Basic Infant Radiant Warmer for Simulation

—— Operator's Manual

WARNING: IN ORDER TO UNDERSTAND THE FUNCTION ENOUGH, USER SHOULD LEARN THIS MANUAL BEFORE OPERATE RADIANT WARMER.

02-50-1300

BNT-1000 Infant Radiant Warmer

—— Operate Manual

Revisions

Revision Letter	Pages Affected	Date
Original Issue		August, 2003
1	All	August, 2008

RN：bnt1000ue1

Guidance and manufacturer's declaration – electromagnetic emissions		
The *Radiant warmer* is intended for use in the electromagnetic environment specified below. The customer or the user of the *Radiant warmer* should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment – guidance**
RF emissions CISPR 11	Group 1	The *Radiant warmer* 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 emissions CISPR 11	Class A	The *Radiant warmer* is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply net work 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	

Guidance and manufacturer's declaration – electromagnetic immunity			
The *Radiant warmer* is intended for use in the electromagnetic environment specified below. The customer or the user of the *Radiant warmer* 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 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 should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
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	<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	Mains power quality should be that of a typical commercial or hospital environment. If the user of the *Radiant warmer* requires continued operation during power mains interruptions, it is recommended that the *Radiant warmer* be powered from an uninterruptible power supply or a battery.
Power frequency (50 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power 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.			

Guidance and manufacturer's declaration – electromagnetic immunity			
The *Radiant warmer* is intended for use in the electromagnetic environment specified below. The customer or the user of the *Radiant warmer* should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
			Portable and mobile RF communications equipment should be used no closer to any part of the *Radiant warmer,* including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz outside ISM bands[a]	3 Vrms	$d = 1.2\sqrt{P}$
	10 Vrms 150 kHz to 80 MHz in ISM bands[a]	10 Vrms	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2,5 GHz	10 V/m	$d = 1.2\sqrt{P}$ 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 metres (m).[b] Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[c] should be less than the compliance level in each frequency range.[d] 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. The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz.

b The compliance levels in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2,5 GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas. For this reason, an additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in these frequency ranges.

c 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 the *Radiant warmer* is used exceeds the applicable RF compliance level above, the *Radiant warmer* should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the *Radiant warmer.*

d 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 the Radiant warmer.

The *Radiant warmer* is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the *Radiant warmer* can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the *Radiant warmer* 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 outside ISM bands $d = 1.2\sqrt{P}$	**150 kHz to 80 MHz in ISM bands** $d = 1.2\sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2\sqrt{P}$	**800 MHz to 2,5 GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.12	0.23
0.1	0.38	0.38	0.38	0.73
1	1.2	1.2	1.2	2.3
10	3.8	3.8	3.8	7.3
100	12	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be determined 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 The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz.

NOTE 3 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 4 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

WARRANTY

The product being described in this manual is warranted against defects in materials or workmanship for one year from the date of shipment, with the following exceptions.

1. All consumable and disposable products are guaranteed to be free from defects upon shipment only.
2. Calibrations are considered normal maintenance and are not included in the 1-year warranty.
3. The damage was caused by wrong transport.
4. The damage was caused by fire, earthquake, flood and other natural disaster.

During the warranty period any defective parts other than those listed above will be replaced at no charge to the customer. This warranty is rendered void and our company cannot be held liable for conditions resultant there from if:

1. Damage to the unit is incurred as a result of mishandling.
2. The customer fails to maintain the unit in a proper manner.
3. The customer uses any parts, accessories, or fittings not specified or sold by our company.
4. Damage to the unit is incurred as a result of service use s any parts, accessories, or fittings not specified or sold by our company.
5. Damage to the unit is incurred as a result of operates not follow operating precautions and operating manual.
6. Damage to the unit is incurred as a result of operates environment not be in accord with operate manual required.
7. Sale or service is performed by the non-certified service/dealer agency.
8. Damage to the unit is incurred as a result of lower this device system safety performance by use with any device which not be in accord with this device safety requirement.
9. Damage to the unit is incurred as a result of irrelevancy change.

The Accreditation Manual for Hospitals requires each piece of equipment to be tested prior to initial use and at least every two year thereafter. To comply with this standard, we recommend that you participate in our accreditation Testing compliance Program during the warranty period. This service can be performed through our company and authorized dealers.

SERVICE

For optimal performance, product service should be performed only by authorized and qualified service personnel. Please contact the local agency or the After-Sales of our company to get more technical information about maintenance.

OPERATING PRECAUTIONS

1. Please read and learn this manual before operate Infant Radiant Warmer (follows abbreviation Warmer).
2. Warmer misuse may result in harm to an infant. Warmer should be used only by property trained personnel as directed by an appropriately qualified physician aware of currently known hazards and benefits.
3. Warmer should be used only in the expected use range which is written in this manual.
4. Direct radiation from sunlight or other infrared source could cause overheating of the infant without activating the Over Temperature Alarm. DO NOT leave the WARMER in direct sunlight or near other sources of radiant heat.
5. DO NOT leave the WARMER in the presence of flammable anesthetic gases or other flammable materials, such as some types of cleaning fluids.
6. Devices which are easily interfered by magnetic field should not be used near the WARMER because they may interfered by the WARMER.
7. The fast air flow can affect the thermal balance of the infant. Therefore, the WARMER should be placed in the room where the air flow rate is less than 0.3m/s.
8. Please DO NOT use the WARMER under working environment not stipulated in table 1.1, or else, it may cause the failure or the WARMER can not meet the requirements.
9. Check the panels regularly to examine whether these panels are installed firmly to avoid the infant falling on the floor.
10. Please check the firm of panel regularly, DO NOT leave the infant uncared to prevent the baby falling from the bassinet.
11. When operating the panel, pay attention not to touch any part of the infant to avoid the harm on the skin of infant.
12. If the infant wears the clothes or is covered with the blanket, and it can affect the infrared radiation of infant, so we suggest that the infant should be naked.
13. When the bassinet tilts, some part of the patient is near heater so as to absorb more radiant heat, therefore, these parts should be checked more than before.
14. To make sure infant's safety, in **Manual Mode**, measure the body temperature of infant every 15min; in **Baby Mode**, measure the body temperature of infant every 30min.
15. Please DO NOT touch the heater or its protective parts to avoid the scald.
16. Please DO NOT put anything on the top of WARMER, or else, it will cause the damage and the hazard.
17. To avoid overturning, please DO NOT move the WARMER breadthwise.
18. One person of sufficient strength is required to move the WARMER. Please disconnect all power cords before moving.
19. Casters should be locked tightly to prevent moving.
20. Please DO NOT keep the power switch on for a long time when the mains power is disconnected. Or else, it may waste the power of internal battery or damage the battery.
21. Please cut off the power supply before replacing the fuse according to the stipulated specification.
22. Please use the skin temperature sensor and other parts provided by our company, or else, it will decrease the safety of equipment.

23. The effective life of Warmer is 6 year. It should be stop use over effective life, or else, it will easily appear fault and cannot achieve original performance requirement.
24. The device, accessories and the packaging have to be disposed of waste correctly at the end of the usage. Please follow Local Ordinances or Regulations for disposal.

ELECTRICAL PRECAUTIONS

1. Using auxiliary equipment that is not compatible with the safety requirements will reduce the safety. Please make sure that the auxiliary equipment has passed the safety testing according to adjusted national standards based on GB9706.1 and got the safety certificate.
2. Make sure the equipment reliable earthed. Please stop use if there is any problem about earth connection.
3. Considering the reason of the electric shock hazard, please refer to the qualified service personnel.
4. Only use the power wire which with the equipment, or else, it will decrease the safety of equipment.
5. Must hold the plug when connect or disconnect the power wire, do not pull the power wire.
6. Do not kink the joint of power wire.
7. Do not put any things near by the power wire plug, to avoid can not disconnect the power if happen emergency.

ELECTROMAGNETIC COMPATIBILITY PRECAUTIONS

- **STATEMENT:**

1. Infant Radiant Warmer needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the ACCOMPANYING DOCUMENT.
2. A portable and mobile RF communications equipment can affect Infant Radiant Warmer.

- **WARNING:** The Infant Radiant Warmer should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the Infant Radiant Warmer should be observed to verify normal operation in the configuration in which it will be used.

SEASONAL SAFETY CHECK

1. Please clean the plug of power cord at least once a year. Too much dust on plug may cause the fire.
2. The following safety checks should be performed at least every two years by a qualified person who has adequate training, knowledge, and practical experience to perform these tests. The data should be recorded in an equipment log. If the device is not functioning properly or fails any of the above tests, the device has to be repaired.

①. Inspect the equipment and accessories for mechanical and functional damage follow Section 2 in this manual.
②. Inspect the safety relevant labels for legibility.
③. Inspect the fuse to verify compliance with rated current and breaking characteristics.
④. Verify that the device functions properly as described in the table 1.1 instructions for use.
⑤. Test the protection earth resistance according GB9706.1-2007: Limit 0.1Ω.
⑥. Test the earth leakage current according GB9706.1-2007: Limit:NC 0.5 mA, SFC: 1mA.
⑦. Test the patient leakage current according GB9706.1-2007: Limit: NC 0.1mA, SFC: 0.5mA.
⑧. Test the patient leakage current under single fault condition with mains voltage on the applied part according GB9706.1-2007: Limit 5mA.

TABLE OF CONTENTS

SECTION PAGE

SECTION 1.

SYMBOLS, DEFINITIONS AND USE

This manual used different letterform and symbol for increase the legibility and pellucid. As follow:

- Standard letterform ------ use for general text.
- Overstriking letterform ------ use for emphasize word or sentence.

1.1 SYMBOLS

·The symbol below highlights a WARNING or CAUTION:

WARNING or CAUTION

·The symbol below highlights an ELECTRICAL SHOCK HAZARD WARNING

ELECTRICAL SHOCK HAZARD WARNING

·The symbol below indicates "Attention: Consult accompanying documents":

Attention: Consult accompanying documents

·The symbol below indicates "Type B equipment with an F-type floating applied part":

Type B equipment with an F-type floating applied part

·The symbol below indicates "AC power":

AC power

·The symbol below indicates the "Power On":

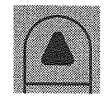
Power On

·The symbol below indicates the "Power Off":

Power Off

·The symbol below indicates the "Increase Set Temperature keys":

Increase Set Temperature keys

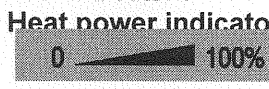


·The symbol below indicates the "Decrease Set Temperature keys":

Decrease Set Temperature keys

·The symbol below indicates the "Heat power indicator":

Heat power indicator



·The symbol below indicates "Protective earth (ground)":

Protective earth (ground)

·The symbol below indicates "Electromagnetic wave disturb":

Electromagnetic wave disturb

·The symbol below indicates the "Output power AC220V/50Hz, Max 5A":

Output power AC 220V/Hz, Max 5A

~220V/50Hz Max:5A

·The symbol below indicates the "Input power AC220V/50Hz, Max 5A":

Input power AC 220V/Hz, Max 5A

~220V/50Hz Max:5A

·The symbol below indicates the "Type F, 5A Fuse":

Type F, 5A Fuse

·The symbol below indicates that "This End Up":

This End Up

·The symbol below indicates that "Keep dry":

Keep dry

·The symbol below indicates that "Fragile":

Fragile

1.2 DEFINITIONS

This manual include some confusable and interchangeable terminology, this section use for learn well about this manual.

- **SKIN TEMPERATURE SENSOR:** A sensing device including the link with the equipment intended to measure the infant's baby temperature.
- **STEADY TEMPERATURE CONDITION:** A condition which is reached when the temperature, measured at the center of the TEST DEVICE positioned on the mid point of the EQUIPMENT mattress, does not vary by more than 1℃ over a period of 1 hour.
- **CONTROL TEMPERATURE:** The preventative control temperature to the temperature control.
- **BABY MODE:** A mode of operation in which the power output varies automatically in response to the temperature of the baby, to achieve a temperature close to a value set by the operator.

1.3 USE

This manual provides instructions for installation, use, operator maintenance, and troubleshooting of BNT-1000 Infant Radiant Warmer. We are not responsible for the malfunction which is caused due to not following the instruction on our manual. The equipment adjusts and service only follow this manual by qualified service person. Service manual could get from Technical Support Department.

The operator should read and understand of the content of this manual. This manual should be put together with the device so as to the client to check at any moment. The equipment inside part like fuse replace, adjust and service must need qualified person operate, so this manual not include service information, if you need these information, please contact our company After Sale Department to get it.

SECTION 2.

GENERAL INTRODUCTION, FEATURE AND SPECIFICATION

2.1 GENERAL INTRODUCTION

BNT-1000 Infant Radiant Warmer is used to care infants and do paediatric operations. This Infant Radiant Warmer adopts anti-blast infrared-tube made of microcrystal quartz as heat source, which has high radiant efficiency and is heated quickly. In structure, the tilt of infant's bed can be adapted continuously; radiant head can two-directory rotate on horizon; X-ray cassette shelf is set under the infant's bed, which insure infant can be screened in the warmer. It adopts high-bright eradiate lamp to detect lightness. The advanced microprocessor control temperature system makes the operation more rational. The warmer has Auto-warm (controlled by infant's skin temperature) mode. The Warmer separately display set temperature and real temperature. In order to insure the infant's safety during first aid, treatment, and nursing, this warmer has the alarm functions as sensor failure, power failure, and temperature deviation and over temperature alarm.

Product intended use: The infant radiant warmer is a radiant warming, open type incubator intended to provide an optimum clinical environment for observation, examination, temperature regulation, and management of neonates.

2.2 FEATURE

2.2.1 Part discern

The following diagram shows the main parts of the infant radiant warmer:

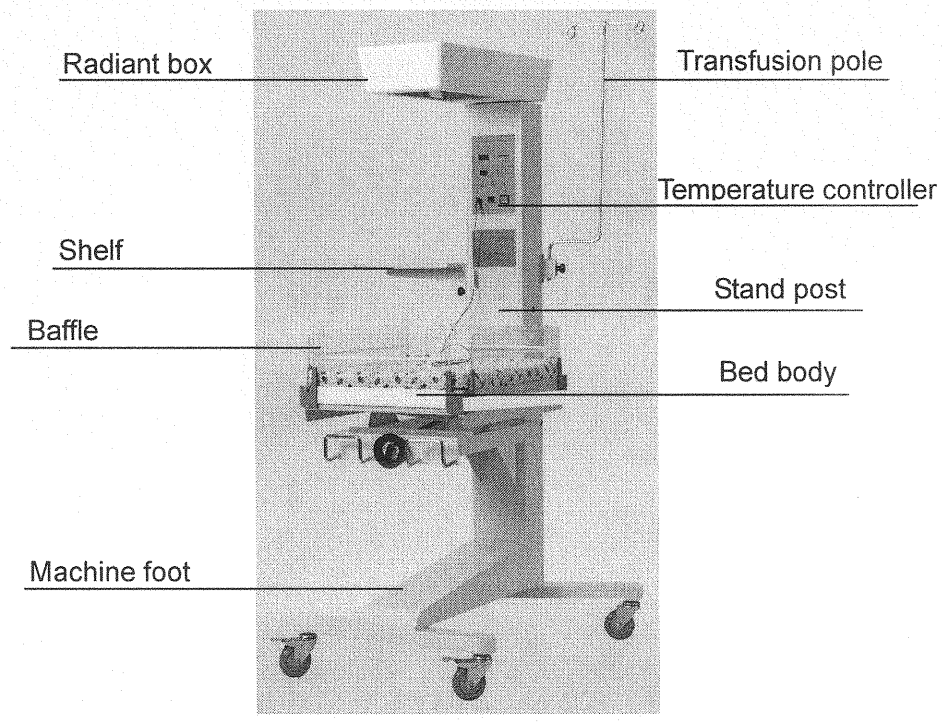


figure 1: Installation sketch map

2.2.2 Radiant box

Radiant box made up of Heater, reflex housing, the controller control the heater by Baby mode(servo skin temperature control). Exam light provided lighting for bed tray area. Radiant box could rotate two side for X-ray, the heater continue heat when radiant box rotate.

2.2.3 Bed body

The design of bed body achieved multifunction and practicability, provided good assist for nurse baby. The flap baffle could be put down, the back baffle have soft port for transfusion tube. The bed could be tilt 0° to 10° . There is a hole in the front of the bed used for pull out X-ray tray.

2.2.4 Temperature controller

Temperature controller is the core of radiant warmer, when turn on the power, the temperature controller microcomputer make a serial diagnostic test to make sure the system are run well. In this process, all display screen and indicator lighting with a turn on sound except Power failure indicator.

In Baby mode, the controller adjust the heat power through set temperature and measure temperature from skin sensor for keep the temperature stable.

2.2.5 Exam lamp

Press exam lamp switch to open or close exam lamp. Please open the exam lamp only if you need.

2.2.6 X-ray operate

Rotate the radiant box to left or right in order to put X-ray machine, put down the front flap baffle, pull out the X-ray tray, put on the X-ray cassette, back the X-ray tray, take out the X-ray cassette after make the X-ray, reposition other part.

2.2.7 Transfusion pole

Used for hang transfusion bottle. The max load of transfusion pole is 2 kg.

2.2.8 Shelf

Used for put some small device like monitor. The max load of shelf is 2 kg.

2.3 SPECIFICATION

Table 1.1 is the specification of BNT-1000 Infant Radiant Warmer.

Table 1.1 specification

This equipment belongs to Class Ⅰ, Type B, continuous operation common equipment.

POWER

Model BNT-1000-1E.....AC 110 / 120 V, 50Hz / 60Hz

Model BNT-1000-2E..... AC 220 / 240V, 50Hz / 60Hz

Input Power..... ≤1000VA

TEMPERATURE CONTROL RANGE AND RELATIVE SPECIFICATION

Control mode..... baby mode

Temperature control range.....25℃～37℃

Skin temperature sensor measure range.....20℃～42℃

Deviation between sensor measure temperature and control temperature.....≤0.5℃

Skin Sensor Precision..... ≤0.3℃

Bed surface temperature Uniformity..... ≤1℃

Temperature Rise Time ..... ≤45min

Bed tiltable.....continues adjustable in ±10°

ALARM

Sensor failure alarm.....alarm with audible and visual when sensor open circuit, short circuit or disconnect, cut off power.

Over temperature alarm.....alarm with audible and visual when displayed temperature was approach 38℃, cut off power.

Deviation alarm.....after temperature equilibrium, alarm with audible and visual when displayed temperature was 1℃ above or below control temperature, cut off power if above 1℃.

Power failure alarm..... alarm with audible and visual when power failure

ENVIRONMENT TEMPERATURE

(It is a suggestion that please do not use outside of the allow environment.)

Operate temperature range..... 18℃～30℃

Store temperature range.....-40℃～+55℃

ENVIRONMENT HUMIDITY

Operate humidity range..... 30%RH～75%RH

Store humidity range..... ≤93%RH

ATMOSPHERIC PRESSURE

Transport and Store atmospheric pressure range.....500hPa～1060hPa

Operate atmospheric pressure range.....700hPa～1060hPa

STREAM VELOCITY

Ambit environment stream velocity..... ≤0.3m/s

SECTION 3.

PRODUCT INSTALLATION

3.1 PRODUCT INSTALLATION

3.1.1 PRODUCT INSTALLATION SCHEME

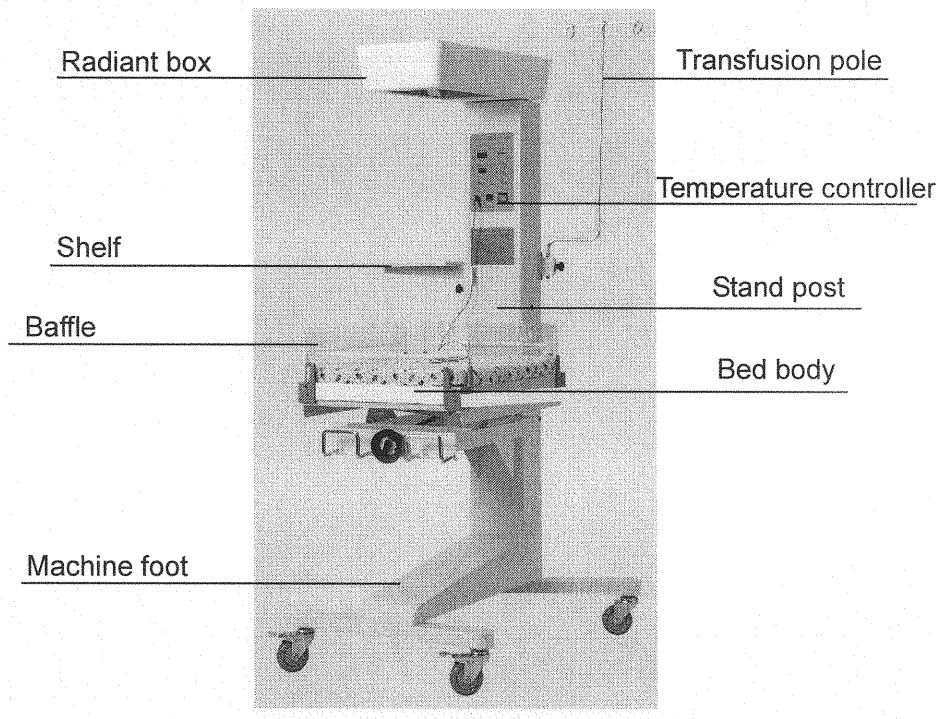


Figure 3-1: Product installation scheme

3.2 INSTALLATION STEP

3.2.1 Disassembly Stand post back board.

3.2.2 Assemble Machine foot and Stand post.

Assemble Machine foot and Stand post through four M6×20 bolts, M6 grower washers and M6 flap gaskets.

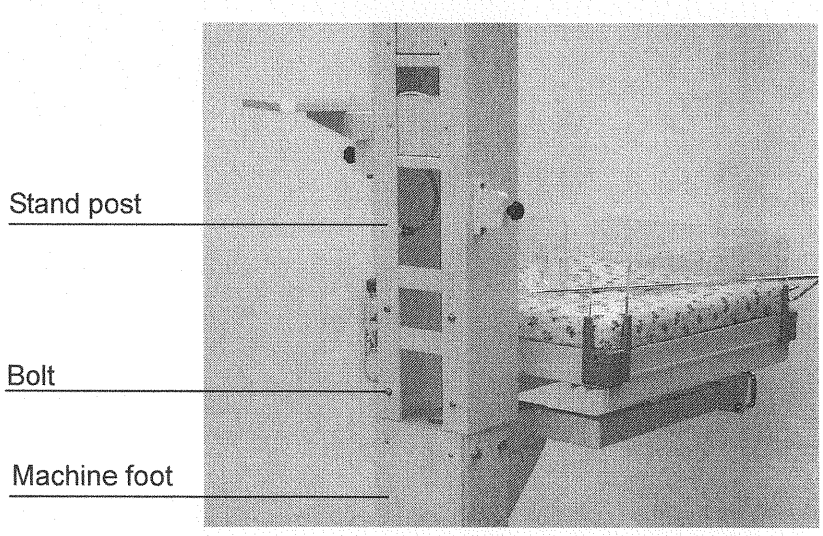


Figure 3-2: Product installation scheme

3.2.3 Assemble Radiant box and Stand post

Assemble Radiant box and Stand post through four M6×20 bolts, M6 grower washers and M6 flap gaskets, connect two set wires.

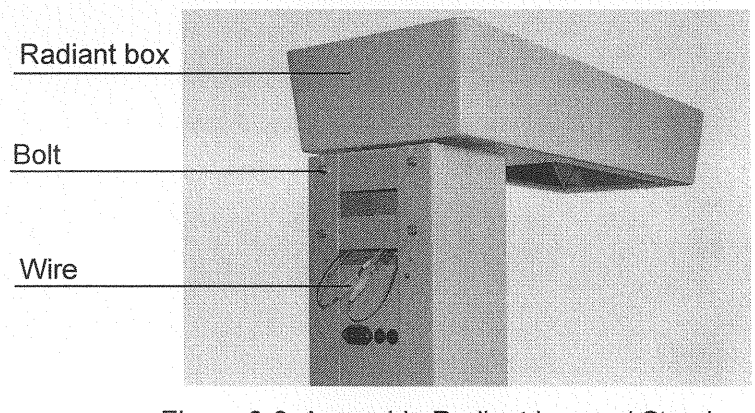


Figure 3-3: Assemble Radiant box and Stand post

3.2.4 Assemble Shelf and Transfusion pole

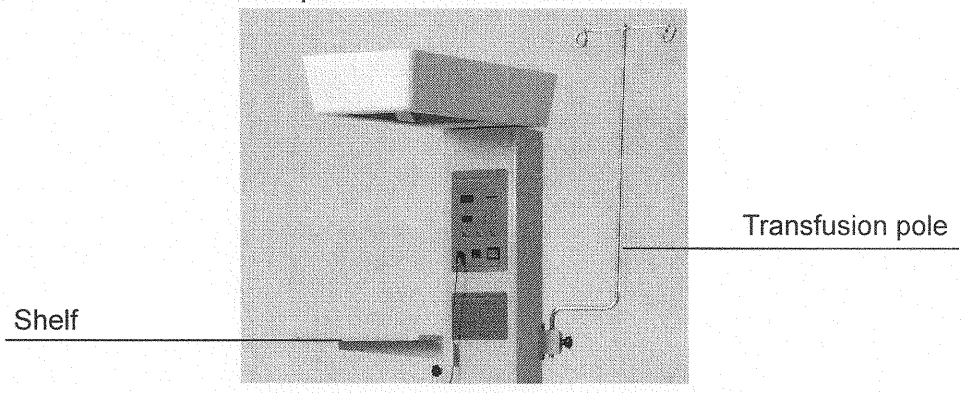


Figure 3-4: Assemble Shelf and Transfusion pole

3.2.5 Assemble flap baffle

Assemble 4 flap baffle as figure 3-5.

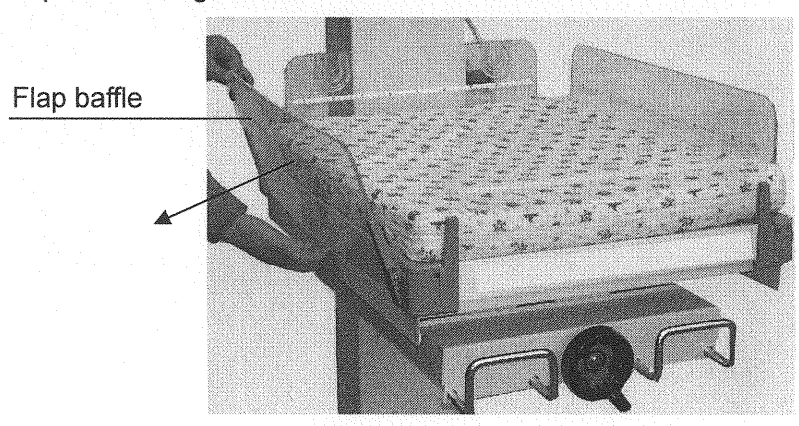


Figure 3-5: Assemble flap baffle

3.2.5 Assemble Stand post back board

Assemble Stand post and Stand post back board through six M4×20 bolts, M4 grower washers and M4 flap gaskets.

3.2.7 Assemble Section bottler shelf（Optional）

Assemble Section bottler shelf on Stand post.

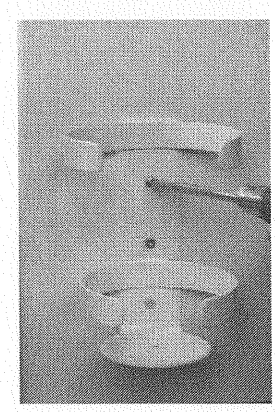


Figure 3-6: Assemble Section bottler shelf

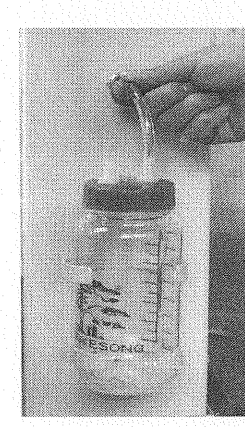


Figure 3-7: Assemble Section bottler

3.2.8 Assemble Section bottler on shelf, and connect the bottle tube.

`NOTE: press connector before pull out bottle tube.

3.2.9 Connect power wire

3.2.10 Connect skin temperature sensor

`NOTE: must screw down the bolt; make sure the stand post is upstanding, make sure radiant box is level, or else, effective the temperature uniformity.

SECTION 4.
OPERATION GUIDE

4.1 GENERAL

This section provided the guide of Warmer operation.

4.2 CONTROLLER PANEL SCATTERGRAM

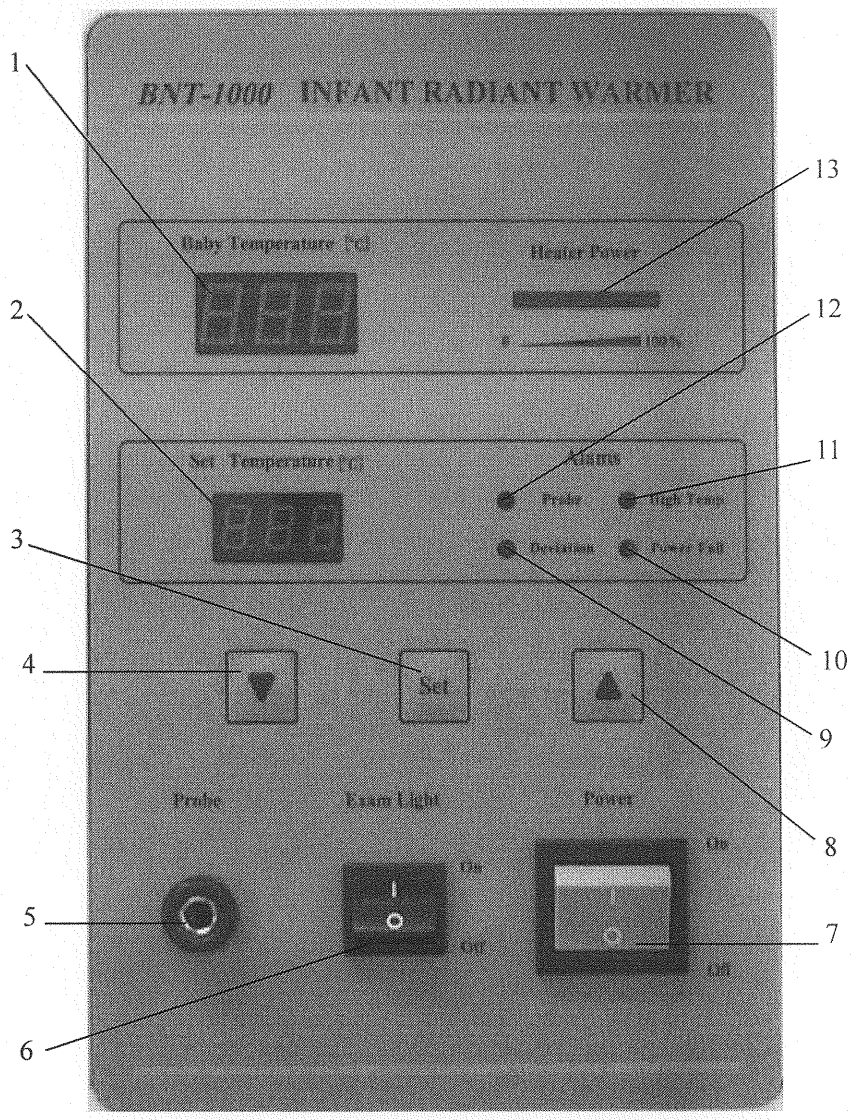


Figure 4-1: Controller panel scattergram

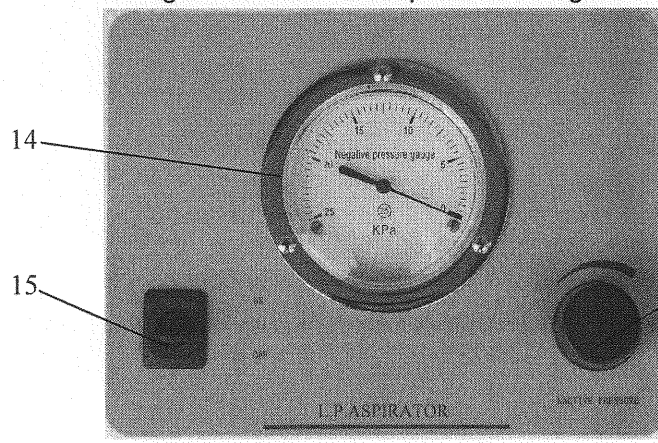


Figure 4-2: section panel scattergram

4.3 FUNCTION EXPLANATION

1- Baby temperature display screen.
2- Set temperature display.
3- Set key, press set key, the screen flash, and then press "▼/▲" key to adjust set temperature.
4- ▼ Decrease key – Decrease the set temperature value together with set key.
5- Skin temperature sensor jack.
6- Exam lamp switch.
7- Power switch
8- ▲ Increase key – Increase the set temperature value together with set key.
9- Deviation alarm indicator.
10- Power failure alarm indicator.
11- Over temperature alarm indicator.
12- Sensor alarm indicator.
13- Heat power indicator, indicate the heat power percentage.

14- Negative pressure meter.
15- Pressure adjust valve.
16- Power switch.

4.4 OPERATION EXPLANATION

4.4.1 Check the wholeness of warmer

- Make sure the equipment has been sterilized.
- Make sure the flap baffle has been assemble firmly.
- Make sure the flap baffle no crack and edged.
- Make sure the bed tilt suitable and lock well.
- Make sure the power wire connected well and the installation was safety.
- Make sure the caster well and lock well.

NOTE: Make sure the supply power accord with the require power in electric nameplate. In order to make the equipment earth well, must connect the power wire to single-phase three wire mains jack, do not use extension cord.

4.4.2 Check temperature controller

- Turn on check

If connect the power, the system will self-test after turn on, and then come into auto-mode. The system will alarm if system failure.

- Check Exam lamp

Turn on the Exam lamp switch to check Exam lamp.

- Check Power failure alarm function

If the temperature controller power switch is turn on, disconnect the power wire, power failure alarm will be active, power failure alarm indicator will be lighting. Connect the power wire after check.

IMPORTANT: Make sure the rechargeable battery is finish charge. If not charge, the equipment will not alarm when alarm active. If the battery is charge well, and the system do not alarm when alarm active, the warmer must maintain.

- Check temperature accuracy

Put the skin sensor and a mercury-in-glass thermometer in the cup which fill 30℃±5℃ water, make the sensor probe close to thermometer mercurypool, after stirred, read the thermometer, contrast with controller display temperature, the deviation should be in 0.5℃.

NOTE: If the test temperature over the allow deviation temperature, please test again, if also over the allow deviation temperature, please refer to professional service person.

- Check temperature deviation alarm

Set the temperature at 34℃, after the display temperature arrive to 34℃ and stable, put the skin sensor in the cup which fill 36℃ water, the deviation alarm active with indicator lighting and intermittently audible alarm when the display temperature exceed 35℃, turn off the heat power indicator and cut off the power, the alarm will stop when the display temperature deviation in the range ±1℃, the deviation alarm active with indicator lighting and intermittently audible alarm when the display temperature bellow 33℃, the heat power indicator also display.

- Check over temperature alarm

If the set temperature is between 34℃ to 37℃, put the skin sensor in the cup which fill 40℃ water, the over temperature alarm active with indicator lighting and audible alarm when the display temperature exceed 38℃. The heat power indicator will be turn off and the power will be cut off.

- Check sensor failure alarm

If in baby mode, disconnect the sensor, the sensor alarm active with indicator lighting and audible alarm, the heat power indicator will be turn off and the power will be cut off. The alarm will be stop if connect the sensor.

4.5 OPERATION PROCEDURE

In baby mode, the skin temperature will be adjusted close to set temperature, in this mode the heat was accord with baby need.

WARNING

- **Please read the operate precautions this manual before operate the equipment.**
- **Please do not use the warmer if do not pass check, and refer to qualified service person.**
- **The operator could not leave the equipment when the baby in equipment.**
- **It should check baby and baby skin temperature timed.**
- **Baby would be dehydrate after long time radiant, the nurse should makeup water for baby.**

4.5.1 The prepare before operate

If reuse the warmer after disconnected the power, maintain or cleaning, please refer section 4.4 and do the test.

Connect the sensor and set the temperature.

4.5.2 Use baby mode

Baby mode was heated and made baby temperature close to set temperature. In this mode, the system adjusted the radiant output accord with the deviation between skin sensor measure temperature and set temperature, to make the baby temperature keep stable. This mode used for keep baby skin temperature.

NOTE: Do not use this mode if baby shock or fever.

It could not use baby mode if baby shock, because baby skin temperature was lower than usual when shock, if use baby mode, it will make baby skin temperature too hot.

It could not use baby mode if baby fever, because baby skin temperature was higher than usual when fever, if use baby mode, it will make baby skin temperature too low.

The operator usually thinks that baby temperature is rectum temperature. Rectum temperature is measure from baby rectum by thermometer (usually use liquid-in-glass thermometer), in order to get precise temperature, it should put the thermometer in rectum at least 5cm deep, it was very dangerous that baby move maybe caused rectum perforation or thermometer disintegrate, or it was not deep enough or put in short time, the measured temperature was not true, so it was not suitable use rectum temperature to control the equipment heat power.

Connect the skin sensor probe to infant skin surface.

- If baby lying on bed, put the sensor between abdomen xiphoid and navel except liver area.
- If baby prostrate on bed, put the sensor on baby back, it would batter at kidney area.
- To make sure the sensor contact to baby skin well, it should fixed the sensor by medicine tape. For lying on side baby, the place for put sensor should be confirmed by attending physician.

WARNING

- **Must make sure the sensor probe connect well to baby skin surface, if the sensor disconnect from baby skin, the sensor measured temperature would not be baby skin temperature but air temperature or bed surface temperature, so it may over heat and caused baby too hot even scald or died.**
- **Do not cover any things like cloth on sensor, or else, it will effective temperature accuracy.**
- **The sensor measured temperature is only skin surface temperature but not baby actual temperature, so the operator must measure baby temperature timed, check baby temperature whether higher or below.**

In baby mode, the heat power adjusts accord with the deviation between set temperature and skin sensor measured temperature. Set the set temperature according to clinical requirement, press set key, set temperature display screen flash, it means into set function, press "+/-" key to increase or decrease set temperature, press once, increase or decrease 0.1℃, press and hold on, it will adjust continuous, press set key after adjust for back to running, it will back to running if do not press any key after 10 seconds.

NOTE: The operator should choose the set temperature according to clinical requirement and baby practical situation.

WARNING

- **Even though the warmer was servo control if in baby mode, but operator also could not leave away, in order to avoid baby without monitor and get accident.**

4.5.3 Memory function

In normal working, if power cut off suddenly, power regain in 10 minutes, the control mode and the set value would not be changed.

4.5.4 Put the X-ray cassette

Rotate the radiant box to left or right in order to put X-ray machine, put down the front flap baffle, pull out the X-ray tray, put on the X-ray cassette, back the X-ray tray, take out the X-ray cassette after make the X-ray, reposition other part.

4.5.5 Bed tilt

Turn the handle of wheel to adjust the bed tilt.

4.5.6 Radiant box rotate

Rotate the radiant box on two sides in ±45° stepless.

4.5.7 Suction operation (Optional)

Clean and sterilize suction bottle before turn on suction, connect suction bottle tube.

Turn on suction, seal up delivery tube, screw down the pressure regulator valve gradually, if the suction pressure increase gradually, it means gas circuit airproof well. Adjust the pressure regulator valve to clinical pressure value [pressure adjust range: 0 – 22Kp (0 – 165 mmHg) stepless] to do the suction for baby.

SECTION 5.

CLEANING AND MAINTENANCE

5.1 GENERAL

This section provides the guide of cleaning and maintenance for warmer.

5.2 CLEANING

WARNING

- **Must disconnect supply power and close all power switch before cleaning.**
- **Radiant box must cooling for 30 minutes before cleaning and sterilize.**

If use the warmer at first time, or finished a baby rescue/nurse, or use continuous for one week, the equipment must cleaning and sterilize. It needed soft cloth or paper and a national registered detergent/ disinfectant (like 84 disinfectant). It could not use any emery cloth, alcohol, propanol or unregistered solution.

5.2.1 Disassemble before cleaning

NOTE: It needn't disassemble all of the parts for daily cleaning. Make sure the warmer was empty when cleaning, and do the cleaning after disassemble and clean the part.

1. Disconnect main power plug and all gas tube.
2. Remove all auxiliary equipment.
3. Remove transfusion soft port.
4. Remove shelf and other accessory.

5.2.2 Sterilization/ Cleaning

1. Clean surface of all parts, clean the obvious smutch by cloth with detergent, clean the surface by disinfectant, dry by cleaning cloth after sterilize time.
2. Transfusion soft port, make up sterilize liquid in sterilize vessel, steep the soft port in sterilize liquid for a set time, wash by water and dry.
3. Temperature sensor, cleaning surface by detergent carefully, do not put sensor plug and probe into detergent or water. Dry by cloth after cleaning.
4. Clean main machine after disassemble, clean all surface of equipment by detergent, dry by cloth or paper.

NOTE

- **Radiation screen and exam lamp reflex housing could be damaged easily, so it should clean carefully, in order to avoid damaged reflex membrane, effective the radiation.**
- **Do not use ultraviolet radiation, alcohol, acetone or other organic solution to sterilized the synthetic glass, in order to avoid damaged synthetic glass.**
- **Do not use lube, alcohol or other things to make device surface lubricating.**
- **It should avoid let the liquid into device inner through heat yield hole when clean the warmer.**
- **Do not leave inflammables after cleaning and assemble.**

5.2.3 Assemble after cleaning

NOTE: Before install the parts onto the radiant warmer, please check each parts carefully and to see whether there is any broken. If there is any broken, it should be replaced immediately.

Assemble all cleaning parts according to negative sequence of disassemble. Check every part of the equipment without baby, running for several hours. Put the necessary accessories on right place. Check refers section 4.4.

5.3 MAINTENANCE

5.3.1 Rechargeable battery maintenance

Please check the condition of the build-in rechargeable battery before the first use of device or in the alternation of device using.

1. Operate the unit for a period of 12 to 24 hours.
2. Trigger a power failure alarm by disconnecting the AC power cord.
3. The power failure alarm should activate and continue to alarm for at least 10 minutes.
4. Reconnect the unit to the AC line and recharge the battery.
5. If the power failure alarm cannot last more than 10 minutes, please replace the rechargeable battery. For this battery, it should be replaced by qualified service personnel.

5.3.2 Heater's replace

In order to ensure the effect of the infrared radiant, when the heater passes the lifetime, it must be replaced although it can work normally. The reason is:

The electromagnetism spectrum infrared radiance of the heater will be reduced with the working time passing. Then the device will not achieve the standard as table 1.1 in this manual. Thereby it is lack of the effect when the doctor uses it to keep warm to the patient.

For the heater's replacing, it should be replaced by authorized and qualified service personnel.

5.3.3 Transfusion soft port

It must change soft port if the material has brittleness or glutinosity.

5.3.4 Fuse's replace

Unscrew the fuse cover, replace the fuse.

5.4 TROUBLE SHOOTING

Troubleshooting of the infant radiant warmer is presented in the following table. If the fault cannot be localized from the table, the unit should be removed from service and servicing should be referred to our company or authorized and qualified service personnel.

Table 5.1 TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	REMEDY
Sensor Failure Alarm	Skin Sensor no not insert	Insert skin sensor
	Skin sensor disconnect	Check plug and connect situation
	Skin Sensor damaged	Replace skin sensor
	Skin sensor do not connect to infant skin	Connect skin sensor to infant skin
	Skin sensor do not at right place	Put skin sensor at right place
Over Temperature Alarm	Electric circuit failure	Replace electric circuit component
	Solid relay damaged	Replace the Relay
Temperature Deviation Alarm	The deviation over allow value between measured temperature and set temperature	If measured skin temperature below set temperature, check the skin sensor whether right; if measured skin temperature above set temperature, check baby skin temperature, adjust set temperature according to check result.
	Skin sensor disconnect from baby skin and drop down	Connect skin sensor to baby skin
	Sharp change of environment temperature	Check the temperature of ambient
	Heating source beside	Remove the source far away from the Incubator
Power Fail Alarm activated Audible and Visual	Power cord disconnected	Connect the power cord
	Power off	Switch off the power
	Fuse fail	Replace Fuse
Control Panel Failed	Poor connection	Reseat the connector
	Broken panel	Replace the panel

ACCESSORY 1: PACKING LIST

NO.	Name	Quantity	Remark
1	Whole warmer(Machine stand, Radiant box)	1	
2	Sensor	1	
3	Mattress	1	
4	Power wire	1	
5	Shelf	1	
6	Transfusion pole	1	
7	Φ5×75 cross screwdriver	1	
8	Wrench	1	
9	Operator's manual	1	
10	Packing list	1	