



MODEL 905V

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Check out our video demonstration here:
<https://bit.ly/2GwA3EH>

GENERAL DESCRIPTION

The Model 905V is an oxygen analyzer designed to measure the oxygen concentration in the headspace of containers such as small vials or bottles. The Model 905V has a specialized, low volume oxygen sensor internal to the analyzer, connected inside to the front panel inlet fitting with narrow bore inert tubing, flanged at the end. A sampling probe assembly connects to the external port of this fitting. Included with the analyzer are specialized connectors, tubing, needles and fittings to allow sampling from small containers or vials.

This unit does not have an internal pump. The sample switch and sampling LED indicator on the front panel are not installed. Vent tubing connects to the exit port of the sensor and extends out from the rear panel sample vent. The unit is powered by standard 100-240 VAC or internal battery (optional).



Before beginning testing with the unit, be sure to follow precautions in this manual regarding liquid contamination in the tubing and sensor.



DO NOT USE ANY OTHER POWER SUPPLY THAN THE ORIGINAL SHIPPED WITH THE ANALYZER.

OPERATION

The operating controls and adjustments for the 905V are as follows:

1. Power switch: located on the front panel., turns unit off and on.
2. LCD readout: on the front panel; displays oxygen concentration from 0.00 to 100.00 percent.
3. COARSE SPAN ADJUSTMENT (BACK): Screwdriver adjustment potentiometer on the rear panel; used to adjust calibration of span, or room air, setting. This span adjusts the oxygen reading within a roughly 13% range (roughly 17% to 30% room air oxygen upon manufacture).
4. FINE SPAN (RIGHT): Dial adjuster located on the front of the analyzer; used for rapid, fine adjustment of the span. The range of this adjuster is approximately 2% (20-22% oxygen upon manufacture).
4. ZERO ADJUSTMENT (BACK): Screwdriver adjustment potentiometer on the rear panel to adjust calibration of zero setting. Please see the “zero calibration” section; adjusting the zero will have effect on all subsequent readings and should be done carefully.

4. Low Batt indicator on front panel: lights if internal battery voltage drops below 10.5 volts DC. (Installed on battery powered units only.)
5. Fuse holder on rear panel; holds 2 amp fuse (and spare fuse) for circuit protection. If the fuse blows, carefully pull out the plastic holder to install the second fuse and review your power situation.
6. Charger plug on rear panel; connection for battery charger/power module, accepts center positive 12V DC charger or power supply. **For battery equipped analyzers, do not use any charger other than the trickle charger supplied. The battery is a 10 pack AA NiMH pack. Substituting a different charger will void the warranty.**
7. Front panel black delrin fitting, for sample probe connection (not labeled).

SENSOR FLOW CONNECTIONS

The oxygen sensor is mounted directly behind the black delrin front panel fitting to which the sample probe is attached. The sensor has two small diameter tubes for sample inlet and outlet connections. A short sleeve of tygon tubing, one inch in length, 1/16 ID, slips onto both tubes, and narrow-bore inert tubing, 1/32 ID, slips into these sleeves to provide a minimum volume flow path for the sample. One tube,

flanged at the end, connects to the interior part of the black delrin fitting. The other tube connects to a piece of tygon tubing which extends out through the rear port labeled sample vent. This tubing assembly has a length of tygon attached, a 3 way plastic fitting with an open vent, and a blunt point luer needle which accepts the 5 cc plastic syringe.



CAUTION: Do not force liquid or air under high pressure, either with the gas-tight syringe, or from a gas cylinder, through the inlet probe or the outlet tubing. High pressures will damage the sensor.

To force air through the sensor for calibration checks, use the 1 CC or 5 CC syringe connected to the outlet tubing and operate the plunger in and out – slowly-- while blocking off the open vent on the 3 way fitting.

OPERATIONAL CHECK

Plug the power module into an AC outlet and insert the plug into the jack on the back of the unit. Depress the power switch to turn the unit on. Allow the analyzer approximately 30 seconds to warm up and equilibrate.

The internal oxygen sensor has built-in temperature compensation. However, the sensor may show some transient

characteristics if the ambient temperature changes too quickly. Such temporary drift disappears after the sensor's temperature reaches equilibrium with the ambient temperature. Therefore, if moving the analyzer between locations with a wide degree of temperature difference ($>15^{\circ}\text{C}$), it is advisable to allow the analyzer's sensor to equilibrate for 10-15 minutes.

INITIAL CALIBRATION

Calibration of the analyzer is done by checking and adjusting as required the SPAN settings. Follow these steps:

- 1) provide a fresh sample of room air to the sensor by attaching a 5 cc plastic, gas-tight syringe to the orange luer connector attached to the rear vent.
- 2) Block off the open vent and slowly pull the syringe plunger out, which will suck air in through the probe needle. This needle is a very narrow bore, so the air will be sucked in slowly. If the needle is blocked, you may see the reading decrease substantially – you are creating a vacuum. Either remove the needle or replace it with a new one.
- 3) If the reading on the LCD is not 20.93%, adjust the SPAN potentiometer on the front of the instrument until the reading shows 20.93%. The oxygen content of

room air is a constant 20.93%, and can be used as a standard to set the calibration of the analyzer.

NOTE: If the unit is idle for a time the O₂ reading will gradually drift downward to about 20. This is normal, as the sensor requires some small flow of air over the electrode to create a reading. Introduce fresh room air before attempting to calibrate.

NOTE: Our analyzers are manufactured and calibrated at 510 ft (or about 150m) above sea level. Calibration upon delivery will be required if at a significantly different elevation.

OPERATION/VIAL TESTING

To test samples of vials or bottles, the sample must have a septum cap, aluminum seal or thin plastic which can be punctured by a needle. If the sample has a plastic cap, it may be necessary to partially drill out a portion of the plastic to enable puncturing with the syringe needle. Samples may be tested by two different methods with the 905V:

- 1) water injection to force sample out of the vial
- 2) syringe suction at the sample vent to draw sample out of the vial.

WATER INJECTION METHOD

This method is more complicated but provides the best accuracy for very small samples, such as 2 ml vials with limited headspace.

A video demonstration is available: type www.quantekinstrument.com into your web browser, then add this to the end of the address. This is case sensitive:

[/905Vdemo/905Vvideo.htm](http://www.quantekinstrument.com/905Vdemo/905Vvideo.htm)

username: oxygen
password: 905vdemo

Attach a straight bore 21 or 22G needle to the 1 cc plastic syringe. Fill this syringe with water, operating the plunger several times to remove any air in the syringe. Tap the syringe to remove any air bubbles. Puncture the vial with the syringe needle, making sure that the tip of the needle is going to be below the probe needle, or preferably extending into the sample in the vial. Next, puncture the needle of the sample probe, attached to the front panel of the unit, through the septum of the vial so that the needle is in the headspace of the vial but not into the liquid. The tip of this needle should be well above the syringe needle to prevent liquid from getting on the tip. Depress the syringe plunger to inject water into the vial, which will force the headspace gas out through the probe needle, tubing and into the sensor.

One cc of water is typically used, but good results can be obtained with as little as 0.5 cc. Wait for about 30 seconds for the reading to stabilize and record the reading.



NOTE: Avoid getting liquid on the probe needle, because it can be forced into the sensor. If the needle at any time is accidentally pushed into the liquid, or if it gets wet from the injection of water with the syringe, it must be removed and cleaned and dried before re-using. Rinse the needle out with distilled water and dry it with nitrogen.

⚠️ 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. Liquids can be detrimental to the sensor.

Because the sensor is mounted upside down, very small amounts of liquid droplets will likely pass through the sensor without touching the membrane, which allows O₂ to diffuse into the sensor. Sensor operation is only affected if liquid coats the membrane. This results in readings much lower than normal, and often the sensor will not respond at all until it is cleaned and dried.

Liquid is usually visible if accidentally forced into the probe tubing, and it can usually be cleaned and dried without affecting sensor performance by removing, cleaning and drying.

IF WATER GETS IN THE SENSOR

It is recommended that the sensor be flushed first with clean distilled water as soon as possible. This can easily be done with a plastic syringe connected to the vent tubing, and the probe tip extending into the clean water. Pull the plunger out, which will suck water into the tubing and sensor.



CAUTION: WHEN CONDUCTING THIS CLEANING, DO NOT FILL THE SYRINGE WITH LIQUID AND FORCE THE CONTENTS INTO THE SENSOR AT HIGH PRESSURE. THE SENSOR CAN BE DAMAGED.

After flushing, completely dry the sensor and tubing with a stream of nitrogen. This may take 1-8 hours depending on how contaminated the

sensor is. Do not allow sample to dry in the sensor. Dry coating is difficult to remove and will affect sensor performance.

SYRINGE SUCTION METHOD

The sample vial is punctured as above with the probe needle. The water injection is not used. Instead, connect the 1 cc or 5 cc syringe with the plunger depressed, to the vent tubing at the rear panel. Any amount of headspace sample may be withdrawn from the vial by drawing the syringe plunger back to the appropriate mark while blocking off the open vent. Typically one cc is sufficient. If the vial is small, this method will create a partial vacuum in the vial as sample gas is drawn out.

Keep in mind that this method does reduce the sample pressure, which will cause the O₂ readings to be lower. This effect may be significant for small vials, 1 to 5 cc, which is why the water injection method is better for them. For 50 to 100 cc vials or other containers, withdrawing 1-2 cc is not significant.

SAMPLE PROBE ASSEMBLY

The probe assembly is a one piece assembly with a removable tip and needle. The tubing used is a very narrow bore inert polymer which is flanged on both ends, held in place by the

black plastic screw fitting, to the back of the tip of the probe assembly. 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 special screw-in male fitting with a low volume, narrow bore 25 ga needle with a teflon seat. When tightened, this provides a minimum volume, leak tight seal for the needle.

NOTE: if removing or replacing this needle, be sure to install the loose washers which fit between the teflon seat and the internal seal inside the probe piece.

When screwed into the bulkhead fitting, the captive black screw presses the flanged end tightly against a mating piece. This internal mating piece, also flanged, then connects to the O₂ sensor.

The probe assembly should be replaced if any part of it is cracked. It should be removed and cleaned 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. 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.

ZERO CHECK

The electronic zero setting is very stable and rarely requires adjustment.

To check the zero reading, connect a flow of nitrogen at low pressure and low flow, less than 2 psig, to the outlet tubing.

If it reads outside the range of .00% to .05%, then adjust the ZERO potentiometer on the rear panel of the unit as needed until the LCD readout displays 00.03%, with N₂ in the sensor.



CAUTION: HIGH PRESSURE GAS CAN DAMAGE THE INTERNAL PART OF THE SENSOR. Flow the nitrogen through the sensor for about 4-5 minutes until the reading stabilizes. Adjust if required.

BATTERY OPERATION AND RE-CHARGING

If your analyzer has a battery installed, the LOW BATT indicator light will come on indicating that the battery needs to be re-charged. The 905V will run 12-14 hours before

needing recharging. To re-charge the battery, plug the external charger module into a standard AC outlet and connect the male plug from the charger to the jack located at the back panel. NOTE: turn unit off for best results charging. However, if the LOW BATT light comes on, you may continue to use the analyzer if you wish.

CHARGER LED:

Dark – not plugged into AC outlet, or not seeing battery pack

Blinking green – sensing pack, delivering charge

Solid green – charge complete, or safety shutoff timer has turned charger off – whichever comes first.

PRESERVING THE BATTERY (if installed)

For best results:

- 1) Charge the battery when the analyzer is off.
- 2) Charge the analyzer fully every four weeks.
- 3) A 95% charge requires 2-3 hours of charging time. If the battery is low, the analyzer can be operated with the charger plugged in, but it may first require charge with the unit

turned off before it will operate. The battery is a 10 pack of AA NiMH, with high temp shutoff protection and 10V low cutoff.

The low V cutoff protects the batteries from draining too low – therefore, even if the pack has 9V left, testing the battery leads with a test meter will read a very low garbage voltage, such as 1V.

Please note that since the battery charger “looks” for a battery pack, even a defective one, the analyzer will not operate if the pack is removed completely. If, for some reason, you want to remove the battery pack and operate the unit, you will need to acquire a 12V DC power supply, center positive, 2.5mm, with 1.0A available current draw.

THE FUSE HOLDER is located on the rear panel. It contains the active fuse in the center position and a spare in the rear position. To access the fuse, squeeze the top and bottom of the fuse holder and pull out. The fuse is a 2A fuse.

ANALOG OUTPUT (optional)

If your analyzer has an analog output on the back, the output will generally be 0-5Vdc. Please refer to your calibration certificate for exact values.

Also, please note that performing calibration or any other adjustments to the rear span, or front span, will affect the analog output.

Reminder: before performing calibration, it is advised that you introduce a sample of fresh room air into the analyzer through the back exhaust. If left to sit, the oxygen reading may drift down to ~20%. This is normal. The sensor operates best with a low flow or fresh room air sample.

Technical Specifications

Sensor Type:	Proprietary Electrochemical
Sensor Life:	Typically four to five years
Range:	0 to 100% O ₂
Accuracy:	+/- 1% of concentration O ₂
Sensitivity:	0.01% O ₂
Calibration Controls:	Potentiometer adjustment for SPAN and ZERO.
O₂ Span Calibration:	Set as required with room air to 20.9% O ₂ , or as needed with fine SPAN
O₂ Zero Calibration:	Not normally required; rear panel adjustment, set with nitrogen, ~ 6 months.
Power:	115/240 Vac, 60/50 Hz, Input to wall module for continuous operation and battery charging.
Battery (optional) :	Sealed, 10 pack AA NiMH battery pack, 2000mAH per cell, with 10V low voltage cutoff and thermal shutoff protection.
Battery Life:	10-12 hours before recharging.
Dimensions:	9.8W x 4H x 10L in. (249 x 102 x 254 mm)

Weight: 9 lb. (4 Kg)
Warranty: One year parts and labor,
except probe and needles.

Shipping and Mailing Address:

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MODEL 905V OPERATING SUPPLIES

1. 9003 needles, SS, pkg of 5, 21G straight bore
2. 9012 Power module/battery charger
3. 9031 Oxygen sensor
4. 9051 Accessories kit, consisting of:
(2) Tygon connector, 1 in. by 1/16 ID;
(1) three way vent connector; (1) 5 cc syringe; (3) straight bore needles
(1) fuse (1) one cc syringe