



Telecom Sector Skill Council
Training Module

OXYGEN CONCENTRATOR

Maintenance and Basic Operation

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1. Oxygen Concentrator

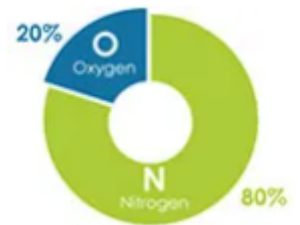
Oxygen concentrators are medical devices that assist people who have a low level of oxygen in their blood. They are powered by plugging the device into an electrical outlet or by using a battery. If a battery is used, then it will need to be charged by plugging it into an electrical outlet. Most concentrators also come with an adapter so you can use the device while you drive.

Oxygen concentrators do not need to be refilled. The concentrators run on electrical power and thus supply an unlimited amount of oxygen.

2. Why is it used?

It is used to separate oxygen from the nitrogen and other gasses and to produce pure form of oxygen for further use.

An oxygen concentrator receives air, purifies it, and then distributes the newly formed air. Before it goes into the concentrator, air is made up of 80 percent nitrogen and 20 percent oxygen. An oxygen concentrator uses that air then it comes out as 90 to 95 percent pure oxygen and 5 to 10 percent nitrogen. The nitrogen is separated to give the patient the highest dose of oxygen possible, as it is difficult to get that percentage of oxygen without the help of a medical device.



3. Types of Oxygen Concentrator and oxygen delivery

There are two types of oxygen concentrators: stationary and portable.

Stationary oxygen Concentrator:

- Provide an uninterrupted oxygen supply with a flow ranging from 0.5 to 10–15 L·min⁻¹.
- They have a mean weight of about 10 kg.
- They have several ergonomic handles built in, to offer options for lifting or rolling the device.
- The concentrator plugs into the main electricity supply at home, using 300 W (or below) per hour (about the same as four light bulbs). A back-up compressed gas cylinder is sometimes provided, to use in case of a power failure.
- They currently support oxygen flow rates up to 2 L·min⁻¹.



Portable oxygen concentrator:

Portable oxygen concentrators are the latest technology for LTOT users who desire a small, lightweight and portable oxygen solution in a compact and mobile unit. Portable concentrators vary in weight, size, oxygen flow settings, range of L·min⁻¹ and battery life, as well as other specifications.



The key differences between stationary and portable concentrators can be summarised by four major factors:

1. oxygen output
2. size and weight
3. power options
4. price.

Comparison table: Stationary & Portable oxygen concentrator	
- Stationary oxygen concentrators have higher oxygen output and lower costs	- Portable oxygen concentrators offer smaller size and less weight as well as greater flexibility with power sources.
- Stationary oxygen concentrators are commonly used by patients on LTOT, as they are cost-effective and are safer than using compressed gas cylinders.	- patients who live active lives and are often away from an AC (wall socket) power source, a portable oxygen concentrator is the best choice
- work on AC & DC supply. However patients using stationary oxygen concentrators need to consider changing filters weekly, regular servicing and the warm-up period of the machine	- portable oxygen concentrators use lithium-ion batteries, which degrade over time. Most of these batteries can be recharged approximately 300 times without significant degradation.

There are two types of oxygen delivery in oxygen concentrators: *continuous flow dose delivery and pulse mode delivery*. Continuous flow dose delivery supplies a constant, steady and reliable oxygen flow based on the setting number in L·min⁻¹, while pulse mode delivery delivers a pulsed “bolus” of oxygen when the user begins to take a breath. Initially, the individual flow setting should be adjusted.

Oxygen Concentrator are available in 3 type of model i.e

- **5-liter model**
- **8-liter model**
- **10-liter model**

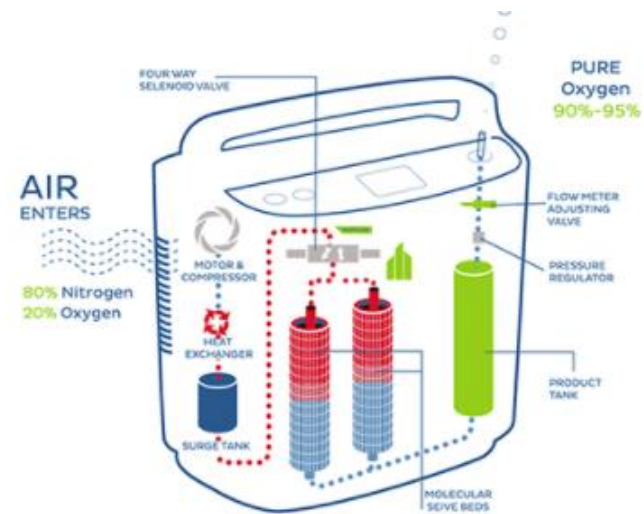
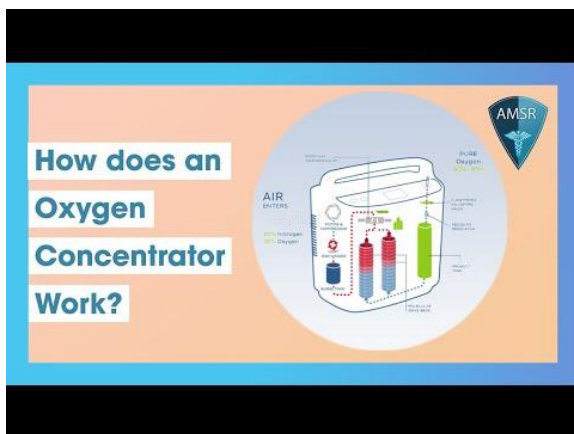
5-Litre model	8- Litre model	10-Litre model
The home oxygen concentrators market in India is predominant with oxygen concentrators imported from America and China.	This model is rarely used by the customers as there are less seller (China) and prefer high-capacity model	This model is preferred over 8 litre model.
Bestselling 5 Litre model 1. Nidek Nuvo Lite 5 LPM 2. Philips Everflo 5 LPM 3. Devilbiss 5 LPM 4. Oxymed Mini 5. Airsep Visionaire 5 6. Evox 5 LPM	Bestselling 8 Litre model 1. Longfian Jay-8 2. Home Medix HM-8	Bestselling 10 Litre model 1. Airsep Intensity 10 2. Devilbiss 10 LPM 3. Dr Diaz 10 LPM 4. Nidek Nuvo 10 Litre 5. Oxymed 10 Litres
Price Range: INR 52,000 – 65,000	Price Range: INR 55,000 – 65,000	Price Range: INR 90,000 – 1.20 lakhs

In detail pricing and rental service : [The Ultimate Guide to Oxygen Concentrator Prices in India \(2021\) \(oxygenintimes.com\)](http://oxygenintimes.com)

4. Working of oxygen concentrator

The 5 Step Concentrator Process:

1. Takes air from the room.
2. Compresses the oxygen.
3. Takes out nitrogen from the air.
4. Adjusts the way the air is delivered.
5. Delivers the purified air.



Link : [How Does An Oxygen Concentrator Work? Learn About Concentrators \(oxygenconcentratorstore.com\)](http://oxygenconcentratorstore.com)

There are many parts that make up a portable oxygen concentrator.

- a. Compressor
- b. Sieve bed filter is a couple of the main parts.
- c. The compressor compresses air that is filtered into the concentrator, then delivers the air in a continuous stream.

The compressed air moves to the sieve bed filters. The sieve bed filter plays an important role, as it is the device that removes the nitrogen from the air. A material called Zeolite, which is a six-sided microscopic cube with holes on each side, is in the sieve bed and this is what removes the nitrogen from the air.

Two sieve beds are located in the concentrator. After air is first compressed in the concentrator, it is forced into the first sieve bed. Oxygen is sent into the product tank. The first sieve bed then gets filled up with nitrogen. Next, the gas flow is switched, and the compressed air is moved to the second sieve bed. The first sieve bed's compressor is sent to the outside room, and the air from the product tank goes back into the first sieve bed.

The drop in pressure from the first sieve bed and the weakening of oxygen makes the Zeolite release nitrogen. The Oxygen and Nitrogen come back together and are released in the room as regular air. The air is then compressed and sent to the second sieve where Oxygen is moved through it to the Product Tank. The whole cycle starts over again with the first sieve after a few seconds.

Other important parts are the cooling system that keeps the portable oxygen concentrator from overheating, and the nasal cannula that delivers the purified oxygen after the oxygen has been passed through all the sieve bed filters. The cannula helps improve oxygen absorption.

5. Installation & Set-up of Oxygen Concentrator

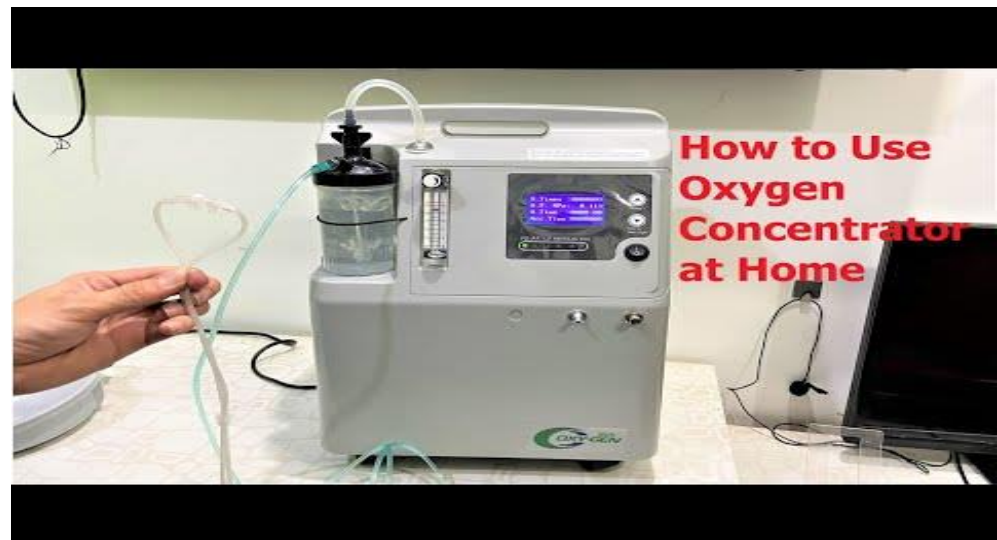
Installation of the device is simple and easy to use. As most of the products in the market have similar specifications may add one or more component as per the product specification.

Let get into details:

Product: GVS 5L Oxygen Concentrator Oxy-Pure Ultra Silence

Specifications:

1. Flow rate: 0:5L/min
2. Sound Level \leq 43db
3. Warranty period of this product is 24 Months or 5000 Hrs (whichever is earlier).
4. Oxygen concentrator machine
5. Humidifier Bottle
6. Oxygen Canuula 2 number
7. External filter (one with machine & one extra)
8. Internal filter (one with inside the machine and one extra)
9. Power cord
10. General Machine manual



Procedure to set-up

1. Remove the safety belt from the bottom.
2. Place the oxygen concentrator near the power socket and place where it is easy to use.
3. Wash (warm water) the filter resembles in black colour and fit it into the device.
4. Fill the humidifier bottle with warm water till the indicated marker.
5. Place the humidifier bottle at the bottle place and connect it to the machine nozzle.
6. Attache oxygen cannula to humidifier bottle. (Note: different machine has different connector. Please read the manual before proceeding further)
7. To run the machine safely, it should be connected to a stabiliser i.e. 1kv.
8. Once the device is one allow 1-2 minute the stabilizer to stable and then a beep sound which will indicate the device is good to go.
9. "On" the oxygen concentrator machine you will find various reading on the display panel.
10. You can set your oxygen pressure as prescribed by the doctor.

6. General maintenance of oxygen concentrator & Precaution

1. Unplug the concentrator before cleaning.
2. To avoid electrical shock, DO NOT remove cabinet during operation.
3. Do NOT operate the concentrator without the filters installed.
4. Be sure to check the current owner's manual for any additional instructions.

Weekly maintenance process which takes less than 5 minutes.

- record the type of maintenance being performed, the elapsed operating hours from our meter and check that the flow meter is set for the prescribed litres per minute flow rate.
- Remove the air filter, located on the back/side of the concentrator cabinet, and Wash it in warm, soapy water, rinse thoroughly with warm tap water and allow it to dry.
- Now would be a good time to clean the concentrator cabinet with a damp rag and mild detergent.

Annual inspection

1. Outlet HEPA Filter and compressor Inlet Filter

- To inspect the outlet bacterial filter, first remove the concentrator cabinet.
- Inspect the filter and change if necessary - if it looks dirty, for instance.
- Just remove the plastic tubing from both ends and replace it with a new filter.
- Then reassemble the concentrator cabinet.

2. Oxygen Concentration levels

- Check the oxygen concentration levels with an oxygen analyser.
- Verify the concentrator supplying the prescribed level of oxygen, proper concentration percentage and proper air pressure.
- Attach the analyser to the cannula, or flexible tube, and then the cannula to the concentrator at the oxygen outlet barb to verify the readout for each measurement.

3. Power loss Alarm

- check the power loss alarm.
- Run the concentrator for at least one minute and then unplugging the power cord.
- The power loss alarm should sound to indicate it to working properly.



Safety Precaution while using oxygen concentrator at home.

1. Keep the oxygen at least 3 metres from any open flame or heat source, such as candles or a gas stove, or from anything that could cause a spark.
2. Do not smoke or let anyone else smoke near the oxygen equipment.
3. Avoid using anything flammable near the oxygen, including petrol,
4. cleaning fluid, and aerosol cans or sprays such as fresheners or
5. hairspray.
6. Do not allow alcoholic solutions, oil or grease to come into contact with oxygen supply devices. This includes petroleum jelly.
7. Check that all electrical equipment in the vicinity of the oxygen is properly grounded (earthed).
8. Avoid using electrical appliances such as hairdryers and razors while oxygen is in use.
9. Make sure you have smoke alarms in your house.
10. Keep the oxygen equipment clean and dust free.
11. Always plug your oxygen concentrator into a grounded electrical outlet. Never use an extension cord or power board.
12. As the oxygen concentrator becomes hot when in use, locate it in a well-ventilated area, away from curtains or drapes.
13. Have your oxygen concentrator inspected and serviced regularly according to the supplier's instructions.
14. Store oxygen cylinders in an upright secure position in a well-ventilated area away from any open flame, heat source or direct sunlight. Do not cover with cloth or plastic.
15. Handle oxygen equipment with care to avoid damaging cylinders.
16. Secure and transport oxygen cylinders correctly. Check with your state or territory department of transport regarding the transport of oxygen in cars as safety standards may vary from state to state.
17. Use the correct pressure gauge and regulator.
18. When a cylinder is almost empty, close the valve and mark the cylinder as empty. Do not store full and empty cylinders together.
19. If you have been prescribed oxygen 24 hours a day you may need a back-up oxygen cylinder. Discuss with your doctor whether this is the case for you.

7. Troubleshooting

Tips on troubleshooting in case if your oxygen concentrator starts to alarm.

- indicators on the top of Oxygen Concentrator show the reading behind alarm.
- if there is a red light something is definitely wrong, and we should shut off the Oxygen Concentrator immediately
- if you get indicator showing low oxygen then we should ensure plugged in directly into your outlet not a extension cord weight heavy duty.
- If still indicator showing low oxygen, then we should use reset button.
- make sure your tubing is not kinked and twisted as it'll block the oxygen passage.

