windynation

GC10 10A Golf Cart Solar Charge Controller
CHC-GC10-48

User's Manual

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1 INTRODUCTION

The WindyNation GC10 Golf Cart Solar Charge Controller provides an intelligent solution for charging 36 and 48-volt golf cart battery systems, suitable for outdoor usage.

The controller can charge 36V or 48V DC battery banks using MPPT boost technology which allows standard 12 volt solar panels to be used for a highly efficient and battery-friendly charge control.

Built in protection includes overvoltage, short circuit, reverse polarity, PV panel reverse current, over charging, and over temperature protection. In the event of a short circuit or overload event, the system will be protected and remain undamaged.

Read this manual carefully before installing or using the controller and keep it for future reference.

1.1 FEATURES

- ✓ Compact size can be mounted conspicuously
- ✓ Intelligent BOOST Charging of 36V or 48V battery banks with 12 Volt panel
- ✓ Maintains batteries and extends battery life
- ✓ Suitable for 36V or 48V golf cart systems
- ✓ IP67 Rated Suitable for Outdoor Use
- ✓ Compatible with all battery types including gel, sealed, lithium
- ✓ Pre-wired MC4 compatible connector for easy panel install
- ✓ Pre-terminated battery connection with 3/8" ring terminals
- ✓ Built-in overload and short circuit protection
- ✓ Automatic self-recovery after fault removal
- ✓ LED system status indicators
- ✓ Wide operating temperature range -25˚C to +55˚C (-13˚F to +131˚F)
- ✓ Optional Wireless Bluetooth adapter for monitoring and provisioning
- ✓ Throttled input current to allow for additional solar input

1.2 SAFETY INFORMATION

Please read the installation and operating instructions carefully prior to use. Pay special attention to the **IMPORTANT** and **WARNING** statements in the manual.

WARNING:

Never install during a lightning storm or where unsafe voltages are present.

Solar panels produce power when exposed to light. Shade solar panels whenever solar panel wires are exposed.

Do not use with equipment that exceeds the rated power for this device.

1.3 SPECIFICATIONS

1.3.1 Electrical Specifications

Parameter	CHC-GC10-48
Rated Charge Current	10 Amps
Typical Idle Consumption	At idle < 20mA
Maximum Solar Input Voltage	42V DC
Battery System Voltage	36V DC or 48V DC
Battery Type	All Lead Acid (default) and Lithium
Float Charging Voltage	41.4V DC 55.2V DC
Boost Charging Voltage	43.2V DC 57.6V DC
Equalizing Charging Voltage	43.8V DC 58.4V DC
Equalizing Charge Interval	30 days (NA for Li battery)
Overvoltage Protection	48.0V DC 64.0V DC
Charging Conversion Efficiency	90-97%
MPPT Tracking Rate	>99%
MPPT Working Voltage Point	14-25V

1.3.2 Physical Specifications

Parameter	Value
Dimension (H x W x D)	3.94" (100mm) x 3.94" (100mm) x 1.18" (30mm)
Unit Weight	5.3 oz. (150g)
Operating Temperature	-25˚C to +55˚C (-13˚F to +131˚F)
Environmental Protection	IP67
Connection Wires	SOLAR: 5" (125mm); 14 AWG w/ MC4 Connect BATTERY: 18" (450mm); 14 AWG w/ 3/8" Lugs

2 INSTALLATION

IMPORTANT: Insure all terminating connections are clean and tight to prevent arcing and overheating.

## 2.1 ELECTROSTATIC (ESD) PRECAUTIONS

All electronic circuits may be damaged by static electricity. To minimize the likelihood of electrostatic damage, discharge yourself by touching an electrical ground (e.g.: copper pipe) prior to handling the unit. The risk of electrostatic damage is highest when relative humidity is below 40%.

2.2 MOUNTING

Mounting is optional as long as the controller is stabilized to prevent physical damage that may occur during transportation.

The controller can be mounted vertical or horizontal on any flat surface and should be located as close as possible to the batteries. In most cases, the controller may be placed inside the battery compartment of the golf cart for ease of use and installation.
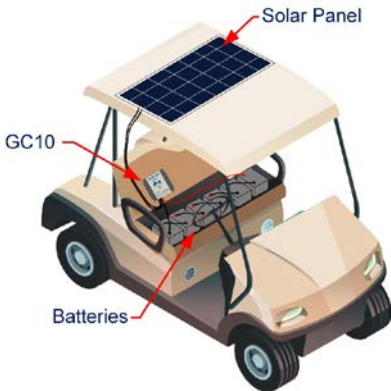
2.3 CONNECTIONS

WARNING: Loose connectors result in excessive voltage drop and may over heat wires, which can cause the wire insulation to melt. This can cause electrical fires. Verify all connections are secure and have no voltage drop.

IMPORTANT: A 15-amp fuse needs to be placed in the positive wire connecting the charge controller to the battery and the positive wire connecting the charge controller to the solar panel (s).

1)   Connect the Battery
Connect the charge controller to the battery BEFORE connecting the solar panels to the charge controller. The battery output wires are pre-terminated with 3/8" lugs for easy connection to battery terminals. Depending on the application, the lugs may be removed and different connectors can be used (eg: alligator clips). Be sure to note the polarity of each terminal; the charge controller self-protection feature will prevent damage from

reverse polarity connections, but the charge controller will not function until the battery is connected properly.

2)   Connect the Solar Panel (PV) Array

The controller solar wires are pre-terminated with MC4 compatible connectors for an easy connection. Be sure to note the polarity of each terminal; the charge controller self-protection feature will prevent damage from reverse polarity connections, but the charge controller will not charge the batteries until the PV Array is connected properly.
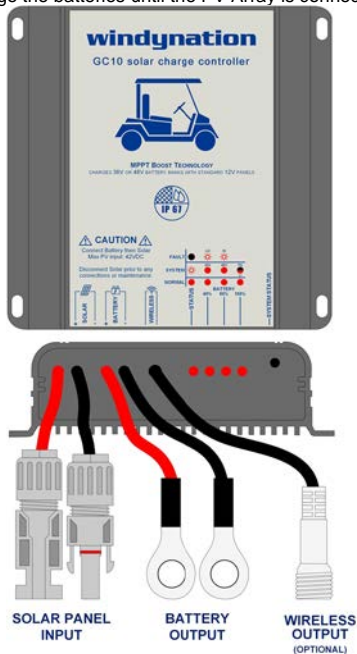
WARNING: High voltages may be present on the solar panel output wiring. Solar panels produce electricity when exposed to light. Make sure the solar panels are placed in the shade and are NOT in direct sunlight. Use caution and avoid touching any conductors in the system circuit to avoid electric shock.

2.4 PARALLEL CONNECTIONS

Multiple controllers can be installed in parallel on the same battery bank to achieve higher charging current. For example, connecting two units in parallel can allow for 20 amps of charging current as shown below.
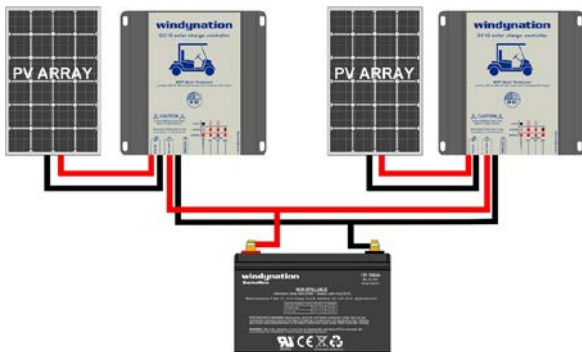
2.5 WIRELESS COMMUNICATION ADAPTER (OPTIONAL)

Windy Nation offers an optional Bluetooth wireless adapter (CHC-GC10-WL) that allows the user to monitor and configure the system from up to 50 feet away using a downloadable application on any smartphone or tablet (Android and Apple operating systems) with Bluetooth capabilities. The wireless transmitter comes with a 5" [125mm] connection cable and mounting ears.


2.5.1 Physical Specifications

Parameter	Value
Dimension (H x W x D)	1.4" (36.2mm) x 3.0" (76mm) x 0.6" (15mm)

Unit Weight	1.0 oz. (29g)
Mounting	Surface mount using key hole
Enclosure Protection Class	IP67
Operating Temperature	-4°F to 167°F (-20°C to 75°C)
Power Consumption	<14mA (operating) / <11mA (standby)
Signal Range	49' (15m)

2.5.2 Adapter Installation

Mount the wireless adapter (CHC-GC10-WL) on any flat surface near the GC10 controller. Join the male threaded connection housing on the adapter into the female threaded connection on the wireless cable of the controller as shown below. The wireless port on the controller will provide power to the wireless adapter.
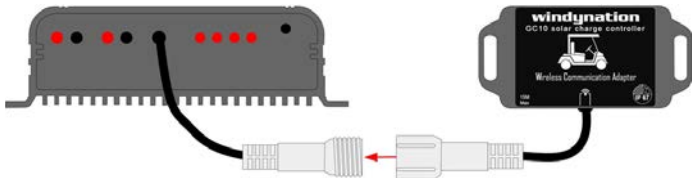


2.5.3 Application Set-Up

IMPORTANT: WindyNation did not develop the compatible application.

1. Download the free application from the App store directly to your smartphone.
-   Android System: go to Google Play Store and search "PVChargePro":
-   IOS System: Go to Apple app Store and search "PVChargePro":

PV Charge Pro

2. Be sure Bluetooth is enabled on your smartphone and open the application. The Main Screen "Real-Time Monitoring" will open
    a. Select the "+" icon in the top right corner to open the BT Scan List
    b. Once the wireless adapter is found, it will appear as "CHC-GC10-48", select the device and click the "Con" button
    c. Upon successful connection, the Real-time monitoring values will update to reflect the status of the controller.
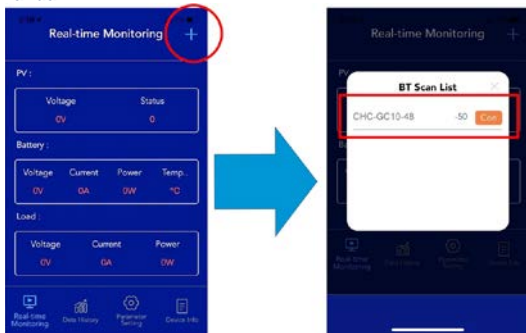
2.5.4   Application Use

The application features four functional areas: Real-time Monitoring, Data History, Parameter Setting, and Device Info. Each area is selectable using the associated icon at the bottom of the application

IMPORTANT: The GC10 does NOT have a LOAD connection. Although the app shows the LOAD parameters and readings, these fields are not applicable to the GC10.

2.5.4.1   Real-time Monitoring

Select the "Real-time Monitoring" icon from the bottom of the application screen to see real-time performance of the Solar Panel and Battery.

2.5.4.2   Data History

Select the "Data History" icon from the bottom of the application screen to see historical performance logged by the controller. You can view previous days records as shown.

Previous Days Data ← | → Next Days Data
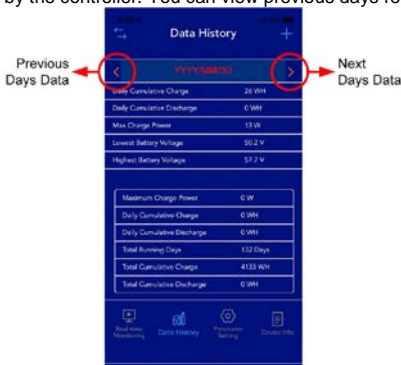
2.5.4.3   Parameter Setting

Select the "Parameter Setting" icon from the bottom of the application screen to view and edit the various parameters set on the controller.

Once in the Parameter Setting interface, click the "Setting" button, enter the password: **123456** into the password field, and select "Confirm" as shown below:
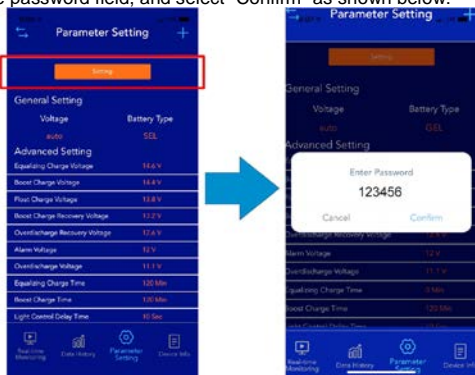
There are two "General Setting" adjustable categories: Battery Voltage and Battery Type, where all other parameters are only available with "User" Battery Type.

Each field is selectable by tapping the field on the app as shown below:
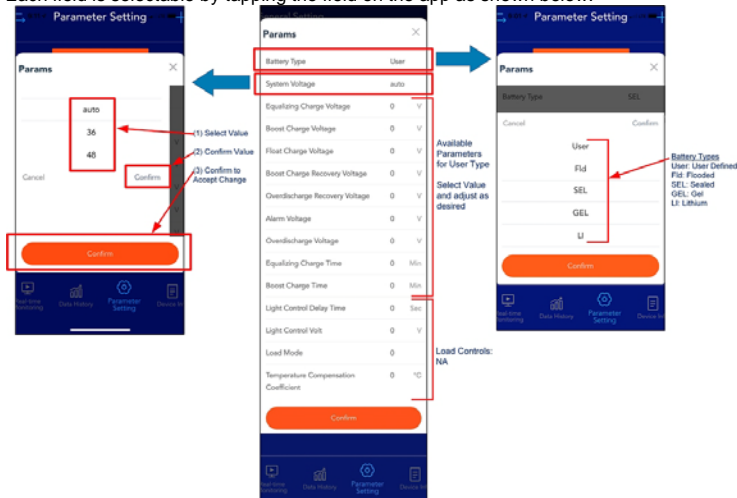
To change the value, select the desired value, tap the first confirm button, and then the second confirm button to accept the changes.

All changes require the admin password to be entered on the app, which is **123456**

The successful entry of the password and/or parameter change will be acknowledged within the app.

2.5.4.4   Configuring a 36 Volt Battery

The controller will default to 48 volts. For 36-volt golf carts, select the parameter setting and proceed as follows:

1. Tap Battery Type, select "User", tap the first confirm button, and then the second confirm button to accept the changes.
2. Tap System Voltage, select "36", tap the first confirm button, and then the second confirm button to accept the changes, see image below
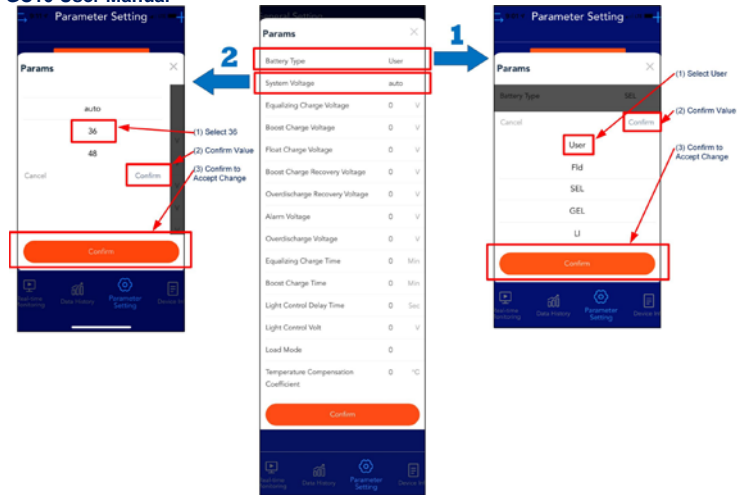
3. Once back at the Parameter Settings tap the final "Confirm" button
4. Ensure the settings are correct; see image below:
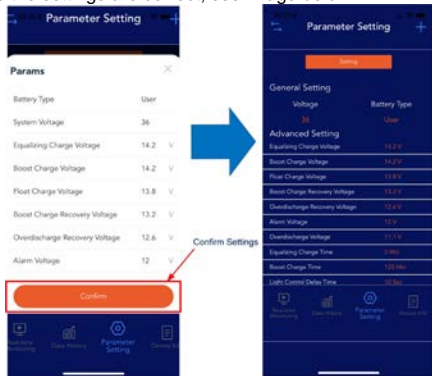
2.5.4.5 Device Info

Select the "Device Info" icon from the bottom of the application screen to view the currently connected device and the current application version.

The Controller Factory Default settings can also be reset by pressing the "Set To Factory Settings" button as shown below.

3 OPERATION

3.1 POWER

Once properly connected to a battery and solar panel array, the charge controller will immediately begin operating and the STATUS LED should light.

3.2 LED INDICATORS

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On the bottom of the controller are four LEDs and a pushbutton switch. The first LED is the status LED and the following three LEDs are indicator LEDs.

3.2.1 Status LED

The STATUS LED will identify to the user which mode the INDICATOR LEDs are in (Normal, System, Fault). The default mode is Normal, where the STATUS LED will be solid red and the INDICATOR LEDs will display the Battery Charge Level as shown in the LED Table, available in Section 3.2.4.

When the STATUS LED is not lit, this indicates a fault mode, and the INDICATOR LEDs will display the current fault detected as shown in the LED Table, available in Section 3.2.4.

If the STATUS LED is blinking red, this indicates the controller is in System Mode, where the INDICATOR LEDs are displaying Battery Information as shown in the LED Table, available in Section 3.2.4.

3.2.2 Indicator LEDs

There are three INDICATOR LEDs, which depending on the mode of the controller will provide additional information regarding the Battery Voltage from normal mode, Battery information when in system mode, and the fault condition when in fault mode.

If any INDICATOR LED is flashing when in normal mode, this indicates the battery is currently charging to the next level.

3.2.3 Status Switch

The user can change the mode to "System" by pressing the STATUS SWITCH once, which will change the INDICATOR LEDs to display the current battery type and associated system charging voltage (36 or 48 volts); after 10 seconds, the indicator LEDs will return to NORMAL mode.

3.2.4 LED Table

MODE	STATUS LED	INDICATOR LEDs			Description
		1	2	3	
NORMAL (Default)	Solid Red	OFF	OFF	OFF	Battery level is below 40%
		Flash Red	Flash Red	Flash Red	Any LED Flash = Charging
		Solid Red	OFF	OFF	Battery level is above 40%
		Solid Red	Solid Red	OFF	Battery level is above 80%
		Solid Red	Solid Red	Solid Red	Battery is Charged
SYSTEM	Flash Red	Solid Red	OFF	-	System Voltage = 36 V
		OFF	Solid Red	-	System Voltage = 48 V
		-	-	OFF	Battery Type is Lead Acid
		-	-	Solid Red	Battery Type is Lithium
FAULT	OFF	Flash Red	OFF	OFF	Battery over discharged
		OFF	Flash Red	OFF	Battery over voltage

4   TROUBLESHOOTING AND SUPPORT

The Controller requires minimal care. It is recommended to inspect all the connections at least two times per year for insulation damage or corrosion and to ensure all connections are tight and secure.

4.1 MAINTENANCE & CARE

- Clean the area around the controller of any dirt or debris with a cloth.
- Inspect for loose, broken, or burnt wire connections.
- Inspect batteries for cracked or bulging cases and corroded terminals.
- Make sure the PV array is clean and remove any debris.

4.2 TROUBLESHOOTING

Problem	Possible Remedies
The Status LED indicator doesn't light when the solar panel is exposed to sunlight.	1. Check if the solar panel cables are connected properly. 2. Check to make sure the battery is charged to at least 10VDC. 3. Check all wiring connections to make sure they are in their designated locations and make sure that there are no loose connections. 4. Measure the PV array open-circuit voltage and confirm it is within its normal limits.

4.3 SUPPORT

If you are experiencing technical problems, and cannot find a solution in this manual, you can contact Windy Nation Inc. for further assistance.

- Call: (805) 323-6445

- Email: support@windynation.com

- Write: 1404 Fleet Ave, Ventura, CA 93003

For challenging issues or to just ask a question, check out our FREE Community Forums! Consult our community of DIY'ers for fast answers to all your questions: http://www.windynation.com/community/