

How to set up an oxygen flow splitter

Annex 2 - Oxygen therapy and Oxygen humidification

When there are multiple patients requiring oxygen therapy but there are a limited number of oxygen concentrators, an oxygen flow splitter is recommended. The flow splitter is connected to the oxygen concentrator and can divide the supplied oxygen amongst a maximum of 5 different patients.

The 10L/min oxygen concentrator model is recommended as the flow splitter cannot deliver more oxygen than the maximum flow the oxygen concentrator can produce. Meaning that the combined patients' oxygen needs cannot exceed 10L/min.

To set up the oxygen flow splitter you will need the following:

- A 10L/min oxygen concentrator
- A flow splitter
- Interconnection hose
- 5 check valves (so oxygen flows towards patient only, and not back into flow splitter)
- If providing humidified oxygen, a humidifier for each patient and distilled water is required

If a patient is a suspected or confirmed case of airborne disease, such as pulmonary tuberculosis or measles, a specialized antibacterial is to be used between the check valve and humidifier (See photos).

Setting up the flow splitter:

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| 1. Place the flow splitter on a stable surface or attach it to a wall near the patients. |
| 2. Connect the Oxygen concentrator(s), via the hosepipe, to the flow splitter. |
| 3. Cut the silicone tube in equal lengths: short and medium sizes (see pictures). |
| 4. Connect the exit of the flow splitter via the (short) silicon tubes, with the check valves. Make sure to connect the check valves in the same direction of the flow! |
| 5. Connect the hose connectors to the humidifiers. |
| 6. Connect the check valves via the (medium size) silicon tubes, with the hose connectors on the humidifiers. |
| 7. Connect a patient tube between the humidifier and the patient. |
| 8. If a patient is a suspected or confirmed case of airborne disease, such as pulmonary tuberculosis or measles, a specialized antibacterial is to be used between the check valve and humidifier (See photos below). |



Figure 1: Oxygen concentrator with flow splitter

Adjusting the oxygen flow:

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| 1. Open the flow meter on the oxygen concentrator to its maximum concentration (either 5L/min or 10L/min). |
| 2. Open all but one of five valves to the max on the oxygen flow splitter. |
| 3. Turn on the concentrator. |

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| 4. Adjust the open flow meter on the flow splitter to 1L, if using a 5L/min concentrator, or 2L, if using a 10L/min concentrator. Continue with the other flow meters as needed (depending on the number of patients). |
| 5. Attach oxygen tubing to the flow splitter spouts. |
| 6. If administering humidified oxygen, fill the humidifiers with medical distilled water until the indicated line and attach them between the flow splitter and the patients. If distilled water is not available, MSF filtered or tap water can be used as long as the tap water is conforming to norms for residual chlorine. |
| 7. Connect a humidifier to a single flow meter spout. |
| 8. Connect oxygen tubing to the humidifier lid spout. |

Ideally, the oxygen concentrator is on the floor between two beds whilst the flow splitter and humidifiers are on the wall above the patients. The back of the concentrator should be a few centimetres from the wall as to not overheat.

Important to note:

- The flow splitter will never deliver more oxygen than the concentrator is capable of supplying. If a low oxygen alarm rings, you may need to reduce the flow to one or more patients.
- The flow meter on the oxygen concentrator may go above the red line. Although normally this should be avoided, the oxygen concentrator needs to overcome the additional resistant from the flow splitter.
- Changing the flow rate of one patient on the splitter will affect the other connections and flow rates. Whenever altering flow rates, or adding or removing a patient from the splitter, check the other flow meters and adjust accordingly.
- If there are no longer patients connected to the flow splitter, turn off the oxygen concentrator.
- If delivering humidified oxygen, always use distilled water and attach the humidification bottle between the flow splitter and the patient.



Figure 1: Circular antibacterial filters attached between the flow splitter and each humidifier. This is not necessary unless the patients are infectious by air transmission (e.g. tuberculosis).

Note: A check valve should be before the antibacterial filter!

Evidence and images from: (Médecins Sans Frontières, n.d.)(Médecins Sans Frontières, 2018b)