

Air Fluidized Support System

LI-7

S T A N D A R D T Y P E



OPERATION MANUAL











KEISEI MEDICAL INDUSTRIAL CO., LTD.

Safety Precaution

To ensure safe operation of the LI-7 and to prevent injury to the patient or user, the following markings are provided in the instruction for use and on the equipment.

 Warning	<p>This symbol indicates that the failure to follow the precautions indicated here and the mishandling of the device may result in severe injury or death to humans.</p>
 Caution	<p>This symbol indicates that the failure to follow the precautions indicated here and the mishandling of the device may result in injury and damage to equipments and facilities</p>

	<p>This symbol indicates that the mishandling of the device may result in electrical shock.</p>
	<p>This symbol indicates the matters which need special attentions, which are prohibited, and which should be followed.</p>
	<p>This symbol indicates safety sign and note.</p>
	<p>This symbol indicates an article number of the product.</p>
	<p>This symbol indicates a serial number.</p>
	<p>This symbol indicates a manufacturer.</p>
	<p>This symbol indicates B-type attaching part.</p>
	<p>This symbol indicates that it is necessary as a duty to see the Instructions of Use.</p>

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[1] Product Overviews

- The LI-7 system provides floating support to patient in grave condition, applying the physical principles of air fluidized microsphere (ceramic beads).
- In continuous fluidizing mode, the ceramic beads are continuously air fluidized and support the patient with minimum surface contact pressure.
- In intermittent fluidizing mode (optional), the ceramic beads are fluidized intermittently and halted (ex. 10 seconds fluidization for every 15 minutes halt). In this halted interval ceramic beads are settled into a mold around the body, and support the patient in an immobilized posture. This is especially effective for supporting patient who should not move, or need to maintain a stabilized posture for nursing care, wound cleaning or traction treatment.
- Patient is laid on a loose fitting “filter sheet” separated from fluidized beads. As the filter sheet is an important functional component of LI-7 system, which protects the beads from leakage, placed on top of the beads tank, should be covered with an ordinary cotton sheet for protection. Warm dry air comes upwards through the filter sheet, and it maintains a hygienic and comfortable environment with appropriate temperature for the patient lying on the bed.
- Built-in weight scale (optional) allows monitoring the patient’s weight changes while lying down on the bed.



[2] Product Features

(1) Hygienic Environment

- * The filter sheet on top of the ceramic beads tank lets the warm dry air pass through upwards, at the same time, it also lets the patient's bodily fluids such as lymph, blood, sudor, and urine permeate downwards, removing these fluids from the area where the patient's skin contacts with the sheet.
- * When the patient's bodily fluids permeate through the filter sheet and attach to the ceramic beads, they produce sodium ions. The growth of bacteria is prevented by the alkaline environment of the beads with increased pH level (approx. 11). The bodily fluids permeated to the ceramic beads are dried and form lumps as the air passes through, and the odors are also removed. Finally the lumps settle down at the bottom of the beads tank.
- * These lumps accumulated at the bottom of the beads tank are easily taken out by lifting the screen placed on the tank bottom.
- * A rising current of air passing through the filter sheet forms hygiene environment on the bed, which reduces such risks as aerial infection.

(2) Comfortable Temperature Environment

- * Ceramic beads temperature of the LI-7 is selectable depending on the patient care needs.
- * When the ceramic beads reach to the selected temperature, they remain at the same temperature due to their high thermal inertia.
- * Dry air blowing around the patient prevents skin swelling caused by bodily fluids such as perspiration. Comfortable environment for the patient is maintained.
- * LI-7 maintains an ideal treatment environment for the patient by providing with a comfortable temperature environment, hygienic environment in which the growth of bacteria is inhibited, and a comfortable floating support. In many cases tranquilizers and localized treatment are no longer in need, and open treatment can be performed even on extensively injured patients.
- * For bedridden patients, LI-7 helps to relieve their physical and emotional distress. These patients accordingly become relaxed to undergo medical treatment, or to sleep.

(3) Support of the Low Surface Contact Pressure

- * The LI-7 is an advanced air fluidized support system recognized globally to provide patient with floating support on the fluidized ceramic beads. The system of floating support avoids the treatment disturbances caused by skin swelling, instability, and difficulty in postural control of the patient's body.
- * Surface contact pressure on the patient is dispersed evenly and reduced drastically, avoiding the disturbance of the blood flow in skin and muscle capillary.
- * The filter sheet is spread with considerable latitude to allow free movements on the ceramic beads even when the patient's body sinks to a depth so that the damages on the patient's skin caused by friction or rubbing are prevented.
- * Elimination of bacteria and a dehydration effected by the reduced surface contact pressure prevent the affected area from aggravating or from the tissue destruction.



- * Pressure ulcers are avoided without constant postural control.
- * In case of cardiopulmonary arrest, cardiopulmonary resuscitation (CPR) is carried out immediately without inserting flat panel since the patient's body is immobilized immediately when the fluidization of the ceramic beads is stopped.
- * As patient with skin graft can lie on their back directly after the surgery, tighten distress of fixed posture can be avoided.

(4) Intermittent Fluidization Mode for Traction Treatments

- * This mode is appropriate for the traction treatment as surface contact pressure dispersed evenly and beads settle into a mold around the body of the patient when the fluidization of the ceramic beads is suspended.
- * In this mode, patient is supported in the immobilized posture. Even if surface contact pressure is dispersed unevenly and is slipped due to the body movement, the intermittent fluidizing brings the reduced surface contact pressure dispersed evenly back and re-fix.


(5) Improvement in Patient Care and care management

- * Not only the improvement of service quality in the patient cares, higher productivity also is assured by the introduction of LI-7 system. Consequently significant contribution to the improvement of patient care management in healthcare service facility is envisaged.
- * Just pressing a button, an easy operation to fluidize or to settle the ceramic beads leads an easy handling of the patient during postural control or sheet replacement.
- * The LI-7 remarkably reduces exertions of medical care staff as constant postural control to prevent from pressure ulcers is not needed.
- * In addition to simple patient handlings of caring and curing for the medical care staff, patients, who are taken care and treated by those staff, show their cooperation for the treatment with reduced pain.
- * The LI-7 is designed not only for patients but also for medical staff to save their times.
- * Built-in digital weight scale to weigh patient lying on the bed saves troubles of having to transfer the patient to the separated scale.
- * Digital weight scale continuously indicates weight variations between the latest weight and the weight set up at the beginning and allows a flexible hydration control of the patient.

[3] Applications

This device is superior support system, intended to reduce pain of a patient or solve bed sore problem. Especially it is suitable for wide-range skin damage.

Major indications of the device are support of a patient with damages such as burn injury and prevention of stress injury (bed sore).

 **Caution**



Regular care such as rehabilitation is necessary; low contact pressure for a long period may promote risk of heterotopic ossification (HO).



[4] Parts name and options

(1) Parts name



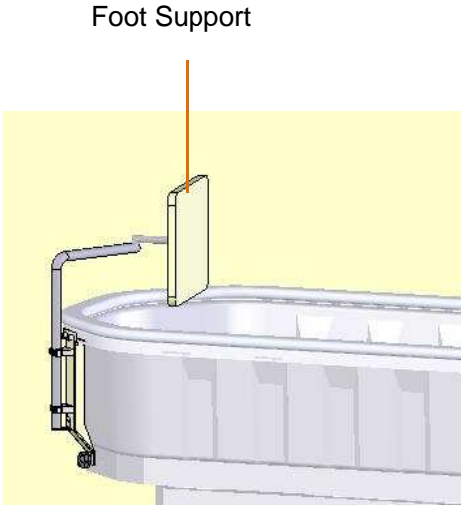
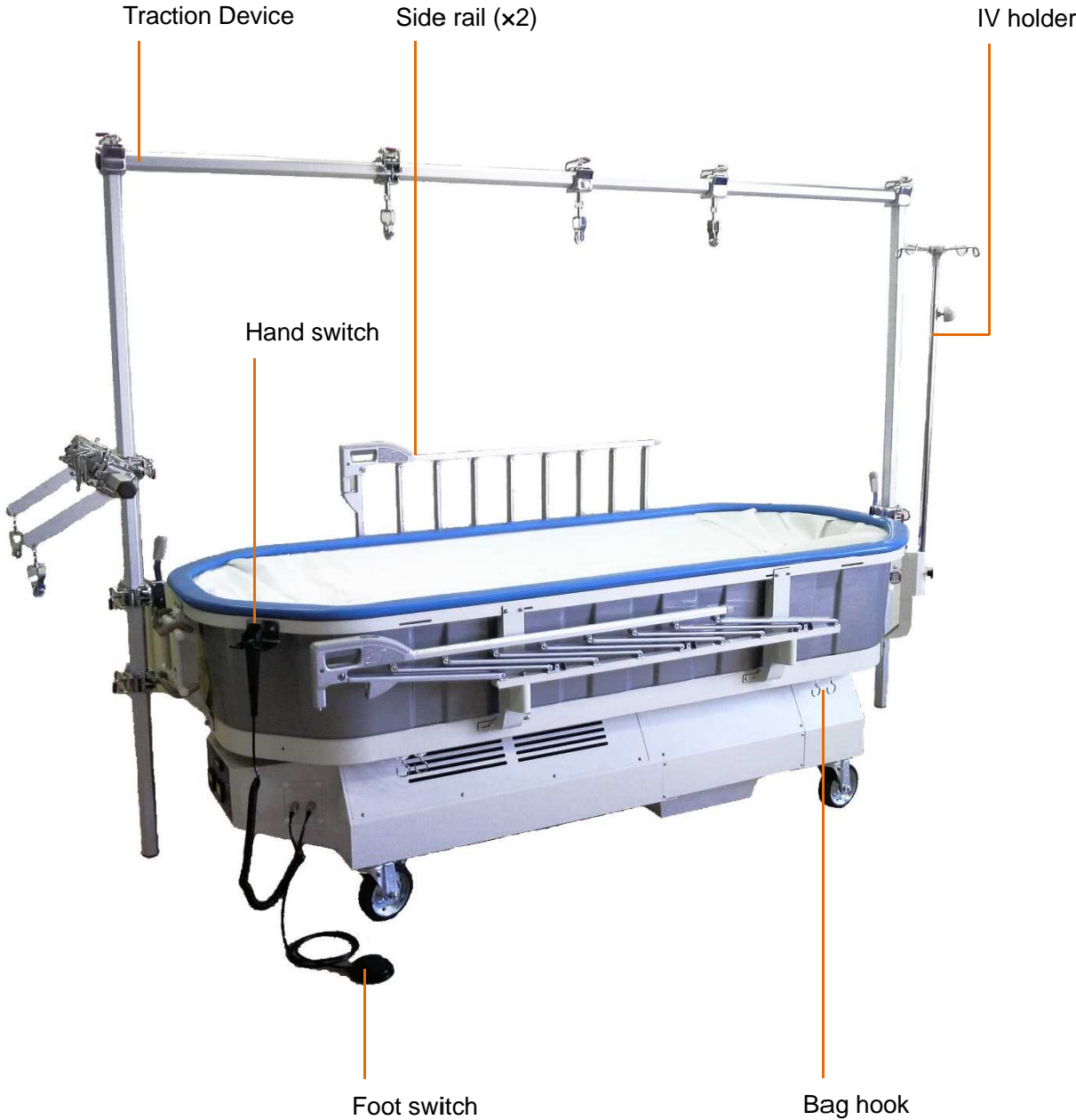
Vinyl sheet (machine cover)



Ceramic beads (25 kgx18)



(2) Options



Built-in step



Gatch-up back rest



Back rest A



Back rest B



Patient weight scale control box



[5] Cautions for use

(1) Installation

- ① When moving the LI-7 system unit, empty the beads tank and move it with two or more people.
- ② Install LI-7 indoor place.
- ③ Keep LI-7 away from any liquid and oil.
- ④ LI-7 should be located at such places as; temperature and humidity are controlled, direct sunlight is shut out, air is clean free from dust•salinity•sulfur content etc, which bring harmful influences on the LI-7.
- ⑤ Keep out of fire and heating appliance such as heater.
- ⑥ Install the device on a site where is flat and has sufficient strength. After installation, fix the castor, and do not add vibration or shock.
- ⑦ Do not install at the place at storage of chemicals or where gas/radiation may occur.
- ⑧ Do not put any objects that obstruct the flow of air underneath and near the LI-7. Air inhale and exhaust are performed at the bottom of frame.
- ⑨ Pay attention to allowable current and then connect power plug to the socket with grounding wire without fail.
- ⑩ Do not bend, step on and load any objects on power cord and cables for the foot control switch and hand control switch. It causes wire breakings and contact failures.
- ⑪ Install the unit in a position where it will not interfere with the insertion or removal of the power plug.



Wet hand use at handling power plug and insert to the AC socket may cause electric shock.

Keep power cord free from any object. Power cord damage by heavy objects may cause electric shock and possibly fire.



(2) Operations

The LI-7 is to be operated by properly trained staff only.

① Pre-operations

- i. Make sure plugs of power cords and hand control switch cables are connected to appropriate in-let or jacks without fail.
- ii. Check the proper amount of ceramic beads remains in the tank.
- iii. Make sure that the filter sheet and hold down rubber are certainly fitted. Ceramic beads may leak due to slight wrinkle or incomplete fit of sheet and rubber.

② Under operations

- i. Stop the flow, and make a helper to support a patient incoming/outgoing. Do not stand or step on the LI-7 as the diffuser at the bottom of the tank or the filter sheet are subject to damages.
- ii. Do not use pins or any sharp objects on the filter sheet as ceramic beads may leak through even a pinhole on the filter sheet.
Repair pin holes with autoclave-tape temporarily whenever the ceramic beads start leaking from pin holes during operation. After cleaning or changing sheets, repair with iron-on patch tape completely.
- iii. Cover the filter sheet with a cotton sheet; the filter sheet is a part of the device.
Move the cotton sheet on the filter sheet when changing body position of the patient.
- iv. Never use large quantity of water on the LI-7. The ceramic beads absorbing moisture cause fluidization failure or damage of diffuser.
- v. Monitor constantly whether the patient and the LI-7 are in normal condition or not. When any abnormalities are observed, take appropriate measures such as stopping the operation of LI-7 keeping the patient safe.
- vi. Pay attention to drying skin/affected area and dehydration caused by long-term use, and take care of moisturization and water intake.

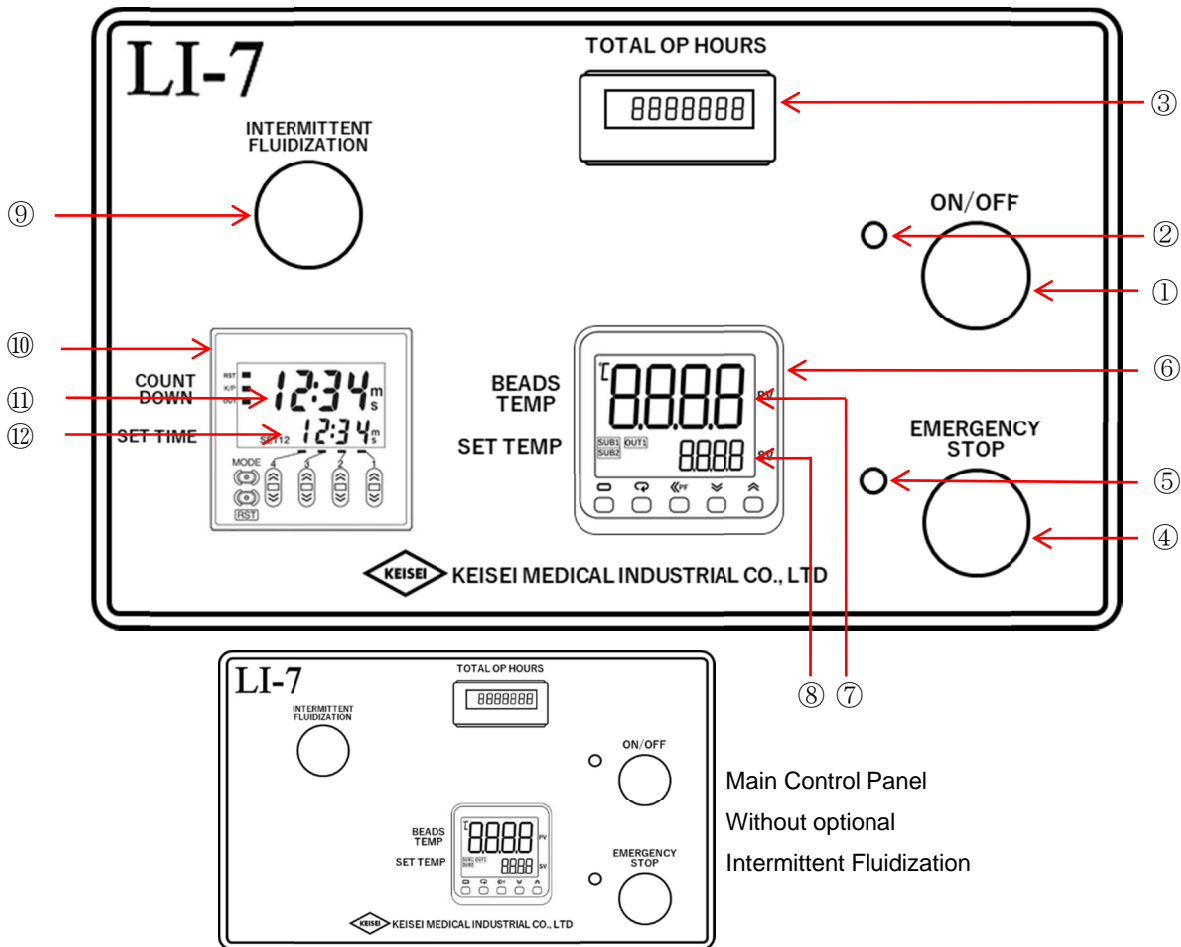
③ Post-operations

- i. Turn off the operation switch, main breaker, and circuit breaker.
- ii. When pulling off the plug, do not apply undue pressure and make sure to hold the plug to pull off, not the cord. Pulling off by holding the cord may cause wire breaking or disconnection between cords and plug.
- iii. After cleaning up the accessories and cords check them and put them in order.
- iv. Clean the LI-7 to be ready for the next use.
When the LI-7 is not expected to be used for a while, cover it with the attached vinyl sheet and fix tightly with a shock cord.
- v. Use a piece of cloth containing neutral detergent to wipe the plastic sheet.






[6] Control Panels

(1) Main control panel




Main Control Panel
Without optional
Intermittent Fluidization

Each parts name and functions

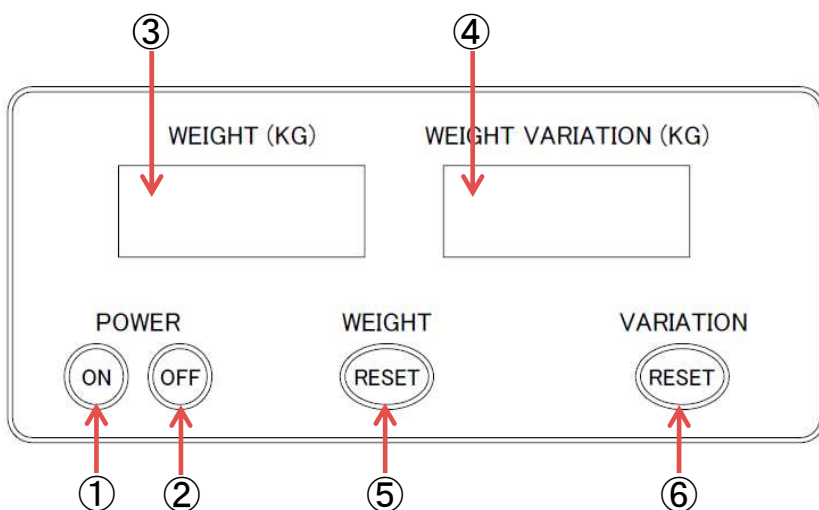
- ① Operation Switch Switch button for Start/Stop of system operation.
- ② Switch-on LED This LED is lit when system is turned on.
- ③ Operation hour counter Displays accumulated total hours of fluidization.
Dot blinks while it counts(in hour).
- ④ Emergency stop switch System stops fluidization immediately if this button is pressed.
- ⑤ Emergency-stop LED This LED is lit when system is stopped by Emergency stop switch.
- ⑥ Temperature controller Beads temperature is controlled with this device
- ⑦ Beads thermometer Displays actual temperature of beads.
- ⑧ Set beads temperature Displays set(desired) beads temperature.
Temperature is to be set using up/down button switch   .
Press  to change the digit to be set.



※ Hereafter optional intermittent function is described.

- ⑨ Intermittent switch Start/Stop switch for intermittent fluidization.
- ⑩ Intermittent Timer Timer to set both fluidization time in seconds and halts time in minutes and seconds.
- ⑪ COUNT DOWN window Displays remaining time interval of intermittence and counts down to zero.
- ⑫ SET TIME window Set time interval of intermittent fluidization is displayed.
Push four digit  button to set the selected time interval.

(2) Patient weight scale control box operation panel



Patient weight scale control box hung on the bedside

• Each part name and function

- ① POWER ON Patient weight scale is turned on.
- ② POWER OFF Patient weight scale is turned off.
- ③ WEIGHT display window Actual weight is displayed (0.1Kg up).
- ④ WEIGHT VARIATION display Variation of the weight since last reset is displayed.
- ⑤ WEIGHT RESET switch Switch to reset Patient weight display, to Zero the value in the ③ window.
- ⑥ WEIGHT VARIATION RESET switch ... Switch to reset weight variation display, to Zero the value in the ④ window.



(3) Breakers and Hand/Foot switch Jacks

Hand Switch / Foot Switch Sockets:
Two sockets are compatible for both of
the Switches.



Breakers



● Circuit Breakers :

For the protection of Blower, Heater and cooling fan, corresponding circuit breaker will be activated in case excess electric current flows.

● Main Breaker :

Main power switch as well as main circuit breaker to protect the system from entire failure in case excess electric current flows.





[7] Operation

(1) Operational Procedures

After installation of LI-7 system, fill the bead tub with 425Kg of ceramic beads (25kg x 17 cans), and carry out warm operation at 38°C of setting temperature for over 24 hours. After finishing the warm operation, set at chosen temperature, and use the device (leave 25kg x 1 can and empty 17 cans for the future).


Operational procedures:

- ① Confirm that the Screen is sunk in the beads tank.
- ② Make sure filter sheet is placed appropriately and hold down rubber is not loose.
- ③ Connect power cable to AC mains socket.
- ④ Turn on the circuit breakers and main breaker on the left side panel of the main control panel ([6]-(3)).
- ⑤ Press operation switch ([6]-(1)-①) to start ceramic beads fluidization.
- ⑥ Press UP/DOWN button switch  in temperature controller ([6]-(1)-⑥) to set the selected ceramic beads temperature. Press  to change the digit to be set.
- ⑦ Preheat the beads prior to the patient use to reach the target beads temperature.
- ⑧ Place cotton sheet over the filter sheet before patient is transferred in.
- ⑨ In case the patient's weight exceeds 100kg, remove 1kg of the beads at every 1kg weight over.
Maximum patient weight is 135kg.

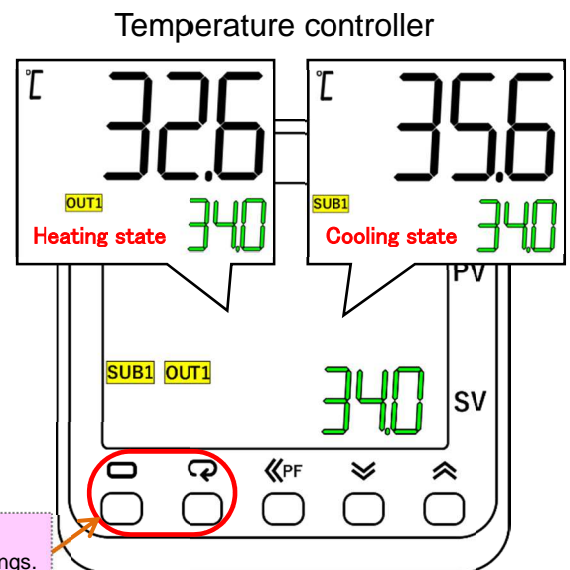


For the protection of fragile diffuser board at the bottom of beads tank, patient transferring in and out should be performed while beads fluidization stops completely so that beads have been settled into a mold like beach sand.

(2) Continuous Fluidizing Mode

- ① Press operation switch ([6]-(1)-①) to start the ceramic beads fluidization.
- ② Press UP/DOWN button switch  in temperature controller ([6]-(1)-⑥) to set the selected ceramic beads temperature. In case the actual beads temperature is lower than set temperature **OUT1** lamp illuminates and the heater is activated to heat-up beads. If actual beads temperature is higher than set temperature, **SUB1** lamp illuminates and cooling fan is activated to cool-down beads temperature.
- ③ Press operation switch ([6]-(1)-①) once again to stop the ceramic beads fluidization.

These two keys are invalid for operation.
Forcibly operating them will cause the device to lose its settings.



Temperature change of the ceramic beads takes time due to their high thermal inertia. (It takes an hour to raise beads temperature 1°C~2°C.)

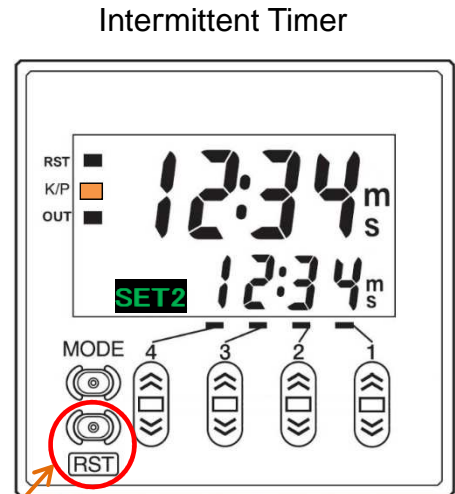


(3) Intermittent Fluidizing Mode (optional)

Fluidization and halt are repeated during selected time interval.

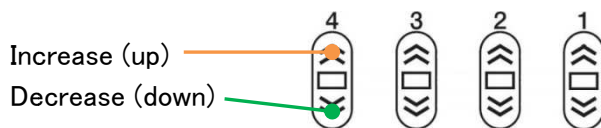
- ① Under continuous Fluidization mode press intermittent fluidization switch ([6]-(1)-(9)) to shift the operation mode to intermittent fluidization. Make sure that the electric display of intermittent timer is lit.
- ② Counting down starts from the preset intermittent fluidization time interval ([6]-(1)-(11)).

m = minute(s)
s = second(s)







This key is invalid for the operation.
Forcibly operating them will cause the device to lose its settings.

- ③ Press mode shift button switch ^{MODE} (lower part [6]-(1)-(10)) to select either fluidization or halt. Then press switch button ⁴ ³ ² ¹ seeing time display ([6]-(1)-(12)) to set each time of fluidization by second(s) or halt fluidization by minute(s) and second(s).



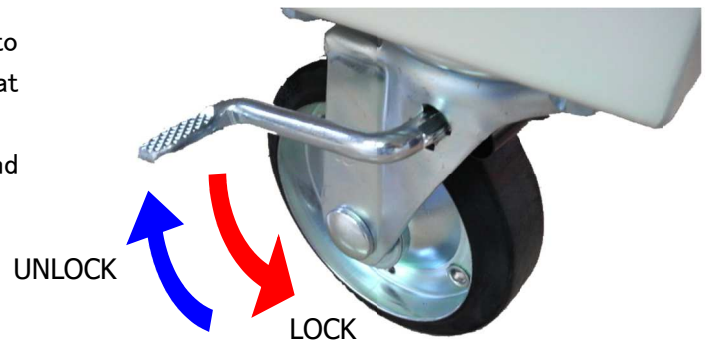
Preset fluidization time interval is displayed when “**SET1**” is lit, while preset halt time interval is displayed when “**SET2**” is lit.

- ④ “OUT”  lamp is lit when fluidization is halted in the intermittent fluidization mode.
- ⑤ “K/P”  Key Protection lamp lit means RST key is invalidated and protected as factory default.
- ⑥ RST  lamp always remain un-lit as it represent  key is invalid.
- ⑦ Press intermittent fluidization switch ([6]-(1)-(9)) to stop the intermittent fluidization. Electric light of Intermittent Timer on the control panel stops illuminating and the mode is shifted to continuous fluidization.
- ⑧ To stop the operation completely, press operation switch after the mode has been shifted to continuous fluidization from intermittent fluidization by taking the above mentioned procedure.



(4) Caster

Lock the caster by stepping on the caster pedal to brake the move of the unit. Pay attention that the pedal bounces up when the lock is released. Make sure to fix the castors for installation and storage of LI-7.



(5) Closing Procedures

After using the LI-7, run the system without patient at the temperature of 38°C to dehydrate the ceramic beads adequately as well as to dry the patient's bodily fluids and exudates permeated into the beads, and to eliminate bacteria.

In continuous fluidization of the ceramic beads, most of the bacteria are eliminated within 24 hours. Even some sort of resistant staphylococcus aureus are even sterilized within a few days.

- ① Change and clean the filter sheet. While the filter sheet is removed for replace and cleaning, also clean the ceramic beads and check the amount of the beads.
- ② If the LI-7 is supposed to be used again within a few days, keep it running to prepare for the next use.
- ③ If the LI-7 is not expected to be used for a while, disconnect power cable, place attached plastic sheet machine cover over the entire unit, and tighten it with shock cord. Make sure to lock the casters as well.

(6) Emergency Stop

By pushing EMERGENCY STOP Switch button ([6]-(1)-④) in case of patient or system emergency, LI-7 halts fluidization and beads returns to static, settled condition within 4-5 seconds. This means CPR ready status is provided to perform Cardio Pulmonary Resuscitation as if patient is placed on normal bed or on the floor. Operators of the LI-7 system may consider this EMERGENCY STOP switch button also as "CPR ready" key.

Operation Switch ([6]-(1)-①), Hand Switch and Foot Switch also provides same effect as EMERGENCY STOP switch, halting fluidization, beads settled in 4-5 seconds. EMERGENCY STOP switch only halts fluidization while all previous settings are kept.



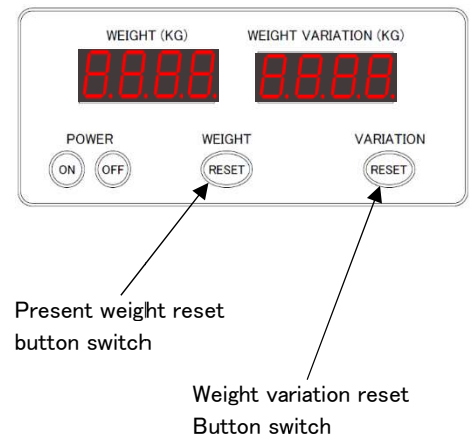
[8] Weighing Method

(1) Weighing Method

Prior to the usage of the weight scale, switch on LI-7 system to have sufficient beads fluidization and preset the target temperature. When measurement is performed, switch on the Weight Scale at least 30 minutes before patient is loaded and warm up the system adequately.

Reset key is to be used after the measurement figure has reached stable enough.

- ① Place a comforter or a blanket if the patients want to use one.
- ② Press present weight reset button switch on control panel for 2 seconds long to reset the indicator. (0.0 is indicated.)
- ③ Remove the comforter or the blanket placed on the bed at ①.
- ④ Lay a patient down on the bed.
- ⑤ Place once again the comforter or the blanket removed from the bed at ③. Present weight of patient is shown in the indicator.
- ⑥ Press weight variation reset button switch (0.0 is indicated.). Afterwards, weight variation is shown in the indicator.



(2) Case Example

Case of a patient of weight 65kg with a blanket of 1kg

	Indication of present Weight	Indication of weight variation
① Place the blanket on the bed.	1. 0	1. 0
② Press present weight reset button switch.	0. 0	0. 0
③ Remove the blanket.	- 1. 0	- 1. 0
④ Lay the patient down on the bed.	6 4. 0	6 4. 0
⑤ Place the blanket on the patient. (Patient weight is indicated.)	6 5. 0	6 5. 0
⑥ Press weight variation reset button switch.		

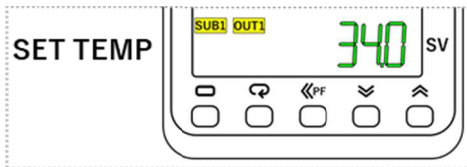
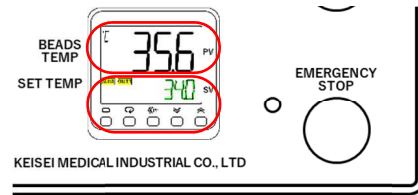


Built-in weight scale of LI-7 mea: **Caution** ht including everything on top of the ceramic beads tank. Note that installed side rails and back rest are subjected to scale. Patient weight scale works only when the ceramic beads are in the beads tank.



[9] Temperature Control

(1) Operational Temperature of Beads



Beads temperature setting is an input of temperature the system operator shall select for the patient care needs. LI-7 system accepts input between **25°C to 38°C**.



Once this setting is input, carefully observe the **beads temperature** window to know the **actual** beads temperature as LI-7 system tries to reach this setting activating heating/cooling devices. Depending on the actual room temperature system may reach the set beads temperature, however, if the room is too cold, set temperature may not be reached.



The LI-7 system inhales ambient air for the fluidization. Therefore beads temperature control is dependent on the room air temperature control. When LI-7 system is put in use, air conditioning is recommended if the room temperature is too cold. As shown in the diagram next page, LI-7 system indicates best controllability of beads temperature at the room temperature between 20°C to 23°C.

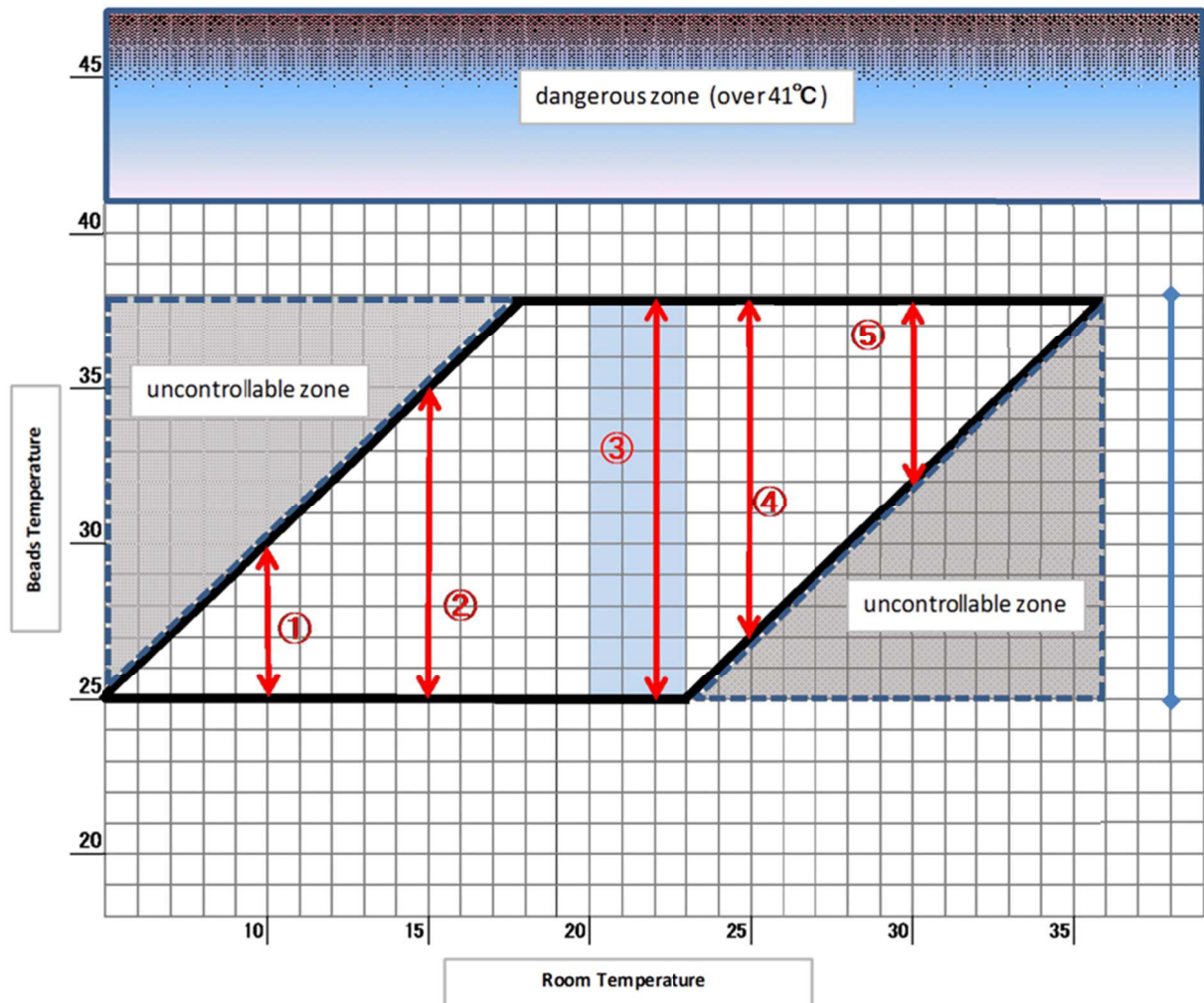
Actual lowest controllable beads temperature is “room temperature plus 2°C”, and highest is “room temperature plus 20°C”. In another word, for example, in case target beads temperature is 30°C, room temperature should be maintained at minimum 10°C (10+2) and maximum 28°C (28+2).



Caution

Unclean and blocked filters cause rising both the minimum and maximum temperature of the ceramic beads.





Beads temperature setting range : 25 – 38 °C.

Beads temperature controllable range : $RT + 2^{\circ}\text{C} - RT + 20^{\circ}\text{C}$ (*RT: room temperature)

Case examples:

- ① When RT is 10°C, beads temperature can be controlled 25 – 30°C.
- ② When RT is 15°C, beads temperature can be controlled 25 – 35°C.
- ③ When RT is 22°C, beads temperature can be controlled 25 – 38°C.
- ④ When RT is 25°C, beads temperature can be controlled 27 – 38°C.
- ⑤ When RT is 30°C, beads temperature can be controlled 32 – 38°C.

Alarm sounds when the bead temperature exceeds 38°C or $\pm 0.5^{\circ}\text{C}$ of the setting temperature.



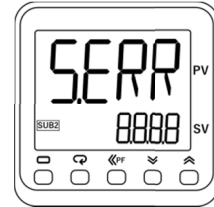
If the temperature of the beads is above 39°C, there may be something wrong with the equipment. Operator of the LI-7 system must be careful to watch the beads temperature and should take quick and appropriate counter measure such as cooling down room temperature or check the cooling fan and/or its circuit breaker etc if beads temperature shows this high.



[10] Alarm

○ Alarming abnormality

Under normal operation, when an alarm is generated following Error Codes are to be displayed in the Beads temperature display line of Temperature adjuster ([6]-1-⑦)

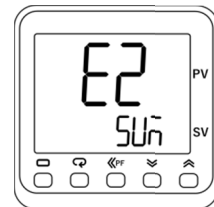




Meaning of each Error Code and measures to be taken as follow :

Error Code	Meaning of code	Cause and measure to be taken
SEERR	Abnormal input	Thermal sensor possibly snapped. Contact local service agent.
E333	A/D converter is abnormal	Possibly Circuit is snapped and/or affect of noise. Contact local service agent.
E111	Abnormal Memory	Possibly affection of noise Contact local distributor or service agent.
SUB2 (Alarm sounds)	Beads exceed allowable temperature (39°C)	Refer to [12] Trouble shooting. (P28)

○ Intermittent Timer abnormal

Following Error code is displayed when intermittent timer is abnormal.



Error codes and Display window		Abnormal parts	Recovery method	Counter measure
				
E1	n/a	CPU abnormal	Reset Key or Reboot	In case same symptom is Repeated after the recovery, contact local Service agent.
E2	n/a	Memory(RAM) abnormal	Reboot	In case same symptom is Repeated after the recovery, contact local Service agent.
E2	SUñ	Memory(EEP) abnormal	Reset Key	Initial program setting input is required. Contact local service Agent.



[11] Maintenance

For prolonged life and efficiency, regular inspections and preventative maintenances on the LI-7 have to be done.

Keep records of contents and reports of regular inspections and preventative maintenances for future reference.

OUTLOOK OF REGULAR INSPECTIONS

No.	Where to Inspect	How Often to Inspect	What to Inspect/Maintain
①	Filter Sheet	As the occasion may demand	Wash the sheet and check its surface if there are any pin holes.
②	Ceramic Beads	As the occasion may demand (every 1-2weeks)	Clean the beads by lifting the screen. See the level of ceramic beads.
③	Air Cleaner	Every 3weeks	Vacuum up.
		Every 5-6months	Exchange.
④	Pre-Filter	Every 3weeks	Vacuum up, Wash in water.
		Every 5-6months	Exchange.
⑤	Air Filter	Every 3weeks	Vacuum up, Wash in water.
		Every 5-6months	Exchange.
⑥	Superficial Observation of the Machine	Every 1month	Wipe the unit with a cloth containing alcohol liquid.
⑦	Tank Interior	Every 5-6months	Wipe the inside wall with a cloth containing alcohol liquid.
⑧	Diffuser	Every 5-6months	See it if there are any cracks and holes.
⑨	Heat Exchanger	Every 5-6months	Vacuum up dirt on the fin.
⑩	Main Breaker	When abnormal seen	Find possible aspects.
⑪	Circuit Breaker	When abnormal seen	Find possible aspects.



Warning

Disconnect power supply cable plug from power supply socket when inspection and maintenance is performed .

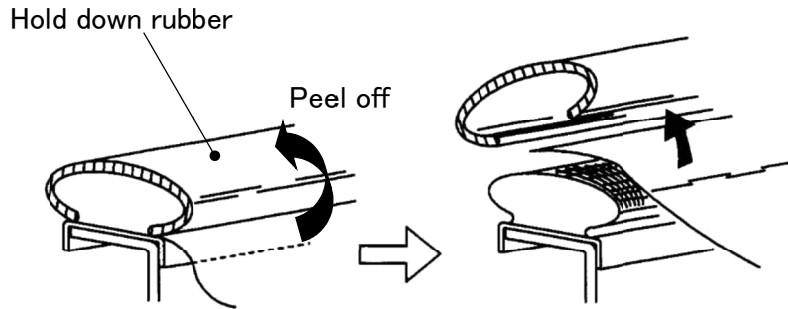
Pay attention to electric shock when side panel is opened for inspection and maintenance (outlook numbers of ③・④・⑤・⑨・⑩・⑪). Removal of panels or covers should be minimum at inspection and maintenance.



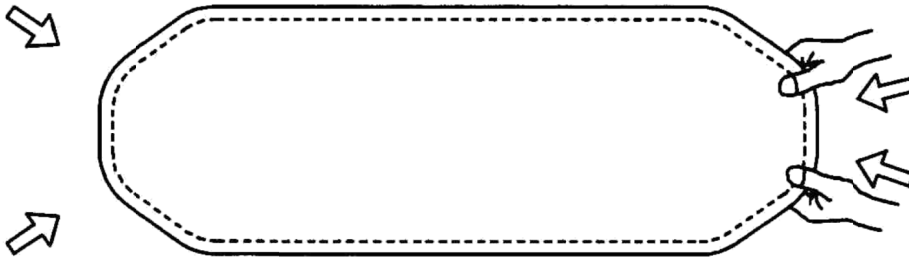
(1) Filter Sheet

① Sheet change

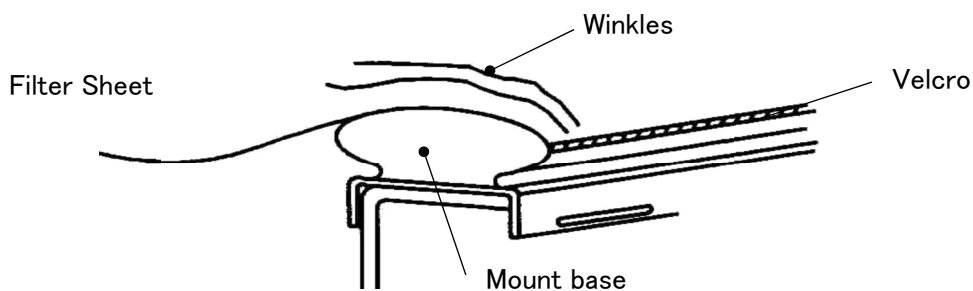
- i. Change the filter sheet as the occasion may demand. It is recommended to change the filter sheet at every new patient transferred in no matter how long the previous patient has used.
- ii. Detach the filter sheet by pulling the hold down rubber up from inside first and peeling filter sheet off the Velcro tape on mount base.



- iii. Place filter sheet clinging on the outside at the mount base corners (pointed by allows in the figure).



Ceramic beads may leak from very few chinks or very slight wrinkles. Place filter sheet pulling horizontally and tightly and smoothing out wrinkles in the Velcro part of filter sheet.



② Wash and Dry

- i. The filter sheet is made of 100% polyester. Wipe ordinary dirt and stains away with absorbent cloths such as gauze or towel since the polyester 100% sheet is waterproof.
- ii. The filter sheet is machine washable with reduced mechanical action and spinning. Use lukewarm water and neutral detergent or detergent containing active ingredients. Dry it in the airy shade after washing.
- iii. After wash and dry, iron at a low temperature (not exceeding 95°C). When ironing, check if there are no seams, cracks, and holes on the filter sheet.

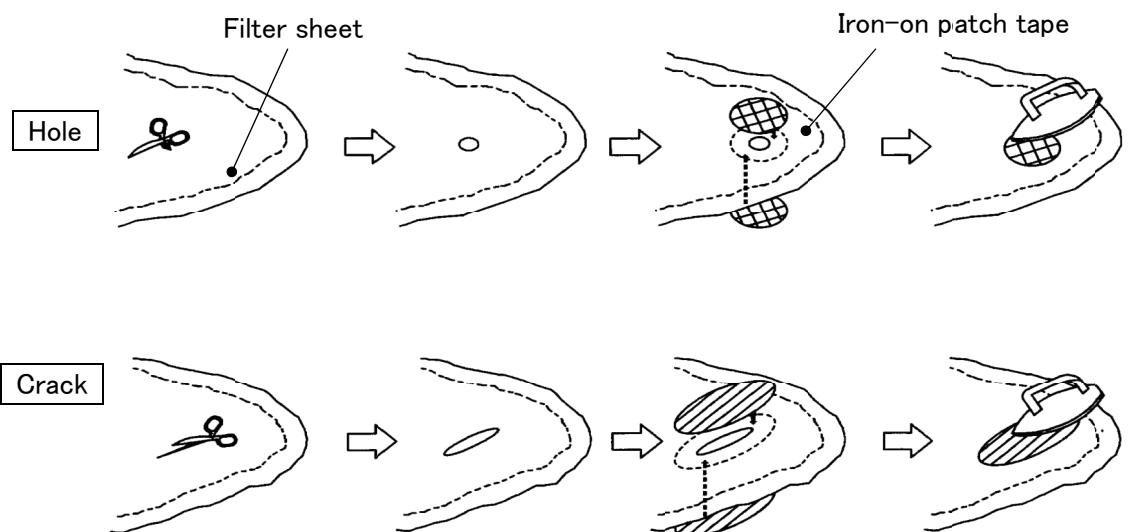
! Caution



Do not use chlorine detergent; it promotes deterioration of the filter sheet.
Do not use a hospital laundry, and assign the person in charge of cleaning to ironing; inappropriate cleaning promotes deterioration of the filter sheet.
Do not use a drier; it makes rucks on the sheet, which may cause bead leak.

③ Repair

- i. Make sure to check if there are no holes or cracks on the filter sheet prior to washing and an operation. Cracks and holes can easily be detected by holding up the filter sheet against the sun.
- ii. When the ceramic beads overflow through pinned holes during operation, stop the fluidization and wipe the ceramic beads spread on filter sheet away with a wet cloth. Repair pinned holes with the autoclave tape temporarily and later repair properly with the iron tape at the occasion of sheet change.
- iii. How to repair
 - 1) Remove frays in the hem of cracks and holes with scissors.
 - 2) Prepare a pair of iron-on patch tape (for lower temperature) with rounded corners, which is cut to cover the crack and hole completely.
 - 3) Cover the crack or hole up with a pair of prepared iron-on patch tape over both front and back sides and then iron them.



Remove frays in the hem of cracks and holes

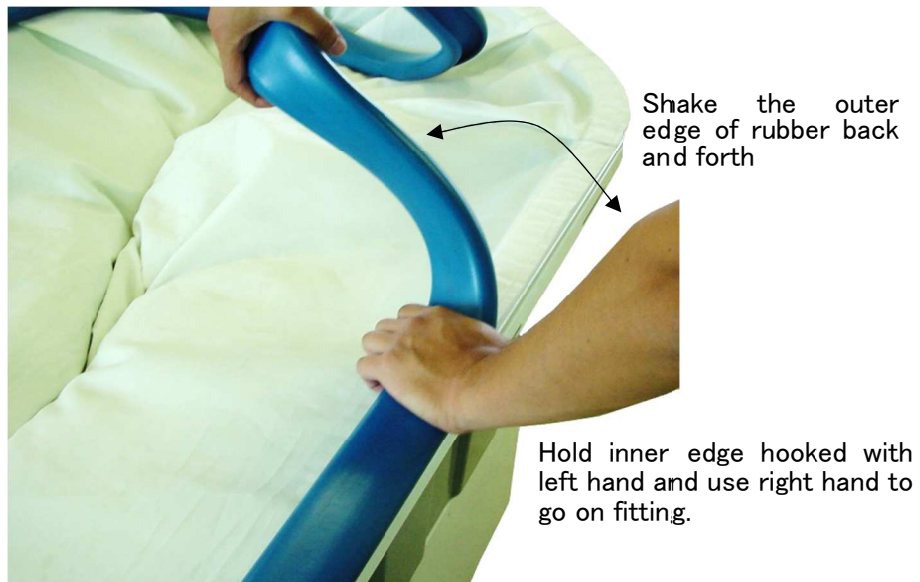
Put a pair of iron tape on both sides

Iron them



④ Fitting hold down rubber

- i. Place ● marked on hold down rubber on ▲ marked in the middle of mount base on the longer side of the ceramic beads tank. Hook inner edge of hold down rubber on mount base first and then fit hold down rubber on mount base while pulling rubber outwards.
- ii. Hold inner edge hooked with left hand and use right hand to go on fitting hold down rubber on mount base. Complete to fit all around with left hand shaking the outer edge of rubber back and forth.



- iii. At the end, hook inner edge of hold down rubber on mount base and put hold down rubber on mount base while pulling the rubber outwards as well as step i.



(2) Ceramic Beads

① Cleaning

Patient percolation liquid, containing various bacteria, having passed through the filter sheet, is adsorbed in ceramic beads being alkalinized and therefore sterilized, then, turns to be dried lumps and finally sink down to the bottom of the beads tank.

Occasionally remove the lumps at the bottom of ceramic beads tank by the method described below. Accumulated lumps may cause air flow failure.

- i. Lift up the screen from the bottom of the beads tank while ceramic beads are fluidized. Remove the lumps accumulated on the screen, then place screen back in the ceramic beads tank.
- ii. Removal of the lumps using the screen is to be performed as the occasion may demand.
- iii. After cleaning, check the volume amount of the ceramic beads in the tank. Adjust the beads volume amount according to the patient's weight. (refer to P13 [7]-(1)-(9))

Caution



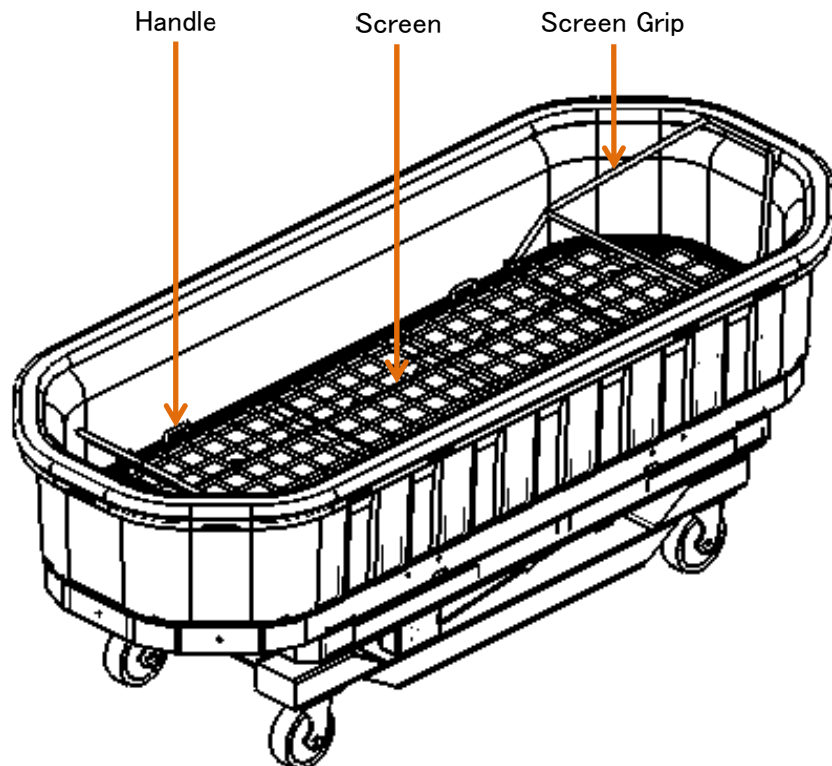
Because floor scattered with ceramic beads is very slippery and dangerous, wipe away completely with a wet dust cloths, or a mop, etc.

Warning



Clean frequently; bacteria may remain at interspace of hold-down rubber or on bead chunk.

Exchange the filter sheet and the beads when the device is used for a severe infection patient; risk of residual bacteria is high.



② Cause of fluidization failure

The causes of the fluidization failure are roughly divided into the following two different kind of liquid mixed with the ceramic beads:

- i. Volatile liquid (Urine, sweat, water, plasma etc.)
- ii. Nonvolatile liquid (Contents of topical agents such as ointment, or patient percolation liquid)

LI-7 automatically disposes of above mentioned liquid if it is small amount. However, do not allow too much volume liquid permeate into the ceramic beads tank. Beads fluidization maybe blocked since the volatile liquid raises humidity in the ceramic beads tank, while the nonvolatile liquid wraps the ceramic beads with a sort of fatty material.

- * For patient with dermatosis etc., spread a market available plastic a market available plastic sheet of impermeable coating, partly or entirely between the patient and the filter sheet when topical agents such as ointment are used.
- * The plastic sheet is to be spread over or under cotton sheet if it is used. Functional effect of LI-7 remains same even if patient's affected area is bandaged for exudation fat, or is distanced from air flow by the plastic sheet.

③ Moisture effect to ceramic beads

Possible cause how beads are moisturized, which triggers fluidization failure, is shown below.

- i. In case LI-7 with cold ceramic beads inside due to long time no use is brought into warm room and operation starts again. Abrupt change in temperature causes dew condensation.
- * In case of fluidization failure is due to moisture, run the system with reduced beads volume amount so that system gets recovered by the less load.
 - * Adjust room temperature 6°C lower than the ceramic beads present temperature.
 - * Keep on running LI-7 if it is supposed to be used within a few days to prevent ceramic beads from cooling off and absorbing moisture.



Do not keep running LI-7 in weak fluidization caused by heavy ceramic beads that absorbed moisture as it causes over-loading on the blower motor. Consequently circuit breaker trips, then, alarm beep goes off, and finally the operation of LI-7 stops.

④ Ceramic beads life periods

After several thousand hours of fluidization the ceramic beads surface coating naturally deteriorates. The deteriorated beads surface coating reduces the capability of liquid disposal and tends to be more under the influence of moisture. Namely fluidization power is weakened.

Life period of ceramic beads differs as it depends on the condition of each user.

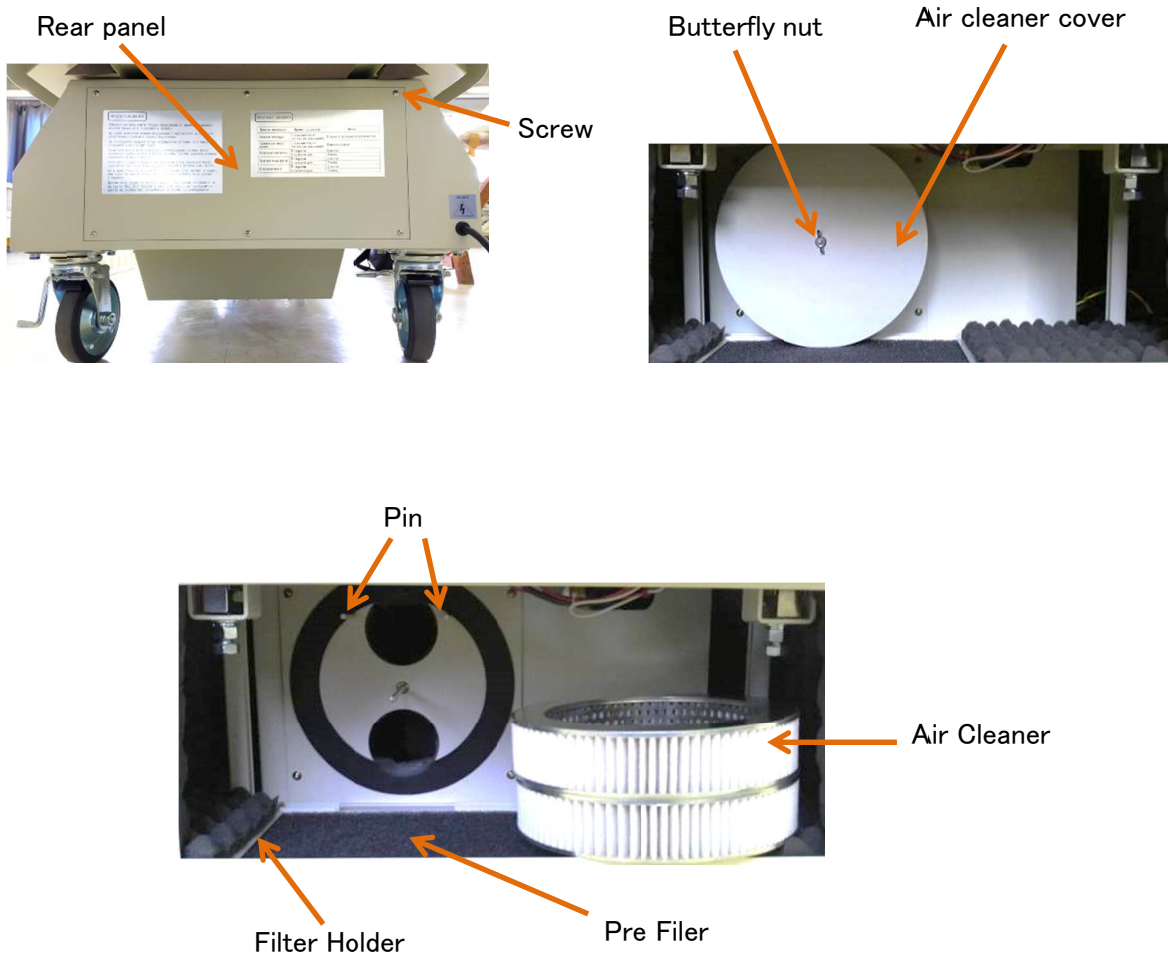
When patient support capability is obviously aggravated due to weak fluidization, whole ceramic beads have to be replaced. Contact your local service agent for the replacement of ceramic beads.



(3) Air Cleaners and Pre-Filters Inspections

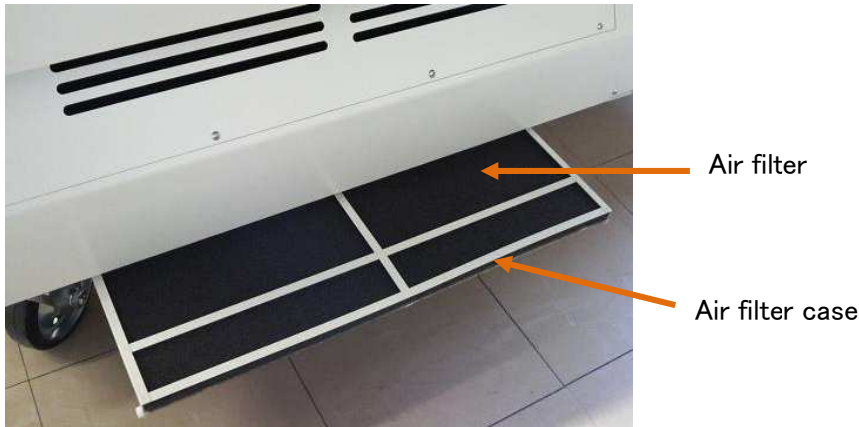
Remove six screws holding the rear panel (the other side of main control panel) and open the panel.
Remove the butterfly nut and take the air cleaner cover off, then you can take the air-cleaner off.
Pull the pre-filter out from the filter holder.
Vacuum the air cleaner and the pre-filter. Wash them in water if necessary.
Exchange the pre-filter in every 5-6 months.

Hang the air cleaner on the pin, pass the air cleaner cover through the volt, and finally tighten the butterfly nut.
Insert the pre-filter completely to the end of the filter holder to be fixed.
Screw down the panel at the upper three point and lower three point.



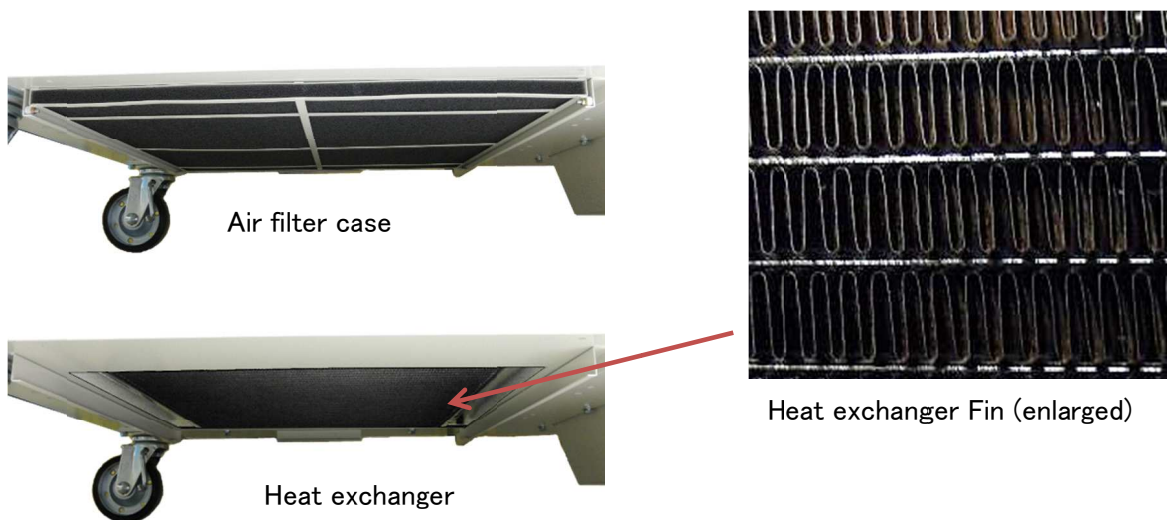
(4) Inspection and cleaning of the Air Filter

Draw the air filter case from the air filter housing in the bottom of the bed underneath heat exchanger.
Take air filter out from the air filter case.
Vacuum the air filter. Wash them in water if necessary.
Exchange the air filter every 5–6 months.
Put the air filter completely back to the air filter case to be fixed.
Insert the air filter case back to the air filter housing.



(5) Inspections and cleaning of Heat Exchanger

Draw the air filter case from the air filter housing in the bottom of the bed underneath heat exchanger
Vacuum the dusts on the fins of the heat exchanger.



Cleaning of Heat Exchanger maybe somewhat uneasy as it tends to get dust on the bottom face.
Be careful not to break or bend the fins while cleaning.
Broken or bent fins causes rising of the temperature.



[12] Trouble shooting

Consult the troubleshooting chart below when a symptom of functional failure in LI-7 appears.

When confirmation and solution, do so without a patient on board.

Contact your local service agent when the symptom is not found in this list, or when the symptom persists even after implementing the solution.

Symptoms	Confirmation and solution
Built-in lamp is not illuminated when the operation switch is turned on.	<ul style="list-style-type: none"> ▪ Check if the power plug is connected correctly. ▪ Check if the circuit breaker is tripped. (P11)
The blower motor is not activated when the operation Switch or hand (foot) switch is pressed.	<ul style="list-style-type: none"> ▪ Check if the circuit breaker is tripped. (P11) ▪ The hand (foot) switch may be disconnected. →Contact local service agent.
Temperature of the ceramic beads cannot be raised. (cannot be lowered.)	<ul style="list-style-type: none"> ▪ Check the temperature setting. (P12) ▪ Check if the room temperature is within the controllable temperature range of the beads. (P17) ▪ Check if the circuit breaker is tripped. (P11) ▪ Check the flow of the ceramic beads. →If there is insufficient fluidization, refer to “Ceramic beads are not sufficiently fluidized” below. ▪ Clean or replace the air filter if it is clogged. (P26) ▪ Clean the fins of the heat exchanger if it is clogged. (P26)
Fluidization of the ceramic beads is not sufficient.	<ul style="list-style-type: none"> ▪ Check if the ceramic beads contain any liquid. →In the case of volatile liquids, volatilize in empty operation. In the case of nonvolatile liquids, replace the ceramic beads. ▪ Clean or replace the air cleaner and pre-filter if it is clogged. (P25) ▪ Use a screen to check for and remove sediment. (P23)
An error is displayed on the temperature controller.	<ul style="list-style-type: none"> ▪ Refer to [10] Alarm. (P18)



Symptoms	Confirmation and solution
Alarm sounds. (Beads exceed allowable temperature. (39°C))	<ul style="list-style-type: none"> ▪ Remove any blankets or other objects that may interfere with the heat exhaust. ▪ Lower the temperature setting. (P12) ▪ Turn off the heater breaker. (P11) ▪ Check if the fan is working. (P11) →If it does not work after turning on the fan breaker, turn off the power. ▪ Check the flow of the ceramic beads. →If there is insufficient fluidization, refer to “Insufficient fluidization of ceramic beads” above. ▪ Clean or replace the air filter if it is clogged. (P26) ▪ Clean the fins of the heat exchanger if it is clogged. (P26)
Leakage of the ceramic beads.	<ul style="list-style-type: none"> ▪ Check if fit the filter sheet properly. (P20) ▪ Check if fit the hold down rubber properly. (P22) ▪ Check if there are holes on the filter sheet. →Repair the filter sheet with iron-on patch tape. (P21)
Incorrect weight is displayed.	<ul style="list-style-type: none"> ▪ Check if cables, equipment, etc. are in contact with the ceramic bead tank. ▪ Check if the room and/or beads temperature changed suddenly.



The solutions regarding the system inside of the unit should be carried out by personnel qualified for inspections and maintenances.
 Pay attention not to pinch fingers when opening and closing covers or panels.
 Do not touch nor unnecessarily open the parts that are not specified in solutions as it may cause electric shock.
 Do not disassemble or alter the unit and accessories.

Follow law and regulation of the countries when disposing the device.



[13] Specification

Manufacturer's product Name : Air Fluidized Support System LI-7

Generic Name : Air Fluidized Bed

International HS Code : 9018.90-1102

Dimension	(L) 2,200 mm × (W) 905 mm × (H) 880 mm
Weight	Total: approx. 670 kg Main body: 245 kg Beads: 425 kg
Rating Power consumption	single-phase AC200 – 240 V 50/60 Hz 1.1 kW/1.3 kW
Air flow	Approx. 1.7 m ³ /min.
Setting range of ceramic beads Temperature	25 °C – 38 °C
Controllable range of ceramic beads Temperature	Room temperature + 2.0°C (higher than 25°C or over) – room temperature + 20°C
Ceramic beads	Ceramic sphere diameter : 50~150 μ
Filter sheets	Made of polyester monofilament, opening mesh: approx. 37 μ
Maximum heights of Patient	200 cm
Maximum weights of Patient	135kgs. Over 100 kgs reduce one kg ceramic beads for every one kg weight increase
Weighing range of weight scale	+150 kg – -99.9 kg
Measurement accuracy	± 0.2 kg
Environment for use	5 – 35 °C for room temperature, 45 – 85 % for humidity.
Environment for storage	-20 – 65 °C for room temperature, 45 – 85 % for humidity.
<i>standard accessories</i>	
18	ceramic beads 25 kg (17 plus 1 spare)
2	filter sheet
1	Vinyl sheet (machine cover)
1	screen
2	air cleaner
1	air filter (for standard type)
1	pre filter (for standard type)
1	operation manual (LI-7 standard type)

The design specifications of our products are subject to change without prior.



MAINTENANCE INSPECTION RECORDS

Areas of Inspection	Date of Cleaning or Replacement				
① Filter Sheets					
② Ceramic Beads					
③ Air Cleaner					
④ Pre-Filter					
⑤ Air Filter					
⑥ Inner Observation					
⑦ Tank Interior					
⑧ Diffuser					
⑨ Heat Exchanger					





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Ver.03

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