CareFusion

Low Flow MicroBlender

Service Manual

L1130 Rev. C

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Table of Contents

Note: This manual is intended as a guide for the service/repair calibration of the Low Flow MicroBlender by a qualified technician.

Section 1:
Overview of the 3920 Low Flow Microblender Operation

The Low Flow MicroBlender mixes medical grade compressed air and oxygen to provide a pressurized gas source ranging from 21% to 100% oxygen.

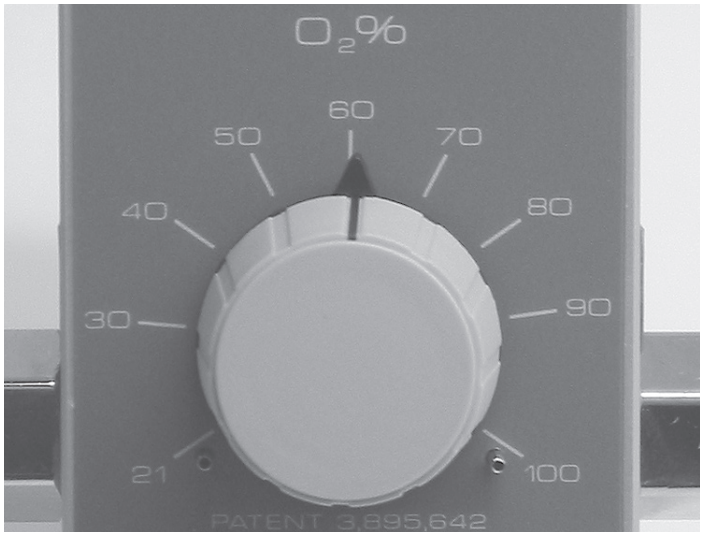

Figure 1

The two 50±5 PSIG (3.52 ± 0.35 kg/cm^2) gas sources enter through the diameter indexed (DISS) air and oxygen inlet connectors located on the bottom, rear of the blender (Figure 2). Each inlet connector incorporates a 30 micron particulate filter. From the filter the gases travel through a duckbill check valve which prevents possible reverse gas flow from either the air or oxygen supply systems.

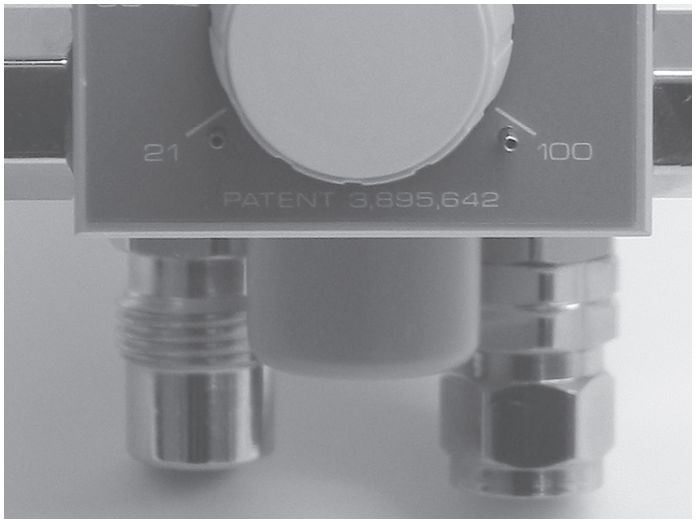

Figure 2

Balance Module (Figure 3)

The two gases then enter the two-stage Balance Module. The purpose of this module is to equalize the operating pressure of the air and oxygen gas sources before entering the Proportioning Module. The diaphragm responds to the difference in pressure and directs the movement (stroke) of each ball valve assembly contained within the air and oxygen chambers. The movement of each ball valve adjusts the amount of gas flowing through the Balance Module, equalizing the air and oxygen pressures.

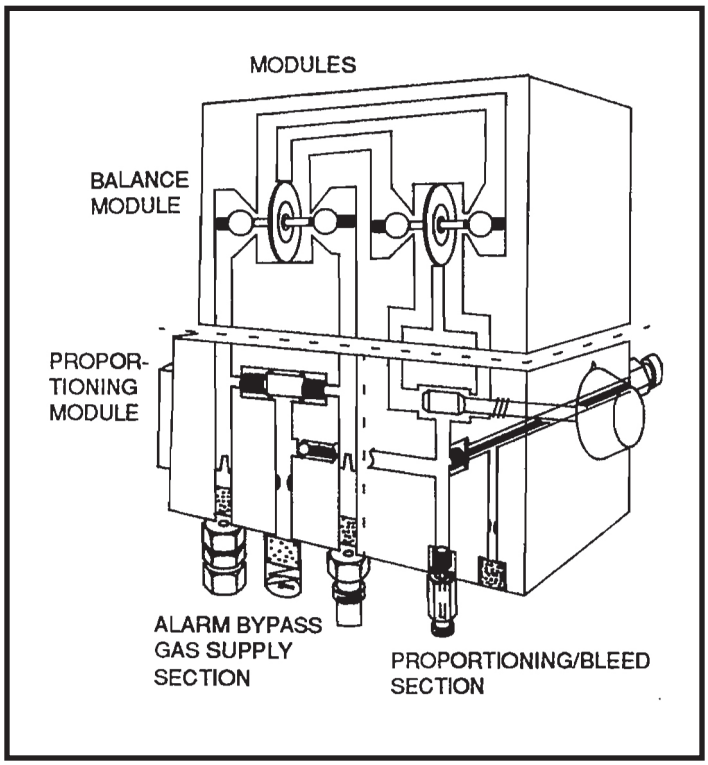

Figure 3 Air-Oxygen Blender Diagram

Proportioning Module (Figure 4)

From the Balance Module the gases flow into the Proportioning Module and are mixed according to the oxygen percentage selected on the external control knob. This Module consists of a double ended valve positioned between two valve seats.

One valve seat controls the passage of air and the other valve seat controls the passage of oxygen into the Low Flow MicroBlender outlet. At this point, the two gases have been blended according to the oxygen percentage selected on the MicroBlender control knob.

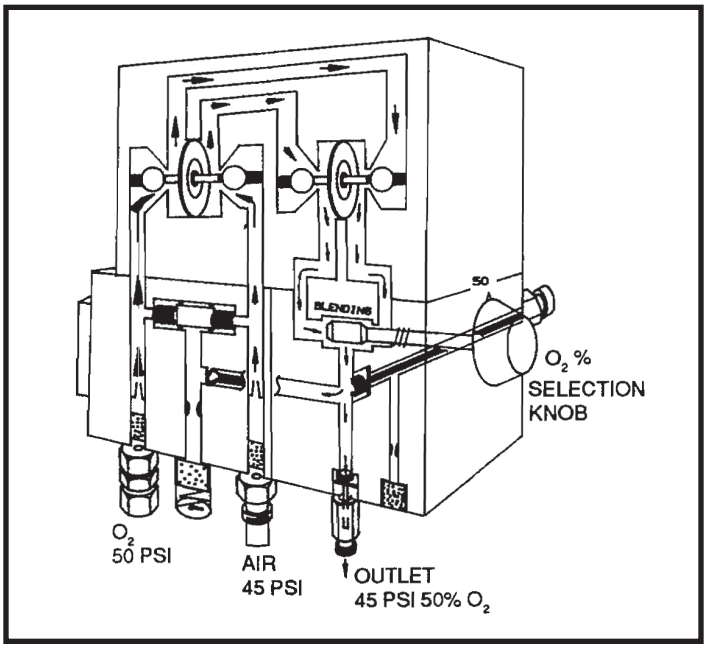

Figure 4

With the control knob at the full counter-clockwise position (21%), the double ended valve will completely close off the flow of oxygen, allowing only the air to flow. By adjusting the control knob in the full clock-wise (100%) position the flow of air is blocked, permitting only the flow of oxygen through the blender outlet.

Alarm/Bypass (Figure 5)

The alarm feature provides for an audible alarm if source pressures differ by 20 PSI (1.41 kg/cm^2) or more. The primary purpose of the alarm is to audibly warn the operator of an excessive pressure drop or depletion of either source gas. The alarm will also activate in the event of elevation of either source gas when a difference of 20 PSI (1.41 kg/cm^2) or more is detected. Should both gas pressures (oxygen or medical air) increase or decrease simultaneously, and a 20 PSI (1.41 kg/cm^2) differential is not seen, there will not be an audible alarm. If either source gas pressure drops, the output pressure of the blender will drop similarly, since the source gases are always balanced to that of the lower pressure.

The bypass function operates in unison with the alarm. The alarm bypass poppet communicates directly with the air supply on one end and the oxygen supply on the other.

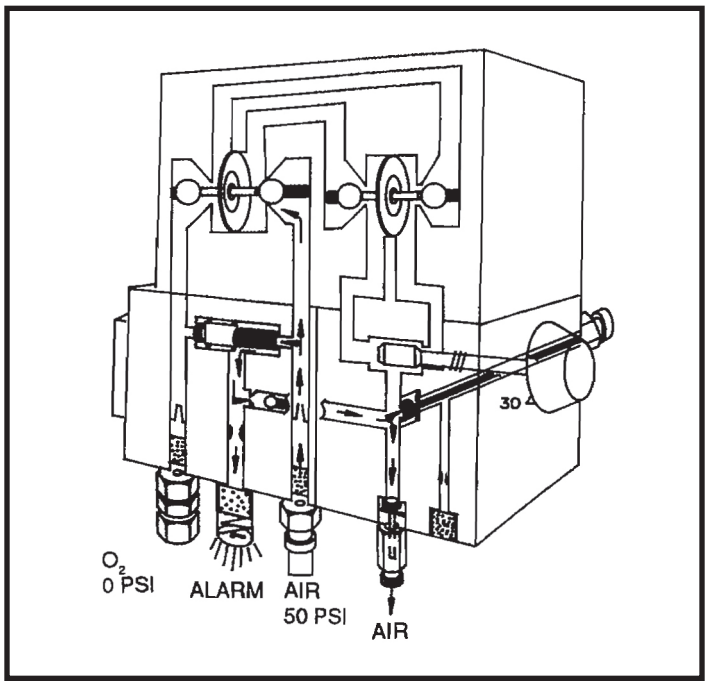

Figure 5

When the two source gases are near equal in pressure, the alarm bypass poppet is positioned over the bypass channel, blocking the flow of both gases. The poppet will remain seated for unequal pressures up to 20 PSI (1.41kg/cm^2). Once a 20 PSI (1.41kg/cm^2) difference is sensed by the poppet, the higher gas pressure will overcome the spring force and pressure as its opposite end, thus creating a path for gas (air or oxygen) to flow into the alarm channel.

The gas with the higher pressure will also flow directly to the blender outlet port bypassing the Balance and Proportioning Modules. The gas is also directed to the bottom of the unit to the reed alarm, thus creating an audible warning. The oxygen concentration will be that of the gas at the higher pressure. The blender in the alarm/bypass mode will deliver the oxygen (100%) or air (21%) until the bypass mechanism resets when source gas pressure is restored to a differential of approximately 6 PSI (0.42 kg/cm^2).

Some characteristics of the alarm/bypass system on the Low Flow MicroBlender differ somewhat from those of model 3300 and other older model blenders.

If the Low Flow MicroBlender is set at 21% and the oxygen source pressure is reduced sufficiently to produce a 20 PSI (1.41kg/cm^2) or greater differential, the unit will not alarm because it will continue to deliver 21% concentration according to the setting. If the control is moved slightly from the 21% setting, the alarm will sound.

Similarly, if the Low Flow MicroBlender is set to deliver 100% concentration and air source pressure is reduced or lost, the unit will not alarm because it will continue to deliver the selected 100% concentration.

The Low Flow MicroBlender is left connected to source gases but is not being used (i.e. no output flow or bleed flow), the unit will not alarm if a 20 PSI (1.41kg/cm^2) or greater pressure differential develops. It is felt that if the blender is not in use, an alarm under these conditions may be an unnecessary distraction or nuisance.

Gas Outlets (Figure 6)

The primary gas outlet is used for unmetered high flow applications in the range of 3-30 LPM. The flow of gas is automatically initiated by an attachment of a pneumatic device to the outlet port. A check valve is unseated upon connection allowing the mixed gases to flow through the primary outlet.

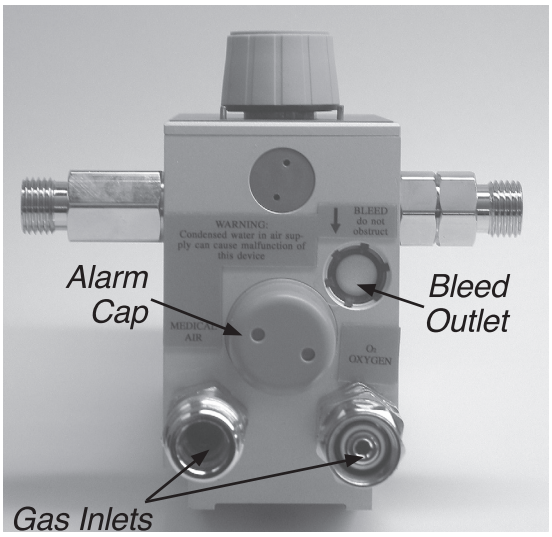

Figure 6

The auxiliary outlet is located on the right side of the Low Flow MicroBlender and is designed to deliver metered gas through a flowmeter. Mixed gas may be delivered within specified accuracy tolerance from this outlet at 0.5 LPM and above. When a connection is made to the auxiliary outlet a 2.5-3.5 LPM bleed of mixed gas to the atmosphere is activated. This bleed is essential to ensure accuracy of concentration for applications utilizing low flows down to 3 LPM.

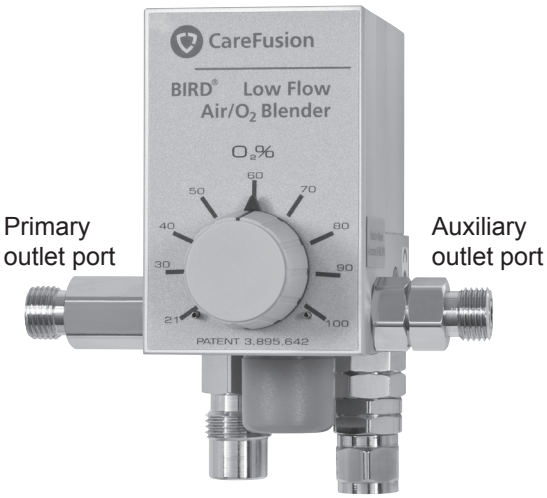

Figure 7

Section 2:
Warnings, Cautions and Notes

The Low Flow MicroBlender should be operated by trained, qualified medical personnel under the direct supervision of a licensed physician. Before clinical application, the WARNINGS, CAUTIONS and NOTES should be read and understood.

CAUTION: Conditions may exist that could damage the Low Flow MicroBlender or other pieces of equipment.

WARNING: Conditions may exist that could adversely affect the operator or patient.

NOTE: A specific point is made to assist the operator in its understanding.

WARNINGS:

- Respirable (medical) air should meet the requirements of an ANSI Z86.1-1973 commodity specification for air, Type 1 Grade D or better. It should also have a dew point of 5°F (2.75°C) or more below the lowest temperatures to which the air distribution (piping) system is exposed. Particulate (condensed) water in the air supply is harmful to many medical devices utilizing or controlling compressed air. Filters frequently become restricted by deposits of dissolved salts and other airborne matter. While compressed air is typically the major source of deposits, other medical gases and distribution systems are capable of delivering filter restricting matter. This restriction of filters causes insidious reduction in flow capability of the blender, possibly starving a downstream device such as a ventilator, causing malfunction. Therefore, it is very important to perform preventative maintenance, minimally at recommended intervals on devices with filters, especially if the gas supply is not known to be clean and/or free of condensed water.
- The Low Flow MicroBlender should be serviced and/or calibrated by a CareFusion trained hospital/dealer service technician or CareFusion.
- The Low Flow MicroBlender is designed to operate from a 50 PSIG (3.52 kg/cm2) air source and a 50 PSIG (3.52 kg/cm2) oxygen source.
- Do not occlude or obstruct the bleed port or muffler on the bottom of the MicroBlender.
- Adjustment of oxygen concentrations should be verified by an oxygen analyzer.
- When the Low Flow MicroBlender is not in use and the auxiliary outlet is connected, close off gas supply sources as the continuous gas bleed may drain compressed gas tanks empty.
- When reassembling the blender, do not pressurize the system unless the valve seat has 3 full turns of thread engaged. The seat can be forcefully ejected by gas pressure if not sufficiently engaged. Do not exceed 3 full turns or the rear seat may be damaged.

CAUTIONS:

- An air inlet filter/water trap (P/N 07426) is recommended for use with the MicroBlender to minimize the possibility of contaminants such as particulate debris or condensed water entering the blender or patient gas delivery system.
- Do not steam autoclave or otherwise subject the Low Flow MicroBlender to temperatures above 145°F (62°C).
- Do not immerse assembled blender in liquid decontamination agents.
- When pressurizing the blender inlets, avoid excessive pressure surges (as could be caused by “Quick Dump” valves). Always use needle valves and pressurize inlets slowly.
- Use recommended lubricants sparingly as lubricant may migrate to other areas and cause the Low Flow MicroBlender to malfunction.

Notes:

- Users are advised to use pressure regulators that display regulated pressure.
- Allow equilibration time for FIO_2 changes before analyzing gas.

Section 3:
Clinical Troubleshooting

Problem	Potential Cause	Corrective Action
Oxygen concentration discrepancy between blender setting and analyzer (greater than 3%).	Flow requirements are outside the specified LPM range.	Correct flow. Auxiliary outlet (right outlet) port flow range is 0-30 LPM. The Primary (left outlet) port is 3-30 LPM.
	Analyzer out of calibration.	Calibrate analyzer.
	Blender out of calibration.	Recalibrate or service further as necessary (see Section 4).
	Low flow bleed muffler obstructed causing restriction of fixed bleed.	Remove obstruction and verify bleed flow is within tolerance.
	Gas supply contaminated.	Check source gases with calibrated O_2 analyzer to confirm O_2 is 100% and AIR is 21%.
	Air entrained into circuit by ventilator or accessory device.	Correct
Alarm sounding.	Inlet pressure differences of 20 PSI (1.41kg/cm^2) or more.	Correct pressure difference.
	Alarm module not calibrated properly.	Recalibrate or service further as necessary (see Section 4).
	Inlet gas contamination, alarm module malfunction.	Disassemble, clean, reassemble, calibrate, install inlet filter/water trap on air line, and correct cause of gas contamination.
Low Flow MicroBlender in bypass. No Alarm.	Alarm Reed Assembly (P/N 05436) improperly installed or damaged.	Remove and replace.
	Alarm gas orifice obstructed.	Remove obstruction from orifice.
Low Flow MicroBlender accurate only when inlet gas pressures are equal.	Balance module not functioning properly.	Disassemble balance module, clean, replace diaphragms(s), reassemble and test.

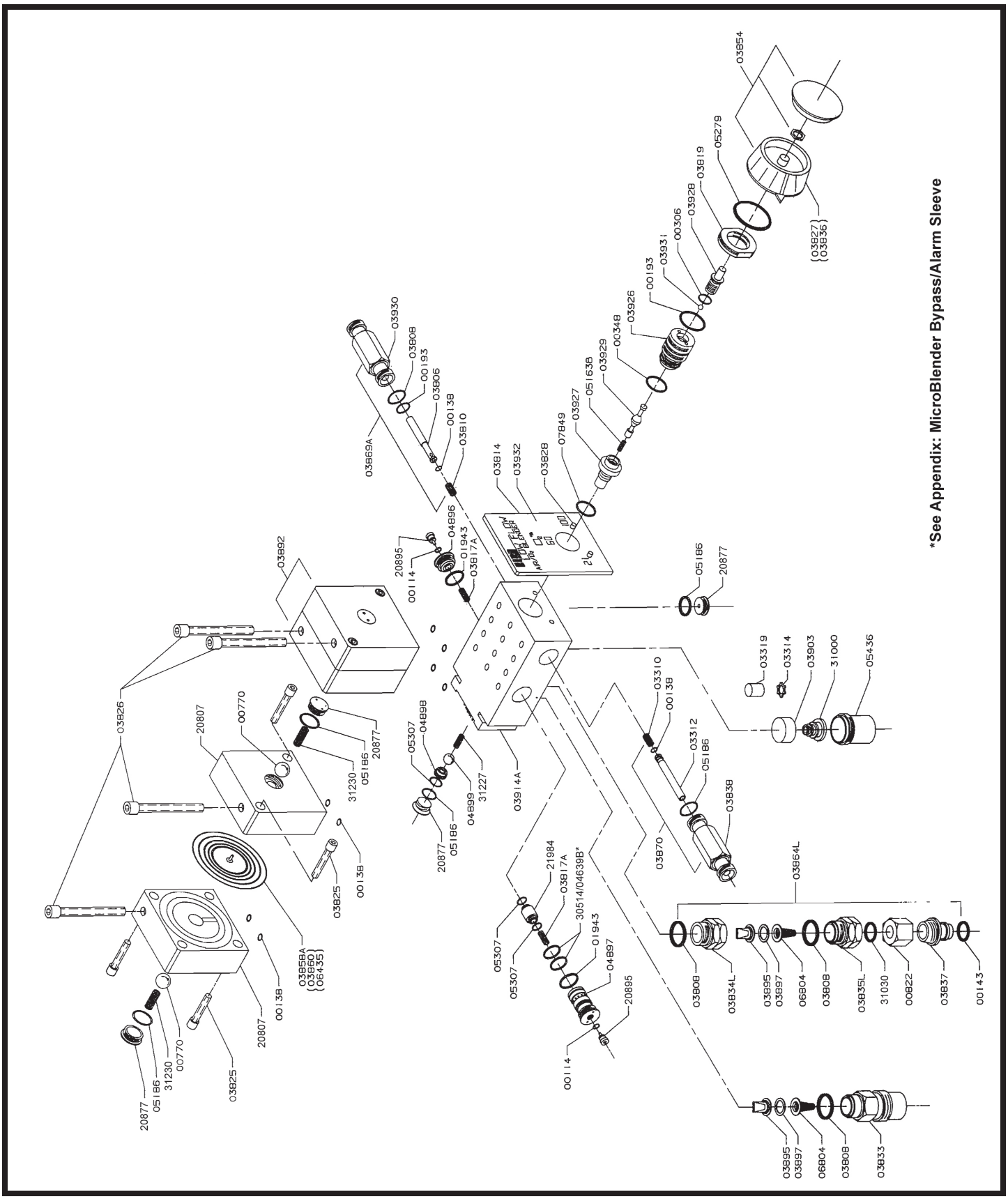

Figure 8, Low Flow MicroBlender (Air/Oxygen Blender) Components Illustration

WARNING: The Low Flow MicroBlender should be serviced and/or calibrated by a CareFusion trained hospital/dealer service technician or CareFusion.

Caution: Before attempting to service/repair the Low Flow MicroBlender, the service person should first be familiar with its design and operation as explained in Section 1 of this manual.

A numbering system is utilized, so that one can easily identify the steps involved with each operation.

A. Service/Calibration Tools

Assembling and disassembling the Low Flow MicroBlender requires special tools (shown in Figure 8), which are available from CareFusion individually or as a kit (P/N 03852).

Part No.	Description
00631	Lubricant
03850	Alignment Assembly Tool (2)
03849	Spanner Wrench
03851	Lubricant Grease
03884	Vibra-Tite Thread-locking Compound
10101	Tube Assembly, Leak Test
10102	Tube Assembly, Pressure Test
10108	Fitting, Bleed Test
10138	Blender Alarm Tool

Additional tools and supplies recommended for service/repair:

5/32" Allen wrench

1/8" Allen wrench

9/32" Hex nut driver

3/4" Open end or adjustable wrenches (2)

11/16" Open end or adjustable wrench

7/32" Allen wrench

Small needle nose pliers

Isopropyl Alcohol

A Low Flow MicroBlender Maintenance Kit may be ordered by specifying P/N 10003. This kit includes all parts necessary for periodic preventive maintenance.

CareFusion recommends using an ultrasonic cleaner for cleaning all components. However, cleaning with an all-purpose liquid cleaner and rinsing with clear, warm water may be substituted. Both methods require thoroughly blow drying all passages before final assembly. When using an ultrasonic cleaner, follow the manufacturers instructions.

B. Disassembly/Reassembly Procedure (Figure 9 and 10)

Balance Regulators

1.0 Balance Block Disassembly/ Reassembly – Top of MicroBlender

1.1 With a 5/32" Allen wrench, remove the top four screws securing the two balance block assemblies to the valve block.

Note: *The balance block assemblies are identical and interchangeable. For ease of assembly, the blocks may be labeled (A, B, C and D).*

1.2 Using spanner wrench, remove the caps (2 each per balance block assembly). Remove O-rings and discard.

Note: *Poppet spring and ball will be loose following removal of balance block cap. Remove components and set aside.*

1.3 With a 5/32" Allen wrench, remove each of four (4) screws securing each pair of blocks. Remove the diaphragms and O-rings and discard.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning assembly. Be sure that the poppet seat areas are perfectly clean.

Balance block assembly replacement parts:

Part No.	Qty.	Description
00138	8	O-ring
03858A	2	Diaphragm
05186	4	O-ring

Balance Block Reassembly

1.4 Holding diaphragm alignment tool (P/N 03850) in hand , place the “A” Block onto the alignment tool with the diaphragm cavity facing up.

1.5 Place diaphragm (P/N 03858A) into cavity.

Note: *Make sure poppet pin on diaphragm seats into diaphragm alignment tool (P/N 03850).*

1.6 Place “B” block on top of assembly with diaphragm cavity facing down.

Note: *Align block assemblies for proper gas flow. Three holes on each block (bottom) must be aligned.*

1.7 Insert second diaphragm alignment tool (P/N 03850) into Block “B”, making sure the poppet pin on diaphragm seats into alignment tool.

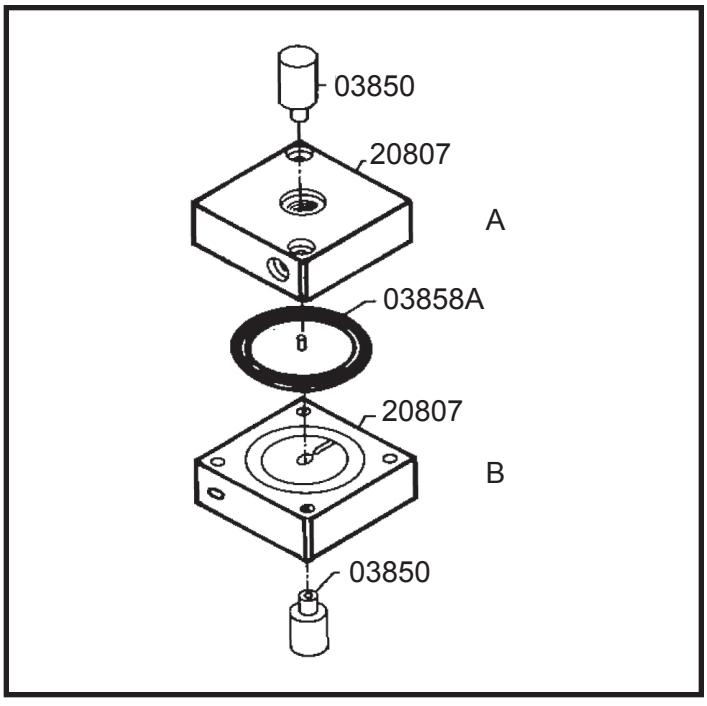

Figure 9

1.8 Fasten block “A” and “B” together loosely with two (2) screws (P/N 03825).

1.9 Holding the two (2) diaphragm alignment tools in place, lay the entire assembly with one of it’s surfaces on a flat surface. This will align blocks properly for mating with valve block.

1.10 Using a 5/32" Allen wrench, tighten the previously installed two (2) screws holding blocks “A” and “B” together. Torque to 60 in/lb.

1.11 Install and tighten, using a 5/32" Allen wrench, remaining two (2) screws (P/N 03825) to opposite side of “A” and “B” block assembly. Torque to 60 in/lb.

1.12 Remove both diaphragm alignment tools and place “A” and “B” block assembly on its side.

1.13 Place ball (P/N 00770) into seat.

1.14 Lightly lubricate O-ring (P/N 05186) with lubricant (P/N 00631) and install on Balance Block Cap (P/N 20877).

1.15 Place a very small amount of lubricant grease (P/N 03851) on one end of spring (P/N 31230), then install lubricated end into block cap.

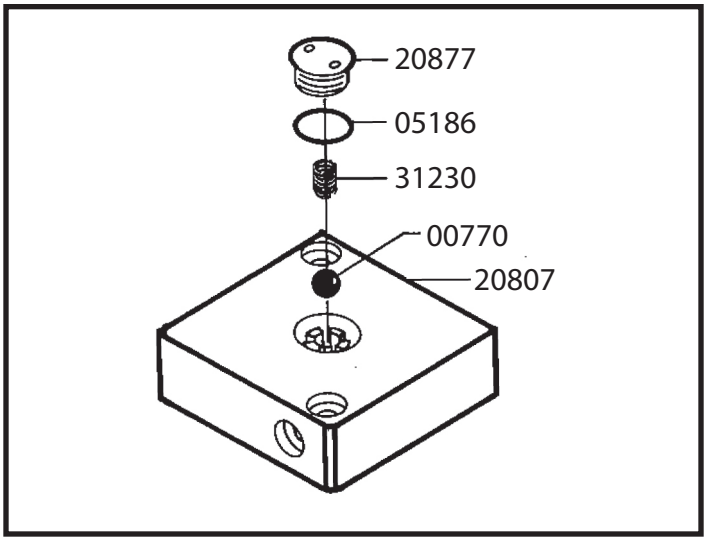

Figure 10

Note: *Lubricant on spring end ensures adherence of spring to cap during placement into block assembly.*

1.16 Install cap and spring into block assembly and tighten in place using spanner wrench. Torque to 30 in/lb.

1.17 Place block assembly “AB” on opposite side and repeat steps 1.13 to 1.16.

1.18 Reassemble block “CD” using same procedure as “AB” beginning with Step 1.4.

1.19 Lightly lubricate O-rings (P/N 00138) with lubricant (P/N 00631).

1.20 Place block assemblies and O-rings (P/N 00138) aside for final assembly.

Valve Block

2.0 Oxygen Inlet Disassembly/ Reassembly–Bottom Rear of MicroBlender

Note: *This assembly threads into the block with a left-handed thread. A single groove on nut indicates left hand thread.*

2.1 With a 3/4" open end wrench, remove the oxygen inlet assembly from the valve block.

2.2 Using a second 3/4" open end wrench, separate the O_2 connector from the filter retainer.

2.3 Use a 3/4" open end wrench to stabilize the filter retainer, then remove the O_2 tail piece using a 1/8" Allen wrench.

2.4 Remove the filter, duckbill check valve, O-rings and washer and discard.

Note: *The filter may have to be grasped with pliers to remove.*

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

Oxygen Inlet Reassembly

Replacement parts:

Part No.	Qty.	Description
00143	1	O-ring
31030	1	O-ring
03808	2	O-ring
03895	1	Duckbill Check Valve
03897	1	Washer
06804	1	Inlet Cone Filter

Note: *Prior to installation, place a small amount of Vibra-Tite (P/N 03884) on threads of O_2 Tailpiece (P/N 03837) and let Vibra-Tite dry for at least 10 minutes.*

2.5 Lightly lubricate O-ring (P/N 03808) with lubricant (P/N 00631) and assemble to O_2 connector (P/N 03834).

2.6 Insert duckbill check valve (P/N 03895), washer (P/N 03897) and cone filter (P/N 06804) into O_2 connector.

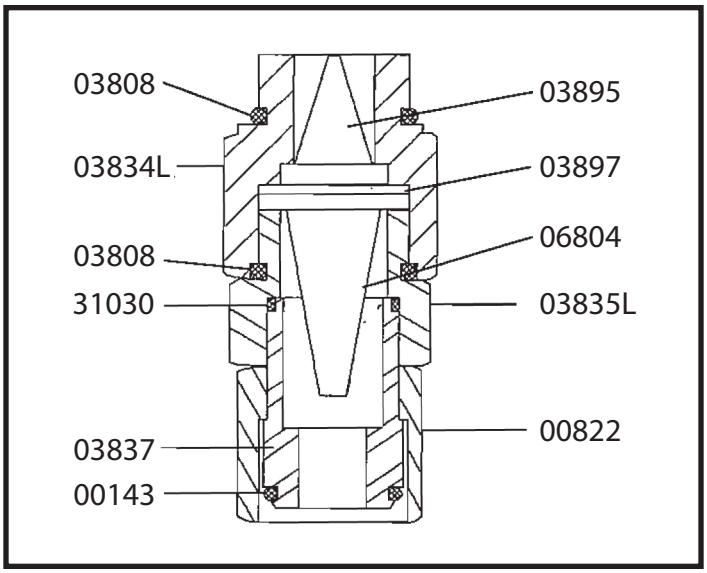

Figure 11

Note: *Step on washer fits into duckbill check valve.*

2.7 Lightly lubricate O-rings (P/N 03808, 31030) with lubricant (P/N 00631) and assemble to O_2 filter retainer (P/N 03835L).

2.8 Using two (2) 3/4" open end wrenches, tighten the O_2 connector to the filter retainer. Torque to 10 ft./lb.

2.9 Take unlubricated O-ring (P/N 00143) and assemble to O_2 tail piece (P/N 03837).

2.10 Insert O_2 tail piece into nut (P/N 00822) and using a 1/8" Allen wrench, tighten to O_2 connector. Torque to 10 ft./lb.

2.11 Set O_2 inlet aside for final assembly to vale block.

3.0 Air Inlet Disassembly/Reassembly – Bottom Rear of MicroBlender

3.1 With a 3/4" open end wrench, remove the air inlet assembly with O-ring. Remove and discard O-ring.

3.2 Remove the inlet cone filter located in valve block and discard.

Note: *The filter may have to be grasped with pliers to remove.*

3.3 Next, remove the washer and duckbill check valve from the valve block assembly. Discard check valve and washer.

Clean all parts with ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

Air Inlet Reassembly

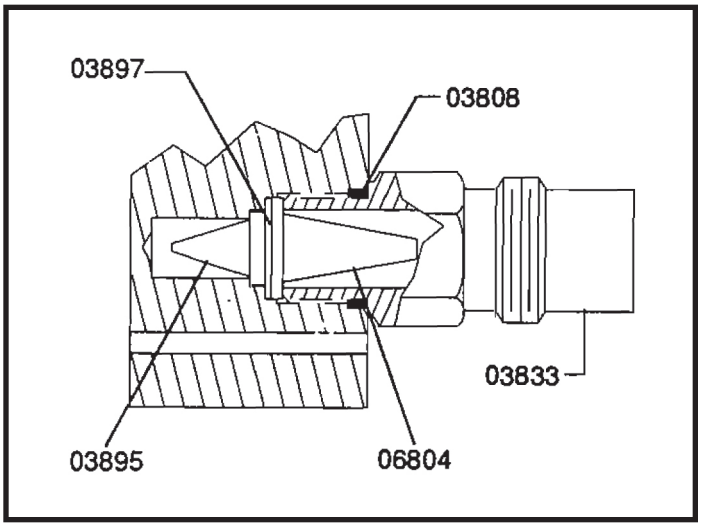

Figure 12

Replacement parts:

Part No.	Qty.	Description
03808	1	O-ring
03895	1	Duckbill Check Valve
03897	1	Washer
06804	1	Inlet Cone Filter

3.4 Install lightly lubricated O-ring (P/N 03808) with lubricant (P/N 00631) on air inlet connection (P/N 03895).

3.5 Place inlet cone filter (P/N 06804) inside air inlet.

3.6 Set air inlet aside with duckbill check valve (P/N 03895) and washer (P/N 03897) for final assembly to valve block.

4.0 Primary Outlet Disassembly/ Reassembly – Left Side Front of MicroBlender

4.1 With an 11/18" open end wrench, remove the primary outlet from the valve block.

Note: *Small spring is loose and may fall out of cavity.*

4.2 Remove poppet from the outlet, then remove O-ring from poppet and discard.

4.3 Remove O-ring from the outlet body and discard.

Clean all parts with in an ultrasonic cleaner and rinse with clean, warm water. Ensure all passages are blown completely dry and that poppet seat areas are perfectly clean before beginning reassembly.

Primary Outlet Reassembly

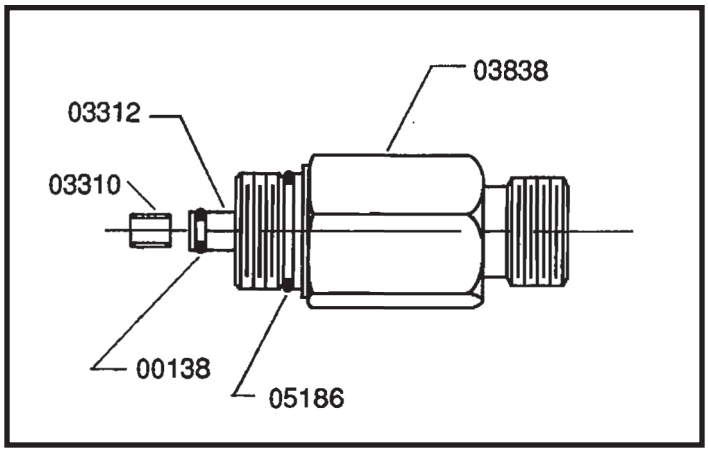

Figure 13

Replacement parts

Part No.	Qty.	Description
00138	1	O-ring
05186	1	O-ring

4.4 Lightly lubricate O-ring (P/N 05186) with lubricant (P/N 00631) and install on primary outlet housing (P/N 03838) and lubricated O-ring (P/N 00138) on poppet (P/N 03312).

4.5 Insert poppet into the outlet housing.

4.6 Set assembly with spring (P/N 03310) aside for final assembly.

5.0 Auxiliary Outlet Disassembly/ Reassembly – Right side, Front of MicroBlender

5.1 Using an 11/16" open end wrench, remove the auxiliary outlet from the valve block assembly.

Note: *Small spring is loose and may fall out of cavity.*

5.2 Remove poppet from auxiliary outlet, then remove and discard O-ring (P/N 00138).

5.3 Remove O-rings (P/N 03808 and 00193) from the outlet body (P/N 03930) and discard.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry and poppet seats are perfectly clean before beginning reassembly. Ensure orifice on Auxiliary outlet (P/N 03930) is not occluded.

Auxiliary Outlet Reassembly

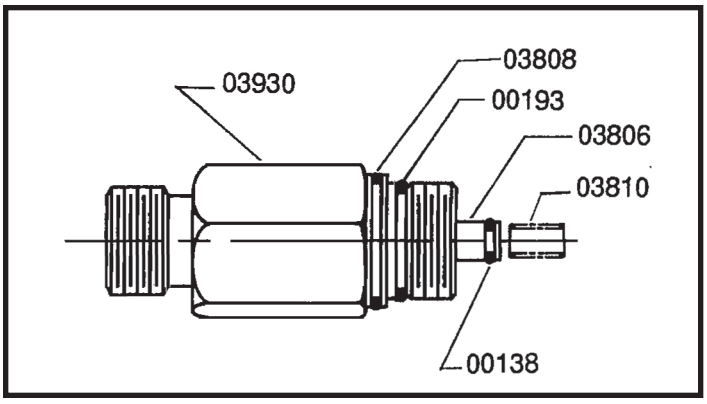

Figure 14

Replacement parts:

Part No.	Qty.	Description
00138	1	O-ring
00193	1	O-ring
03808	1	O-ring

5.4 Lightly lubricate O-rings with lubricant (P/N 00631). Install lubricated O-rings (P/N's 03808 and 00193) on auxiliary outlet housing (P/N 03930) and O-ring (P/N 00138) on poppet (P/N 03806).

5.5 Insert poppet into auxiliary housing.

5.6 Set assembly with spring (P/N 03810) aside for final assembly.

Proportioning Module

6.0 Control Knob/Front and Rear Seat Valve Disassembly/Reassembly – Front of MicroBlender

6.1 With thin blade screwdriver or knife, remove gray cover plate from knob assembly.

6.2 Using a 9/32" nut driver, loosen nut just enough to remove knob assembly from front seat valve stem.

6.3 Remove and discard O-ring from front seat locknut. Using an 11/16" open end wrench, remove front seat lock nut. Remove front plate by gently separating from block assembly.

6.4 Using spanner wrench (P/N 03849), remove the front seat (incorporating valve stem). Remove O-rings and discard.

Note: *Small 1/8" ball may be loose and drop from assembly.*

6.5 Rotate valve stem counterclockwise to remove from front seat. Remove O-rings from valve assembly and discard.

6.6 Carefully remove poppet valve and spring from rear seat.

6.7 Using a 1/8" Allen wrench, remove the rear seat and O-ring from valve body. Discard O-ring.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

Control Knob/Front and Rear Seat Reassembly

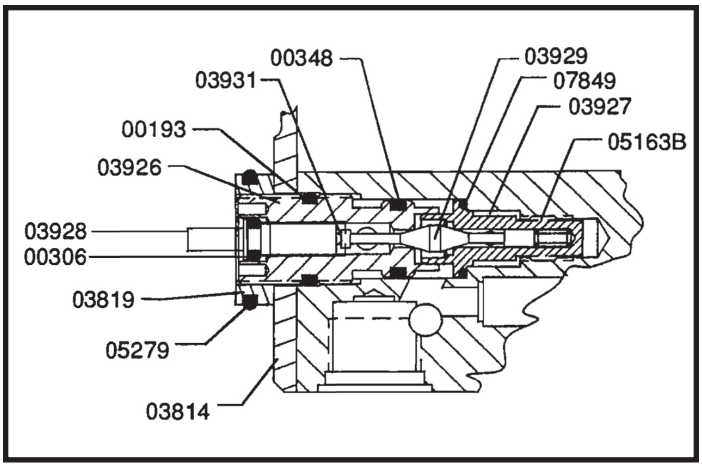

Figure 15

Replacement parts:

Part No.	Qty.	Description
00193	1	O-ring
00306	1	O-ring
00348	1	O-ring
05279	1	O-ring
07849	1	O-ring
5163B	1	Spring

6.8 Inspect valve seat faces carefully. They should have a sharp edge void of chamfer, nicks or wear. Replace if necessary.

Caution: Any damage to seats may prevent proper calibration.

6.9 Install absolutely clean 1/8" ball (P/N 03931) into valve stem (P/N 03928).

Note: *Do not use lubricants or any other substance as a means of securing ball into stem. The ball joint interface, consisting of ball (P/N 03931), stem (P/N 03928), and poppet valve (P/N 03929), MUST be kept clean and free of contaminants to insure accurate calibration.*

6.10 Using lubricant (P/N 00631), lubricate O-ring (P/N 00306) and place into groove in valve stem (P/N 03928).

6.11 Install valve stem assembly (P/N 03928) into front seat (P/N 03926) and rotate valve stem clockwise until O-ring (P/N 00306) bottoms out. Rotate valve counterclockwise two turns.

Repeat above procedure 10 times and ensure that valve stem movement is smooth, uniformly tight and without any detectable end play.

6.12 Back out stem, turn counterclockwise until valve stem O-ring (P/N 00306) is just inside the front seat (P/N 03926).

6.13 Using lubricant (P/N 00631), lubricate O-rings (P/N 00348, 00193) and install on front seat (P/N 03926).

6.14 Inspect proportional valve (P/N 03929) for scratches, nicks, wear and cleanliness.

6.15 Using lubricant (P/N 00631), lightly lubricate O-ring (P/N 07849) and install in groove of rear valve seat (P/N 03927).

6.16 Set valve stem/front seat assembly, rear seat proportional valve spring aside for final assembly.

7.0 Bypass Disassembly/Reassembly – Both sides, rear of MicroBlender

7.1 Using a slender, pointed probe, remove sealant plug from both side caps.

7.2 Using an 1/8" Allen wrench, unscrew adjuster from left and right hand side bypass seats.

7.3 Remove and discard O-ring from each adjuster.

Note: *A small spring is contained in each assembly and might remain in poppet bypass valve housing after adjuster has been removed.*

7.4 Using a spanner wrench (P/N 03849), unscrew bypass sleeve from left rear side of valve block. Remove and discard O-rings.

7.5 From right rear side of block, unscrew bypass seat. Remove and discard O-ring.

Note: *If spring(s) are still in cavity, carefully remove them.*

7.6 Carefully push bypass poppet valve through bypass sleeve.

Note: *Use a blunt slender probe to push poppet valve out of enclosure. Use care to avoid scratching surface of cylinder in which poppet valve operates.*

7.7 Remove and discard O-rings from poppet valve.

> Caution: Carefully inspect internal surfae of sleeve for any signs of wear and damage to the special coating.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

*See Appendix: MicroBlender Bypass/Alarm Sleeve.

Alarm Bypass Reassembly

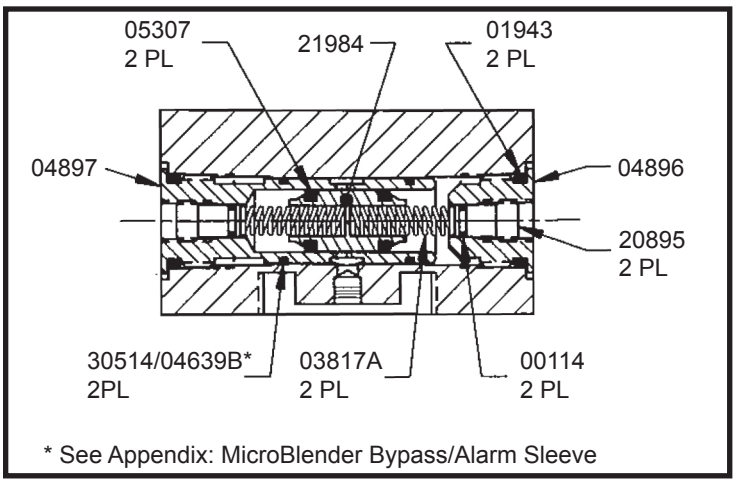

Figure 16

Replacement parts:

Part No.	Qty.	Description
00114	2	O-ring
01943	2	O-ring
30514/04639B*	2	O-ring
05307	2	O-ring

7.8 Using lubricant (P/N 00631), lubricate (2) O-rings (P/N 01943). Install one (1) O-ring on bypass seat cap (P/N 04896) and one (1) O-ring on sleeve (P/N 04897).

7.9 Using lubricant (P/N 00631), lubricate two (2) O-rings (P/N 30514/04639B*) and install on sleeve (P/N 04897).

7.10 Using lubricant (P/N 00631), lightly lubricate two (2) O-rings (P/N 00114) and install one (1) on each bypass adjuster (P/N 20895).

7.11 Thoroughly lubricate two (2) O-rings (P/N 05307) with lubricant grease (P/N 03851) and install one (1) in each groove at end of bypass poppet (P/N 21984) shoulder.

7.12 Set bypass seat assembly, sleeve assembly, bypass poppet assembly, adjuster springs (P/N 03817A) and adjuster assemblies aside for final assembly.

8.0 Outlet Cap Disassembly/Reassembly – Bottom, Front of MicroBlender

8.1 Using spanner wrench (P/N 03849), remove outlet cap and O-ring from valve block. Remove and discard O-ring.

Outlet Cap Reassembly

Replacement Parts:

Part No.	Qty.	Description
05186	1	O-ring

8.2 Lightly lubricate and install O-ring (P/N 05186) on cap (P/N 20877). Set aside for final assembly.

9.0 Muffler Disassembly – Bottom, Middle of MicroBlender

9.1 With a small screwdriver, carefully lift star retainer from bottom of valve block. Discard star retainer.

9.2 Remove muffler carefully with a pointed probe and discard.

Muffler Assembly

Replacement Parts

Part No.	Qty.	Description
03314	1	Star Retainer
03319	1	Muffler

9.3 Set muffler (P/N 03319) and retainer (P/N 03314) aside for final assembly.

10.0 Alarm Disassembly/Reassembly – Bottom, Middle of MicroBlender

10.1 Using blender alarm wrench (P/N 10138), unscrew alarm cap.

10.2 Remove diffuser foam and discard.

10.3 Remove spring.

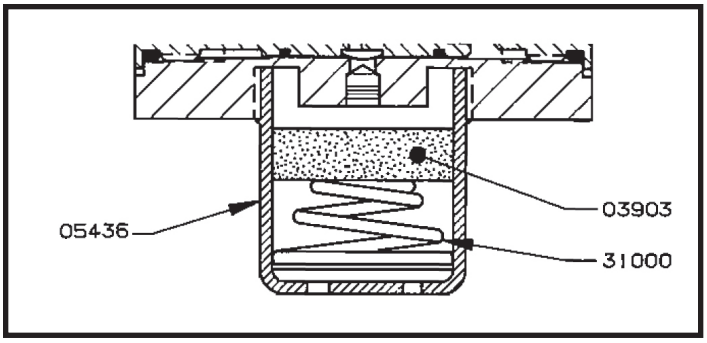

Figure 17

Alarm Cap Reassembly

Replacement parts

Part No.	Qty.	Description
03903	1	Diffuser
05436	1	Alarm Cap

10.4 Install spring (P/N 31000) with its wide base on top of reed inside alarm cap (P/N 05326).

10.5 Place diffuser (P/N 03903) into alarm cap above spring.

10.6 Check alarm assembly for proper audible function.

10.7 Set alarm assembly aside for final assembly.

11.0 Alarm Check Valve Disassembly/ Reassembly – Rear of MicroBlender

11.1 With spanner wrench (P/N 03849) remove cap from rear of valve block.

11.2 Remove and discard O-ring from cap.

11.3 Using a 5/32" Allen wrench, remove checkball retainer, rubber checkball and spring.

11.4 Remove and discard O-ring and rubber checkball.

Clean all parts with an ultrasonic cleaner. Ensure all passages are blown completely dry before beginning reassembly.

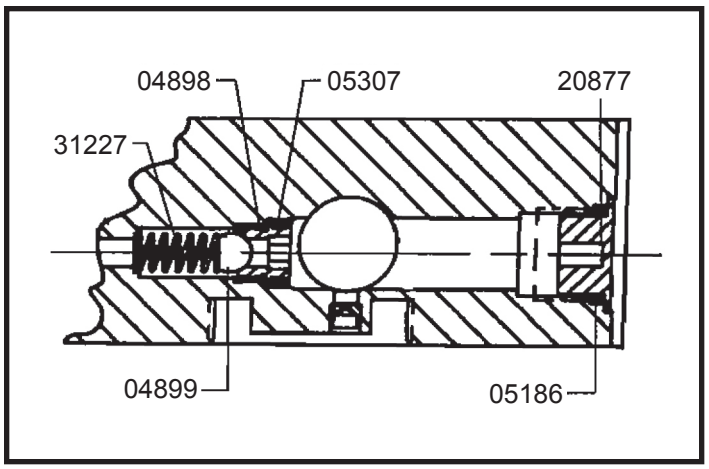

Figure 18

Alarm Check Valve Reassembly

Replacement parts:

Part No.	Qty.	Description
04899	1	Rubber Checkball
05186	1	O-ring
05307	1	O-ring

11.5 Using lubricant (P/N 00631), lubricate O-ring (P/N 05186) and install on cap (P/N 20877).

11.6 Using lubricant (P/N 00631), lubricate O-ring (P/N 05307) and install in groove on checkball retainer (P/N 04898).

11.7 Inspect new rubber checkball (P/N 04899) to ensure that it is spotless, clean and not damaged by scratches, nicks or flat spots. Lubricate lightly with lubricant (P/N 00631).

11.8 Set rubber checkball, checkball retainer assembly, spring (P/N 31227) and cap assembly aside for final assembly.

12.0 Valve Block

12.1 Clean valve block with an ultrasonic cleaner. Ensure all passages are blown completely dry before assembly.

Inspect for any sign of excessive wear, damage, or any condition that may affect proper function.

Sequence/Index of Final Assembly

13. Alarm Check Valve Assembly
14. Front/Rear Seat Assembly
15. Auxiliary Bypass Assembly
16. Muffler
17. Outlet Cap
18. Right Side Outlet Assembly
19. Left Side Outlet Assembly
20. Front/Rear Seat Leak Test
21. Balance Block
22. Air Inlet
23. Oxygen Inlet Assembly
24. Alarm Cap Assembly

Low Flow MicroBlender Final Assembly

Caution: Using lubricant (P/N 00631) lightly lubricate all threaded components with the exception of Rear Seat (P/N 03927).

13.0 Alarm Check Valve Assembly

13.1 Position blender resting on front surface with rear of valve block facing upwards.

13.2 Install spring (P/N 31227), place lubricated rubber checkball (P/N 04899) on spring.

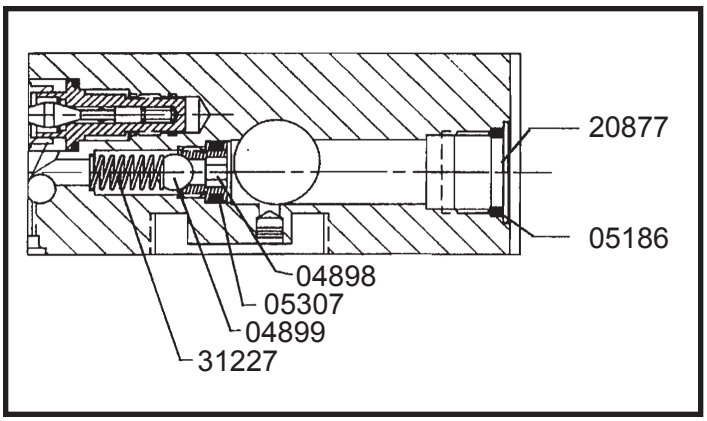

Figure 19

13.3 Using a 3/16" Allen wrench, install check valve retainer (P/N 04898). Verify that O-ring (P/N 05307) is lightly lubricated prior to installing retainer. Torque to 30 in/lb.

13.4 Using spanner wrench (P/N 03849), install cap (P/N 20877), verify O-ring (P/N 05186) is lightly lubricated. Torque to 30 in/lb.

14.0 Front and Rear Valve Seat Assembly– Front of Valve Block

14.1 Position blender with front surface facing upwards.

14.2 Install rear seat valve (P/N 03927) with lubricated O-ring (P/N 07849) and inserted spring (P/N 05163B) through front port.

14.3 Using a 3/16" Allen driver and torque wrench, secure rear seat in place, with a torque tension of 25 in/lb.

14.4 Carefully insert large shoulder of clean bypass poppet valve (P/N 03929) into rear seat. Shorter, dimpled end interfaces with ball (P/N 03931).

Note: *Do not use lubricant or any other substance as a means of securing ball into valve stem. The ball joint interface, consisting of ball (P/N 03931), stem (P/N 03928) and poppet valve (P/N 03929), MUST be kept clean and free of contaminants to INSURE accurate calibration.*

14.5 By hand, install front seat assembly (P/N 03926) into valve block opening. Using a spanner wrench (P/N 03849), rotate front seat until last O-ring (P/N 00193) is just inside valve block.

WARNING: Do not pressurize system unless O-ring (P/N 00193) on front valve seat threads is just inside surface of valve block. If not, seat can be forcefully ejected.

14.6 Ensure that valve stem O-ring (P/N 00306) is situated just inside front seat assembly (P/N 03926).

14.7 Align the dowel pins in front plate assembly (P/N 03814) with two holes in valve block front surface. Gently push front plate against blender front surface.

14.8 Loosely hand fasten nut (P/N 03819) with wider shoulder against front plate. DO NOT install O-ring (P/N 05279) in groove at this time.

14.9 Install control knob with black pointer against 21% O_2 stop, at left side of valve block.

14.10 Using a 9/32" nut driver, lightly tighten collet nut on control knob assembly to valve stem.

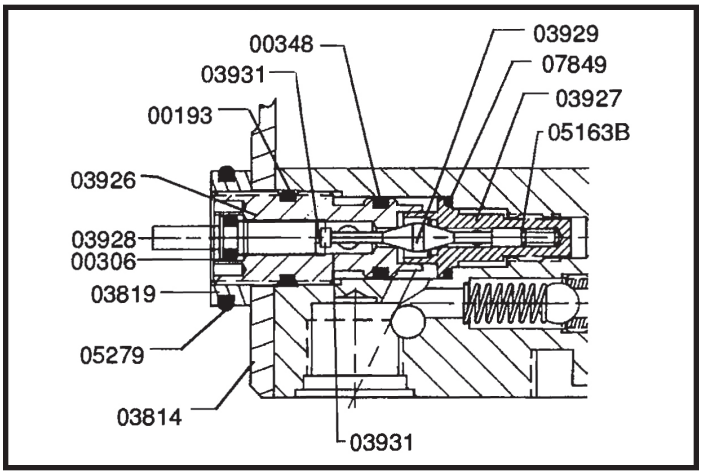

Figure 20

15.0 Alarm Bypass Assembly— Left/Right Side, Rear of Valve Block

15.1 Position blender resting on its top side. After verifying all O-rings are lubricated, insert assembled bypass sleeve (P/N 04897) into valve block. Using spanner wrench (P/N 03849), secure sleeve into valve block. Torque to 30 in/lb.

Caution: Be extremely careful not to damage O-rings (P/N 30514/04639B*) during bypass sleeve (P/N 04896) installation.
*See Appendix: MicroBlender Bypass/ Alarm Sleeve.

Note: *Ensure that bypass poppet valve (P/N 21984) with two (2) lubricated O-rings (P/N 05307) is inside sleeve.*

15.2 Install one spring (P/N 03817A) through bypass sleeve into bypass poppet valve port.

Note: *Ensure spring (P/N 03817A) is positioned into the recess of the bypass poppet (P/N 21984).*

15.3 Using an 1/8" Allen wrench, screw bypass adjuster (P/N 20895) with lightly lubricated O-ring (P/N 00144) into bypass sleeve until adjuster is slightly recessed into sleeve.

15.4 Position blender to rest on bypass sleeve side and install bypass seat (P/N 04896) with lubricated O-ring (P/N 01943), using spanner wrench (P/N 03849), secure seat to valve block. Torque to 30 in/lb.

15.5 Carefully insert 1/8" Allen wrench through bypass seat (P/N 04896) into bypass poppet valve. Push bypass poppet against spring (P/N 03817A) and check for smooth movement and recoil action.

15.6 Install spring (P/N 03817A) through bypass seat (P/N 04896) into the recess in bypass poppet valve (P/N 21984).

15.7 Using an 1/8" Allen wrench, screw bypass adjuster screw (P/N 20895) with lubricated O-ring (P/N 00114) into bypass seat, until adjuster is slightly recessed into valve seat.

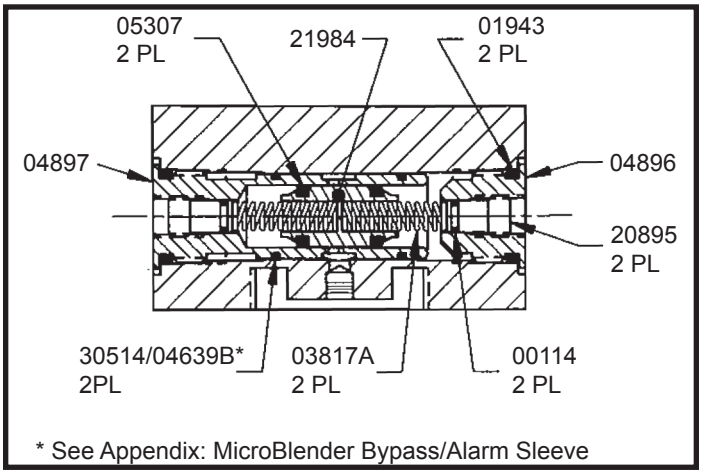

Figure 21

16.0 Muffler Assembly – Bottom, Center of Valve Block

16.1 Install one (1) muffler (P/N 03319) into valve block bleed port.

16.2 With a small screwdriver, secure the star retainer (P/N 003314) over the muffler.

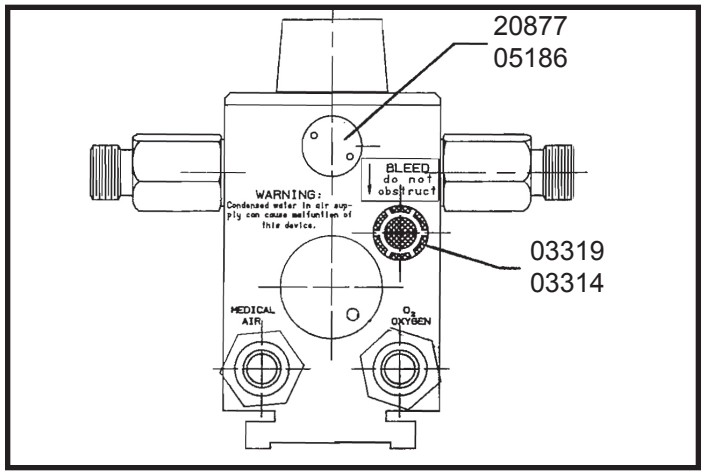

Figure 22

17.0 Outlet Cap – Bottom, Front of Valve Block

17.1 Using spanner wrench (P/N 03849), secure outlet cap (P/N 20877) with lightly lubricated O-ring (P/N 05186) into valve block. Torque to 30 in/lb.

18.0 Auxiliary Outlet – Right side, Front of Valve Block

18.1 Position blender assembly on its side (auxiliary outlet port facing up), then install spring (P/N 03810) into bottom of recess in auxiliary outlet valve block port.

Note: *Auxiliary outlet spring is longer than primary outlet spring.*

18.2 Install auxiliary outlet housing (P/N 03930) and poppet into auxiliary outlet port on valve block and hand tighten in place.

18.3 Using an 11/16" open end wrench, tighten assembly to valve block. Torque to 10 ft/lb.

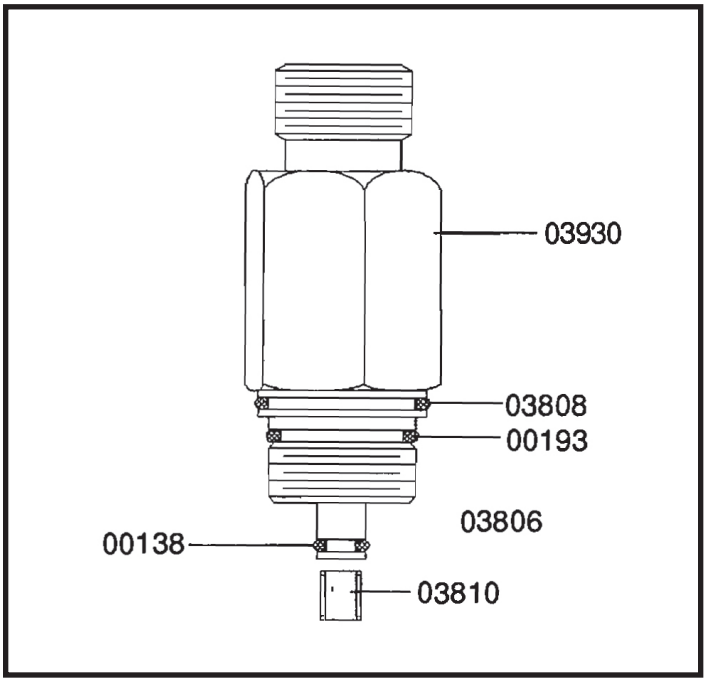

Figure 23

19.0 Primary Outlet Assembly – Left Side, Front of Valve Block

19.1 Position blender assembly on its side, with primary outlet port facing upwards. Install primary spring (P/N 03310) in center of primary outlet cavity bottom.

Note: *Primary outlet spring is shorter than auxiliary outlet spring.*

19.2 After verifying O-rings are lubricated, install primary outlet housing and poppet into primary outlet port on valve block and hand tighten in place.

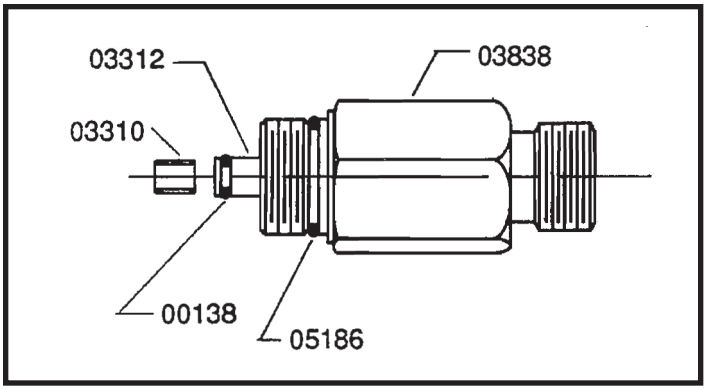

Figure 24

19.3 Using 11/16" wrench, tighten assembly to valve block. Torque to 10 ft/lb.

20.0 Front and Rear Seat Leak Test

20.1 Connect gas supply source(s) 0-80 PSIG (0-5.62 kg/cm^2) pressure regulator(s) pressure test tube(s) (P/N 10102) leak test tube (P/N 10101) and sampling beaker half way filled with water, to valve block as shown in Figure 25.

20.2 Adjust O_2 pressure regulator between 10-15 PSIG (0.70-1.05 kg/cm^2). Air regulator remains OFF (CLOSED).

Note: *Compressed air may be utilized for seat leak test.*

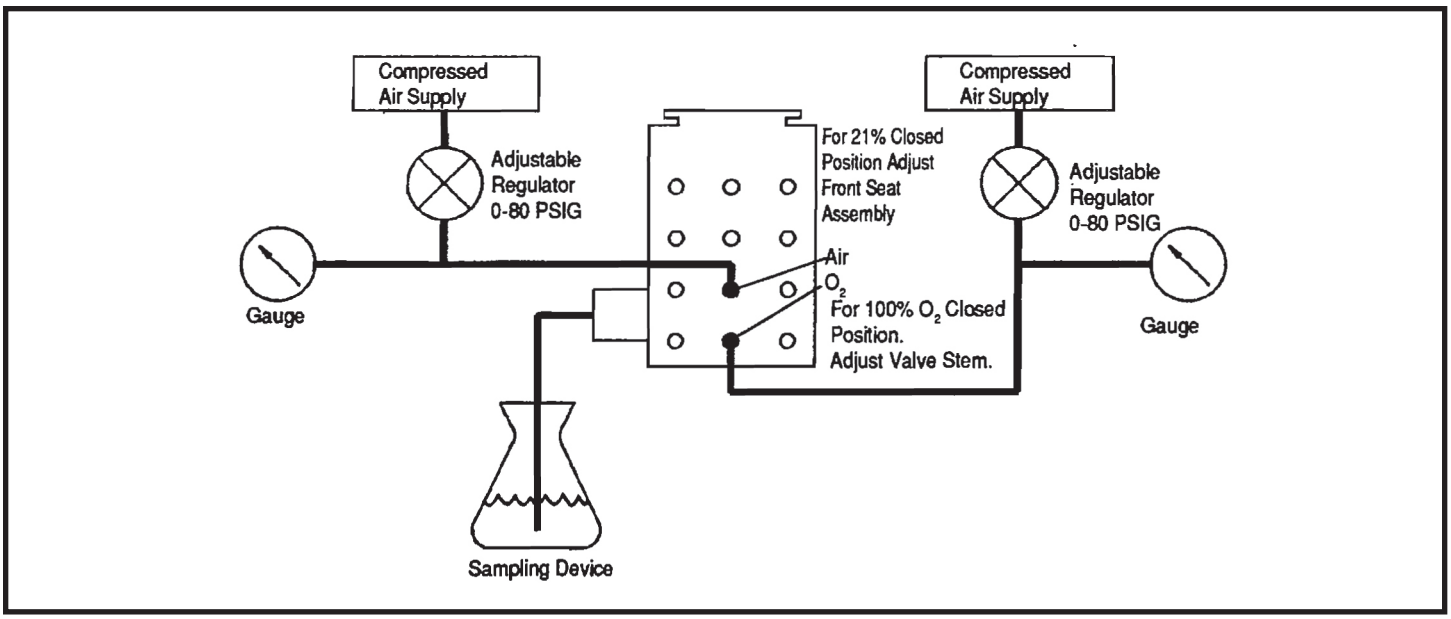

Figure 25

20.3 Slowly turn blender valve stem (P/N 03928) clockwise, until bubbles appear on water surface.

20.4 Then turn valve stem counterclockwise until bubbles just stop. A maximum leak of 4 bubbles per minute is acceptable.

Note: *If bubbling continues at a rate greater than 4 bubbles per minute, either the front seat or valve stem are damaged and should be replaced.*

20.5 Carefully install O_2 selection knob with black pointer against left side stop (21% O_2), and secure knob collet nut with 9/32" nut driver. Turn oxygen supply source OFF (closed).

20.6 Carefully rotate O_2 selection knob clockwise until black-pointer rests against right side stop (100% O_2).

Caution: Extreme care must be taken during this procedure. Any resistane to rotation is likely to be valve contact with rear seat. Further turning of knob will force the valve into the rear seat making subsequent calibration difficult.

Note: *If unable to fully rotate knob to right side stop (100% O_2), return the knob to the left side stop (21%), and remove the knob. With spanner wrench (P/N 03849), rotate the front seat (P/N 03926) counterclockwise approximately one half (1/2) turn, and return to step 20.2.*

20.7 Carefully remove O_2 selection knob, make certain not to upset or change valve stem position.

20.8 Adjust air pressure regulator between 10-15 PSIG (0.70-1.05 kg/cm^2).

20.9 Using spanner wrench (P/N 03849), carefully and slowly, turn front seat (P/N 03926) clockwise until bubbling at water

surface just stops. STOP adjusting seat, the very moment bubbling ends. Be aware that bubbling may continue after seat and valve have made contact. A maximum leak of 4 bubbles per minute is acceptable.

Note: *If bubbling continues at a rate greater than 4 bubbles per minute, either the rear seat or valve stem are damaged and should be replaced.*

20.10 Using an 11/16" wrench, secure nut (P/N 03819) checking that seat position has not changed during tightening of nut, by insuring that bubbling has just stopped and does not reappear. Torque nut to 40 in/lb.

Note: *Verify front plate (P/N 03814) is aligned with valve block.*

20.11 Install O-ring (P/N 05279) on nut. Carefully reinstall O_2 selection with pointer at right side (100% O_2) stop. Torque collet nut to 4 in/lb.

20.12 Rotate knob counter clockwise to verify left hand (21% O_2) stop is bubbling at a rate of less than 4 bubbles per minute. Install cap on knob.

21.0 Balance Block Assembly— Top of Valve Block

21.1 Assemble four lubricated O-rings (P/N 00138) each, to two balance block assemblies (P/N 03892).

21.2 Using a 5/32" Allen wrench and a torque wrench, secure the two balance block assemblies to the valve block with four screws (P/N 3826). Tighten screws to 60 in/lb.

Note: *Align balance block assemblies squarely with valve block prior to tightening in place.*

22.0 Air Inlet Assembly – Bottom, Left Rear of Valve Block

22.1 Install duckbill check valve (P/N 03895) in air inlet port with bill facing inside cavity.

22.2 Place washer (P/N 03897) on top of duckbill check valve. Raised step fits into duckbill.

Note: *Lightly lubricate both sides of washer to prevent binding or twisting between duckbill check valve and nylon cone inlet filter.*

22.3 Place large diameter end of nylon cone inlet filter (P/N 06804) into air inlet port on valve block.

Note: *Install air inlet fitting (P/N 03833) with lubricated O-ring (P/N 03808) into air inlet port on valve block and hand tighten in place.*

22.4 Using a 3/4" wrench, secure air inlet into valve block. Torque to 10 ft/lb.

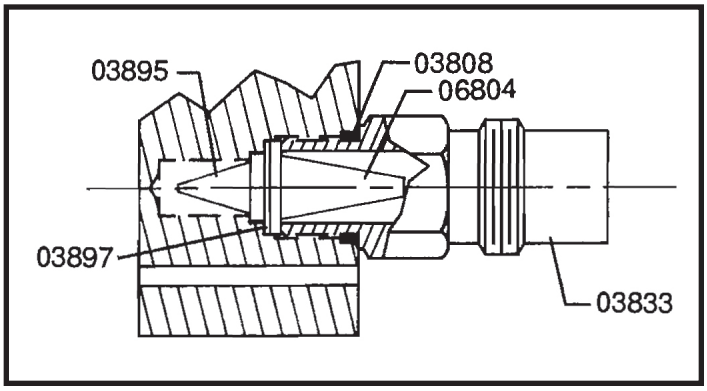

Figure 26

23.0 Oxygen Inlet Assembly – Bottom Rear, Right of Valve Block

23.1 Hand tighten oxygen inlet assembly into valve block port.

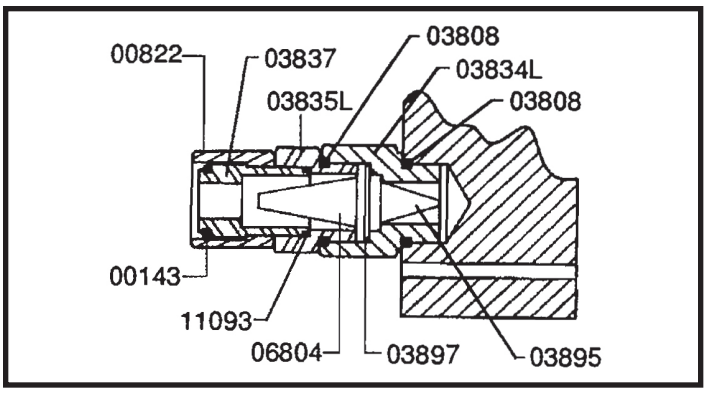

Figure 27

Note: *This assembly threads into the block with a left hand thread. Turn counterclockwise to tighten. Single groove on nut indicates left hand thread.*

23.2 With a 3/4" wrench secure assembly to valve block. Torque to 10 ft/lb.

24.0 Alarm Cap Assembly

24.1 From below valve block, carefully install alarm cap assembly into valve block. Hand tighten only.

C. Set Up Procedure for Testing

The Low Flow MicroBlender should be tested in a system which closely duplicates the conditions of use for which the blender was designed. Illustrated below is a schematic diagram of the system that should be used to test the Low Flow MicroBlender.

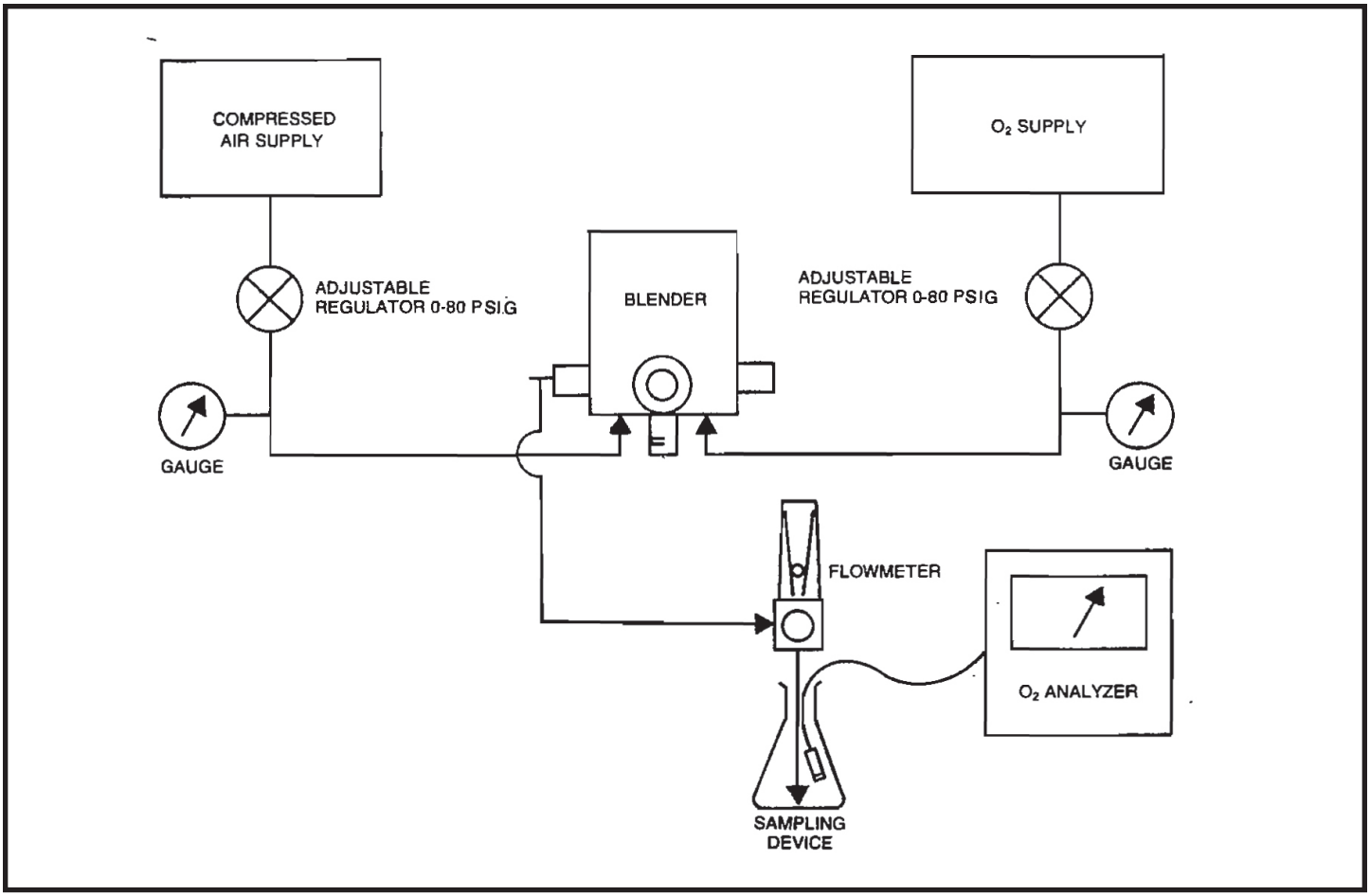

Figure 28

1. Calibration Tools/Equipment

Thin Bladed Screwdriver or Knife

1/8" Allen Wrench

9/32" Nut Driver

Spanner Wrench (P/N 03849)

11/16" Open End Wrench

Oxygen Regulator (2 Stage, Adjustable 0-80 PSIG [0-5.60 kg/cm^2])

Air Regulator (2 Stage, Adjustable 0-80 PSIG [0-5.60 kg/cm^2])

Oxygen Flowmeter (0-35 LPM)

90° Elbow Adapter (P/N 2688-331)

1" Crooked Neck Pole or equivalent

Oxygen Analyzer (analyzer should read in tenths to ensure accuracy of calibration)

Female Post Bracket (P/N 04322)

Oxygen Sampling Hose (P/N 07572)

Tapered Nipple (P/N 32042)

1 1/8" Open End Wrench

7/8" Open End Wrench

2. Air/Oxygen Setup

- The gas supplies must be clean and dry and have the ability to generate 80 PSIG (0-5.60 kg/cm^2) for both air and oxygen inlet pressures.
- When high pressure tanks are utilized, blow potential debris from the valve; quickly open and close each valve to prevent debris from entering the test equipment.
- Connect recommended adjustable air and oxygen regulators to each gas supply, securing with a 1 1/8" open end wrench.
- Turn the oxygen and air regulator control knobs to full counterclockwise closed position.
- Secure the air and oxygen high pressure hoses to each regulator using applicable wrenches.

3. Oxygen Analyzer Setup/ Calibration

- The accuracy of the calibration of the Low Flow MicroBlender will depend heavily upon the accuracy of the oxygen analyzer.
- The oxygen analyzer should have a response time of 10 seconds or less. The analyzer should read in tenths and ideally be of the digital type.
- Calibrate the oxygen analyzer according to the manufacturer’s procedure.

4. Test Equipment Setup

- Secure a female post bracket (P/N 04322) to a 1-inch diameter pole.
- Install the built-in male post bracket on the Low Flow MicroBlender into the female post bracket on the pole.
- Using 7/8" and 11/16" open end wrenches, secure the air and oxygen high pressure hoses to the Low Flow MicroBlender inlets.
- Attach and secure flowmeter, in upright position, to left side outlet.

Note: *Insure flowmeter is turned OFF.*

- Secure tapered nipple (P/N 32042) and hex nut (P/N 00822) to flowmeter outlet.

- Attach one end of sampling hose (P/N 07572) to flowmeter and other end to bifurcation (P/N 01003). Ensure one-way valve (P/N 05537) is secured into remaining large opening of bifurcation. Attach remaining outlet of bifurcation to oxygen analyzer probe.
- The system is now ready for calibration.

D. Calibration Procedure – Low Flow MicroBlender

1.0 Proportioning Valve

Note: *Proportioning Valve endpoints are set by following final assembly procedure 20.0, Front and Rear Seat Leak Test (page XX).*

1.1 Turn air and oxygen sources ON. Adjust both regulators to a static 50 PSIG and adjust flowmeter to 3 LPM.

1.2 Rotate control knob counterclockwise to 21% stop, allow analyzer to stabilize.

Perform the following checks:

Knob Setting	Pressure Oxygen/Air	Oxygen Concentration
21	*50 PSIG/50 PSIG	21.0% - 22.0%
30	*50 PSIG/50 PSIG	27.0% - 33.0%
60	*50 PSIG/50 PSIG	57.0% - 63.0%
90	*50 PSIG/50 PSIG	87.0% - 93.0%
100	*50 PSIG/50 PSIG	99.0% - 100%
** = 3.52kg/cm² / 3.52 kg/cm²*		
30	*50 PSIG/40 PSIG	27.0% - 33.0%
60	*50 PSIG/40 PSIG	57.0% - 63.0%
90	*50 PSIG/40 PSIG	87.0% - 93.0%
** = 3.52kg/cm² / 2.81 kg/cm²*		
30	*50 PSIG/60 PSIG	27.0% - 33.0%
60	*50 PSIG/60 PSIG	57.0% - 63.0%
90	*50 PSIG/60 PSIG	87.0% - 93.0%
** = 3.52kg/cm² / 4.22 kg/cm²*		

If concentrations meet specifications, continue on. If concentrations do not meet specifications, repeat Step 20.1 – 20.12 in Final Assembly Procedure.

1.3 Adjust control knob at 60% oxygen and set air/oxygen pressures each at 50 PSIG (3.52 kg/cm^2).

1.4 Remove flowmeter adapter and flowmeter from primary outlet of blender.

1.5 Connect the flowmeter with adapter to the auxiliary outlet on the right side.

1.6 Adjust flowmeter to 0.5 LPM and check oxygen analyzer. Reading should be between 57.0% - 63.0%.

1.7 Insert bleed test tube (P/N 10108) assembly into bleed port at bottom of valve block. The bleed flow should read 2.5 to 3.5 LPM.

Note: *Should blender not meet this specification, 1.6 or 1.7, inspect bleed orifice in auxiliary outlet or bleed orifice in valve block for occlusion.*

1.8 Increase air pressure from 50 PSIG (3.52 kg/cm^2) to 60 PSIG (4.22 kg/cm^2). Oxygen percent on oxygen analyzer should read 57% - 63%.

1.9 Lower air pressure from 60 PSIG (4.22 kg/cm^2) to 40 PSIG (2.81 kg/cm^2). Oxygen percent on oxygen analyzer should read 57% - 63%.

Repeat steps 1.8 and 1.9 by increasing or decreasing oxygen supply pressure

1.10 Remove bleed test tube assembly from bleed port.

2.0 Alarm Calibration

The alarm system is designed to sound an audible tone if the inlet pressures are different by 20 PSI (1.41 kg/cm^2) or more, such as if either source gas failed.

When the Low Flow MicroBlender is in the alarm phase, the remaining or higher pressure gas is routed to the blender outlet. Some gas will also flow through the alarm reed valve creating an audible tone. This gas then exits out the bottom of the blender module.

2.1 Ensure air and oxygen regulators are adjusted to a static 50 PSIG (3.52 kg/cm^2), align control knob indicator with 60%, ensure flowmeter is connected to primary outlet and is set to 3 LPM.

2.2 Reduce air pressure until the audible alarm sounds. The air pressure should read 30 ± 2 PSIG (2.11 ± 0.14 kg/cm^2).

- If alarm sounds above this pressure, rotate adjuster clockwise, left side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.1 ± 0.14 kg/cm^2)
- If alarm sounds below this pressure, rotate adjuster counterclockwise, left side of blender, with an 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm^2).

2.3 Raise air pressure slowly. Alarm/bypass should reset to normal function when pressure reaches 44 PSIG (3.10 kg/cm^2) or below.

2.4 Restore air pressure to 50 PSIG (3.52 kg/cm^2) and reduce oxygen pressure until the audible alarm sounds. The oxygen pressure must be 30 ± 2 PSIG (2.11 ± 0.14 kg/cm^2).

- If alarm sounds above this pressure, rotate adjuster clockwise, right side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm^2).
- If alarm sounds below this pressure, rotate adjuster counterclockwise, right side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm^2).

2.5 Raise oxygen pressure slowly. Alarm/bypass should reset to normal function when pressure reaches 44 PSIG (3.10 kg/cm^2) or below.

3.0 Outlet Flow Test

3.1 With 0-35 LPM flowmeter connected to auxiliary outlet fitting, set O^2 selection knob at 60% and oxygen/air supply sources at 50 PSIG (3.52 kg/cm$_2$) static.

3.2 Turn flowmeter control knob completely open. Flowmeter should read a minimum of 30 LPM.

3.3 Reduce air pressure to 0 PSIG (0 kg/cm^2). Flowmeter should read a minimum of 30 LPM. Audible alarm should sound.

3.4 Increase air pressure to 50 PSIG (3.52 kg/cm^2) and rotate O_2 selection knob against 21% stop. Flowmeter should read a minimum of 30 LPM.

3.5 Rotate O^2 selection knob against 100% stop. Flowmeter should read a minimum of 30 LPM.

3.6 Set O_2 selection knob at 60%. Reduce O_2 pressure to 0 PSIG (0 kg/cm^2). Flowmeter should read a minimum of 30 LPM. Audible alarm should sound.

3.7 Remove flowmeter form auxiliary outlet and connect to primary outlet fitting. Repeat steps 3.2 through 3.6.

3.8 Remove flowmeter from primary outlet fitting.

4.0 Inlet Check Valve Leak Test

4.1 Disconnect oxygen hose assembly from gas source. Remove all connections from blender outlets to ensure that there is no outlet flow from blender.

4.2 Place free end of oxygen supply hose under water to check for leakage past oxygen inlet check valve. Gradually increase air supply pressure from 0 to 80 PSIG (0 to 5.62 kg/cm^2).

4.3 Reverse above procedure to check for leakage past air inlet check valve.

4.4 Replace duckbill check valves (P/N 03895) in inlets if bubbles indicate any leakage.

4.5 Disconnect both high pressure lines from blender, remove blender from test assembly. Calibration is now complete.

Section 5:
Performance Check

Prior to placing the Low Flow MicroBlender into clinical use, perform the following test:

After satisfactory completion of the Performance Check, refer to Section 7, Maintenance and Servie Policy.

WARNING: If the Low Flow MicroBlender does not function as described below, contact CareFusion technical support. Do not use the blender until correct performance is verified. Use Setup Procedure as described in Section 5.

Blender Adjustment	**Blender Response**
1. Connect 50 ± 5 PSIG (3.52 ± .035 kg/cm^2) air/oxygen source gases. Adjust control knob to 60% . Connect flowmeter to auxiliary outlet, set flow to 5 LPM minimum.	1. Alarm/Bypass should not activate.
2. Connect an oxygen flowmeter to auxiliary outlet to activate auxiliary bleed and disconnect 50 PSIG (3.52 kg/cm^2) air souce from blender. ***Note:*** *The blender must be flowing gas for the alarm to activate.*	2. Audible alarm
3. Reconnect 50 PSIG (3.52 kg/cm^2) air source to blender	3. Audible alarm stops. Verify oxygen concentration (57% to 63%) with an oxygen analyzer.
4. Disconnect 50 PSIG (3.52 kg/cm^2) oxygen souce from blender.	4. Audible alarm
5. Reconnect 50 PSIG (3.52 kg/cm^2) oxygen source from blender.	5. Audible alarm stops. Verify oxygen concentration (57% to 63%) with an oxygen analyzer.
6. Set oxygen flowmeter at 1 LPM.	6. Oxygen analyzer should read 57% to 63% when measured from the flowmeter outlet.

Section 6:
Cleaning and Sterilization

Blenders manufactured by Carefusion are compatible with ethylene oxide gas sterilization.

Caution: Do not steam autoclave or otherwise subject Low Flow Micro-Blender to temperatures over 145°F (62°C).

Caution: Do not immerse assembled MicroBlender into liquid decontamination agents.

Caution: Do not use any strong solvent or abrasive cleaners on labels.

Use an all purpose liquid cleaner on exterior.

Section 7:
Maintenance and Service Policy

> Caution: The Low Flow Micro-Blender should be serviced or calibrated by a CareFusion trained hospital/dealer service technician.

The Low Flow MicroBlender should be subject to a regular maintenance and service program, including periodic accuracy checks between normal overhauls. Although the frequency of these tests will vary depending on degree and severity of service, it is recommended that they be performed at least once every six (6) months under the best conditions.

Elastomer components such as diaphragms and O-rings are designed to function satisfactorily for a minimum of two (2) years. The need for cleaning and replacement will depend on gas line conditions and will be indicated by the blender not meeting its specification performance. CareFusion recommends that complete maintenance be performed at least every two (2) years. Elastomer components will not function indefinitely, and the probability of their causing malfunctions increases progressively after two (2) years of service.

Section 8:
Replacement Parts

	Part Number	Description	Quantity Required
*	00114D	O-ring (.117 x .040)	2
*	00138D	O-ring (.176 x .070)	10
*	00143D	O-ring (.239 x .070)	1
*	00193D	O-ring (.364 x .070)	2
*	00306D	O-ring (.114 x .070)	1
*	00348D	O-ring (.301 x .070)	1
	00770D	Ball, 3/16" dia.	4
	00822	Nut, 9/16" – 18 Hex	1
*	01943	O-ring (.437 x .070)	2
	03310	Spring, .21 x .16 x .25LG	1
	03312	Poppet Check Valve, Primary	1
*	03314D	Ring, Rtng, Int. .39	1
*	03319	Muffler Bleed	1
	20807	Blender, Balance Block	4
	03806	Poppet Check Valve, Auxiliary	1
	03914A	Block, Vlv MicroBlender, W Plugs	1
*	03808D	O-ring (.4681D x .078)	4
	03809	Conn. Aux. Outlet 02, 1/4 BPT	1
	03810	Spring, .210 x .156 x .437	1
	20895	Bypass Adjuster	2
	21984	Poppet, Bypass .700	1
	03817A	Spring (.148 OD x .500)	2
	03819D	Nut, Front Seat	1
	03825D	Screw, 10-32 x .75 Hex Soc Hd	8
	03826D	Screw, 10-32 x 2.25 Hex Soc Hd	4
	20877	Cap, Balance Block	6
	03833	Air Inlet Connector	1
	03834L	Conn, 9/16 – 18 LH x 9/16 – 18 LH, 02	1
	03835L	Conn, 7/17 – 27 x 9/16 – 18 LH, 02	1
	03837	Nipple, 02 Conn	1
	03838	Hsng, Check Valve, Primary	1
	03854	Knob, Assembly	1
*	03858A	Diaphragm, Assembly	2

Replacement Parts

	Part Number	Description	Quantity Required
	03859D	Spring (.118 OD x 450 LG)	1
	03864L	Inlet, 02 DISS	1
	03869A	Auxiliary Outlet Assembly	1
	03870	Primary Outlet Assembly	1
*	03895D	Duckbill Check Valve	2
*	03897D	Washer, Step (.500 D x .171 D)	2
*	03903	Alarm Foam	1
	03926	Front Seat Low Flow	1
	03927	Rear Valve Seat	1
	03928	Stem, Valve Low Flow	1
	03929	Valve, Low Flow	1
	03931	Ball, 1/8" Stainless Steel	1
*	30514/04639B	O-ring (.426 1D x .040)	2
	31227	Spring, 210 x .020 x .55	1
	04896	Cap, Bypass Seat	1
	04897	Bypass Sleeve	1
	04898	Retainer, Checkball	1
*	04899	Ball, Check Rubber	1
*	05163B	Spring (.093 x .053 x .300)	1
*	05186D	O-ring (.414 x .070)	6
*	05279D	O-ring (.614 x .070)	1
*	05307D	O-ring (.239 x .070)	2
	05436	Alarm Retainer Cap Assembly	1
*	06804D	Nylon Cone Filter	2
*	07849D	O-ring (.313 x .051)	1
	31000	Spring	1

The “D” suffix is used when ordering certain parts. These parts come in packages of 10. However, the “Quantity Required” column indicates the number of parts actually required for one Low Flow MicroBlender.

**Indicates parts are contained in Maintenance Kit, P/N 10003.*

Refer to page 7 for component illustration.

Low Flow MicroBlender Overhaul Kit P/N 10003

Part Number	Description	Quantity
00114	O-ring, .117 x .040	2
00138	O-ring, .176 x .070	10
00143	O-ring, .239 x .070	1
00193	O-ring, .364 x .070	3
00306	O-ring, .114 x .070	1
00348	O-ring, .301 x .070	1
01943	O-ring, .437 x .070	2
03314	Starwasher	1
03319	Muffler	1
03808	O-ring, .468 1D x .078	4
03858A	Diaphragm Assembly	2
03895	Duckbill Check Valve	2
03897	Washer, Step	2
03903	Foam Diffuser	1
04639	O-ring, .426 x .040	2
04899	Ball, Rubber, Check Valve	1
05163B	Spring, .093 x .053 x .300	1
05186	O-ring, .414 x .072	7
05279	O-ring, .614 x .070	1
05307	O-ring, .239 x .070	3
06804	Nylon Filter	2
07849	O-ring, .313 x .051	1
33621	Ball, Rubber, 3/16 dia.	4
30514	O-ring, .410 x .0050 nitrile	2
31030	O-ring, .364 x .070	1
04639B	O-ring, .429 x .040	2

Section 9:
Product Specifications

Low Flow MicroBlender

Size ..... (not including inlet and outlet fittings)	3 1/2" (9 cm) H x 2 1/4" (5.6 cm) W x 4 1/2" (11.5 cm) D
Weight	2 3/4 lbs. (1.25 kg)
Gas Supply Pressure (Air and O_2)	30 - 75 PSIG (2.11 kg/cm^2 - 5.27 kg/cm^2) (air and oxygen must be within 20 PSI differential). The Low Flow MicroBlender will maintain stated accuracy at supply pressures provided the differential between supply pressures does not exceed 10 PSIG (0.70 kg/cm^2). Output flow rate will be diminished if either supply pressure is below 50 PSIG (3.52 kg/cm^2) and will be increased if both supply pressures are above 50 PSIG (3.52 kg/cm^2).
Knob Adjustment Range	21 to 100%
Primary Outlet	Left Side Port (Facing unit)
Primary Outlet Flow Range	3 to 30 LPM (no bleed)
Maximum Flow @ 60% knob setting, 50 PSIG (3.52 kg/cm^2) inlet pressure	≥ 30 LPM
Flow @ 21% or 100% knob setting, 50 PSIG (3.52 kg/cm^2) inlet pressure	≥ 30 LPM
Bypass flow (loss of air or O_2) 50 PSIG (3.52 kg/cm^2) inlet pressure of remaining gas	≥ 30 LPM
Auxiliary Outlet	Right Side (facing unit)
Auxiliary Outlet Flow Range	0 to 30 LPM (Bleed 2.5-3.5 LPM)
Accuracy – with inlet gases within 10 PSIG (0.70 kg/cm^2) and each gas pressure greater than 30 PSIG (2.11 kg/cm^2), but less than 75 PSIG (5.27 kg/cm^2)	± 3% of full scale over the stated flow ranges (i.e., 3 percentage points at any reading)

Product Specifications

Alarm/Bypass Activation	20 ± 2 PSIG (1.41 ± 0.14 kg/cm^2) When inlet gas pressures differ by a nominal 20 PSIG (1.41 kg/cm^2) or more provided maximum pressure of either supply gas does not exceed 75 PSIG (5.27 kg/cm^2) or a minimum pressure of 40 PSIG 2.81 kg/cm^2). In other words, one supply gas must remain at 40 PSIG (2.81 kg/cm^2) or above to provide enough gas pressure to operate the alarm in the event the other supply pressure falls to 20 PSIG (1.41 kg/cm^2) or below. There will be no alarm or bypass if the control knob is set to 21% and source oxygen pressure is reduced or turned off. Similarly, if control is set to 100% there will be no alarm if air pressure is reduced or turned off. In either case, the unit will continue to deliver the selected concentration of 21% or 100%. There will be no alarm under condition of 20 PSIG (1.41 kg/cm^2) or greater source pressure differential if unit is not in use (i.e., no output flow or bleed flow).
Alarm Sound Generator	Vibrating Reed
Alarm/Bypass Reset	When inlet pressure differential is 6 PSI (0.42 kg/cm^2) or less
Pressure Drop	Less than 6 PSIG (0.42 kg/cm^2) at 50 PSIG (3.52 kg/cm^2) inlet pressures and 10 LPM flow

NOTE: Product specifications are subject to change without notice.

Section 10:
Warranty

The products of CareFusion Corporation (CareFusion herein) are warranted to be free from defects in materials and workmanship and to meet the published specifications.

The liability of CareFusion under this warranty is limited to replacing, repairing or issuing credit, at the discretion of CareFusion, for the parts that become defective or fail to meet published specifications during the warranty period; CareFusion will not be liable under this warranty unless (A) CareFusion is promptly notified in writing by Buyer upon discover of defects or failure to meet specifications; (B) the defective unit or part is returned to CareFusion, transportation charges prepaid by Buyer; (C) the defective unit or part is received by CareFusion for adjustment no later than four weeks following the last day of the warranty period; and (D) CareFusion's examination of such unit or part shall disclose, to its satisfaction, that such defects or failures have not been caused by misuse, neglect, improper installation, unauthorized repair, alteration or accident.

Any authorization of CareFusion for repair or alteration by the Buyer must be in writing to prevent voiding warranty.

CareFusion warranties as hereinabove set forth shall not be enlarged, diminished or affected by, and no obligation or liability shall arise or grow out of the rendering of technical advice or service by CareFusion or its agents in connection with Buyer's order of the products furnished hereunder.

Limitations of Liabilities

In no event shall CareFusion be liable to Buyer for loss of profits, loss of use, consequential damage or damages of any kind based upon a claim for breach of warranty, other than the purchase price of any defective product covered hereunder.

This warranty does not cover normal maintenance such as cleaning, adjustment or lubrication and updating of equipment or parts. This warranty shall be void and shall not apply if the equipment is used with accessories or parts not manufactured by CareFusion or authorized for use in writing by CareFusion, or if the equipment is not maintained in accordance with a prescribed schedule of maintenance.

The warranty stated above shall extend for a period of one year from date of delivery, with the following exceptions:

1. Electrical components for remote monitoring of physical variables such as temperature, pressure, oxygen saturation or flow are warranted for ninety (90) days from date of receipt.
2. Elastomeric components and other parts or components subject to deterioration over which CareFusion has no control are warranted for sixty (60) days from date of receipt.

The foregoing is in lieu of any other warranty, expressed or implied, including, without limitation, any warranty of merchantability, except as to title, and can be amended only in writing by a duly authorized representative of CareFusion.

Appendix:
MicroBlender Bypass/Alarm Sleeve

If the Bypass/Alarm Sleeve has the Identification groove shown below, part number 30514 O-rings are to be installed in the indicated O-ring grooves.

If the Bypass/Alarm Sleeve does not have the Identification groove, part number 04639B O-rings are to be installed in the O-ring grooves.