FLOTEC INC

7625 West New York Street
Indianapolis, IN 46214-4911
317-273-6960
(Fax) 317-273-6979

E-mail: flotec@floteco2.com
Website: http://www.floteco2.com

Service Manual

Swedish Standard Institute
"Svensk STD SS 367615
Annex "E1" (Oxygen)
Pressure Regulator

TABLE OF CONTENTS

I. TOOLS, TEST EQUIPMENT AND SERVICE MATERIAL

A. TOOLS

Open end wrenches – 7/16 in, 9/16 in, 5/8 in, 11/16 in
Adjustable wrench-10 in (25) cm
Hex key wrench-1/4 in
Strap wrench
Socket wrench 7/16 in

B. TEST EQUIPMENT

Pin-Indexed Yoke Assy, CGA 870, Oxygen; ¼" Male
Adaptor with Male W21.80 x 1/14 mm THD
Test flowmeter with an accuracy of + or – 2% if reading @ 70 degrees F (21 degrees C) and 14.7 psi (101 kPa)
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.
Insert Instructions

II. SPECIFICATIONS

Flotec Svensk STD Regulators are small, lightweight devices that are available in a variety of configurations to meet the various requirements for medical gas delivery. Flotec Svensk STD Regulators equipped with short PR Cap and special Hose Barb with orifice 4 LPM flow Oxygen. The following instructions provide information to assist qualified personnel in the service and repair of Flotec Svensk STD Regulators. It is recommended that the repair technician read this service and repairs instructions thoroughly before servicing Flotec Svensk STD Regulators.

Storage Temperature: -40 degrees F to 140 degrees F
Operating Temperature: -20 degrees F to 150 degrees F
Materials: Brass, Anodized Aluminum, Teflon, Neoprene, Silicone, EPDM
Filtration: Sintered bronze 10 micron High Pressure filter
Supply Pressure Range: 3000 psig
Operating Pressure: 20-24 psig
Inlet Connections: Svensk STD 367615 with W21.80 x 1/14 mm thread Nut and Connector w/EPDM o-ring
Dimensions: Variable depending on type and style specified. Regulator w/ short cap has L= 3.47"; O.D. approx. 1.50"
Weight: Variable depending on type and style specified, Regulator w/ short Cap has weight .55 lbs
Indicators: Cylinder Contents, Medical Gas Flow Rate
Outlet Connection: Hose Barb HB12-20-4 w/ orifice 4 LPM flow Oxygen

III. THEORY OF OPERATION

The Flotec Svensk STD Regulator is a single stage piston-type regulator. When it is initially attached to a high-pressure gas cylinder, the internal components are in the position shown in enclosed drawings. With the cylinder off, the spring exerts force against the piston assembly and pushes the piston assembly away from the regulator seat.

When the cylinder valve is opened, high-pressure medical gas (approximately 3000 psig) passes through the inlet filter and flows through the seat. The gas then flows through the shaft of the piston and exits to the regulated output cavity.

The gas continues to flow into this area until the cavity builds enough pressure to overcome the force of the spring, which occurs at 20 psig. The piston assembly then moves toward the seat and the seal blocks the flow path and prevents the pressure from rising above 20-24 psig. This all occurs in a fraction of a second. When gas is let out of the output cavity through the flow-controlling device, the pressure in the cavity drops. The spring then pushes the piston assembly away from the seat to allow the oxygen to restore the pressure to 20 psig and deliver the flow through the flow-controlling device at the prescribed rate. This too happens in a fraction of a second.

In the unlikely event that the regulator does not regulate properly and should the internal pressure rise above 50 psig the relief valve will unseat and safely release gas through the vent holes in the side of the body.

NOTE The Flotec Svensk STD Regulator is shown in enclosed drawings.

IV. DEFINITION OF STATEMENTS

Statements in this manual proceeded 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 should be made only by qualified personnel familiar with their operation. Do no 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 Swivel body of the regulator. These holes must be open to atmosphere for proper regulator operation.

NOTE Flotec Svensk STD Regulators are equipped with a new permanent O-Ring that eliminates the need for a washer seal yet still provides a hand tight 3000 psi seal. Never remove or replace O-Ring with a non-Flotec O-Ring.

V. PRODUCT CLASSIFICATION DATABASE

Device-	Regulator, Pressure, Gas Cylinder
Device Description-	Pressure regulator
Medical Specialty	Anesthesiology
Product Code	CAN
Regulation Number	FDA #868.2700
Device Class	**1**
GMP Exempt?	No
510(k) Exempt?	Yes

European Commision Meddev 2.4/1 Rev 8 Part 2, Rule 11
Active devices to administer, remove medicines and other substances to or from body,
Or Directive 93/42/EEC
"Pressure Regulator for Medical gases"
Class 2B

Health Canada CAN/CSA- Z305 87M
Medical Device Regulations Classification Rules for Medical Device
Part 1, Rule 9- Active devices to administer or withdraw energy to or from the body
"Medical Pressure Regulator"
Class 2.

VI. INSTALLATION INSTRUCTIONS

See Insert Instructions provided with each regulator.

VII. SERVICE AND REPAIR

NOTE Always perform the regulator 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.

A. CLEANING, LUBRICATION AND SEALING

Clean metal parts of the regulator with isopropyl alcohol and thoroughly blow dry with dry, oil free compressed gas. Use a clean lint free cloth with isopropyl alcohol to clean internal parts, being certain to remove any residual fibers.

O-ring seals that have been cleaned or are new replacements should be lubricated with a film of KRYTOX 240AC Fluorinated Grease.

Whenever pipe threaded (NPT) connections must be disassembled, reseal the threads with Teflon tape. When applying teflon tape remove old sealant from the male and female threads and wrap the male threads with Teflon tape in a clockwise direction, starting 1 to 2 threads back from the end.

1. INLET CONNECTIONS

a. REMOVABLE CONNECTION

1. Using a ¼" Hex key wrench on the regulator Connector, remove Connector with Nut from Swivel body. Remove knurled swivel Nut from the Connector Assy.
   CAUTION Hold the regulator with down so that any particulate matter will fall out of the port
2. If the inlet filter replacement is required, remove it from the Connector.
3. If the Connector's o-rings replacement is required, remove them.

b. INSTALLATION CONNECTION

1. Install a replacement inlet filter in the Connector and secure in place using a 11/64" rod .
2. Install the Connectors o-rings.
3. Put the Connector Assy into knurled Nut.
4. Using a ¼" Hex key wrench install the Connector Assy with knurled Nut to Swivel body. Torque 12-15 Ft.lbs.

2. HOSE BARB WITH ORIFICE.

a. REMOVAL
Remove Hose Barb Assy using 7/16" Socket wrench.
Remove old sealant from 1/8 NPT Swivel Body port.

b. SERVICE
Inspect the orifice, HB thread for wear or damage and replace as necessary.

c. INSTALLATION

1. Reseal the male threads on the HB Assy outlet with Teflon tape.
2. Thread the outlet into the regulator Swivel body and tighten.

3. REGULATOR INTERNAL COMPONENTS

a. REMOVAL

1. Remove the end short Cap with o-ring from Swivel Body.
1. Remove Piston/ Manifold Set from Swivel Body.

b. SERVICE

1. Remove the large O-ring from the piston for inspection. Clean the piston with isopropyl alcohol and thoroughly blow dry. Inspect both O-rings for wear or damage. Replace as necessary with new O-rings that have been lubricated with a film of Krytox 240AC lubricant. Inspect the seal on the end of the piston for cuts or abrasions. **WARNING** Failure to install the piston seal will render the regulator inoperative and will result in uncontrolled high flows through the relief valve vent ports.
2. Clean the relief valve with isopropyl alcohol and thoroughly blow dry. Inspect the relief valve O-ring for cuts and wear. Replace the O-ring if it is damaged.
3. Clean the inside of the regulator body with isopropyl alcohol and a lint free cloth and thoroughly blow dry. Inspect the seat for damage. Apply a film of Krytox 240 AC lubricant approximately ½" wide to the inner surface of the regulator body.

c. INSTALLATION
1. Install Piston/ Manifiold Set into Swivel body.
2. Thread the short Cap with o-ring into Swivel Body. Don't torque it until finished Test
3. After testing, torque short Cap and Swivel body approx. 10-12 Ft.lbs.

VIII. TESTING

Perform the following test procedures after servicing the regulator or to determine if a regulator problem exists.

WARNING If service to the internal components of the regulator has been performed, conduct a preliminary dynamic pressure test per the "DYNAMIC PRESSURE TEST" instructions with a medical gas cylinder pressure of 3000 psig. With inlet pressure 3000 psig, outlet pressure from Hose Barb with orifice 4 LPM flow should be 20-24 psig.

A. LEAK TEST

WARNING Do not attempt to repair leaks while the regulator is pressurized.

1. Connect the regulator to an appropriate cylinder used knurled Nut..
2. Apply a compatible leak test solution to all outlets and fittings. SLOWLY open the cylinder valve. Constant bubbling of the leak test solution denotes the presence of a leak.
3. Tighten fittings as required to eliminate all external leaks. **WARNING** Do not over tighten threaded connections.

B. DYNAMIC 20-25 PSIG PRESSURE TEST

1. Connect the regulator to an oxygen cylinder and SLOWLY open the cylinder valve.
2. Set a flow on the regulator Hose Barb.
3. Verify that the pressure test gauge stabilizes from 20 to 24 psig.

E. FLOWRATE TEST for 4 lpm

NOTE A number of variables including ambient atmospheric conditions and test instrumentation resolution and accuracy will affect the results of flowrate testing. Compensation must be made for deviation from ambient conditions of 70 degrees F and 29.3 inches HG at the location of the test.

1. Connect the regulator to a full gas cylinder and **SLOWLY** open the cylinder valve.
2. Connect the flow control barbed outlet connector.
3. Verify that the flows read on the test flowmeter are 4 LPM within + or – 10% of the flow set .

IX. REPLACEMENT PARTS LIST FOR DXSXX-XXXX SVENSK STD SS 367615 PRESSURE REGULATOR

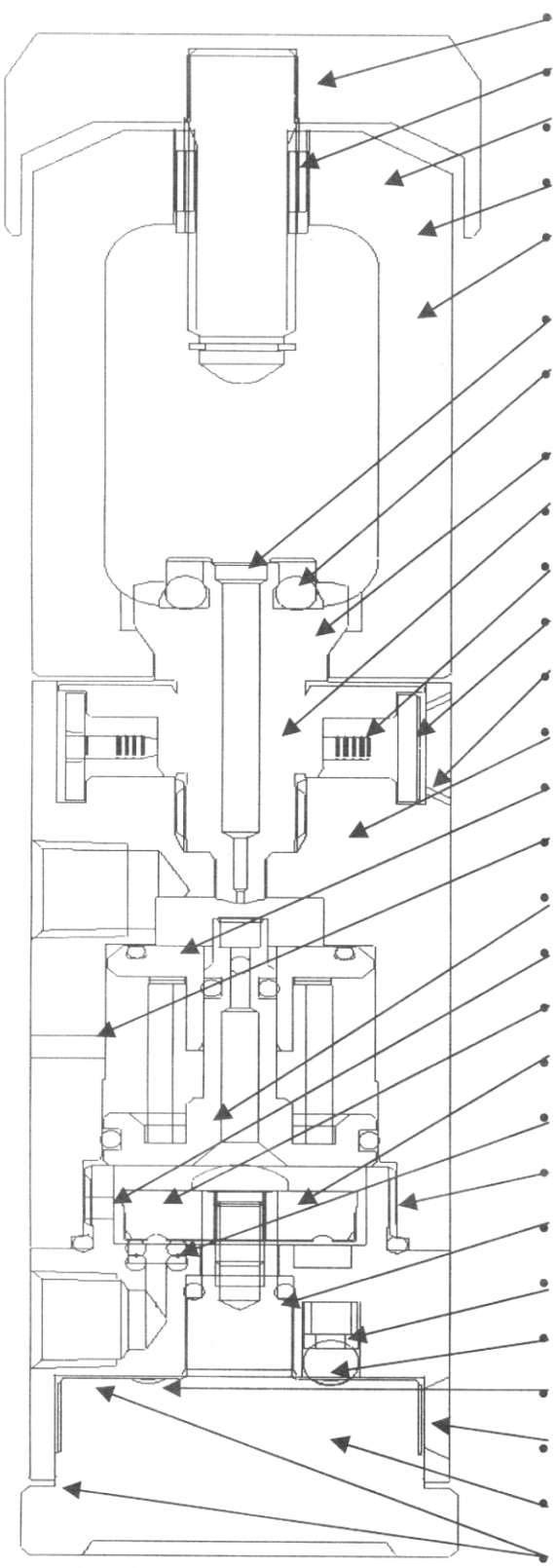
DESCRIPTION	FLOTEC PART #
HOSE BARB WITH ORIFICE	HB12-20-4
FILTER	810-6033-021
0-RING NEOPRENE 90 DURO	810-6737-202
0- RING NEOPRENE 90 DURO	810-6737-002
O-RING METRIC EPDM 80 DURO	810-6737-401
SPRING 20 PSIG	810-6496-017
PISTON BRASS	810-6621-112
MANIFOLD BRASS	810-6622-002
PISTON SEAL	810-6236-001

SHORT CAP O-RING	210-6022-022

X. TROUBLESHOOTING GUIDE

THE REGULATOR LEAKS AT:

Vent holes in Swivel body	Particulate matter in regulator	Clean regulator internal components
	Piston O-ring leaks	Replace piston O-rings (2)
	Piston seal leaks	Replace piston seal
	Relief valve o-ring leaks	Replace relief valve o-ring
Connector Assy	Connector not properly tightened	Tighten connector
	O-ring leaks	Replace connector O-ring
Hose Barb threaded (NPT)	Loose connections	Disassemble clean and reseal threads, reassemble and tighten
THERE IS NO FLOW OR INACCURATE FLOW AT HOSE BARB OUTLET	Regulator inlet filter is blocked	Replace inlet filter
	Hose Barb 4 LPM orifice is blocked	Replace inlet filter
	Cylinder is empty	Replace Cylinder
	Hose connector not properly engaged	Re-engage and tighten Hose Barb connector



- **DOME**-Handle
- Stainless Steel Helicoil thread insert
- All Metal Construction
- 11 Anodized Aluminum colors available (14641 combinations)
- 2 Plated Brass colors available (Uni-guard with germicidal effect and 24K Gold plated)
- **10** Micron Sintered Bronze Filter
- New permanent O-Ring design eliminates the need for a washer yet still provides a hand tight 3000 psi seal
- All Brass High Pressure Inlet Conduit
- Unique **INGAGE**, no external parts
- All Brass High Pressure Bourdon Tube
- Large High Visibility Night Glow w/ Color Coding of pressure
- **WINDOW** with pointers to indicate Cylinder pressure
- **SWIVEL** Body
- Safety Relief Valve
- Safety vent holes (2)
- Piston type pressure reducer
- Safety vent hole
- Integral **FILTER** in flow orifice assembly
- Large and wide selection of flow ranges
- Redundant sealing and bearing surfaces (3)
- Anti-Blowout Design w/ No snap rings
- Interlocking Shaft design
- Teflon bearing pads
- Redundant detent system outside the Oxygen flow (3)
- Precision bearing race for long life
- Large High Visibility **NIGHT GLOW** Flow numbers
- All metal knob
- Interlocking Knob design

Patent Pending

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