

DrufelCNC NVCM6 V2.1 6 AXIS (Novusun) 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.

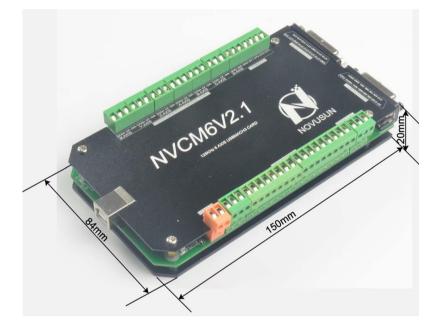
1. Features

- Support 6-axis CNC control.
- 16 input interface.
- 16 output interface.
- 1 port 0-10V spindle speed analog output interface (can change to PWM output).
- Main device is 12V-32VDC power supply input, current should higher than 1A.
- ARM motion control chip.
- Support USB.

2. Appearance

NVCM motion controller is with the sealed open structure, there are 4pcs setting holes at the bottom. You can fix 2pcs 3mm diameter holes at the cabinet, and install the controller into the cabinet.

The products overall size is 150mm*84mm*20mm.

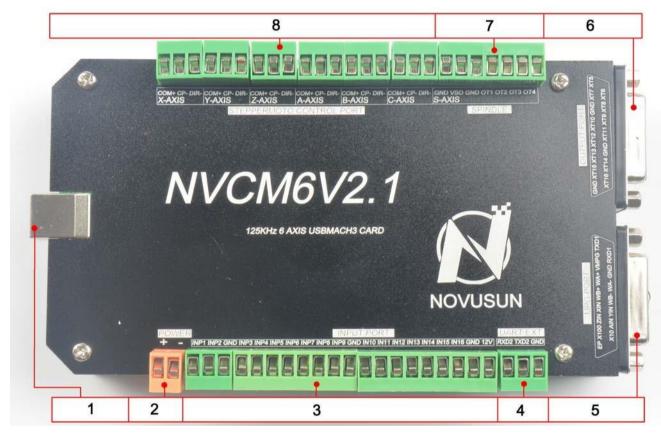


The bottom install size is 125.5mm*71.5mm.



3. Product connection define and method

The controller connection includes a power supply interface, a USB connection interface, an MPG interface, a Stepper / Servo control output interface, a spindle control output interface, Estop and a limited switch input and tool settings interface and so on.

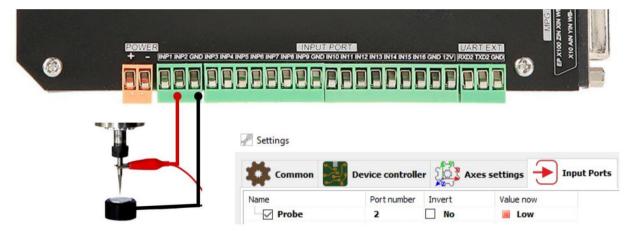


- 1 USB Port.
- **2** Main power Interface.
- **3** Input interface.

Estop limited Tool setting input interface



Probe input connection

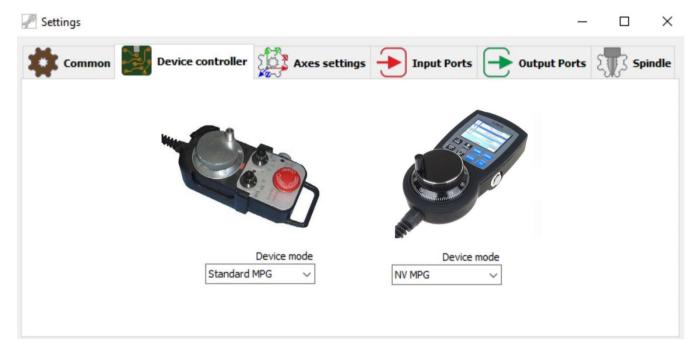


End switch input connection



4 - Communication external interface.

5 - MPG connection.



Pin mark	Definition	Notes
GND	MPG Ground	MPG power supply GND.
TXD	MPG serial communication Output Port	For the digital display MGP communication
RXD	MPG serial communication input Port	For the digital display MPG communication
100X	100X multiplication switch	Short connect with GND means 100X multiplication, cutoff means no pulse
10X	10X multiplication switch	Short connect with GND means 10X multiplication, cutoff means no pulse

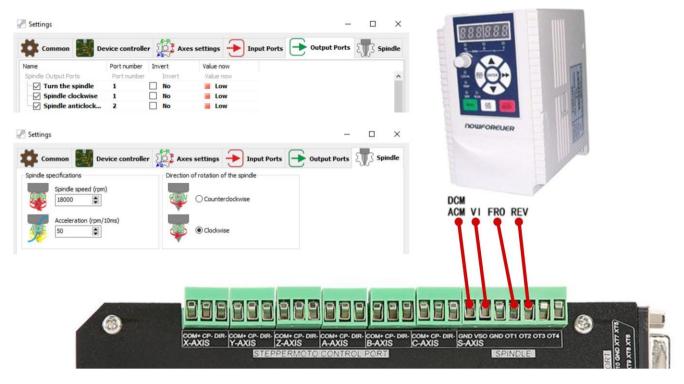
1X	1 X multiplication switch	Short connect with GND means 1X multiplication, cutoff means no pulse
ESTOP	MPG Estop	Short connect with GND means Estop effective, cutoff show invalid
C-IN	C Axis selected switch	Short connect with GND means selecting C axis, cutoff means don't select
B-IN	B Axis selected switch	Short connect with GND means selecting B axis, cutoff means don't select
A-IN	A Axis selected switch	Short connect with GND means selecting A axis, cutoff means don't select
Z-IN	Z Axis selected switch	Short connect with GND means selecting Z axis, cutoff means don't select
Y-IN	Y Axis selected switch	Short connect with GND means selecting Y axis, cutoff means don't select
X-IN	X Axis selected switch	Short connect with GND means selecting X axis, cutoff means don't select
VDD5	MPG power supply 5V	MPG power supply 5V

	Output	output
WHA+	MPG A Phases Positive	MPG A Phase differential Input Positive
WHB+	MPG B Phases Positive	MPG B Phase differential Input Positive
WHA-	MPG A Phases Negative	MPG A Phase differential Input Negative
WHB-	MPG B Phases Negative	MPG B Phase differential Input Negative

6 - Common IO output include OUT1, OUT2 on the spindle interface, totally 10 ports IO output, open drain output.

🛹 Settings			-	
Common Dev	rice controller 🔀 Axes set	tings 🔶 Input Ports	Output Ports	Spindle
Cooling Output Ports		Value now		^
DIR- GND VSO GND OT1 OT2 OT3 OT4 S-AXIS	AND			

7 - Spindle control output. GND1 (Output GND), VSO (0-10V adjustable speed output), INDEX (spindle speed feedback input), OUT1 (common output port 1), OUT2 (common output port 2).



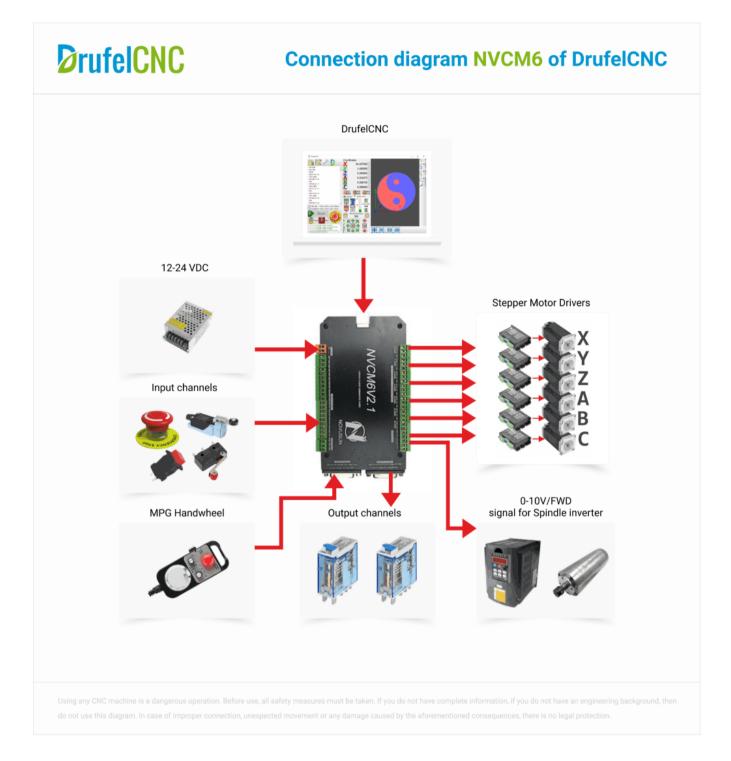
8 - Terminal block is 6 axis stepper driver control output interface, from left to right, there are X,Y,Z,A,B,C 6 axis output, it's common anode, the cable connection for each axis is COM+/CP-/DIR-, COM is common+ ,CP is Pulse-, DIR is direction-.

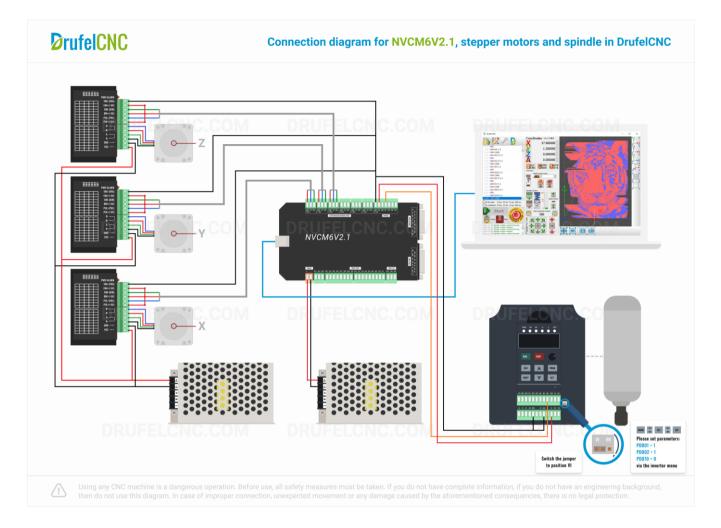
Pin mark	Axis	Definition
COM+	Commom+	Common anode +5V
СРХ-	X axis	Pulse output- for X axis
DIX-	X axis	Direction output- for X axis

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СРҮ-	Y axis	Pulse output- for Y axis
DIY-	Y axis	Direction output- for Y axis
CPZ-	Z axis	Pulse output- for Z axis
DIZ-	Z axis	Direction output- for Z axis
CPA-	A axis	Pulse output- for A axis
DIA-	A axis	Direction output- for A axis
СРВ-	B axis	Pulse output- for B axis
DIB-	B axis	Direction output- for B axis
CPC-	C axis	Pulse output- for C axis
DIC-	C axis	Direction output- for C axis

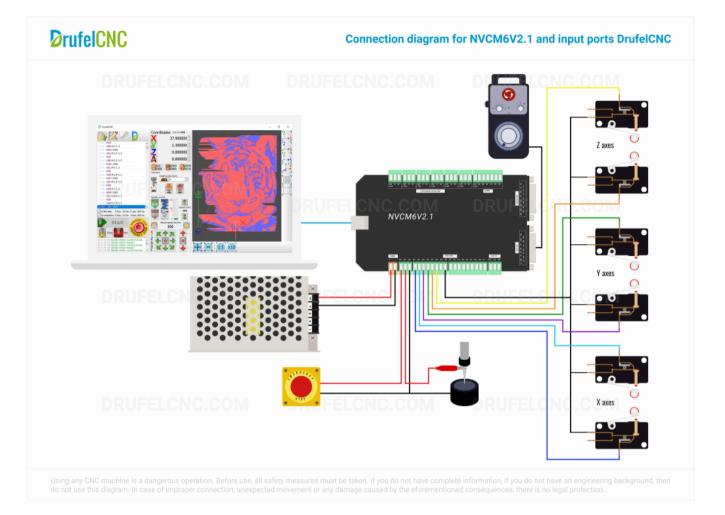
4. Basic connection diagram



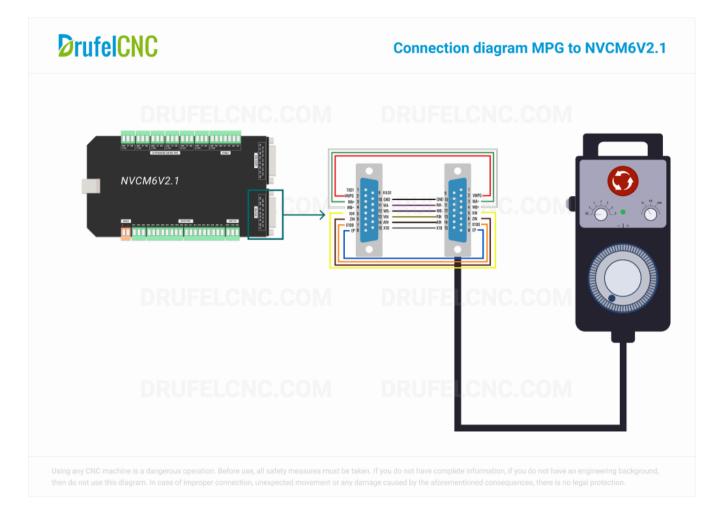


5. Connection diagram stepper motors and spindle

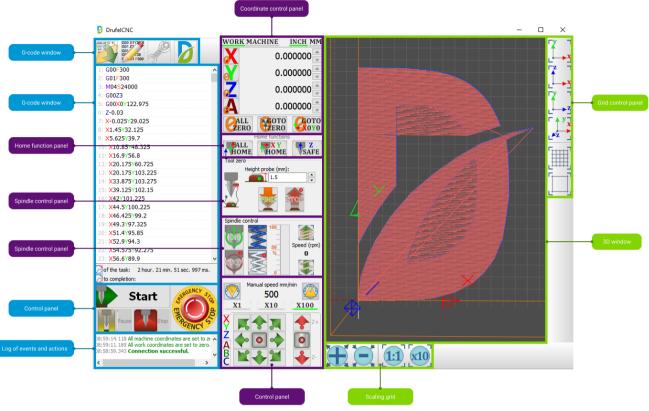
6. Connection diagram input ports



7. Connection diagram MPG



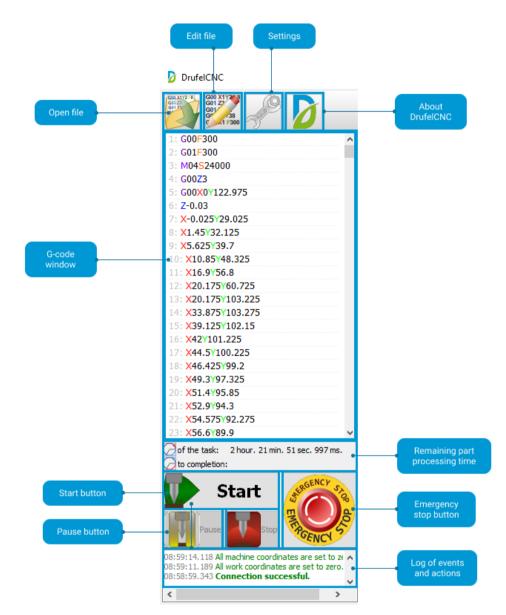
8. DrufelCNC interface



The DrufelCNC interface can be divided into three blocks:

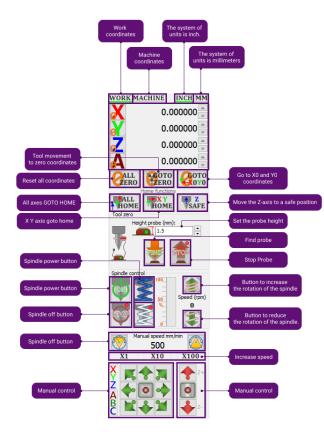
- 1. G-code window
- 2. Base functions
- 3. 3D window

G-code-window:



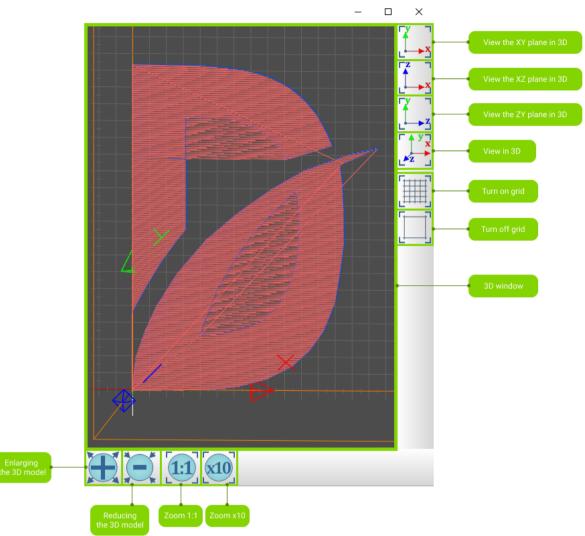
Functions	Description
Open file	Open file button
Edit file	Edit g-code file button
Settings	Function setting button
About DrufelCNC	DrufelCNC information
	button
G-code window	Display of G-code
Start	Start button
Pause	Pause button
Remaining time part	Remaining part
	processing time
Emergency stop	Emergency 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
rain 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. Installing DrufelCNC

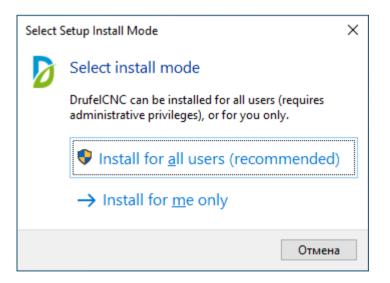
To install the program you need to download the installation files on the official website www.drufelcnc.com. You can use one of the following files:

- 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 Please read the following important information before continuing.		Ø
Please read the following License Agreement. You must accept the terms of this agreement befo continuing with the installation.	re	
LICENSE AGREEMENT 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 t 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 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 operation_safety and use of this machine_I agree that there is no situation in which I would cor		~
● I accept the agreement		
○ I do not accept the agreement		
Next >	С	ancel

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 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 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

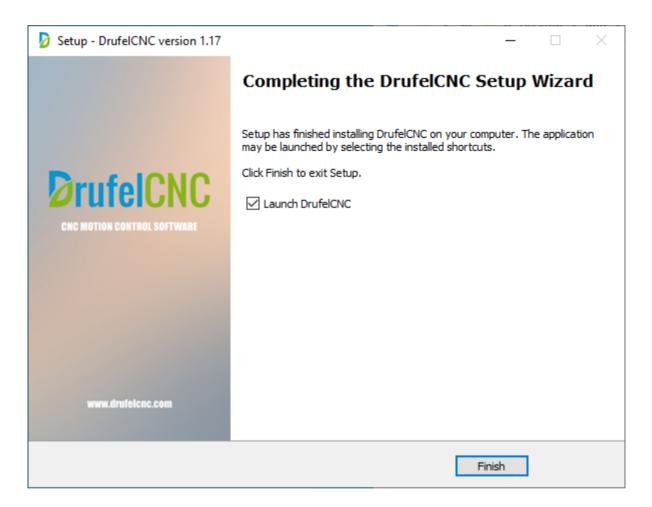
5. *Preparing for installation.* A window with information about the selected installation type, selected components and installation directory will be displayed. Check the information and click "Install."

D Se	etup - DrufelCNC version 1.17 -		×
	ady to Install Setup is now ready to begin installing DrufelCNC on your computer.		
	Click Install to continue with the installation, or click Back if you want to review or change any s	settings.	
	Destination location: C: \Program Files \DrufelCNC		^
	Additional tasks: Additional shortcuts: Create a desktop shortcut		
	<	>	
	< Back Install	Ci	ancel

Setup - DrufelCNC version 1.17	_		×
Installing Please wait while Setup installs DrufelCNC on your computer.			Ø
Creating shortcuts 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.

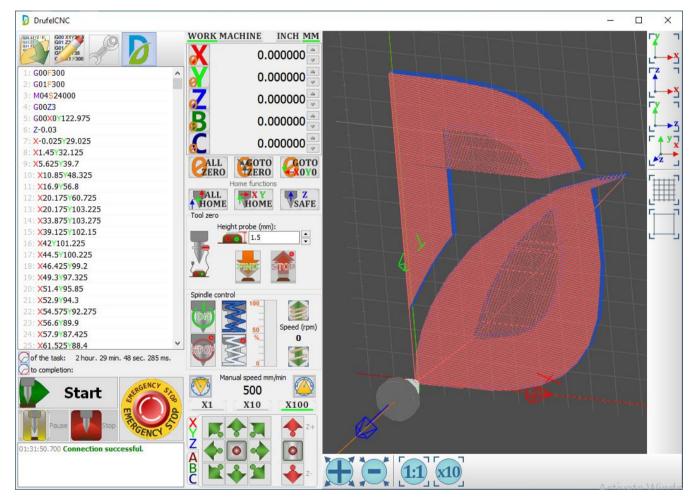


10. Run the program

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.

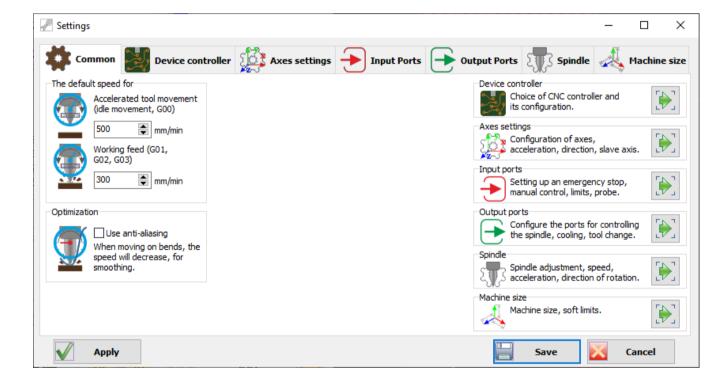
11. Customization

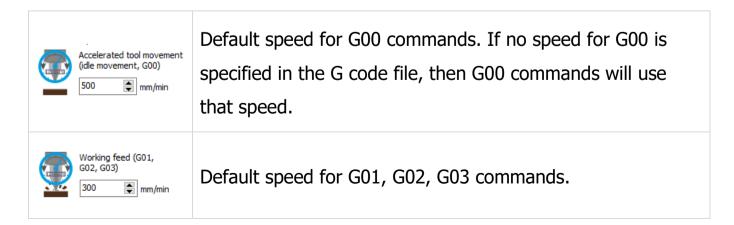
To configure DrufelCNC you must click on the button with the image of the key

Next, go to the section of settings that interests you.

11.1.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.

11.2.Controller Configuration

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

Settings								-		
Common	Device controller	🐴 Axes setti	ngs 手	Input Po	orts 💽 Output	Ports	Spi	indle 🛃	Machin	ie siz
evices:					Automatic s	election of	supported	device	🚺 Refr	esh
Name	Manufacturer	VID	PID	Version	Serial number	Outp	Input			
NVxMxV2	NOVUSUN	49745	0	256	0001A0000000	65	65			
		33006	33	256		0	9			
	nands				Device mode					>
	nands			Standa	Device mode ard MPG V					>
Period sending comm 5 ms	\sim		The p							>
Period sending comm 5 ms The duration of the of 5 us	\sim		The p		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.

11.3. 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 Impulses at 1 mm Enabled 1600 Speed mm/min Enabled 1600 Impulses at 1 mm Invert direction Invert step Invert direction Invert step	Slav	ve axis - v	^
Setting the axis Y Impulses at 1 mm Enabled I600 Speed mm/min Enabled I500 Intervent Invert direction Invert direction Invert step Invert	Slav	ve axis - v	
Setting the axis Z Impulses at 1 mm Enabled 1600 Speed mm/min Enabled 1600 Speed mm/min Invert direction Invert direction Invert step Invert step Inve	Slav	ve axis - v	
Setting the axis A Impulses at 1 mm Speed mm/min Acceleration mm/min Invert direction Invert step Backlash mm Enabled 300 + 1500 + 20 + 20 Dir Invert H Step Invert 0 + 0	Slav	ve axis - v	
Setting the axis B Impulses at 1 mm Speed mm/min Acceleration mm/min Invert direction Invert step Backlash mm Impulses at 1 mm Speed mm/min Acceleration mm/min Invert direction Invert step Invert Backlash mm 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 -	~
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.

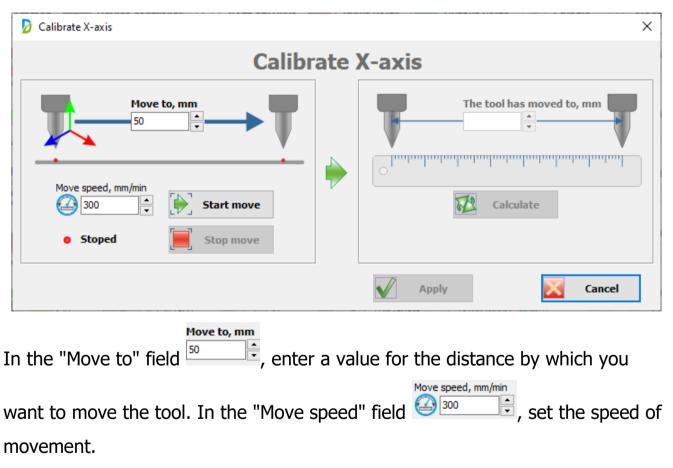
Enabled	Enables the axis to be displayed in the coordinate list.
Impulses at 1 mm	The number of pulses per millimeter. You can use the calibration function to calculate.
Speed mm/min	Maximum speed of the axis movement.
Acceleration mm/min	Smooth acceleration of the axis movement.
Invert direction	Invert 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.

11.3.1. 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» **button**. After pressing the button, movement will begin for the specified segment.

Calibrate X-axis		×
Calibr	ate	X-axis
Move to, mm 50 50 50 50 50 50 50 50 50 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		×
Calibr	ate	X-axis
Move to, mm 50 50 Move speed, mm/min 20 300 Start move 50 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		×
Calibra	ate	X-axis
Move to, mm 50 • •	4	The tool has moved to, mm
Move speed, mm/min 300 Stoped Stop move	~	Calculate Set 1600 pulses per millimeter.
		Apply Cancel

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

11.4. Configure Input Ports

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

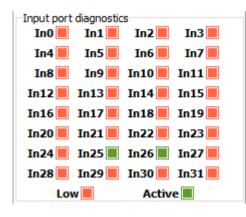
🚺 Common 🛃 D	evice controlle	r 💭 Axe	es settings 👌	Input Ports	Output Ports 🗐 Spindle 🙏 Machine s
Vame	Port number	Invert	Value now	Hot Key	Hotkey settings
Main Input Ports	Port number	Invert	Value now	Hot Key	↑ Ctrl + Δ ^{Use default keys}
Emergency stop	1	No No	Low	None None	Use global hotkeys
	0	No 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.

11.4.1. Input port diagnostics

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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.

11.4.2. Hot keys

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

🖗 Settings					- 🗆 X
🔹 Common 🛃 D	evice controlle	er 🛴 Axe	es settings 🕘	Input Ports	Output Ports Spindle Addance size
Name	Port number	Invert	Value now	Hot Key	Hotkey settings
Main Input Ports	Port number	Invert	Value now	Hot Key	Ctrl + A ^U Use default keys
Emergency stop	1	No	Low	Press the key	Use global hotkeys
	0	No No	Low	None	
···· Pause	0	No No	Low	None None	
Start	0	No No	Low	None None	
		_	_		

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

Common 🛃 D	evice controller	r 💭 Axe	s settings 🕣	Input Ports	Output Ports	🗊 Spindle 📣	Machine si
lame	Port number	Invert	Value now	Hot Key	Hotk	key settings	
Main Input Ports	Port number	Invert	Value now	Hot Key	$^{\circ}$	trl + Δ ^{∐Use d}	efault keys
Emergency stop	1	No No	📕 Low	Alt + E			lobal hotkeys
Smooth stop	0	No No	Low	None None			
Pause	0	No No	Low	None None			188 B88
Start	0	No No	Low	None None	e		
Probe	2	No No	Low				
(axis	Port number	Invert	Value now	Hot Key		ut port diagnostics	
🖂 Limit X+	3	No No	Low		I	n0 📕 In1 📕 In2 📕	In3
🖂 Limit X-	3	No No	Low		Ir	n4 📕 🛛 In5 📕 🛛 In6 📕	In7 📃
	3	No No	Low		Ir	n8 📕 🛛 In9 📕 In10 📕	In11
í axis	Port number	Invert	Value now	Hot Key	Inf	12 📕 In13 📕 In14 📕	In15
🖂 Limit Y+	4	No	Low		Int	16 📕 In17 📕 In18	In19
	4	No No	Low		Ind	20 📕 In21 📕 In22	In23
	4	No	Low				In27
Zaxis	Port number	Invert	Value now	Hot Key			
🖳 🗹 Limit Z+	5	No No	Low			28 In29 In30	
Limit Z-	5	No	Low		×	Low Activ	ve

«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	Born Scroll Fause Scroll Scroll
$ \begin{array}{c c} & & & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline \end{array} $ \\ \hline \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \\ \hline \end{array} \\ \hline \\ \hline \\ \hline \\ \hline \end{array} \\ \hline \\ \hline \end{array} \\ \\ \hline \end{array} \\ \hline \\ \hline \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \\ \hline \end{array} \\ \hline \end{array} \\ \\ \hline \\ \hline \\ \hline \\ \hline \\ \\ \hline \\ \hline \\ $ \end{array}$ \\ \\		Insert Home Page Up Lock / * - Detete Page Down 7 * -
	Att Gr	← ↓ →
	— • • •	
Emergency stop	Start	Spindle On/Off
Smoth stop		Spindle Speed +10%
→ Jog X++	Jog Z++	 Spindle Speed +10%
← Jog X	Page Jog Z	Spindle Speed -10%
Jog Y++	Ind Jog A++	Jog Speed +100
↓ Jog Y	Insert Jog A	Jog Speed -100

Attention! Custom shortcuts take precedence over the default keys.

11.5.Configuring output ports

To configure output ports, click the Output Ports tab.

••	mmon 🛃 De	1				UIU	H	
Name	the st Darste	Port number	Invert	Value now Value now				
	utput Ports rn the spindle	1	Invert	Low				
	indle clockwise	2		Low				
	indle anticlock	2		Low				
	utput Ports	Port number	Invert	Value now				
		4		Low				
	ditional cooling	5		Low				
	les Output Ports	Port number	Invert	Value now				
	able X axle	0	∏ No	Low				
	able Y axle	0		Low				
Ena	able Z axle	0	□ No	Low				
Ene	able A axle	0	 No	Low				
	able B axle	0	No No	Low				
	able C axle	0	 No	Low				

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

11.6.Spindle adjustment

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

P Settings	- 🗆 ×
Common Device controller 🔛 Axes settings 🔶 Input Ports 💽 Output Ports	Spindle 🔬 Machine size
Spindle specifications Direction of rotation of the spindle Image: Spindle speed (rpm) 6000 6000 Image: Occurred conterclockwise Image: Acceleration (rpm/10ms) Image: Occurred conterclockwise Image: Spindle speed (rpm) Image: Occurred conterclockwise Image: Spindle	
Spindle coefficient Output signal (0.0 - 1.0) 1 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.

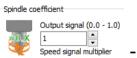
Acceleration



- 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.

11.7.Machine size

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

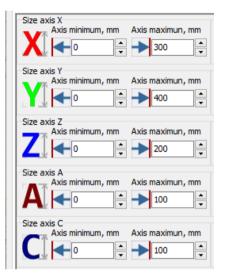
home function.

nettings		– 🗆 ×
Common Device controller	Axes settings 🔶 Input Port	s 🕒 Output Ports 🗊 Spindle 🚜 Machine size
Size axis X Axis minimum, mm Axis maximun, mm Axis maximun, mm 300	Soft Limit for X axis Use for Safe, slow, mm Min Max 10	Home X-axis function Home direction Home order Speed, mm/min To max To max Home order Speed, mm/min
Size axis Y Axis minimum, mm Axis maximun, mm Axis maximun, mm 400	Soft Limit for Y axis Use for Safe, slow, mm Min Max 10	Home Y-axis function Home direction Home order Speed, mm/min
Size axis Z Axis minimum, mm Axis maximun, mm Axis maximun, mm 200	Soft Limit for Z axis Use for Safe, slow, mm Min Max 10	Home Z-axis function Home direction Home order Speed, mm/min To max 7 3 4 300 4
Size axis A Axis minimum, mm Axis maximun, mm Axis maximun, mm	Soft Limit for A axis Use for Safe, slow, mm Min Max 10	Home A-axis function Home direction Home order Speed, mm/min To max To max 4 2 300
Size axis C Axis minimum, mm Axis maximun, mm Axis maximun, mm I100	Soft Limit for C axis Use for Safe, slow, mm Min Max (10) •	Home C-axis function Home direction Home order Speed, mm/min To min To max F 6 300 +
Apply		Save Cancel

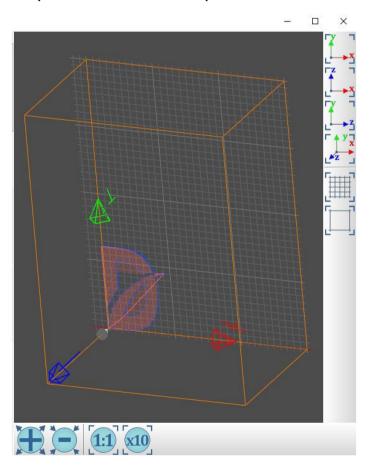
11.7.1. Size axis

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.



11.7.2. 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 Use for Safe, slow, mm
Min 10 📩
Soft Limit for Y axis Use for Safe, slow, mm
Min 10 🙀 Max 🔁 10 🔹
Soft Limit for Z axis Use for Safe, slow, mm
Min 🕂 Max 🚍 10 🔹
Soft Limit for A axis Use for Safe, slow, mm
Min 10 🛉
Soft Limit for C axis Use for Safe, slow, mm
Min 打 Max 🤶 10 📮

will stop and prevent it from moving towards the minimum.

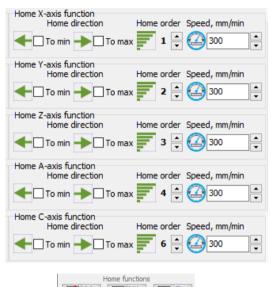
Image → When the maximum limit of your axis is reached, the tool will stop moving and prevent it from moving towards the maximum.

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

Safe, slow, mm

11.7.3. Home function

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



These settings are for buttons **Real Real Real OF State** 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.

I = 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.

Home order

Speed, mm/min

home order = 6 will be executed most recently.

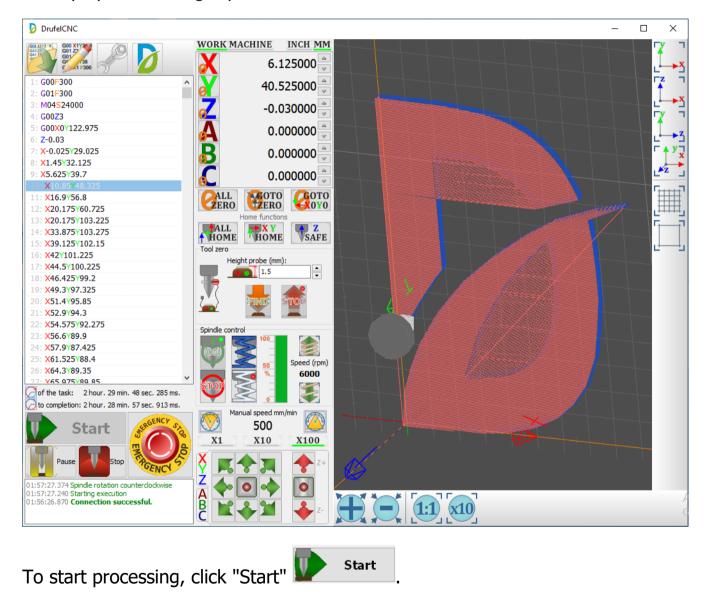
 \bigcirc is the speed of the tool when searching for the home position.

12. 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.



13. Search tool zero

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

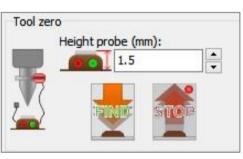
used. Next, click

. 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

14. Manual control

	Manual speed m	m/min_
	× 500	< 😂
X1	X10	X100

sets the speed of movement of the

instrument during manual operation.

n	e			A	
ч	λ	2	1	ч	
N.	0		7	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 (100).

For manual control, press the corresponding joystick button





Spindle control and cooling 15.

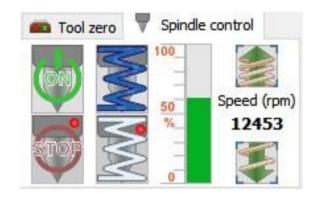
- Spindle power button.
- Spindle off button.

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

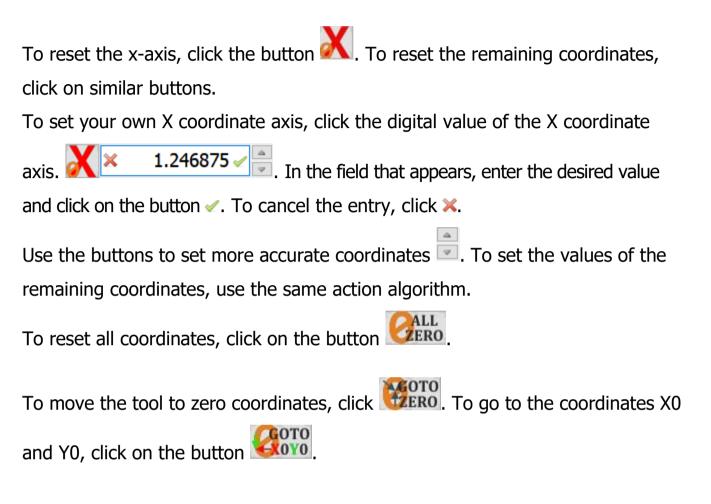


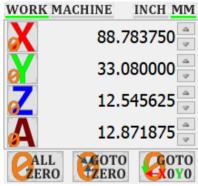
Button to increase the rotation of the spindle.

- Button to reduce the rotation of the spindle.



16. Assignment of coordinates

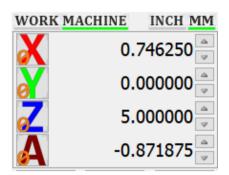




16.1.Measurement system

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.

16.2. 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 <u>MACHINE</u>.

16.3.Work coordinates

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

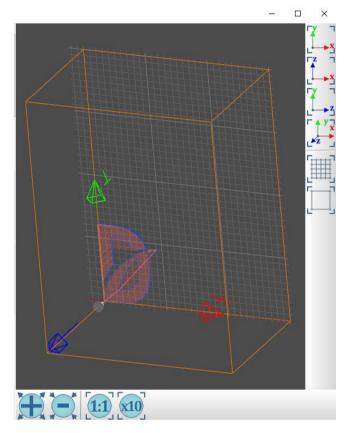
Work coordinates are relative to machine coordinates.

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

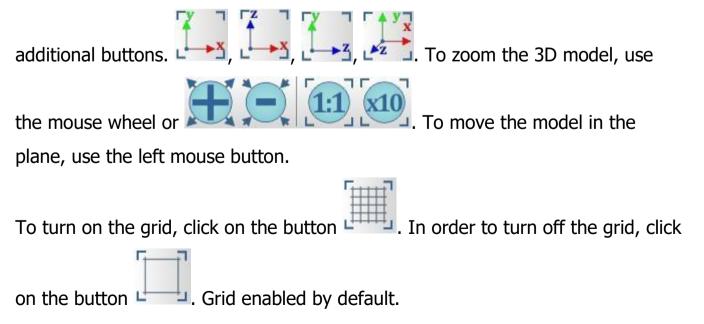
If work coordinates are activated for display, they are highlighted in green **WORK**.

17. 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

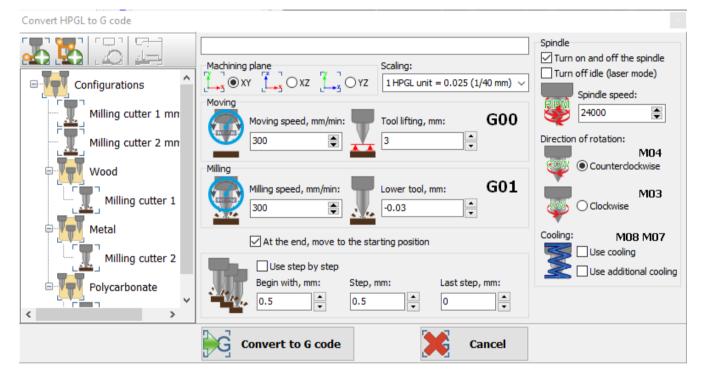


18. Opening HPGL files

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

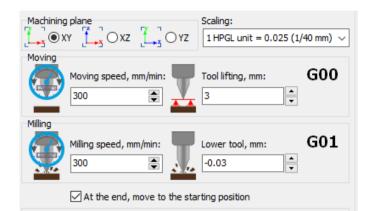
the folder, then select the file.

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



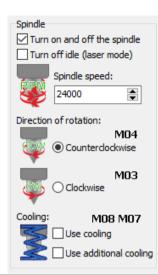
After successful conversion, you will see a three-dimensional model of the file.

19. Basic parameters of the HPGL file converter



Machining plane	The plane in which the HPGL file will be executed.
Scaling: 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.

19.1. 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: 24000	The spindle speed while executing the HPGL file. When using a laser, sets the laser power.		
Direction of rotation: 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. Corresponds to commands M08 and M07.		

19.2. 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.

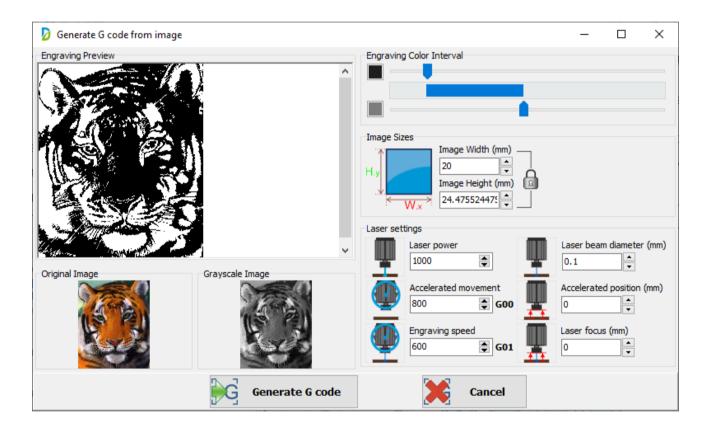


Begin with, mm:	After this axis position, the step milling algorithm will start. For	
	example after $Z = 0.5$ mm.	
Step, mm: 0.5	The cutter will move this distance after each cycle through the entire	
	HPGL file. For example, 0.5 mm.	
Last step, mm:	If nococcary, you can got a fixed distance for the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

20. 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.

Engrav	ving Color I	interval			
			(

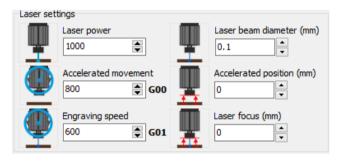
In the Image Sizes block, you can adjust the image size.

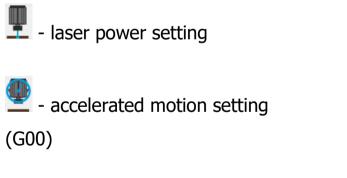
Image Sizes	
H.y	Image Width (mm) 20 Image Height (mm) 24.475524475
in Wix re	

🗟 - proportional image resizing.

Inot proportional image resizing.

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





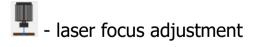


\overline - engraving speed setting

- laser beam diameter

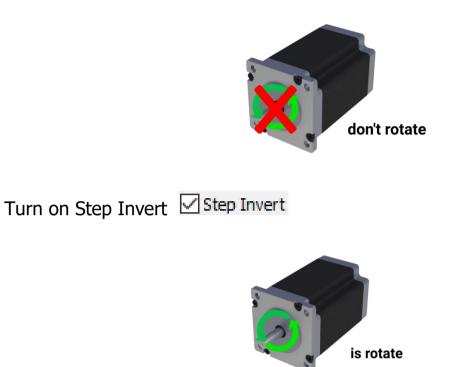
adjustment (mm)

- accelerated position adjustment (mm)



21. Stepper motors

If your stepper motors don't rotate



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.

