

# Jog through ADC inputs

Main window:

The screenshot shows the 'CNC Settings' window with the 'Inputs/Outputs/Sensors' section expanded. The 'Jog through ADC inputs' option is selected. The main area displays a table for configuring ADC inputs for axes #0 through #5.

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone	Max range	Max alarm	Ignore Max	
#0	X	ADC0	<input type="checkbox"/>	-1	50	2000	2100	4050	4096	<input type="checkbox"/>
#1	Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

Basic functions:

The screenshot shows the same 'CNC Settings' window with annotations explaining the basic functions of the 'Jog through ADC inputs' configuration. The annotations are as follows:

- Jog activation by number**: Points to the 'Jog through ADC inputs' option in the left sidebar.
- Axis selection for control**: Points to the 'Axis' column in the table.
- ADC number selection**: Points to the 'Channel' column in the table.
- ON / OFF ignoring zero**: Points to the 'Ignore Zero' column in the table.
- level after which is an error**: Points to the 'Min alarm' column in the table.
- Minimum signal level**: Points to the 'Min range' column in the table.
- bottom level of the dead zone**: Points to the 'Dead Zone' column in the table.
- Top level of the dead zone**: Points to the 'Max range' column in the table.
- Maximum signal level**: Points to the 'Max alarm' column in the table.
- level after which is an error**: Points to the 'Ignore Max' column in the table.
- SAVE settings**: Points to the 'SAVE' button in the top right corner.

- **ADC**-a device that converts the input analog signal into a discrete code (digital signal). In this case, the incoming analog signal is proportionally converted into a control signal of displacements along the selected coordinate.
- To activate the Jog through ADC inputs, it is necessary to check the box next to number of channel:

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone	Max range	Max alarm	Ignore Max	
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	-1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

- Next you need to select the axis by which the control will be carried out using an analog signal. It is also possible to select a vertical support control system during tracking (TNC).

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone	Max range	Max alarm	Ignore Max	
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	-1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Y	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> Z	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> A	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> B	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> C	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#6	<input type="checkbox"/> U	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#7	<input type="checkbox"/> V	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#8	<input type="checkbox"/> W	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#9	<input type="checkbox"/> THC	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

- It is also necessary to choose the number of the ADC input channel on the controller, where the analog signal from the analog control (analog-joystick) will go directly.

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone	Max range	Max alarm	Ignore Max	
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	-1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

- The processor input is usually designed to measure an analog signal in the range of 0 to 5V. Correspondingly inside the processor, this analog signal will be converted to a digital value from 0 to 4096. Where 0 is 0V, and 4096 is 5V.
- In CNC machines, as a rule, the source of the analog signal and the main control is the joystick. The most convenient and most common are joysticks based on Hall sensors with power supply + 5V and output signals 0-2.5V-5V. Where the level 2.5B corresponds to the position of the joystick at rest, i.e. the controlled axis is not subject to control. After converting the analog signal to 2.5V, the digital value of 2048 corresponds to the digital value of 2048. Typically, joysticks and similar control devices at the output, even at rest, have small distortions and noises in the output signal. To prevent false positives and unauthorized movements, a "dead zone" is entered in the settings.
- "Dead zone" - is set by two values of the lower and upper limit of the values of the input signal, in the range of which the system will not respond to the input signal and system movements

and other reactions to the joystick will be absent. For example, the system will not perform any reactions or actions in the range of values from 2000 to 2100, which in turn corresponds to the input signal levels in the range from 2.44V to 2.56V.

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone		Max range	Max alarm	Ignore Max
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	-1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

- Accordingly, 0V is a movement to the left or counterclockwise, at the maximum speed and 5V is movement to the right or clockwise at the maximum speed. The value of the signal in the range from 0 to 2.5V - allows a smooth, adjustable movement to the left or counterclockwise, and accordingly the signal value from 2.5V to 5V allows a smooth, controlled movement to the right or clockwise.
- Also in the program is designed to protect against breakage of the joystick itself or broken wires. Because when the cable is cut from the joystick to the controller input, the level of the input signal will be equal to or close to 0V (0). Also, for certain errors in the wiring, it is possible for a false alarm to occur at 5V level (4096) at the controller input. To prevent movement with such errors in the program, you can set the minimum and maximum level of the signal at the input to the controller. For example, the minimum signal level is set to 50, which corresponds to 0.06V, and the maximum level is set to 4050, which corresponds to 4.94V.

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone		Max range	Max alarm	Ignore Max
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	-1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone		Max range	Max alarm	Ignore Max
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	-1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone	Max range	Max alarm	Ignore Max	
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

	Axis	Channel	Ignore Zero	Min alarm	Min range	Dead Zone	Max range	Max alarm	Ignore Max	
#0	<input checked="" type="checkbox"/> X	ADC0	<input checked="" type="checkbox"/>	-1	50	2000	2100	4050	4096	<input checked="" type="checkbox"/>
#1	<input type="checkbox"/> Z	ADC3	<input checked="" type="checkbox"/>	100	450	2044	2244	4096	4000	<input checked="" type="checkbox"/>
#2	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#3	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#4	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>
#5	<input type="checkbox"/> X	ADC0	<input type="checkbox"/>							<input type="checkbox"/>

- MPG - designed for manual control of the CNC without resorting to control from the operator panel. With the help of the control panel, the operator of the CNC machine can change the position of the axes, change the feedrate, adjust the spindle operation, set “0” and perform other operations while in close proximity to the workpiece.
- examples of MPG are presented below:



- After activation, you can select the operating input numbers for the MPG on the controller - input1 and input2

input1:

MPG/Encoder through binary inputs

	Input1	Input2	Slot	Axis	Dimension	Encoder Resolution
#0	<input checked="" type="checkbox"/> Input 8	Input 9	MPG wheel	Pendant		400
#1	<input type="checkbox"/> Input 0	Input 11	MPG wheel	General Purpose		400
#2	<input type="checkbox"/> Input 1	Input 9	MPG wheel	Pendant		65536
#3	<input type="checkbox"/> Input 2	Input 11	MPG wheel	General Purpose		400
#4	<input type="checkbox"/> Input 3					
#5	<input type="checkbox"/> Input 4					
#6	<input type="checkbox"/> Input 5					
#7	<input type="checkbox"/> Input 6					
#8	<input type="checkbox"/> Input 7					
#9	<input type="checkbox"/> Input 8					
#10	<input type="checkbox"/> Input 9					

ET10 encoder inputs

	Input#	Slot	Axis	Dimension	Encoder Resolution
#4	ET10 Encoder #0	MPG wheel	X		100

input2:

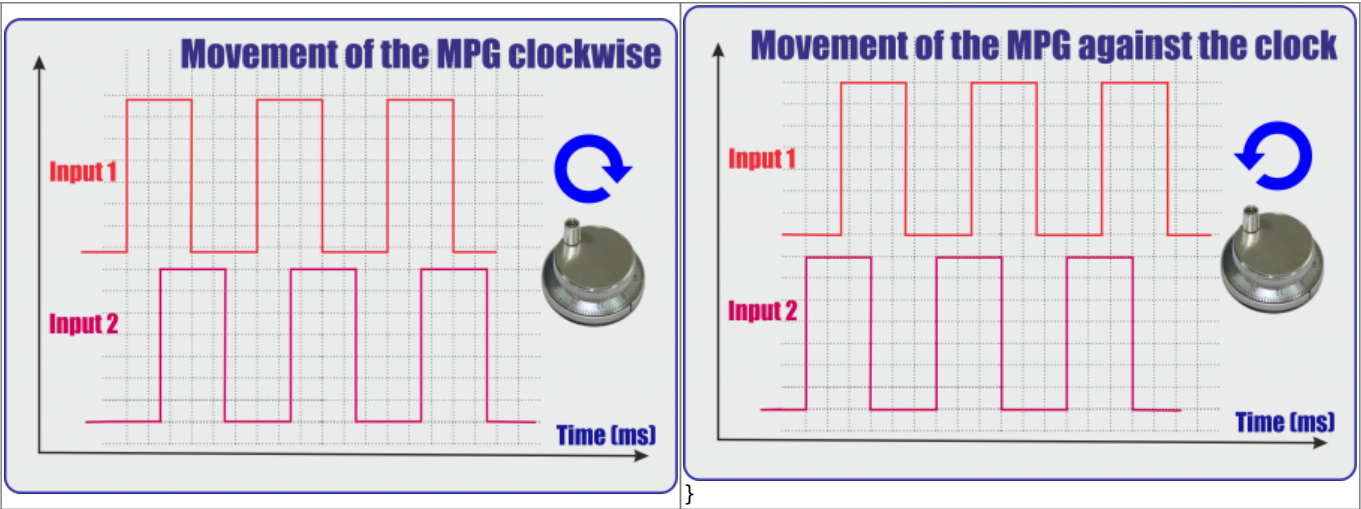
MPG/Encoder through binary inputs

	Input1	Input2	Slot	Axis	Dimension	Encoder Resolution
#0	<input checked="" type="checkbox"/> Input 8	Input 9	MPG wheel	Pendant		400
#1	<input type="checkbox"/> Input 10	Input 0	MPG wheel	General Purpose		400
#2	<input type="checkbox"/> Input 8	Input 1	MPG wheel	Pendant		65536
#3	<input type="checkbox"/> Input 10	Input 2	MPG wheel	General Purpose		400
#4	<input type="checkbox"/> Input 3	Input 4				
#5	<input type="checkbox"/> Input 5	Input 5				
#6	<input type="checkbox"/> Input 6	Input 6				
#7	<input type="checkbox"/> Input 7	Input 7				
#8	<input type="checkbox"/> Input 8	Input 8				
#9	<input type="checkbox"/> Input 9	Input 9				

MPG/Encoder inputs

	Input#	Slot	Axis	Dimension	Encoder Resolution
#4	ET10 Encoder #0	MPG wheel	X		100

- Timing diagram of signals of MPG:



- It is also necessary to select the MPG function:



**MPG/Encoder through binary inputs**

	Input1	Input2	Slot	Axis	Dimension	Encoder Resolution
#0	<input checked="" type="checkbox"/> Input 8	Input 9	MPG wheel	Pendant		400
#1	<input type="checkbox"/> Input 10	Input 11	MPG wheel	General Purpose		400
#2	<input type="checkbox"/> Input 8	Input 9	MPG wheel	Pendant		65536
#3	<input type="checkbox"/> Input 10	Input 11	MPG wheel	General Purpose		400

Functions	Discriptions
MPG wheel	Direct control of MPG
THC/Z axis offset	Controlling the tracking on cutting with the help of MPG
Spindle Sync	Spindle control, via the analog output to control the spindle speed.

- If necessary, select the coordinate axis, which will be controlled by MPG

**MPG/Encoder through binary inputs**

	Input1	Input2	Slot	Axis	Dimension	Encoder Resolution
#0	<input checked="" type="checkbox"/> Input 8	Input 9	MPG wheel	Pendant		400
#1	<input type="checkbox"/> Input 10	Input 11	MPG wheel			400
#2	<input type="checkbox"/> Input 8	Input 9	MPG wheel			65536
#3	<input type="checkbox"/> Input 10	Input 11	MPG wheel			400

**MPG/Encoder ET10 encoder inputs**

Input#	Slot	Axis	Dimension	Encoder Resolution
		Pendant		
		X		
		Y		
		Z		
		A		
		B		
		C		
		U		
		V		
		W		
		Pendant		

- Next we select the length of displacements with the help of MPG. Number of movements in mm per pulse MPG:

**MPG/Encoder through binary inputs**

	Input1	Input2	Slot	Axis	Dimension	Encoder Resolution
#0	<input checked="" type="checkbox"/> Input 8	Input 9	MPG wheel	Pendant	0.1	400
#1	<input type="checkbox"/> Input 10	Input 11	MPG wheel	General Purpose		400

- We set the resolving power of the PGM - the number of pulses per one revolution of PGM

**MPG/Encoder through binary inputs**

	Input1	Input2	Slot	Axis	Dimension	Encoder Resolution
#0	<input checked="" type="checkbox"/> Input 8	Input 9	MPG wheel	Pendant	0.1	401

## Mpg/Encoder ET10 throught binary inputs

If you use the ET10 controller <https://shop.pv-automation.com/et10/9-mycnc-et10.html>, you can used not only MPG function, but also the encoders, to monitor the position of any of the axes.

- To activate the MPG or Encoder, it is necessary to check the box next to needed number:

**MPG/Encoder ET10 encoder inputs**

	Input#	Slot	Axis	Dimension	Encoder Resolution	
#4	<input checked="" type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#5	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#6	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#7	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100

- After activation, you can select the encoder number on the controller for operating

**MPG/Encoder ET10 encoder inputs**

	Input#	Slot	Axis	Dimension	Encoder Resolution	
#4	<input checked="" type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#5	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#6	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#7	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100

- It is also necessary to select the MPG function:

**MPG/Encoder ET10 encoder inputs**

	Input#	Slot	Axis	Dimension	Encoder Resolution	
#4	<input checked="" type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#5	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#6	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#7	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100

Functions	Discriptions
MPG wheel	Direct control of MPG
THC/Z axis offset	Controlling the tracking on cutting with the help of MPG
Spindle Sync	Spindle control, via the analog output to control the spindle speed.

- If necessary, select the coordinate axis, which will be controlled by MPG

**MPG/Encoder ET10 encoder inputs**

	Input#	Slot	Axis	Dimension	Encoder Resolution	
#4	<input checked="" type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#5	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#6	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100
#7	<input type="checkbox"/>	ET 10 Encoder #0	MPG wheel	X		100

- Next we select the length of displacements with the help of MPG. Number of movements in mm per pulse MPG:

**MPG/Encoder ET10 encoder inputs**

	Input#	Slot	Axis	Dimension	Encoder Resolution
#4 <input checked="" type="checkbox"/>	ET10 Encoder #0	MPG wheel	X	0.1	100
#5 <input type="checkbox"/>	ET10 Encoder #0	MPG wheel	X		100
#6 <input type="checkbox"/>	ET10 Encoder #0	MPG wheel	X		100
#7 <input type="checkbox"/>	ET10 Encoder #0	MPG wheel	X		100

- We set the resolving power of the PGM - the number of pulses per one revolution of PGM

**MPG/Encoder ET10 encoder inputs**

	Input#	Slot	Axis	Dimension	Encoder Resolution
#4 <input checked="" type="checkbox"/>	ET10 Encoder #0	MPG wheel	X	0.1	100
#5 <input type="checkbox"/>	ET10 Encoder #0	MPG wheel	X		100
#6 <input type="checkbox"/>	ET10 Encoder #0	MPG wheel	X		100
#7 <input type="checkbox"/>	ET10 Encoder #0	MPG wheel	X		100

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