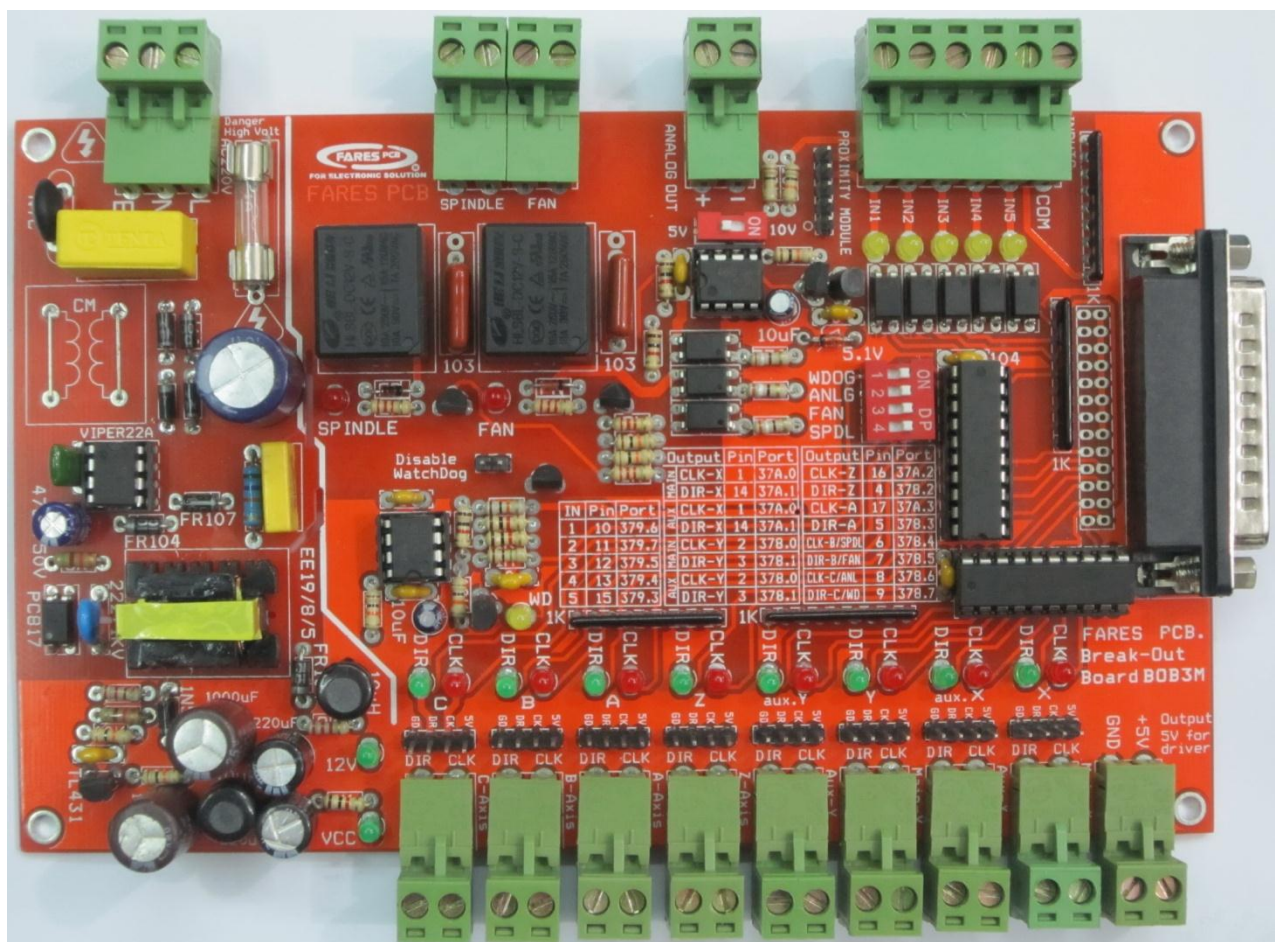


General Description

FIPBOB3M is a complete, buffered isolated parallel breakout board. It supports Eight output control signal groups to drive Six axis CNC machine with extra two duplicated auxiliary output control signals for X and Y axes. Each signal group supports two control signals (Direction and Clock). The most important feature of **FIPBOB3M** is the embedded switch mode power supply which generates all required voltages for the card. The breakout board provides total optical isolation of the PC parallel port from both power supply and Input control signals. Output control signals isolation depend on the opto-isolation in stepper driver. **FIPBOB3M** supports five standard limit switches. Two output relays could be enabled via DIP switch for additional spindle and fan control and one analog output with two selected ranges (5V/10V) for controlling spindle speed. A very important feature of **FIPBOB3M** is the watchdog facility which disables all outputs until PC starts up and loads the controlling software.

Figure 1. FIPBOB3M



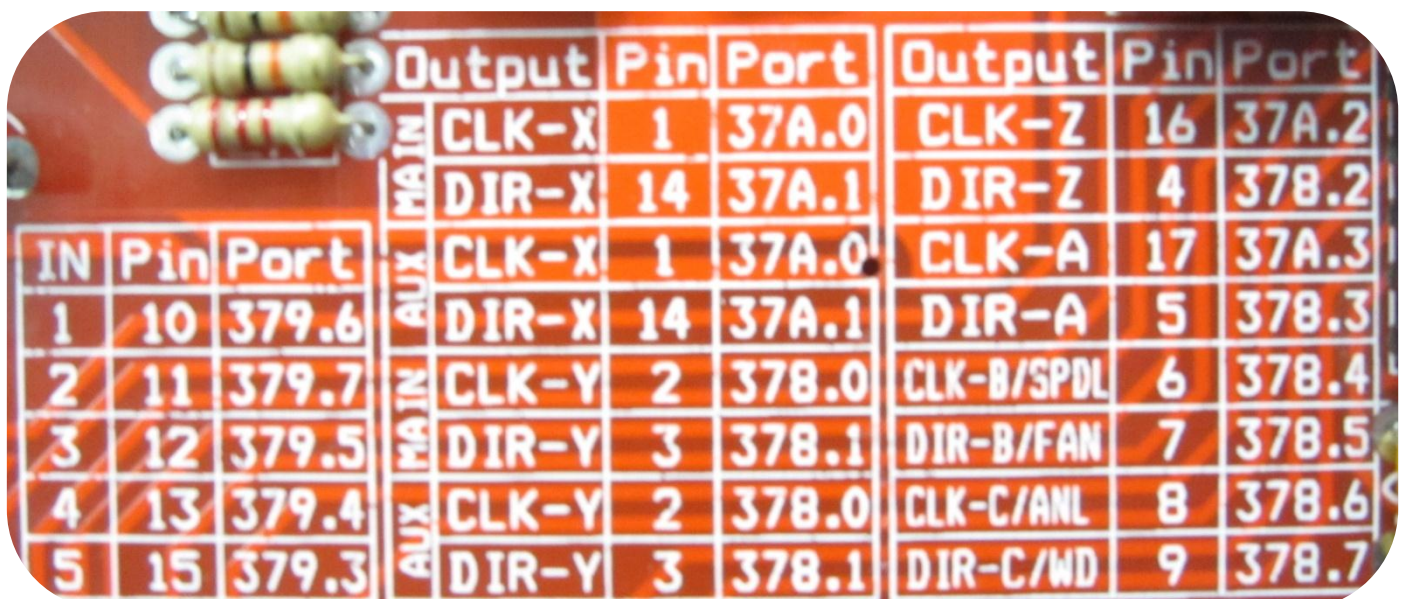
FIPBOB3M Features

- AC 220V power input.
- Eight output signal groups provide 6 axes control
 - Main X axis
 - Auxiliary X axis
 - Main Y axis
 - Auxiliary Y axis
 - Z axis
 - A axis
 - B axis
 - C axis
- All outputs are opto-isolated with high speed photo coupler.
- Each control signal group consists of Pulse "CLK" and Direction "DIR" Outputs. Control signals are TTL compatible (10mA). for pin assignment and addressing show table1.
- LED indicator for
 - Output pulse signal "RED" for CLK output.
 - Output direction signal "Yellow" for DIR output.
 - Output relays "RED" for (Spindle, FAN)
 - Input signals" Yellow".
 - Output watchdog "Yellow".
 - Power Supply "RED" for PC side and "Green" for Driver side (beyond the opto-isolators)
- Five external inputs (Dry contact) for standard micro switches with additional socket for external proximity module.
- All inputs are opto-isolated for safety.
- Two output relays 12V coil / 3A contacts (resistive load) for spindle and FAN control.
- One analog output (PWM) for controlling spindle speed. There are two selected ranges via DIP switch (5V and 10V).
- Watchdog Facility with LED indicator to ensure that all outputs are disabled during PC start up and loading the Software program that controlling the machine.
- All outputs and inputs are brought out via pin header and pluggable screw clamp connector for flexibility.
- Dimension: 183 x 130 x 23 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 **FIPBOB3M** card.

Table1. Input and Output Ports

| Port # | Pin# | Function | Direction |
|--------|------|-----------------------|-----------|
| 378.0 | 2 | CLK_Y , CLK_AY | Output |
| 378.1 | 3 | DIR_Y , DIR_AY | Output |
| 378.2 | 4 | DIR_Z | Output |
| 378.3 | 5 | DIR_A | Output |
| 378.4 | 6 | CLK_B / Spindle | Output |
| 378.5 | 7 | DIR_B / Fan | Output |
| 378.6 | 8 | CLK_C / Analog output | Output |
| 378.7 | 9 | DIR_C / Watchdog | Output |
| 37A.0 | 1 | CLK_X , CLK_AX | Output |
| 37A.1 | 14 | DIR_X , DIR_AX | Output |
| 37A.2 | 16 | CLK_Z | Output |
| 37A.3 | 17 | CLK_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 |



| IN | Pin | Port | Output | Pin | Port | Output | Pin | Port |
|----|-----|-------|--------|-----|-------|------------|-----|-------|
| 1 | 10 | 379.6 | CLK-X | 1 | 37A.0 | CLK-Z | 16 | 37A.2 |
| 2 | 11 | 379.7 | DIR-X | 14 | 37A.1 | DIR-Z | 4 | 378.2 |
| 3 | 12 | 379.5 | CLK-X | 1 | 37A.0 | CLK-A | 17 | 37A.3 |
| 4 | 13 | 379.4 | DIR-X | 14 | 37A.1 | DIR-A | 5 | 378.3 |
| 5 | 15 | 379.3 | CLK-Y | 2 | 378.0 | CLK-B/SPDL | 6 | 378.4 |
| | | | DIR-Y | 3 | 378.1 | DIR-B/FAN | 7 | 378.5 |
| | | | CLK-Y | 2 | 378.0 | CLK-C/ANL | 8 | 378.6 |
| | | | DIR-Y | 3 | 378.1 | DIR-C/WD | 9 | 378.7 |

Figure 2. System Overview

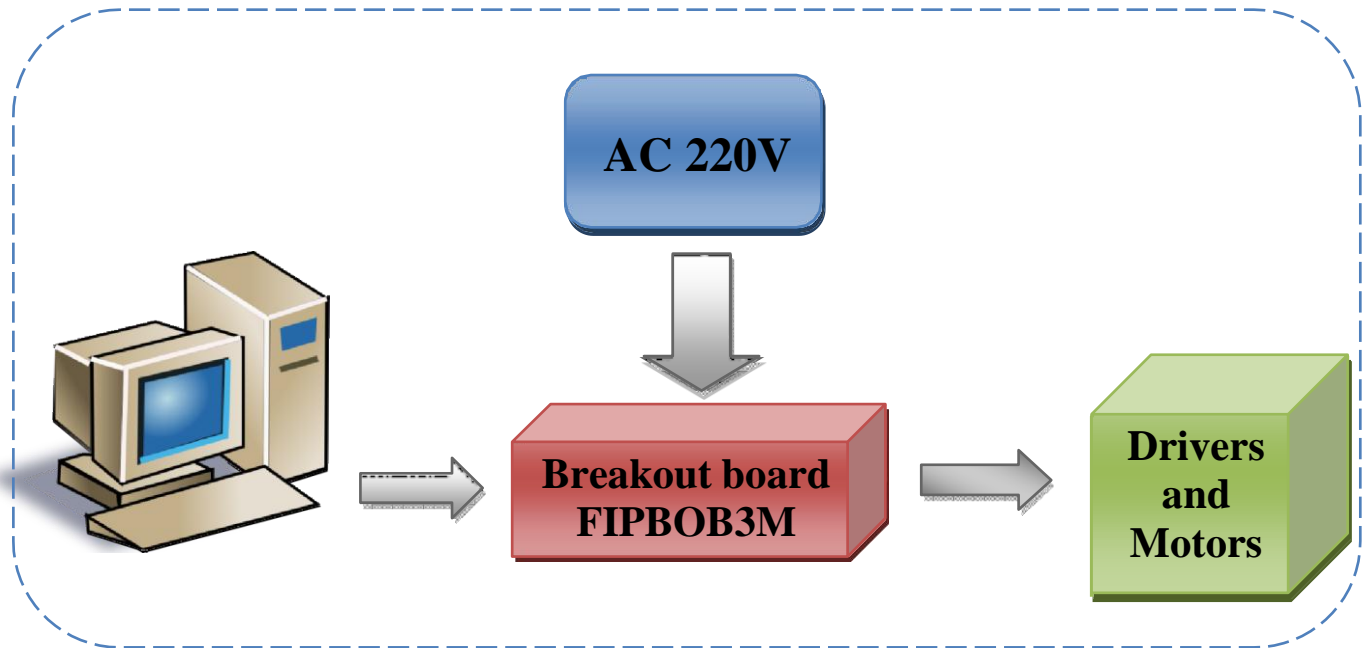
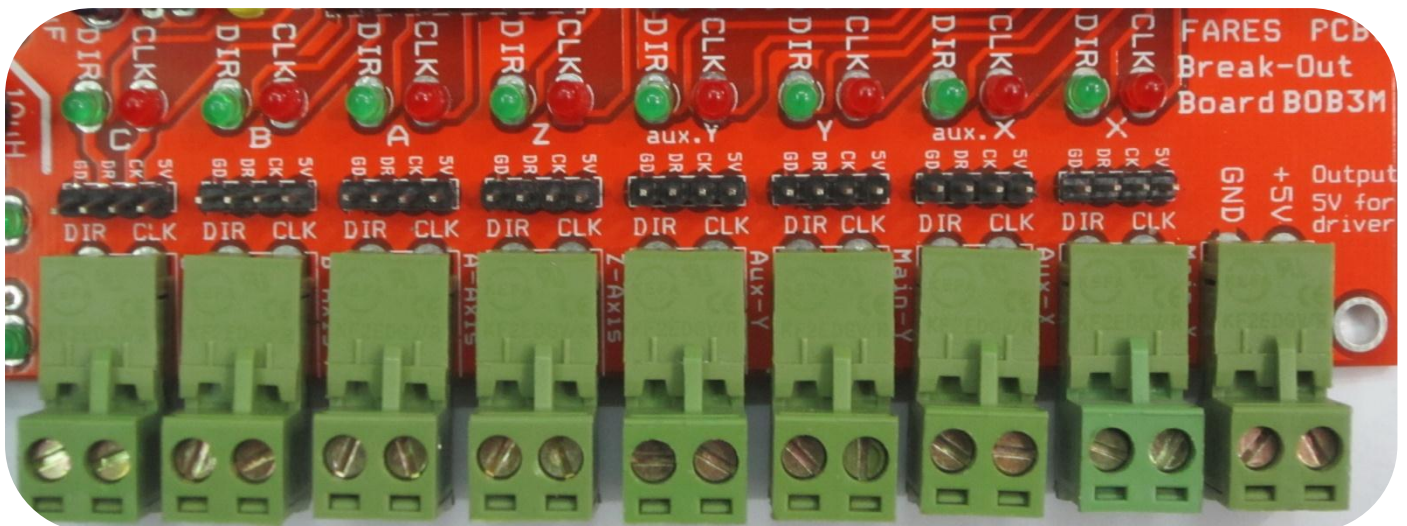
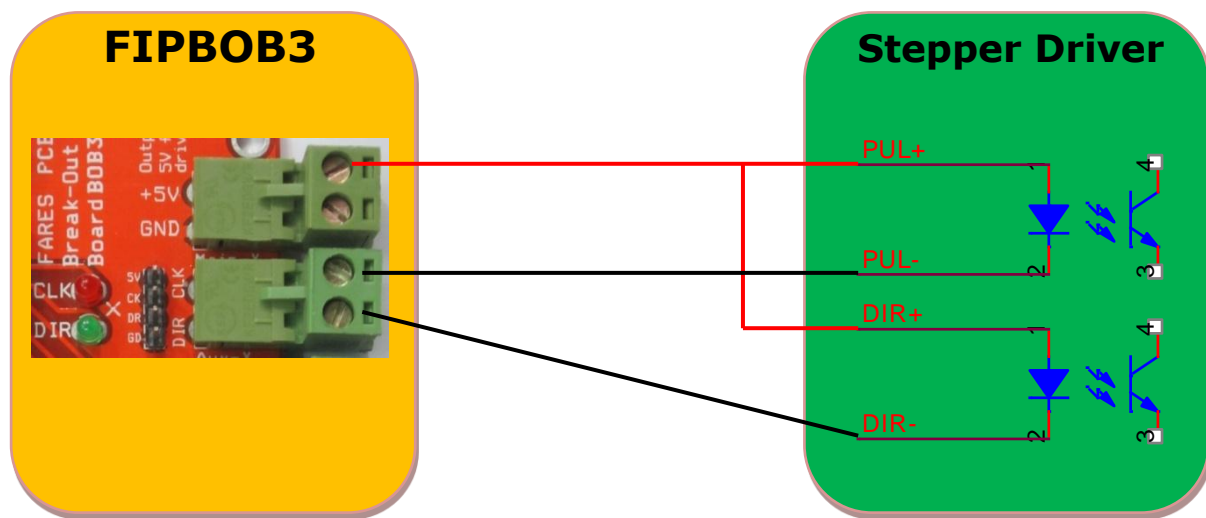


Figure 3. Output connections



How to connect control signals?

1. Connect "+5V" power 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 **FIPBOB3** to Direction input in stepper driver.

Figure 4. Main-X axis connection**Main-X axis connection****Note:**

The output Main-X/Main-Y and Aux-X/Aux-Y are the same respectively. Use main and auxiliary outputs to control two motors driving the same axis.

How to connect spindle and coolant fan?

1. Enable Spindle and/or Fan by setting DIP switch as seen in figure 5.
2. Set the output pin 2 as Spindle and the output pin 3 as fan in software program.
3. The output is dry contact and rated for 3A max. So, if the load needs more current use external relay or contactor.

Figure 5. Spindle and Fan enabling

Set SW3 (FAN) to ON state
Set SW4 (SPDL) to ON state

| Port | Pin | Function |
|-------|-----|----------|
| 378.4 | 6 | Spindle |
| 378.5 | 7 | Fan |

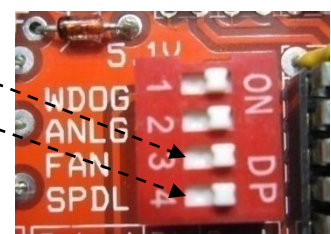
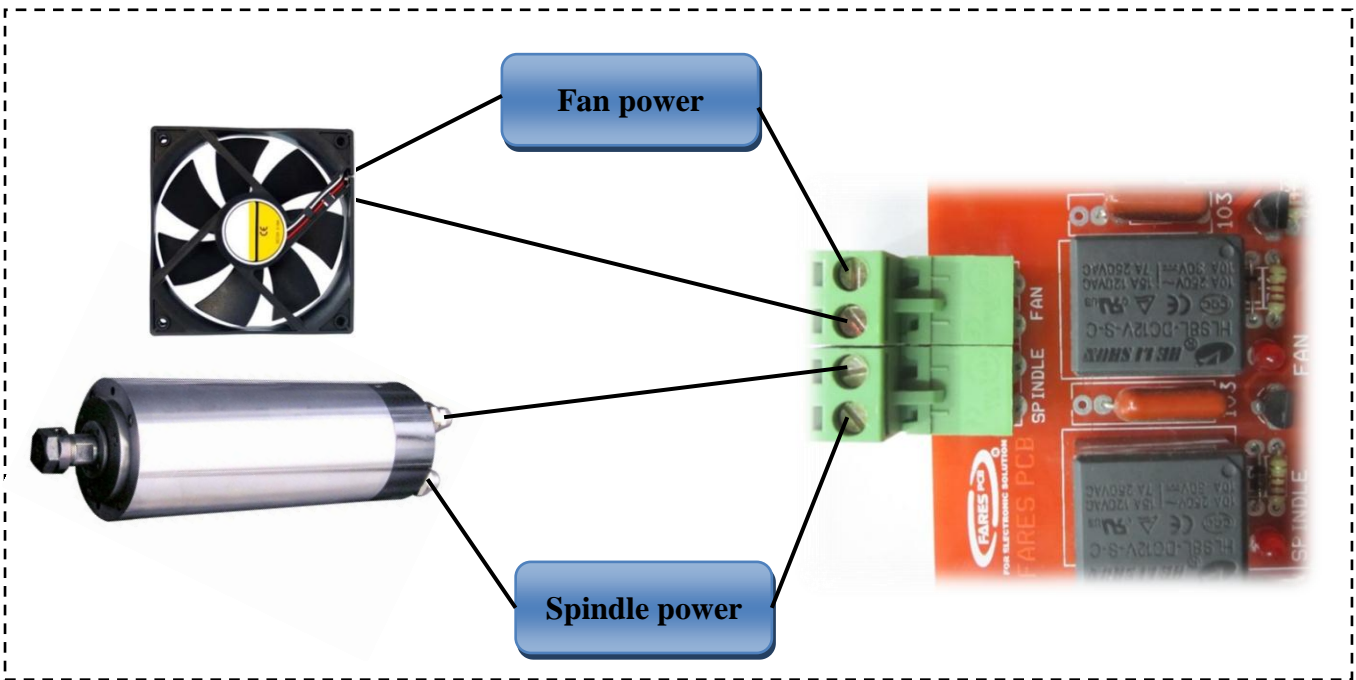
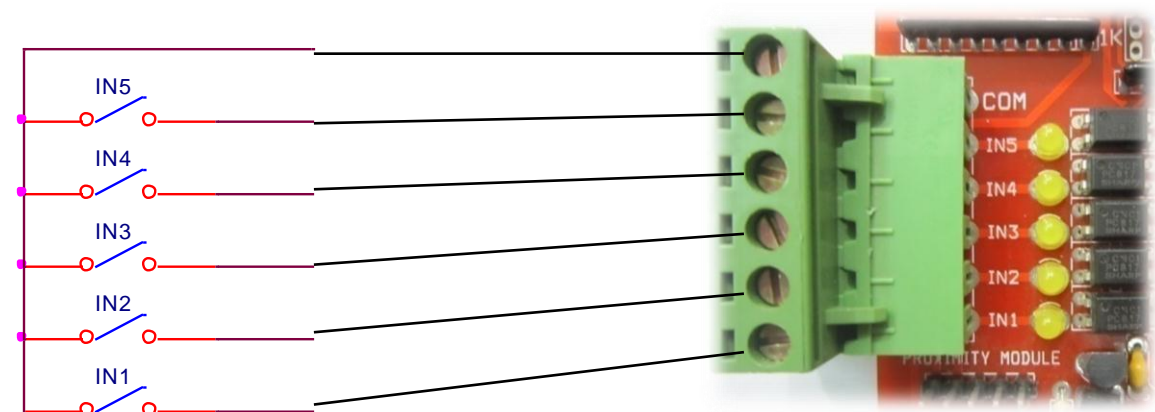


Figure 6. Connection of spindle motor and coolant fan to FIPBOB3**How to connect input limit switches?**

1. Connect one terminal of each switch to an input on **FIPBOB3**
2. Collect all other terminals of limit switches and connect them to "COM" output terminal on **FIPBOB3**.

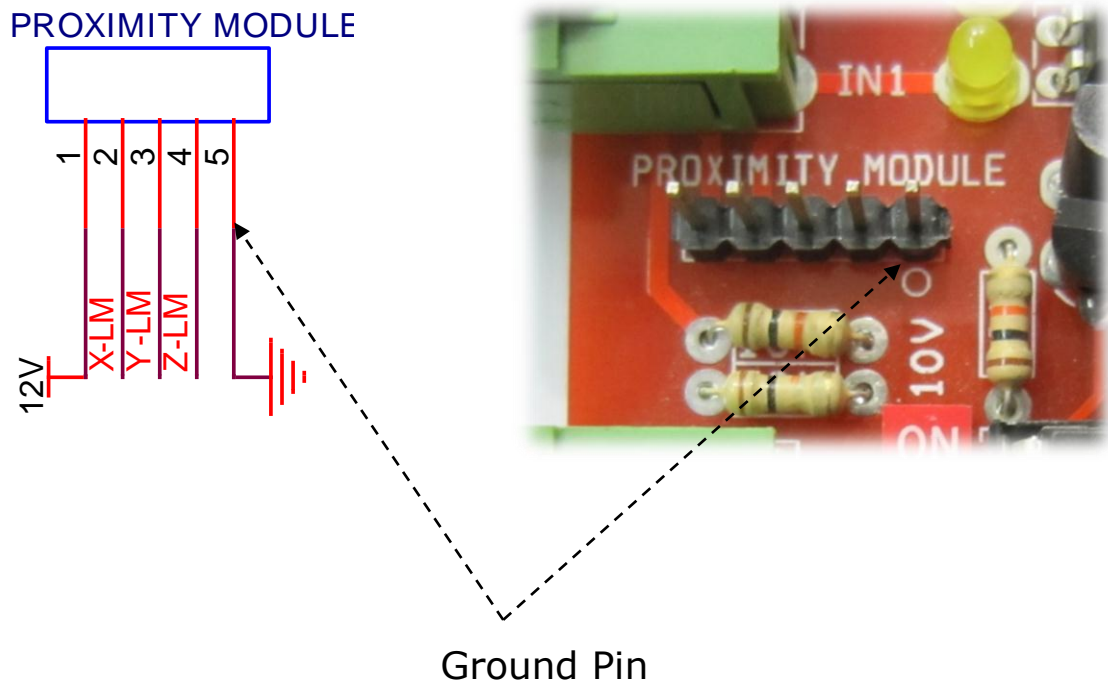
Figure 7. Connection of standard limit switches.

| Port | Pin | Function |
|-------|-----|----------|
| 379.3 | 15 | IN5 |
| 379.4 | 13 | IN4 |
| 379.5 | 12 | IN3 |
| 379.6 | 10 | IN2 |
| 379.7 | 11 | IN1 |

How to connect input Proximity sensors?

FIPBOB3 didn't support direct connecting of inductive proximity sensor, but it provides the power supply required to bias proximity sensor and interface circuit via Socket labeled "PROXIMITY MODULE".

Figure 8. Proximity module socket.



Note:

It's advised to use proximity module product of *FARESpcb*. This module is compatible with FIPBOB3 and direct connected to "PROXIMITY MODULE" socket. Both NPN and PNP types are available.

Can I control spindle motor speed from PC through FIPBOB3M?

The answer is: Of course, you can.

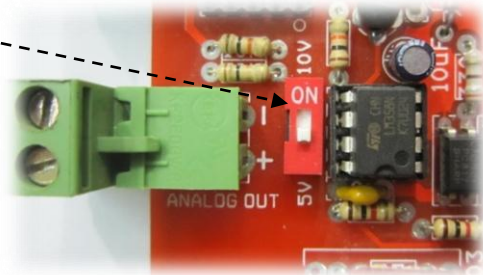
FIPBOB3 provides one analog output can be used to feed any motor speed control device. Your software must support PWM output control.

FIPBOB3 receives PWM from PC and convert it to analog voltage signal which is directly proportional to PWM duty cycle. The output voltage range is selected using DIP switch.

Figure 9. Analog output setting.

Analog output range selecting

| PWM output (378.6) Pin 8 (Duty cycle) | Analog output | |
|---|-----------------|------------------|
| | DIPSW (ON) | DIPSW (OFF) |
| 0 % | 0V | 0V |
| 50 % | 2.5V | 5V |
| 100 % | 5V | 10V |



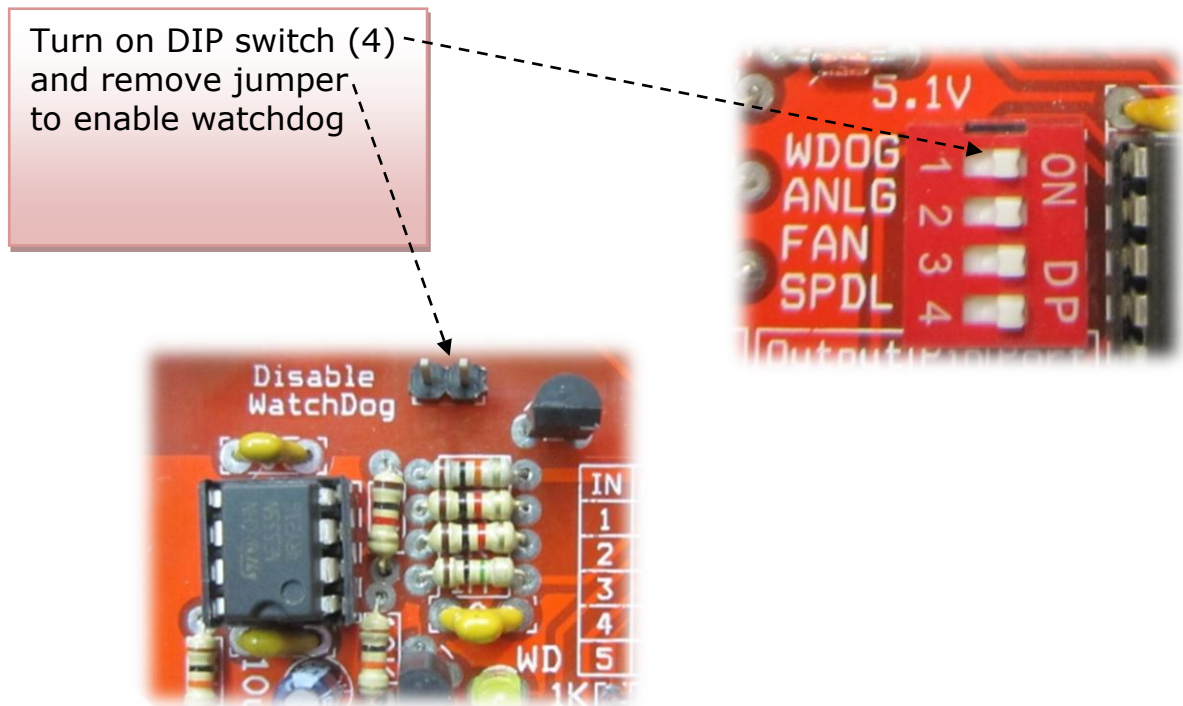
What is the Watchdog facility included in FIPBOB3?

Sometimes during turning PC on, random outputs appear on parallel port which may causes random action of system. To overcome this problem you may didn't connect power to system before running your software on PC and when the software starts to take the control of parallel port then you are able to connect power to other system components such as motor drivers.

Another more efficient solution that didn't need this noisy turning power on sequence is the watchdog function.

Watchdog is simply a mono-stable circuit enables all outputs only when a train of pulses is produced from parallel port. So, whatever the state of parallel port "0" or "1" all outputs are disabled until PC turn on and software program takes the control of parallel port and outputs a clock circuit to mono-stable input.

FIPBOB3 includes watchdog circuit connected to port 378.7(Pin 9).to enable watchdog function, turn on WD DIP switch and take off the jumper labeled "Disable Watchdog"

Figure 10. Watchdog enabling.

Pay attention to multiplexing of output signals

- Spindle and Clock B outputs are multiplexed in 378.4(Pin 6).
- Spindle and Direction B outputs are multiplexed in 378.5(Pin 7).
- Spindle and Clock C outputs are multiplexed in 378.6(Pin 8).
- Spindle and Direction C outputs are multiplexed in 378.7(Pin 9).

Figure 11. General outputs.

| Port | Pin | Function |
|-------|-----|----------|
| 378.4 | 6 | O1 |
| 378.5 | 7 | O2 |
| 378.6 | 8 | O3 |
| 378.7 | 9 | O4 |

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