14 Appendix D: MPG Handwheel Pendant

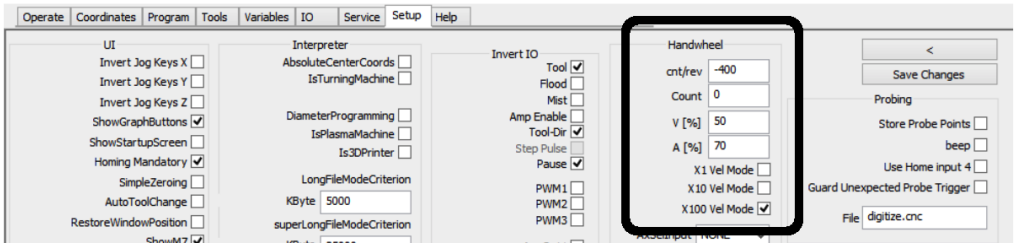
The MPG Handwheel Pendant is a very useful add-on, designed to improve the user friendliness of any CNC machine using USBCNC.

The MPG Handwheel Pendant has four main functionalities:

- Control and move machine axes individually
- Machine Feed Over Ride during operation
- Start and Pause your current job
- Zero-ing of individual axes

The installation procedure of the Handwheel can be found on the next page.

There are 5 settings which need to be set prior to using the MPG Handwheel. These settings can be found on the second page of 's Setup Tab.



Cnt/rev
Cnt/rev sets how many counts one complete revolution of the handwheel is. It is possible to invert the functionality of the Handwheel by placing a minus sign in front of the value. The cnt/rev is set to 400 counts by default.

Count
Count shows the current count position of the handwheel.
Count can be used to figure out how many counts/rev your handwheel has. When you start at zero counts, and perform a full 360 degree rotation of the handwheel the count value should read 400 for DamenCNC handwheels.

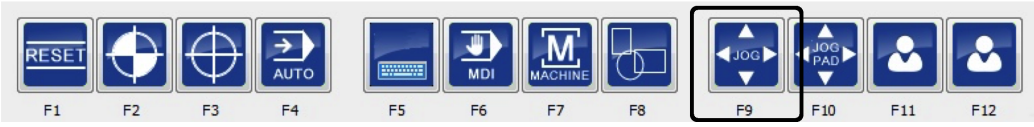
V[%]
V[%] is the maximum velocity in percentages (as is set in Setup tab) for each axis that will be used during moving your machine using the handwheel. This value is by default set to 50%, allowing the Handwheel to be useful for accurate determining the Zero position of individual axes.

A[%]
A[%] determines the percentage of the maximum acceleration (as is set in the Setup tab) of an axis that will be used during a jog with the handwheel.

X1...X100 Vel Mode
When the user selects any Velocity Mode, during jogging your machine will immediately stop when you stop rotating the handwheel.
The absolute position of the Handwheel will not be maintained if any velocity mode is selected.
If no velocity mode is selected, during jogging your axis may not immediately stop if the handwheel rotation stops. Therefore it is safe practise to to leave this setting just as is.

Control and move machine axes individually

The Handwheel allows the user to move the machine axes within 's functionality called JOG. The JOG menu can be found by pressing F9 in the main menu or click the JOG tab:



Now it is possible to control and move your machine using the Up / Down, Left / Right, Pg Up / Pg Dn keys on your keyboard. The Handwheel mode is activated by select any of the velocity modes by pressing F9, F10 or F11:

Here the velocity mode which is selected by pressing F9 is most sensitive, where each Handwheel rotational increment typically results in a 0.01mm movement. The F10 velocity mode typically yields a 0.1mm movement, and F11 usually results in 1mm displacement for each click. Press the right button **XYZAB** to switch to an other axis.

Machine Feed Over Ride during operation

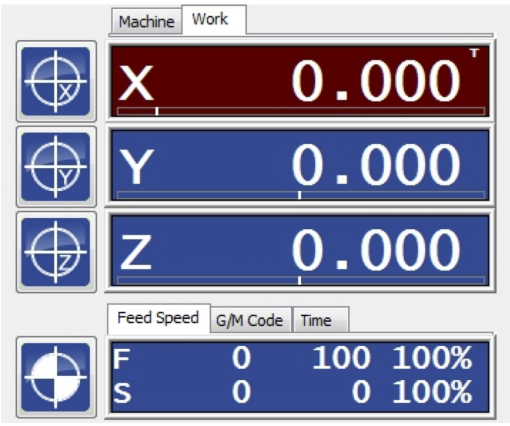
During a CNC job the machine feed rate can be reduced from 100% towards 0%, or increased up to 300% by rotating the Handwheel. This feature is useful when you are performing a prototype CNC job, or entered an either too high or too low machine feed rate.

Start and Pause your current job

The two push buttons on the MPG Handwheel can be used to pause and (re-)start your job during operation.

Zero-ing of individual axes

Use the Handwheel to zero individual axes within the Work Coordinate System (which differs from the Machine Coordinate System) by entering the JOG menu described on the previous page. Jog towards the location which you want to set to zero. When the machine has moved to the correct position, press the Zero (left) button. Note that the value on 's Digital Read Out (DRO) is now set to zero:

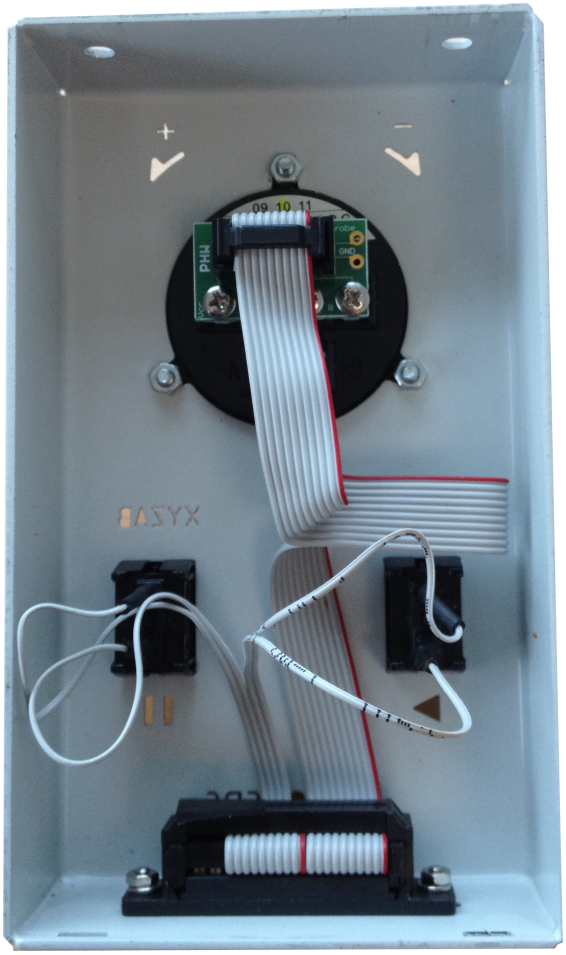


Press the right button **XYZAB** to switch to another axis if you want to zero another axis as well, and repeat the process.

Electrical Pin-out 25P SUB-D and Ribbon cable

Note that the first cable of the Ribbon cable is red, which corresponds to Pin 1 of the 25P-SUB-D Connector.
When you mount the Ribbon cable you can use this conversion table:

Pin Number 25P SUB-D	Function	Comment	Cable Number Flat Ribbon cable
1	Not connected		1 - RED
2	HANDWHEEL -A	Encoder Signal A	3
3	HANDWHEEL -B	Encoder Signal B	5
4	Not connected		
5	+5VDC USB	Power from CPU	9
6	Not connected		
7	RUN (Zero axis)	Input on CPU	13
8	PAUSE (Change axis)	Input on CPU	15
9	Not connected		
10	Not connected		
11	Not connected		
12	Not connected		
13	Not connected		
14	Not connected		
15	Not connected		
16	Not connected		
17	GND PHW	Ground PHW	8
18	Not connected		
19	Not connected		
20	GND RUN	Ground RUN	14
21	GND PAUSE	Ground PAUSE	16
22	Not connected		
23	Not connected		
24	Not connected		
25	Not connected		


+
−
09 10 11
PHW
GND
XYZAB

Frequently asked questions regarding MPG Handwheel

Q: When I press the Zero button, it does not zero but place a value?

A: When you have entered a tool diameter in the Tool Table and that tool is loaded, will compensate for half the diameter when pressing the ZERO button. The area which we have circled in red, is where displays the values it has stored in memory. So if in your G-code you would not specify a Feed rate (f) when programming a G1 code, would use the value of 60.00mm / min stored in memory. The same is true for the tool, if not written in your program, will assume it can use the tool stored in memory, in this case tool 1. If you don't want to compensate for the Tool Diameter, go to the Tab Tools, and change the Tool Diameter of the tool to 0.00, and save your settings.

Q: When I rotate the MPG Handwheel clockwise (+ direction), my coordinates (or Feed Over Ride) decreases in value, whereas I expect them to increase?

A: To fix this problem, go to the Tab Setup. There is a box designated for the MPG Handwheel. In this box you see the subbox cnt/rev. If you add an minus to the value you see there (i.e. -400 instead of 400) or vice verse, the MPG Handwheel will reverse its counting. Don't forget to save your settings!

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