the image of the key Next, go to the section of settings that interests you.

. Next, go to the section of settings that interes

## **10.1.Common**

In the common tab, you can set values for accelerated tooth movement (idle movement, G00), working feed (G01, G02, G03) and use anti-aliasing.







Use anti-aliasing When moving on bends, the speed will decrease, for smoothing. When moving along curved vectors, the speed of movement will decrease.

## **10.2.Controller Configuration**

In the window that opens, go to the «Device Controller» tab.

| Settings   |                   |              |       |          |                          |             |             | -      |         | ×      |
|--|-------------------|--------------|-------|----------|--------------------------|-------------|-------------|--------|---------|--------|
| Common   | Device controller | 🐴 Axes setti | ngs 🕘 | Input Po | orts 💽 Output            | Ports       | <b>Spir</b> | ndle 🦂 | Machine | e size |
| evices:  |                   |              |       |          | Automatic s              | election of | supported   | device | 🖄 Refre | sh     |
| Name   | Manufacturer      | VID          | PID   | Version  | Serial number            | Outp        | Input       |        |         |        |
| NVxMxV2  | NOVUSUN           | 49745        | 0     | 256      | 0001A000000              | 65          | 65          |        |         | 1      |
|  |                   | 33006        | 33    | 256      |                          | 0           | 9           |        |         |        |
|  |                   |              |       |          |                          |             |             |        |         |        |
| c  |                   |              |       |          |                          |             |             |        |         | ,      |
|  | ands              |              |       |          | Device mode              |             |             |        |         | >      |
|  | iands             |              |       | Stand    | Device mode<br>ard MPG V | _           |             |        | _       | >      |
| Period sending comm<br>5 ms                                    | $\sim$            |              | The   |          |                          |             |             | _      |         | >      |
| C Period sending comm<br>5 ms<br>The duration of the C<br>5 us | $\sim$            |              | The   |          | ard MPG 🛛 🗸              |             |             |        |         | >      |

In the hardware section, you must select a controller by setting a point in the radio button block opposite the USB controller. Save the settings.

## 10.3. Axis Setup

To configure a stepper motor or servo drive, go to the Axis Settings tab.

| Settings   | -    |                | ×    |
|--|------|----------------|------|
| Common Device controller 💭 Axes settings 🔶 Input Ports 💽 Output Ports 🗊 Spindle  | ı    | Machine        | size |
| Setting the axis X<br>Impulses at 1 mm<br>Enabled 1600 Speed mm/min<br>Enabled 1600 Impulses at 1 mm<br>Impulses at 1 mm   | Slar | ve axis<br>- v | ^    |
| Setting the axis Y<br>Impulses at 1 mm<br>Enabled 1600 Speed mm/min<br>Enabled 1600 Speed mm/min<br>Enabled 1600 Speed mm/min<br>Invert direction<br>Invert direction<br>Invert step<br>Invert step<br>In    | Slav | ve axis<br>- v |      |
| Setting the axis Z<br>Impulses at 1 mm<br>Enabled 1600 Speed mm/min<br>Enabled 1600 Speed mm/min<br>Invert direction<br>Invert direction<br>Invert step<br>Invert step<br>Inve | Slav | ve axis<br>- v |      |
| Setting the axis A<br>Impulses at 1 mm Speed mm/min Acceleration mm/min Invert direction Invert step Backlash mm<br>Enabled 300 + 1500 + 20 + 20 Dir Invert H Step Invert 0 + 0  | Slav | ve axis<br>- v |      |
| Setting the axis B<br>Impulses at 1 mm Speed mm/min Acceleration mm/min Invert direction Invert step Backlash mm<br>Impulses at 1 mm Speed mm/min Acceleration mm/min Invert direction Invert step Invert Backlash mm<br>Impulses at 1 mm Speed mm/min Acceleration mm/min Invert direction Invert step Invert Impl Step Invert Impl Step Invert Impl Step Invert  | Slav | ve axis<br>-   | ~    |
| Apply Save   | c    | ancel          |      |

Set the required number of pulses for each axis. Save the settings. If necessary, specify the submission of the axes. Use the inversion setting to change the direction of rotation of the motor.

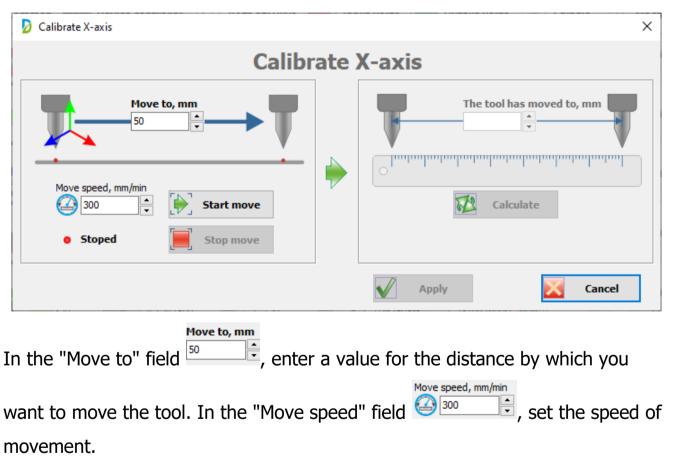
| ✓ Enabled           | Enables the axis to be displayed in the coordinate list.                                |
|---------------------|---|
| Impulses at 1 mm    | The number of pulses per millimeter. You can use the calibration function to calculate. |
| Speed mm/min        | Maximum speed of the axis movement.   |
| Acceleration mm/min | Smooth acceleration of the axis movement.   |
| Invert direction    | Invert the direction of movement of the axis.   |
| Invert step         | Invert the step signal when transmitting the axis movement commands.                    |
| Backlash mm         | Backlash of the ball screw.   |



A slave axis can be defined for an axis. Then, the slave axis will move along with the current.

## 10.3.1. Calibrate axis

By clicking on the calibration button for a specific axis, the axis calibration window will open. This window is for calculating the number of pulses per mm.



Attention! This speed must be slow! This is necessary so that you can quickly respond to an emergency and not damage the machine.

After that click on the «Start move» **start move** button. After pressing the button, movement will begin for the specified segment.

| Calibrate X-axis  |                           | ×            |  |  |  |  |  |
|---|---------------------------|--------------|--|--|--|--|--|
| Calibrate X-axis  |                           |              |  |  |  |  |  |
| Move to, mm<br>50<br>50<br>50<br>50<br>50<br>50<br>50<br>50<br>50<br>50 | The tool has moved to, mm |              |  |  |  |  |  |
|   | of                        | Apply Cancel |  |  |  |  |  |

After the tool has finished moving, use the ruler to measure the actual distance the tool moved.

Enter this value in the «The tool has moved» to field.

| Calibrate X-axis   |  | ×                         |  |  |  |  |  |
|--|--|---------------------------|--|--|--|--|--|
| Calibrate X-axis   |  |                           |  |  |  |  |  |
| Move to, mm<br>50<br>50<br>Move speed, mm/min<br>200<br>300<br>Start move<br>50<br>Stop move |  | The tool has moved to, mm |  |  |  |  |  |
|  |  | Apply Cancel              |  |  |  |  |  |

Click the «Calculate» Calculate button. After pressing, the number of pulses per 1 mm will be calculated that you need to set for the axis to be calibrated.

| 💋 Calibrate X-axis   |   | ×  |  |  |  |  |  |  |  |
|--|---|--|--|--|--|--|--|--|--|
| Calibrate X-axis   |   |  |  |  |  |  |  |  |  |
| Move to, mm<br>50 V  | • | The tool has moved to, mm                    |  |  |  |  |  |  |  |
| Move speed, mm/min         300         Start move         Stoped | v | Calculate<br>Set 1600 pulses per millimeter. |  |  |  |  |  |  |  |
| Apply Cancel   |   |  |  |  |  |  |  |  |  |

Click the «Apply» Apply button to apply the calculation results.

## **10.4. Configure Input Ports**

To configure input ports, go to the Input Ports tab.

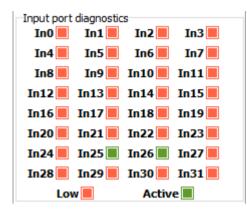
| 🚺 Common 🛃 D     | evice controlle | r 💭 Axe | es settings 👌 | Input Ports | Output Ports 🗐 Spindle 🙏 Machine s     |
|------------------|-----------------|---------|---------------|-------------|--|
| Vame             | Port number     | Invert  | Value now     | Hot Key     | Hotkey settings                        |
| Main Input Ports | Port number     | Invert  | Value now     | Hot Key     | ↑ Ctrl + Δ <sup>Use default keys</sup> |
| Emergency stop   | 1               | No No   | Low           | None None   | Use global hotkeys                     |
| Smooth stop      | 0               | No No   | Low           | None None   |  |
| Pause            | 0               | No No   | Low           | None None   |  |
| Start            | 0               | Νο      | Low           | None None   |  |
| Probe            | 2               | No No   | Low           |             |  |
| X axis           | Port number     | Invert  | Value now     | Hot Key     | Input port diagnostics                 |
| 🖂 Limit X+       | 3               | No No   | Low           |             | In0 📕 In1 📕 In2 📕 In3 📕                |
| 🖂 Limit X-       | 3               | No No   | Low           |             | In4 📕 In5 📕 In6 📕 In7 📕                |
|                  | 3               | No No   | Low           |             | In8 📕 In9 📕 In10 📕 In11 📕              |
| Y axis           | Port number     | Invert  | Value now     | Hot Key     | In12 In13 In14 In15                    |
| 🖳 🗹 Limit Y+     | 4               | No No   | Low           |             | In16 In17 In18 In19                    |
| 🖳 🗹 Limit Y-     | 4               | No No   | Low           |             | In20 In21 In22 In23                    |
| Home Y           | 4               | No No   | Low           |             | In24 In25 In26 In27                    |
| Z axis           | Port number     | Invert  | Value now     | Hot Key     | In24 In25 In26 In27                    |
|                  | 5               | No      | Low           |             |  |
| Limit Z-         | 5               | No      | Low           |             | Low Active                             |

Set the input port numbers according to the configuration of the machine and the CNC controller. Save the settings.

## **10.4.1. Input port diagnostics**

DrufelCNC - software for controlling CNC machines. Read more: https://drufelcnc.com

This panel displays the current state of the controller input ports.



A red LED indicates I there is no signal on the input port. A green LED indicates I signal is present on the input port.

## 10.4.2. Hot keys

In order to set your hot keys, you need to click on the Hot Key column of a specific input port.

|                 |   |   |   | - 🗆 ×   |
|-----------------|---|---|---|---|
| evice controlle | er 🔀 Axe                                  | es settings 🕘   | Input Ports   | Output Ports 5pindle Machine size   |
| Port number     | Invert                                    | Value now   | Hot Key   | Hotkey settings   |
| Port number     | Invert                                    | Value now   | Hot Key   | ^ Ctrl + A <sup> </sup>   |
| 1               | No  | Low   | Press the key   | Use global hotkeys  |
| 0               | No No                                     | Low   | None  |   |
| 0               | No No                                     | Low   | None None   |   |
| 0               | No No                                     | Low   | None  |   |
|                 | Port number<br>Port number<br>1<br>0<br>0 | Port number     Invert       Port number     Invert       1     No       0     No       0     No       0     No | Port number         Invert         Value now           Port number         Invert         Value now           1         No         Low           0         No         Low           0         No         Low           0         No         Low | Port number         Invert         Value now         Hot Key           1         No         Low         Press the key           0         No         Low         None           0         No         Low         None           0         No         Low         None |

Next in this field you must specify your keyboard shortcut that you want to use.

| Common 🛃 D       | evice controller | Axe    | s settings 🕣 | Input Ports | • Output Ports     | Spindle 🙏 Machine s                 |
|------------------|------------------|--------|--------------|-------------|--------------------|-------------------------------------|
| lame             | Port number      | Invert | Value now    | Hot Key     | Hotk               | ey settings                         |
| Main Input Ports | Port number      | Invert | Value now    | Hot Key     | $\hat{\mathbf{C}}$ | trl + Δ <sup>Use default keys</sup> |
| Emergency stop   | 1                | No No  | 📕 Low        | Alt + E     |                    | Use global hotkey                   |
| Smooth stop      | 0                | Νο     | Low          | None None   |                    |                                     |
| Pause            | 0                | Νο     | Low          | None None   | 8                  |                                     |
| Start            | 0                | Νο     | Low          | None None   | e e                |                                     |
| Probe            | 2                | No No  | Low          |             |                    |                                     |
| ( axis           | Port number      | Invert | Value now    | Hot Key     |                    | t port diagnostics                  |
|                  | 3                | No No  | Low          |             | In                 | 10 In1 In2 In3                      |
|                  | 3                | No No  | Low          |             | In                 | 14 📕 In5 📕 In6 📕 In7 📕              |
|                  | 3                | No No  | Low          |             | In                 | 18 📕 In9 📕 In10 📕 In11 📕            |
| / axis           | Port number      | Invert | Value now    | Hot Key     | In1                | 2 In13 In14 In15                    |
|                  | 4                | No     | Low          |             | In1                | 6 In17 In18 In19                    |
|                  | 4                | No No  | Low          |             | In2                | 20 In21 In22 In23                   |
|                  | 4                | No     | Low          |             |                    | 24 In25 In26 In27                   |
| Zaxis            | Port number      | Invert | Value now    | Hot Key     |                    | 28 In29 In20 In27                   |
| ····☑ Limit Z+   | 5                | No     | Low          |             |                    |                                     |
| Limit Z-         | 5                | No     | Low          |             | ¥                  | Low Active                          |

«Use global hotkeys» - this function in which if the DrufelCNC window is not active, then hotkeys will still go to DrufelCNC.

«Use default hotkeys» - this function for hotkeys will work according to the following list:

| Default Hotkey Info  |                         |   |  |  |  |  |  |
|--|-------------------------|---|--|--|--|--|--|
|  | Default hotkeys         |   |  |  |  |  |  |
|  |                         |   |  |  |  |  |  |
| Esc F1 F2 F3 F4 F5 F   | F8 F7 F8 F9 F10 F11 F12 | Print         Scroll         Scroll         Fause           SysRq         Lock         Freak         Num         Cops         Scroll  |  |  |  |  |  |
| $ \begin{array}{c c} & & & & & \\ \hline & & & \\ \hline & & & \\ \hline \\ \hline \\$ |                         | Inset Home Page Up<br>Delete Down 7<br>Home 9<br>Home 9<br>Home 9<br>Home 1<br>Home |  |  |  |  |  |
|  |                         | ↑<br>↑<br>↑<br>↑<br>↑<br>↑<br>↑<br>↑<br>↑<br>↑  |  |  |  |  |  |
| Emergency stop   | RStart                  | <sup>▶</sup> Spindle On/Off   |  |  |  |  |  |
| Smoth stop   |                         | Spindle Speed +10%  |  |  |  |  |  |
| → Jog X++  | Jog Z++                 | <ul> <li>Spindle Speed +10%</li> </ul>  |  |  |  |  |  |
| ← Jog X  | Page Jog Z              | Spindle Speed -10%  |  |  |  |  |  |
| Jog Y++  | Ind Jog A++             | Jog Speed +100  |  |  |  |  |  |
| ↓ Jog Y  | Inset Jog A             | Jog Speed -100  |  |  |  |  |  |

Attention! Custom shortcuts take precedence over the default keys.

## **10.5.Configuring output ports**

To configure output ports, click the Output Ports tab.

| -        | ommon 🛃 De        |             |        | Axes settings |  | 2 | 6~ · · · · |  |
|----------|-------------------|-------------|--------|---------------|--|---|------------|--|
| lame     |                   | Port number | Invert | Value now     |  |   |            |  |
|          | Output Ports      | Port number | Invert |               |  |   |            |  |
|          | urn the spindle   | 1           | No     | Low           |  |   |            |  |
|          | pindle clockwise  | 2           | No No  | Low           |  |   |            |  |
|          | pindle anticlock  | 3           | No     | Low           |  |   |            |  |
|          | Output Ports      | Port number | Invert |               |  |   |            |  |
|          | ooling            | 4           | No     | Low           |  |   |            |  |
|          | dditional cooling | 5           | No     | Low           |  |   |            |  |
|          | xles Output Ports | Port number | Invert | t Value now   |  |   |            |  |
| E        | nable X axle      | 0           | No No  | Low           |  |   |            |  |
| E        | nable Y axle      | 0           | No No  | Low           |  |   |            |  |
| E        | nable Z axle      | 0           | No No  | Low           |  |   |            |  |
| E        | inable A axle     | 0           | No No  | Low           |  |   |            |  |
| ···· 🗌 🖪 | inable B axle     | 0           | No No  | Low           |  |   |            |  |
| E        | nable C axle      | 0           | No No  | Low           |  |   |            |  |

Set the output port numbers according to the configuration of the machine and the CNC controller. Save the settings.

## **10.6.Spindle adjustment**

To configure the spindle parameters, you need to go to the "Spindle" tab.

| Settings   |  | - 🗆 ×                 |
|--|--|-----------------------|
| Common Device controller   | Axes settings 🔶 Input Ports 💽 Output Ports | pindle 📈 Machine size |
| Spindle specifications   | Direction of rotation of the spindle       |                       |
| Spindle speed (rpm)<br>6000  |  |                       |
| Acceleration (rpm/10ms)  | Clockwise                                  |                       |
| Spindle coefficient  |  |                       |
| Output signal (0.0 - 1.0)          I         Speed signal multiplier |  |                       |
|  |  |                       |
|  |  |                       |
|  |  |                       |
| Apply  | Save                                       | Cancel                |

Set the speed and acceleration parameters according to the spindle

specification. Set the default spindle rotation direction.

Set the spindle coefficient. Save the settings.

6000

## **Spindle speed**

Spindle speed (rpm) -- the nominal number of revolutions per minute

for your spindle.

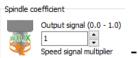
## Acceleration



- when the spindle is turned on, the spindle

rotation speed will be smoothly set in accordance with the specified acceleration.

## Spindle coefficient



speed signal multiplier - if you need to calibrate the output value

of the port 0-10V then change this multiplication factor.

With this Counterclockwise/Clockwise setting,



you can set the direction of rotation of the spindle when you press the «Turn

the spindle» window.

## 10.7.Machine size

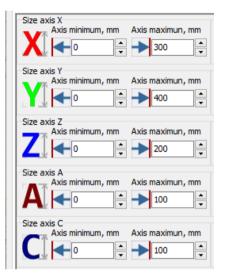
With these settings you can customize the machine dimensions, soft limits, home function.

| 🖉 Settings   |   | – 🗆 X  |
|--|---|--|
| Common Device controller   | Axes settings 🔶 Input Port                                    | s 🕞 Output Ports 🕅 Spindle 🚜 Machine size  |
| Size axis X<br>Axis minimum, mm<br>Axis maximun, mm<br>Axis maximun, mm<br>300 | Soft Limit for X axis<br>Use for Safe, slow, mm<br>Min Max 10 | Home X-axis function<br>Home direction<br>Home order Speed, mm/min<br>To min<br>To max<br>To max<br>Home order Speed, mm/min |
| Size axis Y<br>Axis minimum, mm<br>Axis maximun, mm<br>Axis maximun, mm<br>400 | Soft Limit for Y axis<br>Use for Safe, slow, mm<br>Min Max 10 | Home Y-axis function<br>Home direction<br>Home order Speed, mm/min<br>To min To max 2 300                                    |
| Size axis Z<br>Axis minimum, mm<br>Axis maximun, mm<br>Axis maximun, mm<br>200 | Soft Limit for Z axis<br>Use for Safe, slow, mm<br>Min Max 10 | Home Z-axis function<br>Home direction<br>Home order Speed, mm/min<br>To min To max To max 3 (200)                           |
| Size axis A<br>Axis minimum, mm Axis maximun, mm                               | Soft Limit for A axis<br>Use for Safe, slow, mm<br>Min Max 10 | Home A-axis function<br>Home direction<br>Home order Speed, mm/min<br>To min To max To max<br>4                              |
| Size axis C<br>Axis minimum, mm<br>Axis maximun, mm<br>I 100                   | Soft Limit for C axis<br>Use for Safe, slow, mm               | Home C-axis function<br>Home direction<br>Home order Speed, mm/min<br>To min<br>To max<br>F<br>6<br>300<br>V                 |
| Αρρίγ  |   | Save Cancel  |

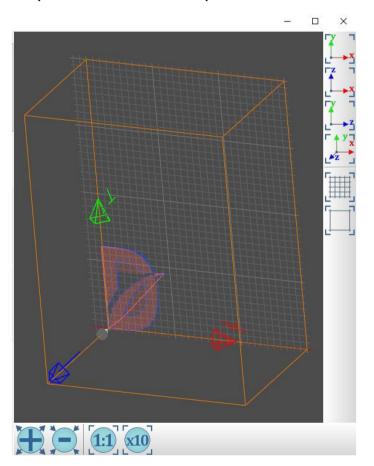
## **10.7.1. Size axis**

Set the min / max limits for your machine.

Attention! The limits are specified in machine coordinates. The difference between the min and max should be the actual axis length of your machine.



According to these settings in the 3D model window, the dimensions of the axis will be displayed as a quadrilateral in each plane.



### 10.7.2. Soft limit

DrufelCNC - software for controlling CNC machines. Read more: https://drufelcnc.com

If you want the tool to stop when it reaches the minimum and maximum of your axis, use the appropriate constraints. These settings are designed to not damage your machine.

| Soft Limit for X axis<br>Use for Safe, slow, mm |
|---|
| Min 10 📩  |
| Soft Limit for Y axis<br>Use for Safe, slow, mm |
| Min 10 🛉  |
| Soft Limit for Z axis<br>Use for Safe, slow, mm |
| Min 🕂 Max 🚍 10 🔹                                |
| Soft Limit for A axis<br>Use for Safe, slow, mm |
| Min 10 🛉  |
| Soft Limit for C axis<br>Use for Safe, slow, mm |
| Min 🚺 🗆 Max 🤶 10 🚔                              |

will stop and prevent it from moving towards the minimum.

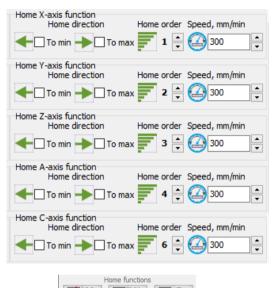
Image → When the maximum limit of your axis is reached, the tool will stop moving and prevent it from moving towards the maximum.

if the specified value remains before reaching the minimum or maximum, the tool speed is reduced to the minimum.

Safe, slow, mm

# 10.7.3. Home function

With these settings you can set the driving direction, priority and speed.



These settings are for buttons **These settings** on the main window.

• when searching for the home position, the instrument will move to the minimum.

• when searching for the home position, the instrument will move to the maximum.

Attention! If you have turned on both the "To min" and "To max" settings, then when searching for the home position, the instrument will first move to the minimum and then to the maximum.

- allows you to specify the order in which the search for the home position is performed for each axis.

home order = 1 will be executed very first.

Speed, mm/min

home order = 6 will be executed most recently.

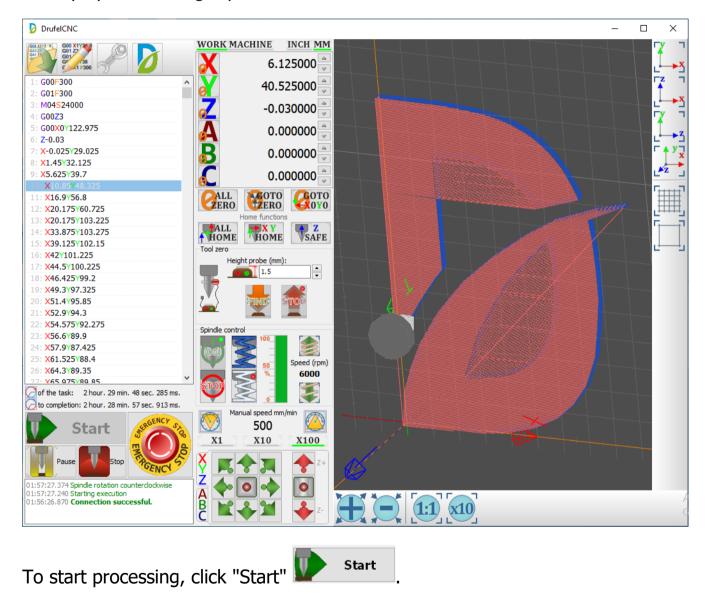
 $\bigcirc$  is the speed of the tool when searching for the home position.

# **11.** Run the control program (G-code)

To run the control program in the language of G-code, you must click on the

button with the image of the folder *w*, then select the file.

If the file is recognized successfully, the three-dimensional model of the file will be displayed in the right part of the main window.



## 12. Search tool zero

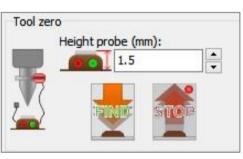
To begin searching for a tool zero, set the height List of the probe

used. Next, click **X**. Wait until the end of the process.

First you need to configure the input port number for the probe. The Z axis is assigned according to the value found and the height of the probe.

After completing the tool zero search, the tool will return to its original position.

To cancel the tool zero search, click



For the tool zero search to work correctly, you must set the input port number in accordance with the port number on the controller where your probe is connected. Set "Invert" so that the "Value now" in the normal state of the Probe is "Low".

| 🗱 Common 🛃       | Device controlle | r 🔀 Axe | s settings | Input Ports | Dutput Ports Spindle 🚜 Machine siz |
|------------------|------------------|---------|------------|-------------|------------------------------------|
| Vame             | Port number      | Invert  | Value now  | Hot Key     | Hotkey settings                    |
| Main Input Ports | Port number      | Invert  | Value now  | Hot Key     | ↑ Ctrl + A Use default keys        |
| Emergency stop   | í                | 🗹 Yes   | Active     | None        | Use global hotkeys                 |
| - 5mooth stop    | 0                | 🗌 No    | 📕 Low      | None        |                                    |
| Pause            | 0                | 🗌 No    | 📕 Low      | None        |                                    |
| - Start          | 0                | 🗌 No    | low        | None None   |                                    |
| 🗹 Probe          | 2                | No No   | 📕 Low      |             |                                    |
| X axis           | Port number      | Invert  | Value now  | Hot Key     | Input port diagnostics             |
| Limit X+         | 3                | 🗹 Yes   | 📕 Active   |             | In0 📕 In1 📕 In2 📕 In3 📕            |
| Limit X-         | 3                | 🗹 Yes   | 📕 Active   |             | In4 📕 In5 📕 In6 📕 In7 📕            |
|                  | 3                | 🗹 Yes   | 📕 Active   |             | In8 📕 In9 📕 In10 📕 In11 📕          |
| Y axis           | Port number      | Invert  | Value now  | Hot Key     | In12 📕 In13 📕 In14 📕 In15 📕        |
|                  | 4                | 🗹 Yes   | 📕 Active   |             | In16 📕 In17 📕 In18 📕 In19 📕        |
| Limit Y-         | 4                | 🗹 Yes   | 📕 Active   |             | In20 📕 In21 📕 In22 📕 In23 📕        |
|                  | 4                | 🗹 Yes   | 📕 Active   |             |                                    |
| Z axis           | Port number      | Invert  | Value now  | Hot Key     |                                    |
|                  | 5                | 🗹 Yes   | Active     |             | In28 In29 In30 In31                |
| Limit Z-         | 5                | V Yes   | Active     |             | V Low Active                       |

DrufelCNC - software for controlling CNC machines. Read more: https://drufelcnc.com

#### 13. Manual control

| Mi    | anual speed mn | n/min |
|-------|----------------|-------|
| - 😢 🗙 | 500            | < 😂   |
| X1    | X10            | X100  |

sets the speed of movement of the

instrument during manual operation.

| м  |    |    |   | A |   |
|----|----|----|---|---|---|
| ч  | λ. | 2  | 1 | ч |   |
| N. | 12 |    | 1 | 0 | u |
| 13 | 5  | 30 | 1 | 7 |   |

This field

- Speed reduction button.

- Speed increase button.

- x1 1% of the set speed or minimum speed.
- x10 10% of the set speed.
- **X100** 100% of the set speed.

The current speed is highlighted in green ( $x_{100}$ ).

For manual control, press the corresponding joystick button







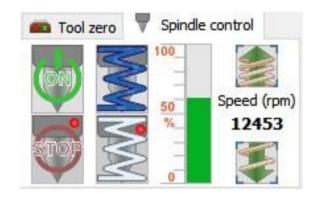
#### Spindle control and cooling 14.

- Spindle power button.
- Spindle off button.

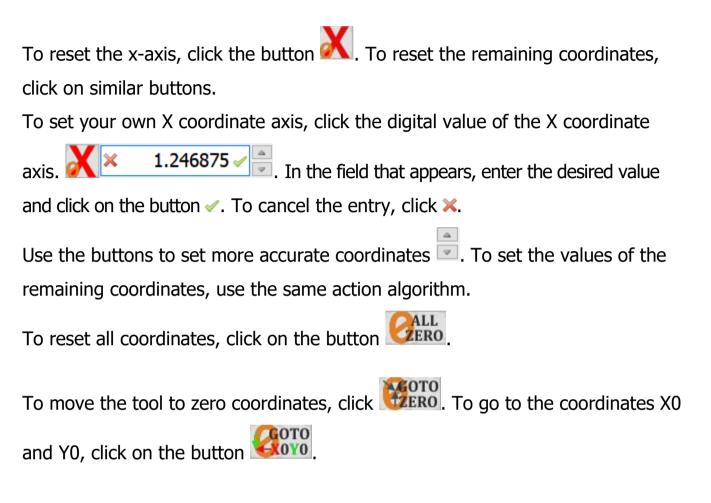
To set the spindle speed, click on the progress bar area.

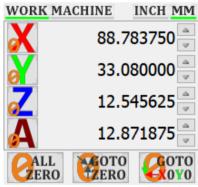


- Button to increase the rotation of the spindle.
  - Button to reduce the rotation of the spindle.



## **15.** Assignment of coordinates

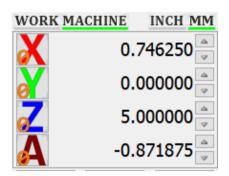




#### **15.1.Measurement system**

The default system of units is millimeters. To set the units in inches, click **INCH MM**. To set the system of units in millimeters, click **INCH MM**. The current coordinate system is highlighted in green.

### **15.2. Machine coordinates**



The machine coordinates are the actual coordinates of your axes.

These coordinates are used to define the limits and dimensions of the machine. If machine coordinates are activated for display, they are highlighted in green **MACHINE**.

### **15.3.Work coordinates**

| WORK M | ACHINE | INCH MM  |
|--------|--------|----------|
| X      | 88.    | 783750 🚊 |
| ø      | 33.0   | 080000   |
| Z      | 12.    | 545625 🚊 |
| A      | 12.8   | 871875 🚊 |

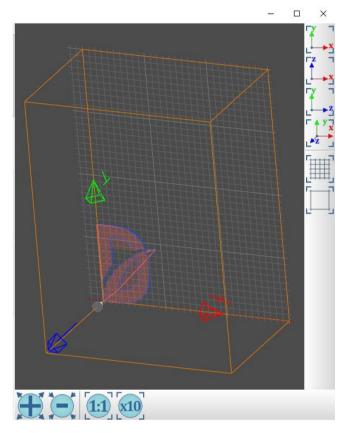
Work coordinates are relative to machine coordinates.

These are the coordinates at which the g-code is executed by default.

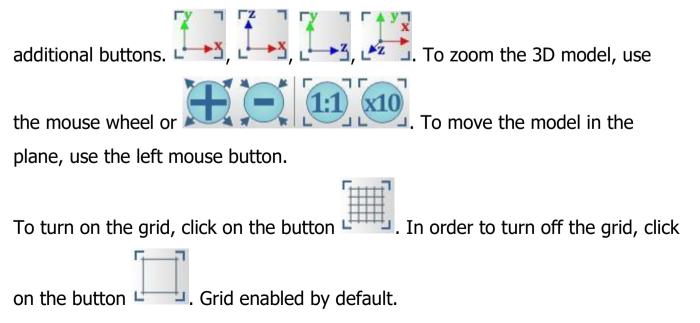
If work coordinates are activated for display, they are highlighted in green **WORK**.

# 16. Display 3D model

The code you downloaded is displayed as a 3D model on the right side of the application window.



To rotate the 3D model, move the mouse pointer to the display area of the 3D model. Right-click and hold to move the mouse pointer. You can also use

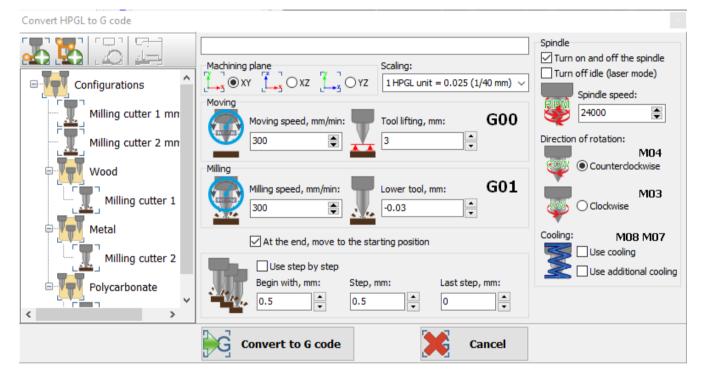


# **17.** Opening HPGL files

To open files in HPGL format, you must click on the button with the image of

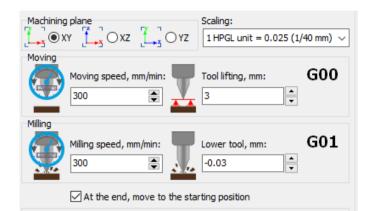
the folder, then select the file.

In the window that opens, you must select the parameters for converting HPGL to G-code.



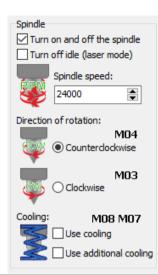
After successful conversion, you will see a three-dimensional model of the file.

# **18.** Basic parameters of the HPGL file converter



| $ \begin{array}{c} \text{Machining plane} \\ & \overbrace{\rule{0pt}{2}{4}}^{\text{Machining plane}} \\ & \overbrace{\rule{0pt}{2}}^{\text{Machining plane}} \\ & \overbrace{\rule{0pt}{$ | The plane in which the HPGL file will be executed.                   |
|--|--|
| Scaling:<br>1 HPGL unit = 0.025 (1/40 mm) ~  | The scale corresponds to one HPGL unit per millimeter.               |
| Moving speed, mm/min:  | Tool travel speed without milling. Moving between milling areas.     |
| Milling speed, mm/min:   | The speed at which the tool moves when milling. Model milling speed. |
| Tool lifting, mm:  | Tool position when moving to the milling area.                       |
| Lower tool, mm:  | Tool position when milling the model.                                |

# **18.1.** Spindle settings of HPGL file converter



| ☑ Turn on and off the spindle | The spindle will turn on when the HPGL file starts executing, the spindle turns off when the HPGL file finishes executing. |
|-------------------------------|--|
| Turn offidle (laser mode)     | The spindle will only work when milling. This setting is suitable for laser or plasma operation.                           |
| Spindle speed:<br>24000       | The spindle speed while executing the HPGL file. When using a laser, sets the laser power.                                 |
| Direction of rotation:<br>M04 | The direction of rotation of the spindle is counterclockwise when executing the HPGL file. Corresponds to command M04.     |
| Clockwise MD3                 | The direction of rotation of the spindle is clockwise when executing the HPGL file. Corresponds to command M03.            |
| Cooling: M08 M07              | Cooling will be turned on before executing the HPGL file.<br>Corresponds to commands M08 and M07.                          |

# **18.2.** Use step by step

With the help of "Use step by step" you can set up step-by-step milling (cutting) of models. This will reduce the negative impact on the cutter.

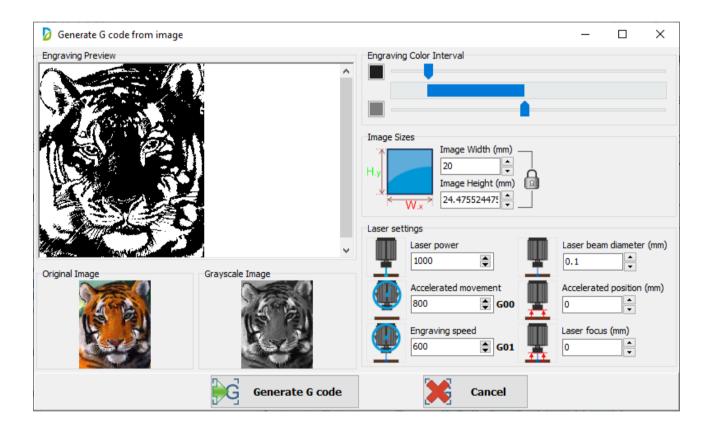


| Begin with, mm: | After this axis position, the step milling algorithm will start. For   |
|-----------------|--|
|                 | example after $Z = 0.5$ mm.  |
| Step, mm:       | The cutter will move this distance after each cycle through the entire |
|                 | HPGL file. For example, 0.5 mm.  |
| Last step, mm:  | If necessary, you can set a fixed distance for the last step.          |

# **19.** Generating a G-code from an image

To open a file in the format (png, jpeg, gif, bmp), you must click on the button with the image of the folder  $\mathbb{P}$ , or select the necessary file and transfer it to the G-code field.

In the window that opens, you must select the options for converting the image into a G-code.



In the engraving color interval block, you can adjust the color interval.

| Engra | aving Color Interval |  |
|-------|----------------------|--|
|       |                      |  |
|       | •                    |  |

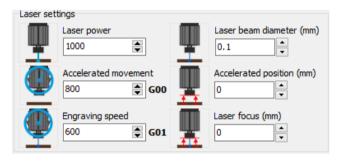
In the Image Sizes block, you can adjust the image size.

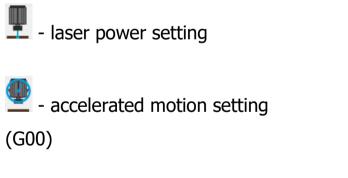
| Image Sizes |                   |
|-------------|-------------------|
|             | Image Width (mm)  |
| T.y         | Image Height (mm) |
| K W.x →     | 24.475524475      |

🗟 - proportional image resizing.

Inot proportional image resizing.

In the Laser Settings block, you can configure the laser settings.







\overline - engraving speed setting

- laser beam diameter

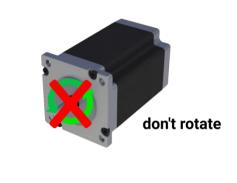
adjustment (mm)

- accelerated position adjustment (mm)

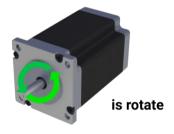


## 20. Stepper motors

If your stepper motors don't rotate



Turn on Step Invert Step Invert



If you doubt the correct connection of ENA + ENA- then temporarily do not connect it. Make sure your motors spin. The default ENA port is activated on most stepper motor drivers.



DrufelCNC - software for controlling CNC machines. Read more: https://drufelcnc.com