

# G450 / G460 Battery pack performance and maintenance procedures

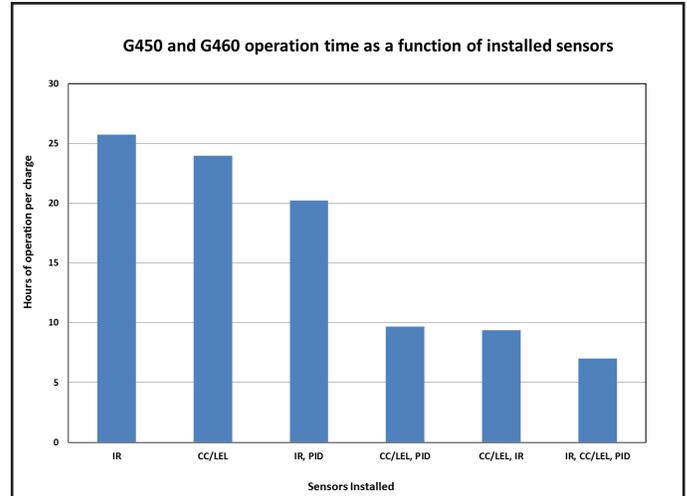


**G50 and G460 rechargeable (NiMH) battery packs provide outstanding operation time, cycle life and low temperature performance. Periodic deep discharge ensures the best possible performance.**

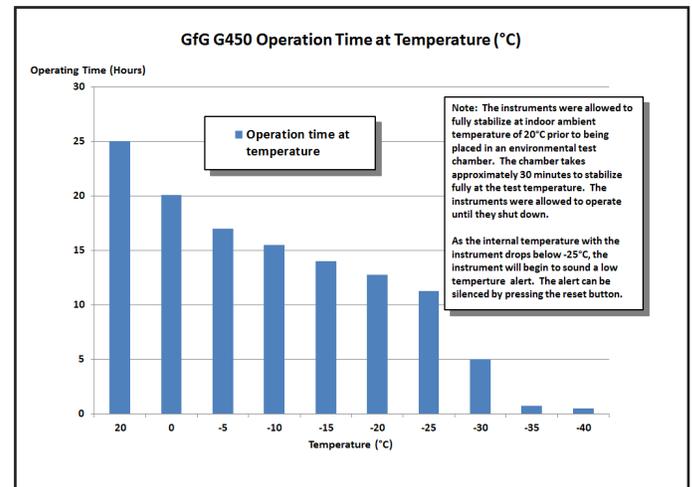
Interchangeable G450 and G460 rechargeable nickel-metal hydride (NiMH) and alkaline battery packs are designed to provide up to 25 hours of continuous operation. NiMH batteries provide excellent cycle life and low temperature performance, and are warranted for 2-years. The typical G450 run-time after two years with a properly maintained NiMH battery pack is usually around 16 hours.

Some types of sensors require more power than others. The highest power consuming sensors are photoionization detector (PID) sensors, followed by standard catalytic LEL sensors and infrared (IR) sensors. The power requirements for oxygen and electrochemical toxic sensors (e.g. CO, H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub>, etc.) are so low that they do not materially affect the instrument run time.

The following chart shows the expected run-times per charge (or set of batteries) for various heavy-power sensor configurations. All configurations include O<sub>2</sub> and CO/H<sub>2</sub>S sensors as well as the listed "high power" sensors.



The temperature can also have an effect on the operation time of the instrument. While high temperatures up to 122°F (50°C) do not have an effect on operation time, in very cold temperatures the operation time becomes shortened. Alkaline batteries should be avoided when operating temperatures are below 32°F (0°C). NiMH battery packs provide excellent low temperature performance down to -4°F (-20°C), and can be used for short periods of time down to -40°F (-40°C). The following chart shows the expected run times for a G450 equipped with a rechargeable NiMH battery pack and standard LEL, O<sub>2</sub>, CO and H<sub>2</sub>S sensors in various temperature conditions:



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NiMH battery packs are designed to last for hundreds of charging cycles without losing capacity, but can be damaged if the charging system allows the batteries to overheat. GfG "Smart Chargers" are sophisticated devices with their own microprocessor and charging software. The charger maintains continuous communication with the instrument and the installed battery pack throughout the charging process. To avoid damage due to overheating, GfG "Smart Chargers" use a two-stage process. When the instrument is initially placed in the cradle the charger starts out in the fast charging mode. The charger will continue in the fast charging mode until the battery pack reaches 90% of its full charge condition (or until the charger verifies that the battery is already fully charged). Once fast charging is complete the charger continues in trickle charge mode. The instrument display indicates how long the instrument has been in fast charging mode, and if fast charging is complete, how long the instrument has been in trickle charging mode.

**Completely discharged batteries may require up to 6 hours to reach the trickle charge stage. Instruments should be left on the charger for at least 2 hours in trickle mode AFTER fast charging is complete to reach 100% full charge capacity.**

GfG "Smart Chargers" are available in single (DIC1) and double (DIC2) versions. DIC1 "single" charger cradles are designed to charge the instrument only. DIC2 "double" cradles simultaneously charge both the instrument and the MP-2 motorized pump.

The chargers can be used with 110 - 240 VAC power, or can be used with an optional 12 VDC vehicle charging system.



• **G450 / G460 Charging Cycle**

The green LED in the "single" charger cradle indicates power. A solid amber LED indicates fast charging. A flashing amber LED indicates trickle charging. The instrument display indicates how long the instrument has been in each stage of the cycle.



**Solid amber LED indicates fast charging, a flashing amber LED indicates trickle charge mode.**

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Rechargeable battery packs are black



Alkaline battery packs are gray

- **Changing battery packs**

Use the included tool, or any 2 mm hex key wrench to loosen and remove the two screws securing the battery pack to front of the instrument housing, then **GENTLY** remove the battery pack from the instrument.



Only use fingers when removing the battery pack from the instrument. Never use a screwdriver or other hard tool to remove the battery pack!



Make sure that the vibrator (the flat disc on the top of the battery pack ) is at the top when the battery pack is reinserted into the instrument, then reinstall and tighten the screws. Do not force when inserting the pack into the housing! Make sure screws are secure but do not overtighten!

- **Voltage depression due to over-charging**

NiMH batteries do not develop “memories”, however, if they are not exercised they may become “lazy.” Even though the normal amount of power is stored the battery, the peak voltage in “lazy” batteries drops more quickly than usual. The proper technical name for this condition is “voltage depression.”

Voltage depression is caused by the formation of small crystals of electrolyte on the plates, increasing resistance and lowering the voltage of some individual cells in the battery. To the user it appears the battery is not holding its full charge; to the instrument



the rapid drop in voltage indicates that the batteries are about to run out of energy.

Exercising the battery by putting it through a deep-discharge cycle can break down the crystals, and improve or restore the run time of the instrument.

- **Avoiding or reducing voltage depression**

The best way to avoid or reduce reduced operating time because of voltage depression is to avoid over charging the battery pack!

The instrument should not be left continuously charging in the charger cradle for more than 2 weeks at a time.

The instrument display indicates how long the instrument has been charging. If the display indicates the instrument has been charging for more than 14 days, remove the instrument from the charger, or disconnect the cradle from power.

The NiMH cells in the battery pack lose very little power while the instrument is turned off. The battery pack in a fully charged instrument should provide 90% or more of its normal operation time for a month or longer when the instrument is stored away from the charger.

- **“Anti-lazy battery” deep-discharge cycle**

Fully charged instruments that fail to operate for the expected time should be exercised by means of the “anti lazy battery” deep discharge cycle. Instruments that are left on the charger for prolonged periods between use may benefit from being exercised by being deep discharged on a quarterly basis.

To take full advantage of the latest anti-lazy battery options it is also necessary to have the latest version charger cradle and power adapter. Charger cradle and power adapters sold prior to October, 2011 can be updated at the GfG factory in Ann Arbor to the latest configuration. Charger cradles sold since October, 2011 are already equipped with the latest version hardware and software.



To perform or schedule an “Anti-lazy battery” deep discharge cycle:

1. Press and hold down “Reset” button until the “Main menu” choices appear, then select “Options.” The “Options” choice is used to adjust display contrast, alarm loudness or activate the “Anti Lazy Battery” deep-discharge cycle.



2. From the “Options Menu” choose “Anti-Lazy-Battery.”



3. To perform a one-time deep discharge cycle for NiMH battery pack, press “Change.” This will activate the deep discharge feature on a one-time basis. The display will show “1X” instead of “Off.”



4. Press “Exit” to return G450 to normal operation. **DO NOT TURN THE INSTRUMENT OFF!** When the power remaining in the battery drops below the “low battery” threshold, instead of sounding the normal alarms, the display will show the “Anti-Lazy-Batt. running” status message.

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5. Allow the instrument to run until the battery is completely drained, then recharge it normally, or **AFTER** the battery icon shows it is down to last 10%, place instrument in the charger cradle.
6. The instrument will display the “Anti Lazy Battery” status message, and continue to discharge the battery while it is in the charger. When the deep discharge is complete the one time (1X) anti-lazy battery cycle is cancelled, and the instrument is recharged in the normal way.



**Note:** If you place the instrument in the charger before the battery icon shows it is down to the last 10% remaining voltage, the instrument will turn off, cancel the deep-discharge cycle, and begin recharging in the normal charging mode!

- **Other “Anti-lazy battery” cycle options**

It is possible to program the instrument so the deep discharge cycle is always automatically activated whenever the instrument is placed in the charger when the battery is below 10% remaining voltage.

From “Options” menu choose “Anti-Lazy-Battery” then press “Change” to activate the one-time deep discharge cycle (the display will show “1X” ). Press “Change” again to choose “Days,” then press “Exit” to return to normal operation.



Once the “Days” choice has been activated, anytime the instrument is placed in the charger when there is less than 10% remaining voltage the deep discharge cycle will be activated automatically.

- **Limiting automatic deep discharge cycle to certain days**

Since deep-discharge can take up to 20 hours to complete, it may be advisable to limit automatic deep-discharge to certain days of the week (i.e. enabling the feature for Fridays to give the instrument a full weekend to complete discharging and recharging).

Press the “down arrow” key to highlight the “Anti-Lazy days” choice, then press “Change.” The instrument will display the days of the week. Select the desired days for the automatic activation of this feature, then “Exit” to return to normal operation.

