MEDI+PRODUCTS

The Reassurance

PRODUCTS BY MEDICANIX INC.

Emergency Power System: MD – M Series

Owner's Manual

MEDICANIX INC.

Reassurance MD - M Series Owner Manual

Medicanix Inc.
30 Nurney St.
Stamford, CT 06902
Phone 203.324.3711 • Fax 203.487.7423

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Product Information

(Required information when calling for service)

Date of Purchase:

Serial Number:

Facility Information:

(In the rear of the system)

Name Plate:

Model & Serial Number

Safety Warnings and Disclaimer

Location Warnings:

- Insure that you store the system in a structurally sound area as these UPS systems are extremely heavy. Also take special care when moving or lifting the system. Remove the batteries before attempting a stairway.

- Leave adequate space around the system for proper ventilation and do not store or lean items against the system which will prevent the ventilation needed for the system to function.

- Do not locate in high traffic areas where the possibility of impact can be foreseen.

Intended Use and Equipment & Wiring Connections:

- This system is not intended to support life or run life supporting equipment but rather to power surgical appliances needed in superficial surgical procedures. When used within a surgery environment do not use in the presence of flammable anesthetic mixtures with air oxygen or nitrous oxide. Applicable codes may specify keeping the system at a distance from the patient.

- This UPS system stores energy. Output battery terminals and possibly output breakers or outlets may possibly be live when the system is turned off or after the input power has been disconnected.

- Please be sure to electrically isolate the UPS entirely before opening access panels on the unit.

- Please be sure that the power supplied to this unit is the proper phase, voltage, and amperage specified.

MEDICAL USAGE

SAFETY NOTICE & DISCLAIMER

1. All hardwired units should be installed by licensed, professional personnel in accordance with local and national codes. Most Reassurance units are however 'plug & play' and not hardwired.

2. The unit should be installed in an area kept at controlled room temperature or somewhat cooler (60 - 70ºF).

3. Although the system is supplied with sealed VRLA batteries they are not *leak proof.* We recommend the unit should not be located near explosive medical gas storage or open flame heaters or electric spark-inducing equipment.

STATEMENT OF LIABILITY IN MEDICAL ENVIRONMENTS

- The ***REASSURANCE*** is not to be relied upon as a primary emergency power source for life-support equipment. Its use is intended for the supply of emergency power to appliances which may be employed in non life-threatening medical procedures. It is imperative that it is understood that at no time should a patient remain unattended. At this writing the FDA has no classification for a general-purpose medical emergency power supply. This system is not a medical device.

- All life-support type equipment, life-signs monitors, gas monitors etc. are expected to have their own built-in F.D.A. approved appliance-specific energy sources and be maintained correctly. General room lighting and exit signs are also expected to have multiple independent energy sources.

- If life-supporting equipment is to be powered by any sort of electrical source or device it is MEDI-PRODUCT'S expectation that several alternative independent power supply sources and devices be available.

Operation & Maintenance

Operating Instructions

Overview

- The panel control allows you to monitor and customize the operating parameters to the inverter/charger.
- It is equipped with the following features:
- LED Indicators - The at-a-glance LEDs provide the inverter/charger status in a straightforward way.
- LCD Display - The LCD display is used for setting up the inverter/charger operation and viewing current status or fault messages.
- ON/OFF Pushbuttons (x2) - Allows the inverter or charger to be enabled or disabled. Menu Pushbuttons (x5) - The menu pushbuttons allow access to operational parameters of the Inverter or Charger. These have been set by MEDI+Products and generally should not be reset by the User.
- Rotary Knob - The rotary encoder knob is used to scroll through and select various menu items and settings. Push the rotary knob to "SELECT" a menu item or to "save" a setting once it is displayed on the LCD screen.

Front Panel:

The front panel contains LEDs, an LCD display for viewing system status; pushbuttons to control system operation; and a Rotary Knob that allows an easy way to select and find system information.

LED Indicators:

There are four LED's indicators on the front panel that light steady or blink to indicate the inverter/charger's status. When the system is first powered-up, all the LED'S come on as it goes through a self-test. Once the self-test is complete, the LEDs along with the LCD provide the operating status of the inverter/charger.

LCD Display

The LCD display is used for setting up the system operation as well as viewing the current operating status or any fault condition. This display has two lines of alphanumeric characters and features a backlight that can be set to turn off to conserve power. The top line provides the inverter/charger status, which is detailed in this section. The bottom line displays battery information while using the METER menu, system troubleshooting information while in the TECH menu and menu items that can be configured for your specific system operation while in the SETUP menu. This display automatically powers up with the current system status on the top line and the Home Screen on the bottom line.

ON/OFF Pushbuttons:

ON/OFF INVERTER: This pushbutton toggles the inverter function on and off. The green "INV" LED turns on and off with the pushbutton.

ON/OFF CHARGER:

This pushbutton toggles the charger function on and off whenever the charger is actively charging. The green "CHG" LED turns on and off with this pushbutton. This pushbutton is also used to initiate an equalize charge. MEDI+Products does not recommend employing this feature.

Menu Pushbuttons:

These five menu pushbuttons provide quick access to menu items that can help with configuring, monitoring and troubleshooting your inverter/charger. Please do not change the preset selections without knowledge and reason.

SHORE:

This name may seem strange in a medical setting but it has become accepted jargon in the off-grid power industry. It means the Utility-supplied power. This pushbutton allows you to set the system according to the supply breaker size. Mobile units with a 15 amp plug should be set for 15 amps. Mobile units with a 20 amp plug should be set to 20 amps. Hardwired units or mobile units with a 30 amp plug should be set for 30 amps.

AGS:

This pushbutton allows the networked Auto Generator Start (AGS). If there is no fuel-powered generator supplying power to the system do not use this button.

METER:

This pushbutton provides meter information on the inverter/charger system; see section 3.2.3 for more detailed information.

SETUP:

This pushbutton allows the inverter/charger to be configured. Please do not change the preset selections without knowledge and reason

TECH:

This pushbutton allows access to menu selections that can help service personnel with troubleshooting,

Rotary SELECT Knob

Turn the rotary knob clockwise and counterclockwise to view the different menu items and available charger and inverter settings. Push or "SELECT" the rotary knob to enter a menu item or to "save" a setting once they are displayed on the LCD screen. Please do not change the preset selections without knowledge and reason

Operating the Inverter/Charger

Inverter Mode

Turning the inverter on: Press the ON/OFF INVERTER pushbutton to activate the inverter function. The inverter will either be actively "inverting" by using power from the batteries to power the AC loads or will be "searching" for a load by using very little power from the batteries - if in search mode. The green 'INV' LED will be on when the inverter is actively inverting and the green 'INV' LED will flash while searching. Turning the inverter off: While the inverter is actively "inverting" or "searching", the ON/OFF INVERTER pushbutton can be pressed to switch the inverter function off and this will turn the green 'INV' LED off

Inverter Standby:

The inverter is in standby when the inverter is active (green 'INV' LED is on) and an external AC power (utility/shore or generator) is passing through the inverter to power the AC loads. During normal operation, the AC loads will be powered by the external AC power, however, if a blackout or brownout condition occurs, the inverter senses these conditions, transfers to inverter mode and powers the AC loads connected to the inverter. If you have critical loads and in Inverter Standby, do not press the ON/OFF INVERTER pushbutton to turn the inverter function off. If the green 'INV' LED is off, inverter power will NOT be available to run your critical loads if the external AC power is interrupted. If however if the loads are non-critical, there is the possibility that the system will turn on needlessly while unattended. In order to prevent this set inverter to off.

Operating the Charger:

Turning the charger on:

The charger will automatically be activated and begin to charge the batteries when acceptable AC power is supplied to the system. When the charger is ON, it produces DC voltage and current to charge your batteries. The CHG LED will be on when the charger is ON and actively charging. While charging the display will show Bulk, Absorption, Float or Full Charge as the batteries progressively recharge.

Charger Standby:

While the charger is actively charging, the ON/OFF CHARGER pushbutton can be pressed to switch the charger to "Charger Standby'. While the charger is in Charger Standby, the incoming AC is still available on the inverter's output, but the charger is not allowed to charge. The display will show 'Charger Standby' and the CHG LED will flash when the charger is in standby mode. This is not recommended. To resume charging, momentarily press the ON/OFF CHARGER button; or disconnect/reconnect AC power to the inverter's input.

Equalize charging:

Equalizing is a "controlled overcharge" performed after the batteries have been fully charged. MEDI+Products does not recommend this procedure except in special circumstances. WARNING: Do not perform an equalization charge without reading, understanding and following all safety precautions pertaining to charging/equalization

System Status Messages:

The control uses the top line of the LCD display to show the inverter/charger's current operation by displaying a status message. This section will show the inverter/ charger's operating modes and the available status messages under each mode. Use these status messages along with the Status LED'S to determine the inverter/charger's current operating status and to help troubleshoot the system if a fault occurs.

There are three operating modes of the inverter/charger:

· Charger Mode
· Fault Mode
· Inverter Mode

Inverter Mode Messages

The inverter/charger will be in the Inverter Mode when AC power (utility) is not available or unacceptable to the inverter/charger's input. The Inverter Mode messages are: Off, Searching and Inverting.

Off - This message tells you that there is no AC available on the inverter's AC output. The inverter function is off and there is no utility power AC sensed on its input.

Searching - The inverter is in the Search mode, which means the AC loads on the inverter output are less than the Search Watts setting. The search mode function is used to reduce the inverter draw from the battery and may be turned off at any time if you want full inverter output voltage available at all times (see SETTINGS).

Inverting - The inverter is providing AC voltage on its output by inverting power from the batteries.

Charger Mode Messages

When AC power (utility) is connected to the inverter/charger, it begins to monitor the AC input for acceptable voltage. Once the AC input is accepted, the AC transfer relay (inside the inverter) closes and charger mode begins. There are several charger mode messages; view the top line of the LCD display and the corresponding message in this section to determine and understand the particular charger mode.

Charging

Once the charger mode has been enabled, the unit will wait and display "Charging" to determine the

charge routine. If the DC voltage is low the charger will initiate "Bulk Charging". If the DC voltage is high the charger will skip the Bulk and Absorb charging stages and go directly to Float Charging.

Bulk Charging

The battery charger is delivering maximum current to the batteries. The charger will remain in bulk charge until the absorb voltage is achieved. Absorb Charging - The absorb charge state is the constant voltage stage and begins when the absorb voltage is reached while bulk charging. During this stage, the DC charging current decreases in order to maintain the absorb voltage setting. This charge stage continues until the Absorb Charging time is finished.

Float Charging

At the end of the Absorb Charging time, the charger reduces the charge voltage and tries to maintain the batteries at the float charge voltage setting;

Full Charge

This status indicates that you have entered the Battery SaverTM mode. This mode maintains the batteries without overcharging, thus preventing excessive drying out of the AGM batteries. After 4 hours "Float Charging's the charger will turn off and "Full Charge" is displayed (charger is now in Battery SaverTm mode). If the battery voltage drops the charger will automatically initiate another 4 hours "Float Charging" This cycle helps to ensure the batteries are monitored and maintained; and continues as long as AC power is continuously connected to the AC input.

Charger Standby

This means the charger has been disabled to prevent any charging, but the AC power (utility) to the AC input is still available on the AC output. This display is shown when the ON/OFF CHARGER pushbutton is pressed while the AC power is passing through the inverter/charger. To enable charging again, press the ON/OFF CHARGER pushbutton. When the charger is again enabled, the charger will continue in the charge mode it left and the CHG (green) LED will come on steady.

Equalizing

The battery charger is delivering an overcharge to equalize the battery voltages. MEDI+Products does not recommend this procedure The equalize charge mode can be manually stopped by pressing and holding the ON/OFF CHARGER pushbutton down (about 5 seconds) until the LCD screen displays Float Charging

Settings

The Operational Parameters of the system are set by MEDI+Products at the time of system assembly.. This section will show you how to navigate the control, give you an understanding of the function of each adjustable setting for informational purposes and should any become accidentally misadjusted.

Navigating the Menu

The control has an internal structure that provides menu items and adjustable specific parameters. LCD Display - The bottom line of the LCD display shows the menu items, adjustable settings or the meter's display information. The bottom line of the LCD display returns to the Home Screen to show DC voltage and current after 2 minutes – if no buttons have been pressed. When the "←" (left facing arrow) symbol is shown on the display, it indicates that the currently displayed setting has been selected and will be used.

Menu Pushbuttons (five) - These five menus allow simple access to the menu items that can help with configuring, monitoring and troubleshooting the inverter/charger system.

Rotary SELECT Knob - This knob allows you to quickly scroll through and select various menu items and settings after pressing a menu pushbutton. This knob also is used to "save" a setting once it is displayed on the LCD screen.

Menu Pushbuttons and Menu Items

The five menu pushbuttons (SHORE, AGS, METER, SETUP or TECH) allow the inverter/charger system to be configured to specific settings. These menus also allow you to access menu items that can help with

monitoring and troubleshooting your system. MEDI+Products does not recommend changing settings without understanding or consulting our technical service.

SHORE

Menu This name may seem strange in a medical setting but it has become accepted jargon in the off-grid power industry. It means the Utility-supplied power. The setting coordinates the system with the circuit breaker rating from the incoming AC source

SHORE: Shore Max

This selection ensures the inverter AC loads receive the maximum current available from the utility or generator power. . Mobile units with a 15 amp plug should be set for 15 amps. Mobile units with a 20 amp plug should be set to 20 amps. Hardwired units or mobile units with a 30 amp plug should be set for 30 amps. Whenever the utility connected to the inverter the current used to power the AC loads and to charge the batteries is monitored. When the total current used to power the AC loads and charge the batteries begins to approach the Shore Max setting, the current that was used for charging the batteries will automatically be reduced. This ensures that the AC loads have all the available current when needed.

CAUTION: The Shore Max setting does not limit the current to the inverter loads. If the current from the loads on the output of the inverter are greater than the circuit breaker rating on the incoming AC source, you may experience nuisance tripping on this breaker.

AGS Menu

The AGS menu pushbutton allows the optional Auto Generator Start (AGS) controller (if installed and networked) to be configured to your specific system preferences and check status of the AGS. Refer to the ME-AGS Owner's Manual (part number: 64-10005) for detailed information on the Magnum Energy Auto Generator Start (ME-AGS) and this menu.

METER Menu

Pressing the METER menu pushbutton gives you access to different meters, which helps determine the status of the inverter/charger and battery system.

METER: 01 INV/CHG Meter - This menu provides the DC voltage and current while either inverting or charging.

The DC: V (Volts) display provides the voltage from the batteries connected to the inverter. The DC: V accuracy is ± 1.5% with a 0.1 VDC resolution.

While inverting, the DC: A (Amps) displays a negative number to show the battery current used by the inverter. If you are charging, the DC A (amps) displays a positive number to show the amount of current delivered to the batteries. The accuracy of this display below 1 amp AC ("10 amps DC @12VDC) is not detected. When the current into or out of the batteries is greater than 1 amp AC, the display accuracy is ±20%.

METER: 02 BM: Soc thru 06 BM: TECH - These menus allow the optional Battery Monitor (if installed) to be configured to your specific system preferences and display the status of the battery system; refer to the MEBMK Owner's Manual (part number 64-0013) for detailed information on the Magnum Energy Battery Monitor Kit (ME-BMK) and these menus.

SETUP Menu

Pressing the SETUP menu pushbutton provides access to the menu items and settings that allow the inverter/charger to be configured operationally.

SETUP: 01 Search Watts

Allows you to turn off the Search Watts feature or adjust the power level to determine when the search watts feature becomes active. The power level range selection is 5W to 50W. If this feature

is not needed, select Search=Off. . When search is turned off, the inverter continuously provides full AC voltage regardless of the size of the loads.
Default setting~ Search = 5W. When the Search Watts feature is active, "Searching" appears on the top line of the LCD display and the green 'INV' LED will slowly flash.

What is the "Search Watts" feature?

This feature is used to help save battery power by reducing the inverter's output to search pulses when there is no detectable load. If someone turns on a load greater than the wattage level setting while the inverter is "searching", the inverter will start "inverting" to provide full voltage on its output.

Should I use the "Search Watts" feature?

If your usage is intermittent and there is a likelihood of forgetting to shut the system off during unattended hours (weekends, nights) this feature may prevent unnecessary battery discharge should the power fail. However, if you require some small load (i.e. digital clocks, satellite receivers, answering machines, etc.) to always be on, then this feature should be turned off (Search = Off).

SETUP: 02 LowBattCutOut

The Low Battery Cut-Out (LBCO) setting is used to set the DC voltage level that
turns off the inverter to help protect the batteries from over-discharge damage. Selections are from 9.0 VDC to 12.2 VDC (12-volt inverter models), 18.0 VDC to 24.4 VDC (24-volt inverter models). If the battery voltage drops below the LBCO selected set-point continuously for more than 1 minute, the fault LED will come on, the inverter will turn off, and the display will show a 'Low Battery' status. If the battery voltage falls below 8.5 volts (12-volt models), 17.0 volts (24-volt models), the fault LED and 'Low Battery' status will be immediate. Recommended settings: LBCO = 10.0 VDC (12-volt models), 20.0 VDC (24-voltmodels) The inverter will automatically begin to start inverting when the DC voltage increases to 12.5 VDC (12-volt models), or 25.0 VDC (24-volt models). If AC power is available and connected to the inverter's input, the inverter will automatically clear the 'Low Battery' fault, pass the input AC power to the output and begin recharging the batteries. In extreme circumstances, you have the ability to fully discharge the batteries by setting the LBCO to 9.0 VDC (12-volt models), or 18.0 VDC (24-volt models).

SETUP: 03

Battery AmpHrs Used to select the approximate capacity of the battery bank connected to the
inverter. This setting determines the time the battery charger is in the Absorb Charging stage (Le. Absorption Time). Selections are in 10 AmpHrs increments from 200 to 2500 AmpHrs. MEDI+Products systems utilize 100 and 140 AmpHr batteries in sets of two, three or six. Refer to your purchase documents, or call MEDI+Products if you believe that the factory setting has been altered.

SETUP: 04 Battery Type

Used to select the battery type, which determines the battery charge profile and ensures the batteries are receiving the proper charge voltage. The fixed voltage selections are GEL (for Gel batteries), Flooded (for liquid lead acid batteries), AGM 1 or AGM 2 MEDI+Products recommends the AGM2 setting.

SETUP: 05

Charge Rate - Used to set the maximum charge rate allowed to charge the batteries during bulk, absorption, float and equalize charging. Selections are 'Max Charge = 0%' up to 'Max Charge = 100%. The Max Charge =0% setting is available to help minimize charging while continuing to allow pass-thru power. The rest of the selections are provided to limit the charge rate to the battery bank, which helps prevent battery overheating

caused by charging at too high a charge rate. Most MEDI+Products surgical applications are intermittent and low recharge rates are recommended. For laboratory equipment applications and other full-time load situations the setting should be higher, but not so high as to cause nuisance panel breaker trips. Call MEDI+Products if help is needed with this setting.

SETUP: 06 VAC Dropout

Used to select the minimum AC voltage that must be present on the input before the inverter/charger switches from inverter to charger mode. For example: If this setting is set to Dropout = 60 VAC, then the AC input voltage must be above 60 Volts before the inverter will switch from inverter mode to charge mode. MEDI+Products recommends a 90 VAC setting.

SETUP: 07 Power Saver

This setting allows you to turn off the Power Saver feature or select the time (from 1 minute to 60 minutes) that determines how often the display goes into Power Saver mode. The Power Saver feature causes the LCD back-light and LED'S on the display to turn off to conserve energy. The panel goes into Power Saver mode if there hasn't been a pushbutton pressed or fault message for a period of time (this time is determined by the setting. Whenever the panel goes into the Power Saver mode, the LCD backlight and LED's can be reactivated by pressing any menu pushbutton . If you have a fault during the Power Saver mode, the LCD backlight and Fault LED will come on and stay on as long as the fault is detected. If you want the LCD backlight and LED'S to always be on, you can turn the Power Saver feature off by selecting PwrSave = Off. Note: Even though you can press any menu pushbutton, do not press the ON/OFF INVERTER or ON/OFF CHARGER pushbutton to reactivate the panel's backlight and LED'S - this will cause the charger or inverter to change the operating status. Instead, press the METER pushbutton; it does not change the inverter or charger status.

SETUP: 08 Scrn Contrast

Used to adjust the contrast of the LCD screen for the best looking display based on the current lighting conditions and viewing angle.

TECH Menu

The TECH menu pushbutton provides access to selections that are used to assist service technicians in troubleshooting. It provides access to system information along with a selection that allows all system settings to be returned to the original factory default values.

TECH: 01 Temperatures

This "read only" menu displays temperature readings of the battery temperature sensor (if connected), the transformer, the FET'S (Field Effect Transistors) and a networked AGS (if installed).

TECH: 02 Revisions

This "read only" menu displays the firmware revision level of the inverter, panel and any optional accessory (i.e. AGS) that is installed and networked.

TECH: 03 Inv Model

This "read only" menu displays the model number of the inverter.

TECH: 04 Load Defaults

This menu restores all settings on the inverter/charger to the inverter/charger manufacturer's default settings. Note: These are NOT to be confused with MEDI+Products settings. Do NOT activate these "default settings" as they are not appropriate to MEDI+Products' application of the inverter/charger.

Maintenance & Trouble Shooting Procedures

Maintenance – User/Owner

The MEDI+Products REASSURANCE contains virtually no moving or lubricated components and therefore requires almost no user maintenance except testing and recordkeeping.

The user should be aware that by their nature, battery life is negatively affected by some usage patterns. Of course, batteries are intended to be used, but minimizing deep discharges, and frequent charge / discharge cycles will extend overall life. Their life expectancy will be generally in the range of four to five years. Please refer to the section on Battery Testing for more on this subject. If the appliance(s) supported are intermittently used – as in the case of surgery, for example – it is recommended that the inverter's 'Auto-On' feature be inhibited (turned off). In the case of refrigeration support, the 'Auto-On' should be enabled and its functionality be confirmed by test.

Records should be kept of battery tests as well as incidents causing battery discharges, including date, rate of discharge, length of discharge, name of person doing the test, &c.

The system has a battery voltage alarm which will sound below 11.5 and above 15 volts DC. Battery voltage indicators should be checked if the alarm sounds. Often a low battery alarm will result from a tripped supply breaker in the main building electric panel. If this is not the cause, please contact MEDI+Products promptly.

Maintenance and Troubleshooting – Qualified Technical Support

Adjustments can be made to the inverter module. Please refer to the supplementary inverter manual.

A large amount of energy is stored in the batteries which can cause injury to unqualified persons attempting to effect repairs. Also, no-one untrained with regard to electrical energy should attempt any service task or remove any of the front covers as live circuits will be exposed in all cases.

Eye protection should be worn by any person connecting or disconnecting batteries and battery cables.

Hand-washing is recommended for any person handling batteries.

Various battery connection patterns are used on several model variations. Battery replacements must follow the original factory configuration.

Troubleshooting charts for the inverter modules are within the supplementary inverter manual.

Battery 'float voltage' should be 13.5 – 13.8 VDC for nominal 12 volt systems. Higher voltages will be observed for 'bulk' and 'absorb' stages for preset time periods after a recharger restart, but should not exceed 15.5 except very briefly. Nominal 24 and 48 volts systems will be 27 - 27.6 and 54 – 55.2 respectively.

Fault Mode Messages

The fault LED comes on and a fault status is displayed when an abnormal condition is detected. View the LCD display and the information in this section to determine and correct the issue. Many of the faults will automatically restart when the fault is cleared. Some faults will require a manual restart this requires the

ON/OFF INVERTER pushbutton on the panel to be pressed and released. Finally, if the fault is unable to clear, an inverter reset may be required

System Fault messages

These fault messages are usually caused by some external issue that directly affects the inverter/charger system. Low Battery appears on the LCD and the FAULT (red) LED is on. The PWR (green), CHG (green) and INV (green) LED's are off.

Low Battery

The inverter turned off to help prevent the batteries from being over-discharged. This message is displayed and the FAULT (red) LED illuminates when the battery voltage drops below the low battery setting for more than 1 minute. The inverter will automatically restart and resume operation when the battery voltage rises to 12.5 VDC (12-volt models), 25.0 VDC (24-volt models),

Remedy: This fault will also automatically restart if AC power (utility) is connected to the inverter/charger's input and battery charging begins.

High Battery

The inverter has turned off because the battery voltage is at a very high level. This fault message is displayed and the FAULT (red) LED will be on when the battery voltage is above the High Battery Cut-Out (HBCO) value. This fault will restart and resume operation when the battery voltage drops 0.3 VDC (12-volt models), or 0.6 VDC (24-volt models), below the HBCO value.

Overtemp

This fault message indicates the inverter/charger has shut down because the internal power components (FET's and/or Transformer) have exceeded their safe temperature operating range. When the unit has cooled down, it will automatically restart and continue operation. Remedy~ If the fault occurs while inverting, reduce the load on the inverter; if it occurs while charging, turn down the charge rate. If this fault happens often, ensure the inverter is not in a hot area, has proper ventilation and the cooling fans inside the inverter are working.

AC Overload

This fault message displays when the AC load on the inverter/charger's output has exceeded the inverters AC current protection limits. If the overload condition lasts for less than 10 seconds, the unit will automatically restart and resume operation. However, if the overload occurs for more than 10 seconds, the unit will shut down and will require a manual restart.

Remedy: This fault usually occurs because the connected AC loads are larger than inverter's output capacity, there is a wiring short on the output or the output wires are incorrectly wired. Once the AC loads are reduced or the output wiring is corrected; the inverter can be restarted after a manual restart has been accomplished.

AC Backfeed

This fault message causes the inverter to shutdown because AC voltage from an external AC source has been detected on the inverter's AC output. When the unit shutdowns because of this fault condition, an inverter reset will be required to resume operation

Remedy: This fault usually occurs because the AC output wiring is connected to (or able to be connected to) the incoming AC source. When this fault happens, all system wiring should be re-checked to ensure the incoming hot and/or neutral wires are not able to be connected to the AC output.

High Volts AC

This fault causes the charger to be disabled because a very high AC voltage (>150 VAC) has been detected on the AC input.

Remedy: Remove all AC power from the inverter's AC input for at least 15 minutes to automatically restart this fault; ensure only 12OVAC power is connected to each of the inverter's AC inputs.

Dead Battery Charge

This fault has detected a very discharged battery bank or a battery bank that is disconnected from the inverter. The unit is attempting to enter the charge mode, but has detected less than 7 volts (12-volt models), or 14 volts (for 24-volt models) on the battery bank. This fault will continue until current is able to flow into the battery from the battery charger. Once this happens, it will automatically restart. **Remedy:** Check the DC voltage on the inverter's DC terminals and compare it with the DC voltage on the battery bank. These two voltages should be very close (<0.5 VDC difference). If not, check to ensure all connections are tight.

Overcurrent

This fault causes the inverter to shutdown to protect internal power components and may be caused by an excessive AC load. If the overload condition lasts for less than 10 seconds, the unit will automatically restart and resume operation. However, if the overcurrent condition occurs more than 10 seconds, the unit will shut down and will require a manual restart.

Remedy: This fault usually occurs because the connected AC loads are larger than the inverter's output capacity, there is a wiring short on the AC output or the wires are incorrectly wired. Once the AC loads are reduced or the output wiring is corrected; manually restart the inverter to resume operation. If this fault condition continues after all these recommendation, perform an inverter reset.

FET Overload

This fault message indicates the inverter/charger has shut down because the internal FET's (Field Effect Transistor's) have quickly exceeded a safe operating temperature. When the FET's have cooled, the unit will require a manual restart to resume operation.

Remedy: If the fault continues to occur, disconnect all the inverter's AC output wires and test the inverter. If this fault does not clear after doing a reset, the inverter may require service.

Breaker Tripped

The inverter has detected that the AC input breaker on the inverter/charger has opened due to excess current flow thro the inverter to the AC loads. **Remedy:** After reducing the AC loads, push in the inverter's AC input circuit breaker to reset and resume operation. Note: While in charger mode, the inverter's AC input breaker could nuisance trip if the loads on the inverter's AC output exceed the current rating of this circuit breaker.

Unknown Fault

This fault message displays when the inverter/charger has sent an indeterminate code
Remedy: Call the Technical Support department at Magnum Energy or MEDI+Products.

Tfmr Overtemp

This fault message is displayed when the TCO (Temperature Cutout) opens and causes the inverter to shutdown to protect the internal power transformer from damage. When the TCO has cooled down, the inverter will automatically restart and resume operation. **Remedy:** If the fault occurs while inverting, reduce the load on the inverter. If it occurs while charging, turn down the charge rate. If this fault occurs often, ensure the inverter is in a cool location, has adequate ventilation and the internal cooling fans are operation

Fatal Error $

This fault message indicates that the panel's internal data addressing was unrecognizable; similar to a computer lock-up. **Remedy:** Reset the panel by disconnecting the panel communications cable from the rear of the panel control for 5 seconds and then reconnect. If the fault continues after resetting the control, the control requires service at an authorized Service facility.

Internal (fault)

There are a series of "internal" error messages. These require resetting the inverter.

Performing an Inverter Reset

These instructions are included for the benefit of qualified technicians:
Locate the reset pushbutton on the inverter/charger nearby the 120 VAC cable connectors. Press and hold the Power ON/OFF pushbutton (above the telecom jacks) for approximately fifteen (15) seconds until the Charging/Inverting Status LED comes on and flashes rapidly; once the rapid flashing has begun, release the Power ON/OFF pushbutton. The Status LED will go off after the pushbutton is released. After the inverter reset is completed, press the ON/OFF pushbutton to turn the inverter ON.

Powering-down the Inverter

1. Remove all AC power (utility or generator power) to the inverter.
2. Disconnect the positive battery cable to the inverter, or disconnect the large grey 350 amp DC cable connector.
3. Ensure the inverter and remote control are disconnected from all AC
and DC power (the remote display will be blank). After the inverter has been disconnected from all power for 30 seconds, re- connect the positive battery cable and resume operation. There may be a momentary spark when the positive battery cable is connected to the inverter's terminal; this is normal and indicates that the inverter's internal capacitors are being charged.

Testing Procedures

Testing your emergency power system is a requirement in order to conform to Federal, State, NFPA and other accreditation and regulatory standards. Every Surgery Center both large and small must implement and carry out regular testing of their backup generator and emergency battery backup power system.

Medi-Products sets out the following guidelines and instructions that must be understood and implemented for the use and dependence on our battery backup generators.

Weekly, Monthly and 3 Year load tests must be performed, recorded and documented. The following criteria must be followed in order to complete each test:

Weekly Testing:

The recommended weekly test is a quick and simple test which assures the functionality of the transfer switch, auto-invert and charge mode.

This test is performed by disconnecting the power that feeds the battery backup unit or if your system is a mobile system, unplug its power cord. Upon disconnecting the feed power, your system should switch over to invert mode and draw its power from the batteries.

After you have ensured that your system has switched over and inverting, you will need to restore the feed power (or re-plug the system in for mobile system). Be sure to insure that the system switches back to charge mode and be sure that auto invert is switched back off.

Monthly Testing:

The monthly test is a load test that needs to be conducted no sooner than 20 days and no longer than 40 days from the prior (monthly) load test. This test is to ensure the generator can put out 30% of its name plate capacity for 30 minutes. The following loads should be used for each of the following listed models:

System Size (watts)	Recommended Load Size	Recommended Load Amps @ 120 volt
2000	600	5
2500	750	6.25
2800	840	7
3000	900	7.5
3100	930	7.75
4000	1200	10
4400	1320	11
8800	2640	22

It is important that these monthly tests are performed for no longer than 30 minutes and the load is as close to the recommended size for your system as possible.

Another important issue to take note of is that it is possible to over test your power system. Medi-Products battery backup systems consist of AGM batteries, if they are discharged to frequently or discharged too deeply it can cause damage to batteries, shorting their life expectancy and weakening them.

Record all the testing data on the test record sheet provided by Medi-Products.

3 Year Load Testing:

This test is to ensure that your system can provide enough power for its intended use. It is important to understand that each system is generally sized to meet predetermined design criteria that pertains to a list of necessary equipment that requires power in the event of a power outage. The primary objective of this test must be to ensure that the system is able to meet the needs of an anticipated emergency situation.

Disconnect the supply power to the system and run the equipment that would be necessary in the event of a power failure, enacting a live power outage during a procedure. This test should last up to 2 hours or the duration of the longest procedure that is practiced at the location. Record the equipment that was powered and the duration that the system was supplying power to it.

When the procedure is over restore power to the system and recharge the battery bank.

Record Keeping:

Recording these tests is important for the protection of your practice, and also is credible in the eyes of the state and accreditation agencies. You can use our test logs that are in our service manuals and on our download from our website.

Facility Name: _____

Emergency Power System – Monthly Test Log

System Model:_____ Serial Number: _____ Battery Replacement Due:_____

Standby kW nameplate rating: _____ 30% of standby rating = _____ Batteries Last Replaced: _____

	Time Started	Time Finished	Battery Voltage	Load (watts/amps)	Tested By:	Comments	Status
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							

Installation & Startup

INSTALLATION NOTES

The REASSURANCE system is shipped fully assembled and ready to use. If shipped via LTL, use care removing from the shipping skid.

BATTERY INSTALLATION & REPLACEMENT

Batteries should be replaced every 4 or 5 years. Battery replacements should be of the same size and type as those originally provided and can be ordered from MEDI-PRODUCTS.

DO NOT USE LIQUID CELL OR AUTOMOTIVE BATTERIES. ALL BATTERIES MUST BE REPLACED TOGETHER AT THE SAME TIME AND CONNECTED AS SUPPLIED BY MEDI-PRODUCTS. Call 203-348-2886 with any questions.

Caution: Batteries cannot be 'turned off' – they are always 'on'. Use care to NEVER allow any conductive tool to touch + and – simultaneously. Some models anso have the battery negative to be 'bonded to the cabinet. The use of insulating tape is recommended.

1. Turn all breakers/switches off, or unplug and remove battery covers.

2. If replacing existing batteries disconnect the gray connector that connects the batteries to the Inverter, if you model does not have a connector, simply start by removing the red inverter cable first.

3. Models 'MD' : To increase access space above the batteries, consider removing 6 nuts/bolts – three each side of the inverter/battery shelf. Using a 15" long prop, the upper section can be 'hinged' upward and supported with the prop.

4. After the inverter is disconnected remove from the batteries all battery cables. (Make sure you take special note of how the cables were routed) and remove all the batteries.

5. Un-package all the batteries and insert them into the battery compartments, making sure they are fully inserted.

WARNING:

CABLE REVERSAL WILL DESTROY THE INVERTER IMMEDIATELY AND WILL VOID THE WARRANTY.

PLEASE TAKE EXTRA CARE BEFORE POWERING SYSTEM WHEN REPLACING ORD INSTALLING BATTERIES

6. Please take note of the battery (DC) voltage that your model number requires. Check the required voltage for your model number listed on the next page. Once you have identified the voltage your system requires please refer to the cable configuration chart to find identify how the battery cables should be installed.

7. Install the battery cables carefully. As the final battery connection is made a significant spark may be noticed. This is normal. PLEASE USE EYE PROTECTION.

8. Reinstall all the cabinet covers and cabinet bolts and test the that the system is inverting by momentarily disconnecting the power supply to check the transfer switch action.

9. Once you have finished the installation and tested the systems momentarily, charge overnight before using.

START-UP NOTES

Before turning on main power, the batteries must be installed

Before plugging in, briefly activate the system by pressing the INVERTER touch-pad on the front panel or switch to 'Auto Invert' as applicable..

Verify that the system is producing power. A motorized tool is a good test device.

If all is well, AC power can now be connected. The normal response will be for the battery charger to become active. After a moment, this will be indicated by a hum and indicator lights illuminating. If this does not happen press the CHARGER touch pad if present on your system.

Automatic power transfer can now be tested by applying a load and briefly disconnecting the AC power, observing that the load is sustained.

It should not necessarily be expected that the output voltage will measure 120 VAC on most multimeters unless a pure-sinewave system is being installed; 90-100 VAC is more typical. The reason for this is that the inverted power is not a "pure" sine waveform which most meters are designed to measure. Please be assured that the Root-Mean-Squared voltage is equivalent to that of the utility and the RMS voltage is the basis for calculating power. Occasionally there may be a compatibility problem with a particular item, in which case the owner should contact MEDI+Products. Any device that does not immediately operate should not be repeatedly tried - to minimize the rare possibility of damage. At the same time it should also be understood that there is a load-hunting mode in the inverter system which may or may not be activated to minimize unnecessary discharge should the system be automatically activated by a power failure when there is no load. This load-hunting action may cause a slight delay in turning on the first load item.
If the owner desires to turn this feature on or off, please contact MEDI+Products or the Inverter booklet.

Before departing, the installer should restore AC power and toggle the POWER button till the indicator light in the power button is off. Unless a Full-time Load is being supported. (When the INV light is off or flashing the system will not activate upon power failure.)

The owner should devise his own testing regimen based on his particular needs and familiarize himself with the equipment and the testing instructions included elsewhere in this manual.

WARRANTY ACTIVATION FORM

MEDI-PRODUCTS warrants that your **REASSURANCE** Emergency Power System is assembled using high quality components and workmanship and is free of defects in material and workmanship. This warranty shall remain in effect for one (1) year from the date of original consumer purchase of the inverter. Warranty on the batteries is pro-rated over 30 months.

THIS WARRANTY DOES NOT COVER:

1) Replacement parts or labor furnished by anyone other than MEDI-PRODUCTS approved service agent. (All approved agents should be licensed electricians or bio-medical technicians or as specifically approved.)

2) Defects or damage caused by labor furnished by someone other than MEDI-PRODUCTS or approved service agent.

3) Any malfunction or failure of this product while it is in the possession of the owner during the warranty period if the malfunction or failure is not caused by a defect in material and workmanship of MEDI-PRODUCTS or if the malfunction or failure is caused by unreasonable use, including the failure to verify the equipment's utility and usefulness prior to emergency conditions.

4) Normal battery depletion.

ALSO:

1) This warranty is non-transferable to other owners of the product during the warranty period without the express written consent of MEDI-PRODUCTS.

2) MEDI-PRODUCTS reserves the rights to repair, replace, or allow credit for any material returned under this warranty. Any damage caused by the customer will be charged or deducted from this allowance.

3) All warranty work will be performed at MEDI-PRODUCTS factory, or using a valid Warranty Authorization Number (WAN) prior to repair. Products shall be delivered to MEDI-PRODUCTS factory freight prepaid and fully insured.

The inverter manufacturer's owner's manual is provided. The owner should become conversant with it and also with this owner's manual. Before operating your SILENT SENTRY™ be sure to read these safety instructions.

TO INITIATE YOUR WARRANTY PLEASE COMPLETE THIS FORM AND RETURN WITHIN 30 DAYS

It is recommended that you keep a copy of this activation form for your own records.

Model Number:	_____	Serial Number:	_____
Date of installation:	_____	Facility Name:	_____
Contact Name:	_____	Phone Number:	_____
Fax Number:	_____	Email Address:	_____

Address where System is installed:_____

Complete and fax to 203-487-7423

Products by: Medicanix Inc.

Stamford CT 06902

(800) 937-3724

Fax: (203) 487-7423

Email: service@medicanix.net

MEDI+PRODUCTS

BACK-UP POWER SYSTEMS