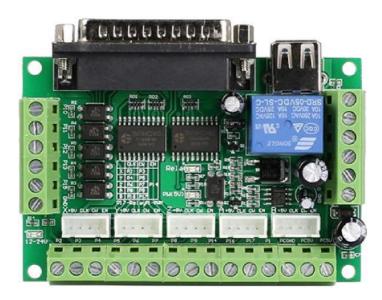
# User Manual of 5Axis Breakout Board



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## **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.

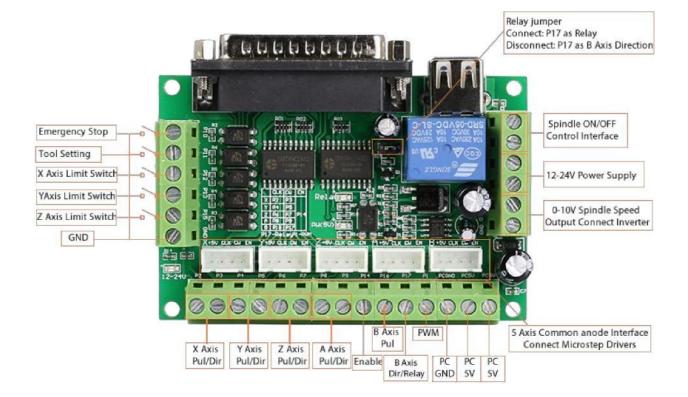
#### **1.2 Features**

- 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.

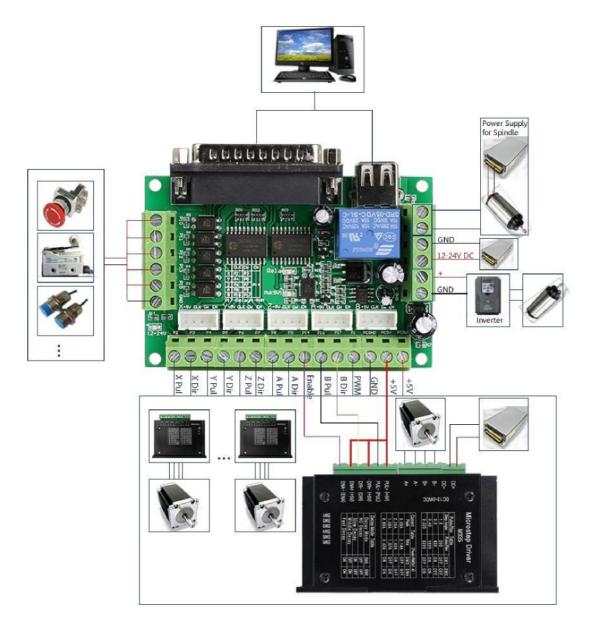
# **2** Specifications

Electrical properties(ambig	ent temperature $Tj = 25 C$ )
Input Power	USB port to directly get power from PC and 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)

# **3 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.

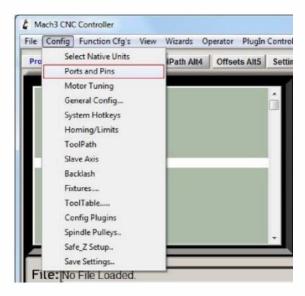
1. Check whether the MACH3 driver is installed correctly.



2. Setup Units: Choose  ${}^{3}00$  's<sup>T</sup> in **Config->Set Default Units for Setup** 

Set Default Units for Setup
Units for Motor Setup Dialog
€ MM's C Inches
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.

Please make sure the Port Address in PC System Port Hos is the same this Port Enabled Port Enabled Port Enabled Port Address Entry in Hex 0-9 A-F only Pins 2-9 as inputs	R MaxNC Mode Max CL Mode enabled Max NC-10 Wave Drive Program restart necessary Restart if changed Sherline 1/2 Pulse mode. Sherline 1/2 Pulse mode. ModBus InputOutput Support ModBus PlugIn Supported. TCP Modbus support Event Driven Serial Control Servo Serial Link Feedback Click "Apply" when you finish setting
--	---

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

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	0	0
Spindle	4	1	0	4	4	1	1
	Check If	you use 5 axis	s	eck if common-		- 6	Click "Apply" at

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

# 5 Axis Breakout Board Interface Adapter

Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey	•
X ++	4	1	12	4	X	0	E
X	4	1	12	4	×	0	
X Home	<b>X</b>	0	0	X	X	0	
Y ++	4	1	13	4	X	0	
Y	4	1	13	4	X	0	
Y Home	8	0	0	X	×	0	
Z ++	4	1	15	4	X	0	
Z	4	1	15	4	×	0	
Z Home	X	0	0	X	X	0	-
	Pins 10-13 and	f 15 are inputs. O	nly these 5 pin numt	oers may be used		ated Setup & Inc	el Apple

Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey	*
Input #3	X	0	0	X	×	0	
Input #4	2	0	0	X	8	0	
Probe	4	1	11	4	X	0	
Index	X	0	0	×	8	0	E
Limit Ovrd	2	0	0	X	×	0	
EStop	4	1	10	4	X	0	
THC On	X	0	0	X	X	0	
THC Up	2	0	0	*	2	0	
THC Down	X	0	0	X	X	0	-
	Pins 10-13 and	15 are inputs. O	inly these 5 pin numb	ers may be used		ated Setup of Inp	outs pply" after se

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

5 Axis Breakout Board Interface Adapter

eight ring	<b>X</b>	0	0	Active Low Motor Enable setu
Enable1				
	1	1	14	<b>X</b>
Enable2	K	0	0	<b>X</b>
Enable3	<b>x</b>	0	0	X
Enable4	X	0	0	Spindle relay switch setu
Enable5	X.	0	0	×
Enable6	X	0	0	*
Output #1	1	1	17	X
Output #2	K.	0	0	X
0.44 #7	2	0	0	¥ *

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

Relay Control Disable Spindle Relays Clockwise (M3) Output # 1 CCW (M4) Output # 1 Output Signal #'s 1-6 Rood Mist Control V Disable Rood/Mist relays Delay	PWM Control Closed Step/Dir Motor           P	Inctions pindle Feedback in Sync Modes I Loop Spindle Control 25 I I D 0.3 e Speed Averaging
Vist M7 Output # 4 0 Flood M8 Output # 3 0 Output Signal #'s 1-6 ModBus Spindle - Use Step/Dir as well - Fenabled Reg 64 64 - 127 Max ADC Count 16380	General Parameters     1     Seconds       CW Delay Spin UP     1     Seconds       CCW Delay Spin UP     1     Seconds       CW Delay Spin UP     1     Seconds       CW Delay Spin DOWN     1     Seconds       CCW Delay Spin DOWN     1     Seconds       CCW Delay Spin DOWN     1     Seconds       Immediate Relay off before delay     Immediate Relay off before delay     Immediate Relay off before delay	Laser Mode. freq I

## 5 Axis Breakout Board Interface Adapter

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

Current Pulley	Min Speed	Max Speed	Ratio
Pulley Number 1	• 0	24000	1
Reversed			

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

3281.25   X Axis     2625   2296.88     2   296.875     2   1968.75     2   1312.5     328.125   0     0   0.05   0.1   0.15   0.2   0.3   0.35   0.4   0.45   0.5     s per:Steps required to mobile 1 mm elue must be the same with the "PulE" in manual control   Time in Seconds   Spindle		Axis Selection	ROFILE	MOTOR MOVEMEN	X - AXIS
1   2625     2   2296.88     1   1968.75     1   1968.75     1   1312.5     1   1312.5     1   1312.5     1   1968.75     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   1312.5     1   10.05     0   0.05   0.1     0   0.05   0.1   0.15     0   0.05   0.2   0.25   0.3   0.35   0.4   0.45   0.5     0   0.05   0.1   0.15   0.2		X Axis		norok mo (Lail)	3281.25
<sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup> <sup>o</sup>	Setup X,Y,Z,A A	Y Axis			2953.13 2625
1     984.375       0     656.25       328.125     0       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.1       0     0.05     0.2       0     0.25     0.3       0     0.1     0.15       0.2     0.25     0.3       0     0.25     0.3       0     0.25     0.3       0     0.25     0.3       0     0.25     0.3       0     0.25     0.3       0     0.25     0.3	separately	Z Axis			
0     0.05     0.1     0.15     0.2     0.25     0.3     0.35     0.4     0.45     0.5       per: Steps required to mobile 1 mm ue must be the same with the "PulE" in manual control     Time in Seconds     Spindle     Spindle		A Axis			E 1312.5 ·
0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5   s per:Steps required to mobile 1 mm the must be the same with the "PulE" in manual control Time in Seconds Time in Seconds Spindle		B Axis			0 656.25 · → 328.125
Accel / Spindle	Click this button af	C Axis	0.35 0.4 0.45 0.5		0 0.05 0.1
Accel	you finish each ax setting, or it will no save the data	Spindle			ust be the same with the "F
	save the data			-	
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	5	SAVE AXIS SETTINGS			
320 200 100 0.050988 5 5 Cancel OK		Cancel OK	0988 5 5	100	320 200

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	-152
Jog Hotkeys ScanCode X++ 39	ScanCode
38	40
33	34