



### **GENERAL DESCRIPTION**

FIPBB02 is a simple , cheap , buffered nonisolated parallel breakout board . It supports four output control signal groups to drive up to four axis CNC machine. Each signal group supports three control signals (Enable , Direction and Clock ) . Two output relays could be enabled via DIP switch for additional spindle control. FIPBB02 also supports five dry contact inputs for travel limit switches.

#### **FIPBB02** features

- Four output control signal groups. labeled X-axis, Y-axis, Z-axis, A-Axis.
- Ena , Dir , Clk control signals are available. For pin assignment and address show table1.
- LED indicator for each output signal.
- Two output relays 5V coil / 3A contacts (resistive load).
- LED indicator for each output relay.
- Five external inputs (dry contact).
- LED indicator for each input status.
- All outputs and inputs are brought out via pin header and screw clamp connector for flexibility.
- Wide power supply range 12DCV to 48DCV.
- Dimension: 180 x 70 x 18 mm.

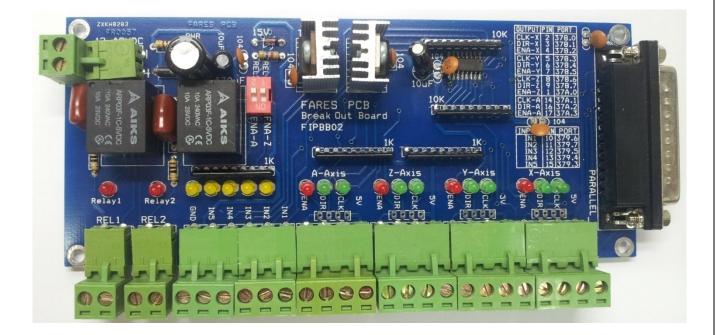


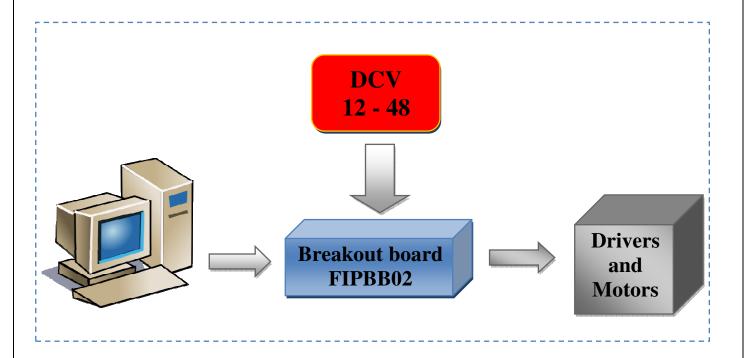


Table1 shows each output and input port, its pin number on DB25 socket and its function. Use this table to configure the software that interface FIPBB02 card.

### Table1.Input and output ports

Port #	Pin#	Function	Direction
378.0	2	CLK_X	Output
378.1	3	DIR_X	Output
378.2	4	ENA_X	Output
378.3	5	CLK_Y	Output
378.4	6	DIR_Y	Output
378.5	7	ENA_Y	Output
378.6	8	CLK_Z	Output
378.7	9	DIR_Z	Output
37A.0	1	ENA_Z	Output
37A.1	14	CLK_A	Output
37A.2	16	DIR_A	Output
37A.3	17	ENA_A	Output
379.3	15	IN5	Input
379.4	13	IN4	Input
379.5	12	IN3	Input
379.6	10	IN1	Input
379.7	11	IN2	Input

## **System Overview**





FARES Industrial Products Breakout Board FIPBB02

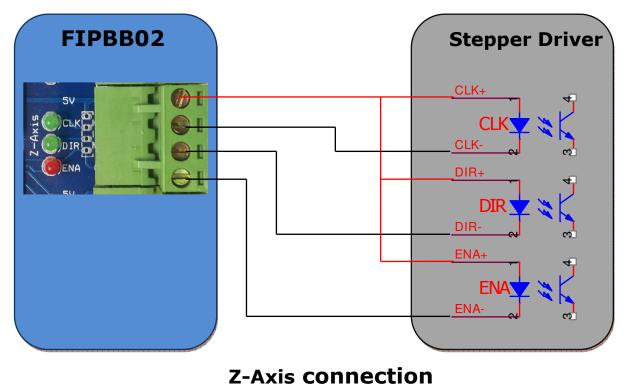
# **Output connections**



## How to connect control signals?

- 1. Connect "5V" output power from FIPBB02 card to all positive inputs of stepper driver.
- 2. Connect output "CLK" to negative input of "Pulse", "step" or "clock" labeled input in stepper driver.
- 3. Connect output "DIR" in FIPBB02 to Direction input in stepper driver.

here's an example of Z-Axix conneting

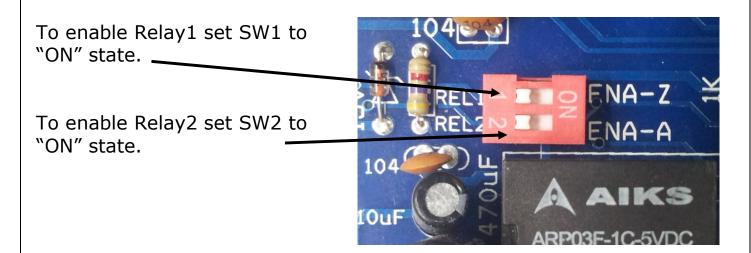




## How to connect spindle and coolant fan?

Two optional relays embedded in FIPBB02 to drive Spindle and Fan. The control signals that drive relay1 and relay2 are multiplexed with the outputs ENA-Z and ENA-A respectively. Follow the next steps to enable the output relays and spindle/fan connecting

1. Enable the two output relays by setting DIP switch as seen in figure 5.



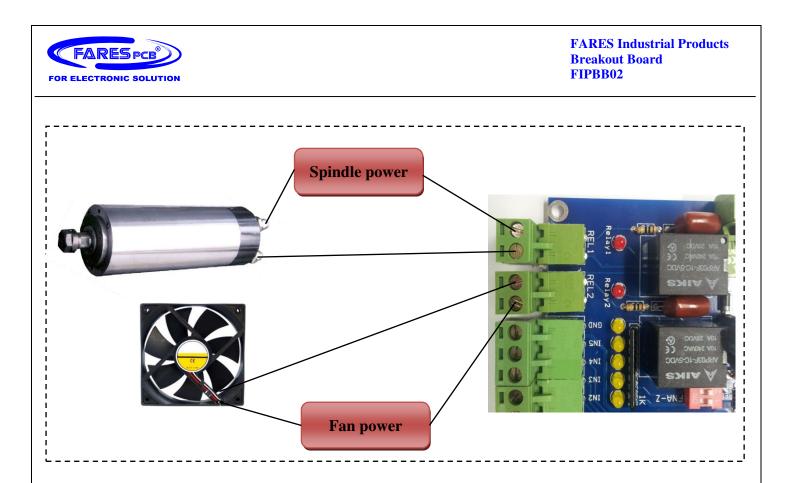
**Note**: If relay1 is enabled then ENA-Z control signal can't be assigned as stepper driver enable signal for Z axis. If relay2 is enabled then ENA-A control signal can't be assigned as stepper driver enable signal for A axis.

2. Set the output Pin1 and/or Pin17 as control signals for Spindle and fan in software program using the next table

SW1	Function
OFF	PIN1(37A.0) is dedicated for ENA-Z
ON	PIN1(37A.0) is dedicated for Relay1 (Spindle Or Fan)

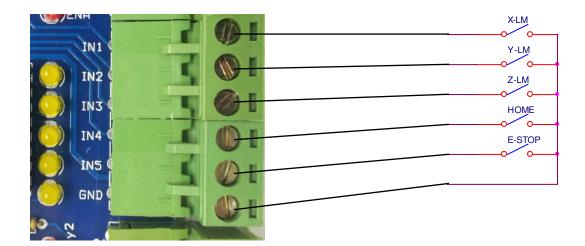
SW2	Function
OFF	PIN17(37A.3) is dedicated for ENA-A
ON	PIN17(37A.3) is dedicated for Relay2 (Spindle Or Fan)

3. The output is dry contact and rated for 3A max. So if the load needs more current use external relay or contactor.



# How to connect input limit switches?

- 1. Connect one terminal of each switch to an input on FIPBB02.
- 2. Collect all other terminals of limit switches and connect them to "COM" output terminal on FIPBB02.



# **Connection of standard limit switches**

FARES Industrial Products Breakout Board FIPBB02



#### How to Install

- 1- Hardware installation
  - Connect one end of the USB cable to the USB connector on the board, and the other end of the USB cable to a USB port on the PC.
  - Connect on end (female) of the parallel cable to the parallel socket (DB25 male) on the board, and the other end (male) of the parallel cable to the parallel socket (DB25 female) on the PC.
- 2 Software installation
  - Insert the CD-ROM into your PC's CD-ROM drive.
  - Install the demo test program (LPTTest Program).
  - Work under XP operating system only.

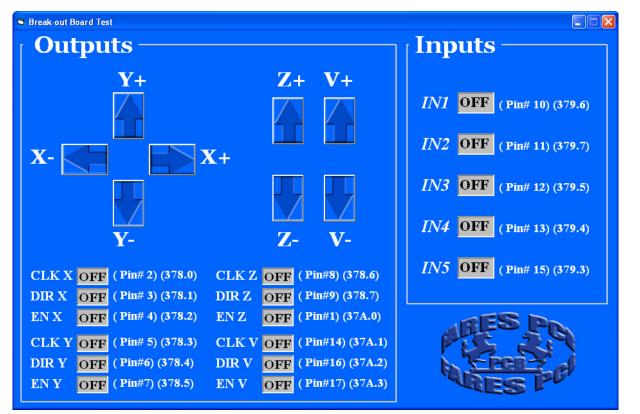
#### **System Requirements**

- One available LPT port.
- 64Mb RAM and 20MB free HD space.
- •

#### Card Test

**1** – Run the demo test program from Start  $\rightarrow$  All Programs  $\rightarrow$  BBTest  $\rightarrow$  FIPBB01. The main window of the software will be opened as shown in figure2.

### FIPBB01 test program window



**2** – To test motor **X** click the associated buttons for X axis (up button labeled (X+) and down button labeled (X-)).

When up button is Pressed

- 1 Green LED labeled  $\ensuremath{\textbf{ENA}}$  is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.

When down button is pressed

- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned off.



3 – Red LED labeled CLK is flicked.

The activated outputs also are highlighted on main window.

**3** – To test motor **Y** click the associated buttons for Y axis (right button labeled (Y+) and left button labeled (Y-)).

When right button is pressed

- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.

When left button is pressed

- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned off.
- 3 Red LED labeled CLK is flicked.

The activated outputs also are highlighted on main window.

**4** – To test motor **Z** click the associated buttons for Z axis (up button labeled (Z+) and down button labeled (Z-)).

When up button is Pressed

- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.
- When down button is pressed
- 1 Green LED labeled  $\ensuremath{\textbf{ENA}}$  is turned on.
- 2 Yellow LED labeled DIR is turned off.
- 3 Red LED labeled CLK is flicked.

The activated outputs also are highlighted on main window.

**5** – To test motor **A** click the associated buttons for V axis ( up button labeled (V+) and down button labeled (V-) ).

When up button is Pressed

- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned on.
- 3 Red LED labeled CLK is flicked.
- When down button is pressed
- 1 Green LED labeled **ENA** is turned on.
- 2 Yellow LED labeled DIR is turned off.
- 3 Red LED labeled CLK is flicked.

The activated outputs also are highlighted on main window.

 $\mathbf{6}$  – To test the input just apply the input and the state of inputs will be updated continuously every 100 msec.

The activated inputs appear as highlighted boxes labeled (ON), and the inactivated inputs appear as dimmed boxes labeled (OFF).

#### Note

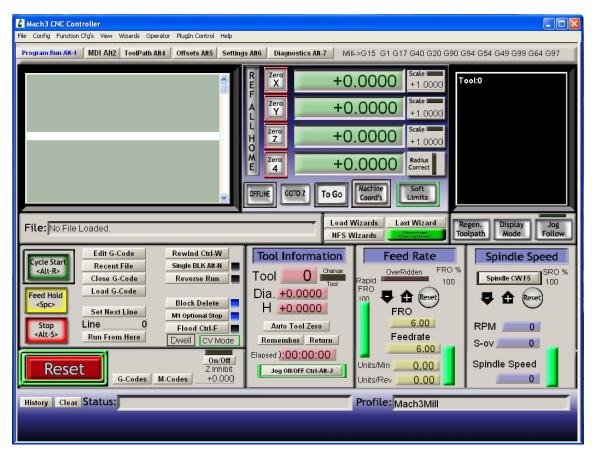
1 - All inputs are active low. I.e. to active an input apply ground (GND) to it.

2 – The status of input LED is opposite to the input state. I.e. if the input is activated (connected to ground), then the LED is turned off and vice versa.



## To test FEPBB01 on Mach3Mill software, follow the next configurations

1 – Setup the **Mach3** program and open **Mach3Mill**. The following screen will appear

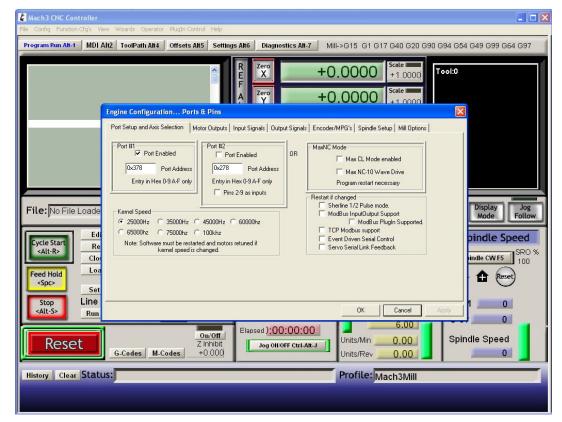


2 – To configure output ports open (Config) – (Ports and Pins), as shown in figure

🖉 Mach3 CNC Controller	
File Config Function Cfg's View Wizards Operator PlugIn Control Help	
Prets and Pina     Alt2     ToolPath Alt4     Offsets Alt5     Settings Alt6     Diagnostics Alt.7     N       Motor Tuning General Config System Hotkeys Homing/Limbs     Alt2     ToolPath Alt4     Offsets Alt5     Settings Alt6     Diagnostics Alt.7     N       Prote and Pina     R     Zero     + (       Homing/Limbs     F     Alt2     Y     + (       Bocklash     Fixtures     F     Zero     + (       Fixtures     ToolTable     Config Plugins     Config Plugins     Config Plugins	MIII->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97 0.0000 Scale +1.0000 0.0000 Scale +1.0000 0.0000 Radius Correct
File: No File Loaded.	Machine Soft Coord's Limits I Wizards Last Wizard Regen. Display Jog Wizards Batter Machine Follow
Cycle Start     Recent File     Single BLK Alt.N       Close G-Code     Reverse Run       Load G-Code     Block Delete       Stop     Set Next Line       Mt Optional Stop       Stop       Alt-S>       Run From Here	Feed Rate       Spindle Speed         OverRidden       FRO %         Inn       Image: Comparison of the section of the se
G-Codes M-Codes +0.000	Units/Min 0.00 Spindle Speed
History Clear Status:	Profile: Mach3Mill



3 - The following screen will appear. Check (**Port Enabled**) box and set the port no to 0x378.



4 – Select (**Motor Outputs**) tab as shown in figure. Enable the required axis and set Step Pin# and Dir Pin# as shown in figure

🖣 Mach3 CNC Controller									
Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97									
R R X +0.0000 Scale +1.0000									
					utput Signals   Enc			ano a l	
	Port Setup and A	Axis Selection		nput Signals   Ui	utput Signals   Enc	oder/MPG's  5p	indle Setup   M	Aill Uptions	
	Signal	Enabled	Step Pin#	Dir Pin#	Dir LowActive	Step Low Ac	Step Port	Dir Port	
	X Axis	4	2	3	X	X	1	1	
	Y Axis	4	5	6	X	X	1	1	
	Z Axis	4	8	9	*	*	1	1	Display Jog
File: No File Loade	A Axis	*	14	16	*	*	1	1	Mode Follow
Cycle Start De	B Axis	*	0	0	*	*	0	0	pindle Speed
<pre>Cycle Start</pre>	C Axis	4	17	0	X	×	0	0	SRO %
Feed Hold			17	0			0	U	
<spc> Set</spc>									eset
Stop Line -									1 0
<alt-s> Run</alt-s>						OK			pply 0
			On/Off	Elapsed ):C	00:00:00	- Unite/M		.00	Spindle Speed
Control         Jog oll OFF ctrl-Alt-J         Units/Min         0.00         Spindle Speed           G-Codes         M-Codes         +0.000         Units/Rev         0.00         0									
History Clear Status:		_			_	Profil	e: Mach3	BMill	



5 – Select **(Output Signals)** as shown in figure and assign pin number for each output enable.

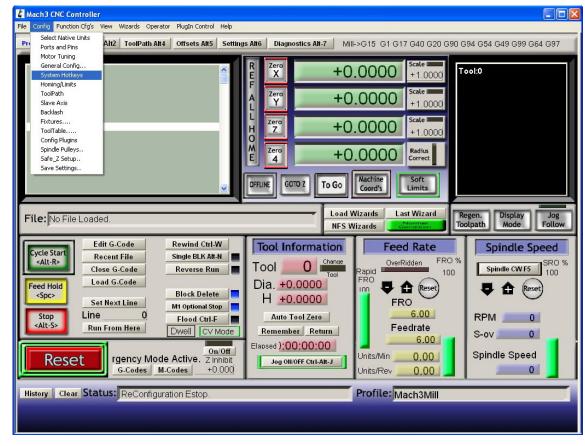
rogram Run Alt-1 MDI A	w Wizards Operato			gnostics Alt-7 M	ill->G15 G1 G1	7 G40 G20 G9	00 G94 G54 G49 G99 G64 G97
			R E F A Zero X Zero	+(	0.0000	Scale + 1.0000	Tool:0
	Engine Configurat	ion Ports & Pi	ins				
	Port Setup and Axis 9	Selection   Motor Ou	utputs   Input Signals	Output Signals Encode	r/MPG's   Spindle Set	tup   Mill Options	
	Signal	Enabled	Port #	Pin Number	Active Low	~	
	Digit Trig	Enabled	1	Pin Number	Active Low		
	Enable1	4	1	4	*		
	Enable2	4	1	7	*		
	Enable3	4	1	1	*		
	Enable4	4	1	17	8		
	Enable5	2	1	0	*		
File: No File Loade	Enable6	2	1	0	*		Display Jog Mode Follow
•	Output #1	2	1	0	8		Mode Follow
Edi	Output #2	2	1	0	2		
Cuala Chart	Output #3	2	1	0	8		pindle Speed
<alt-r></alt-r>	Output #4	2	1	0	*		
	<u> </u>		10	1-	1.77	<b>M</b>	hindle CW F5 100
Feed Hold Loa	F	'ins 2 · 9 , 1 , 14 , 16 , a	and 17 are output pins.	No other pin numbers sho	ould be used.		Reset)
<spc> Set</spc>							
Stop Line					ок  [	Cancel	
<alt-s> Run</alt-s>						Cancer	Apply
			Elanced)	00:00:00		6.00	
		On/O	л –		Units/Min	0.00	Spindle Speed
Reset	Mode Active.			ON/OFF Ctrl-Alt-J			
J	G-Codes M-C	Codes +0.0			Units/Rev 📃	0.00	0
n Ctatu					Drofila		
History Clear Statu	ReConfigura	tion Estop.			Profile: Ma	ach3Mill	

6 – Select **(Input Signals)** as shown in figure and assign pin number for the input correspond to axis.

Ach3 CNC Controller									
File: No File Loade	Signal X ++ X X Home Y ++ Y Y Home Z ++ Z Z Home A ++ A	Enabled	Port #           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1           1	Pin Number           11           12           0           13           15           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0	Active Low	Emulated	HotKey 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Display Jog Mode Follow Dindle Speed Indle CWF5 SRO %
Feed Hold       Loa         Set       Set         Stop       Run         OK       Cancel         Automated Setup of Inputs       OK         OB       OD/OFF         OH       OL         Spindle Speed       OH         Units/Rev       OH         O       OH         O       OH         OH       OH         OH       OH         OH									



7 – To configure the operating keys used in manual testing open (Config) – (System Hotkeys) as shown in figure



8 - The following screen will appear

🐇 Mach3 CNC Controller							
File Config Function Cfg's View Wizards Operator PlugIn Control Help							
Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97							
	2.0000 Scale +1.0000 Scale ► ►						
Jog Hotkeys       ScanCode       ScanCode         ScanCode       ScanCode       ScanCode         Y++       38       X       40         Y++       39       Y-       37         Z++       33       Z       34         A_U ++       187       A_U       183         B_VY++       393       C_VV       593         Cycle Start       Recent File       Close G-Code       ScanCode         Colose G-Code       Load G-Code       393       Code List       393         System Hotkeys       ScanCode       ScanCode       ScanCode       ScanCode         System Hotkeys       ScanCode       ScanCode       ScanCode       ScanCode       ScanCode         System Hotkeys       ScanCode       ScanCode       ScanCode       ScanCode       ScanCode       ScanCode       939         System Hotkeys       ScanCode       ScanCode       ScanCode       ScanCode       939       ScanCode       ScanCode       939       ScanCode       ScanCode	EM Codes						



9 – Click X axis in the increment direction (X++) then the following screen will appear

🕹 Mach3 CNC Controller							
File Config Function Cfg's View Witards Operator Plugin Control Help Program Run Alt-1 MDI Alt2 ToolPath Alt4 Offsets Alt5 Settings Alt6 Diagnostics Alt-7 Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G99 G64 G97							
System HotKeys Setup	2						
Jog Hotkeys         Trigger #         DEM Code           X+++         38         X         40         1         1         8         1           Y+++         38         Y         40         1         1         8         1           Y++-         38         Y         10         1         1         10         1           Z++         33         Z         124         3         1         10         1           A/U++         1187         A/U         SetHiotKey         X         12         1							
Edit G-Code         B / V ++ (399)         B / V           Cycle Start         Edit G-Code         C / W++ (399)         C / W           System Hotkeys         13         1           System Hotkeys         ScanCode         ScanCode	Regen. Toolpath         Display Mode         Jog Follow           0 %         Spindle Speed         SR0 %           00         Spindle CW F5         100						
Feed Hold     Load G-Code     DRO Select.     999     Code List.     999       Stop     Stop     Line     Load G-Code     999     Code List.     999       Kun From Here     Code List.     999     Code List.     999     Code List.     999	RPM 0 S-ov 0						
On/Off Z Inhibit         Elapsed ):00:00:00 Jog Oll/OFF Ctri-Alt-J         Units/Min         0.000           G-Codes         M-Codes         +0.000         Units/Rev         0.000	Spindle Speed						
History Clear Status: ReConfiguration Estop. Profile: Mach3Mill							

 $10\,$  – Press right arrow on the keyboard to assign this key to move the X motor in the increment direction

11 – Repeat steps 9,10 to assign different key for each movement and direction for every axis( table shows the recommended keys to use in control motors in X,Y,Z axis)

#### Table2. Keys assigned to motor movements.

Axis	Increment (++)	Decrement ()
Х	Right	Left
Y	Up	Down
Z	Page Up	Page down
V	+	_

12 – Press **(RESET)** button to inactive emergency stop and start move the motors by clicking the above selected keys.



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