






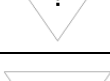











**HUMIDIFLOW™ Installation Manual**  
**Nidek Medical Products, Inc.® Mark5 Nuvo®**  
**Model 500 M5C5**  
**HMK-NN**



## Important Safety Notes

	<b>Warning:</b> Do not open the case of an oxygen concentrator if it is connected to a power supply. There is a serious risk of electric shock.
	<b>Warning:</b> Follow all safety warnings outlined in the documentation provided with each specific oxygen concentrator.
	<b>Warning:</b> The HUMIDIFLOW™ is only to be installed by a trained professional technician.
	<b>Warning:</b> The HUMIDIFLOW™ does not reduce the dangers associated with concentrated oxygen. Observe all necessary precautions when using an oxygen concentrator.
	<b>Caution:</b> Read through all documentation and instructions for each specific oxygen concentrator before installing a HUMIDIFLOW™.
	<b>Caution:</b> Do not attempt to service or open the HUMIDIFLOW™. It is designed to be maintenance-free.
	<b>Caution:</b> It is very important that the filters on the oxygen concentrator be changed with regularly scheduled maintenance. Reduced performance or damage may result from improper maintenance.
	<b>Caution:</b> Do not add water to the HUMIDIFLOW™.
	<b>Caution:</b> The HUMIDIFLOW™ components (i.e. tubing, etc.) should not come into contact with any moving parts (i.e. fans) inside of the concentrator.
	<b>Caution:</b> Do not touch or molest the fibers inside of the HUMIDIFLOW™ module in any way. Doing so could damage the HUMIDIFLOW™.
	<b>Note:</b> Do not modify or move any of the fittings attached to the HUMIDIFLOW™. Each model has been tested in a specific configuration, and modifying it may cause irregular performance.
	<b>Note:</b> The HUMIDIFLOW™ is designed to add water vapor to the outlet oxygen stream. This will cause the output oxygen concentration to read slightly lower or, with some meters, inaccurately. The results are similar to adding a bubble humidifier before measurement. To accurately measure the oxygen output from the concentrator, use Porous Media P/N ID-1406 (In-Line Dryer), or test the oxygen upstream of the HUMIDIFLOW™.
	<b>Note:</b> The output flow rate of the oxygen concentrator should be checked and adjusted as necessary, using a calibrated flow gauge, following HUMIDIFLOW™ installation.



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## Important Safety Notes



**Note:** Incorrect installation of the HUMIDIFLOW™ may invalidate its warranty or cause unsatisfactory results.



**Note:** The exact vertical and horizontal orientation of the HUMIDIFLOW™ module is unimportant and the module will work equally well in any orientation.



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# Installation Instructions

**Nidek Medical Products, Inc.® Mark5 Nuvo® Model 500 M5C5**

**(HMK-NN)**

## **Installation Instructions**

### **Required Tools:**

One #2 Phillips screwdriver

### **Included parts:** (See Picture A)

One HUMIDIFLOW™ (w/ appropriate fittings and tubing pre-installed)

Two Small cable ties

Four Large cable ties

One Piece ½" air tubing with fitting attached

### **Installation Procedure:**

1. Remove the 4 screws on the sides of the unit
2. Remove the 2 screws on the back of the unit.
3. Remove the back cover.
4. Remove the 2 screws located inside the unit that hold the front cover in place, which are located at the top of unit near the screws for the back cover.
5. Remove the front cover.
6. Using a large cable tie attach the HUMIDIFLOW™ module to the black 1 inch tubing in the back of the concentrator. Make sure the HUMIDIFLOW™ is upright by keeping the open port on the top. Ports should be facing to the right side so that the tubing will wrap around the large metal cylinder. Make sure cable tie is tight and will not slide. (See Picture B)
7. From the front of the concentrator disconnect the ½" air tube from outlet port next to the compressor at the bottom (outlet) of the sound chamber. (See Picture C)
8. Feed the ½ inch tube attached to the HUMIDIFLOW™ with right angled fitting through the square opening located directly adjacent to the sound chamber outlet. (See Picture D)
9. Attach the open end of the short section of ½ inch tubing to the outlet port of the sound chamber and secure with a large cable tie. (See Picture E)
10. Feed the open end of the included detached ½ inch air tube through the same square opening so that the tubing goes to the back of the unit and attach the right angle hose barb to the compressor inlet tube. Secure with large cable tie. (See Pictures F & G)
11. Attach the open end of the ½ inch tube from step 10 to the open port on the HUMIDIFLOW™. Secure with large cable tie. (See Picture H)
12. Disconnect ¼ inch tubing from the top of the flow meter. (See Picture I)
13. Connect long ¼ inch tubing coming from the top of the HUMIDIFLOW™ to the top port on the flow meter. Secure with small cable tie. (See Pictures J & K)
14. Connect the ¼ inch tube from step 12 (still connected to the in-line bacteria filter) to the ¼ inch hose barb attached to tubing from the bottom of the HUMIDIFLOW™, and secure with a small cable tie. (See Picture L)
15. **Double check to ensure that none of the lines are pinched or kinked.**



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## Installation Instructions

**Installation Procedure (continued):**

16. Reattach front cover.
17. Reattach back cover.
18. **Test the system for leaks by running the concentrator at its maximum rated flow. Once the maximum flow rate is achieved, briefly and completely block the output oxygen. If the flow gauge drops to zero, there are no leaks in the oxygen tubing.**

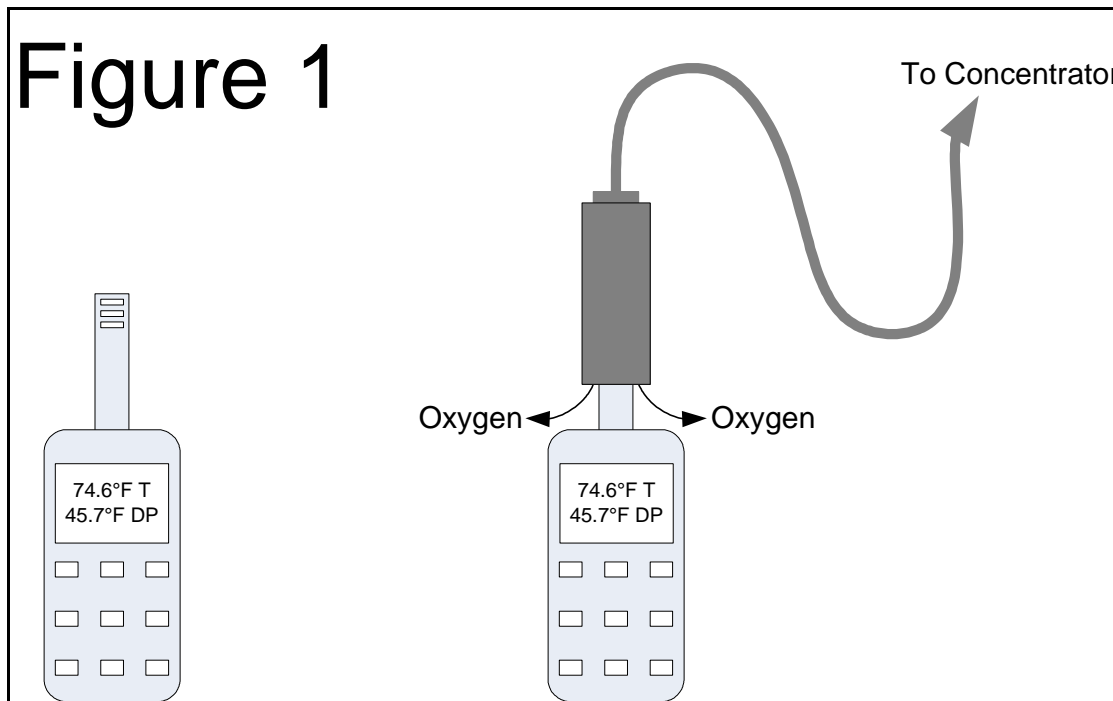


## Optional Performance Verification

Each HUMIDIFLOW™ is put through a series of tests prior to leaving our facility to ensure a high quality product that will perform well for many years. To ensure long life and optimal performance, it is important that the filters in the O<sub>2</sub> concentrator are replaced according to the mfg.'s recommended schedule and in some cases (i.e. cigarette smoking indoors) more often than recommended. Proper and timely replacement of the filters will ensure peak performance of both the HUMIDIFLOW™ and the O<sub>2</sub> concentrator. If you wish to check the performance of the HUMIDIFLOW™, please use the following procedure.

You will need a humidity sensor with a humidity probe that can be enclosed by tubing (see Figure 1). We recommend a humidity sensor that has at least an accuracy of  $\pm 3\%$  of reading, preferably  $\pm 2\%$  of reading or better. This sensor also needs to have the ability to read out moisture level as dew point. This is important because most oxygen concentrators warm the out coming oxygen, and relative humidity (RH) is strongly affected by temperature. Dew point is not affected by changes in temperature. There are many places to buy such a unit. Not all of these units will be able to read out in dew point, so it's important to verify this feature. The unit that is used by the manufacturer for HUMIDIFLOW™ testing is Lufft model C200. It is available through McMaster Carr (<http://www.mcmaster.com/>) as part number 6495T98, but may also be found elsewhere.

**Note:** While Figure 1 shows two humidity sensors, it is best to use only one sensor for both measurements, due to slight disagreement between sensors.





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## Optional Performance Verification

### Testing Instructions:

1. Place the concentrator in a stable environment. (One where the temperature and relative humidity change slowly.)  
**Note:** Use an environment that is at normal environmental relative humidity (at least 30% RH or 40°F dew point). If the environment is very dry, it will be difficult to measure the HUMIDIFLOW™ performance.
2. Make sure that the concentrator has a new inlet filter and a new outlet final filter. If either filter has a high pressure drop, it will reduce the HUMIDIFLOW™ performance.
3. Turn on the concentrator and allow it to warm up. Allow at least 30 minutes if the concentrator has come from a different environment, such as a cold vehicle.
4. Once it has warmed up, set the oxygen flow to 3 liters per minute.
5. Turn on the humidity sensor, place it near the oxygen concentrator, preferably near the air inlet, and allow it to stabilize at the dew point of the room.  
**Note:** Do not breathe near sensor nor have it near a person.
6. Record the room dew point.
7. Enclose the probe of the humidity sensor in tubing from the oxygen concentrator. It may be necessary to install an adapter with larger diameter tubing at the end to fit over the probe. See Figure 1  
**Note:** Make sure that the tubing completely encloses the open portion of the probe. Make sure also that the fit over the probe is loose enough to easily allow the oxygen to exit around the probe.
8. Allow the humidity sensor to stabilize at the dew point of the oxygen.
9. Record the oxygen dew point.
10. If the HUMIDIFLOW™ is working correctly, the dew point of the oxygen should be within 7°F (4°C) of the ambient room dew point.  
**Note:** There are many factors that can affect the performance of the HUMIDIFLOW™ device once installed in an oxygen concentrator. Any pressure drop in a gas stream dries the stream slightly, so inlet filters, restrictive tubing, and sound abatement equipment producing a pressure drop in the air stream will dry the air slightly before entering the HUMIDIFLOW™ and thus reduce the dew point of the outlet oxygen slightly. Pressure drop in the outlet filter or any constricted tubing will reduce the oxygen pressure and thus dry it slightly after leaving the HUMIDIFLOW™. Small oxygen concentrators (3 lpm units) intake less air into the HUMIDIFLOW™ and thus do not humidify the oxygen quite as well as larger 5 and 10 lpm units.



## Frequently Asked Questions

**Q:** *How can I increase the humidity of the output oxygen in a very dry room?*

**A:** The HUMIDIFLOW™ uses the intake room air to humidify the output oxygen. To increase the humidity of the output oxygen, simply place a room air humidifier in the same room as the oxygen concentrator.

**Q:** *How often does the HUMIDIFLOW™ need to be serviced?*

**A:** The HUMIDIFLOW™ is designed to be maintenance-free. Regular maintenance of the oxygen concentrator includes filter cleaning and/or changes, which will maintain the efficiency of the HUMIDIFLOW™. The module itself does not require any additional service.

**Q:** *Can I use an external humidifier bottle on a HUMIDIFLOW™-equipped oxygen concentrator?*

**A:** It is not necessary to use a humidifier bottle in conjunction with a HUMIDIFLOW™. However, a humidifier bottle can be used for additional humidification, if desired.

**Q:** *Do I need to use an in-line water trap with a HUMIDIFLOW™-equipped oxygen concentrator?*

**A:** Since the HUMIDIFLOW™ does not transfer liquid water to the output oxygen, an in-line water trap is not required.

**Q:** *Does the HUMIDIFLOW™ affect the accuracy of the built-in flow gauge on my oxygen concentrator?*

**A:** No, the flow gauge maintains the same level of accuracy that it had without a HUMIDIFLOW™ installed.

**Q:** *Will installing a HUMIDIFLOW™ affect the portable cylinder filling function of my oxygen concentrator?*

**A:** No. The HUMIDIFLOW™ is integrated in such a way that it does not affect the oxygen used for filling a portable cylinder. The oxygen supplied to the filling port remains unhumidified, and cylinder filling is unaffected.

**Q:** *Can I expect to see condensation (rain-out) in the oxygen supply tubing as a result of installing a HUMIDIFLOW™?*

**A:** No. The HUMIDIFLOW™ will never humidify the oxygen stream above the ambient level. Additionally, HUMIDIFLOW™ specifically transfers molecular water to the oxygen stream, so it will not be encumbered by liquid water.



## Trouble Shooting Guide

Problem	Probable Cause	Solution
The unit does not power up after HUMIDIFLOW™ installation.	Power cord not plugged in.	Insert plug into power outlet.
	Circuit breaker tripped.	Refer to oxygen concentrator documentation for instructions on resetting.
The unit does not put out sufficient flow after installation of the HUMIDIFLOW™.	The flow control knob is improperly adjusted.	Adjust flow to prescribed level using flow control knob.
	The oxygen flow is being obstructed.	Check all oxygen lines to ensure they are not kinked or pinched.
	There is a leak in the oxygen tubing or fittings.	Check all fittings for leaks, and re-secure as necessary.
The flow gauge does not drop to zero when testing the unit after installation of the HUMIDIFLOW™.	The in-line oxygen filter is restricting the flow.	Ensure that the in-line oxygen filter is has been changed.
	The output flow is not being completely blocked.	Completely block the oxygen flow to accurately test the system.
The unit alarms or displays a low O <sub>2</sub> warning after installation of the HUMIDIFLOW™.	There is a leak in the oxygen tubing or fittings.	Check all fittings for leaks, and re-secure as necessary.
	The oxygen flow is being obstructed.	Check all oxygen lines to ensure they are not kinked or pinched.
	There is a leak in the oxygen tubing or fittings.	Check all fittings for leaks, and re-secure as necessary.
	The in-line oxygen filter is restricting the flow.	Ensure that the in-line oxygen filter is has been changed.
The output oxygen concentration seems to have dropped significantly after installing the HUMIDIFLOW™.	The intake air is being restricted.	Ensure that the air intake filter is has been changed.
	The measurement device is providing an inaccurate reading because of the humidified oxygen stream.	Ensure that the recommended in-line dryer is in place, drying the oxygen for an accurate measurement. Also verify that the dryer is new or recently regenerated, as a saturated dryer will cause inaccurate readings.
	The oxygen flow is being obstructed.	Check all oxygen lines to ensure they are not kinked or pinched.
	There is a leak in the oxygen tubing or fittings.	Check all fittings for leaks, and re-secure as necessary.