Liberator ®

User Manual (US)

CAIRE®

Symbols Glossary

ISO 7000	
	Keep away from rain, keep dry. Reg. # 0626
	Stacking limit by number. Reg. # 2403
	Name and address of manufacturer. Reg. # 3082
	The country and date of manufacture. The “CC” identifies the two letter country code of the country of manufacture. The date of manufacture is in YYYY-MM-DD format. Reg. # 6049
	Caution, consult accompanying documents. Reg. # 0434A
	Catalog Number. Reg. # 2493
	Serial Number. Reg. # 2498
	Storage or operating temperature range. Reg. # 0632
	Storage humidity range Reg. # 2620
	Atmospheric pressure limitation. Reg. # 2621
	This way up. Reg. # 0623
	Fragile, handle with care. Reg. # 0621
	Contains hazardous substances. Reg. # 3723
	Importer. Reg. # 3725
ISO 7010	
	Frostbite may occur on contact with cold liquid or gaseous oxygen, or frosted parts. Warning low temperature. To warn of low temperature or freezing conditions. Reg. # W010
	The instruction manual must be read. Reg. # M002
	Keep away from open flame, fire, sparks. Open ignition source and smoking prohibited. Reg. # P003
	Do not smoke near unit or while operating unit. Reg. # P002
	Type BF applied part (degree of protection against electric shock). Reg. # 5333
	Warning. Reg. # W001
Council Directive 93/42/EEC	
	Authorized representative in the European Community
	If the product unique device identifier (UDI) label has the CE#### symbol on it, the device complies with the requirements of Directive 93/42/EEC concerning medical devices. The CE#### symbol indicates notified body number.
	This device complies with the requirements of Directive 2010/35/EU concerning medical devices. It bears the pi marking as shown.
ADR	
	Non-toxic gas.
	Hazard Oxidizing substances: fire intensifying risk. Oxidizing agents cause fires to burn more vigorously.
	Refrigerated Liquid, USP; Produced by Air Liquefaction
Additional Symbols	
	Keep unit well ventilated at all times
	Keep away from flammable materials, oil and grease.
	Wipe connector with clean dry cloth before filling.
	Authorized representative in Switzerland.
	If the device bears the UKCA mark as shown with UKCA#### indicating the notified body number, this device complies with UKCA regulations.

IEC 60417	
	Do not cover unit or carry portable unit under your clothing. These units normally vent oxygen. No. 5641
21 CFR 801.15	
RX ONLY	Federal law restricts this device to sale by or on the order of a physician.
IEC 60601-1	
IP21	Drip Proof Equipment - IP21
Council Directive 2012/19/EU	
	WEEE This symbol is to remind the equipment owners to return it to a recycling facility at the end of its life, per Waste Electrical and Electronic Equipment (WEEE) Directive. Our products will comply with the restriction of Hazardous Substances (RoHS) directive. They will not contain more than trace amounts of lead or other hazardous material content.
ISO 15223-1	
MD	Medical Device. Reg. # 5.7.7
UDI	Unique device identifier Reg. # 5.7.10

This product may be covered by one or more patents, US and international. Please visit our website below for the listing of applicable patents. Pat.: www.caireinc.com/corporate/patents/ .

Specifications

- Mode of Operation: Continuous Flow
- Type of Protection Against Electrical Shock: Internally Powered Equipment
- Degree of Protection Against Electrical Shock: Type BF Applied Part
- IP21 Classification According to the Degree of Protection Against Ingress of Water: Internal protection against ingress of solid foreign objects greater than or equal to 12.5 mm in diameter and ingress of vertically dripping water.
- Equipment not suitable for use in the presence of flammable mixtures

Product Specifications					
	Liberator 20	**Liberator 30**	**Liberator 37**	**Liberator 45**	**Liberator 60**
LOX Capacity	21.0 L 50.7 lb (23 kg)	31.0 L 74.8 lb (33,9 kg)	37.3 L 90.0 lb (40,8 kg)	45.7 L 110.3 lb (50,04 kg)	60.2 L 145.3 lb (65,9 kg)
Gaseous Equivalent Capacity	17,337 L	25,580 L	31,121 L	37,724 L	49,679 L
Weight, Empty*	39 lb (17,96 kg)	48.6 lb (22,04 kg)	50 lb (22,68 kg)	55 lb (24,95 kg)	75.4 lb (34,19 kg)
Weight, Filled**	89.7 lb (40,69 kg)	122.32 lb (55,94 kg)	140 lb (63,48 kg)	165.32 lb (74,99 kg)	220.68 lb (100,1 kg)
Height	24.5 in. (622 mm)	29.5 in. (749 mm)	32.75 in. (832 mm)	37 in. (940 mm)	39 in. (991 mm)
Diameter	14 in. (356 mm)	14 in. (356 mm)	14 in. (356 mm)	14 in. (356 mm)	16 in. (406 mm)
Typical use time at 2 LPM	6.0 days	8.9 days	10.8 days	13.1 days	17.2 days
Operating Pressure	20 psi (137 kPa)	20 psi (137 kPa)	20 psi (137 kPa)	20 psi (137 kPa)	20 psi (137 kPa)
Normal Evaporation Rate	1.6 lb/ day (0,73 kg/day)	1.6 lb/ day (0,73 kg/day)	1.6 lb/ day (0,73 kg/day)	1.6 lb/ day (0,73 kg/day)	1.65 lb/ day (0,75 kg/day)
Standard Flow Control Range	Off, .25, .5, .75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12, 15 LPM	Off, .25, .5, .75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12, 15 LPM	Off, .25, .5, .75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12, 15 LPM	Off, .25, .5, .75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12, 15 LPM	Off, .25, .5, .75, 1, 1.5, 2, 2.5, 3, 4, 5, 6, 8, 10, 12, 15 LPM
Flow Rate Accuracy†	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 10%

*The empty weight may vary slightly.
** The full weight may vary based upon the filling conditions.
† This accuracy is only at 70F and 14.7 psig and with a calibrated accurate mass flow meter.

Warning Information

Important: Read this manual thoroughly before operating the Liberator.
RX Only.

 **WARNING: THIS DEVICE IS NOT INTENDED FOR LIFE SUSTAINING USE.**
WARNING: PATIENT OR OTHERS MAY BE ENTANGLED IN CANNULA OR OTHER TUBING CAUSING ASPHYXIATION. **WARNING: IF YOU FEEL THE EQUIPMENT IS NOT OPERATING PROPERLY, CALL YOUR HEALTH CARE PROVIDER. DO NOT ATTEMPT TO REPAIR OR ADJUST THE UNIT YOURSELF.** **WARNING: DO NOT MODIFY THIS EQUIPMENT WITHOUT AUTHORIZATION FROM THE MANUFACTURER.** **WARNING: IF CONTINUITY OF OXYGEN SUPPLY IS REQUIRED, ENSURE THAT AN ADEQUATE SUPPLY OF OXYGEN AND/OR A SECONDARY OXYGEN SUPPLY IS AVAILABLE AT ALL TIMES DURING THERAPY.**
WARNING: DO NOT ALLOW SMOKING, CANDLES, OR OPEN FLAMES WITHIN 10 FEET (3 METERS) OF THE DEVICE, OR CLOSER THAN 8 INCHES (20 CM) FROM ANY SOURCE OF IGNITION.
WARNING: KEEP YOUR UNIT IN A WELL-VENTILATED AREA.
 **WARNING: DO NOT STORE LIQUID OXYGEN EQUIPMENT IN A CLOSET, CAR TRUNK, OR OTHER CONFINED AREA. DO NOT PLACE BLANKETS, DRAPERIES, OR OTHER FABRICS OVER EQUIPMENT.**
WARNING: THIS PRODUCT CAN EXPOSE YOU TO CHEMICALS INCLUDING NICKEL, WHICH IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. FOR MORE INFORMATION, GO TO WWW.P65WARNINGS.CA.GOV.
WARNING: IN THE EVENT THERE IS A SERIOUS INCIDENT OCCURRING WITH THIS DEVICE, THE USER SHOULD IMMEDIATELY REPORT THE INCIDENT TO THE PROVIDER AND/OR THE MANUFACTURER. A SERIOUS INCIDENT IS DEFINED AS AN INJURY, DEATH, OR POTENTIAL TO CAUSE INJURY/DEATH SHOULD THERE BE A REOCCURRENCE OF THE INCIDENT. THE USER CAN ALSO REPORT THE INCIDENT TO THE COMPETENT AUTHORITY IN THE COUNTRY WHERE THE INCIDENT OCCURRED.

 **Caution: Use the Liberator only as directed by your doctor.**

Caution: The unit contains liquid oxygen which is extremely cold, almost 300°F (-184°C). Exposure to such a low temperature can cause severe frostbite.
Caution: Liquid and gaseous oxygen, though non-flammable, cause other materials to burn faster than normal. This hazard, along with the low temperature of liquid oxygen, warrants certain safety precautions.
Caution: Keep flammable materials away from this equipment. Aerosol sprays, oils and grease, including facial creams and petroleum jelly, ignite easily and may burn rapidly in the presence of oxygen.
Caution: Smoking while wearing an oxygen cannula can cause facial burns and possibly result in death. **Caution: Removing the cannula and placing it on clothing, bedding, sofas, or other cushion material will cause a flash fire when exposed to a cigarette, heat source, spark or flame.** **Caution: If you smoke please: (1) turn off the portable, (2) take off the cannula, and (3) leave the room where the device is located.**
Caution: In the event of an accidental tip-over, immediately but cautiously return the unit into an upright position if possible. If any liquid oxygen is escaping, leave the area immediately and call your healthcare provider. Do not attempt to move the unit or stop the liquid oxygen from escaping.

Note: Do not touch frosted parts of any unit.
Note: Do not store or operate the portable coupled to the Liberator.
Note: Do not allow untrained personnel to handle or operate this device.
Note: Use of this device is prohibited on commercial passenger and cargo air flights by the Federal Aviation Administration.

Intended Use

The CAIRE Liberator Oxygen unit is intended for the administration of supplemental oxygen. The device is not intended for life support nor does it provide any patient monitoring capabilities.

Introduction

The Liberator reservoir is intended for the administration of supplemental oxygen to the patient in the end user's home and can also be used in institutions such as nursing homes or sub-acute care facilities. The device is not intended for life support nor does it provide any patient monitoring capabilities. It is recommended to have an alternate source of supplemental oxygen in the event of mechanical failure.

The device is used by COPD patients or those with diminished breathing capacity. The device is prescribed to the patient. The device is sold to a provider that is trained to operate and service the Liberator reservoir. The provider trains the user.

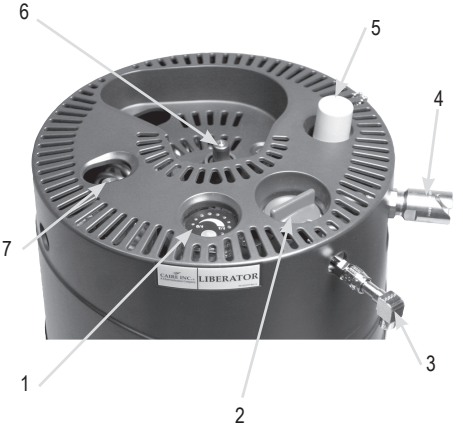
The liquid oxygen system includes the Liberator and a portable unit, which provides you with supplementary oxygen as prescribed by your physician. This user manual contains the instructions for using the Liberator. Refer to the user manual supplied with the portable unit for its operation. The Liberator is intended for stationary use. You may take oxygen directly from the Liberator.
The Liberator is offered as a top fill model or a dual top fill and side fill unit. They are filled by your health care provider. The portable provides an ambulatory source of oxygen for an extended period of time. It is filled from the Liberator.

Note: The service provider will assist with the initial setup and instruct proper handling and usage of the unit.

Dual Fill Liberator shown.
Also available in 20, 37, 41, 45, and 60 liter models.

Controls

1. Gen 4 Meter Liquid Level Gauge
2. Flow Control Knob
3. DISS Connection
4. Liberator Side Fill connector (if applicable)
5. Liberator Release Button (Top Fill push-on style only)
6. Liberator Top Fill Connections (QDV)
7. Vent Valve



Operating Instructions

1. To verify the level of liquid oxygen in the unit, see page 9.
2. Clean the fill connectors on both the Liberator and portable unit with a clean, dry, lint free cloth between each fill to prevent freezing and possible equipment failure.

WARNING: THE CONNECTION MUST BE DRY, BECAUSE MOISTURE CAN CAUSE THE EQUIPMENT TO FREEZE TOGETHER AND MAY CAUSE LEAKAGE IN THE FILL CONNECTORS.

WARNING: CLEAN THE FILL CONNECTIONS ON THE LIBERATOR AND PORTABLE UNIT WITH A CLEAN, DRY, LINT FREE CLOTH.

WARNING: DO NOT DEPRESS OR DISTURB THE METAL POPPET ON THE FILL CONNECTOR WHEN DRYING IT. THIS CAN CAUSE LEAKAGE OF LIQUID OXYGEN. IF A LEAK OCCURS, LEAVE THE ROOM AND CALL YOUR HEALTH CARE PROVIDER.

WARNING: SHOULD LEAKAGE BE EXCESSIVE TO THE POINT THAT A STREAM OF LIQUID IS PRESENT, LEAVE THE AREA AND CALL YOUR HEALTH CARE PROVIDER IMMEDIATELY.

WARNING: IF LARGE AMOUNTS OF VAPOR ARE ISSUING FROM THE UNITS DURING FILLING, STOP FILLING, LEAVE THE ROOM AND CALL YOUR HEALTH CARE PROVIDER.

WARNING: IF PROLONGED HISSING IS HEARD, STOP USE AND CONTACT YOUR HEALTH CARE PROVIDER IMMEDIATELY

3. Turn the Liberator flow control knob to the off (0) position.
4. Follow the filling instructions provided for the portable unit.

WARNING: IF THE PORTABLE DOES NOT SEPARATE EASILY, DO NOT USE FORCE. THE UNITS MAY BE FROZEN TOGETHER. LEAVE THE UNITS CONNECTED AND WAIT UNTIL THEY WARM UP – THEN THEY WILL SEPARATE EASILY. DO NOT TOUCH ANY FROSTED PARTS.

Caution: Should there be any liquid leakage from the portable after separating the units, set the portable aside, ensuring it remains vertical, leave the room, and call your health care provider immediately.

Caution: Should there be any liquid leakage from the reservoir after separating the units, open windows in the room, leave the room and call your health care provider immediately.

Caution: Check the liquid level only after the vent valve is closed.

Basic Operations

1. Use the following chart as a guideline to determine the length of time the Liberator will operate:

Model	L-20	L-30	L-37	L-45	L-60
Off	Nominal				
0.25	34-17	50-2	61-10	74-19	90-2
0.5	24-16	35-15	43-16	53-4	68-8
0.75	16-11	23-18	29-3	35-11	45-13
1	12-8	17-19	21-20	26-14	34-4
1.5	8-5	11-21	14-13	17-17	22-18
2	6-4	8-21	10-22	13-7	17-1
2.5	4-22	7-3	8-17	10-15	13-16
3	3-2	5-22	7-6	8-20	11-9
4	2-11	4-10	5-11	6-15	8-12
5	2-1	3-13	4-8	5-7	6-19
6	1-12	2-23	3-15	4-10	5-16
8	1-5	2-5	2-17	3-7	4-6
10	1-0	1-18	2-4	2-15	3-10
12	0-19	1-11	1-19	2-5	2-20
15	0-19	1-4	1-11	1-18	2-6

Note: Times are in days and hours (format 00-00).

Note: The “Nominal” times are for ideal conditions, i.e. maximum fill, exact flow rates, good loss rate, Liberator not being moved, etc. These times are the maximum expected.

Note: Your individual results will vary.

2. Use the following chart as a guideline to the recommended tubing length.

FLOW SETTING	MAXIMUM (RECOMMENDED) TUBING LENGTH*	
(LPM)	20-psig	50-psig
1-6	100 Ft. (30.5 m)	100 Ft. (30.5 m)
8	100 Ft. (30.5 m)	75 Ft. (22.9 m)
10	50 Ft. (15.2 m)	50 Ft. (15.2 m)
12	25 Ft. (7.6 m)	50 Ft. (15.2 m)
15	25 Ft. (7.6 m)	25 Ft. (7.6 m)

*Length is oxygen tubing only. Does *not* include a 7 Ft. cannula.

3. Verify functionality of the gauge

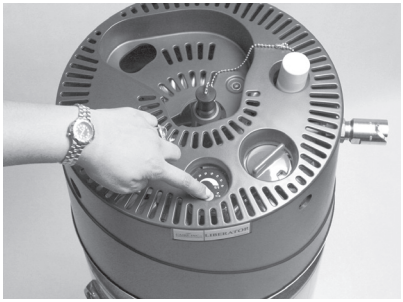
• Depress button to display level. If level is displayed and Low Battery Indicator is not illuminated, battery level is acceptable.

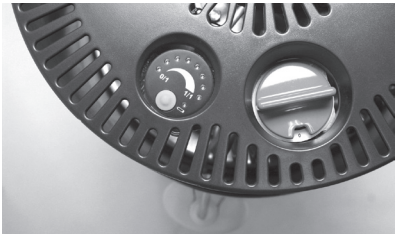
4. To verify the level of liquid oxygen in the unit with the liquid level gauge:

• Depress the push button on top of the unit for two seconds minimum. Read the LED to indicate contents level.

Caution: The Liberator is empty if only the first red LED is lit.

• If the Low Battery Indicator lights up when the button is depressed, inform your health care provider the next time your Liberator is filled.





Gen 4 Meter

5. Install the DISS extension.

6. Either

a. Attach cannula to the DISS adapter barb on the DISS connection provided by health care provider or

b. Attach a humidifier bottle to the DISS connection provided by health care provider:

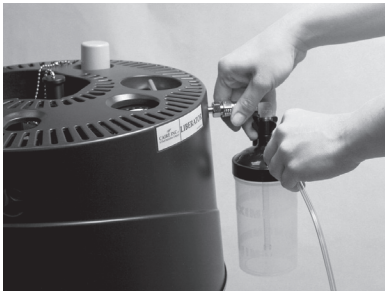
• Fill the humidifier bottle with distilled water to the proper level as indicated in the humidifier instructions.

• Attach your breathing cannula to the oxygen tube connector on the humidifier.

7. Turn the flow control knob clockwise until the prescribed flow rate (numeral) is visible in the knob "window" and a positive detent is felt.

Caution: The knob should not be set higher than the maximum prescribed flow rate. Out-of specification oxygen flow will result if the flow control knob is set between flow rates. An indication of oxygen flow is the presence of bubbles in the humidifier bottle.

Caution: To ensure proper flow rate, verify fittings are tight and leak free.



Humidifier Bottle and Cannula are not included

8. Adjust your breathing cannula to the proper position to breathe comfortably.

Note: Ensure the cannula is fully inserted and secure. During inhalation, you should hear or feel oxygen flow to the prongs of the nasal cannula. The proper placement and positioning of the prongs of the nasal cannula in your nose is critical to the amount of oxygen delivered to the respiratory system of the end user.

9. You should be receiving oxygen now. Check to make sure that there are bubbles in the humidifier bottle.

10. Under certain environmental conditions and with continuous use, the Liberator may develop an excessive amount of ice on the warming and breathing coils within the shroud. You should defrost the unit between liquid oxygen fills to prevent this ice build-up.

Caution: Always turn the flow control knob to off (0 position) when not in use, or when the unit is empty.

To Defrost the Unit

1. Fill a Portable so that you can continue to receive oxygen while the Liberator defrosts.

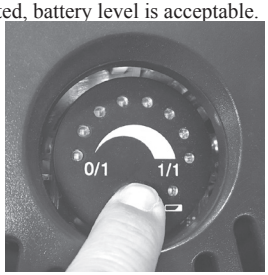
2. Set the Liberator flow control knob to 0 and allow the unit to warm to room temperature, as indicated by the melting of all ice from the unit.

3. Check the condensation collection bottle frequently during defrosting and empty as required.

4. If the Portable runs low before the Liberator is fully defrosted, you may refill it as needed.

Battery Care and Maintenance

• Depress button to display level. If level is displayed and Low Battery Indicator is not illuminated, battery level is acceptable.



• If the Low Battery Indicator lights up when the contents button is depressed, call your Service Provider to replace the battery.

Portable Filling and Operating Instructions

Prior to filling any portable unit, visually verify:

a. Broken shroud or shroud components
b. QDV deformation
c. Level indicator functionality
d. Presence of all required labels
e. Cryogenic reservoir damage (dents, dings)
f. If LOX is still present in the unit, inspect for heavy frost or condensation on the exterior of the unit.

Please reference the user manual of your portable liquid oxygen device for specific filling and operating instructions.

WARNING: IF THE PORTABLE UNIT IS NOT COMPATIBLE WITH THE LIBERATOR, DO NOT ATTEMPT TO FILL OR USE THE PORTABLE UNIT.

Maintenance

Clean the fill connectors on both the stationary and portable units with a clean, dry, lint-free cloth between each fill to prevent freezing and possible equipment failure.

There are no user-serviceable parts in the Liberators.

Your service provider is responsible for any maintenance that my be required per the technical manual of this device. Call your service provider for any maintenance requirements.

The expected service life is a minimum of five years.

Troubleshooting

Issue	Solution
Inadequate Flow	• Verify flow control knob is on correct flow rate setting • Verify flow control knob is not set in between flow rates. • Verify liquid oxygen is in unit • Verify if cannula is kinked or pinched • Verify if cannula is properly connected to unit NOTE: If issues persists, contact your service provider.
The liquid level meter does not work or is not accurate.	• The battery may need to be replaced or the meter re-calibrated. Contact service provider for assistance.
The low battery LED illuminated on liquid level meter.	• Contact service provider for assistance.
Frosting on coils of Liberator.	• Frosting on coils is normal operation when breathing off of Liberator.
There is frosting on tank or side of Liberator.	• Frosting on outside of tank is abnormal; contact service provider for assistance.
There is a hissing sound emanating from Liberator.	• During normal operation the unit's primary relief valve will open from time to time to relieve excess pressure, especially soon after filling. • If hissing is persistent or abnormal, this could indicate excess pressure being vented off or a leak in the system. Contact service provider for assistance.
Liquid Oxygen evacuating from blue QDV.	• The QDV may have frozen open. Open windows if possible and evacuate area immediately. Contact service provider. • To prevent frozen QDV, be sure to wipe QDV with dry lint free cloth before and after filling your portable.
Condensation or water pooling up on floor.	• As the frost melts on the coils, water may accumulate on the floor if the condensate bottle is not used or is full. Verify that condensate bottle is installed properly and emptied as needed.
Portable takes a long time to fill.	• It could take several minutes to fill portable device if the portable device is warm or hasn't been used recently. • Consult user manual for your portable liquid oxygen device.
Portable not filling.	• Ensure reservoir tank has sufficient liquid to fill your portable device. Ensure portable device is pushed onto QDV correctly and the portable vent valve lever is held in the open position. • Consult user manual for your portable liquid oxygen device.

Cleaning Standard

WARNING: CLEAN ONLY AFTER THE UNIT IS EMPTY.

- Clean using a solution of mild dish washing detergent and water.
- Apply cleaning solution directly to a lint-free cloth. Approved cleaners include HydroPure and HydroKlean. Do not spray cleaners directly on the Liberator.
- Wipe the outside surface with the lint-free cloth until the outside surface is clean.

Caution: Do not use high temperature and high pressure washing equipment to clean these units.

- Do not get cleaner on any internal components or valves.
- Allow the unit to dry thoroughly before using.

Note: Note to health care provider – for reprocessing procedures, see applicable service manual.

Disposal

Always return Liberator, including all components, to your homecare provider for proper disposal. You can also contact your local city or town offices for instructions on proper disposal of the battery.

WEEE and RoHS

This symbol is to remind the equipment owners to return it to a recycling facility at the end of its life, per Waste Electrical and Electronic Equipment (WEEE) Directive.

Our products will comply with the restriction of Hazardous Substances (RoHS) directive. They will not contain more than trace amounts of lead or other hazardous material content.

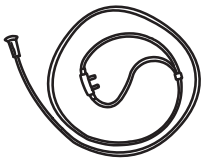
Transport and Storage

The device should be stored in the upright position, and be well ventilated. Do not allow the device to lie on its side. Humidity up to 95% noncondensing. Temperatures range from -40°F to 158°F (-40°C to 70°C).

Operating temperature ranges from 14°F to 104°F (10°C to 40°C). Relative humidity range from 30% to 75% noncondensing.

Note: The atmospheric pressure range is 700 hPa to 1060 hPa (elevation of 10,000 Ft. to -1,000 Ft.).

Accessories



Cannula
Position with prongs facing upward in nose and loop over ears. Slide adjuster under chin until comfortable.

Condensate Bottle

Roller Base

Note: Ensure the proper size roller base is used with the Liberator.

Note: Only use roller base on flat surfaces.

Note: To Equipment Provider: The following oxygen administration accessories are recommended for use with the Liberator:

- Nasal Cannula: CAIRE Part Number 5408-SEQ
- Firebreak: CAIRE Part Number 21126636

A firebreak is recommended for use with any cannula.

- CAIRE offers a firebreak intended to be used in conjunction with the oxygen reservoir. The firebreak is a thermal fuse to stop the flow of gas in the event that the downstream cannula or oxygen tubing is ignited and burns to the firebreak. It is placed in-line with the nasal cannula or oxygen tubing between the patient and the oxygen outlet of the Liberator. For proper use of the firebreak, always refer to the manufacturer's instructions (included with each firebreak kit).
- Additional recommended accessories information is available online at www.caireinc.com.

Safety

WARNING: PORTABLE RF COMMUNICATIONS EQUIPMENT (INCLUDING PERIPHERALS SUCH AS ANTENNA CABLES AND EXTERNAL ANTENNAS) SHOULD BE USED NO CLOSER THAN 30 CM (12 INCHES) TO ANY PART OF THE LIBERATOR, INCLUDING CABLES SPECIFIED BY THE MANUFACTURER. OTHERWISE, DEGRADATION OF THE PERFORMANCE OF THIS EQUIPMENT COULD RESULT.

WARNING: USE OF ACCESSORIES, TRANSDUCERS AND CABLES OTHER THAN THOSE SPECIFIED OR PROVIDED BY THE MANUFACTURER OF THIS EQUIPMENT COULD RESULT IN INCREASED ELECTROMAGNETIC EMISSIONS OR DECREASED ELECTROMAGNETIC IMMUNITY OF THIS EQUIPMENT AND RESULT IN IMPROPER OPERATION.

WARNING: USE OF THIS EQUIPMENT ADJACENT TO OR STACKED WITH OTHER EQUIPMENT SHOULD BE AVOIDED BECAUSE IT COULD RESULT IN IMPROPER OPERATION. IF SUCH USE IS NECESSARY, THIS EQUIPMENT AND THE OTHER EQUIPMENT SHOULD BE OBSERVED TO VERIFY THAT THEY ARE OPERATING NORMALLY.

Caution: Medical Electrical Equipment needs special precautions regarding Electromagnetic compatibility (EMC) and needs to be installed and put into service according to the EMC information provided in this manual.

Caution: Portable and mobile radio frequency (RF) communications equipment can affect Medical Electrical Equipment.

Caution: The Liberator Reservoir should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the Liberator Reservoir should be observed to verify normal operation in the configuration in which it will be used.

Table 1

Guidance and Manufacturer's Declaration—Electromagnetic Emissions

The Liberator is intended for use in the electromagnetic environment specified below. The customer or the user of the Liberator should assure that it is used in such an environment..

Emissions Test	Compliance	Electromagnetic Environment - Guidance
RF emissions CISPR 11	Group 1	The Liberator uses RF energy only for internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The Liberator is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not Applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not Applicable	

Table 2*: Recommended separation distances between portable and mobile RF communications equipment and the Liberator

The Liberator is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Liberator can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Liberator as recommended below, according to the maximum output power of the communications equipment

Rated maximum output power of transmitter	Separation distance according to frequency of transmitter m		
	from 150 kHz to 80 MHz	from 80 MHz to 800 MHz	from 800 MHz to 2,5 GHz
W	$d = 1.2\sqrt{P}$	$d = 1.2\sqrt{P}$	$d = 2.3\sqrt{P}$
0,01	0.12 m	0.12 m	0.23 m
0,1	0.38 m	0.38 m	0.73 m
1	1.2 m	1.2 m	2.3 m
10	3.8 m	3.8 m	7.3 m
100	12 m	12 m	23 m

For transmitters rated at a maximum output power not listed above, the recommended separation distance (d) in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.
NOTE 1 at 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

* This table is included as a standard requirement for equipment which has been tested to specific test levels and over specific frequency ranges and been found compliant with regulations.

Table 3: Guidance and Manufacturer's Declaration—Electromagnetic Immunity

The Liberator is intended for use in the electromagnetic environment specified below. The customer or the user of the Liberator should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment – guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV Contact ±2 kV, ±4 kV, ±8 kV, ±15kV air	±8 kV Contact ±2 kV, ±4 kV, ±8 kV, ±15kV air	Floors should be wood, concrete or ceramic tile. If floors are synthetic, the relative humidity should be at least 30 %.**
Electrical fast transient/ burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	Not applicable DC powered device Not applicable No data input/output lines	Not applicable
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	Not applicable DC powered device	Not applicable
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0,5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) 25 cycles <5 % U_T (>95 % dip in U_T) for 5 sec	Not applicable DC powered device	Not applicable
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A / m 50/60 Hz	3 A / m 50/60 Hz	Power frequency magnetic fields should be that of a typical commercial or hospital environment.

NOTE U_T is the A.C. mains voltage prior to application of the test level.

** This statement indicates that the required testing was performed in a controlled environment and the Liberator are found to be compliant with regulations.

Table 4: Guidance and Manufacturer's Declaration—Immunity ME Equipment and ME Systems

Guidance and Manufacturer's Declaration—Immunity

The Liberator is intended for use in the electromagnetic environment specified below. The customer or user of the Liberator should ensure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
Conducted RF IEC 61000-4-6	3 Vrms 6 Vrms (In ISM Bands) 150 kHz to 80 MHz	Not applicable Battery powered device, No SIP/SOP	Portable and mobile RF communications equipment should be used no closer to any part of the Liberator, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1,2 \sqrt{P}$
Radiated RF IEC 61000-4-3	80 MHz to 2.7 GHz	10 V/m 80 MHz—2,7 GHz 80 % AM at 1 kHz	$d = 1,2 \sqrt{P}$ $d = 2,3 \sqrt{P}$ where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a], should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol: 

Test frequency (MHz)	Band[a)] (MHz)	Service[a)]	Modulation[b)]	Maximum power (W)	Distance (m)	Immunity Test Level (V/m)
385	380–390	TETRA 400	Pulse modulation[b)] 18 Hz	1.8	0.3	27
450	430–470	GMRS 460, FRS 460	FM[C)] ±5 kHz deviation 1 kHz sine	2	0.3	28
710	704–787	LTE Band 13, 17	Pulse modulation[b)] 217 Hz	0.2	0.3	9
745						
780						
810	800–960	GSM 800/900, TETRA 800, IDEN 820, CDMA 850, LTE Band 5	Pulse modulation[b)] 18 Hz	2	0.3	28
870						
930						
1720	1700–1900	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation[b)] 217 Hz	2	0.3	28
1845						
1970						
2450	2400–2570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse modulation[b)] 217 Hz	2	0.3	28
5240	5100–5800	WLAN 802.11 a/n	Pulse modulation[b)] 217 Hz	0.2	0.3	9
5500						
5785						

Note: If necessary to achieve the IMMUNITY TEST LEVEL, the distance between the transmitting antenna and the Liberator may be reduced to 1m. The 1m test distance is permitted by IEC 61000-4-3.

[a] For some services, only the uplink frequencies are included.
[b] The carrier shall be modulated using a 50% duty cycle square wave signal.
[c] As an alternative to FM modulation, 50% pulse modulation at 18 Hz may be used because while it does not represent actual modulation, it would be worst case.

NOTES

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