

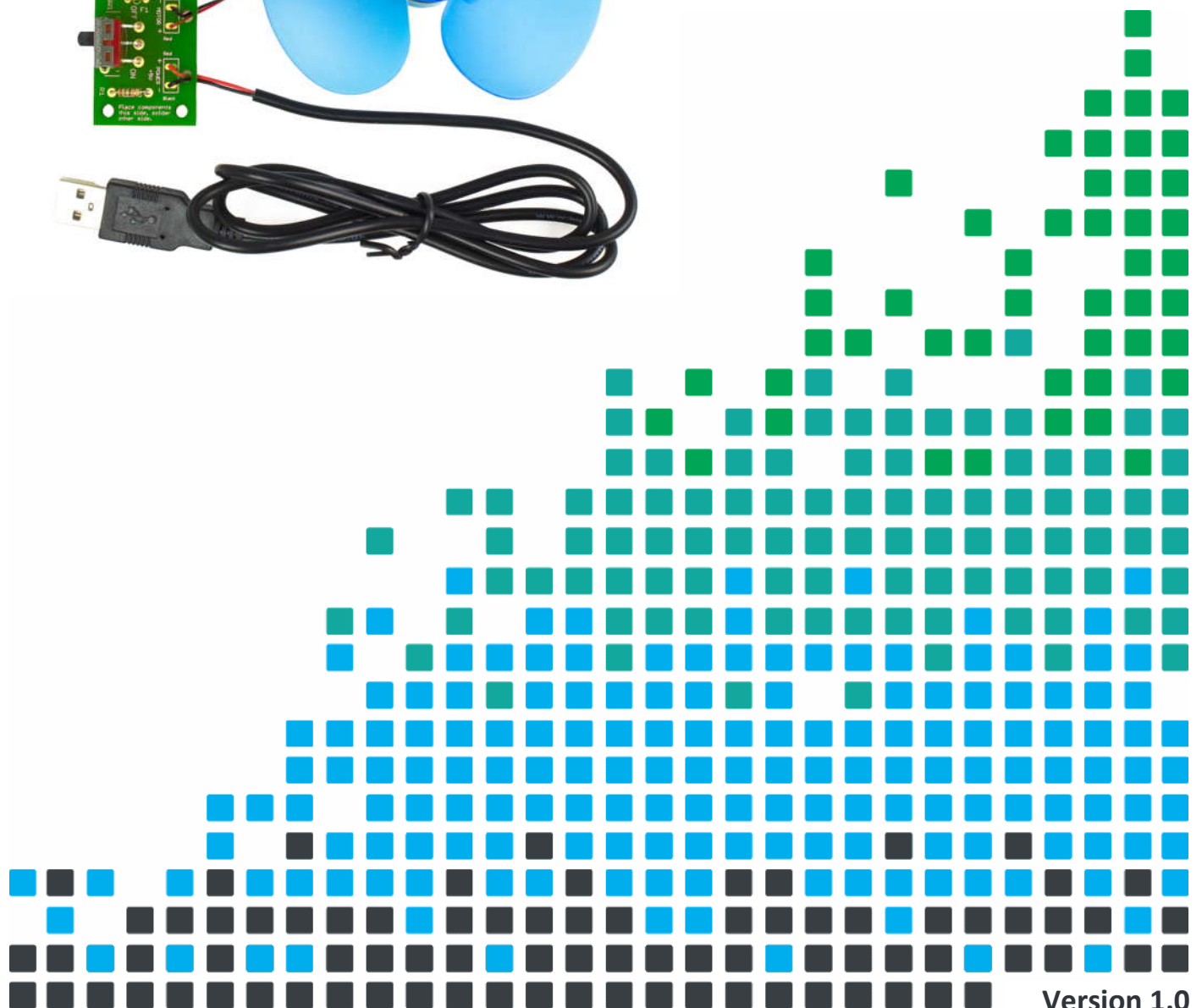
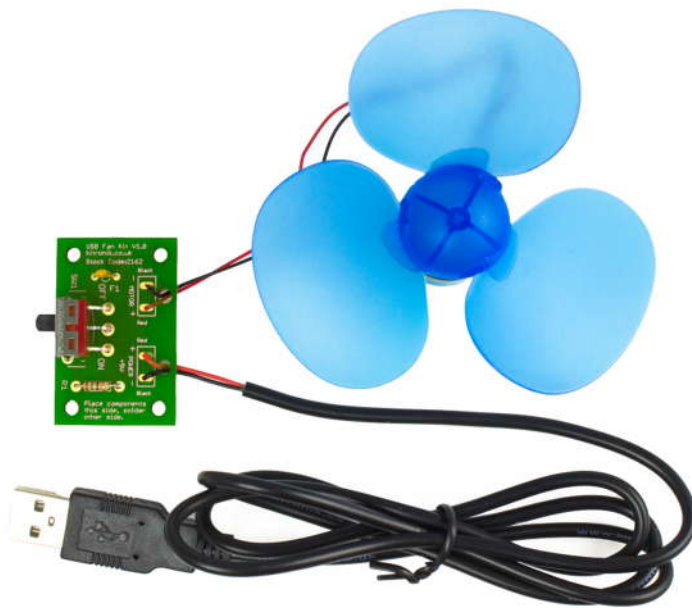


# ESSENTIAL INFORMATION

BUILD INSTRUCTIONS  
CHECKING YOUR PCB & FAULT-FINDING  
MECHANICAL DETAILS  
HOW THE KIT WORKS

KEEP YOURSELF COOL WITH THIS

## USB FAN KIT



Version 1.0

## Build Instructions

Before you start, take a look at the Printed Circuit Board (PCB). The components go in the side with the writing on and the solder goes on the side with the tracks and silver pads.

### 1 PLACE RESISTORS

Start with the resistor R1. The text on the PCB shows where R1 should go. It doesn't matter which way around the resistor goes into the board.

PCB Ref	Value	Colour Bands
R1	15Ω	Brown, green, black



### 2 PLACE THE FUSE

Place the fuse into F1. It doesn't matter which way around the fuse goes into the boards.



### 3 SOLDER THE SWITCH

Solder the PCB mounted right angled slide switch into SW1. The row of three pins that exit the back of the switch must be soldered but it will not matter too much if you can't solder the other two pins.



### 4 CONNECT THE POWER LEAD

The USB power lead needs to be connected. Feed the red and black wire of the lead through the strain relief hole.

The red wire of the USB power cable is soldered to the power pad labelled 'Red' and the black wire of the USB power cable is soldered to the power pad labelled 'Black'.



### 5 CONNECT THE MOTOR LEAD & FAN

Finally, the motor lead needs to be connected. Feed the red and black wire of the lead through the strain relief hole.

The red wire of the motor is soldered to the motor pad labelled 'Red' and the black wire of the motor is soldered to the motor pad labelled 'Black'.

Once soldered, push the plastic fan onto the motor shaft.



## Checking Your USB Fan PCB

Check the following before you plug your fan into a USB port.

### Check the bottom of the board to ensure that:

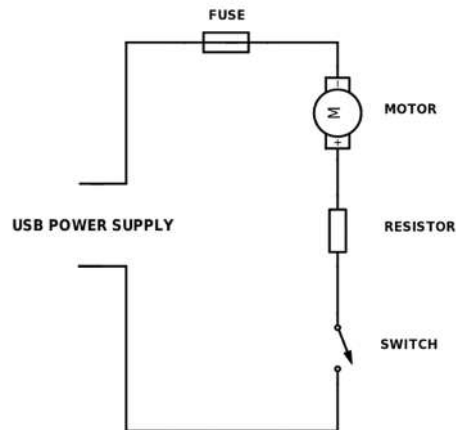
- All holes (except the four large mounting holes and two strain relief holes) are filled with the lead of a component.
- All these leads are soldered.
- Pins next to each other are not soldered together.

### Check the top of the board to ensure that:

- The red wire on the USB power cable is connected to the power connector labelled 'Red' and the black wire on the USB power cable is connected to the power connector labelled 'Black'.
- The red wire on the Motor is connected to the motor connector labelled 'Red' and the black wire on the Motor is connected to the motor connector labelled 'Black'.



## How the USB Fan Works



The circuit diagram for the USB Fan is shown above. It is a very simple circuit. The 5V that powers the circuit is supplied from the USB connector.

The low power motor in this fan has been selected to not draw too much current from a computer USB port. If it was powered directly from 5V it would take more current, and possibly damage a computer. The 15 $\Omega$  resistor drops the voltage down, reducing the voltage to prevent this happening in normal operation.

If the Fan becomes jammed then the motor will stall, and start to take more current. The fuse will protect the USB port if this happens.

Finally, the on / off switch allows the circuit to be opened and closed: open the switch to turn the Fan off and close the switch to turn the Fan on.

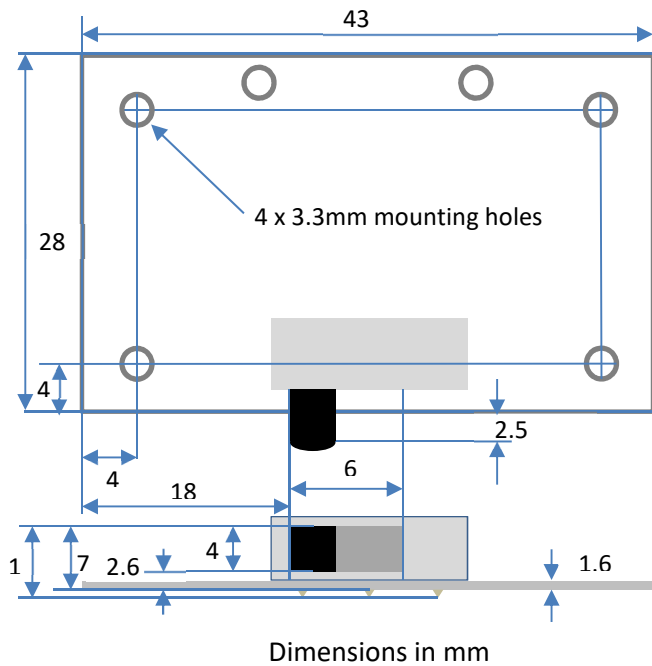


## Designing the Enclosure

When you design the enclosure, you will need to consider:

- The size of the PCB.
- Where the on / off switch is mounted.
- There are four 3.3mm holes in the corners of the PCB to secure the PCB in the enclosure.

The following technical drawings of the built USB Fan PCB and motor should help you to design your enclosure.



The four mounting holes are all 4mm from the board edge.

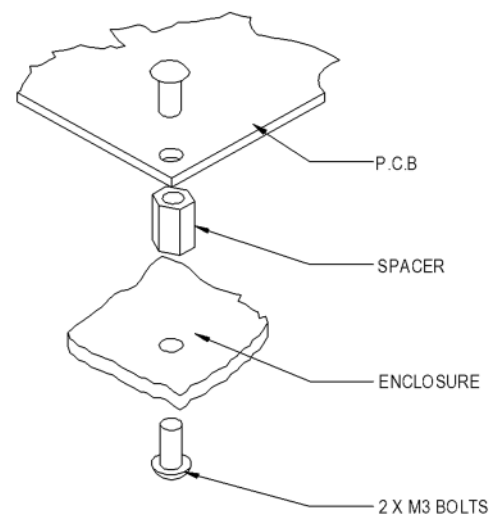
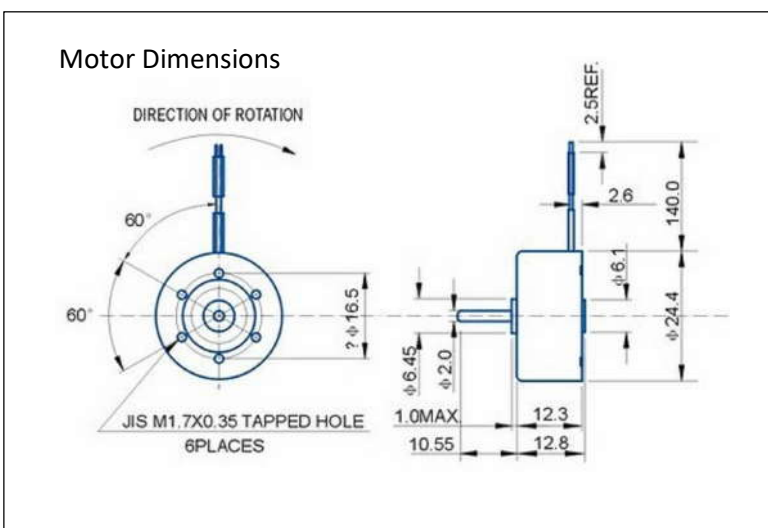
The assembled PCB is approximately 10 mm tall including solder points.

The Fan is 90mm in diameter, and approximately 18mm in depth.

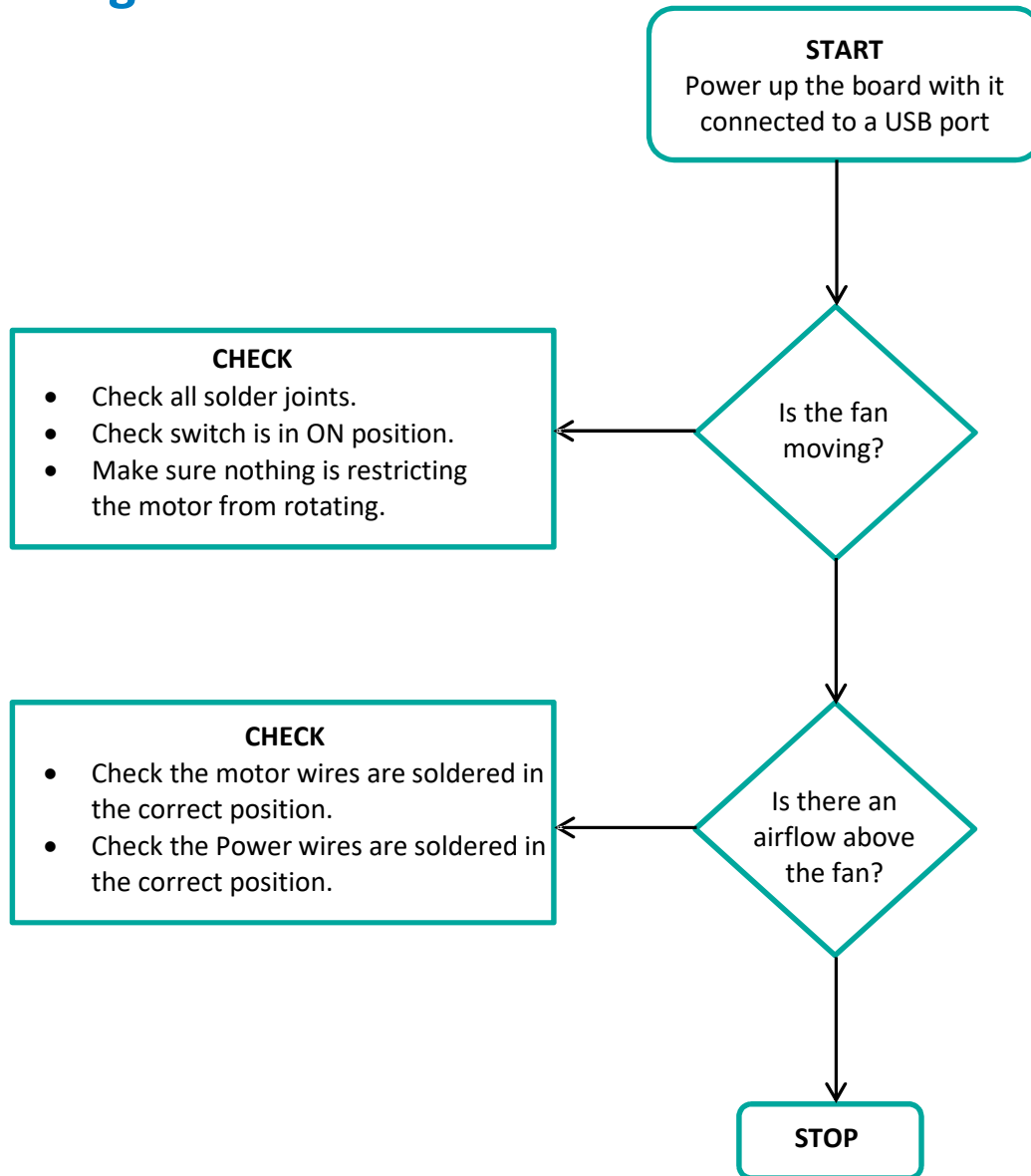
### Mounting the PCB to the enclosure

The drawing below shows how a hex spacer can be used with two bolts to fix the PCB to the enclosure.

Your PCB has four mounting holes designed to take M3 bolts.



## Fault Finding Flowchart



## Online Information

Two sets of information can be downloaded from the product page where the kit can also be reordered from. The 'Essential Information' contains all of the information that you need to get started with the kit and the 'Teaching Resources' contains more information on soldering, components used in the kit, educational schemes of work and so on and also includes the essentials. Download from:

[www.kitronik.co.uk/2162](http://www.kitronik.co.uk/2162)



This kit is designed and manufactured in the UK by Kitronik

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