

CNC Stepper motor Control. CS4EV12-1 Rev. 1

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USER'S MANUAL

TABLE OF CONTENTS

Page

Contents

1.0	FEATURES1
2.0	SPECIFICATIONS1
3.0	SYSTEM REQUIREMENTS2
4.0	WARNING2
5.0	CONTROL BOX DESCRIPTION
5.1	Back Panel Description3
5.2	Front Panel Description4
5.3	Internal Layout5
6.0	QUICK START (STEP by step)
6.1	Step 1. Connecting Motor cables6
6.2	Step 2. Connecting Limit switches Board6
6.3	Step 3. Aux 1 (AC Plug)7
6.4	Step 4. Connecting External E-Stop7
6.5	Step 5. Connecting VFD:8
6.6	Step 6. Connecting Probe8
6.7	Step 7. Software Installation:9
6.8	Step 8. Configuring the Pendant9
7.0	PINOUT14
8.0	DISCLAIMER15

1.0 FEATURES

- Ethernet controlled CNC Stepper motor Control Box.
- 4 Stepper motors.
- Suitable for a wide range of stepping motors of Nema 17, 23 and 34.
- Relay Controlled Aux 1 AC Plug.
- 1 Remote Pendant Input. (Pendant not included)
- 1 External E-Stop input.
- 1 Probe input.
- RJ45 interface for easy Limits and encoder connection.
- U V W Motor terminals (VFD Controller).
- Works directly with Mach3.

2.0 SPECIFICATIONS

Main Voltage Input (VAC)	220V
Main voltage for motors (VDC)	60V
Logic supply voltage (VDC)	5V and 12V
Peak Current per axis (A)	20
Step input frequency	0-400KHz
Digital inputs (LOW)	-0.5V - 0.8V
Digital inputs (HIGH)	2V-5V
Aux 1 Output	110VAC@15A
Cooling	2 DC fan
Dimensions (cm)	40x50x25
Weight (lbs) / (kg)	

3.0 SYSTEM REQUIREMENTS

Processor	1Ghz CPU
Memory	512
Ethernet	
Operating System	Windows 2000, Windows XP, Windows Vista, or Windows 7
Software	Mach3 Version R3.043.066

4.0 WARNING



Electrical shock or serious physical injury could result due to misuse Control BOX.

Disconnect power cables while installing the Control Box.



Read and follow instructions on the manual.





5.3 Internal Layout



6.0 QUICK START (STEP BY STEP)

6.1 Step 1. Connecting Motor cables.

STE	STEPPER MOTOR CABLE							
		WIRE						
PIN	DESCRIPTION	COLOR						
1	A+	RED						
2	A-	WHITE						
3	B+	BLACK						
4	В-	GREEN						





6.2 Step 2. Connecting Limit switches Board.



User's Manual

Wiring is made to work with an <u>A32 Switch Assembly</u>, <u>C16 – Photo and Limit Board</u>, a <u>C45 LIMIT AND HOME UNIVERSAL</u>, <u>A61 – Inductive Switch Assembly</u> or a C27-Ethernet RJ45 Breakout Board, which could take any kind of switches, including inductive, capacitive, hall effect, optical, or mechanical.

6.3 Step 3. Aux 1 (AC Plug).

110 – 220 VAC outputs controlled by Solid State Relays.

6.4 Step 4. Connecting External E-Stop.

The external e-stop is optional. If the plug is not present, the e-stop circuit will get closed. If the plug is put in place, a NC e-stop switch must be used.



Note: in the case of not using the external e-stop, change the position of the jumper according prevention image:



Use the external stop

Do not use the external stop

6.5 Step 5. Connecting VFD:



The box is prewired for US VFD Mode, if using on INTERNATIONAL mode, open the box and move the jumper on the C32.

The true max and min speeds of the spindle must be set:

Current Pulley	Min Speed	Max Speed	Ratio
ulley Number 1	▼ 7000	23000	1
Reversed			

6.6 Step 6. Connecting Probe.

Touch probes are wired and preconfigured and just needs to be connected to the back panel. CNC4PC offers this unit:

<u>http://www.cnc4pc.com/Store/osc/product_info.php?cPath=69&products_id=323</u>, but other may be used as long as the wiring is compatible,







3.5mm Jack

Refer to the product's documentation for additional information: <u>http://cnc4pc.com/Tech_Docs/TP1.pdf</u>

6.7 Step 7. Software Installation:

Before connecting the box to power install the basic software and configuration files:

- 1. Download and install Mach3: <u>ftp://machsupport.com/Mach/Mach3Version3.043.066.exe</u>.
- 2. Download and install the Ethernet Smooth Stepper Plugin: http://warp9td.com/downloads.htm
- 3. Install the Mach3 License.
- 4. Download and copy XML and configuration files: <u>http://cnc4pc.com/Files/CS4EV12-</u> <u>1_rev1.zip</u>. Make sure to copy each file in the specific directory.

6.8 Step 8. Configuring the Pendant.

In the case of not using the external e-stop, change the position of the jumper according prevention image:



Set the jumpers on the C32 to use the inputs coming from the DB25 for the pendant:



User's Manual

1. Configure Ports & Pins to use port 2 and pins 2-9 as inputs.



Configure the Smooth Stepper Plugin to use pins 2-9 on port 2 as inputs:

Controller I	requency	The Cont	roller Frequenci						OK
1 kHz	•	times per when our	second the vel putting pulses.	poity is updated Port 2	Pins 2 through	9 Direction In	•)	Cance
This setting h smoother bec	as tradeoff ause there	are more	er frequencies, veleocity update	the motion should be	Output M	ode	Noise Filtering		
But at higher a minor point	frequencies , a smaller	the negal data buffe	tive aspects ind r, and more der	ude lower resolution (probably nands on USB bandwidth.	Step an	d Quadrature	Noise Filtering o	finputs.	
At 250 Hz, up the buffer ler	to 4 secon igth, so at 5	ds of data i00 Hz, 2 s	can be queued econds can be l	up. Each doubling of frequency halves ouffered, 1 kHz, 1 second, etc.	x 🔽	Γ	An input must be time in microsect	stable for th onds before it	ne specified amount t will be considered
Ma	ix Step Free	uency	Set the maxir	num step frequency to the	Y 🔽		valid. Values will be as	signed to gro	ups of similar signals
X-axis	256 kHz	-	value that is frequency fo	greater than the maximum step reach axis.			The specified va nearest multiple	lues will be rounded to the of about 1.43 microseconds. To	
Y-axis	256 kHz	•	limit resolutio step rate is 5	n. For example, if the real max 00 kHz, and you set the Max	BV		a value of 0.0 m	or a given gr icroseconds.	oups of inputs, use
Z-axis	256 kHz	-	Step Frequer be 1 MHz, bu	icy to 1 MHz, then full scale will t the plugin will never send a and to the SmoothStepper			Limits	0.00	-
A-axis	256 kHz	•	greater than bit of resoluti	1/2 of full scale, thus losing one on.	Watchdog -		Home	0.00	1
B-axis	256 kHz	-	The Setting f Resolution is	or Spindle is not the same. fixed, so it doesn't matter what	If the PlugIn communicate	fails to with the	Probe	0.00	1
C-axis	256 kHz	-	Motor Tuning that makes M	, so you may choose a selection otor Tuning work better.	device within of time listed	the amount below, an	EStop 0.00		
Spindle	32 kHz	-			the device.	uiggereu in	Jog	0.00	
Spindle					The time is in is rounded to	the nearest	Encoders/MPGs	0.00	 (includes A, B, Index, and timing
C Relay o	r None	E PW	ч	Step and Dir	tenth of a se value is 3.1	econd. Max seconds.	Miscellaneous	0.00	
		Base Hz	Hz 1000 Pulse Width (us) 0.0		2.0		(Miscellaneous covers all other inputs)		
Homing			hile Leading Pro			Miscellaneous			
IME	Home Swi	tch To Ope	n Or Close	Slave Are Independen	t	□ De-Ref	ference Axes in EStop	,	
X-axis	500000.0	A-axis	500000.0	Master and A-axis 0.2					
Y-axis	500000.0	B-axis	500000.0	Master and B-axis 0.2					
Z-axis	500000.0	C-axis	500000.0	Master and C-axis 0.2	-				

2. Enable Output 6 on port 2 pin 1.

	all married	Port #	Pin Number	Active Low	<u>^</u>
Jucpuc #1	8	0	0	×	
Output #2	X	0	0	2	
Output #3	2	0	0	×	
Output #4	X	0	0	X	
Output #5	X	0	0	X	
Output #6	4	2	1	X	
Charge Pump	4	1	17	X	
Charge Pump2	X	0	0	×	
Current Hi/Low	×	0	0	×	
Output #7	X	0	0	*	
Dutput #8	X	0	0	×	~
Pin	s 2 · 9 , 1 , 14 , 16 , a	nd 17 are output pins. I	No other pin numbers sho	uld be used.	

Configure the MPG and ENCODER on port 2 pins 2 and 3 for channels A and B.

lignal	Enabled	A -Port #	A -Pin #	B -Port #	B -Pin #	Counts/U	Velocity	
ncoder1	-	0	2	0	3	1.000000	100.000000	
incoder2	×	0	0	0	0	1.000000	100.000000	
ncoder3	×	0	0	0	0	1.000000	100.000000	
incoder4	×	0	0	0	0	1.000000	100.000000	
VIPG #1	4	2	2	2	3	1.000000	100.000000	
MPG #2	×	0	0	0	0	1.000000	100.000000	
MPG #3	×	0	0	0	0	1.000000	100.000000	

iignal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey	~
EM Trig #1	4	2	4	X	8	0	_
EM Trig #2	4	2	5	2	*	0	
EM Trig #3	4	2	6	X	*	0	
EM Trig #4	4	2	7	X	*	0	
EM Trig #5	4	2	8	*	8	0	
EM Trig #6	4	2	9	*	*	0	100
DEM Trig #7	1	2	10	X	X	0	
EM Trig #8	4	2	15	4	X	0	
EM Trig #9	4	2	12	X	×	0	
EM Trig #10	4	2	13	2	*	0	
VFM Trin #11	*	0	n	*	*	0	~
	Pins 10-13 an	id 15 are inputs. O	inly these 5 pin num	bers may be used	f on this screen Autom	ated Setup of In	puts

3. Configure the OEM Triggers as described in the image:

4. There are two sets of brains. One is for regular 1-6 axes, and the other one is for 1-4 and using axes 5 and 6 for SSO (Spindle Speed Override) and FRO (Freedrate Override). Brains for 1-6 axes: http://cnc4pc.com/Files/MPG4_LPT2Brain_V4.zip

Brains with SSO and FRO <u>http://cnc4pc.com/Files/MPG4_LPT2_FRO_SSO_v6.zip</u> Download, copy in to the Brains Directory and enable the following brains found <u>HERE</u>.



5. Set the Step Jog resolution:



7.0 PINOUT

PORT	PIN	CONTROL BOX FUNCTION	MACH FUNCTION
1	1	NOT USED	NOT USED
1	2	STEP X	STEP PIN#
1	3	DIR X	DIR PIN#
1	4	STEP Y	STEP PIN#
1	5	DIR Y	DIR PIN#
1	6	STEP Z	STEP PIN#
1	7	DIR Z	DIR PIN#
1	8	STEP A	STEP PIN#
1	9	DIR A	DIR PIN#
1	10	MACH E-STOP FUNTION	ESTOP
1	11	LIMIT X	X++
1	12	LIMIT Y	Y++
1	13	LIMIT Z	Z++
1	14	STEP SPINDLE (PWM)	STEP PIN#
1	15	PROBE	PROBE
1	16	DIR SPINDLE	DIR PIN#
1	17	NOT USED	NOT USED
2	1	NOT USED	NOT USED
2	2	ENCODER A	ENCODER 1 AND MPG#1
2	3	ENCODER B	ENCODER 1 AND MPG#1
2	4	SELECT X (MPG)	OEM TRIG #1
2	5	SELECT Y (MPG)	OEM TRIG #2
2	6	SELECT Z (MPG)	OEM TRIG #3
2	7	SELECT A (MPG)	OEM TRIG #4
2	8	SELECT 1 (MPG)	OEM TRIG #5
2	9	SELECT 10 (MPG)	OEM TRIG #6
2	10	SELECT 100 (MPG)	OEM TRIG #7
2	11	NOT USED	NOT USED
2	12	SELECT 5(MPG)	OEM TRIG #9
2	13	SELECT 6 (MPG)	OEM TRIG #10
2	14	NOT USED	NOT USED
2	15	E-STOP (MPG)	OEM TRIG #8
2	16	AUX 1	OUTPUT #1
2	17	CHARGE PUMP	CHARGE PUMP

8.0 DISCLAIMER

Use caution. CNC machines could be dangerous machines. DUNCAN USA, LLC or Arturo Duncan are not liable for any accidents resulting from the improper use of these devices. This product is not fail-safe device, and it should not be used in life support systems or in other devices where its failure or possible erratic operation could cause property damage, bodily injury or loss of life.