## **AirPi Assembly Instructions**

To begin the assembly of your AirPi it is first necessary to check that you received all the components. These are listed below, with their functions and designators as marked on the board. If you are missing any parts, please contact <u>raspberrypiweather@gmail.com</u>

Component		Designator	Function	Image
BMP085		J5	Measure temperature and air pressure	
DHT22		U7	Measure temperature and relative humidity	il III
MiCS-2710		U4	Measure nitrogen dioxide levels	
MiCS-5525		U5	Measure carbon monoxide levels	<b>I</b>
Electret microphone		M1	Measure average sound levels	٠
LDR		LDR	Measure light levels	10
Red LED		LED1	Inform user that it has failed to upload data	1
Green LED		LED2	Inform user that it has successfully uploaded data	1
0.1 $\mu$ F capacitor		C1	Used as part of the microphone amplifier circuit	No. of Concession, No. of Conces
470 $\mu$ F capacitor		C2	Used as part of the microphone amplifier circuit	P
8 pin header		J3	Connecting additional sensors to the ADC	1
26 pin header		J1	Connecting the AirPi to the Raspberry Pi	
MCP6283		IC1	Used for amplifying the microphone signal	11M
MCP3008		U1	Converting analogue signals to digital	- minit
8 pin IC socket		IC1	Holding the MCP6283 in place	
16 pin IC socket		U1	Holding the MCP3008 in place	<b>*</b>
68 $\Omega$ resistor		R4	Used as part of the MiCS-2710 circuit	
82 $\Omega$ resistor		R6	Used as part of the MiCS-5525 circuit	
100 $\Omega$ resistor	× 2	R13, R14	Protective resistors for LEDs	
330 $\Omega$ resistor		R8	Used as part of the microphone amplifier circuit	
10K $\Omega$ resistor	× 4	R2, R11 R12, R5	Pull-up and pull-down resistors	
22K $\Omega$ resistor	× 2	R1, R3	Pull-up and pull-down resistors	
100K $\Omega$ resistor		R7	Pull-down resistor	
390K Ω resistor		R9	Used as part of the microphone amplifier circuit	

## Soldering the kit



Begin by soldering the 26 pin header. Place it into the board (as shown on the right), and solder one pin at an end (see left). Then you can proceed to straighten the header by moving it with pliers or your fingers (but be careful of the heat!) whilst pressing the soldering iron to the pin you

soldered. Once you've straightened the header, you can proceed to soldering the remaining pins. If you accidentally connect two pins together with solder, you can use a solder sucker (less than  $\pounds$ 3) to remove the excess solder.





Then proceed to soldering the white DHT22 temperature & humidity sensor. First bend its legs away from the plastic grill on the front (above, far left). Then place it into the board (centre left). To hold it in place while you are soldering it, you can bend its legs in opposite directions (centre right). This trick can be used with all the remaining components on the board as well. Once you've finished soldering it, trim the legs off the bottom, leaving only the small blob of solder (far right).



Proceed to solder all the resistors on the board: match each one's colour code with its corresponding value using the table above, and read the values inside the rectangles on the board to find where it goes. Place it into the PCB, bend its legs apart, solder it and then trim the legs on it.



Continue by soldering the two capacitors. The smaller, red one is not polarised (the direction it is soldered does not matter) however the larger, cylindrical 470  $\mu$ F capacitor is polarised. One side of it has negative signs along it, and it is is important that when inserted into this board, the pin closer to these negative signs is put into the hole *not* marked with a plus symbol.

Next, solder the two LEDs. These are also polarised. It is possible to determine which end is negative by which leg of the LED is shorter. If the legs have been trimmed, the negative side of the LED is that which is flat, as opposed to round. Ensure that this negative leg is put in the hole *not* marked with a plus symbol. Make sure you solder the coloured LEDs into the right locations (as marked by the text saying 'GREEN' or 'RED').





Solder the BMP085 sensor, ensuring that it is as flat as possible relative to the AirPi PCB. Then solder in the microphone. Orient it so that the white circle outlined on the circuit board matches up with the physical outline of the microphone.





Solder the LDR, followed by the 8 pin header. When soldering the 8 pin header, make sure the shorter pins go into the board, and the plastic sits on top of the board (as in the image). Neither of these two components are polarised.



Solder the final two sensors, the MiCS-2710 and the MiCS-5525. Note that these sensors are polarised, and the notch protruding from the sensor must match up with the white notch on the board whilst soldering them. Ensure that you do not solder either of these sensors into the space on the board for the TGS2600 sensor.





The only remaining parts to solder are the two IC sockets. Make sure that the notches at the ends of these are matched up with the corresponding notches on the board. Once you've soldered them in, place the chips into the sockets (ensuring the notches on the PCB and the ICs match).



Once you've finished soldering all the components, the board should look like the following images (from above and below):



