



30L Low Flow Air/O₂ Blender



Service Manual

Contact Us for Product Assistance



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AMVEX 30L LOW FLOW AIR/O₂ BLENDER SERVICE MANUAL

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NOTE: This manual is intended as a guide for the servicing and calibration of the 30L Low Flow Air/O₂ Blender.

SECTION 1: INTRODUCTION

The AMVEX 30L Low Flow Air/Oxygen Blenders are intended for non-invasive mixing and delivery of a ratio of medical air and medical oxygen as stand-alone devices or as components of a respiratory support apparatus implemented by trained medical professionals. The main body of the device is constructed of aluminum, and primary flow channels are contained within or between the aluminum pieces. Various internal components that are or can be in contact with the gas or gases include diaphragms, o-rings, check valves, and foam filters. All components are safe for oxygen use.

The AMVEX 30L Low Flow Air/Oxygen Blender can be used in conjunction with:

- Blender Wall Mount
- Blender Mount with Pole Clamp
- Blender Mount with Eclipse® or Fairfield® Equipment Rail Bracket
- Blender Mount with Unimount® Equipment Rail Bracket
- Blender Water Trap with Two 90-Degree Fittings
- Medical Gas Hose

INDICATIONS FOR USE:

The AMVEX 30L Low Flow Air/Oxygen Blender is intended to deliver air and oxygen with a respiratory setting. Oxygen concentrations can be adjusted from 21% to 100%. The blender is designed to operate from a 50 PSIG (3.52kg/cm²) air source and a 50 PSIG (3.52kg/cm²) oxygen source.

Use of this device is restricted to prescription by or direction by a licensed medical practitioner.

NOTE:

Remove from the packaging and inspect for damage. If there is any damage, **DO NOT USE** and contact OHIO MEDICAL (refer to “Contact Us” page).

SECTION 2: OVERVIEW OF THE 30L LOW FLOW AIR/OXYGEN BLENDER OPERATION

The 30L Low Flow Air/O₂ blender mixes medical grade compressed air and oxygen to provide a pressurized gas source ranging from 21% to 100% oxygen.

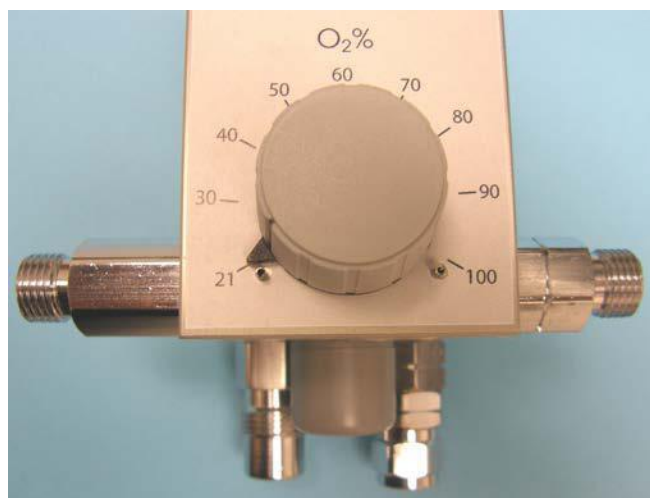


Figure 1

GAS INLETS (FIGURE 2)

The two 30-75 PSIG gas sources enter through the diameter indexed (DISS) air and oxygen inlet connectors located on the bottom, rear of the blender. Each inlet connector incorporates a 30 micron particulate filter. After being filtered, the gases travel through duckbill check valves which prevent possible reverse gas flow to either the air or oxygen supply systems.

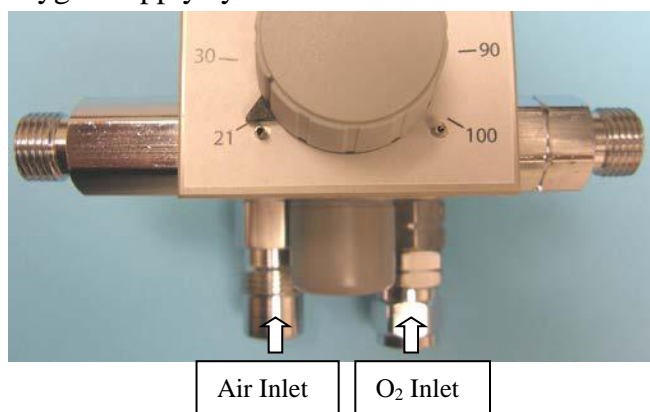


Figure 2

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 to the lower of the two pressures.

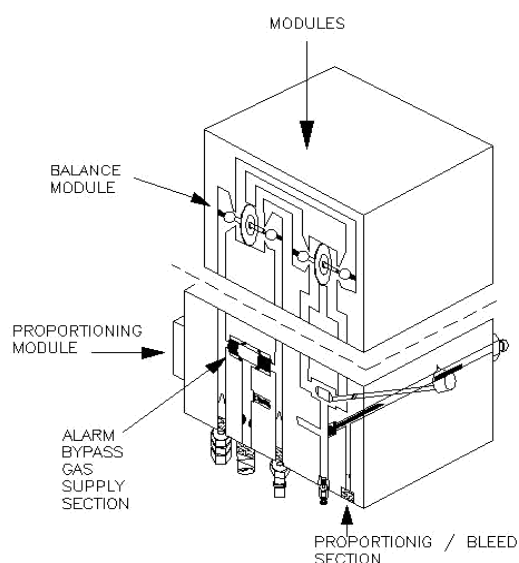


Figure 3
Amvex Air/O₂ Blender Diagram

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.

SECTION 2

OVERVIEW OF THE 30L LOW FLOW AIR/OXYGEN BLENDER OPERATION

One valve seat controls the passage of air and the other valve seat controls the passage of oxygen into the 30L Low Flow Air/O₂ blender outlet. At this point, the two gases have been blended according to the oxygen percentage selected on the oxygen blender control knob.

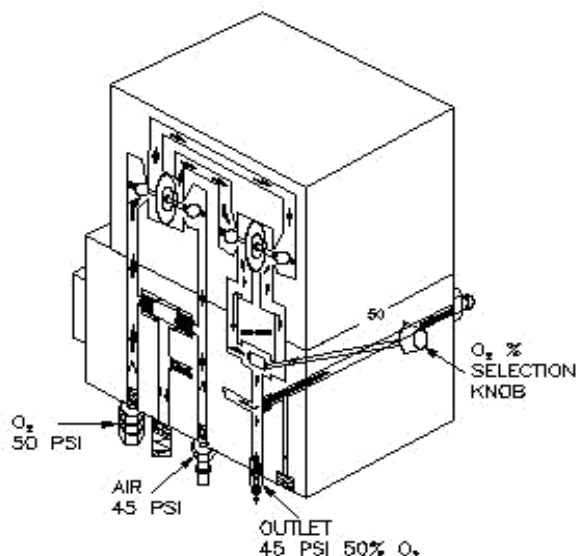


Figure 4

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 clockwise (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/cm²) 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/cm²) or more is detected.

Should both gas pressures (oxygen or medical air) increase or decrease simultaneously, and a 20 PSI

(1.41Kg/cm²) 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.

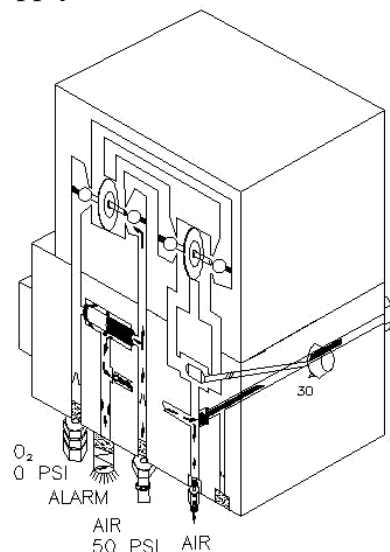


Figure 5

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/cm²). Once a 20 PSI (1.41Kg/cm²) difference is sensed by the poppet, the higher gas pressure will overcome the spring force and pressure the poppet at 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/cm²).

SECTION 2

OVERVIEW OF THE 30L LOW FLOW AIR/ OXYGEN BLENDER OPERATION

If the 30L Low Flow Air/O₂ Blender is set at 21% and the OXYGEN source pressure is reduced sufficiently to produce a 20 PSI (1.41Kg/cm²) 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 30L High-Low Flow Air/O₂ Blender 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 30L Low Flow Air/O₂ Blender should be disconnected when not being used. If left connected to source gases while not being used (i.e. no output flow or bleed flow), the unit will not alarm if a 20 PSI (1.41Kg/cm²) or greater pressure differential develops. If the blender is not in use, an alarm under these conditions may be an unnecessary distraction or nuisance.

GAS OUTLETS (FIGURE 6 and FIGURE 7)

The primary gas outlet is utilized for unmetereed low 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.

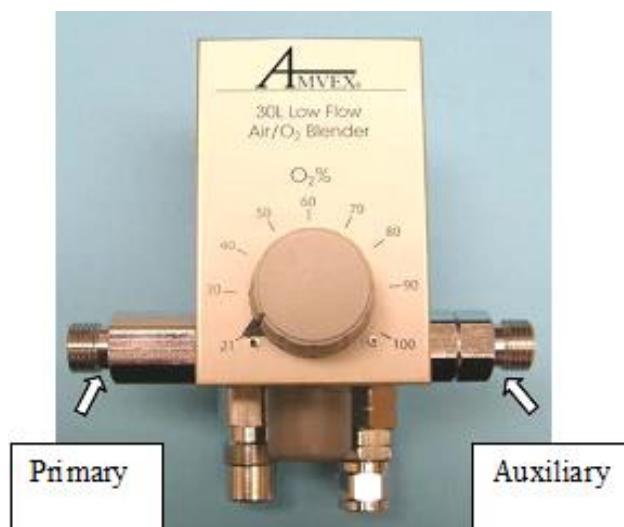


Figure 7

The auxiliary outlet is located on the right side of the 30L Low Flow Air/O₂ Blender 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 attained. The bleed flow exits the blender through a bleed port located on the bottom as shown in Figure 6. This bleed allows for applications utilizing low flows down to 3 LPM.

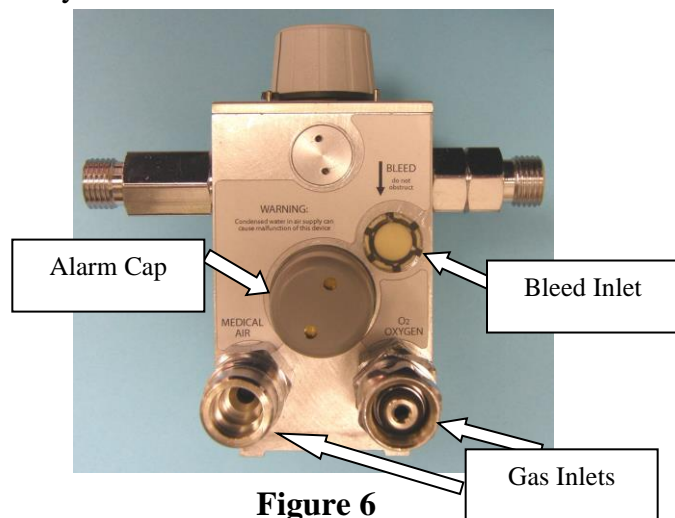




Figure 6

SECTION 3: WARNINGS, CAUTIONS & NOTES

The 30L Low Flow Air/O₂ Blender should be operated by trained, qualified medical personnel under direct supervision of a licensed physician. Before clinical application, the WARNINGS, CAUTIONS and NOTES should be read and understood.

Safety Symbol	Content
 WARNING	Indicates potential serious adverse reactions and safety hazards which if not avoided could result in death or serious injury
 CAUTION	Defines any special care to be exercised by the user for the safe and effective use of the device and the care necessary to avoid damage to the device that may occur as a result of use or misuse
NOTE	Provides additional information to clarify an explanation or instruction for the safe and effective use of the device

WARNINGS

- Use this 30L Low Flow Air/Oxygen Blender only for its Intended Use as described in this manual.
- Identify existing conditions that could adversely affect the operator or patient.
- **DO NOT** use this device in an MRI environment.
- Always use medical grade gasses that meet the requirements of ANSI/CGA G7.1-2011 Grade D or better and 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.
- An air inlet filter/ water trap is recommended for use with the 30L Low Flow Air/Oxygen Blender. Filters can become restricted in a manner that can cause insidious reduction in the flow capability of the blender and lead to malfunction.
- **DO NOT** occlude or obstruct the bleed port or muffler on the bottom of the blender.
- Adjustment of oxygen concentrations must be verified using an oxygen analyzer.
- **DO NOT** use this 30L Low Flow Air/Oxygen Blender when the alarm is sounding.
- Use recommended lubricants sparingly as lubricant may migrate to unintended parts of the blender and cause it to malfunction.
- The oxygen selector knob does not rotate 360 degrees. Rotating the dial beyond the endpoint settings will damage the 30L Low Flow Air/Oxygen Blender.

SECTION 3

WARNINGS, CAUTIONS & NOTES

CAUTIONS

- U.S. Federal law restricts this device to sale by or on the order of a licensed medical practitioner.
- **DO** close off gas supply sources when the 30L Low Flow Air/Oxygen Blender is not in use and the auxiliary outlet is connected. The continuous gas bleed may drain compressed gas tanks empty.
- Store the 30L Low Flow Air/Oxygen Blender in a clean, dry area when not in use.
- Ensure all connections are tight and leak free.

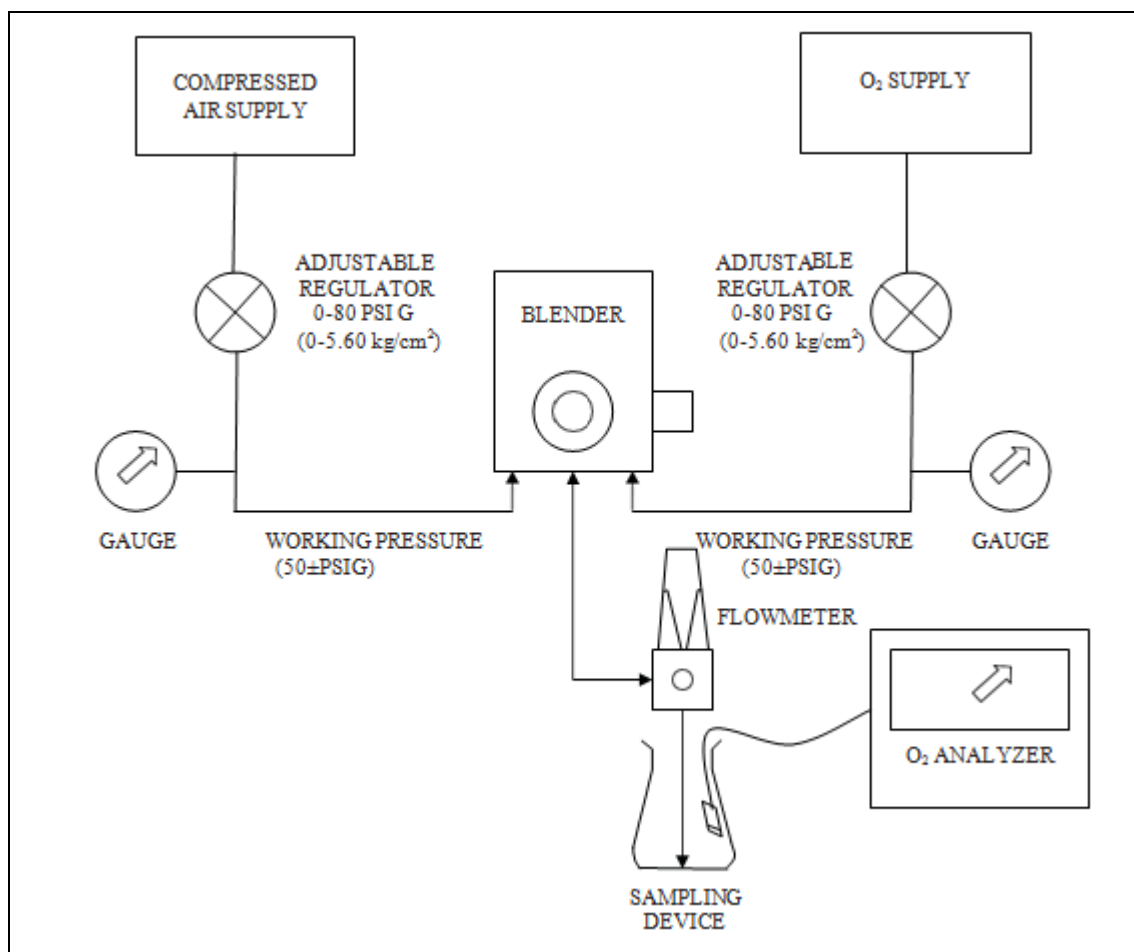
NOTES

- Allow equilibration time for fractional concentration of inspired oxygen (FIO_2) changes before analyzing gas.
- Use pressure regulators that display regulated pressures.
- Compressed gas can contribute to deposits that can obstruct filters. Filters can become restricted in a manner that can cause insidious reduction in the flow capability of the blender and lead to malfunction. It is important to perform preventative maintenance as recommended and more frequently if the gas supply is not known to be clean and/or free of condensed water.

SECTION 4

SETUP PROCEDURE

The 30L Low Flow Air/Oxygen Blender 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 30L Low Flow Air/ Oxygen Blender.



SECTION 5: PERFORMANCE CHECKS

Prior to placing the 30L Low Flow Air/O₂ Blender into clinical use, always perform the following test:



WARNINGS:

- If the 30L Low Flow Air/O₂ Blender does not function as described below. Contact the OHIO MEDICAL (Refer to “Contact Us” page).
- Do NOT use the blender until the correct performance is verified.

BLENDER ALARM BYPASS CHECK	
BLENDER ADJUSTMENT	BLENDER RESPONSE
1. Connect 50±5 PSIG (3.52±0.35 kg/cm ²) air/oxygen source gases. Adjust control knob to 60%. Connect flowmeter to auxiliary outlet, set flow to 3 LPM minimum.	1. Alarm/Bypass should not activate.
2. Connect an oxygen flowmeter to auxiliary outlet to activate auxiliary bleed and disconnect 50PSI (3.52 kg/cm ²) air source from Blender. NOTE: The Blender must be flowing gas for the alarm to activate.	2. Audible alarm.
3. Reconnect 50PSI (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 50PSI (3.52 kg/cm ²) oxygen source from Blender.	4. Audible alarm.
5. Reconnect 50PSI (3.52 kg/cm ²) oxygen source to Blender.	5. Audible alarm stops. Verify oxygen concentration (57% to 63%) with an oxygen analyzer)
6. Verify oxygen flowmeter is set at 3 LPM.	6. Oxygen analyzer should read 57% to 63% when measured from the flowmeter outlet.

SECTION 6: SERVICE & REPAIR

⚠ WARNING:

THE 30L LOW AIR/OXYGEN FLOW BLENDER SHOULD BE SERVICED AND/OR CALIBRATED BY A QUALIFIED AND TRAINED TECHNICIAN.

⚠ CAUTION: Before attempting to service/repair the 30L Low Flow Air/ O₂ Blender, the service person should first be familiar with its design and operation as explained in Section 1 of this manual.

Additional tools and supplies recommended for service/repair

- 5/32" Allen wrench
- 1/8" Allen wrench
- 9/32" Hex nut driver
- 5/32" Allen driver
- 1/8" Allen driver
- 3/4" Deep socket
- 11/16" Deep socket
- 3/4" Open end or adjustable wrenches (2)
- 11/16" Open end or adjustable wrench
- 7/32" Allen wrench
- Small needle nose pliers
- Torque wrench (to 120in/lb)
- 0-10 LPM Flowmeter (1/2 LPM increments)

A. SERVICE/CALIBRATION TOOLS

Special tools (Figure 8) will be required for the service disassembly and assembly of the 30L Low Flow Blender. These products may be obtained from OHIO MEDICAL.

A Maintenance Blender Kit may be ordered by specifying DAOBA-00000-05. This kit includes all parts necessary for periodic preventive maintenance.

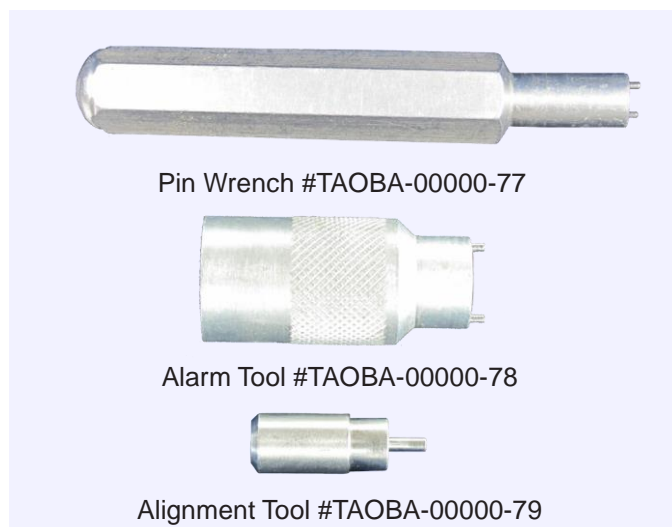


Figure 8

SECTION 6: SERVICE & REPAIR

1.0. BALANCING BLOCKS DISASSEMBLY/REASSEMBLY PROCEDURE (FIGURE 9 and 10)

• BALANCE BLOCK DISASSEMBLY -TOP OF 30L LOW FLOW BLENDER

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.

1.2 Using the pin wrench (P/N: TAOBA-00000-77), remove the block 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 reassembly. Be sure that the poppet seat areas are perfectly clean.

Balance block assembly replacement parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060001	8	O-Ring
10-0700-080007	2	Diaphragm
10-0700-060010	4	O-Ring

• BALANCE BLOCK REASSEMBLY

1.4 Holding Alignment Tool (P/N: TAOBA-00000-79) in hand, place the "A" Block diaphragm onto the alignment tool with the diaphragm cavity facing up.

1.5 Place Balance Block Diaphragm (P/N: 10-0700-080007) into cavity.

NOTE: Make sure poppet pin on diaphragm seats into alignment tool.

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.

1.2 Insert second diaphragm alignment tool into Block "B", making sure the poppet pin on diaphragm seats into alignment tool.

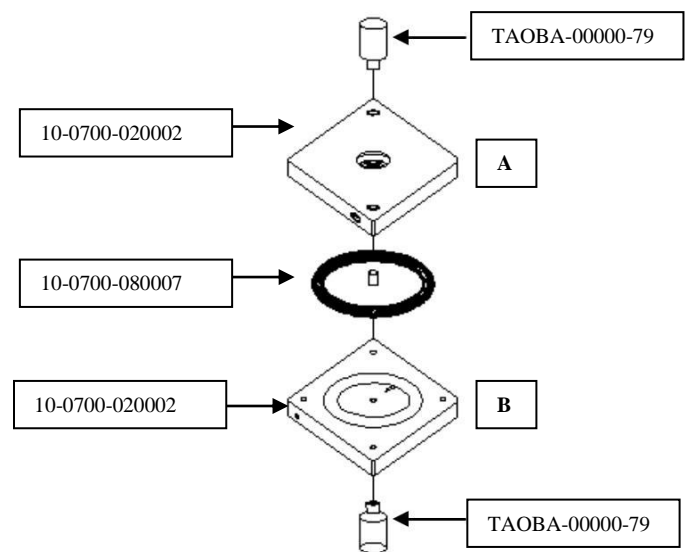


Figure 9

SECTION 6: SERVICE & REPAIR

1.8 Fasten Block “A” and “B” together loosely with two (2) 0.75” socket head cap screws (P/N 10-0700-030009).

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

1.10 Using a 5/32” Allen wrench, tighten the previously installed two (2) 2.25” socket head screws holding (P/N: 10-0700-030008) blocks “A” and “B” together. Torque to 60 in/lb.

1.11 Install and tighten, using a 5/32” Allen wrench, remaining two (2) 0.75” socket head screws (P/N 10-0700-030009) 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 Lightly lubricate O-Ring (P/N 10-0700-060010) with lubricant and install on Balance Block Cap (P/N 10-0700-020005).

1.14 Place a very small amount of lubricant grease on one end of spring (P/N 10-0700-030007), then install lubricated end into balance block cap.

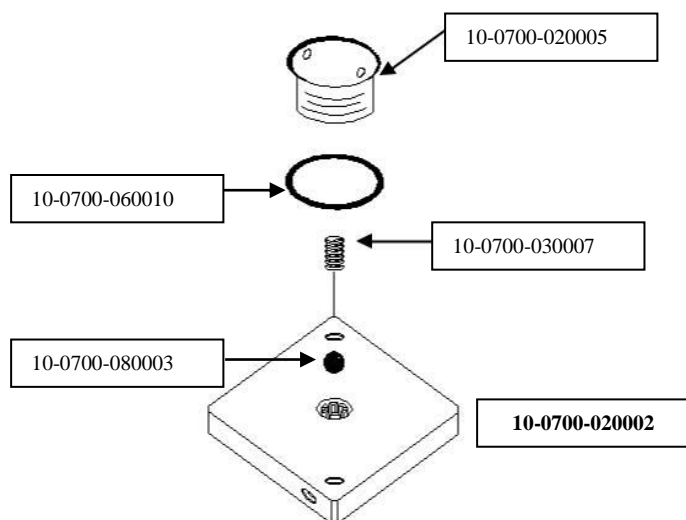


Figure 10

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

1.15 Install block cap and spring into block assembly and tighten in place using pin wrench (P/N: TAOBA-00000-77).

1.16 Repeat steps 1.13 to 1.16 for the opposite side of block assembly “AB”.

1.17 Reassemble blocks “CD” using the same procedure for blocks “AB” beginning with step 1.4.

1.18 Lightly lubricate O-Rings (P/N 10-0700-060001) with lubricant.

1.19 Place block assemblies and O-Rings aside of final assembly.

2.0. OXYGEN INLET DISASSEMBLY/ REASSEMBLY-BOTTOM REAR OF 30L LOW FLOW BLENDER (FIGURE 11)

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 proportion block.

2.2 Using a second 3/4” open end wrench, separate the O₂ inlet base connector and O₂ inlet center connector.

2.3 Use a 3/4” open end wrench to stabilize the O₂ inlet center connector, then remove the O₂ tail piece using a 1/8” Allen wrench.

SECTION 6: SERVICE & REPAIR

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

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

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

• OXYGEN INLET REASSEMBLY

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060012	1	O-Ring
10-0700-060010	1	O-Ring
10-0700-060004	2	O-Ring
10-0700-060014	1	Duckbill Check Valve
10-0700-040007	1	Step Washer
10-0700-080006	1	Inlet Cone Filter

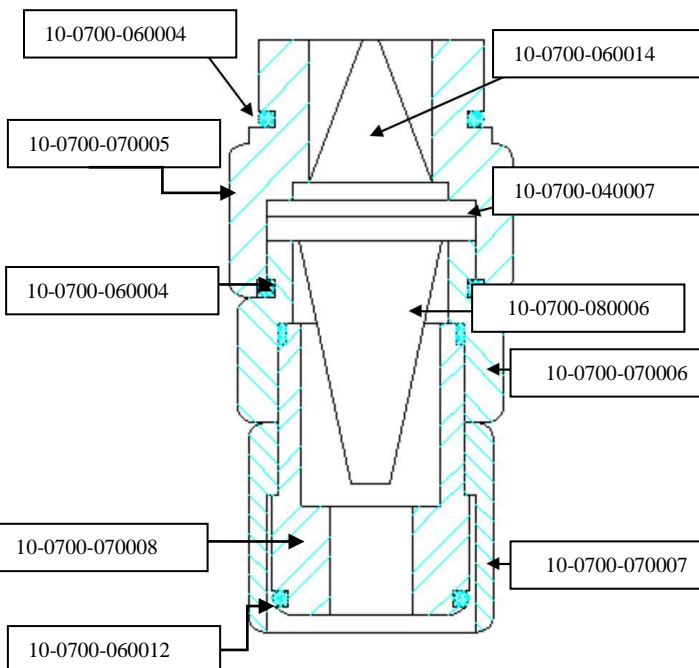


Figure 10

2.5 Lightly lubricate O-Ring (P/N 10-0700-060010) with lubricant and assemble inside of the O₂ inlet center connector (P/N 10-0700-070006).

2.6 Lightly lubricate two (2) O-Rings (P/N 10-0700-060004) with lubricant and assemble to O₂ inlet center connector (P/N 10-0700-070006) and O₂ inlet base connector (P/N 10-0700-070005).

2.7 Insert duckbill check valve (P/N 10-0700-060014), step washer (P/N 10-0700-040007) and inlet cone filter (P/N 10-0700-080006) into O₂ inlet base connector.

NOTE: Step on washer fits into duckbill check valve.

2.7 Using two (2) 3/4" open end wrenches, tighten the O₂ inlet center connector to the O₂ inlet base connector. Torque to 120in /lbs.

2.8 Take unlubricated O-Ring (P/N 10-0700-060012) and assemble to O₂ inlet nipple (P/N: 10-0700-070008).

2.9 Insert O₂ inlet nipple (P/N: 10-0700-070008) into O₂ inlet DISS nut (P/N 10-0700-070007) and using a 1/8" Allen wrench, tighten to O₂ inlet center connector. Torque to 120 in./lbs.

2.10 Set O₂ inlet aside for final assembly to proportion block.

3.0 AIR INLET DISASSEMBLY/REASSEMBLY- BOTTOM REAR OF 30L LOW FLOW BLENDER (FIGURE 12)

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.

SECTION 6: SERVICE & REPAIR

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.

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060004	1	O-Ring
10-0700-060014	1	Duckbill Check Valve
10-0700-040007	1	Washer
10-0700-080006	1	Inlet Cone Filter

• AIR INLET REASSEMBLY

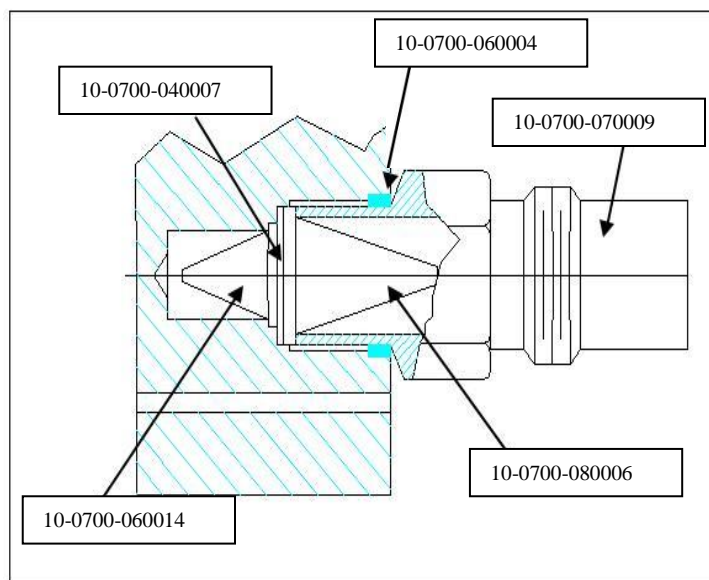


Figure 12

3.4 Install lightly lubricated O-Ring (P/N 10-0700-060004) with lubricant on air inlet connector (P/N 10-0700-070009)

3.5 Place inlet cone filter (P/N 10-0700-080006) inside air inlet.

3.6 Set air inlet aside with duckbill check valve (P/N 10-0700-060014) and washer (P/N 10-0700-040007) for final assembly to valve block.

4.0 PRIMARY OUTLET DISASSEMBLY/ REASSEMBLY-BOTTOM, FRONT OF 30L LOW FLOW BLENDER

4.1 With an 11/16" open end wrench, remove the primary outlet from the valve block assembly.

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

4.2 Remove poppet from primary outlet, then remove O-Ring from poppet and discard.

4.3 Remove O-Ring from primary outlet and discard.

Clean all parts with an ultrasound 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.

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060001	1	O-Ring
10-0700-060010	1	O-Ring

• PRIMARY OUTLET REASSEMBLY

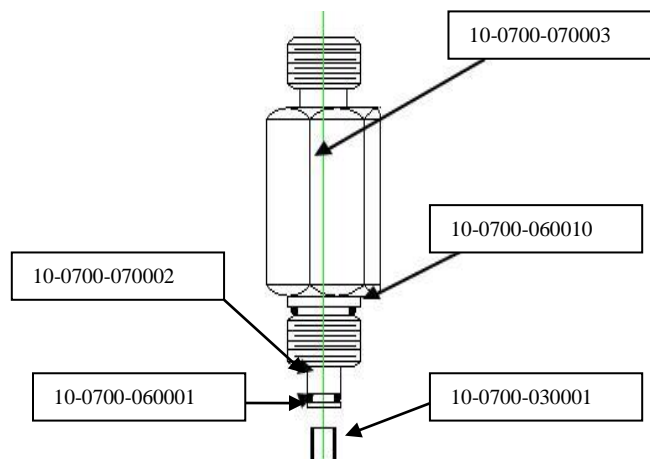


Figure 13

SECTION 6: SERVICE & REPAIR

4.4 Lightly lubricate O-Ring (P/N 10-0700-060010) with lubricant and install on check valve housing (P/N 10-0700-070003).

4.5 Lightly lubricate O-Ring (P/N 10-0700-060001) on primary check valve poppet (P/N 10-0700-070002).

4.6 Insert poppet into the outlet housing.

4.7 Set assembly with spring (P/N 10-0700-030001) aside for final assembly.

5.0 AUXILIARY OUTLET DISASSEMBLY/ REASSEMBLY-RIGHT SIDE, FRONT OF 30L LOW FLOW BLENDER (FIGURE 14)

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 O-Ring from poppet and discard.

5.3 Remove O-Rings from auxiliary outlet housing 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 that the orifice on Auxiliary outlet (P/N: 10-0702-070001) is not occluded.

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060001	1	O-Ring
10-0700-060010	1	O-Ring
10-0700-060004	1	O-Ring

• AUXILIARY OUTLET REASSEMBLY

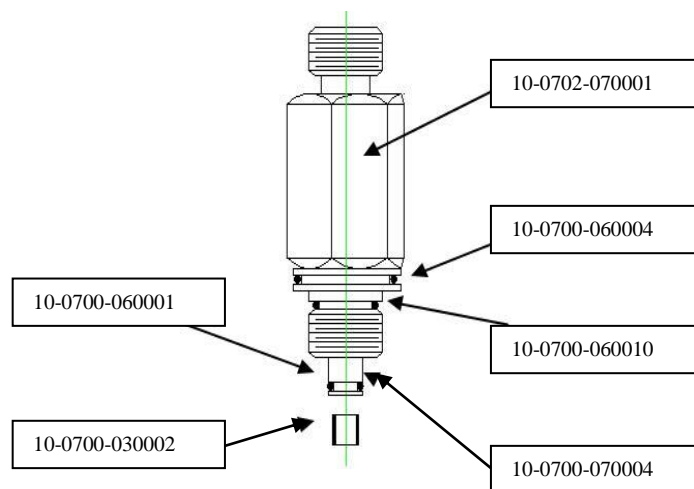


Figure 14

5.4 Lightly lubricate O-Rings with lubricant. Install lubricated O-Rings (P/N 10-0700-060004 and 10-0700-060010) on low flow auxiliary outlet connector (P/N 10-0702-070001) and O-Ring (P/N 10-0700-060001) on auxiliary check valve (P/N 10-0700-070004).

5.5 Insert the auxiliary check valve into the auxiliary outlet connector.

5.6 Set assembly with spring (P/N 10-0700-030002) aside for final assembly.

• PROPORTIONING MODULE

6.0 CONTROL KNOB/ FRONT AND REAR SEAT VALVE, DISASSEMBLY/ REASSEMBLY-FRONT OF 30L LOW FLOW BLENDER

6.1 With a thin blade screwdriver, remove the knob cover by gently separating it from the knob assembly.

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

SECTION 6: SERVICE & REPAIR

6.3 Using an 11/16" open end wrench, remove front seat lock nut. Remove and discard O-Ring from front seat locknut.

6.4 Using a thin blade screwdriver, remove the gray cover plate by gently separating it from the block assembly.

6.4 Using a pin wrench, remove the front seat/valve stem assembly. Remove and discard o-rings.

6.5 Separate the rear valve seat from the front valve seat. Remove and discard O-Rings.

6.6 Carefully remove poppet valve and spring from rear valve seat.

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

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

⚠ CAUTION: Valves and seats should be handled carefully to avoid any damage.

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060007	1	O-Ring
10-0700-060010	1	O-Ring
10-0700-060004	1	O-Ring
10-0700-060011	1	O-Ring
10-0700-060003	1	O-Ring
10-0700-030006	1	Control Knob Spring

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

⚠ CAUTION: Any damage to valve seats may prevent proper calibration.

6.9 Install absolutely clean 1/8" low flow valve ball (P/N 10-0702-030002) into low flow front valve seat (P/N 10-0702-010002) .

⚠ CAUTION: 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 10-0702-030002), stem (P/N 10-0702-010003) and poppet valve (P/N 10-0702-030001), MUST be kept clean and free of contaminants to ensure accurate calibration.

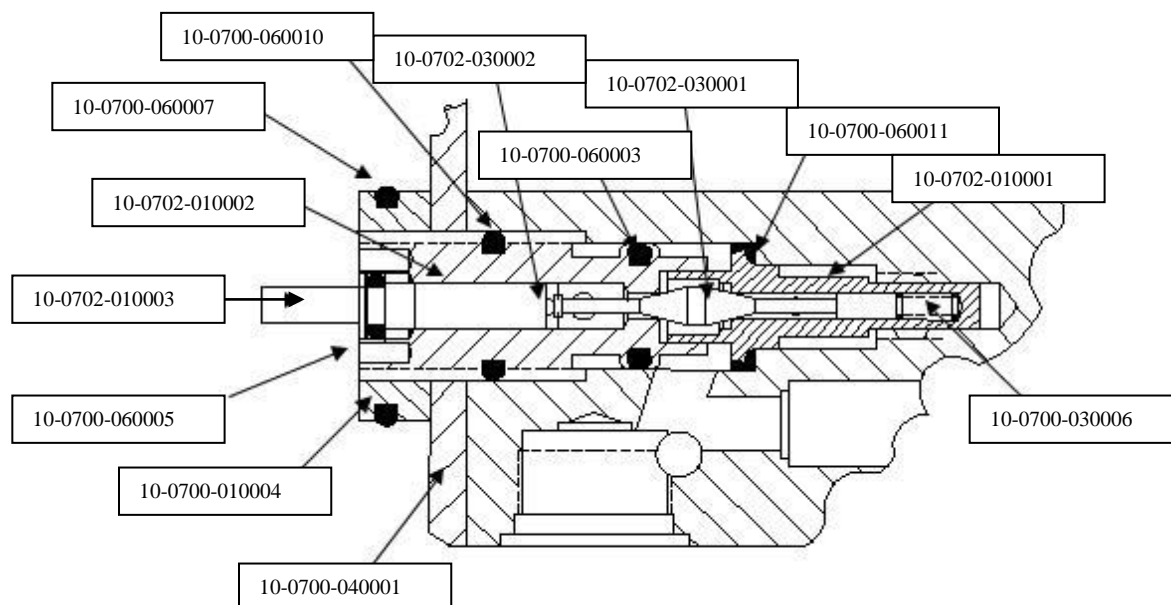


Figure 15

SECTION 6: SERVICE & REPAIR

6.10 Lubricate O-ring (P/N 10-0700-060005) and place it into groove in valve stem (P/N 10-0702-010003)

6.11 Install valve stem assembly (P/N 10-0702-010003) into front seat (P/N 10-0702-010002) and rotate valve stem clockwise until O-ring (P/N 10-0700-060005) 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 10-0700-060005) is just inside the front valve seat (P/N 10-0702-010002).

6.13 Lubricate O-rings (P/N 10-0700-060003, 10-0700-060010) and install on front valve seat (P/N 10-0702-010002).

6.14 Inspect poppet valve (P/N 10-0702-030001) for scratches, nicks, wear and cleanliness.

6.15 Lightly lubricate O-ring (P/N 10-0700-060011) and install in groove of rear valve seat (P/N 10-0702-010001).

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

7.0 BYPASS DISASSEMBLY/REASSEMBLY- BOTH SIDES, REAR OF 30L LOW FLOW BLENDER (FIGURE 16)

7.1 Using a slender, pointed probe, remove tamper resistant sticker from both side caps.

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

NOTE: A small spring is contained in each assembly and might remain in poppet bypass valve housing after adjuster is being removed.

7.4 Using a pin wrench, 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-Ring from poppet valve.

⚠ CAUTION: Carefully inspect internal surface of sleeve for any signs of wear and damage to the special impregnated Teflon® coating.

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

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060006	2	O-RING
10-0700-060008	2	O-RING
10-0700-060009	2	O-RING
10-0700-060002	2	O-RING

SECTION 6: SERVICE & REPAIR

• ALARM BYPASS REASSEMBLY

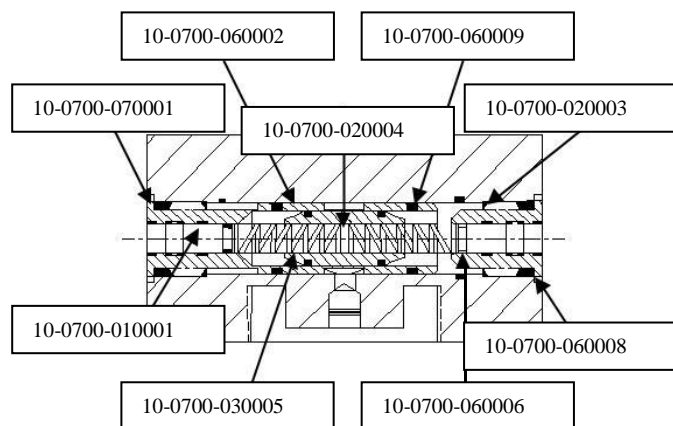


Figure 16

7.8 Using lubricant, lubricate (2) O-Rings (P/N 10-0700-060008). Install one (1) O-Ring on bypass seat cap (P/N 10-0700-020003) and one (1) O-Ring on alarm sleeve (P/N 10-0700-070001).

7.9 Using PFPE Oil, lightly lubricate two (2) O-Rings (P/N 10-0700-060009) and install on alarm sleeve (P/N 10-0700-070001).

7.10 Lightly lubricate two (2) O-Rings (P/N 10-0700-060006) and install one (1) on each bypass adjuster (P/N 10-0700-010001).

7.11 Thoroughly lubricate two (2) O-Rings (P/N 10-0700-060002) with lubricate grease and install one (1) in each groove at end of bypass poppet (P/N 10-0700-020004).

7.12 Set bypass seat assembly, alarm sleeve assembly, alarm shuttle assembly, alarm sleeve springs (P/N 10-0700-030005) and adjuster assemblies aside for final assembly.

8.0 OUTLET CAP DISASSEMBLY/ REASSEMBLY-LEFT SIDE, FRONT OF 30L LOW FLOW BLENDER

8.1 Using pin wrench, remove outlet cap and O-Ring from valve block. Remove and discard O-Ring.

• OUTLET CAP REASSEMBLY

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060010	1	O-RING

8.2 Lightly lubricate and install O-Ring (P/N 10-0700-060010) on block cap (P/N 10-0700-020005). Set aside for final assembly.

9.0 MUFFLER DISASSEMBLY-BOTTOM MIDDLE OF 30L LOW FLOW BLENDER

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

9.2 Remove the muffler bleed carefully with a pointed probe and discard.

• MUFFLER ASSEMBLY

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-080002	1	Star Washer
10-0700-080004	1	Muffler Bleed

9.3 Set muffler (P/N 10-0700-080004) and star washer (P/N 10-0700-080002) aside for final assembly.

SECTION 6: SERVICE & REPAIR

10.0 ALARM CAP DISASSEMBLY/REASSEMBLY- BOTTOM, MIDDLE OF 30L LOW FLOW BLENDER (FIGURE 17)

10.1 Using blender alarm tool (P/N: TAOBA-00000-78),unscrew alarm cap

10.2 Remove diffuser foam and discard.

10.3 Remove spring.

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-080005	1	Foam Diffuser
10-0700-040003	1	Alarm Cap

• ALARM CAP REASSEMBLY

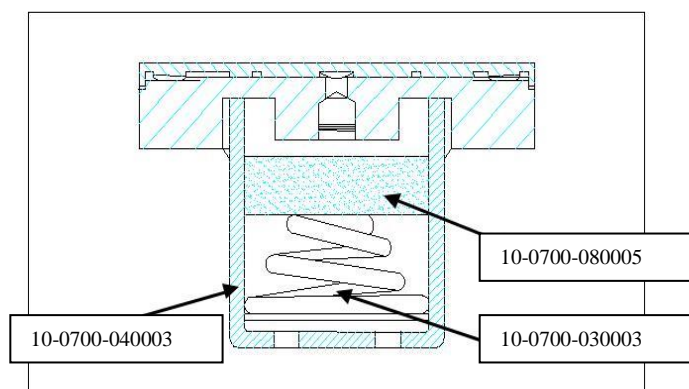


Figure 17

10.4 Install spring (P/N 10-0700-030003) with its wide base on top of reed inside alarm cap (P/N 10-0700-040003).

10.5 Place foam diffuser (P/N 10-0700-080005) 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 30L LOW FLOW BLENDER (FIGURE 18)

11.1 With pin wrench, remove block cap from rear of valve block.

11.2 Remove and discard O-Ring from block 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.

Replacement Parts:

PART NO.	QTY.	DESCRIPTION
10-0700-060013	1	Rubber Checkball
10-0700-060002	1	O-Ring
10-0700-060008	1	O-Ring

• ALARM CHECK VALVE REASSEMBLY

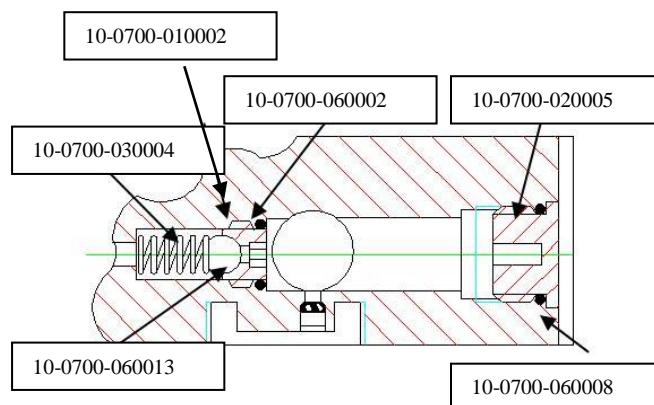


Figure 18

SECTION 6: SERVICE & REPAIR

11.5 Lubricate O-Ring (P/N 10-0700-060008) and install on block cap (P/N 10-0700-020005).

11.6 Lubricate O-Ring (P/N 10-0700-060002) and install in groove on checkball retainer (P/N 10-0700-010002).

11.7 Inspect new rubber checkball (P/N 10-0700-060013) to ensure that it is spotless, clean and not damaged by scratches, nicks or flat spots, lubricate lightly.

11.8 Set rubber checkball, checkball retainer assembly, spring (P/N 10-0700-030004) 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

13.0	ALARM CHECK VALVE ASSEMBLY
14.0	FRONT/REAR SEAT ASSEMBLY
15.0	ALARM BYPASS ASSEMBLY
16.0	MUFFLER
17.0	OUTLET CAP
18.0	AUXILIARY OUTLET ASSEMBLY
19.0	PRIMARY OUTLET ASSEMBLY
20.0	BALANCE BLOCK
21.0	AIR INLET
22.0	OXYGEN INLET ASSEMBLY
23.0	ALARM CAP ASSEMBLY

■ 30L LOW FLOW AIR/OXYGEN BLENDER FINAL ASSEMBLY

⚠ CAUTION: Lightly lubricate all threaded components with the exception of the Rear Valve Seat (P/N 10-0702-010001).

13.0 ALARM CHECK VALVE ASSEMBLY

13.1 Position Blender resting on front surface, with rear of proportion block (P/N 10-0700-020001) facing upwards.

13.2 Install spring (P/N 10-0700-030004); place rubber checkball (P/N 10-0700-060013) on spring.

13.3 Using a 5/32" Allen driver, install checkball retainer (P/N 10-0700-010002). Verify that O-Ring (P/N 10-0700-060002) is lightly lubricated prior to installing retainer. Torque to 30 in/lb.

13.4 Using pin wrench, install block cap (P/N 10-0700-020005), verify O-Ring (P/N 10-0700-060010) 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 valve seat (P/N 10-0702-010001) with lubricated O-Ring (P/N 10-0700-060011) through front port.

14.3 Using a 3/16" Allen driver torque wrench, secure rear seat in place. Torque to 25 in/lb.

SECTION 6: SERVICE & REPAIR

14.4 Carefully insert large shoulder of clean bypass poppet valve (P/N 10-0702-030001) into rear seat. Shorter, dimpled end interfaces with ball (P/N 10-0702-030002)

14.5 By hand, install front seat assembly (P/N 10-0702-010002) into valve block opening. Using a pin wrench, rotate front seat until last O-ring (P/N 10-0700-060010) is just inside valve block.

14.6 Ensure that valve stem O-ring (P/N 10-0700-060005) is situated just inside front seat assembly (P/N 10-0702-010002).

This initial thread engagement is very important for the initial calibration, rotate assembly **CLOCKWISE** three (3) full turns. Then rotate assembly **COUNTER-CLOCKWISE** one and a half (1.5) turns. The o-ring should not be visible.

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 10-0702-030002) stem (P/N 10-0702-010003) and poppet valve (P/N 10-0702-030001), **MUST** be kept clean and free of contaminants to ensure accurate calibration.

WARNING:

DO NOT PRESSURIZE THE SYSTEM UNLESS THE FRONT VALVE SEAT HAS THREE (3) FULL TURNS OF THE THREADS INSIDE THE VALVE BLOCK. SEAT CAN BE FORCEFULLY EJECTED. DO NOT EXCEED THREE (3) FULL TURNS AS THIS MAY DAMAGE THE REAR VALVE SEAT.

14.7 Align the dowel pins in front cover (P/N 10-0700-040001) with the two holes in the

valve block surface. Gently push front cover against blender front surface

14.8 Loosely hand fasten nut (P/N 10-0700-010004) with wider shoulder against front plate.


NOTE: DO NOT install O-ring (P/N 10-0700-060007) in groove at this time.

14.9 Install control knob with black pointer against 21% O₂ stop, at left side of valve block.

15.0 ALARM BYPASS ASSEMBLY- LEFT/RIGHT SIDE, REAR OF VALVE BLOCK

15.1 Position blender resting on its top side. Verify that the alarm shuttle (P/N 10-0700-020004) with two (2) lubricated O-rings (P/N 10-0700-060002) is inside alarm sleeve.

15.2 After verifying all O-rings are lubricated, insert assembled alarm sleeve (P/N 10-0700-070001) into valve block. Using pin wrench, secure alarm sleeve into valve block. Torque to 30 in/lb.

 **CAUTION:** Be extremely careful not to damage O-rings (P/N 10-0700-060009) during alarm sleeve (P/N 10-0700-070001) installation.

15.3 Install one spring (P/N 10-0700-030005) through alarm sleeve into bypass poppet valve port.

NOTE: Ensure spring (P/N 10-0700-030005) is positioned into alarm shuttle (P/N 10-0700-020004).

15.4 Using an 1/8" Allen wrench, screw bypass adjuster (P/N 10-0700-010001) with lightly lubricated O-ring (P/N 10-0700-060006) into alarm sleeve until bypass adjuster is slightly recessed into alarm sleeve.

SECTION 6: SERVICE & REPAIR

15.5 Position blender on alarm sleeve side and install bypass seat cap (P/N 10-0700-020003) with lubricated O-ring (P/N 10-0700-060007). Using a pin wrench, secure seat to valve block. Torque to 30 in/lb.

15.6 Carefully insert 1/8" Allen wrench through bypass seat cap and into alarm shuttle. Push alarm shuttle against spring (P/N 10-0700-030001) and check for smooth movement and recoil action.

15.7 Install spring (P/N 10-0700-030001) through bypass seat cap (P/N 10-0700-020003) into hole in alarm shuttle (P/N 10-0700-020004).

15.8 Using an 1/8" Allen wrench, screw bypass adjuster screw (P/N 10-0700-010001) with lubricated O-ring (P/N 10-0700-060006) into bypass seat, until adjuster is slightly recessed into valve seat.

16.0 MUFFLER ASSEMBLY-BOTTOM, CENTER OF VALVE BLOCK (FIGURE 19)

16.1 Install one (1) muffler bleed (P/N 10-0700-080004) into valve block bleed port.

16.2 With a small screwdriver, secure the star washer (P/N 10-0700-080002) over the muffler bleed.

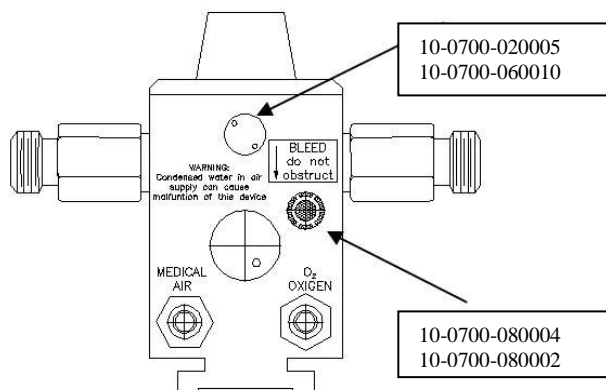


Figure 19

17.0 OUTLET CAP-BOTTOM, FRONT OF VALVE BLOCK

17.1 Using pin wrench, secure outlet cap (P/N 10-0700-020005) with lightly lubricated O-ring (P/N 10-0700-060010) 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 10-0700-030002) into bottom of recess in auxiliary outlet valve block port.

NOTE: Auxiliary outlet spring (P/N 10-0700-030002) is longer than primary outlet spring (P/N 10-0700-030001).

18.2 Install auxiliary outlet connector (P/N 10-0702-070001) 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 120 in/lb.

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 10-0700-030001) in center of primary outlet cavity bottom.

NOTE: Primary outlet spring is shorter than auxiliary outlet spring.

SECTION 6: SERVICE & REPAIR

19.2 After verifying O-rings are lubricated, install primary check valve housing (P/N 10-0700-070003) and poppet (P/N 10-0700-070002) into primary outlet port on valve block and hand tighten in place.

19.3 Using 11/16" wrench, tighten assembly to valve block. Torque to 120 in/lb.

20.0 DIAPHRAGM BLOCK ASSEMBLY-TOP OF VALVE BLOCK

20.1 Assemble four lubricated O-rings (P/N 10-0700-060001) each, to two diaphragm block assemblies.

20.2 Using a 5/32" Allen wrench and a torque wrench, secure the two diaphragm block assemblies to the proportion block with four screws (P/N 10-0700-030008). Tighten screws to 60 inch-pounds.

NOTE: Align diaphragm block assemblies squarely with valve block prior to tightening in place.

21.0 AIR INLET ASSEMBLY-BOTTOM, LEFT REAR OF VALVE BLOCK

21.1 Install duckbill check valve (P/N 10-0700-060014) in air inlet port with bill facing inside cavity.

21.2 Place washer (P/N 10-0700-040007) 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.

21.3 Place large diameter end of nylon cone inlet filter (P/N 10-0700-080006) into air inlet port on valve block.

NOTE: Install air inlet fitting (P/N 10-0700-070009) with lubricated O-ring (P/N 10-0700-060004) into air inlet port on valve block and hand tighten in place.

21.4 Using a 3/4" wrench, secure air inlet into valve block. Torque to 120 in/lb.

22.0 OXYGEN INLET ASSEMBLY BOTTOM REAR, RIGHT OF VALVE BLOCK

22.1 Hand tighten oxygen inlet assembly into valve block port.

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

22.2 With a 3/4" wrench, secure assembly to valve block. Torque to 120 in/lb.

23.0 ALARM CAP ASSEMBLY

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

SECTION 7: CALIBRATION

1. CALIBRATION TOOLS/EQUIPMENT

- Thin Bladed Screwdriver or Knife
- 1/8" Allen Wrench
- 1 1/8" Open End Wrench
- 7/8" Open End Wrench
- 11/16" Open End Wrench
- 9/32" Nut Driver
- Pin Wrench (P/N TAOBA-00000-77)
- Oxygen Regulator (2 Stage, Adjustable 0-80 PSIG [0-5.60 kg/cm²])
- Air Regulator (2 Stage, Adjustable 0-80 PSIG).
- Oxygen Flowmeter (0-35LPM)
- Oxygen Analyzer (analyzer should read in tenths to ensure accuracy of calibration)
- Oxygen Sampling Hose
- Oxygen Sensor

2. AIR/OXYGEN SETUP

- The gas supplies must be clean and dry and have the ability to generate 80 PSIG (0-5.60 kg/cm²) 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 30L Low Flow Blender 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

- Install the built-in post bracket on the 30L Low Flow Blender into the post bracket on the pole.
- Using 7/8" and 11/16" open end wrenches, secure the air and oxygen high pressure hoses to the 30L Low Flow Blender inlets.
- Attach and secure flowmeter, in upright position, to side outlet on adapter.

NOTE: Ensure flowmeter is turned OFF.

- Attach one end of connecting hose to flowmeter and other end to bifurcation. Ensure one way valve is secured into remaining large opening of bifurcation. Attach remaining outlet of bifurcation to oxygen analyzer probe.
- The system is now ready for calibration.

SECTION 7: CALIBRATION

CALIBRATION PROCEDURE 30L OXYGEN BLENDER

1.0 FRONT AND REAR SEAT LEAK TEST

1.1 Connect gas supply source(s), 0-80 PSIG (0-5.62 kg/cm²) pressure regulator(s), pressure test tube(s), leak test tube, and sampling beaker half way filled with water to valve block as shown in Figure 20.

NOTE: Compressed air may be utilized for seat leak test.

1.3 Slowly turn blender valve stem (P/N 10-0702-010003) clockwise, until bubbles appear on water surface.

1.4 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.

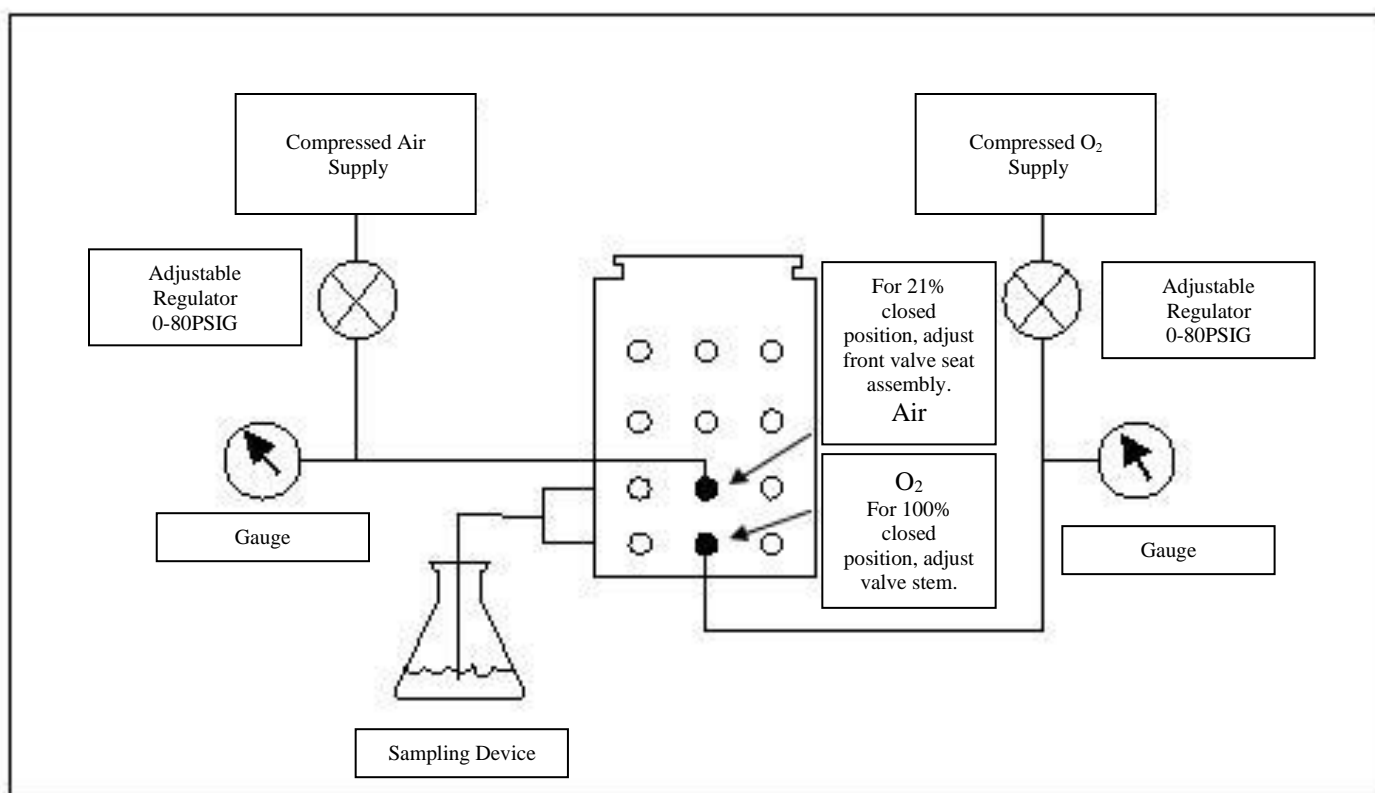


Figure 20

1.2 Adjust O₂ pressure regulator between 10-15 PSIG (0.70 – 1.05 kg/cm²). Air regulator remains OFF (i.e. CLOSED).

1.5 Carefully install control (or O₂ selection) knob with black pointer against left side stop (i.e. 21% O₂), and secure knob collet nut with 9/32" nut driver. Turn Oxygen supply source OFF (i.e. CLOSED).

SECTION 7: CALIBRATION

1.6 Carefully rotate O₂selection knob clockwise until black-pointer rests against right side stop (i.e. 100% O₂).

⚠ CAUTION: Extreme care must be taken during this procedure. Any resistance 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 (i.e. 100% O₂), return the knob to the left side stop (i.e. 21% O₂), and remove the knob. With pin wrench, rotate the front valve seat (P/N 10-0702-010002) counterclockwise approximately one half (1/2) turn, and return to step 1.2

1.7 Carefully remove O₂ selection knob, make certain not to upset or change valve stem position.

1.8 Adjust air pressure regulator between 10-15 PSIG (0.70 – 1.05 kg/cm²).

1.9 Using pin wrench, carefully and slowly, turn front valve seat (P/N 10-0702-010002) 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.

1.10 Using a 11/16" wrench, secure nut (P/N 10-0700-010004) checking the seat position has not changed during tightening of nut, by ensuring that bubbling has just stopped and does not reappear. Torque nut to 40 in/lb.

1.11 Install O-ring (P/N 10-0700-060007) on nut. Carefully reinstall O₂selection knob with pointer at right side (i.e. 100% O₂) stop. Torque collet nut to 4 in/lb.

1.12 Rotate knob counter clockwise to verify left hand (i.e. 21% O₂) top is bubbling at a rate of less than 4 bubbles per minute. Install cap on knob.

2.0 PROPORTIONING VALVE

NOTE: Proportioning valve endpoints are set by following Front & Rear Seat Leak Test.

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

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

2.3 Perform the following checks:

Knob Setting	Pressure Oxygen/Air	% Concentration
21	*50 PSI/50 PSIG	21.0%/22.0%
30	*50 PSI/50 PSIG	27.0%-33.0%
60	*50 PSI/50 PSIG	57.0%-63.0%
90	*50 PSI/50 PSIG	87.0%-93.0%
100	*50 PSI/50 PSIG	97.0%-100%

* = 3.52 kg/cm² / 3.52 kg/cm²

Knob Setting	Pressure Oxygen/Air	% Concentration
30	*50 PSI/50 PSIG	27.0%-33.0%
60	*50 PSI/50 PSIG	57.0%-63.0%
90	*50 PSI/50 PSIG	87.0%-93.0%

* = 3.52 kg/cm² / 2.81 kg/cm²

* = 3.52 kg/cm² / 4.22 kg/cm²

If concentrations do not meet specifications, repeat Front and Rear Seat Leak Test

SECTION 7: CALIBRATION

2.4 Adjust O₂ selection knob at 60% oxygen and set air/oxygen pressures each at 50 PSIG.

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

2.6 Connect flowmeter to auxiliary outlet (i.e. right side outlet) on blender.

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

2.8 Insert bleed test tube assembly into bleed port at bottom of valve block, flow tube should read 2.5-3.5 LPM.

NOTE: Should blender not meet either specification, 2.7 or 2.8, inspect bleed orifice in auxiliary outlet or bleed orifice in valve block for occlusion.

2.9 Increase air pressure from 50 PSIG (3.52 kg/cm²) to 60 PSIG (4.22 kg/cm²). O₂% on oxygen should read 57%-63%.

2.10 Lower air pressure from 60 PSIG (4.22 kg/cm²) to 40 PSIG (2.81 kg/cm²). O₂% on oxygen analyzer should read 57%-63%.

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

2.12 Remove bleed test tube assembly from bleed port.

3.0 ALARM CALIBRATION

The Alarm system is designed to sound an audible tone if the inlet pressures are different by 20 PSI (1.41 kg/cm²) or more, such as if either source gas failed.

When the 30L Low Flow Blender 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.

3.1 Ensure air and oxygen regulators are adjusted to a static 50 PSIG (3.52 kg/cm²), align control knob indicator with 60%, and ensure flowmeter is set to 3LPM

3.2 Reduce air pressure until the audible alarm sounds. The air pressure should read 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

- If the alarm sounds above this pressure, rotate adjuster clockwise, left side of blender, with a 1/8" Allen wrench until alarm sounds as 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).
- If the alarm sounds below this pressure, rotate adjuster counterclockwise, left side of blender, with a 1/8" Allen wrench until alarm sounds at 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

3.3 Raise air pressure slowly. Alarm bypass should reset to normal function when pressure reaches 44 PSIG (3.10 kg/cm²) or below.

3.4 Restore air pressure to 50 PSIG (3.52 kg/cm²) and reduce oxygen pressure until the audible alarm sounds. The oxygen pressure must be 30 ± 2 PSIG (2.11 ± 0.14 kg/cm²).

- 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.
- 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/cm²).

SECTION 7: CALIBRATION

3.5 Raise oxygen pressure slowly. Alarm bypass should reset to normal function when pressure reaches 44 PSIG (3.10 kg/cm²) or below.

4.0 OUTLET FLOW TEST

4.1 With 0 – 35 LPM flowmeter connected to auxiliary outlet fitting, set O₂ selection knob at 60% and oxygen/air supply sources at 50 PSIG (3.52 kg/cm²) static.

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

4.3 Reduce air pressure to 0 PSIG (0 kg/cm²). Flowmeter should read a minimum of 30 LPM. Audible alarm should sound.

4.4 Increase air pressure to 50 PSIG (3.52 kg/cm²) and rotate O₂ selection knob against 21% stop. Flowmeter should read a minimum of 30 LPM.

4.5 Rotate O₂ selection knob against 100% stop. Flowmeter should read a minimum of 30 LPM.

4.6 Set O₂ selection knob at 60%. Reduce O₂ pressure to 0 PSIG (0 kg/cm²). Flowmeter should read a minimum of 30 LPM. Audible alarm should sound.

4.7 Remove flowmeter from auxiliary outlet and connect to primary outlet fitting. Repeat steps 4.2 through 4.6.

4.8 Remove flowmeter from primary outlet fitting.

5.0 INSTALLATION OF CONTROL KNOB

5.1 Rotate control knob fully to 100% position. Check O₂ concentration.

5.2 Using a 9/32" nut driver, loosen control knob nut (P/N 10-0700-010007) and remove control knob.

5.3 Install O-ring (P/N 10-0700-060007) on front valve seat nut (P/N 10-0700-010004).

5.4 Push control knob onto front valve stem, seating it fully on the front valve seat nut O-ring with the black pointer at the 100% position. Be careful not to rotate valve stem.

5.5 Tighten the control knob nut, using a 9/32" socket. Torque to 4 in/lb.

5.6 Recheck 100% - 21% O₂ concentration.

5.7 Snap control knob cover (P/N 10-0700-040006) into control knob.

SECTION 8: CLEANING AND STERILIZATION

WARNINGS:

- Do NOT steam autoclave or otherwise subject 30L Low Flow Air/Oxygen Blender to temperatures over 145°F (62°C).
- Do NOT immerse assembled 30L Low Flow Air/O₂ Blender into liquid decontamination agents.
- Do NOT use any strong solvent or abrasive cleaners on labels.

Use an all-purpose liquid cleaner on exterior. For other general cleaning, use a 70% isopropyl alcohol solution.

SECTION 9: MAINTENANCE AND SERVICE POLICY

⚠WARNING: The 30L LOW FLOW AIR/OXYGEN BLENDER should be serviced or calibrated by a qualified and trained service technician.

The 30L LOW FLOW AIR/OXYGEN BLENDER 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 of conditions.

Elastomer components such as diaphragms and O-Rings are designed to function satisfactory for a minimum of two (2) years. The need for cleaning and replacement depends on gas line conditions and is indicated by the blender not meeting its specified performance. The blender may malfunction due to excessive dirt and debris. OHIO MEDICAL recommends that unit be overhauled 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 10: DISPOSAL INSTRUCTIONS

This device and its packaging contain no hazardous materials. No special precautions need to be taken when disposing the device and/or its packaging.

SECTION 11: REPLACEMENT PARTS

Part Number	Description	Quantity Required
10-0700-020001	Proportion Block	1
10-0700-040001	Cover Plate – Light Grey	1
10-0700-020002	Diaphragm Block	4
10-0700-030005	Alarm Sleeve Spring	2
10-0700-020003	Bypass Seat Cap	1
10-0700-010001	Bypass Adjuster	2
10-0700-020004	Alarm Shuttle	1
10-0700-070001	Alarm Sleeve	1
10-0700-030001	Primary Check Valve Spring	1
10-0700-070002	Primary Check Valve Poppet	1
10-0700-070003	Check Valve Housing	1
10-0700-030002	Auxiliary Check Valve Spring	1
10-0700-070004	Auxiliary Check Valve	1
10-0702-070001	Low flow Auxiliary Outlet Connector	1
10-0700-070006	Oxygen Inlet Center Connector	2
10-0700-070007	Oxygen Inlet DISS	1
10-0700-070008	Oxygen Inlet DISS Nipple	1
10-0700-080002	Starwasher	1
10-0700-030003	Alarm Cap Spring	1
10-0700-030004	Rear Cap Spring	1
10-0700-010002	Checkball Retainer	1
10-0700-070009	Air Inlet Connector	1
10-0702-010001	Low Flow Rear Valve Seat	1
10-0702-030001	Low Flow Valve	1
10-0702-010002	Front Seat Valve Low Flow	1
10-0702-010003	Low Flow Valve Stem	1
10-0700-010004	Front Seat Nut	1
10-0700-040009	Control Knob	1
10-0700-010005	Knob Collet	1
10-0700-010006	Control Knob Washer	1
10-0700-010007	Control Knob Nut	1
10-0700-040006	Knob Cover	1
10-0700-030008	Socket Head Cap Screw, 2.25"	4
10-0700-080003	Diaphragm Block Ball Bearing	4
10-0700-030007	Diaphragm Block Spring	1
10-0700-030009	Socket Head Cap Screw, 0.75"	8
10-0700-060001	O-Ring, Balance Blocks and Check Valve	10
10-0700-060002	O-Ring, Alarm Sleeve and Block Cap	1
10-0700-060003	Front Valve Seat O-Ring	1
10-0700-060004	Inlet/Outlet Connector O-Ring	3

SECTION 11: REPLACEMENT PARTS

Part Number	Description	Quantity Required
10-0700-060005	Front Valve Stem O-Ring	1
10-0700-060006	Bypass O-Ring	2
10-0700-060007	Front Seat O-Ring	1
10-0700-060008	Alarm Cap O-Ring	2
10-0700-060009	Alarm Sleeve O-Ring	2
10-0700-060010	O-Ring, Connectors and Caps	4
10-0700-060011	Rear Seat O-Ring	1
10-0700-080004	Muffler Bleed	1
10-0700-080005	Foam Diffuser	1
10-0700-040003	Blender Alarm Cap - Light Gray	1
10-0700-060013	Check Ball	1
10-0700-060014	Duck Bill Check Valve	3
10-0700-040007	Step Washer	2
10-0700-080006	Inlet Cone Filter	2
10-0700-080007	Balance Block Diaphragm	2

The Quantity required column indicates the number of parts actually required for one 30L Low Flow Air/O₂ Blender.

Maintenance Kit (P/N DAOBA-00000-05) is packaged with the actual quantity required.

SECTION 11: REPLACEMENT PARTS

30L LOW FLOW AIR/O₂ BLENDER KIT (P/N DAOBA-00000-05)

Part Number	Description	Quantity Required
10-0700-130006	Caution/Warning Label	1
10-0700-080002	Starwasher	1
10-0700-030006	Control Knob Spring	1
10-0700-080003	Diaphragm Block Ball Bearing	4
10-0700-060001	O-Ring, Balance Blocks and Check Valve	11
10-0700-060002	O-Ring, Alarm Sleeve and Block Cap	3
10-0700-060003	Front Valve Seat O-Ring	1
10-0700-060004	Inlet/Outlet Connector O-Ring	4
10-0700-060005	Front Valve Stem O-Ring	1
10-0700-060006	Bypass O-Ring	2
10-0700-060007	Front Seat O-Ring	1
10-0700-060008	Alarm Cap O-Ring	2
10-0700-060009	O-Ring, Alarm Sleeve	2
10-0700-060010	O-Ring, Connectors and Caps	10
10-0700-060011	Rear Seat O-Ring	1
10-0700-060012	O ₂ Inlet O-Ring	1
10-0700-080004	Muffler Bleed	1
10-0700-080005	Foam Diffuser	1
10-0700-060013	Check Ball	1
10-0700-060014	Duck Bill Check Valve	3
10-0700-040007	Step Washer	2
10-0700-080006	Inlet Cone Filter	2
10-0700-080007	Balance Block Diaphragm	2

SECTION 12: PRODUCT SPECIFICATIONS

30L LOW FLOW AIR/O₂ BLENDER

Size (not including inlet and outlet fittings).....	Height– 3 ½” (9cm) Width– 2 ¼” (5.6cm) Depth– 4 ½” (11.5cm)
Weight.....	2.75 lbs (1.25kg)
Gas Supply Pressure (Air & O ₂).....	30 – 75 PSIG (2.11 kg/cm ² - 5.27 kg/cm ²). The blender 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
Primary Outlet Flow Range.....	3 to 30 LPM (no bleed flow)
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 Port (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)

SECTION 12: PRODUCT SPECIFICATIONS

30L LOW FLOW AIR/O₂ BLENDER

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) and minimum pressure of one supply gas remains at 40 PSIG (2.81 kg/cm ²) or above. 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 20 PSIG (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 pressure and 40 LPM.

SECTION 13: TROUBLESHOOTING

PROBLEM	POTENTIAL CAUSE	CORRECTIVE ACTION
Oxygen concentration discrepancy between blender setting and analyzer (greater than 3%)	<ol style="list-style-type: none"> 1. Flow requirements are outside the specified LPM range 2. Analyzer out of calibration 3. Blender is out of calibration 4. Low flow bleed muffler is obstructed causing restriction of fixed bleed 5. Gas supply contaminated 6. Air entrained into circuit by ventilator or accessory device. 	<ol style="list-style-type: none"> 1. Correct the flow. Verify that the correct outlet port is being used. Each outlet port has a different flow range. Auxiliary outlet (0 LPM or more). Primary outlet (3-30 LPM or more) 2. Calibrate analyzer 3. Recalibrate or service further as necessary. 4. Remove obstruction and verify bleed flow is within tolerance. 5. Correct the contaminated gas supply. Check source gases with calibrated O₂ analyzer to confirm O₂ is 100% and AIR is 21% 6. Contact OHIO MEDICAL for further information.
Alarm Sounding	<ol style="list-style-type: none"> 1. Inlet pressure differences of 20 PSI (1.41 kg/cm²) or more. 2. Alarm module is not calibrated properly. 3. Inlet gas contamination alarm module malfunction. 	<ol style="list-style-type: none"> 1. Correct the pressure difference. 2. Recalibrate or service further as necessary. 3. Disassemble, clean, reassemble, calibrate, install inlet filter/water trap on air line, and correct cause of gas contamination.

SECTION 13: TROUBLESHOOTING

PROBLEM	POTENTIAL CAUSE	CORRECTIVE ACTION
30L Low Flow Air/O₂ Blender in bypass- no alarm	1. Reed plate is improperly installed or damaged. 2. Alarm gas orifice is obstructed.	1. Contact OHIO MEDICAL for repair. 2. Remove obstruction from orifice. If problem persists, contact Tenacore for repair.
30L Low Flow Air/O₂ Blender Accurate only when inlet gas pressures are equal	1. Balance module not functioning properly. 2. Both air and oxygen gas sources are below 30 PSIG.	1. Disassemble balance module, clean, replace diaphragm(s). Reassemble and test. 2. Correct the low pressure condition.

**SECTION 14:
WARRANTY**

PRODUCTS MANUFACTURED BY TENACORE HOLDINGS INC. ARE WARRANTED TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP

The liability of OHIO MEDICAL under this warranty is limited to replacing, repairing or issuing credit. Determination will be made by OHIO MEDICAL. Such determination will be made in relation to the parts that become defective or fail to meet published specifications during the warranty period. OHIO MEDICAL will not be liable under this warranty unless (A) OHIO MEDICAL is promptly notified in writing by Buyer upon discovery of defects or failure to meet specifications; (B) the defective unit or part is returned to OHIO MEDICAL, transportation charges prepaid by Buyer; (C) the defective unit or part is sent by buyer to OHIO MEDICAL prior to the last day of the warranty period; and (D) OHIO MEDICAL's examination results in a determination that the unit has suffered such defects or failures as a result of misuse, neglect, improper installation, unauthorized repair, alteration or accident.

OHIO MEDICAL warranties as described above and set forth shall not be accretive, diminished or affected by, and further no obligation or liability shall arise or grow from the disclosure of technical advice or service by OHIO MEDICAL or its agents in connection with Buyer's orders.

LIMITATIONS OF LIABILITIES

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

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 TENACORE or authorized for use in writing by OHIO MEDICAL, 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 six months from the day of delivery, with the following exceptions:

1. Elastomeric components and other parts or components subject to deterioration over which OHIO MEDICAL 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 OHIO MEDICAL.



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