



MODEL 905

BENCHTOP O₂ ANALYZER

OPERATING INSTRUCTIONS

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GENERAL DESCRIPTION

The Quantek Model 905 is a portable oxygen analyzer used for the measurement of residual oxygen in gas-flushed (CAP/MAP) food packages. The Model 905 is powered by AC or an internal 10 pack rechargeable battery **(optional)**, with typically 8 hours of operation before recharging is required.

The Model 905 design has proven itself in hundreds of installations for food and other packaging applications. The sensor is unaffected by high levels of background gases such as nitrogen or carbon dioxide. The Model 905 can also be used for applications where the oxygen level is very high (50 to 100%), without overloading the sensor. It is unaffected by trace hydrocarbons or high levels of CO₂, which can poison other types of sensors.

The Model 905 design incorporates a long-life, heavy duty, proprietary electrochemical, maintenance-free sensor. Typical lifetime is 5 years. The sensor is totally sealed, operates at room temperature and is internally compensated for slight temperature variations. Unlike other sensors, it is not dependent on a controlled flow rate for accuracy, is not heated and is not affected by high levels of CO₂, hydrocarbon or other gases.

Components which make up the Model 905 include the case, oxygen sensor, LCD readout, internal sampling pump, one main circuit board, battery (optional), battery charger module and sampling probe. The sample probe is tipped with a particulate filter and luer fit syringe needle with side-port holes to prevent plugging. Sample is drawn through the probe and tubing and then to the oxygen sensor when the pump is turned on. The pump is electronically timed to draw in the sample required for the analysis, and then turns itself off after the pre-set sampling time, which is adjustable from 1 to 10 seconds. The oxygen concentration is read on the display.

The operating controls and adjustments include power switch, pump switch, span, zero and pump time adjustments.

O2 SPAN: Use this on the back of the instrument to adjust the analyzer to 20.9%. Press the pump button, let the reading stabilize, then adjust to 20.9%. You should do this once a week, or if the instrument's altitude has changed.

O2 ZERO: This should generally not be touched. See the section on checking the zero.

PUMP TIME: Use this to set the pump time. 5 seconds is ideal, but if your package has

limited headspace, you can set it to 3 seconds. Use a longer pump time if the sensor is responding slow.

If you ever need to run the pump for longer than 12 seconds, you can hold the button down. It's unclear why you'd ever want to do this.

90% of all repairs to Model 905 analyzers are due to one of three errors:

1) Sucking liquid into the analyzer (use PTFE filters to prevent this and take care not to place the needle into liquid in your package), or

2) Substituting an incorrect charger or power supply, or

3) Leaving the analyzer out where strong cleaning chemicals are used. Over time this will corrode the circuitry – treat the analyzer as you would a laptop or any other piece of sensitive electronic equipment.



PRECAUTIONS

Follow these guidelines to prevent damage to the unit.

- 1. Do not suck liquids into the unit through the needle. Use the filters***

that are labeled “PTFE” to block liquid intake (such as when sampling a milk package, for example)

2. ****** Do not use any other charger or power supply other than what is supplied with the analyzer ******
3. Turn unit off before plugging the unit into the charger.
4. Do not immerse in water or spray water on the unit.
5. Do not drop the unit.
6. It is best to store the analyzer in the fully charged condition; it is best to turn off the analyzer while charging. Charge the analyzer fully at least once a month to preserve battery life.

OPERATION

1. Insert a particulate filter onto the end of the sample probe and then insert a needle onto the filter.
2. Press the POWER switch to start unit. No warm up is required.
3. Press the PUMP switch. The pump will come on for approximately 4 to 6 seconds and pull room air into the sensor through the syringe needle and filter. Note that the meter reading will decrease slightly when the pump is on. This is normal due to the slight vacuum created in the sensor when the pump is

running. Wait approximately 10-12 seconds for the reading to stabilize. Room air should give a reading of 20.7 to 21.1% oxygen.

4. Pierce the food pack with the syringe needle, preferably through a foam rubber septum (supplied). Depress the PUMP switch and wait for the reading to stabilize (10-12 seconds). Leave the needle in the package until a stable reading has been obtained.



Sampling from a package using the PTFE filter, needle, and foam septa.

NOTE: It is difficult to get accurate readings when piercing the bag directly with the needle (without using the foam septa) because air will frequently leak in around the hole caused by the needle. This will result in inaccurate high readings. This is prevented by first inserting a foam seal pad onto the package surface and piercing the needle through the foam.

BATTERY OPERATION (OPTIONAL)

If your unit includes a battery, and the battery is low, the LOW BATT indicator will be lit, indicating that the battery needs to be re-charged.

The unit will run 10-14 hours before needing recharging. To re-charge the batteries, plug the external charger module into a standard 100-240 Vac outlet and connect the plug from the charger to the jack located on the rear panel side of the 905. A full charge requires 2-4 hours of charging time. Turn the unit off while charging.

Since the instrument will deplete and then recharge frequently, it is best to keep the instrument off when not in use for long periods of time (such as overnight, over weekends, etc).

PUMP TIME

The pump run time can be increased or decreased as needed by adjusting the PUMP TIME potentiometer on the rear of the unit. Be careful not to set the time too high with samples that have limited headspace volume. If the bag appears to be totally evacuated, or you hear the pump laboring after a few seconds of sampling, re-set the pump time to a

smaller value. The analyzer requires a minimum of 15cc (or about 3 seconds) to achieve an accurate reading; however, for absolute best accuracy we recommend a 5 second pump time.

CALIBRATION SETTING

Accurate calibration of the unit can be checked at any time by sampling room air, which should give a reading of 20.9% oxygen, plus or minus 0.4%. If the reading is off, it can be set by adjusting the SPAN potentiometer, located on the rear of the unit, with the adjusting screwdriver supplied with the unit.

ZERO SETTING

The zero setting of the O₂ channel is very stable, and will change little even over a period of several months. Although usually not required, The O₂ ZERO reading can be checked one of two ways:

1) **BEST METHOD** – If a source of pure N₂ is available with an outlet flow, turn it on with a light flow and place the sample probe (with needle attached) straight into the tube from which the flow is generating – but do not create a tight seal. Make sure the nitrogen is flowing at a high rate, so that when you press the pump button, you are not drawing in room air.

We also now include an orange tube for calibration which you can insert into a tube of flowing gas:



Also, make sure that the nitrogen has been flowing for at least 30 seconds to flush out any other air that may have been in the tubing.

Press the PUMP button, drawing in the flow . The zero will read 0.0, plus or minus 0.1% O₂. If the reading is not in this range adjust the O₂ ZERO potentiometer as needed. Several turns will be needed to see any movement in the reading, as the adjustment is not very sensitive. This adjustment should be done carefully because it will affect all readings, and it must be done with N₂ in the sensor.

2) ALTERNATE METHOD If you keep the flow very light, you can flow nitrogen directly into the sample probe. While this is the easiest method to zero the instrument, it is critical that you make a good connection with the tubing.



NOTE ABOUT THE ZERO ADJUSTMENT

This adjustment should be done carefully because it will affect all readings, and it must be done with N_2 (or any other zero gas) in the sensor.

Take note that the “electronic zero” of the sensor and electronics is very stable, with typical variance of less than 0.1% O_2 over a period of 6 months.

COMPLETE SYSTEMS TESTING

Ensuring that the complete unit is working properly requires periodic testing of the unit under controlled conditions. Factors which can affect accuracy include calibration, pump function, electronic functions and leak-tightness of all the parts used for sampling, including the needle, filter, sample probe, tubing, fitting, internal tubing and valve.

A simple, periodic test can determine proper operation. With the needle and filter installed, simply perform the zero test described in the previous paragraph and the unit should read zero.

If there are leaks in any part of the system, the readings can be inaccurate on the high side – or begin drifting upward - because of a leak in any part of the system. If a leak is suspected, perform this simple test: fill a bag with nitrogen and check the zero reading as before with 2-3 pump cycles. Keep the needle in the bag. Next, compress the bag by hand (with the pump off), which will force more sample through the tubing into the sensor. This should yield the same reading as sampling with the pump, if there are no leaks. With this positive pressure, air cannot leak into the system with any leaks which may be present. If the reading goes lower, it indicates a leak somewhere which should be corrected.

NEEDLE/FILTER REPLACEMENT

The needle and filter should be replaced if they get plugged up and impede the flow. Both have standard luer fittings, as does the probe tip, and are simply pressed on with a twist to provide a leak-free fit. A simple test can determine if either is plugged:

- 1) Check to make sure the sample probe is screwed into the instrument tightly. We

installed the new sample probe so it should be making a good seal.

- 2) Turn the instrument on, and press the pump button with no needle or filter.
- 3) Wait for reading to stabilize – adjust O₂ span to 20.9% if needed after about 15-20 seconds.
- 4) Put the last needle and filter you used on the end of the probe.
- 5) Press the pump button (without testing a package) and watch the LCD closely.
- 6) The reading will go down, but what is the minimum that it reaches?
 - a. if the reading goes down to 19-20%, then goes back up to 20.9%, then you probably have **no blockage** in the filter, needle, or probe.
 - b. if the reading goes down to 14-19%, then back up slowly to 20.9%, you have a **blockage** in the filter, needle, or probe.
 - c. if the reading goes down to 10-14%, then you have a **very serious blockage** in the needle, filter, or probe.
- 7) If you discover a blockage, you can replace the needle first, and repeat the test – or you can replace the filter and repeat the test. If you replace the needle and filter, you may want to check the probe for kinks. 99% of the time, you have a blockage in the needle and/or filter.

SAMPLE PROBE ASSEMBLY

If your reading goes down to a low number, then rises back up, the first thing to check is if the sample probe is screwed in tightly.

The probe assembly is a one piece assembly and cannot be taken apart. The tubing used is a very narrow bore inert polymer which extends from the flanged end to the tip of the probe assembly. There is a reinforcing tube on the outside.

The inert composition prevents O₂ adsorption on the internal surface. The internal tubing volume is small to minimize the volume of sample required to flush out the sensor to provide an adequate response time.

The tip is a male luer fitting which will accept any luer-hubbed needle or filter. When screwed into the bulkhead fitting, the captive black screw presses the flanged end of the tubing tightly against a mating piece, also flanged, which connects to the inlet port of the O₂ sensor.

The probe assembly should be replaced if any part of it is cracked, or if liquid or other contaminate is visible inside the tubing. Minor kinks in the tubing are generally not a problem, but severe kinks can impede the sample flow or can develop a crack causing leaks.

SAMPLE PROBE ASSEMBLY REPLACEMENT

To replace, unscrew the black plastic screw from the fitting on the analyzer case. Inspect the interior of the fitting for any dirt or particles, which might cause a bad seal. Screw in the plastic screw for the new probe. The threads are easily stripped, so make sure that the screw is properly aligned before tightening. Turn until finger tight only. Do not use a tool to tighten, because this can strip the threads.

LIQUIDS IN SENSOR OR PROBE

Liquid is usually visible if accidentally sucked into the probe tubing, and it can usually be cleaned and dried without affecting sensor performance by removing, cleaning and drying. If water gets into the sensor, it is recommended that the sensor be flushed first with clean distilled water. This can easily be done by immersing the needle into clean water, in 1 second intervals with air, and running the pump.

After flushing, completely dry the sensor and tubing with a stream of nitrogen. This may take 1-6 hours. Do not allow sample to dry in the sensor. Dry coating is difficult to remove and will affect sensor performance.



CAUTION

If liquid is visible at any time in the probe tubing or probe needle, the probe must be disconnected from the front panel fitting and cleaned and dried. It is much easier to clean at this point before it reaches the sensor.

GENERAL TROUBLESHOOTING

Unit does not power up	Check that the unit is plugged in and the tip of the charger/adaptor is firmly inserted.
Unit reads 1. on the LCD	The oxygen sensor has either failed, has come disconnected inside the analyzer, or in very rare cases, the sensor has become so contaminated that it puts out no voltage.
Unit reads very low % and will not rise, even when pumping in fresh air	The sensor has probably been contaminated with liquids (see end of manual). Examine the probe for evidence of liquid contamination. Unscrew the probe to rule out blockage in the probe. If the reading still does not move, contact Quantek for service.
Unit has no suction	Remove the needle and filter from the end of the probe to rule out clogging; press the pump button and lightly tap your finger on the end of the probe. The sound of the pump should change. If it does not, the most likely cause is that the probe is not securely screwed into the front inlet, or the

	pump has been damaged.
Reading goes to a lower level, then immediately rises to 20.9% (for low oxygen packages)	Air is leaking in from somewhere. The first possibility is around where the needle is puncturing your package. Be sure to use septa and have sufficient headspace in your package – or turn the pump timing down further. The second possibility is that your sample probe is not screwed in tightly enough. The third possibility is a failure of the check valves inside this instrument. This is rare. We can ship you check valves, or you can ship the analyzer back.
Analyzer reads less than 20.9% (10%-18%) after pumping in fresh air and adjusting span	Remove the filter and needle to rule out clogging; if your analyzer is 4+ years old, then the oxygen sensor may be depleted; contact us for replacement sensor or send analyzer back for full testing, sensor replacement, and calibration.

<i>Technical Specifications</i>	
<i>Range:</i>	<i>0.0 to 100% Oxygen</i>
<i>Resolution:</i>	<i>0.1% Oxygen</i>
<i>Sensor:</i>	<i>Electrochemical Cell, proprietary design, 4-5 year life</i>
<i>Sample Pump:</i>	<i>Internal, with adjustable timer</i>
<i>Sampling assembly:</i>	<i>Probe with male luer connection for side-port needle, PTFE tubing with captive insertion screw</i>

<i>Power Supply:</i>	<i>100-240 Vac power/battery charger module; Units without battery have a 12V DC power supply center positive, 2.1 or 2.5mm barrel. If your analyzer is equipped with an internal battery, please contact us for battery and/or charger specs.</i>
<i>Battery Life:</i>	<i>Eight hours before re-charging</i>
<i>Size & Weight:</i>	<i>9 x 4 x 10 in., 9 lbs</i>

OPERATING SUPPLIES

1. 9001 Package of 200 foam seal pads
2. 9002 Package of 1000 foam seal pads
3. 9005 Particulate filter, pkg. of 5
4. 9028 Particulate filter, pkg of 25
5. 9085 Liquid & Particulate Filter, qty 3
5. 9088 Liquid & Particulate Filter, qty 15
5. 9003 Side Port Needles, pkg. of 3
6. 9029 Side Port Needles, pkg. of 15
7. 9067 Sample probe assembly
8. 9012 Charger / Power supply for 905



PRECAUTIONS - REMINDER

1. **Do not suck liquids into the analyzer!**
Use the filters that are labeled "PTFE" to block liquid intake (such as when sampling a milk package, for example)

2. **** Do not use any other charger or power supply other than what is supplied with the analyzer ****

EMERGENCY CLEANING PROCEDURE

This procedure can be used for any Quantek analyzer with an O₂ or CO₂ sensor. It is used as a last resort if you believe you sucked in moisture, juices, or liquids into the sensor(s). It is not guaranteed to work, as the sensor may be permanently damaged, or there may be other problems with the unit.

We always recommend that customers return their analyzers to us for repair, but for customers in an emergency situation, this procedure may clean out the analyzer and return it to 100% functionality.

This procedure will not harm either oxygen or CO₂ sensors. Do not use alcohol or any other solvents; water/soap only.

1) Prepare a mild solution of 1-2 drops detergent or liquid soap, and warm water in a clean container.

NOTE: For best results during steps 2-3, you may want to hold the instrument and rotate it occasionally to ensure that cleaning solution reaches all of the internal parts of the tubing

and sensor in the unit. Leaving it stationary on a flat surface may not work as well.

2) Press the pump switch to activate the pump, and dip the probe tip (without the needle) into the soapy solution for about 1 second at a time, every 3-4 seconds, so that you are alternately sucking in cleaning solution and air. This solution will wash out of the back vent and spray, so you can use a paper towel to prevent a mess, but do not completely block the exhaust vent.

3) Repeat step 2 about 12-14 times, then repeat step 2 another 12-14 times with clean warm water to flush out the soapy solution.

4) For units without a pump, connect a syringe to the vent tube of the analyzer, And draw the solutions through the probe. Do not force liquids through the sensor by connecting the syringe to the inlet. Excess pressure can damage the sensor.

If you have a flow of nitrogen available:

4a) To dry the system, connect a very low pressure (1-2 psig stream) of N₂ to the probe. N₂ works better than room air. Make sure that the flow is very light - blasting air through the sensor at high pressure may damage it.

It may take 1-2 hours to totally dry the system. Before the system is dry, the O₂ reading may read near zero. This is normal, as there is liquid still in the sensor from the cleaning procedure. As the sensor dries out, the O₂ reading will gradually rise and will finally reach around 20.9% with room air.

If you do not have a flow of nitrogen available:

4b) Continually press the pump switch to draw air into the sensors. This may take 1-2 hours.

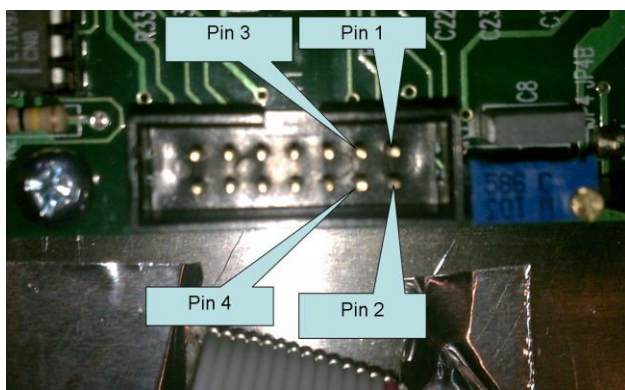
If you have an electrician available, you may use 4c to enable the pump to run continuously

4c) Ensure that the unit is powered off and unplugged. Open the cover of the unit using the four side screws that hold the top cover on.

EASIEST METHOD: Using alligator clips, connect the two posts on the back of the pump switch. This will run the pump continuously.

MORE DIFFICULT METHOD: carefully remove the gray cable from the main circuit board in the unit.

Plug in the unit (not necessary if the unit has an internal battery that is charged).



Short pins 1 and 2 using a conductive screwdriver. You will hear the unit click on and the LCD will now show a reading. You have just turned the unit on.

Short pins 3 and 4 using a shorting pin, jumper, or fine wire. Be careful not to contact the other pins. You will hear the pump turn on. This method will leave the pump running and it will not shut off.

Again, it may take 1-2 hours to totally dry the system. Before the system is dry, the O₂ reading may read near zero - this is normal, as there is liquid still in the sensor from the cleaning procedure. As the sensor dries out, the O₂ reading will gradually rise and will finally reach around 20.9% with room air.

5) Recalibrate the instrument as normal by pressing the pump button and sampling room air, as detailed in the manual.