Liberty Pumps®
A Family and Employee Owned Company

Liberty Pumps StormCell® Battery Recommended

Installation **Manual**

7656000D

Sewage and Grinder Pump Battery Backup

Model LNV100

for pumps up to 1800 W

Features

- Charging system automatically recharges/maintains batteries after use
- Low battery alarm
- Works with marine-type deep cycle batteries
  - *StormCell® batteries recommended*
  - *Batteries not included*

Battery Cell #	Specific Gravity	Voltage	Date

NOTICE Installer: Manual must remain with owner/operator.

Record information:

Model: _____

Serial: _____

Mfg Date: _____

Install Date: _____

Keep this manual handy for future reference.
For replacement manual, visit LibertyPumps.com, or contact Liberty Pumps.
Retain dated sales receipt for warranty.

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Safety Guidelines

	This safety alert symbol is used in the manual and on the pump to alert of potential risk for serious injury or death.
	This safety alert symbol identifies **risk of electric shock**. It is accompanied with an instruction intended to minimize potential risk of electric shock.
	This safety alert symbol identifies **risk of fire**. It is accompanied with an instruction intended to minimize potential risk of fire.
	This safety alert symbol identifies **risk of serious injury or death**. It is accompanied with an instruction intended to minimize potential risk of injury or death.
	This safety alert symbol identifies **battery hazards**. It is accompanied with an instruction intended to minimize potential risk from the battery.
⚠DANGER	Warns of hazards which if not avoided **will** result in serious injury or death.
⚠WARNING	Warns of hazards which if not avoided **could** result in serious injury or death.
⚠CAUTION	Warns of hazards which if not avoided **could** result in minor or moderate injury.
NOTICE	Signals an important instruction related to the pump. Failure to follow these instructions could result in pump failure or property damage.

⚠WARNING	Read every supplied manual before using this product. Specifications are subject to change without notice. Follow all the safety instructions in manual(s) and on the pump. Failure to do so could result in serious injury or death.

Safety Precautions

⚠WARNING **RISK OF ELECTRIC SHOCK**

- Accidental contact with electrically live parts, items, fluid, or water can cause serious injury or death.
- Always disconnect both battery and AC power source before handling or making any adjustments. Fatal electrical shock could occur.
- All installation and maintenance of pumps, controls, protection devices, and general wiring shall be done by qualified personnel.
- All electrical and safety practices shall be in accordance with the National Electrical Code®, the Occupational Safety and Health Administration, or applicable local codes and ordinances.
- This product shall be properly grounded using its supplied grounding conductor. Do not bypass grounding wires or remove ground prong from attachment plugs. Failure to properly ground the product can cause all metal portions and its surroundings to become energized.
- Do not use metal or any other electrical conducting material to raise the float or contact anything inside an electrically live sump pit.
- Do not install this product outdoors. The battery backup is rated for indoor use only.
- Protect this product from the environment. Do not operate in a wet location, expose to liquid or moisture, or allow any foreign objects to enter the openings.
- Because the Battery Backup uses batteries to generate 120V of AC power, both the power cord must be disconnected AND the power switch must be in the OFF position in order to neutralize the unit. Failure to disconnect the power cord and turn OFF the power switch could result in electrical shock sufficient to cause injury or death.

⚠WARNING **RISK OF FIRE**

- Do not use an extension cord to power the product. Extension cords can overload both the product and extension cord supply wires. Overloaded wires will get very hot and can catch on fire.
- Do not use this product with or near flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. If rotating elements inside pump strike any foreign object, sparks may occur. Sparks could ignite flammable liquids.
- This ordinary location product is not to be installed in locations classified as hazardous in accordance with the National Electric Code®, ANSI/NFPA 70.

⚠WARNING **RISK OF SERIOUS INJURY OR DEATH**

- Do not allow any person who is unqualified to have contact with this system. Any person who is unaware of the dangers, or has not read this manual, can easily be injured by inappropriate use of the system.
- Do not allow children to play with this product.
- Not intended for use with other control products.

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⚠WARNING **BATTERY/CHARGER HAZARDS**

- Battery voltage can cause serious or fatal electrical shock. Follow the battery manufacturer's recommendations for maintenance and safe use of battery before use.
- Battery acid is corrosive. Wear adequate Personal Protective Equipment when working with the battery.
- Never allow the battery DC terminals to touch each other. This can cause severe burns and start a fire. For added safety, secure the battery in a protective battery box.
- Only use 12-volt lead acid batteries with this product. Use of batteries with higher or lower output voltages can damage the pump system, leak acid or explode.
- Explosive gases develop during normal battery operation. Keep battery in a well ventilated area, away from sparks and open flames (such as pilot light). Never smoke in vicinity of battery. Batteries generate flammable gases both charging and discharging, which can explode or catch fire if ignited.
- Warning - Burn Hazard. Use caution as external surfaces of product can be hot during normal operation.

NOTICE

- The ambient temperature in the operating environment should not exceed 45°C/113°F.
- If a Carbon Monoxide (CO) sensor is installed, it must be at least 15 feet away from the Battery Backup in order to avoid nuisance CO alarms. Refer to the CO detector's installation guidelines for more information.
- Locate the Battery Backup as far away from batteries as DC cables permit.
- Never place the Battery Backup directly above battery being charged as gases from battery will corrode and damage the unit.
- Never allow battery acid to drip on the Battery Backup when reading gravity or filling battery.
- Do not expose the Battery Backup to rain, snow, or liquids.
- 12-volt marine-type deep cycle batteries recommended (Group 31 AGM or Wet Cell compatible).
- Do not operate the Battery Backup if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified service professional.
- Never charge a frozen battery.
- To protect battery box from chipping and gouging, do not let the battery box sit on a concrete floor. Install the battery box on a shelf or a protective pad (plywood, 2x4s, etc.).
- Always install the battery box in a dry location that is protected from flooding.
- Do not block the fan or exit air ports. Allow adequate ventilation and clearance around the entire unit.
- The Battery Backup shall never be installed in a confined space.

Refer to battery manufacturer's installation manual for additional safety and maintenance instructions.

General Information

Liberty Pumps Battery Backup LNV100 is an innovative power station designed to operate a sewage or grinder pump during a power outage, automatically activating when the AC power to the pump is interrupted. Supplying power continues until the issue with the AC power is restored or as long as the charge in the battery bank lasts.

When electricity is present, the unit charges a 24-volt battery bank and monitors the power line. At the instant that a power line disruption occurs, the LNV100 begins to convert energy stored in the battery bank to AC power to operate the pump. When AC utility power is restored, the LNV100 automatically switches the pump power source back to AC, recharges the battery, and monitors the power line.

The LNV100 is a high-capacity backup power source specifically intended for use with sewage and grinder pumps. It is designed to operate with an external battery bank whose nominal terminal voltage is 24 volts, and whose single or combined Ah rating does not exceed 250 Ah. The continuous load on the LNV100 should not exceed 15A running with a 45A startup surge rating.

A full recharge should take under 16 hours for a 24-volt battery bank rated 100 Ah. The unit will maintain batteries at full charge while electricity is available.

> ⚠ While the LNV100 is a sophisticated electronic device, it should not be expected to perform beyond its limitations, and extreme care should be taken to ensure safe operation within specifications. The LNV100 produces a potentially dangerous and hazardous electrical current even during a power outage, but is safe when properly installed, used, and maintained.

Battery Backup Operation

The smart charging system in the LNV100 is microprocessor controlled to yield optimum charging rates and long battery life for a 24-volt battery bank. The battery monitor is located on the upper surface of the unit.

When the electrical source is restored after a power outage (i.e., AC power active), allowing the resumption of the charging process, there is a 2 second delay during which the charge state of the battery bank is assessed. After this delay the ***CHARGING WHEN FLASHING*** LED begins flashing and remains in this state until the batteries are fully charged at which time the LED becomes solidly illuminated. The ***GOOD BATTERY*** LED will also be illuminated until the unit performs its routine battery condition test. The lower three LEDs indicate the remaining life of the battery bank.

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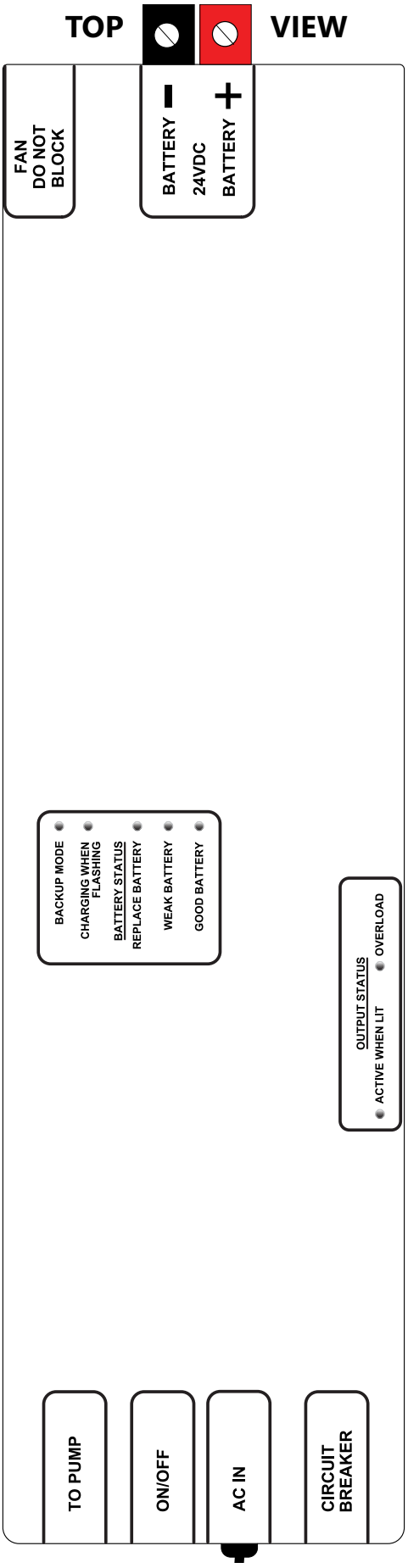
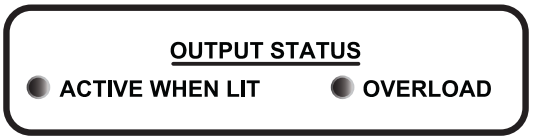


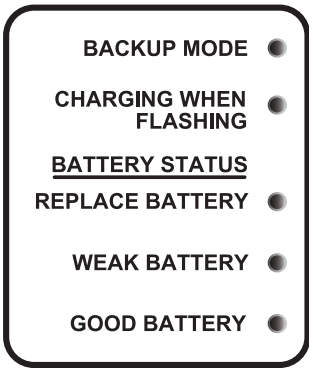
Power Indicator LEDs

The Power Indicators are comprised of two LEDs.



LABEL	LED	INDICATION
ACTIVE WHEN LIT	ON	The unit is providing power. Applicable to both the *Standby* (AC utility power present) and *Backup* (Battery Power) states.
	OFF	The unit is OFF.
		The unit is in sleep mode.
		The unit is in overload mode.
		The circuit breaker on the unit is open.
		The main fuse in the breaker panel is tripped.
		The battery bank has been depleted while operating in the *Standby* state.
OVERLOAD	ON	Excessive power being drawn from the unit.

Battery Status LEDs



The LNV100 has an integrated testing function to evaluate the condition of the connected battery's health, and displays the result on one of three LEDs located in the center of the top panel below the ***CHARGING WHEN FLASHING*** LED. When the unit is switched ON, the test is performed once upon startup, then again every 24 hours.

When performing a condition test after the initial test, the battery bank is evaluated over a period of 30 minutes, after which its condition is displayed as ***GOOD BATTERY*** with a green light, ***WEAK BATTERY*** with a yellow light, or ***REPLACE BATTERY*** with a red light

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accompanied by a periodic alarm every 2 minutes.

LABEL	LED	INDICATION
REPLACE BATTERY	Red	Battery is too old or damaged and needs to be replaced immediately. In this case, the battery bank is no longer rechargeable by the LNV100. See ***Maintenance and Troubleshooting***.
		Battery is unable to make a solid connection due to faulty or missing connection to the battery. See ***Battery Connection***.
WEAK BATTERY	Yellow	Battery bank is no longer working at its new full capacity, and should be changed soon to ensure reliability.
GOOD BATTERY	Green	Battery bank is maintaining a healthy capacity and will work reliably.

Operational Modes

MODE	INDICATION
BACKUP	• ***BACKUP MODE*** LED is ON • Power switch is ON • Unit is unplugged from the AC outlet (or AC power is not available)
	• ***BACKUP MODE*** LED is ON • Power switch is ON • Unit is plugged into an AC outlet • ***CHARGING WHEN FLASHING*** LED is OFF • ***ACTIVE WHEN LIT*** LED is ON
	• ***BACKUP MODE*** LED is ON • Power switch is ON • Unit is plugged into an AC outlet • ***CHARGING WHEN FLASHING*** LED is OFF • ***ACTIVE WHEN LIT*** LED is OFF *In this state, the unit is in sleep mode to conserve battery charge until a load (pump) is applied.*
STANDBY	• ***BACKUP MODE*** LED is OFF • Power switch is ON • Unit is plugged into an AC outlet • ***CHARGING WHEN FLASHING*** LED is ON • ***ACTIVE WHEN LIT*** LED is ON

System Components

Batteries (not included)

Only batteries conforming to Battery Council International (BCI) group size 31 or larger are recommended, up to a maximum total capacity of 250 Ah. Liberty Pumps recommends using Liberty Pumps StormCell® Group 31 Deep Cycle AGM or Wet Cell lead acid batteries. StormCell batteries have been specifically designed to maximize reserve capacity time (the time the battery can operate continuously before it needs to be recharged). Additionally, StormCell batteries have been modified to provide the highest resistance to battery plate degradation due to repeated charging and continuous maintenance charging.

Larger BCI group sizes and multiple-battery arrays may also be used to increase backup longevity.

The marine-variety is acceptable, but ***do not*** use automotive-type batteries.

Battery Box (not included)

Batteries must be securely installed in a high-quality plastic or nylon battery box that comes with a lid designed for that box, available at the point of battery purchase or order Liberty Pumps dual battery box kit #K001582.

Battery Cables

Use only the cables furnished with the LNV100 as they are equipped with the terminations necessary for reliable and solid connections.

The ends with the BLADE terminals mate with the **red** and **black** battery cable connectors on the unit, while the other ends are furnished with RING terminals designed to fit over the wing nut posts of most batteries.

Audible Alarm

While operating on battery backup power and the battery bank is depleted to below 21.6V, a high-pitched audible alarm is emitted. This is a sign that the Battery Backup will imminently lose battery power.

For continuation of battery power, replace the depleted battery bank. Follow ***Battery Replacement***.

If the audible alarm is active, it may be silenced by turning OFF the ON/OFF switch of the Battery Backup. *This does not clear the battery error, it just silences the alarm!*

Turn this switch back ON when the unit's operation is reinstated, such as when AC utility power is restored or after the battery bank has been replaced. ***Failure to do this leaves the pump without backup protection.***

Fan

The air-intake fan, located adjacent to the black DC cable terminal is load controlled. To conserve power, it operates only when load is drawn from the LNV100 exceeding minimum requirements. This eliminates unnecessary fan operation thereby minimizing battery loading.

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Fuse Protection

The LNV100 has no user accessible (replaceable) fuses. A 20A power line circuit breaker offers secondary protection during a possible failure.

Installation

⚠WARNING **BATTERY HAZARDS**

- Battery voltage can cause serious or fatal electrical shock. Follow the battery manufacturer's recommendations for maintenance and safe use of battery before use.
- Battery acid is corrosive. Wear adequate Personal Protective Equipment when working with the battery.
- Never allow the battery DC terminals to touch each other. This can cause severe burns and start a fire. For added safety, secure the battery in a protective battery box.

Battery Backup Placement

In a typical installation, the Battery Backup should be placed on a shelf or mounted on the wall near the basin, and in accordance with all applicable local electrical codes.

Select a location close to a grounded 15A AC power source, convenient to the pump and within 2–4 feet of the battery location, but not directly over either.

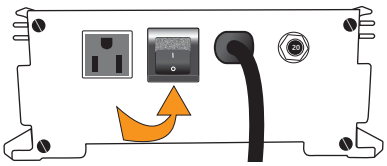
1. Verify the Battery Backup power switch is OFF and the power cord is ***not*** plugged into an AC wall outlet.
2. Mount the Battery Backup at desired location. It is recommended to place on a shelf or mounted to a wall.
3. Do not block either the fan or the exit air ports of the LNV100. Allow at least 2 inches of air clearance on all sides. Any room in which the LNV100 is mounted shall have adequate ventilation.

Battery Connection

Refer to battery manufacturer's recommendations for safe use of the battery.

IMPORTANT: The Battery Backup does ***not*** have reverse polarity protection. Reversing the battery positive and negative source cables will damage the unit.

1. Verify the Battery Backup ON/OFF switch is in the OFF (O) position and the Battery Backup is ***not*** plugged into an AC wall outlet.



2. Install the batteries into their protective boxes and place them into designated spots sufficiently close to the LNV100 to allow the battery cables to reach.

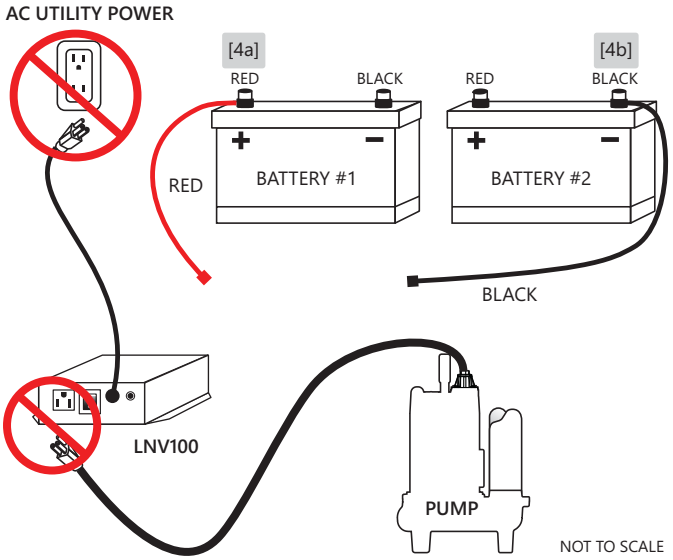
   IMPORTANT: Do not use longer cables than those supplied with the Battery Backup as this may adversely affect the time available for backup operation.
3. Check polarity of battery posts. POSITIVE (POS.,P,+) battery post usually has a larger diameter than NEGATIVE (NEG.,N,−) post.

   Some batteries are equipped with 'Wing-Nut' terminals allowing for easy placement of the terminals to these posts.
4. Connect the two 12-volt batteries into a 24V bank.

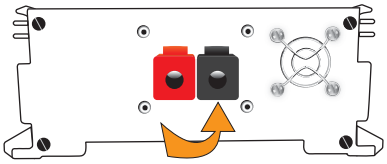
   4a. Connect the RING end of the 4 foot ***red*** cable to the POSITIVE (POS.,P,+) battery post of battery #1.

   4b. Connect the RING end of the ***black*** cable to the NEGATIVE (NEG., N, −) battery post of battery #2.

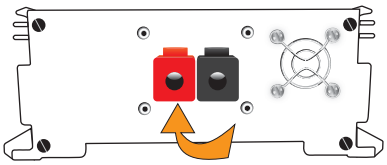
   4c. Tighten connections securely.



   4d. Connect the BLADE end of the ***black*** battery cable into the black terminal block. Tighten the set screw of the block until the cable is secured.



   4e. Connect the BLADE end of the ***red*** battery cable into the red terminal block, located adjacent to the black one. Tighten the set screw of the block until the cable is secured.



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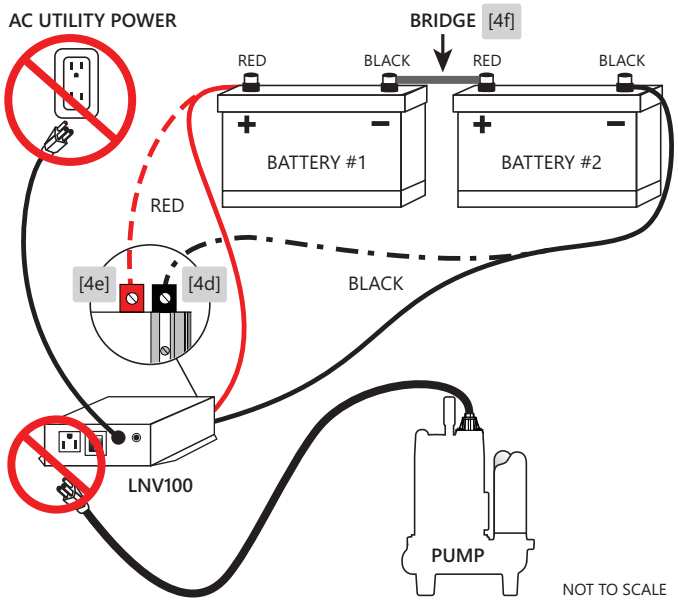
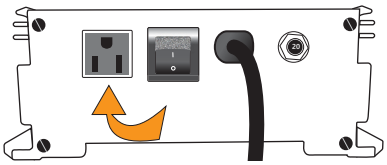
4f. Connect the short bridge cable between the two batteries. The bridge cable has RING terminals at each end.

Important: There will be a perceptive spark at the battery terminal that is connected last as some components in the LNV100 get charged from the batteries. **This is normal**.



5. Cover the battery box(es) and secure the lid(s).
6. Plug the pump into the LNV100.



7. Plug the Battery Backup into a 120 volt 15A AC wall outlet.

   IMPORTANT: Do not use a switch-controlled outlet.
8. Mark circuit in main power panel "*Backup power supply; do not turn off*".
9. Turn the Battery Backup ON/OFF switch to the ON position.
10. Secure the batteries in the box(es) with the provided hold-down strap(s) to prevent unwanted access to the battery.
11. Verify ***ACTIVE WHEN LIT*** LED is ON and *BATTERY STATUS* LED displays, after slight delay, the current state of the battery.
12. Complete ***System Test***.

System Test

⚠WARNING **RISK OF ELECTRIC SHOCK**

- Do not use metal or any other electrical conducting material to raise the float or contact anything inside an electrically live sump pit.

Once connections are complete, test the system as follows:

1. Verify LNV100 is OFF.
2. Plug the pump power cord into the LNV100 AC receptacle.

   Verify the pump level float switch or water level allows it to be ON.
3. Turn ON the LNV100.
4. Verify ***CHARGING WHEN FLASHING*** LED is lit.

   In this state the pump should be pumping within 1–2 seconds.
5. Disconnect the LNV100 from the AC wall outlet, simulating a power failure. Verify ***ACTIVE WHEN LIT*** LED is illuminated.

   After a slight pause, the LNV100 should continue to operate. If it does not, review steps in ***Battery Connection***.

   The fan is not necessarily activated as it is load controlled and turns on when there is a sufficient power draw causing the LNV100 to heat up.
6. Cycle the pump to ensure operation in ***BACKUP MODE*** mode.
7. Plug the LNV100 power cord back into the AC wall outlet. Cycle the pump. Note that after 2 seconds the ***CHARGING WHEN FLASHING*** LED is lit. This is normal and is an indication that the LNV100 has recognized the return of normal AC power. The LNV100 is no longer in ***BACKUP MODE*** and has returned to its normal state of charging the battery and providing utility power.

Maintenance and Troubleshooting

⚠WARNING **RISK OF ELECTRIC SHOCK**

- Accidental contact with electrically live parts, items, fluid, or water can cause serious injury or death.
- Always disconnect both battery and AC power source before handling or making any adjustments. Fatal electrical shock could occur.

Maintenance

Once properly connected, the LNV100 requires no maintenance. When AC power fails, the unit automatically converts battery power to AC power for operation of the appliance; likewise it automatically recharges the battery when AC power returns. During all of these power transitions, the LNV100 requires no manual adjustments. However, the state of the battery health indicators should be noted in the event that batteries may require replacement.

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Battery Replacement

If for any reason the battery needs changing, it is important to follow the provided steps in the order given to avoid damage to the LNV100. Refer to battery manufacturer's recommendations for safe use of the battery.

IMPORTANT: The Battery Backup does ***not*** have reverse polarity protection. Reversing the battery positive and negative source cables will damage the unit.

1. Turn the ON/OFF switch on the LNV100 to the OFF position.
2. Unplug the input power cord of the LNV100 from the wall AC outlet.
3. Unplug the input power cord of the pump from the AC outlet on the LNV100.
4. Disconnect the battery cables from the battery.

   CAUTION: Make sure that the LNV100 is disconnected from AC power and that the ON/OFF switch is in the OFF position before disconnecting battery cables.
5. Replace the battery.
6. Reconnect the LNV100 following Steps [1] through [5] in ***Battery Connection***.

Service

No repair work shall be carried out during the warranty period without prior factory approval. To do so may void the warranty.

Do not disassemble charger, cord, or any associated part. Take Battery Backup to a qualified service center when service or repair is required.

Troubleshooting

LABEL	LED	POSSIBLE CAUSE	CORRECTIVE ACTION
ACTIVE WHEN LIT	OFF	Main fuse blown.	Replace fuse.
		Battery is depleted.	Replace battery.
		No AC utility power connected.	Reconnect unit to AC utility power.
		Unit is in OVERLOAD state.	Excessive power is being drawn from the unit, monitor load usage.
WEAK BATTERY or ***REPLACE BATTERY***	OFF	Battery is depleted.	Replace battery.

Warranty

Liberty Pumps Wholesale/Commercial Series Products Limited Warranty

Liberty Pumps, Inc. warrants that Liberty Pumps wholesale products are free from all factory defects in material and workmanship for a period of three (3) years from the date of purchase (excluding batteries***** and ***Commercial Series********* models). The date of purchase shall be determined by a dated sales receipt noting the model and serial number of the pump. The dated sales receipt must accompany the returned pump if the date of return is more than three years from the date of manufacture noted on the pump nameplate.

The manufacturer's sole obligation under this Warranty shall be limited to the repair or replacement of any parts found by the manufacturer to be defective, provided the part or assembly is returned freight prepaid to the manufacturer or its authorized service center, and provided that none of the following warranty-voiding characteristics are evident:

The manufacturer shall not be liable under this Warranty if the product has not been properly installed, operated, or maintained per manufacturer instructions; if it has been disassembled, modified, abused, or tampered with; if the electrical cord has been cut, damaged, or spliced; if the pump discharge has been reduced in size; if the pump has been used in water temperatures above the advertised rating; if the pump has been used in water containing sand, lime, cement, gravel, or other abrasives; if the product has been used to pump chemicals, grease, or hydrocarbons; if a non-submersible motor has been subjected to moisture; or if the label bearing the model and serial number has been removed.

Liberty Pumps, Inc. shall not be liable for any loss, damage or expenses resulting from installation or use of its products, or for consequential damages, including field labor costs, travel expenses, rental equipment, costs of removal, reinstallation or transportation to and from the factory or an authorized Liberty Pumps repair facility.

There is no other express warranty. All implied warranties, including those of merchantability and fitness for a particular purpose, are limited to three years from the date of purchase. This Warranty contains the exclusive remedy of the purchaser, and, where permitted, liability for consequential or incidental damages under any and all warranties are excluded.

*****Liberty Pumps, Inc. warrants StormCell® batteries for 1 year from date of purchase.

******Liberty Pumps, Inc. warrants that pumps of its ***Commercial Series*** are free from all factory defects in material and workmanship for a period of 18 months from the date of installation or 24 months from the date of manufacture, whichever occurs first, and provided that such products are used in compliance with their intended applications as set forth in the ***Commercial Series*** technical specifications and manuals. The date of installation shall be determined by a completed pump start-up report and warranty registration form. A pump start-up report, filled out by a qualified installer, is required for warranty to take effect. The report must be submitted within 30 days from the installation date and submitted through the Liberty Pumps website.

www.libertypumps.com/wp/dom/Services/Warranty/Commerical-Series-Startup-Form

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