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# 6000S User's Manual Transport Ventilator

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### Product Information Description

Thank you for purchasing our Transport Ventilator

For the correct use of this device, please read and understand this User Manual carefully before use. After reading, please keep this Manual in an easily accessible place.

Product name:	Transport Ventilator		
Model:	6000S		
Registrant:	Ambulanc (Shenzhen) Tech. Co., Ltd.		
Address of the registrant:	Evergrande Fashion Huigu Building 1#101, Fulong Road, Shanghenglang Community, Dalang Street, Longhua District, Shenzhen, Guangdong 518109, China		
Manufacturer:	Ambulanc (Shenzhen) Tech. Co., Ltd.		
Manufacturing address:	3rd and 8th Floor, Block C, Building #5, and 1st to 10th Floor, Building #8, Skyworth Innovation Industry Park, Tangtou 1st Road, Shiyan, Baoan District, Shenzhen, Guangdong 518108, China		
Authorized representative:	Shanghai International Holding Corp. GmbH(Europe) Eiffestrasse 80, 20537 Hamburg, Germany		
Date of manufacture	check on the main unit		
Service life:	8 years		
Manual version:	5.0		

Warning

This device is not intended for home using!

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Ambulanc is responsible for the effects on safety, reliability and performance of this product, only if:

- All installation operations, expansions, changes, modifications and repairs of this product are conducted by Ambulanc authorized personnel;
- The electrical installation of the relevant room complies with the applicable national and local requirements;
- The product is used in accordance with the instructions for use.

# Warning

- This equipment must be operated by skilled/trained clinical professionals.
- It is important for the hospital or organization that employs this equipment to carry out a reasonable service/maintenance plan. Neglect of this may result in machine breakdown or personal injury.

#### Warranty

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

#### **Exemptions**

Ambulanc's obligation or liability under this warranty does not include any transportation or irresistible natural disaster or other charges or liability for direct, indirect or consequential damages or delay resulting from the improper use or application of the product or the use of parts or accessories not approved by Ambulanc or repairs by people other than Ambulanc authorized personnel.

This warranty shall not extend to

- Malfunction or damage caused by improper use or man-made failure.
- Malfunction or damage caused by unstable or out-of-range power input.
- Malfunction or damage caused by force majeure such as fire and earthquake.
- Malfunction or damage caused by improper operation or repair by unqualified or unauthorized service people.
- Malfunction of the instrument or part whose serial number is not legible enough.
- Others not caused by instrument or part itself.

#### **Safety Information**

# **A**Danger

Indicate an imminent hazard that, if not avoided, will result in death or serious injury.

### **/!**\Warning

Indicate a potential hazard or unsafe practice that, if not avoided, could result in death or serious injury.

# **A**Caution

Indicate a potential hazard or unsafe practice that, if not avoided, could result in minor personal injury or product/property damage.

### **A**Note

Provide application tips or other useful information to ensure that you get the most from your product.

#### **Company Contact**

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#### Preface

#### **Manual Purpose**

This manual contains the instructions necessary to operate the product safely and in accordance with its function and intended use. Observance of this manual is a prerequisite for proper product performance and correct operation and ensures patient and operator safety.

This manual is based on the maximum configuration and therefore some contents may not apply to your product. If you have any question, please contact us.

This manual is an integral part of the product. It should always be kept close to the equipment so that it can be obtained conveniently when needed.

#### **Intended Audience**

This manual is geared for clinical professionals who are expected to have a working knowledge of medical procedures, practices and terminology as required for emergency rescue.

#### Illustrations

All illustrations in this manual serve as examples only. They may not necessarily reflect the setup or data displayed on your ventilator.

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### 1. Overview Symbols used on the display

Symbol	Description	
	Refer to the document attached for more details	

### 2. Description 2.1 Intended use

The 6000S ventilator is intended to provide continuous ventilation for patients who require invasive or noninvasive respiratory support and weigh more than 10KG (Infants, children, adults). The 6000S Ventilator is intended for use in emergency treatment outside the hospital and inhospital transportation, and it runs under the central oxygen supply of the hospital or an oxygen cylinder pressure greater than 2.7Bar.

# Warning

6000S Should not be used on neonatal patients.

### 2.2 Applications

#### You can use 6000S:

- To revive patients at the site of the emergency;
- For longer periods in more protracted emergencies, e.g. fire;
- For short-term O<sub>2</sub> inhalation using a respiration masks.

#### You can use 6000S while transporting patients:

- Between the various rooms and departments of a hospital;
- Between the hospital and other premises;
- In emergencies;
- When transport over considerable distances is planned.

#### 6000S:

- Is designed to provide controlled ventilation to persons of **10kg** body weight or more;
- Is used to treat respiration arrest;
- Can be preset to parameters that ensure evenly balanced ventilation, provided that the selected Maximum ventilation pressure Pmax is not exceeded;
- Permits respiration-controlled oxygen inhalation in Demand mode.

### 2.3 Users qualification

6000S must only be used by persons who can verify that they have the following qualifications:

- A medical qualification and training in ventilation techniques.
- Training in the use of the 6000S by a person authorized by Ambulanc
   Improper use may lead to serious physical injury.

### 3. Safety instructions

### 3.1 Safe Using of Oxygen

Highly compressed oxygen can lead to spontaneous explosive reactions in combination with flammable substances (grease, oil, alcohol, disinfectants, etc,):

# **A**Warning

- All screw connections and other components of the ventilator must be kept absolutely free of oil and grease.
- Always wash your hands before starting to work on the oxygen supply.
- Smoking and open flames are strictly prohibited in the vicinity of all fittings containing or transporting oxygen.
- During assembly and when changing the oxygen cylinder, only hand pressure should be used when tightening the screw connections to the cylinder and to the pressure reducer. Never use tools for this purpose. Excessive tighten damages the screw threads and seals and can cause leaks.
- Protect oxygen cylinders from accidental falls. If a cylinder falls, the pressure reducer or the valve may break off and cause a violent explosion.

# **A**Caution

- Always open the valve of the oxygen cylinder slowly to prevent pressure damage to the other fittings.
- The oxygen cylinder should never be completely emptied as this may allow moisture-containing air to enter the cylinder and cause corrosion.
- Secure the oxygen cylinders so that they cannot fall over. If a cylinder falls on the pressure reducer or valve, these could break off, causing a violent explosion.

### **3.2 Patient Ventilation Hose System**

### Warning

- Risk of injury. Only use the Patient Hose System if you are a qualified medical professional and have received training in respiration techniques. Improper use may lead to serious physical injury.
- The Patient Hose System must be subjected to a functional check and visual inspection by the user before use. For this, refer to the instruction manual for the Patient Hose System.

- When connecting the patient valve, check that the direction of flow of the respiratory gas is correct. Make sure that the expiration opening of the patient valve is not covered or prevented from functioning, e.g., by the patient's position.
- Only use the Patient Hose System for the purpose described. For this, refer to the instruction manual for the Patient Hose System.
- The Patient Hose System is not suitable for hyperbaric use (pressure chamber).
- Also refer to the instruction manual for the Patient Hose System.

### **3.3 Accessories/spare parts**

### Caution

- Protect silicone/rubber parts against UV light and prolonged direct exposure to sunlight to prevent them becoming brittle.
- We recommend that work such as inspections and repairs should be carried out by the manufacturer, Ambulanc, or by a technician expressly authorized by Ambulanc.
- Malfunctions and a lack of biocompatibility may result if products from other manufacturers are used. Please bear in mind that in these cases all warranty rights and liability shall become void if the accessories recommended in the instruction manual or original replacement parts are not used.

### 4. Installation

### Warning

After installation, you must make function check to ensure reliable operation. (See "7. Function Check")

### 4.1 Connecting the oxygen cylinder

#### **!** Warning

- Risk of explosion! Wash your hands thoroughly before doing any work on the oxygen supply. Hydrocarbon compounds (e.g. oil, grease, cleaning alcohol, hand cream or adhesive plasters) can cause explosive reactions if they come into contact with highly compressed oxygen.
- Never use wrenches or other tools to tighten or loosen the screw connections.

### 4.2 Connecting the new cylinder

# Caution

 Make sure that the patient is not connected up to the 6000S when you are establishing the gas supply. Otherwise, the automatic self-test of machine will lead to incorrect results.

• When doing this, hold the valve opening away from your body in such a way that any flying particles cannot injure yourself or other people.

#### 4.3 Ventilation Hose System

# Caution

Only grasp the ventilation hose by its ends. Otherwise the hose may be damaged.

# Warning

We strongly recommend to use the original Accessories supplied by Ambulanc only, malfunctions and a lack of biocompatibility may result if products from other manufacturers are used. Please bear in mind that in these cases all warranty rights and liability shall become void if the accessories recommended in the instruction manual or original replacement parts are not used.

### 5. Using the ventilator

### 5.1 Switching on/ self test



The automatic self-test is not a substitute for the functional check. Before using the unit, always carry out a functional check, as described in Section "7. Function check". That is the only way to ensure that the unit is fully functional.

### 5.2 Selecting the ventilation settings

### Warning

The No Air Mix setting should be used when the surrounding atmosphere is polluted or has a low oxygen content or when indication requires this.

### 5.3 Selecting ventilation mode

# **A**Caution

When the trigger pressure is set incorrectly or the patient's spontaneous breathe is improved, this ventilation will result excessive ventilation on patient.

#### 5.4 Ending ventilation

### Caution

Never empty the oxygen cylinder completely. Always ensure that there is a certain residual pressure in the cylinder when you return it for filling, as this prevents moist ambient air from entering and causing corrosion.

#### 5.5 Battery management

# Attention !

- 1) In the use of emergency power it can't charge. Only in case of using an adapter it can charge.
- 2) In order to use batteries for a long-term normal use, it is recommended to charge and discharge once every 3 months.

### 6. Hygienic preparation

### 6.1 6000S



Never immerse 6000S in disinfectants or other liquids. Otherwise damage may be caused to the unit, thus endangering users and patients.

#### 6.2 Ventilation hose

# **A**Caution

Always grasp the hoses at the end, as shown in the drawing, otherwise the hoses may be damaged or torn off. Close both ends of the pressure gauge hose.

### 6.3 Pressure gauge tube

### **L**Caution

Allow the component to dry thoroughly. If any water is left in the pressure gauge tube of the ventilation hose, the unit may not function correctly.

### 6.4 Fittings

### Caution

1. Never immerse fittings in disinfectant or other fluids. Just wipe over with disinfectant. Fluids must not get into the pressure reducer. Otherwise explosions might occur.

If in exceptional cases you have no alternative but to disinfect by wiping, take particular care to prevent any fluid getting into the pressure reducer.

2. In addition to the risk of explosion, there also the risk of disinfectant getting into the patient's respiratory tract with the oxygen and leading to injury.

### 6.5 Cleaning, disinfecting and sterilizing

### **A**Caution

Then allow the components to dry thoroughly. If any water is left in the patient valve

or the pressure gauge hose of the ventilation hose, the unit may not function correctly.

### 7. Functional checks

### 7.1 Checking for leaks in the system

### Caution

The screwed unions of the oxygen lines must only be tightened by hand.

### 7.2 Checking the patient valve

# **A**Caution

When reassembling, make sure that the one-way valve membrane is correctly positioned.

### 7.3 Checking the alarm systems

### **M**warning

In the case of the stenosis alarm and the disconnection alarm, the alarm signal (or message) is only set off when the cause of the alarm is repeated in two successive inspiration phases. This prevents the alarm being triggered by a very short-lived dysfunction.

# **M**warning

In this test the rise in pressure is so strong that the pressure gauge needle may over into the red zone. There are technical reasons for this, and it does not indicate any malfunction.

### 8. Servicing

#### 8.1 Battery



The 7.4V lithium battery is a special battery for this unit. Use only battery supplied by Ambulanc.

If the device is not using over 3 months, we strongly recommend conducting a charge – discharge every three months.

If the device is not using over 1 year, we recommend replacing a new battery before reusing.

#### 8.2 Change Filter

# **A**Warning

Must not be the case without filters operate ventilator. Otherwise, the machine's performance will be impaired, or the machine will be damaged.

### 8.3 Storage

#### **!** Warning

Remember that the ventilator still requires servicing at the specified intervals even when in storage; otherwise it cannot be used when removed from storage.

### 9. Product and accessories

### 9.1 Parts List of Ventilator Bag I



Specific configuration is subject to packing list.

### 10. Technical data

### **10.1 Specifications**

Type of Protection against Electric Shock	Class II Equipment with Internal power supply
Degree of Protection against Electric Shock	BF
Degree of protection against Ingress of Liquids	IP44
Degree of Protection against Hazards of Explosion	Ordinary equipment, without protection against explosion; not for use with flammable anesthetic
Mode of Operation:	Continuous running equipment
Dimensions W×H×D in mm	240×120×100mm include connectors
Weight	Approx. 1.3kg
Display	2.4" TFT color display resolution ratio: 320*240
Pressurized gas connection	External thread 9/16-18
Ventilation hose connection	External diameter 15mm/Internal diameter 20mm

Operating:	
Temperature range	-20°C to +50°C
Humidity	15% to 95%
Air pressure	70 kPa to 110 kPa
Store/transport:	
Temperature range	40°C to +70°C
Humidity	<i>≤</i> 95%
Air pressure	70 kPa to 110 kPa
Power supply	AC: 100 to 240V; 1.5 to 4A; 50/60HZ
	DC : 12 V Adapter
Work current	I <sub>min</sub> =0.3A; I <sub>max</sub> =0.6A
Battery:	
Standard	Lithium battery 7.4V; 3400mAh ;
	operating time: more than 10 hour
Work temperature	-20°C to +55°C
Charge temperature	0°C to 55°C
Ventilation modes	IPPV; A/C; Manual
Operating pressure	2.7 to 6.0 bar
Required gas supply	
Standard gas supply:	
-Supply pressure	At least 2.7bar
-Drawn flow	At least 70 l/min Oxygen(ATPD)
Optimal gas supply:	
-Supply pressure	At least 4.5bar
-Drawn flow	At least 100 l/min Oxygen(ATPD)
Non-recommended gas supply:	
-Supply pressure	Less than 2.7bar
-Drawn flow	Less than 80 l/min Oxygen(ATPD)
Insp-exp. Ratio	Constant 1:1.67
Minute volume(MV)	Continuously variable from 3 to 20 l/min(ATPD)
Ventilation frequency	Continuously variable from 5to 40 min <sup>-1</sup>

O2 concentration	No Air Mix 100% and Air Mix (see page 42)
MV tolerances	±20%
Max. ventilation pressure	20 to 60 mbar
Safety airway pressure	≤100mbar
Pressure gauge accuracy	-10 to 60 mbar , -10 to 10 mbar Deviation $\pm 2$ mbar , Other Deviation $\pm 15\%$
Trigger sensitivity	-2 mbar Deviation ±1mbar
Reusable ventilation hose	Spiral silicone
Patient valve resistance:	
Inspiration	<6 mbar at 30、60 l/min
Expiration	<6 mbar at 30、60 l/min
Emergency air intake	<6 mbar at 15、30 l/min
Respiratory compliance	100 ml/cmH <sub>2</sub> O
Voice alarm mute time	≤ 120s
Voice prompt language	Support eight languages, default Simplified Chinese

1 bar =100kPa

1 mbar=1 hPa

### **11. Storage and transportation**

### **A**Warning!

When the storage condition is beyond the required working environment, the device should be placed in a standard environment at least 8 hours before enter into standby state.

### **12. Electromagnetic Capability**

#### **GUIDANCE AND DECLARATION - ELECTROMAGNETIC EMISSION**

The 6000S is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.

EMISSIONS TEST	COMPLIANCE	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
RF distortion CISPR 11	Group 1	The 6000S uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.

RF distortion CISPR 11	Class B	
Harmonic distortion IEC 61000-3-2	Class A	establishments, including domestic establishments and those directly connected to
Voltage fluctuations/Flicker distortion IEC 61000-3-3	Complies	the public low-voltage power supply network that supplies buildings used for domestic purposes.

#### GUIDANCE AND DECLARATION - ELECTROMAGNETIC IMMUNITY

The 6000S is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.

IMMUNITY TEST	IEC60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
ESD IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 8 kV contact ± 15 kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%.
EFT IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	should be that of a typical commercial or hospital environment.
Power frequency (50Hz/60Hz) magnetic field IEC61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage	<5% UT (>95% dip in UT) for 0.5 cycle	<5% UT (>95% dip in UT) for 0.5 cycle	Mains power quality should be that of a typical commercial or hospital

variations on	40% UT (60%	40% UT (60%	environment. If the user
power supply	dip in UT) for	dip in UT) for	of the 6000S requires
input lines IEC	5 cycles	5 cycles	continued operation
input intes ince			during power mains
61000-4-11			interruptions, it is
	70% UT(30%	70% UT(30%	recommended that the
	dip in UT) for	dip in UT) for	6000S be powered from
	25 cycles	25 cycles	an uninterruptible
			power supply or a
			battery.
	<5% UT(>95%	<5% UT(>95%	
	dip in UT) for 5	dip in UT) for 5	
	sec	sec	

#### **GUIDANCE AND DECLARATION - ELECTROMAGNETIC IMMUNITY**

The6000S transport ventilator is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.

IMMUNITY TEST	IEC60601 TEST LEVEL	COMPLIA NCE LEVEL	ELECTROMAGNETIC ENVIRONMENT- GUIDANCE
Conducted RF IEC61000-4-6	3 Vrms 150 kHz to 80 MHz outside ISM bands	3Vrms (V1)	Portable and mobile RF communications equipment should be used no closer to any part of the6000S transport ventilator, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the
	10 Vrms 150 kHz to 80 MHz in ISM bands	10Vrms (V2)	transmitter. Recommended separation distance

Radiated RF IEC61000-4-3	10V/m (80MHz~ 2.5GHz)	30V/m (E1)	$d = \begin{bmatrix} \frac{3.5}{V_1} \end{bmatrix} \sqrt{P}$ $d = \begin{bmatrix} \frac{12}{V_2} \end{bmatrix} \sqrt{P}$ $d = \begin{bmatrix} \frac{12}{E_1} \end{bmatrix} \sqrt{P}  80 \text{ MHz} \sim 800 \text{ MHz}$ $d = \begin{bmatrix} \frac{23}{E_1} \end{bmatrix} \sqrt{P}  800 \text{ MHz} \sim 2.5 \text{ GHz}$ Interference may occur in the vicinity of equipment marked with the following symbol:
-----------------------------	-----------------------------	---------------	---

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 assess 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 the6000S transport ventilator is used exceeds the applicable RF compliance level above, the6000S transport ventilator should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the6000S transport ventilator

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

Recommended separation distances between portable and mobile RF communications equipment and the6000S transport ventilator.

The6000S transport ventilator is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the6000S transport ventilator as recommended below, according to the maximum output power of the communications equipment.

Separation Power(W) distance (m)					
	0.01	0.1	1	10	100
Frequency(Hz)					

150KHz~80MHz	Outside ISM bands $d = \left[\frac{3.5}{V1}\right]\sqrt{P}$	0.04	0.11	0.35	1.11	3.5
	ISM bands $d = \left[\frac{12}{V2}\right]\sqrt{P}$	0.04	0.11	0.35	1.11	3.5
80MHz~800MHz	$d = \left[\frac{12}{E1}\right] \sqrt{P}$	0.04	0.11	0.35	1.11	3.5
800MHz~2.5GHz	$d = \left[\frac{23}{E1}\right]\sqrt{P}$	0.07	0.22	0.7	2.21	7.00

For transmitters rated at a maximum output power not listed above, the recommended separation distances 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: An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2,5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas.

NOTE 2: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 3: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.





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