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Service Manual **Oxysavrr** **Conserving Regulator**

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I. TOOLS, TEST EQUIPMENT AND SERVICE MATERIAL

A. TOOLS

Screwdriver - (1/4 in. (6 mm) flat blade
Screwdriver-No.2 Phillips
Open end wrenches – 7/16 in, 9/16 in, 5/8 in, 11/16 in
Adjustable wrench-10 in (25) cm
Hex key wrench-1/16 in
Internal retaining ring pliers
Punch-1/8 in (3mm)
Standard paper clip
Hammer
C-Clamp-3 in (8cm)
Dental Pick (or similar pointed instrument)

B. TEST EQUIPMENT

- Tester sensitivity **Magnehelic** .50 – 0 - .50 inches of water
- Flow test **Liter Meter** 0-4 lpm
- Test **pressure gauge** with an accuracy of + or – 2% if reading @ 70 degrees F (21 degrees C) and 14.7 psi
- Tester for stem and shuttle leaking
- Cycle tester for Oxysavrr

Test pressure gauge with a range of 0-100 psi (0-690 kPa) and accuracy in according to ASME 40.1-1998, Grade “B”, permissible error)+/-% of span):

- lower ¼ of scale (0-25 psig) = +/- 3%;
- middle ½ of scale (25-75 psig) = +/-2%;
- upper ¼ of scale (75-100 psig) = +/- 3%.

Leak detector – Nupro “Snoop” or equivalent (oxygen compatible)

C. SERVICE MATERIALS

Krytox 240 AC Fluorinated Grease (DuPont)
Teflon tape – ¼ in (6mm)
Isopropyl alcohol
Cloth – lint free
Oxygen tubing – ¼ in (6mm) I.D.
Service Instructions

II. SPECIFICATIONS and THEORY OF OPERATION

The FLOTEC Oxysavrr™ is an oxygen conserving module, which provides intermittent flow by sensing inspiration and exhalation during the user’s respiratory cycle. It is simply a 2 position, 2 way valve, which allows flow at the beginning of the inhalation and stops flow as exhalation begins. The module fits between the body and flowmeter of FLOTEC’s Ingage Line series regulator or RV regulator. Only factory installation is authorized. The device is actuated by the negative or positive pressure produced by the user’s breathing, acting upon a diaphragm which shifts the flow valve from the open to the closed position. FLOTEC’s double lumen hose and cannula is required for reliable operation of the Oxysavrr™. If the fittings on both hoses are alike, then either hose may be connected to either hose barb on the Oxysavrr™ regulator. If one hose fitting is smaller than the other, then the smaller fitting goes on the diagonal hose barb located on the Oxysavrr™ module. The larger fitting goes on the outlet of the flowmeter module. Only qualified and authorized professional caregivers may prescribe the use of the Oxysavrr™ for use by patients. An analysis of the patient’s breathing patterns must be done to insure that tidal volume and sensor pressures are adequate to insure reliable operation of the device. **FLOTEC products contain no latex or latex byproducts.**

Regulator Inlet Pressure: 250-3000 PSI
Outlet Pressure: Nominal 20 PSI
Flow Range: 2 LPM
Inlet Configuration: CGA 870 Yoke or CGA 540 Nut & Nipple
Outlet Configuration: Hose Barb or DISS 1240 fitting
Replacement Cannula: CN 104 (CN204) AND CN106 (CN206 for DISS Fitting outlets)

Caution: Federal law restricts this device to sales by or on the prescription order of a physician.

Device is provided clean non-sterile

This device is only intended to be used with **FLOTEC** regulators, flowmeters and double lumen cannula

PREVENTIVE MAINTENANCE: Oxysavrr™ regulators should be tested periodically to insure proper performance. The frequency of testing should be established according to usage, but it should be performed at least every six months to evaluate for damage, contamination, wear and performance. Do not disassemble Oxysavrr™ regulators. Only the FLOTEC staff is qualified to clean internally or make repairs.

LEAK TEST: Attach the regulator to an appropriate cylinder, plug all outlets, turn the flow selector to “OFF” and slowly open the cylinder valve. Do not immerse in water. Apply an oxygen compatible leak test solution to all outlets, fittings, windows, and connections. Tighten fittings as required to eliminate all external leaks. **DO NOT** overtighten threaded connections. Replace yoke o-ring if required.

WARNING: Never install a regulator to a post-type valve with more than one o-ring between the valve and the regulator inlet. Before attaching the regulator to the post valve, verify that the valve is not already equipped with a yoke washer.

III. SAFETY WARNINGS:

1. The use of FLOTEC Oxysavrr™ oxygen regulators for gases other than compressed oxygen of up to 3000 psi is expressly prohibited by FLOTEC and the user must assume all liabilities.
2. Use no oil or grease.
3. Never administer oxidizing gases when smoking or when near an open flame.
4. Never use oxygen from a cylinder without reducing the pressure through a suitable regulator intended for that gas.
5. Make sure that the threaded fittings on regulators or the indexing pins on yokes are properly mated for the gas intended. Never attempt to force an incompatible connection.
6. Never permit compressed oxygen to enter a regulator suddenly. Always open the cylinder valve slowly.
7. Fully open the cylinder valve when a regulator is attached and in use.
8. Never leave a cylinder valve open with regulator attached when regulator is not in use.
9. Before a regulator is removed from a cylinder, fully close the cylinder valve and release all gas from the regulator.

10. Never interchange regulators, hoses, or other equipment with similar equipment intended for use with other gases. Pressure regulators and related fittings should never be handled with oily or greasy hands or gloves. Never hold hand over the outlet(s) to test for the presence of pressure.
11. Never use oxygen as a pressure medium to purge obstructed pipelines or equipment, to operate pneumatic tools, or to build up pressure in any tanks.
12. Do not stand in front of a regulator outlet when opening the cylinder valve in case foreign particles are present which could cause a hazardous malfunction of the regulator.
13. The Oxysavrr™ therapy is not intended for critical treatment. The application of the regulator should be made in strict accordance with the prescription and instructions of a physician. The Oxysavrr™ is not intended for patients that are mouth breathers, or have low tidal volume or chronically congested nasal passages or are subject to fainting spells & other high-risk conditions.
14. Secure cylinders to wall, stand, or cart in accordance with local fire codes.
15. The regulator is equipped with an internal safety relief valve, which is designed to protect the regulator. Downstream equipment used in conjunction with the regulator should be equipped with suitable safety valves to prevent overpressurization and damage.
16. Oxygen must never be allowed to contact oil, grease or other petroleum-based substances. Therefore, do not use oil or grease on oxygen regulators, cylinders, valves or other related equipment. Do not use or store oxygen equipment near excessive heat (>125 F or 51.5 C) or open flame.
17. CAUTION: Do not use organic-based threaded sealants on any portion of the regulator. Use only Teflon threaded-sealing tape or oxygen services compound.

Installation to Post Valve

Attach regulator/conservar to post valve.

Do not use a tool to tighten the Tee handle or Dome handle. If leakage occurs inspect and, if necessary, replace the yoke washer or O-ring.

Attach Flotec's dual lumen cannula to (1) hose barb on the silver conservar (2) hose barb or Diss fitting on the flow meter portion of the regulator.

Turn cylinder to on position and flow meter to desired flow to initialize cycling procedures.

Place cannula in normal breathing position and breathe or inhale as deeply as possible for several inspirations to properly initialize cycle. Upon completion of cycling inspirations resume normal breathing pattern for proper function.

Trouble Shooting

Conservar runs continuously

Exhale as deeply as possible through cannula and this will reset the diaphragm to the off position.

The Flotec Oxysavrr has a pilot flow of 1/16 LPM which can be detected only during exhalation. During inhalation, the flow selected will flow from the cannula.

Installation to the cylinder

Attach regulator/conservar to the cylinder.

Do not use a tool to tighten the Tee handle or Dome handle. If leakage occurs inspect and, if necessary, replace the yoke washer or O-ring.

Attach Flotec's dual lumen cannula to (1) hose barb on the silver conservar and (2) hose barb or DISS-1240 fitting on the flow meter portion of the regulator. Flotec's dual lumen cannula must be used and both connectors must be attached

Turn cylinder to on position and flow meter to the 2 LPM position.

Place cannula in normal breathing position and breathe or inhale as deeply as possible for several inspirations to properly initialize cycle. Upon completion of cycling inspirations adjust Flowmeter to the desired flow and resume normal breathing pattern for proper function.

Trouble Shooting:

Conservar runs continuously:

Turn cylinder to on position and flow meter to the 2 LPM position.

Place cannula in normal breathing position and breathe or inhale as deeply as possible for several inspirations to properly initialize cycle.

The Flotec Oxysavrr has a normal pilot flow of 1/16 LPM which can be detected only by submerging the nasal end of the cannula in water. During inhalation, the flow selected will flow from the cannula. During exhalation, the flow of 1/16 LPM will flow from the cannula.

Storage Temperature: -40 degrees F to 140 degrees F

Operating Temperature: -20 degrees F to 150 degrees F

Oxysavrr materials: Anodized Aluminum, Teflon, Neoprene 50 DURO, Silicone, 304 Stainless Steel

Filtration: Filter Disk #XT57 Media, 10 micron ABC, S.S.

Supply Pressure Range: 250 to 3000 psi

Operating Pressure: Outlet- 20 psi

Inlet Connections: Any CGA inlet connection is available for specific gases and most International applications are available upon request)

Dimensions: Variable depending on type and style specified

Weight: Variable depending on type and style specified

Indicators: Cylinder Contents, Medical Gas Flow Rate

IV. DEFINITION OF STATEMENTS

Statements in this manual preceded by the following words are of special significance.

WARNING means there is the possibility of injury or death to you or others.

CAUTION means there is the possibility of damage to the unit or other property.

NOTE indicates points of particular interest for more efficient and convenient operation.

Always disassemble, inspect, clean and repair regulator components in accordance with these instructions. Be aware of all the potential hazards associated with handling and using high-pressure gas equipment. Also, be aware that the possibility of fire exists when the combination of a combustible material, a source of ignition and oxygen is present (Called the Fire Triangle).

WARNING Replacement of parts on high-pressure regulators with Oxysavrr should be made only by qualified personnel familiar with their operation. Do not remove or install parts with the regulator installed on a cylinder. Use only the proper repair tools and parts. Always wear eye protection when servicing high-pressure regulators.

WARNING Contaminants or hydrocarbons may, in the presence of an ignition source and oxygen may combine and burn violently. Never permit oil, grease or other combustible substances to come in contact with oxygen cylinders, regulator parts or repair tools. Provide a clean; oil free surface on which to place disassembled regulator parts.

WARNING Always open high-pressure oxygen cylinder valves **SLOWLY**. This should always be done in order to allow the heat of gas compression to dissipate. Always verify that the oxygen cylinder valve is fully closed (clockwise) before disconnecting the regulator from the cylinder.

WARNING Do not obstruct the vent holes in the body of the regulator. These holes must be open to atmosphere for proper regulator operation.

V. PRODUCT CLASSIFICATION DATABASE

Device-	Conserver, Oxygen
Device Description-	Noncontinuous ventilator (IPPB)
Medical Specialty	Anesthesiology
Product Code	NFB
Regulation Number	FDA #868.5905
Device Class	2
GMP Exempt?	No
510(k) Exempt?	No

VI. INSTALLATION INSTRUCTIONS

See Insert Instructions provided with each Oxysavrr.

VII. SERVICE AND REPAIR

NOTE Always perform the Oxysavrr test procedures in this manual before placing a repaired regulator back in service.

NOTE Refer to the Parts List and Parts Illustration for identification of parts referenced with bold numbers.

VII-A. CLEANING, LUBRICATION AND SEALING

Clean metal parts of the **Oxysavrr** with isopropyl alcohol and thoroughly blow dry with dry, oil free compressed gas. Use a mild solution of soap and water to clean plastic parts. Use a clean lint free cloth with isopropyl alcohol to clean internal parts, being certain to remove any residual fibers.

VII-B .Preparation parts of the Oxysavrr for Assembly

1. Sensor Body (010-6215-001)

- a) Press hose barb press fit (810-6494-N01) into Sensor Body (810-6700-001), using hose barb fixture (Flotec #0087) and big “Dake Arbor” press.
- b) Purchasing will then send it off to be reworked & anodized.

2. Sensor Body Assy (010-6215-012)

- a) Rinse back-up ring (810-6813-001) with alcohol, then in, distilled water and dry it.
- b) Check opening hole of the hose barb press fit after reworked.

3. Vent Body Assy (010-6230-012)

- a) Rinse back-up ring(810-6813-001) in alcohol, distilled water and dry it.
- b) Install **10 micron filter disk** (810-6809-001) into filter hole of the Vent Body (810-6699-012) and press back-up ring snugly against filter. Visually inspect each one; use big “Dake Arbor”hand press.
- c) Install o-ring neoprene 70 DURO (210-6022-022).
- c) Rinse Vent Body Assy after installing 10 micron filter, with alcohol and dry it under lamp.

4. Diaphragm seal (810-6704-001)

- a) Check both surfaces of the diaphragm seal for any damages
- b) Clean diaphragm seal with alcohol, soap water, regular water and dry it under lamp.

5. Stem (810-6701-00X)

Matched set (stem & shuttle must be kept together at all time (for checking, cleaning, rinsing, etc)

- a) Check all holes and grooves to use 6X Utility Magnifier or **Bore scope**– for outside and Bore scope – for inside. It should be free of any particle contaminants.
- b) If needed, deburr cross holes in bore of stem dia .078 to use chucking reamer 5/64” M-42 Cobalt S.S.
- c) Clean Stem with Concentrated Cleaning Solution “Micro-90”. It should be diluted with distill water before use. Basic cleaning solution of 1-2% “Micro-90” (1/2 Gallon distilled water and 37 ml “Micro-90”).To use of Ultrasonic Cleaning System(model T21D). Required cleaning time is approximately 25 min (2 times per 12 min each).
- d) To rinse Stem with distill water to use another Ultrasonic Cleaning System (model is same), rinsing time is approximately 6 min.
Then to rinse with warm regular water (temperature should be appr.90-100F) during 5 min; finally, to rinse with distill water during 5 min. To dry stem under lamp appr. 15 min.
- e) Check again all holes and grooves.It should be free of any particle contaminants.
- f) Keep Stem and Shuttle together in small plastic bag.

6. Shuttle (810-6702-001)

Matched set (Stem & Shuttle) must be kept together at all time (checking, cleaning, rinsing, e.t.c.)

- a) Check hole and groove dia .280 to use 6X Magnifier or **Borescope**. It should be free of any particle contaminants.
- b) Cleaning and rinsing is exactly same as for stem (see above).

7. Matched stem & shuttle

- a) Check matched Stem & Shuttle for leaking to use “Oxysavrr leak tester” (Flotec #0085)
- b) Adjust the tester regulator to 50 psi at the tester inlet.
- c) Install matched set (Stem & Shuttle) into tester. “Torx” end of the Stem should be above. Shuttle should be in off-position (grooved end up).
- d) The total leakage of both outlets combined must be less than 325 cc/min (scale 61 FL111 Omega Rotameter) and more than 80 cc/min (scale 23 FL111).

8. Piston Assy (010-6206-0S1)

- a) Clean back-up ring (810-6813-001) with alcohol, soap water, distill water and dry it under lamp.
- b) Install **0.75 micron** filter disk (810-6809-011) into hole dia .502 of the brass piston (810-6621-S11) and press back-up ring snugly against filter visually inspect each one; used big “Dake Arbor” hand press.
- c) Clean piston after installing 0.75 micron filter, with alcohol and distill water, dry it under lamp.
- d) Install seal orifice (810-6236-001), o-rings silicone 70 DURO (210-6028-006 and 210-6028-019).

9. Piston/ Manifold Assy (PRS-XX)

- a) Clean brass Manifold Assy(010-6207-001); spring (810-6496-001), shims (810- 6506-001) with alcohol and soap water, regular water and dry it under lamp.
- b) Build all parts with piston Assy (010-6206-0S1).
- c) Install Piston/ Manifold Assy into yoke- body or swivel body of D-Line , e.t.c.

VII-C Assembly of the Oxysavrr

- a) D-Line Regulator (DX8XX-XXXXX,etc.) or Yoke Regulator (RX8XX-XXXXX, etc) should be tested for pressure & flow and ready for Assembly. **Do not torque it.**
- b) To join together Vent Body Assy (010-6230-012) with D-Line swivel yoke-body (DX8XX,etc) or Yoke-Regulators Body Assy (RX8XX, etc.).We can use a little krytox. The torque required 15 ft/lb.

Install diaphragm on the smooth surface of the shuttle into special groove.

At the same time, the metal diaphragm disk has to reference, as usual, to short part of the shuttle. Install stem into joined shuttle w/diaphragm seal.

“Torx” end of the stem should be above and shuttle should be grooved up. Try to rotate shuttle w/ diaphragm around the stem. It has to be easy to rotate each other.

c) To connect matched set (stem & shuttle) with diaphragm seal to torqued Vent Body ASSY.

The torque required 12 in/lb. The edges of the diaphragm seal lie into round groove of

the vent body Assy. At the same time, metal diaphragm disk should be reference, as usual, up.

d) To join together FM Body Assy (XXXXX) and Sensor body Assy (010-6215-012).

We can use a little krytox. **Do not torque FM Assy & Sensor body Assy right now.**

e) We should temporary connect FM w/ Sensor Body together with torqued Vent Body

in position when flow window of the FM (LPM) will be 10 degree before pressure

window (PSI) of the Swivel Body. To mark both Vent & Sensor bodies with pencil.

f) Remove FM Body Assy from Sensor body Assy.

g) Screw Sensor Body Assy together with torqued Vent Body Assy in according marks. The torque has to be approximately 30 in/lb.

h) To install FM Body again and torque it for 15 ft/in.

VIII. Test Oxysavrr's sensitivity

a) Install D-Line or Yoke regulator with Oxysavrr (DR8XX-S-XXXXX) on the Oxygen tank. Pressure for inlet should be 1250 PSI. Flow- 2 LPM.

b) Connect the cannula (Flotec CN107) to Magnehelic (0.5 -0 – 0.5 inches of water) and rotameter (0-4 LPM), and Flotec's device (included: 3-way valve; Statvac Aspirator; adjust valve; and two PR's : one- 0-60 psi and second 0-5 psi).

c) Connect device to low pressure system, adjust first PR for 3-5 psi and second for 1.0-1.5 psi.

c) Statvac Aspirator should be joint with Sensor Body's hose barb and rotameter (0-4LPM)- with FM's hose barb.

d) Turn 3-way valve in position "Close", at the same time Magnehelic should indicate "0"; when 3-way valve will be turn in pos. to Statvac Aspirator (this is same inhale)-

Magnehelic has to indicate from .02 to 0.10 inches of water (right side from "0").

At the same time rotameter should indicate 2.0 LPM.

When 3-way valve will be turn in pos. 180 degree from Aspirator (this is same exhale)- Magnehelic has to indicate from .02 to .10 inches of water (left side

From "0"). At the same time rotameter should be indicate also 2 LPM.

IX. REPLACEMENT PARTS LIST FOR DR8xx-S-xxxxxxx AND DR5xx-S-xxxxxxx

DESCRIPTION	FLOTEC PART #
SENSOR BODY ASSY	010-6215-012
VENT BODY ASSY	010-6230-012
DIAPHRAGM SEAL	810-6704-001
MATCHED STEM AND SHUTTLE	010-6226-003
PANEL NUT	810-6741-001
DOME HANDLE	DH209
T-HANDLE	114-6316-117
BRASS THREAD INSERT (new)	810-6039-003
THREAD INSERT HELICOIL (old)	810-6428-001
FILTER	810-6033-021
O-RING NEOPRENE	810-6737-301
SPRING	151-0001-001
PISTON BRASS	810-6621-112