



Questions and Answers

Question: How do I charge the battery?

Answer: Plug the battery charger accessory included with your analyzer into the charger input on the rear panel and plug the mains cord into the charger unit and into mains power. The charge-status LED, visible from the rear panel, will glow red to indicate the battery is charging. The LED will turn green when charging is complete. A full recharge takes approximately four hours or less.

Question: The charge-status LED on the rear panel does not glow red when I plug in the charger. What's wrong?

Answer: If the Impulse 6000D/7000DP is turned on, make sure the "Charge Battery" setting is set to "Yes" on the "Set Up: Battery" screen (refer to the operating manual for details). If the Impulse 6000D/7000DP unit is turned off, the LED should glow red when the external charger is connected correctly and mains power is present.

Question: The charge-status LED blinks red continuously. What does this mean?

Answer: A blinking red charge-status LED indicates a pending charge and should normally last a few seconds before turning solid red. If the blinking continues, the battery-charging circuit has determined that conditions are not correct to initiate the battery-charging cycle. The battery will not be charged if the battery temperature is too cold or too hot. The battery should be charged in an ambient temperature of 10° C to 40° C (50° F to 104° F)

Also, the battery will not be charged if the battery voltage is too low, which can happen if the Impulse 6000/7000DP has been stored for an extended period of time with a fully-discharged battery. In the "Charge Pending" mode, the battery-charging circuit charges the battery at a low rate, which will eventually bring the battery voltage high enough for the normal charge cycle to begin.

Question: On the "Set Up: Battery" screen, the battery charge level remains at "Power = 50 %" even after charging the battery for a few hours. What's wrong?

Answer: On the Impulse 6000D/7000DP, the internal battery pack contains a gas-gauge IC that monitors the battery-charge level. This gas-gauge IC reports the charge level as one of sixteen levels, from 0 % to 100 %. The Impulse 6000D/7000DP reports the battery-charge level in 5 % steps, from 0 % to 100 %. Therefore, five of the 5 % steps aren't used (15 %, 35 %, 50 %, 70 %, and 90 %). The "Power = 50%" message is an indication that the microprocessor was unable to communicate with the battery pack. If this message persists, the battery pack is probably defective.

Question: After charging my unit completely (until the Charge Status LED turns green), the battery charge level still indicates less than 100 %. What's wrong? How do I get the charge level to read 100 %?



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Answer: The answer to this question is somewhat counterintuitive. Battery pack gas-gauge ICs, such as the one used in the Impulse 6000D/7000DP, use a complex algorithm to estimate battery-charge state, taking into account time, temperature, and current flow. The self-discharge estimation (i.e., how much charge the battery loses over time during periods of non-use, sometimes called "shelf-life") is particularly sensitive to battery chemistry, and the shelf-life of today's NiMH cells is significantly longer than the algorithm built into the gas-gauge ICs can accommodate.

When an Impulse 6000D/7000DP is left idle for a few weeks and then powered-on, the battery charge level might be reported as 55 % when the true charge level might be 80 %. If the battery is then completely charged, which requires a 20 % increase in battery charge level, the charge level is only reported as 75 % (55 % plus 20 %).

To correct the reported charge level, use the "Train Battery" feature. To access this feature, press the [SETUP] key, then the [F1] softkey (labeled "Battery"), then press the [F3] softkey (labeled "Train Battery"), then follow the instructions presented on the screen. This procedure can take overnight to complete.

Question: **Is it OK to leave my Impulse 6000D/7000DP unit connected to the battery charger when not in use?**

Answer: Yes. Actually, to keep the reported battery charge level as accurate as possible during extended periods of non-use, it is recommended that the Impulse 6000D/7000DP be left connected to mains power via the battery charger with the unit powered off, in an ambient temperature of 15° C to 26° C (60° F to 78° F). This will continuously trickle-charge the battery (the charge-status LED on the rear panel will be green) to keep both the actual and estimated battery charge level at 100 %.

If the Impulse 6000D/7000DP cannot be kept connected to the battery charger during periods of non-use, the battery should be charged at least once a month. A unit with a discharged battery that is stored for an extended period of time will result in the battery becoming over-discharged, which is likely to result in permanent damage to the battery.

Question: **Should I drain the battery completely before charging my Impulse 6000D/7000DP unit?**

Answer: This is not necessary. The battery does not exhibit a "memory effect". After multiple partial charge-discharge cycles, or if the unit is unused for an extended period of time without the charger active, the battery level indication may become



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inaccurate (i.e., out-of-sync with the actual battery charge level). Completely discharging the unit before charging it will resynchronize the battery charge level indication.

Question: Can I always count on getting nine hours of continuous battery operation on a fully-charged battery?

Answer:

- Age of battery pack. The battery pack will lose some charge capacity over time.
- Use of the backlight display function. This option discharges the battery pack faster.
- Operating the unit at the upper end of the specified operating temperature range, causing the internal fan to power on more often. This may especially be observed with multiple, rapid, high-energy defibrillator pulse discharges into the unit.

Question: Will the battery need to be replaced at some point?

Answer:

Yes. The manufacturer of the NiMH battery cells used in the Impulse 6000D/7000DP specifies a typical loss of 10 % of battery charge after 500 charge-discharge cycles, which is approximately two years of daily use. Battery charge capacity also degrades with time, so even a seldom-used unit will lose some battery charge capacity. The Impulse 6000D/7000DP battery power feature was designed conservatively to maximize the probability of the battery pack performing satisfactorily well beyond two years.

Question: Can I replace the battery myself?

Answer:

No. Replacement of the battery pack in the Impulse 6000D/7000DP requires disassembly of the unit. Impulse 6000D/7000DP owners who send their units to a Fluke Biomedical Authorized Service Center for periodic calibration may want to consider requesting replacement of the battery pack as preventative maintenance, which can be performed for a nominal charge.

Question: Does the condition of the battery affect the calibration/specifications of the unit?

Answer:

The Impulse 6000D/7000DP was designed and tested to meet all its performance specifications at any battery-charge level when operating from mains power or when operating from mains power while charging the battery.

Question: Can I use a different battery charger than the one supplied with the unit?

Answer:

No. For safe and reliable operation, the battery charger supplied with the Impulse 6000D/7000DP MUST be used when operating from mains power, or when operating and charging the battery at the same time.



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Question: I own another Fluke product that came with a 12 V automotive ("cigarette lighter") adapter that fits the DC input jack on my Impulse 6000D/7000DP. Can I use this adapter to operate or charge the Impulse 6000D/7000DP from a 12 V vehicle battery?

Answer: No. For safe and reliable operation, the battery charger MUST have a good earth ground when connected to the Impulse 6000D/7000DP, and vehicle electrical systems inherently lack an earth ground. For battery charging only (with the Impulse 6000D/7000DP turned off, and no other connections to the Impulse 6000D/7000DP unit other than at the charger input jack), attempting to charge from a 12 V vehicle gives inconsistent results and therefore cannot be recommended.

Question: Can I operate or charge my Impulse 6000D/7000DP from a 12 V vehicle battery using an AC inverter to power the charger that came with my Impulse 6000D/7000DP unit?

Answer: No. For safe and reliable operation, the battery charger MUST have a good earth ground when connected to the Impulse 6000D/7000DP, and vehicle electrical systems inherently lack an earth ground. For battery charging only (with the Impulse 6000D/7000DP turned off, and no other connections to the Impulse 6000D/7000DP unit other than at the charger input jack), using a DC-to-AC inverter to power the battery charger may yield consistent battery charging, depending on the quality of the inverter used. As of this writing, Fluke Biomedical cannot recommend the use of a DC-to-AC inverter for battery-charging-only use with the Impulse 6000D/7000DP.