LiveAmp runtime dependencies and expectations

This article explains the runtimes that can be expected with various LiveAmp setups in order to avoid potential frustration from customers. Often, we receive feedback from customers who are using combinations that use a lot of power, who are not aware of the implications and are then surprised by an unexpected low battery warning. To manage these expectations, we summarize the factors that contribute to such low runtimes and give some tips on how to avoid draining the battery unnecessarily soon.

Many customers may not be entirely aware of the factors that contribute to unexpectedly low LiveAmp battery runtimes. To better communicate potential problems, we have already updated the manual to give a better idea, but we also want to provide you with more details here, so you know how to handle potential feedback or requests.

Manual update

Between manual v021 to v022, we made the following changes.

v021

Power supply	Built-in rechargeable battery Capacity: 1,000 mAh.
Current consumption	Max. 250 mA
Charging time	Approx. 4 hours at 500 mA (for example, USB port of a computer)
Uninterrupted recording time with built-in battery (when fully charged)	› 3 hours (wireless data transfer only and passive electrodes) › 4.5 hours (storage on memory card only and passive electrodes)
Battery Type	Lithium ion cobalt battery

v022

Power supply	Built-in rechargeable battery Capacity: 1000 mAh.
Current consumption	▶ Typical use (wireless recording with active electrodes at a sampling rate of 500 Hz): approximately 250 mA ▶ Value can vary between lower current (for example, passive electrodes with SD recording only) or higher current (for example, impedance check with active electrodes, or powering an STE compact by the LiveAmp) ▶ Maximum (during charging): 500 mA
Charging time	Approximately 4 hours at 500 mA (for example, USB port of a computer)
Uninterrupted recording time with built-in battery (when fully charged)	Approximately 4 h when recording to an SD card with passive electrodes at a sampling rate of ≤ 500 Hz. Wireless recording (especially in unstable wireless connection setups) and the use of active electrodes (especially during long impedance checks) can significantly reduce the run time.
Battery Type	Lithium ion cobalt battery

Instead of the vague statements “> 3 hours” or “> 4.5 hours”, we now provide more realistic values and factors that can contribute to lower times. We also added information to the current consumption, listing especially draining combinations such as the impedance check with active electrodes.

This alone should already give a good idea of where to be careful.

Contributing factors

In addition, we ran some measurements with different setups, to provide an even better overview of the contributing factors. To summarize, these are the main factors that can affect the runtime:

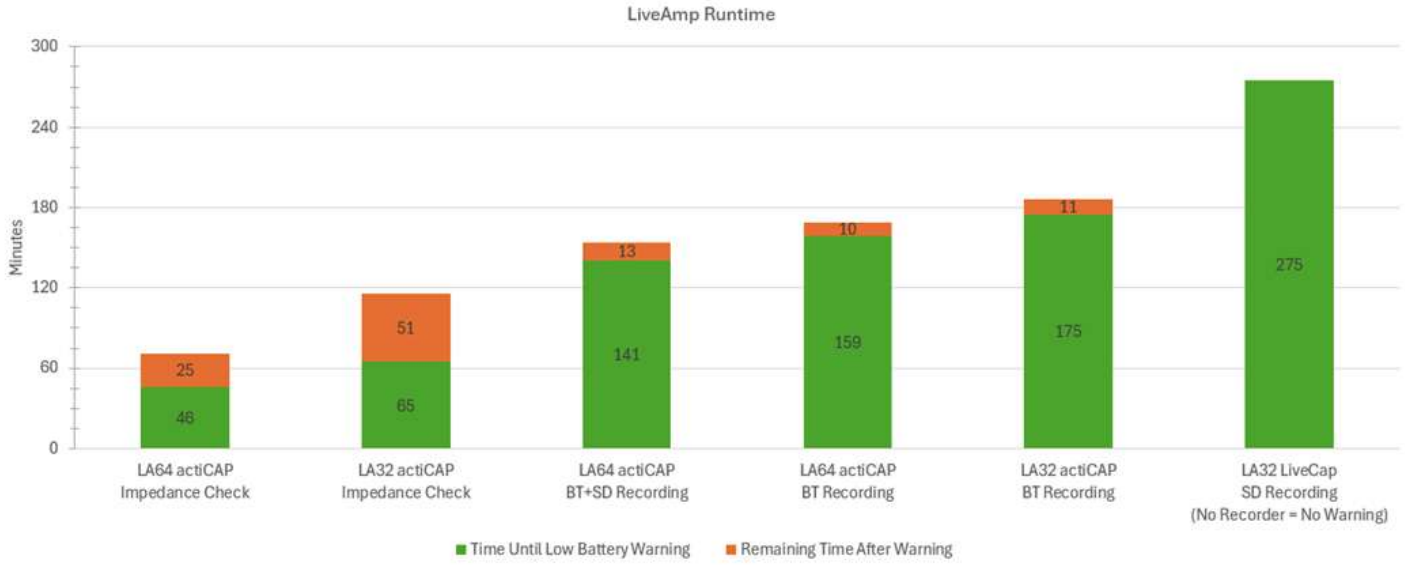
- Electrode type: **Active electrodes** use more power than passive electrodes.
- Operation mode**: Impedance check** uses more power than monitoring or recording, especially for active electrodes.
- Sampling rate: A higher **sampling rate** uses more power than a lower sampling rate.
- Transmission/Recording mode: **Wireless** uses more power than SD recording. A combination of wireless and SD recording uses even more power.
- Setup size/channel number: **LiveAmp64** uses more power than LiveAmp32.
- Data compression: **Noisy data** uses more power than clean data because clean data can get compressed more efficiently before transmission.
- Transmission stability: **Unstable** wireless connection uses more power than a stable connection because the signal strength increases after a disconnect.
- Age: **Older LiveAmps** with heavily used batteries degrade over time and have less remaining capacity.
- Damage: **Damaged** actiCAP electrodes (e.g., water damaged/short-circuited) use more power than undamaged electrodes.

Of course, combining several factors from above can severely decrease the run time even more, as the individual factors are adding to the total effect. For example, running extensive impedance measurements with active electrode in a 64-channel setup will use a lot of power.

In these cases, we highly recommend connecting an external power source and/or keeping the impedance measurements short. Instead of measuring impedances while preparing all the electrodes steps by step, it is better to first prepare all electrodes and only then check the impedance at the very end.

A further relevant detail is that the battery low warning can occur relatively early in impedance checks, which gives the impression of even lower runtimes. In actual recording mode, the battery low warning appears much closer to the realistic end of capacity.

Please see some runtime measurements of realistic conditions in the following graph:



We hope that these details help managing expectations and give you better estimates on what to expect with different setups.