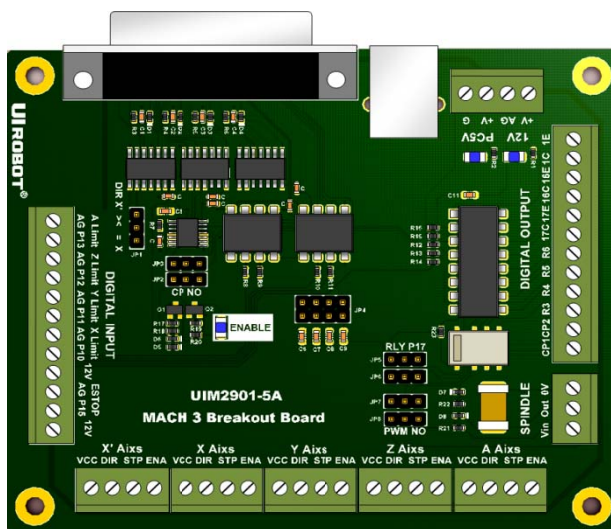# User Manual

UIM2901-5A
MACH3 Breakout Board

UIM2901-5A MACH3 Breakout Board

UIM2901-5A MACH3 breakout board

Features

General

− DB25 interface between PC and user device
− Fully buffered opto-isolated I/O (Input / Output) Ports

Motor Driving Output

− Support 5 stepping motor simultaneously, X', X, Y, Z, A
− Hardware generate secondary X' step/direction from X step/direction for Gantry System
− Jumper selectable, X' direction same / different from X direction

Input Signals

− ESTOP hardware logic to disable servo drives and Charge Pump
− Limit switch inputs, X, Y, Z, A
− Jumper selectable anti-noise low pass filter

Output Signals

− Up to 3+ Open-Drain outputs could be extended for Flood/Mist/ATC etc
− Charge Pump relay, 2 normal open, 2 normal close, 30VDC, 2Amp
− Isolated PWM analog output signal for spindle speed control

Characteristics

Absolute Maximum Ratings

PC Side Supply Voltage... 5.5V
Switch Side Supply Voltage...12.5V
Ambient temperature under bias………….. -40°C to +85°C
Storage temperature.. -50°C to +125°C

Recommended Working Conditions（Ambient Temperature 25℃）

| Supply Voltage		5VDC (PC Side) and 12VDC (Switch Side)
Cooling		Free Air
Working Environment	Environment	Avoid dust, oil mist and corrosive gases
	Temperature	-40 ℃ - + 85 ℃
	Humidity	<80%RH，no condensation, no frosting
	Vibration	3G Max
Storage Temperature		-40 ℃ - + 125 ℃
Size		110mm x 90mm x 15mm (L x W x H)
Wight		0.15 kg

1.0   Typical Wiring Schematic

A typical wiring schematic diagram is provided in Figure 1-1. Although it is designed for UIM240xx Stepper Motor Driver, it may be used for other stepper motor drivers.

User control devices (such as PC) connect to the UIM2901-5A through a male to male DB25 cable. The logic side (user device side) electronics are powered by either a USB cable or a standalone 5VDC power supply. A 12VDC power supply is required if the user wants to use the Relay, Limit Switches, EMS Switch and/or other machine side electronics. There are opto-isolators between the logic side and the machine side.

Please note, the 12V power supply is NOT requireded, if only the UIM240xx Stepper Motor Drivers are connected (i.e., not using other switches or functions like spindle control, etc.).

Figure 1-1: Typical wiring schematic
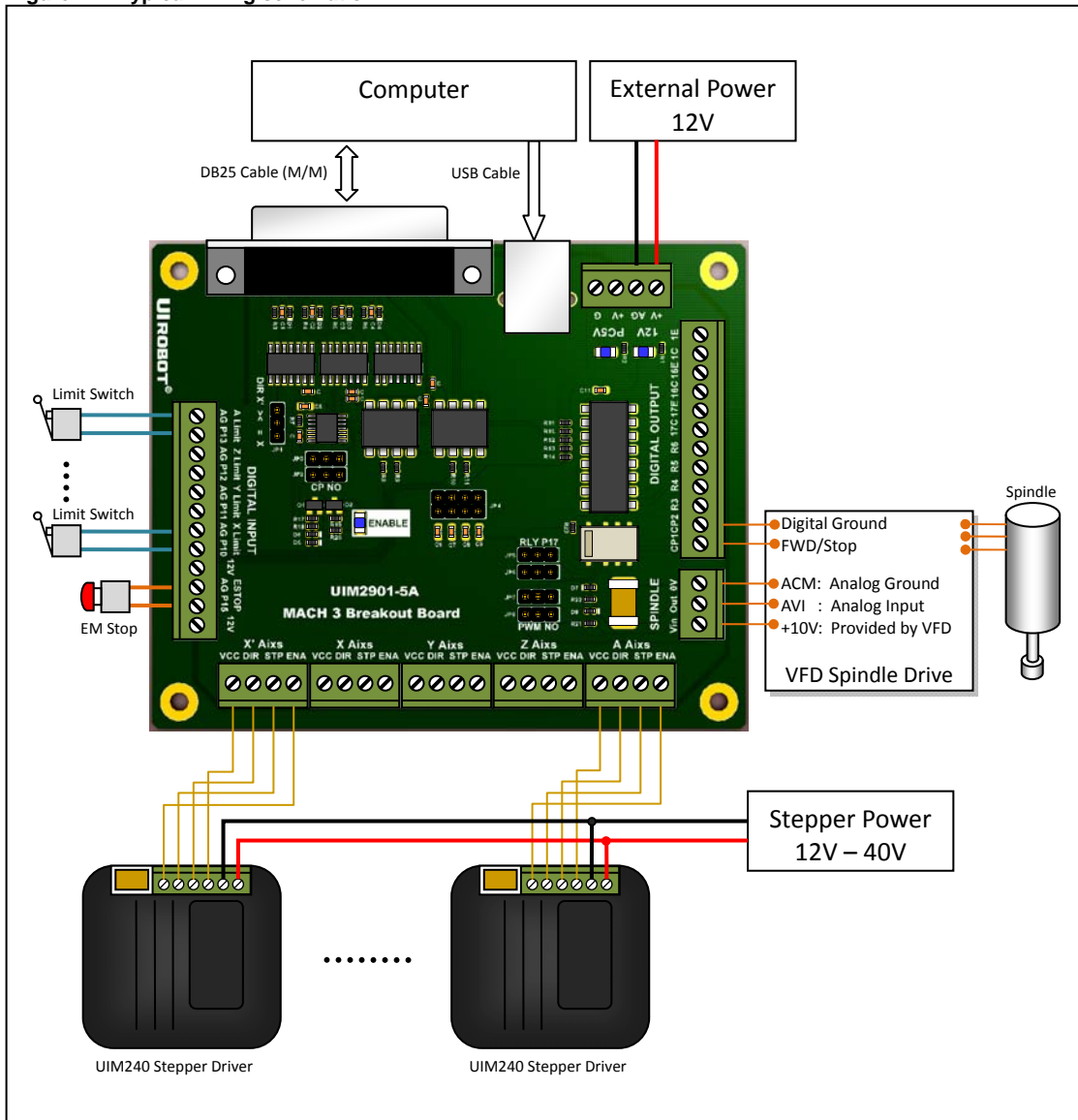
# 2.0 I/O Definitions and Jumper Settings

To help users clearly understand the operation/configuration of the UIM2901-5A Breakout Board, schematic drawings of the board are provided below. Please note, the jumpers' orientation/direction is the same as that on the PCB.

2.1 DB25 Connector Schematic

UIM2901-5A uses a **male to male** DB25 cable to communicate with the MACH3 software. The definition of each PIN is provided in the Figure 2-1. AI input signals are opto-isolated and buffered. All Output signals are buffered and opto-isolated either by the UIM2901-5A Board or by the UIM240xx Stepper Drivers.

If the upper two pins of JP1 is shorten, Axis X' and Axis X running direction will be opposite. If the lower two pins of JP1 is shorten, Axis X' and Axis X running direction will be the same.

**Figure 2-1 DB25 Connector Schematic**
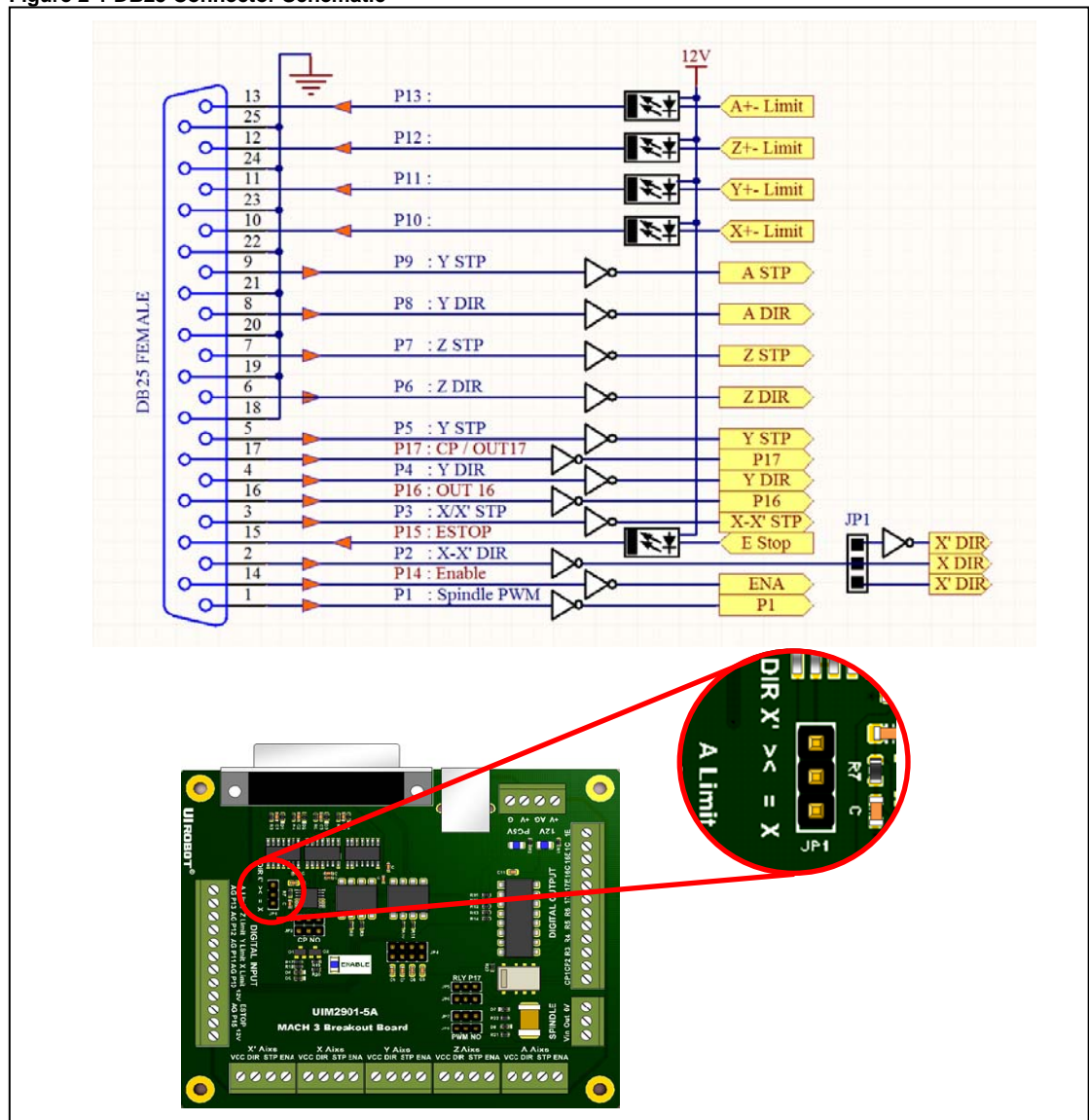
2.2   Motor and Charge Pump Control Circuit

By shorting the left two pins (near the mark of JP2/JP3) of both JP2 and JP3, MACH3's Charge Pump feature can be enabled. Charge Pump action will disable all UIM240 Stepper Drivers and the Charge Pump relay, which can cause stepper motors and spindle to stop.

Shorting the right two pins of JP2 and JP3, the Charge Pump feature will be disabled. Signal from the PIN17 can be used to control the open-collector output of P17C and P17E.

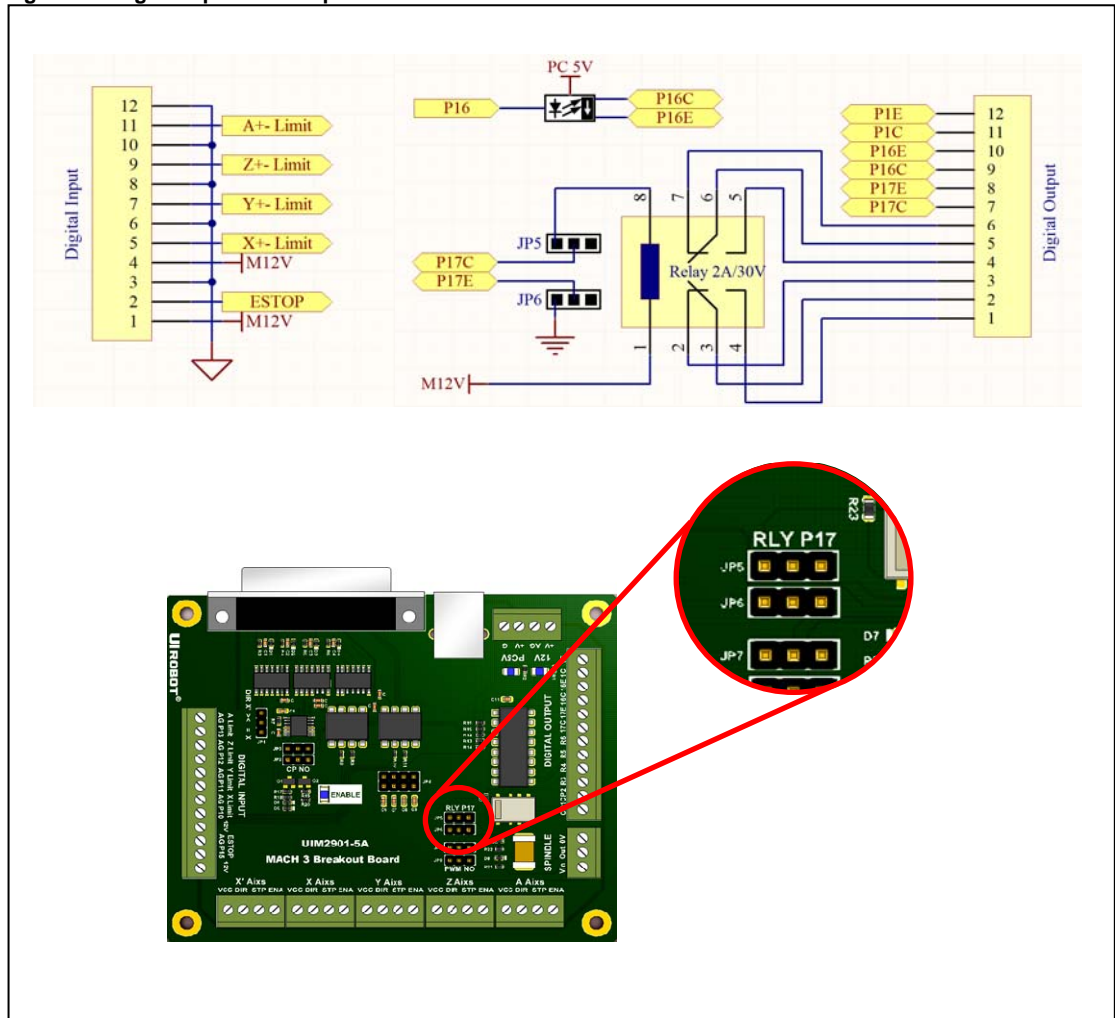**Figure 2-2 Motor and Charge Pump Control Circuit**
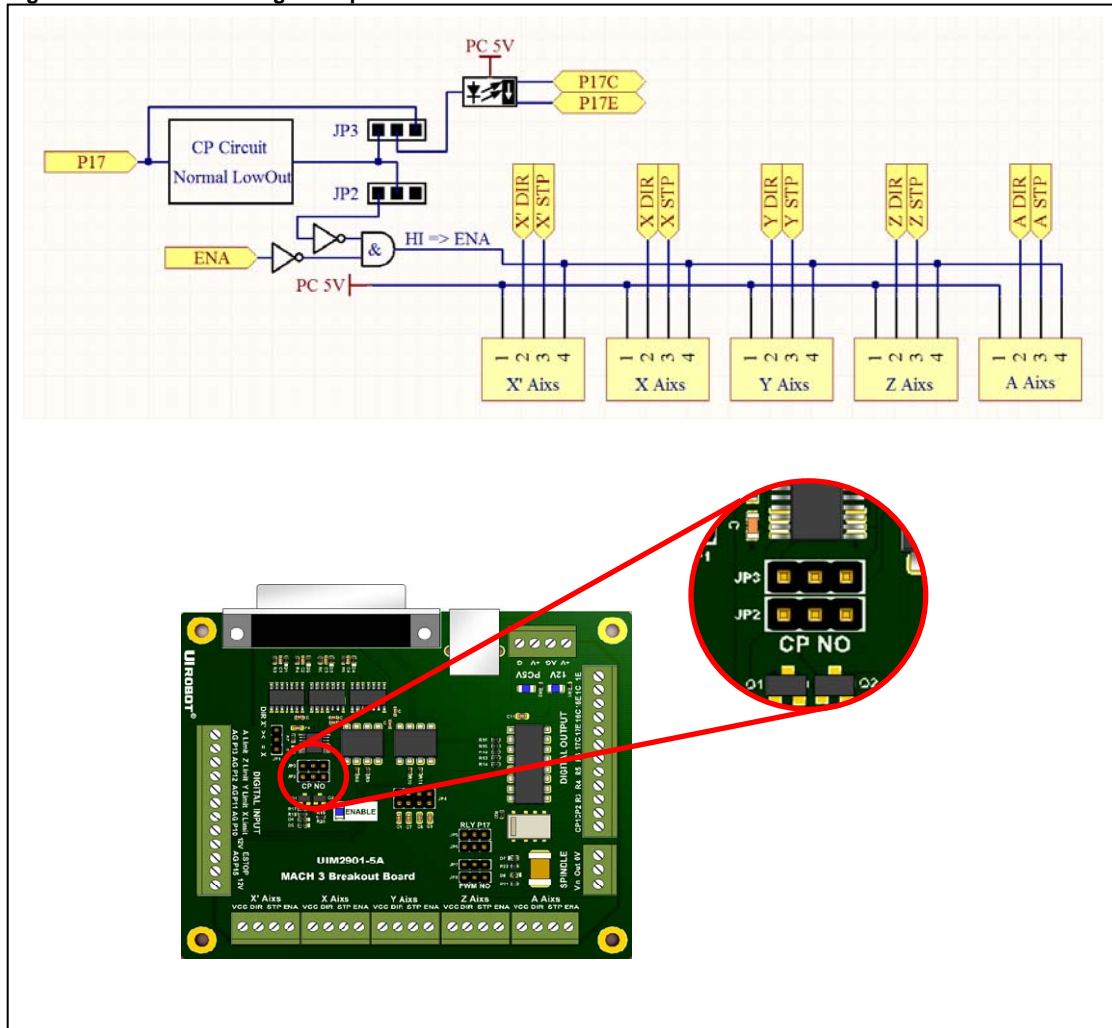
UIM2901-5A MACH3 Breakout Board

2.3 Digital Input and Output Circuit

By shorting the left two pins (near the legend of JP5/JP6) of both JP5 and JP6, the onboard relay can be enabled and controlled through DB25 pin 17.

Pin 16 can be used as open-collector control output. Please note that, P16C links to the opto-isolator's collector pin and the P16E links to the emitter pin.
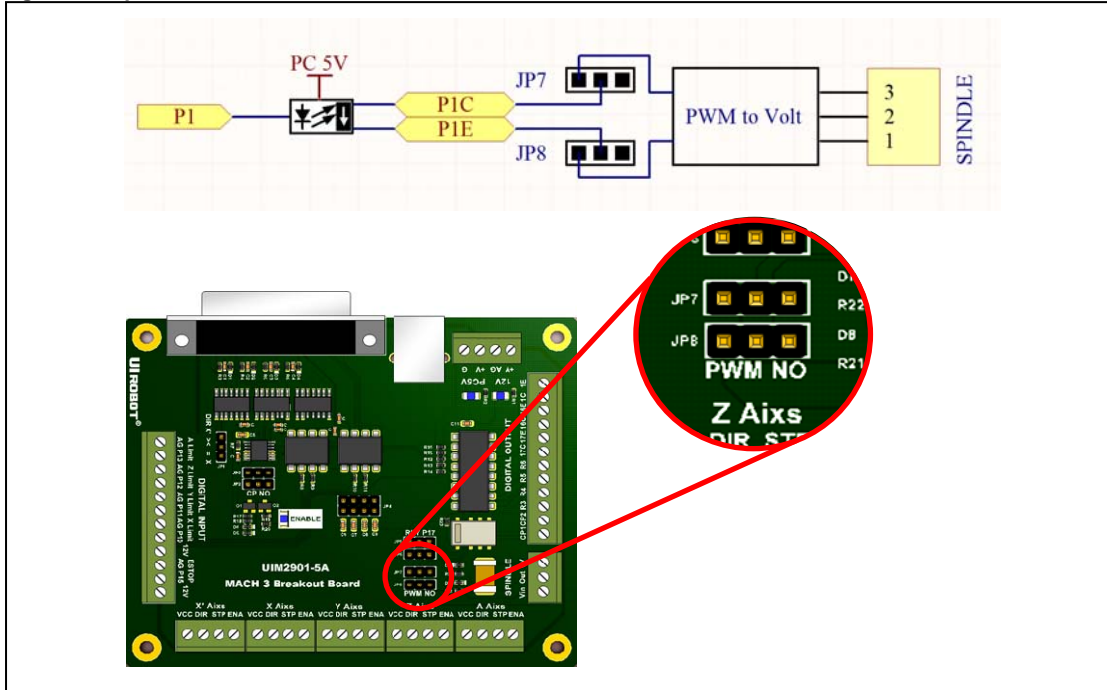
Figure 2-3 Digital Input and Output Circuit

2.4   Spindle Control Circuit

By shorting the left two pins (near the legend of JP7/JP8) of both JP7 and JP8, a PWM wave will be generated to provide a voltage used to control the spindle speed.

Figure 2-4 Spindle Control Circuit

2.5   Digital Input Filters

By shorting the four sets pins of JP4, the hardware digital input filter can be enabled. If JP4 is left open, the digital inputs can be used for high speed inputs.

Figure 2-5 Spindle Control Circuit
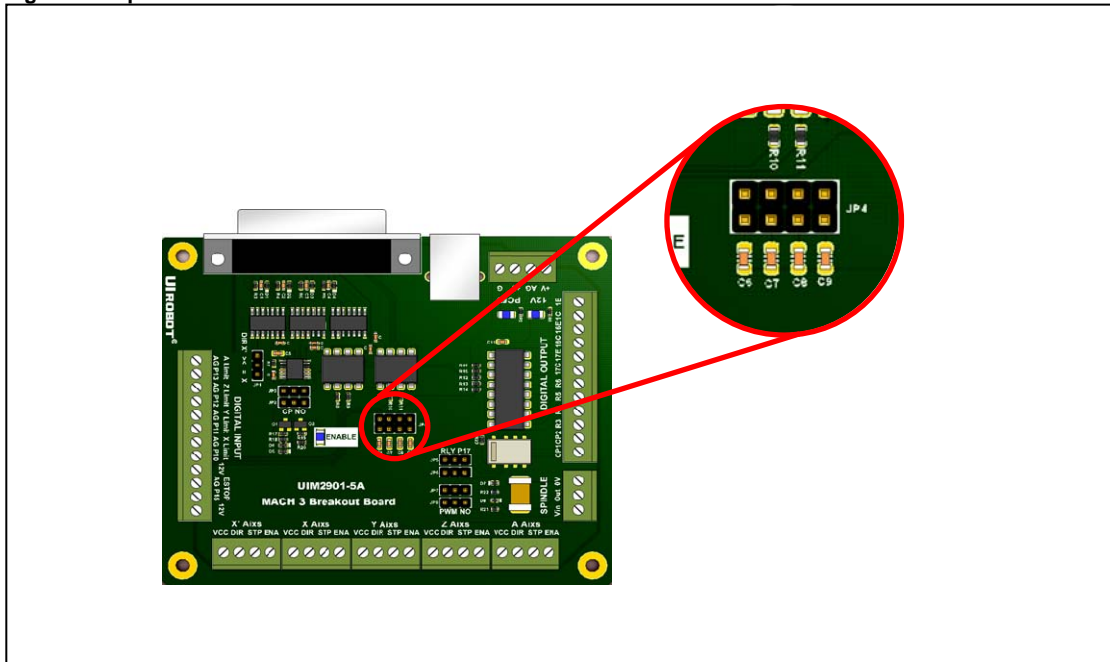
3.0   Ports and Pins Configuration of MACH3

3.1   Port Setup

Figure 3-1 Port Setup

3.2   Motor Driving Step and Direction Configuration

Figure 3-2 Motor Driving Step and Direction Configuration

3.3   Limit Switch Configuration

Figure 3-3 Limit Switch Configuration (I)

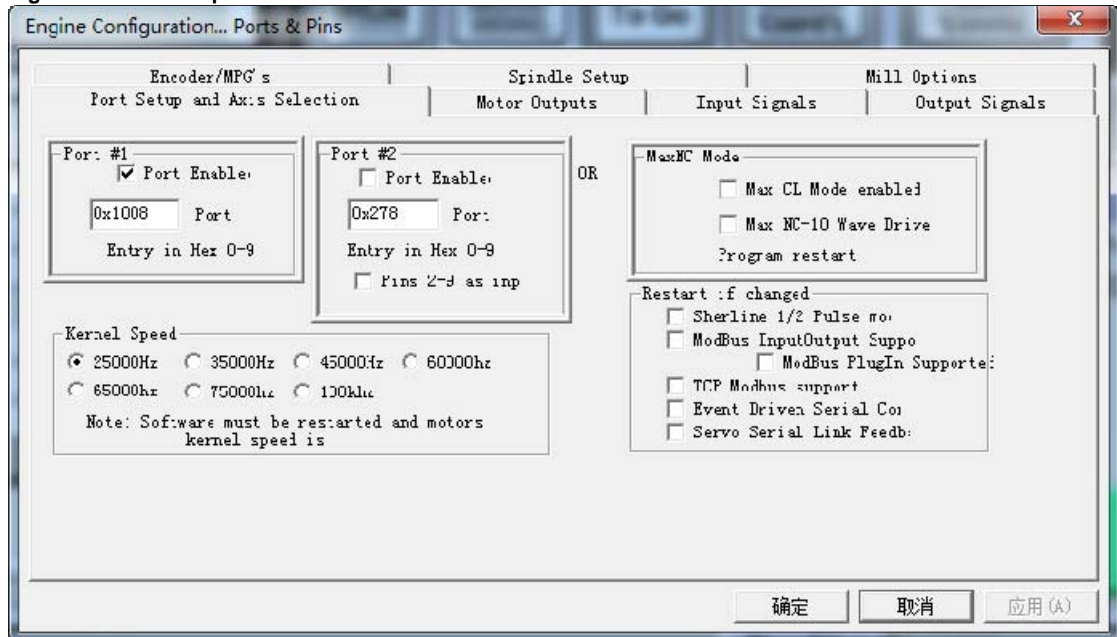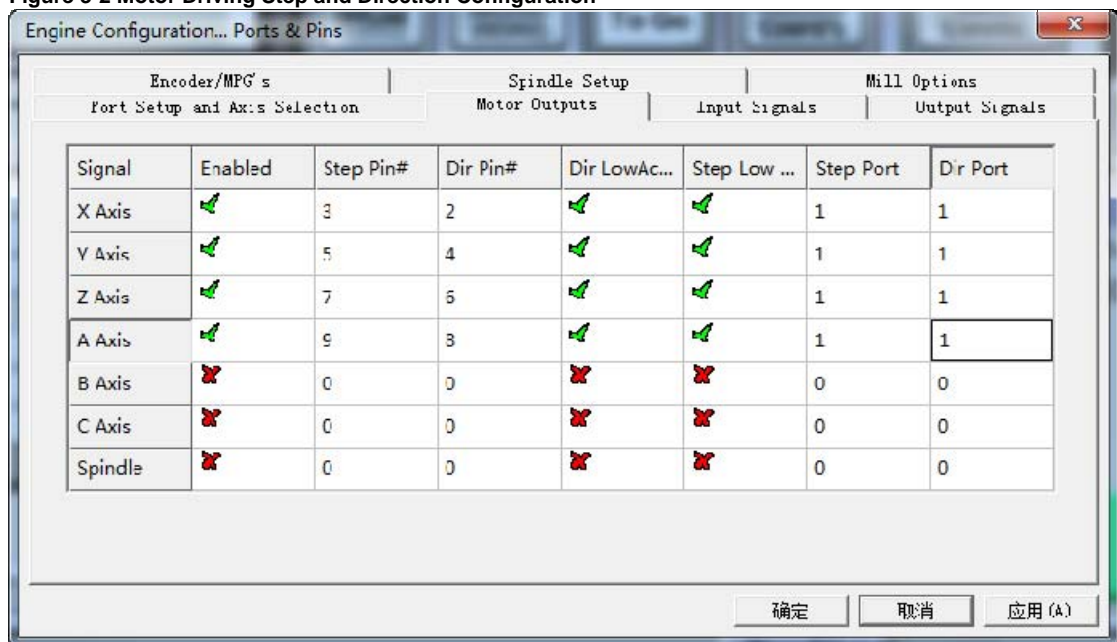| Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey
X ++	✔	1	10	✔	✘	0
X --	✔	1	10	✔	✘	0
X Home	✘	1	0	✘	✘	0
Y ++	✔	1	11	✔	✘	0
Y --	✔	1	11	✔	✘	0
Y Home	✘	1	0	✘	✘	0
Z ++	✔	1	12	✔		0

Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be
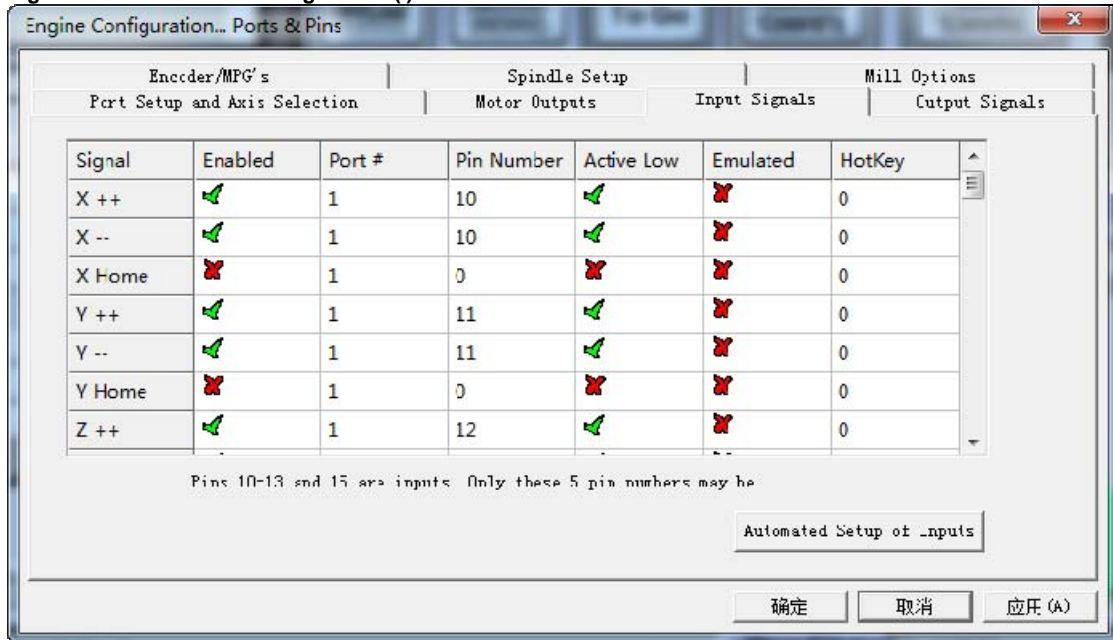
Figure 3-4 Limit Switch Configuration (II)

Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey
Z ++	✔	1	12	✔	✘	0
Z --	✔	1	12	✔	✘	0
Z Home	✘	1	0	✘	✘	0
A ++	✔	1	13	✔	✘	0
A --	✔	1	13	✔	✘	0
A Home	✘	1	0	✘	✘	0
B ++	✘	1	0	✘	✘	0

Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be

UIM2901-5A MACH3 Breakout Board

Engine Configuration... Ports & Pins

Encoder/MPG's   Spindle Setup   Mill Options

Port Setup and Axis Selection   Motor Outputs   Input Signals   Output Signals

Signal	Enabled	Port #	Pin Number	Active Low	Emulated	HotKey
Index	✗	1	0	✗	✗	0
Limit Ovrd	✗	1	0	✗	✗	0
EStop	✓	1	15	✓	✗	0
THC On	✗	1	0	✗	✗	0
THC Up	✗	1	0	✗	✗	0
THC Down..	✗	1	0	✗	✗	0
OEM Trig ...	✗	1	0	✗	✗	0

Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be

Automated Setup of Inputs

确定   取消   应用(A)

Engine Configuration... Ports & Pins

Encoder/MPG's   Spindle Setup   Mill Options

Port Setup and Axis Selection   Motor Outputs   Input Signals   Output Signals

Signal	Enabled	Port #	Pin Number	Active Low
Digit Trig	✗	1	0	✗
Enable1	✓	1	14	✗
Enable2	✗	1	0	✗
Enable3	✗	1	0	✗
Enable4	✗	1	0	✗
Enable5	✗	1	0	✗
Enable5	✗	1	0	✗
Output #1	✗	1	0	✗

Pins 2 - 9 , 1, 14, 16, and 17 are output pins. No other pin

确定   取消   应用(A)

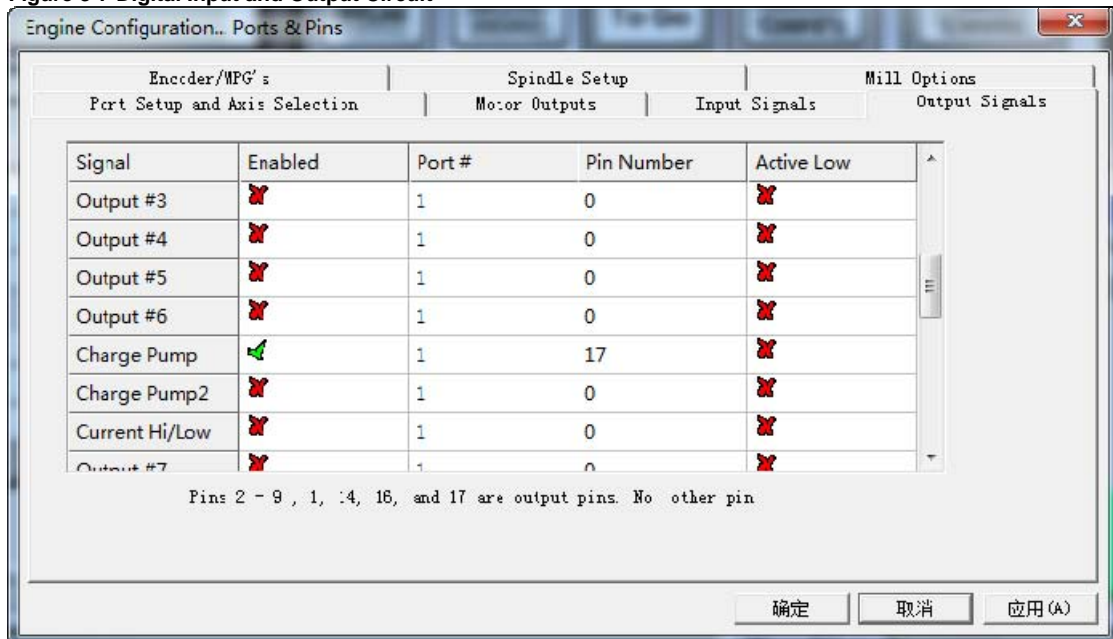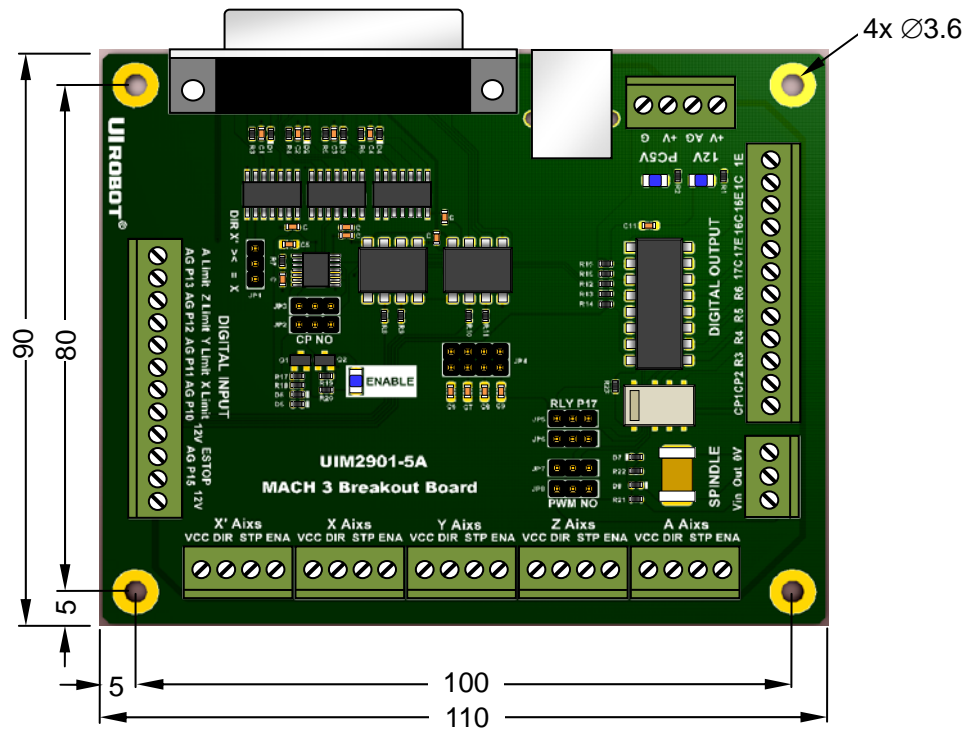## 3.6 Charge Pump Feature Configuration

Figure 3-7 Digital Input and Output Circuit

UIM2901-5A MACH3 Breakout Board

Appendix A   Dimensions

Units: mm