CAIRE®

Liberator

User Manual (English)

Symbols Glossary

ISO 7000; Graphical symbols for use on equipment—Index and synopsis	
	Operating temperature limitation of these units is 10°C to 40°C. Storage temperature limitation range is -40°C to 70°C. Reg. # 0632
	Portable humidity range is 15 to 95%. Base humidity range is 30 to 75%. Reg. # 2620
	Keep away from rain, keep dry. Reg. # 0626
	Name and address of manufacturer. Reg. # 3082
	Caution, consult accompanying documents. Reg. # 0434A
REF	Catalog Number. Reg. # 2493
SN	Serial Number. Reg. # 2498
	This way up. Reg. # 0623
	Fragile, handle with care. Reg. # 0621
ISO 7010: Graphical symbols—Safety colors and safety signs—Registered safety signs	
	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; concerning medical devices	
EC REP	Authorized representative in the European Community
CE 0459	This device complies with the requirements of Directive 93/42/EEC concerning medical devices. It bears the CE marking as shown.
0029	This device complies with the requirements of Directive 2010/35/EU concerning medical devices. It bears the pi marking as shown.
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road	
	Non-toxic gas.
	Hazard Oxidizing substances: fire intensifying risk.
UN1073 OXYGEN, REFRIGERATED LIQUID	Refrigerated Liquid, USP; Produced by Air Liquefaction
Internal Symbols	
	Keep unit well ventilated at all times
	Keep away from flammable materials, oil and grease.
	Wipe connector with clean dry cloth before filling.
IEC 60417: Graphical Symbols for use on equipment	
	Do not cover unit. These units normally vent oxygen. No. 5641
21 CFR 801.15: Code of Federal Regulations Title 21	
RX ONLY	Federal law restricts this device to sale by or on the order of a physician.
Council Directive 2012/19/EU: waste electrical and electronic equipment (WEEE)	
	WEEE
IEC 60601-1: Medical electrical equipment Part 1 General requirements for basic safety and essential performance	
IP21	Drip Proof

This product may be covered by one or more patents, US and international. Please visit our website, Pat.: patents.gtls.io for listing of applicable 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 91.0 lb (41,3 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)	47.5 lb (21,54 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)	122.77 lb (55,68 kg)	141.01 lb (63.98 kg)	165.32 lb (74.99 kg)	220.68 lb (100,1 kg)
Height	24.5 in. (622 mm)	29.5 in. (750 mm)	32.75 in. (832 mm)	37 in. (940 mm)	39 in. (990 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 days 12 hrs	9 days 9 hrs	11 days 14 hrs	14 days 2 hrs	18 days 2 hrs
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%

* 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: 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.

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

The unit contains liquid oxygen which is extremely cold, almost 300°F (-184°C). Exposure to such a low temperature can cause severe frostbite.

Liquid and gaseous oxygen, though nonflammable, cause other materials to burn faster than normal. This hazard, along with the low temperature of liquid oxygen, warrants certain safety precautions.

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.

Smoking while wearing an oxygen cannula can cause facial burns and possibly result in death.
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.
If you smoke please: (1) turn off the portable, (2) take off the cannula, and (3) leave the room where the device is located.

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.**

Do not touch frosted parts of any unit.

Do not store or operate the portable coupled to the
Liberator

Do not allow untrained personnel to handle or operate this device.

Use of this device is prohibited on commercial passenger and cargo air flights by the Federal Aviation Administration.

Introduction

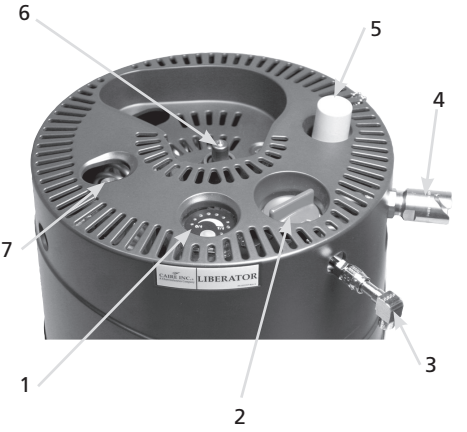
The liquid oxygen system includes the Liberator and a portable unit, which provides you with supplementary oxygen as prescribed by your physician. This user manual contains the instructions for using the Liberator. Refer to the user manual supplied with the portable unit for its operation. The Liberator 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:

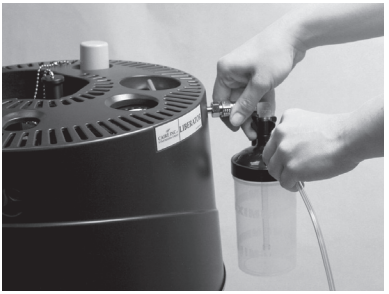
• Fill the humidifier bottle with distilled water to the proper level as indicated in the humidifier instructions.

• 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.

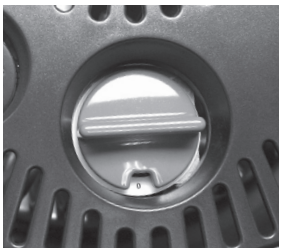
Caution: To ensure proper flow rate, verify fittings are tight and leak free.



Humidifier Bottle and Cannula are not included

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

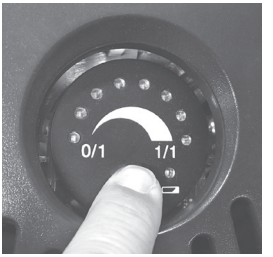


To Defrost the Unit

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.

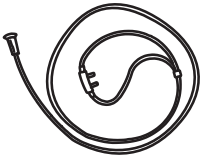
Transport and Storage

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

Safety

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 use of Accessories, transducers, and cables other than those specified, with the exception of transducers and cables sold by the Manufacturer of this device as replacement parts for internal components, may result in increased Emissions or decreased Immunity of the Liberator Reservoir.

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 W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz	80 MHz and 800 MHz	800 MHz to 2,5 GHz
	$d=1.2\sqrt{P}$	$d=1.2\sqrt{P}$	$d=2.3\sqrt{P}$
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 manufacturers 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	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.*
Electrical fast transient/burst IEC 610004-4	±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% UT (>95% dip in UT) for 0,5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	Not Applicable DC powered device	Not Applicable
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Note: UT 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 manufacturers 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
Conducted RF IEC 61000-4-6	3Vrms 150kHz to 80 MHz	Not Applicable Battery powered device	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** $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2,5 GHz 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: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 V/m	

NOTE 1 At 80 MHz and 800 MHz, 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.

[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To asses the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Liberator is used exceeds the applicable RF compliance level above, the Liberator should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Liberator.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

* 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.

Notes

Notes

CAIRE®

www.cairemedical.com

CE 0459

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