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<b>TITLE SUBASSEMBLY #6A: PCB AND ELECTRICAL CONNECTION ASSEMBLY</b>	

Revision	Date	Modifications	Author
V1.0	10-04-2020	Description and labeling of all cables and PCB attachment	Jeroen Roest
V1.1	21-04-2020	Adaption to current insights	Jeroen Roest / Bart Spel
V1.2	24-04-2020	Translation Dutch to English	Guusje Jans / Jim Smit

**This manual explains the assembly of the PCB. Firstly, the PCB connections are grouped per component that needs to be attached. A visual overview of all connections can be found in appendix I. In this manual you will find an explanation for each component (connections: 1-5 & 7). In addition, the assembly of the PCB and Raspberry Pi is described (connection 6).**

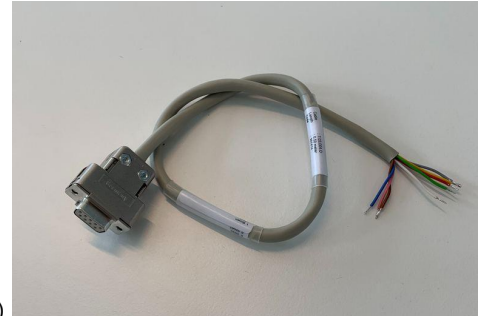
Part	Supplier	Quantity
PCB	Interay	1
MFC cable	Bronkhorst	2
Connector PCB (5-pin)	Interay (geleverd bij PCB)	3
Connector PCB (2-pin)	Interay (geleverd bij PCB)	2
Solenoid Control Valve	Bürkert	1
Grounding (AWG 22, 30 cm)		1
Cable 2 cores (AWG 22, 10 cm)		1
hose 2 mm (4 cm)	Festo	3
Connector Piece 4 mm hose to 2 mm hose	Interscience/WPI	3
Raspberry Pi 4	RS online	1
Flatcable (flowsensor, 20 cm)	RS online	1
Flatcable (display, 30 cm)	Kiwi electronics	1
5-pin connection cable to display (45 cm)	Startech	1
F-F standoff M2.5, 11 mm	Farnell	4
M-F standoff M2.5, 18 mm	Farnell	4
F-F standoff M2.5, 30 mm	Farnell	3
Bolt M2.5, 10 mm lang	Farnell	7
Ring M2.5		7
cable 5 cores (AWG 16, 20 cm)		5
Aluminium tape		n.a.

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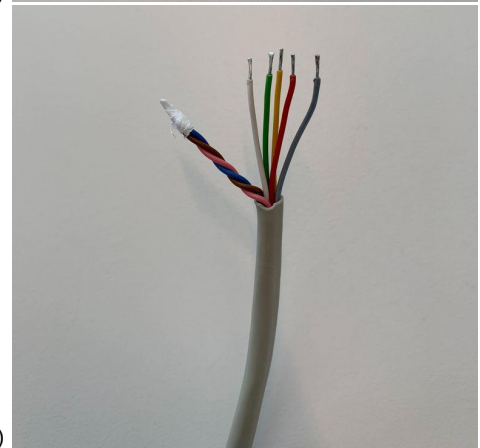
#### MFC (O<sub>2</sub>)

1.
  - The cable in figure 1.1. was provided by our supplier.
  - The brown, blue and pink cables are **not** connected. These wires need to be reisolated, see figure 1.2. These can be done with isolation tape for example.
  - The remaining cables are to be connected to the corresponding entrances of the terminal (See appendix I). It is crucial to connect the right coloured cable to the corresponding channel.
    - For the connection to the PCB the ends of the cables should be locked in the terminal (See figure 1.3, NB the terminal has to have 5 channels!).
    - Connect the terminal to the PCB on location 1.
  - The cables must be around 50 centimetres.

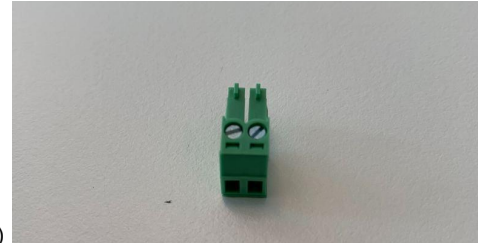
(1.1)



(1.2)



(1.3)

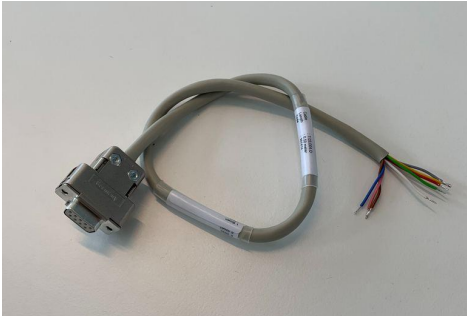


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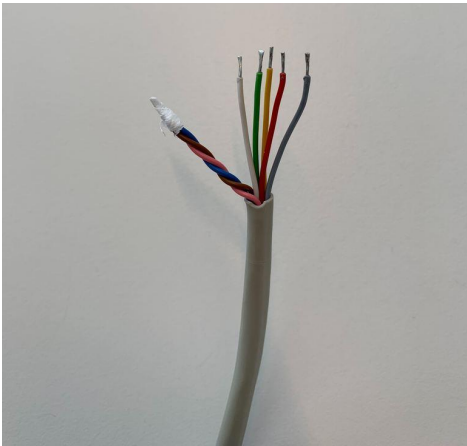
2.
- MFC (Air)*

  - The cable in figure 2.1. was provide by our supplier.
  - The brown, blue and pink cables are **not** connected. These wires are to be reisolated, see figure 1.2. These can be done with isolation tape for example.
  - The remaining cables are to be connected to the corresponding entrances of the terminal (See appendix I). It is crucial to connect the right coloured cable to the corresponding channel.
    - For the connection to the PCB the ends of the cables should locked in the scremterminal (See figure 2.3, NB the terminal has to have 5 channels!).
    - Connect the terminal to the PCB on location 2.
  - The cables must be around 50 centimetres.

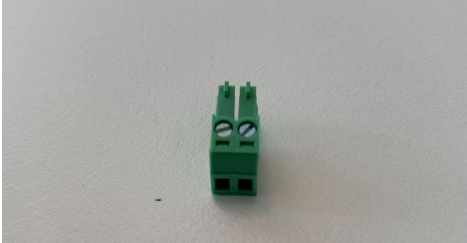
(2.1)



(2.2)



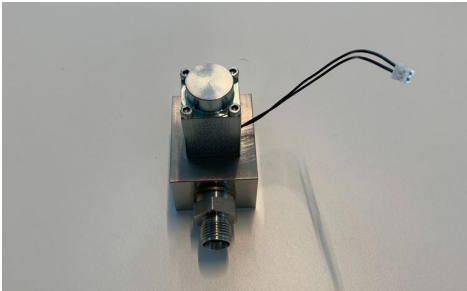
(2.3)



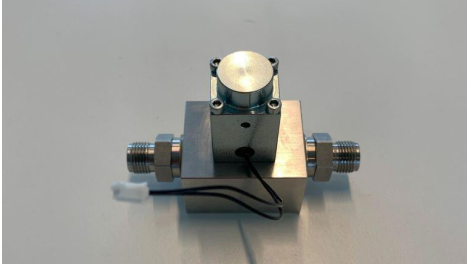
3.
- Proportional Valve (inspiratory)*

  - The outgoing cables are part of the inspiratory proportional valve. See figure 3.1 and 3.2.
  - However, these cables are too short and need to be extended. Therefore the following steps are taken: Strip another 2 core cable on both ends.
    - One end is connected to the PCB on location 3 as seen in figure 1.3.
    - The assembly of the other end is described in subassembly manual No. 11.

(3.1)



(3.2)



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4.

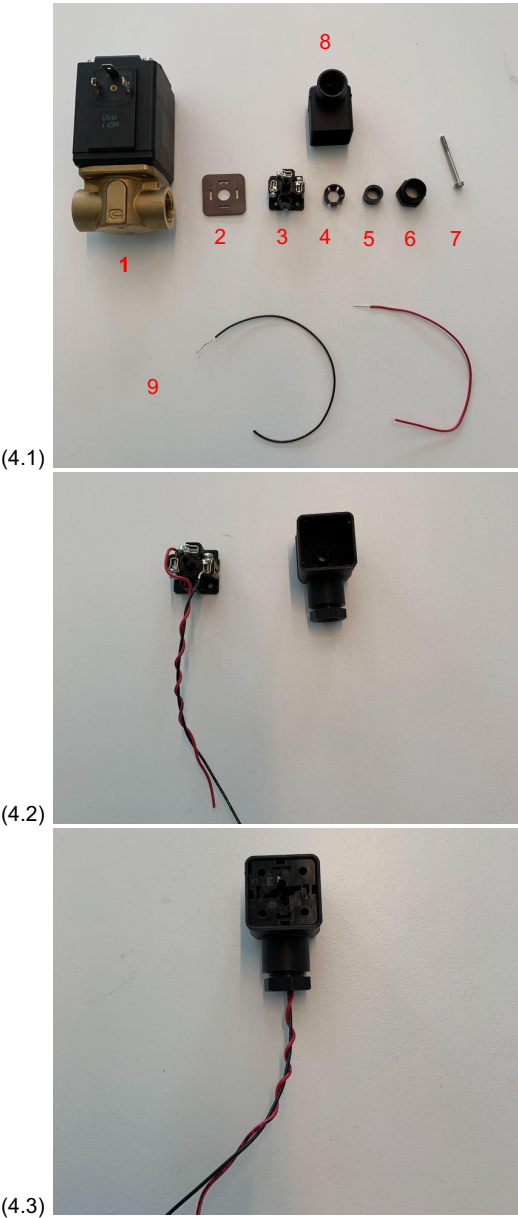
Proportional Valve (Expiratory)

  - The inspiratory and expiratory proportional valves are different in structure and slightly in connection.
  - The valve is supplied with a system to easily connect the wires with the exits of the valve.
    - 1: In figure 4.1 all the parts are layed out.
    - 2: Figure 4.2 explains the second step. Two cables (no. 9) of approx. 30 centimetres are connected to part 3 using screws of the attachment. NB. The cable seen in figure 4.2 is not the correct one. The correct cable has two cores instead of two individual wires.
    - 3: The cable needs to be stripped on both ends. One end must be connected to the screws labelled 1 and 2. Part 5 must be put in part 4. Then, part 4 is put in the circular opening op part 8. Thereafter, this is locked with part 6.
    - 4: The components from step 2 (cables and part 3) are put together, the wires exit form the circular opening.
    - 5: The remaining parts (1,2,& 7) are used later in the assembly process. They will used in the final assembly step.
  - In step 2 we connected the cable (part 9) to part 3. The other end of this cable needs to be connected to a port in the terminal (see figure 1.3). The terminal is connected to the PCB on location 4.

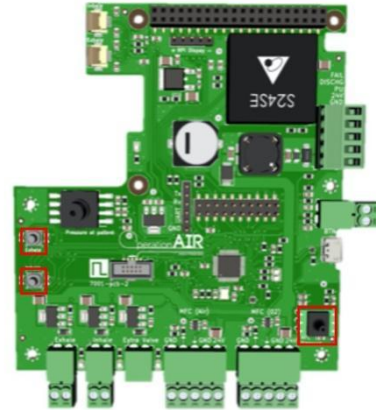
5.

Flow sensor

  - The end of the wire needs to be connected to the PCB at location 5.
  - De Flowsensor is connected in subassembly 11.



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(6.1)

#### Pressure sensors

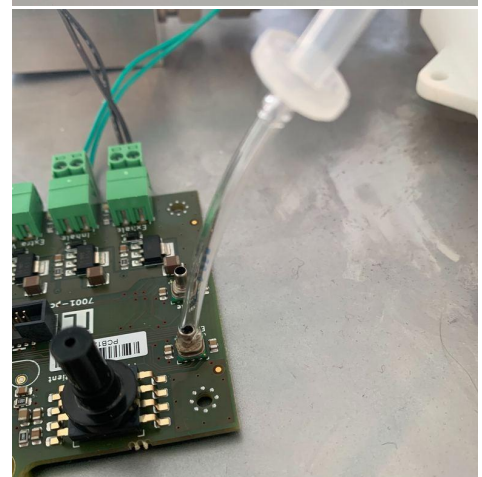
- Figure 6.1 demonstrates where the pressure sensors must be connected to the PCB. (red squares).
- To connect the pressure sensors, two parts are needed. See figure 6.2
  - Connector part: ID 4 mm to 2 mm.
  - Hose ID 2 mm (4 cm long).
- The hose is connected to one end of the connector part (see figure 6.3)
- To connect the two pressure sensor connections (the red squares on the left in figure 6.1). The other end of the 2 mm hose needs to be heated and attached to the PCB. The result can be seen in figure 6.4.
- The remaining connection can be attached to the PCB without heating the extremity (right side rectangle in Figure 6.1).



(6.2)



(6.3)

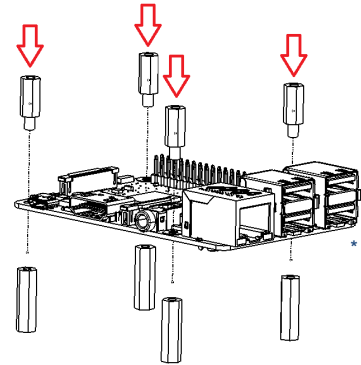


(6.4)

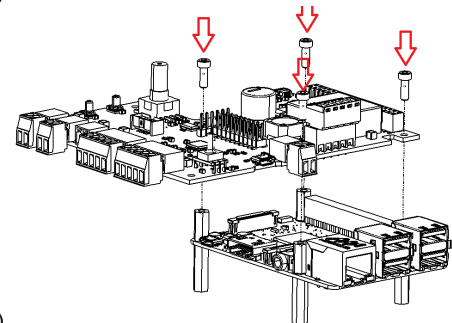
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#### GUI & PCB attachment

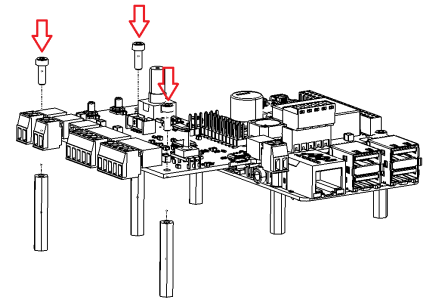
- The 5-core cable needs to be attached to the PCB on location 6.1.
- A flatcable (15 cores) must be connected to the Raspberry Pi on location 6.2. This cable needs to be wrapped in aluminium tape ending 1 cm away from the connection edges.
- When all previous steps are completed, the PCB can be assembled.
  - A F-F standoff M2.5, 11 mm is mounted from the top of the Raspberry Pi. It is screwed on with a M-F M2.5, 18 mm standoff (see figure 7.1).
  - Next, the PCB is mounted on the Raspberry Pi with 4 M2.5, 10 mm bolts (add M2.5 rings). See figure 7.2.
  - The remaining openings in the PCB are connected with F-F M2.5, 30 mm standoffs. These are fixed with 3 M2.5, 10 mm bolts (add M2.5 rings). See figure 7.3.
- The result can be seen in figure 7.5. NB, in this image there are no cable & wires, in reality there are.



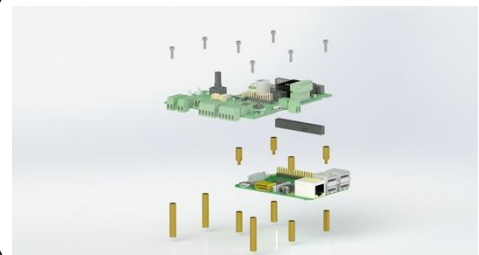
(7.1)



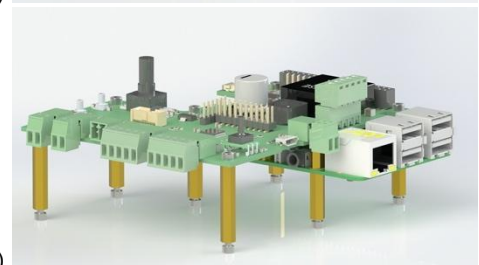
(7.2)



(7.3)



(7.4)



(7.5)

7.

8.

- The USB connection with the fan is made through location 7 op de PCB. This is done in subassembly 11.

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*Power supply*

- The power supply is connected to the PCB on location 8. After the cover is placed. Therefore, a connecting cable with 5 cores needs to be connected to a terminal.
  - The other end of this connecting cable needs to be stripped, and will be connected to the chassis during the final assembly.
9.
  - For convenience, use a cable of which the core wires have different colors.
  - In subassembly 13, a grounding cable is attached to the base.
  - The cable shouldn't have a sleeve, the numbers on the PCB correspond with the entrances on the chassis. These are connected in subassembly 11.



