User Manual of 5Axis Breakout Board



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Contents

1	Introdu	uction and Features	1
	1.1	Introduction	1
	1.2	Features	1
2	Specif	ications	1
3	Interfa	ces	2
4	Wiring	g Diagram for Reference	3
5	MACH	13 Software Settings	3

1 Introduction and Features

1.1 Introduction

The latest upgraded 5 axis breakout board is specially designed for the CNC single axis 2-phase stepper driver controller, such as M542, M542H, MA860H, 2M542, 2M982, DM542(A), DM860(A) etc. single axis stepper driver controller series. With this 5 axis breakout board, any 1-5 single axis stepper driver controllers can be directly controlled by the PC via the MACH3, EMC2, KCAM4, etc.

1.2 Features

- Maximum support 5-axis stepper motor driver controllers
- Compatible with MACH3, Linux CNC (EMC2) etc. parallel-control CNC software.
- USB power supply and peripherals powered phase are separated to protect computer security.
- All the signals are opto-isolated which can protect your computer security.
- 5-input interface to define the Limit, Emergence-Stop, Cutter alignment, etc.
- Wide input voltage range: 12-24V, and with anti-reverse function.
- One relay output control interface, accessed by the spindle motor or the air pump, water pump, etc.
- Output 0-10V analog voltage for inverter to control the spindle speed.

2 Specifications

Electrical properties(ambie	int temperature $Tj = 25$ °C)
Input Dowor	USB port to directly get power from PC and
input Power	12-24V power supply(optional)
Compatible Stepper Motor Driver	Max 5 2-phase Microstep controllers
Driver type	Pulse and Direction signal control
Net/Total Weight	Approx 75g
Dimensions	90 * 70 * 20mm (L*W*H)

Interfaces



4 Wiring Diagram for Reference



5 MACH3 Software Settings

Note: The settings on MACH3 below is in condition that breakout board and stepper drivers are connected in common anode.

1. Check whether the MACH3 driver is installed correctly.

5 Axis Breakout Board Interface Adapter

🚔 Device Manager	
File Action View Help	
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⊿ 🛁 Test_PC	
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Disk drives	
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Human Interface Devices	
IDE ATA/ATAPI controllers	
Keyboards	"!" or "?" should not
International Action of the	be in "MACH3 Driver"
Mach3 Driver	
Mice and other pointing devices	
Monitors	
Network adapters	
A Dother devices	

2. Setup Units: Choose "MM's" in Config->Set Default Units for Setup

Set Default Units for Setup
Units for Motor Setup Dialog
ОК

3. Click "Config"->"Ports and Pins" on Main Interface.



4. Enter in "Port Setup and Axis Selection" to set "Port#1" and "Kernel Speed" shown as below.

Engine Configuration Ports & Pins	
Port Satup and Axis Selection Motor Outputs input Signals Outputs Please make sure the Port Address in PC System Port First Speed Port Enabled Dx278 Port Address Entry in Hex 0-9 A-F only Pins 2-9 as inputs Kernel Speed 0 35000Hz 100khz C 25000Hz 75000hz 100khz Note: Software must be restarted and motors retuned if kernel speed kernel speed	CR Encoder/MPG's Spindle Setup Mill Options MaxNC Mode Max CL Mode enabled Max NC-10 Wave Drive Program restart necessary Restart if changed Sherine 1/2 Pulse mode. ModBus InputOutput Support ModBus Support TCP ModBus Support Event Driven Serial Control Servo Serial Link Feedback
	Click "Apply" when you finish setting
	OK Cancel Apply

5. Click "Motor Outputs" to set it shown as below.

Engir	ne Configurat	tion Ports & Pi	ns	-				X
Por	t Setup and A	xis Selection M	lotor Outputs In	put Signals	Output Signals Enco	oder/MPG's S	pindle Setup	Aill Options
	Signal	Enabled	Step Pin#	Dir Pin#	Dir LowActi	Step Low A	. Step Port	Dir Port
	X Axis	4	2	3	4	4	1	1
	Y Axis	4	4	5	4	4	1	1
	Z Axis	4	6	7	4	4	1	1
	A Axis	4	8	9	4	4	1	1
	B Axis		16	17	4	4	0	0
	C Axis	×	0	0	X	X	0	0
	Spindle	4	1	0	4	4	1	1
		Check If y	ou use 5 axis		heck if common- ross if common-c	anode wirir athode wiri	ng (Click "Apply" after setting up
						0	K Ca	ncel Apply

6. Click "**Iutput Signals**" to set it shown as below.

5 Axis Breakout Board Interface Adapter

X++ 1 12 1 12 1 0 E X 1 12 1 12 1 0 <td< th=""><th>Signal</th><th>Enabled</th><th>Port #</th><th>Pin Number</th><th>Active Low</th><th>Emulated</th><th>HotKey</th><th>*</th></td<>	Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey	*
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Z 4 1 15 4 2 0	Z ++	4	1	15	4	X	0	
	Z	4	1	15	4	X	0	
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	HC Down 🕅 0 0 🕷 🕷 0 🗸		THC Down	X	0	0	×	X	0	-
Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen	Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen	Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen		Pins 10-13 an	d 15 are inputs. O	nly these 5 pin numb	pers may be used	on this screen		
Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen	HC Down X 0 0 0 X X 0 0 Fins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen	Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen	THC Down	Pins 10-13 an	0 d 15 are inputs. O	0 nly these 5 pin numb	Ders may be used	on this screen	0	Ŧ

7. Click "**Output Signals**" to set it shown as below.

5 Axis Breakout Board Interface Adapter

Digit Trig X Enable1 4 Enable2 X Enable3 X	0 1 0	0 14	X E
Enable1 4 Enable2 8 Enable3 8	1	14	X E
Enable2	0	-	
Enable3		0	X
chables -	0	0	X
Enable4	0	0	Spindle relay switch setur
Enable5 🛛 🛣	0	0	X
Enable6 🔀	0	0	X
Output #1 🖌 🚽	1	17	X
Output #2 🛛 🛣	0	0	X
0	0	0	M

8. Click "Spindle Setup" to set it shown as below.

Relay Control Motor Control Disable Spindle Relays Use Spindle Motor Output Clockwise (M3) Output # Output Signal #'s 1-6 PWM Control Flood Mist Control Special Functions Wist M7 Output # 0 Notod Was Output # 0 Output Signal #'s 1-6 General Parameters CW Delay Spin UP Seconds CW Delay Spin DOWN Seconds Max ADC Count 16380 Immediate Relay off before delay	Engine Configuration Ports & Pins Port Setup and Axis Selection Motor Outp	uts Input Signals Output Signals Encoder/I	MPG's Spindle Setup Mill Options
Output Signal #'s 1-6 CCW Delay Spin UP 1 Seconds Laser Mode. freq 1 ModBus Spindle - Use Step/Dir as well CW Delay Spind DOWN 1 Seconds Torch Volts Control Enabled Reg 64 64 - 127 CCW Delay Spin DOWN 1 Seconds Max ADC Count 16380 Immediate Relay off before delay Immediate Relay Immediate Relay	Relay Control Disable Spindle Relays Clockwise (M3) Output # 1 CCW (M4) Output Signal #'s 1-6 Flood Mist Control Image: Disable Rood/Mist relays Disable Rood/Mist relays Delay Mist M7 Output # Flood M8 Output # 3 0	Motor Control Special Fun Very Use Spindle Motor Output PWM Control Step/Dir Motor PWMBase Freq. 100 Minimum PWM 0 % General Parameters CW Delay Spin UP 1 Seconds	ctions ndle Feedback in Sync Modes .oop Spindle Control I 1 D 0.3 Speed Averaging Special Options, Usually Off HotWire Heat for Jog
	Output Signal #'s 1-6 ModBus Spindle - Use Step/Dir as well Enabled Reg 64 64 - 127 Max ADC Count 16380	CCW Delay Spin OP 1 Seconds CW Delay Spind DOWN 1 Seconds CCW Delay Spin DOWN 1 Seconds I Immediate Relay off before delay	Laser Mode. freq I Torch Volts Control

If you use PWM to control the spindle speed, you have to click "**Pulley Selection**" to set it shown as below.

Pulley Selection	17,004	1.000	
Current Pulley Pulley Number 1	Min Speed	Max Speed	Ratio
Reversed		,	,
			ОК

9. Motor debugging. Click Config->Motor Turning and Setup

Veloci 3281.25 2953.13 22953.13 22958.8 1968.75 1968.75 1984.375 9 884.375 9 884.375 9 884.375	Axis Selection X Axis Y Axis Z Axis A Axis	Setup X,Y,Z,A Axis separately
3281.25 22953.13 22953.13 2296.88 1968.75 1968.75 1910.63 1312.5 1312.	X Axis Y Axis Z Axis A Axis	Setup X,Y,Z,A Axis separately
2953.13 2825 2825 2296.88 4 1968.75 5 1640.63 1312.5 5 984.375 6 56.25	Y Axis Z Axis A Axis	Setup X,Y,Z,A Axis separately
2296.86 4 1968.75 5 1640.63 E 1312.5 5 984.375 6 656.25	Z Axis	separately
E 1640.63 - E 1312.5 - E 984.375 - E 656.25 -	A Axis	
656.25		
2 228 125	B Axis	
	C Axis	Click this button after
er:Steps required to mobile 1 mm Time in Seconds		you finish each axis setting, or it will not
in manual control	Spindle	save the data
Accel Velocity Acceleration Step Pulse Dir Pulse	SAVE AXIS SETTINGS	
Steps per In's or mm's per min. in's or mm's/sec/sec G's 1-5 us 0-5		
320 200 100 0.050988 5 5	Cancel OK	
/alue is calculated in the following formula:		
per=(360/1.8)*x/l; x:Microstep. I:screw pitch.		

10. Click "**System HotKeys Setup**". Set X, Y, Z axis hotkey shown as below. Then you can manual control the corresponding axis motor turning via hotkeys.

System HotKeys Setup		
	Jog Hotkeys ScanCode X++ 39 Y++ 38	ScanCode 37 40
	33	34