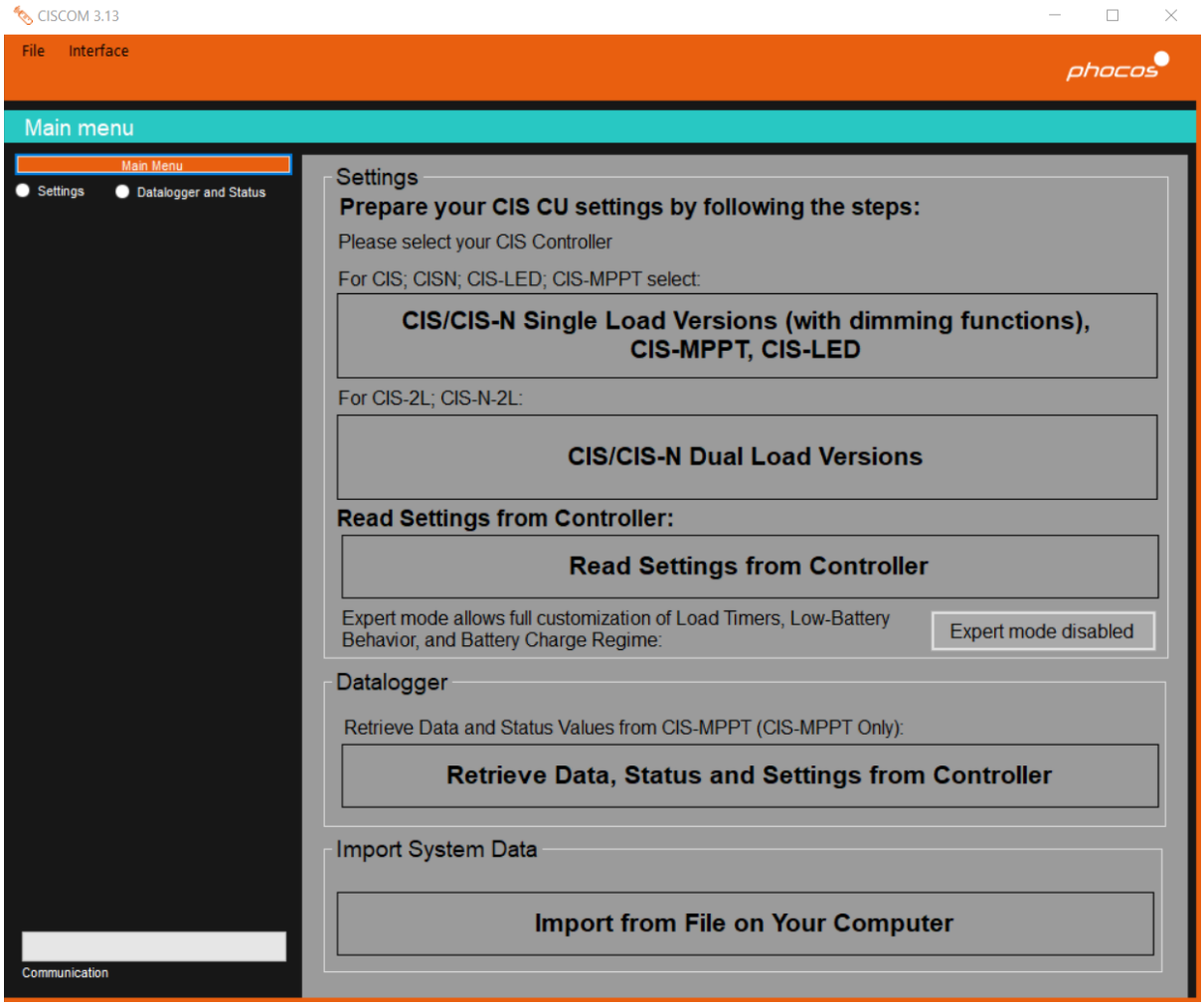
Phocos CISCOM

PC Software for Phocos CIS Family Solar Charge Controllers



Contents

1.0 Introduction

CISCOM software is a programming tool for CIS family solar charge controllers to adjust settings such as load control, battery charge profile, and low voltage disconnect. Additionally, CIS family MPPT controllers have datalogging, and data can be viewed through CISCOM.

CISCOM is intended for use with the MXI-IR programming accessory or to guide programming via CIS-CU remote control. Contact your Phocos sales representative for ordering information.

Features include:

- 2 modes, Non-Expert and Expert, offering easy to use preset profiles or full user customization
- Save settings files or datalogging files for sharing or troubleshooting
- Generate pictures of CIS-CU dials and switches from an easy to use graphical interface (Non-Expert mode only)
- Update firmware of CIS-MPPT-85/20 controllers
- Programmable 0..10V analog signal for compatible LED drivers with dimming
- Dimming settings triggered by time or low battery voltage
- Designed for Windows PC platform

2.0 IMPORTANT SAFETY INFORMATION

WARNING: Do not adjust settings in Expert Mode if you do not know the purpose or effect. Incorrect settings can damage batteries, cause excessive gassing, and create fire or explosion hazards.

CAUTION: Always follow the recommendations of your battery manufacturer.

IMPORTANT: Program all settings for a 12V battery. CIS charge controllers will automatically detect 12 or 24V batteries and automatically adjust settings for 24V systems.

3.0 Software Installation and Getting Started

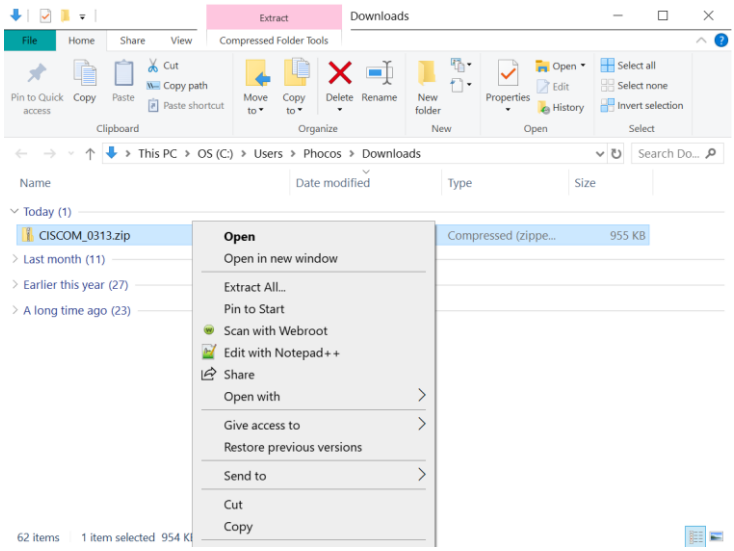
3.1 Installation

Follow these 3 steps to install CISCOM.

1) **Download** the latest version of CISCOM from www.phocos.com → Software Downloads.

2) **Extract** the files from the zip folder.

Right click on the zip file, and select "Extract All" from the menu.



3) **Run** the executable file, and follow the prompts in the dialogue boxes.

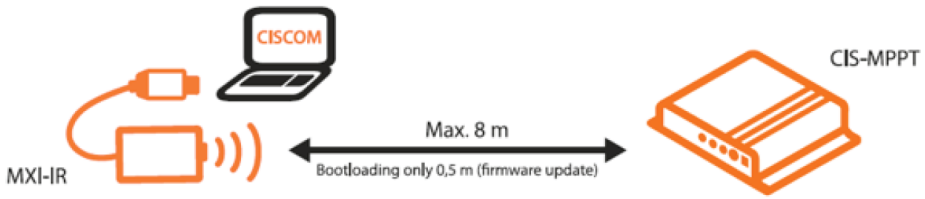
3.2 Getting Started with MXI-IR

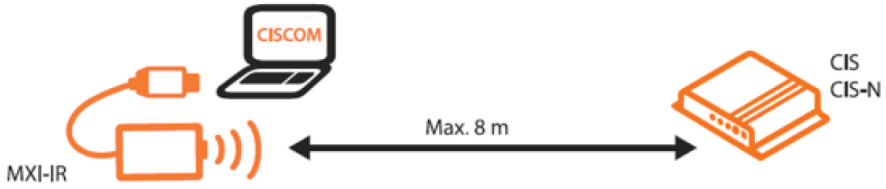
Follow these 5 steps to start using your MXI-IR with CISCOM.

1) **Connect** MXI-IR USB to computer.

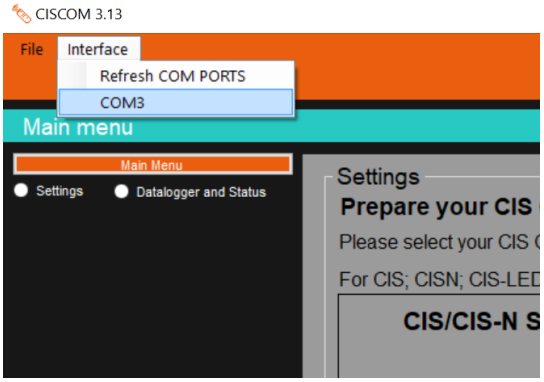
2) **Connect** your charge controller to battery power.

3) **Clear** a line of sight between the IR transceivers of the MXI-IR and charge controller, and ensure the distance is less than 8 m (25 ft).





4) **Select** the COM Port using the Interface Menu.



NOTE: If you see more than one COM option, check for the correct COM Port number using Windows Device Manager, or guess and test. Your COM Port number may be different than the picture. If no COM Port is available or if none of the options work, see the Troubleshooting Section, and follow the instructions for error code 1.

5) **Start** using CISCOM.

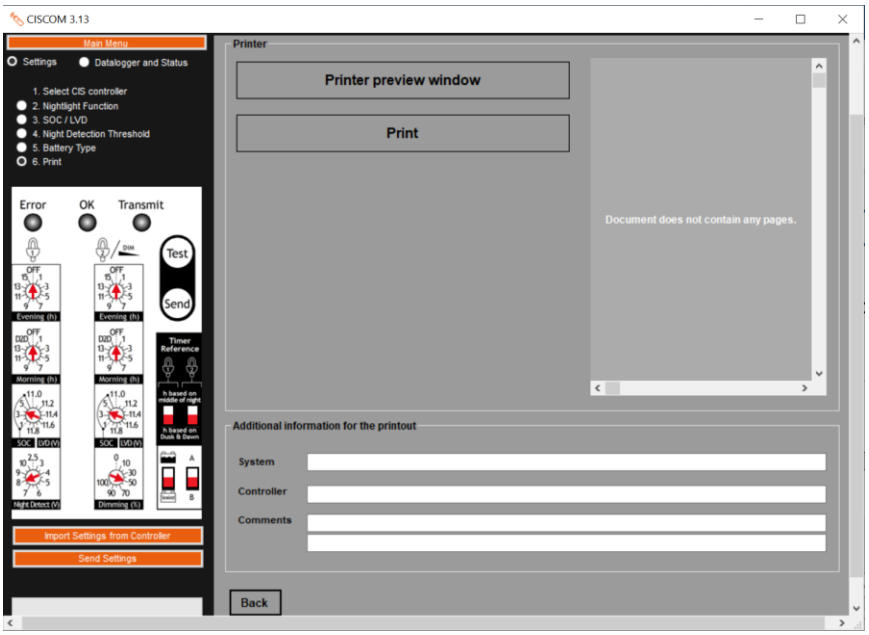
Read settings, retrieve data, or transmit settings using CISCOM menus and buttons.

3.3 Getting Started with CIS-CU

Follow these 5 steps to start using CISCOM to guide your programming with CIS-CU.

1) **Start** using CISCOM in Non-Expert mode.

Use CISCOM menus and buttons to select settings and to generate a picture of CIS-CU dials and switches. Optionally, use the print feature to print the CIS-CU picture for later use.



2) **Connect** your charge controller to battery power.

3) **Clear** a line of sight between the IR transceivers of the CIS-CU and charge controller, and ensure the distance is less than 8 m (25 ft).

4) **Adjust** your CIS-CU dials and switches according to CISCOM picture.

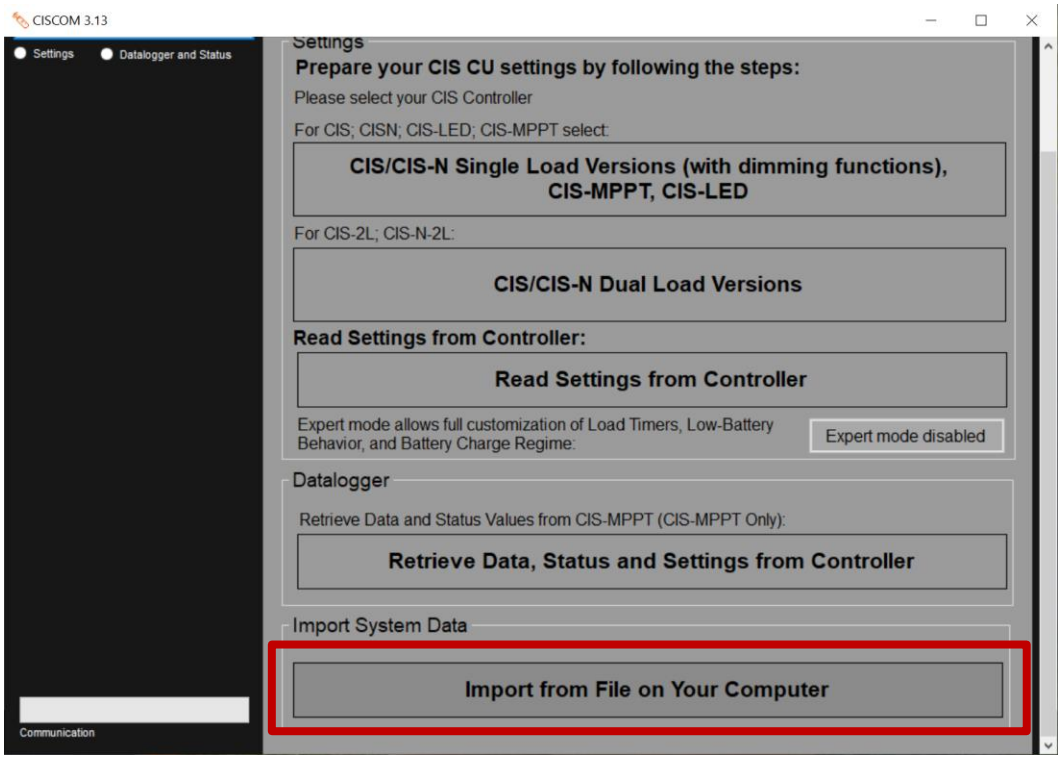
5) **Press "Send"** button of CIS-CU to transmit settings.

3.4 Getting Started without a Programming Accessory

Follow these 2 steps to import a settings file (.cis) or to view a datalogger file (.cisdl).

1) **Start** CISCOM.

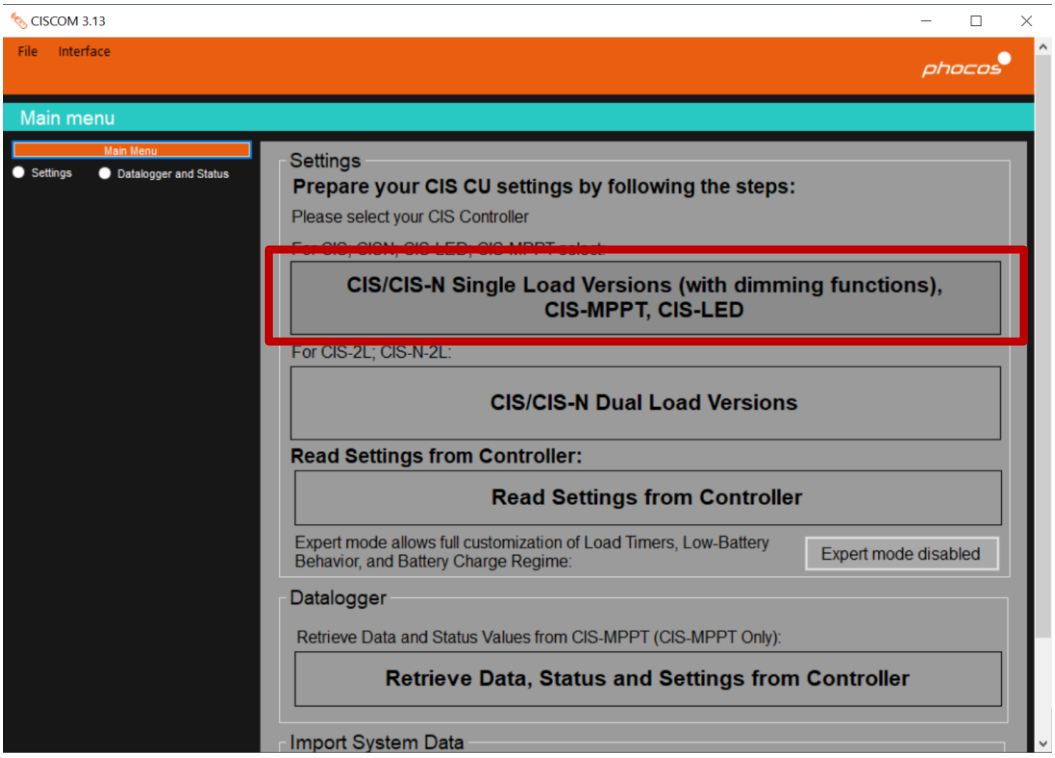
2) **Import** a cis or cisdl file by selecting "Import from File on Your Computer" button in the Main Menu.



Follow these 3 steps to program and save a settings file (.cis).

1) **Start** CISCOM.

2) **Program** a settings file in Non-Expert Mode by selecting "CIS/CIS-N Single Load Versions (with dimming functions), CIS-MPPT, CIS-LED" button in the Main Menu. For Expert Mode, see Section 5.0.



If you have a dual load controller (discontinued), then choose "CIS/CIS-N Dual Load Versions" button instead. These products can be identified by the 2 load wires and no thin black dimming wire.

4.0 Non-Expert Mode

Non-Expert Mode is appropriate for users who have lead acid batteries who may also want to use load programming and adjust low voltage disconnect (LVD) settings or dimming settings.

4.1 Nightlight Function

The Nightlight Function menu is used to program load on/off and dimming on/off controls based on time and reference points like dusk, dawn, or the middle of the night. Use the graphical aid to see the effect of settings changes.

Remember, CIS family controllers intelligently detect day and night based on solar PV voltage. If timer settings exceed the length of night at the install location, the daytime solar PV voltage will still cause the load to turn off.

NOTE: The slider bar for length of night does not control anything. Use the slider bar to see how nightlight settings will automatically adapt to seasonal changes in night length.

There are 3 settings modes available:

- **Standard Controller:** Load is on all the time
- **Dusk to Dawn:** Load turns on at dusk and off at dawn
- **Evening/Morning:** Load turns on at dusk and off at dawn with an off period in between

Rather than turning the light off, you can choose dimming instead, or choose a combination of dimming and off hours. These features save battery energy to avoid low voltage disconnect events caused by bad weather or aging batteries.

Dimming is only available for CIS family controllers that have built-in LED drivers, or when a CIS family controller dimming wire is connected to a compatible LED driver. For CIS controllers with built-in LED drivers, dimming is accomplished by pulse width modulation (PWM).

NOTE: Load disconnect events will override the load programming timers.

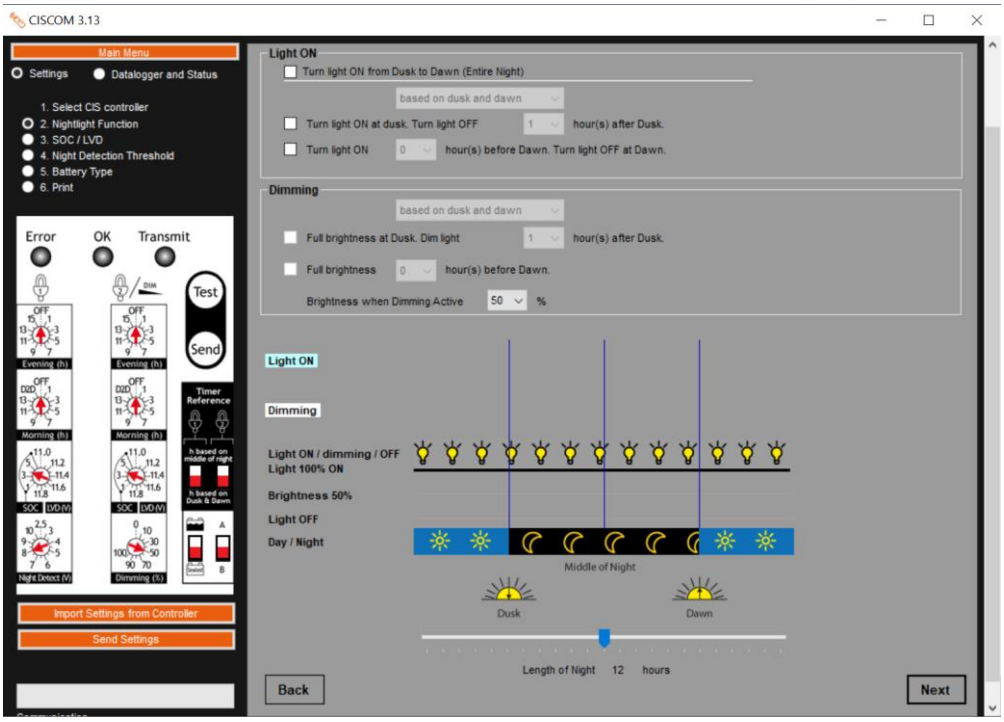


Figure 4.1: Nightlight Settings Menu, Non-Expert Mode, Standard Controller Settings

For Dusk to Dawn (D2D) mode, check the box for "Turn light ON from Dusk to Dawn (Entire Night)".

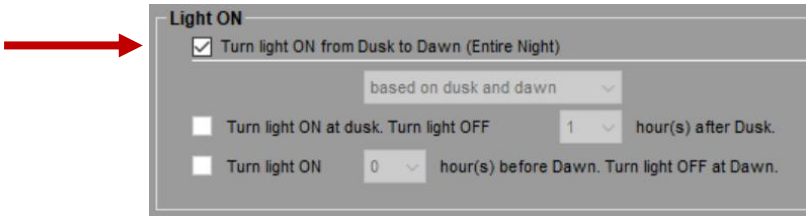


Figure 4.2: Dusk to Dawn checkbox selection

For Evening/Morning mode, check one or both boxes for "Turn light ON at dusk. Turn light OFF ___ hour(s) [reference]" or "Turn light ON ___ hour(s) [reference]. Turn light OFF at Dawn." Next, select your preferred time reference with the drop-down menu, either "based on dusk and dawn" or "based middle of the night". Next, select your preference of hours using the drop-down menus. Use the graphic and slider bar to see how the settings would be implemented.

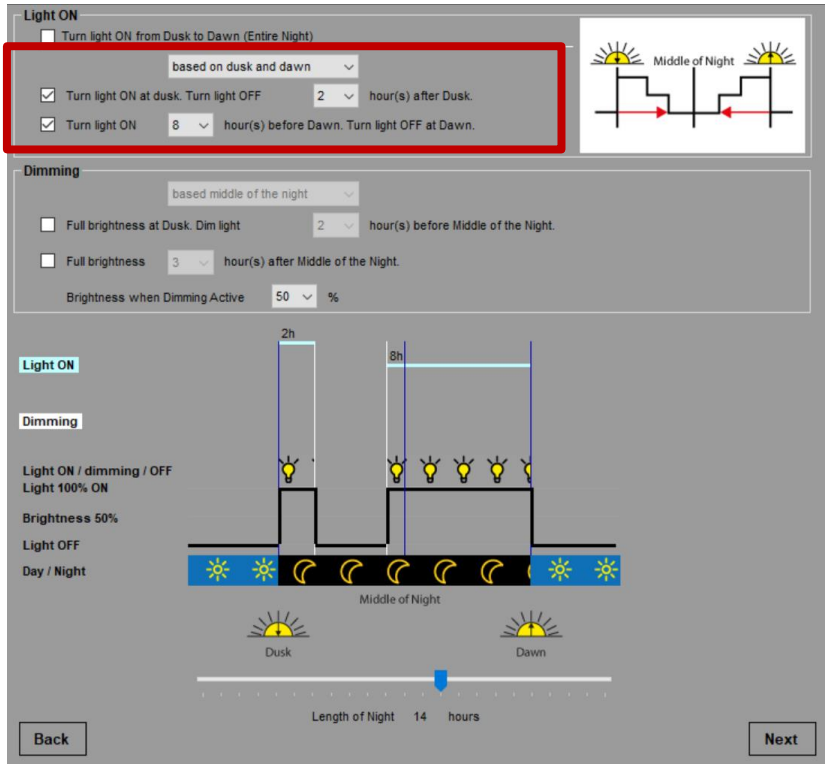


Figure 4.3: Evening/Morning Example with Dusk and Dawn Reference

In the above example, there will be no off time when the length of night is 10h or less.

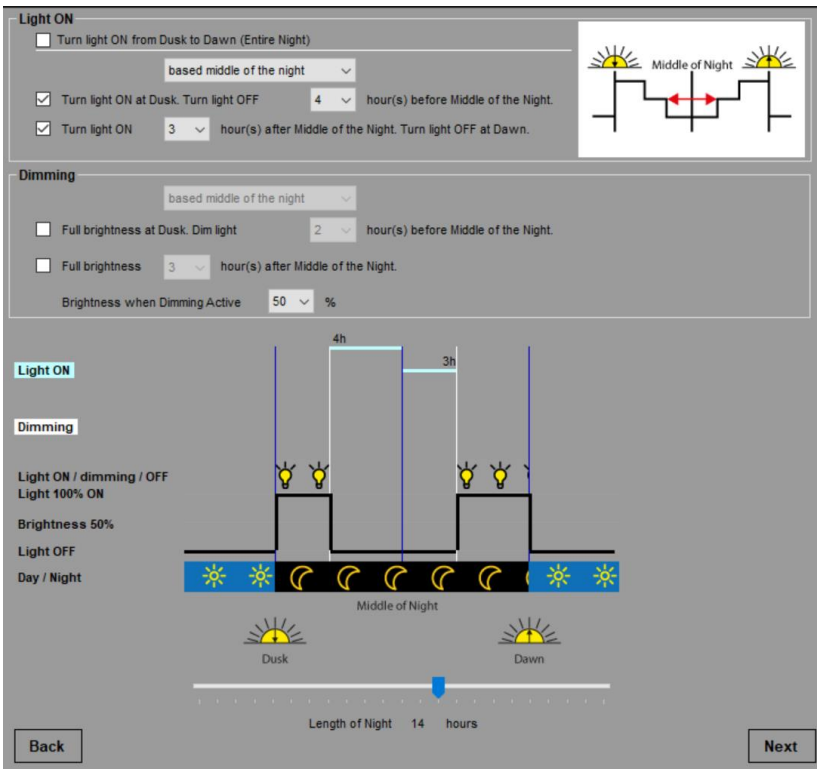


Figure 4.4: Evening/Morning Example with Middle of the Night Reference

In the above example, the load will not turn on if the length of night is 6h or less.

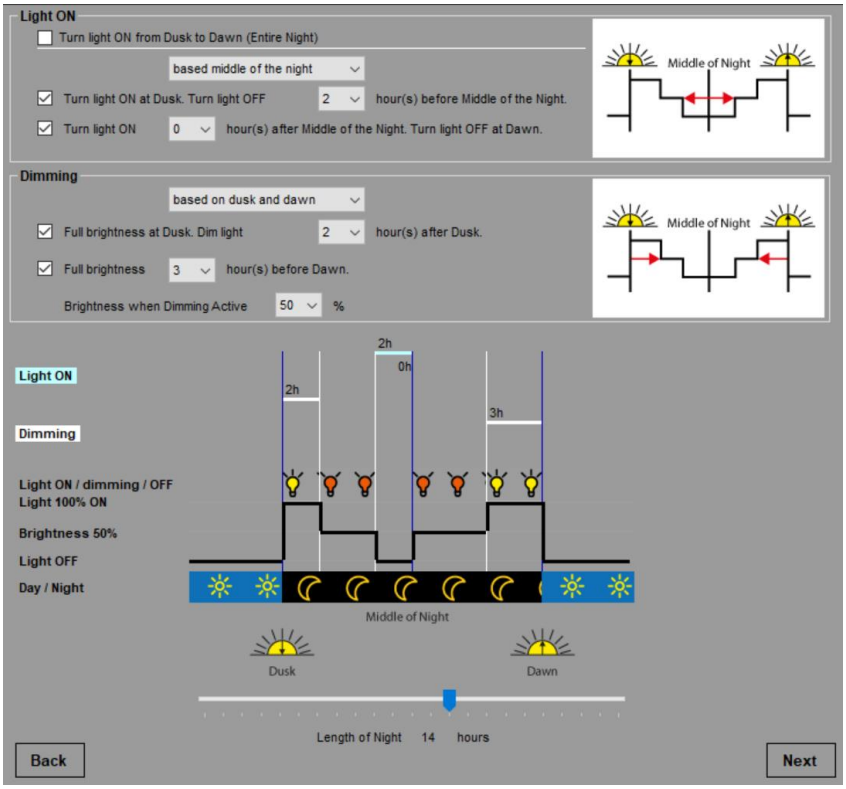


Figure 4.5: Evening/Morning Example with Different Reference Points for Load ON/OFF and Dimming ON/OFF

In the above example, if the length of night decreases, dimming time will decrease.

To adjust the dimming level, use the drop-down menu. At 100%, lights will be at full brightness when dimming is enabled. At 0%, lights will be off when dimming is enabled. There is a linear correspondence in between.

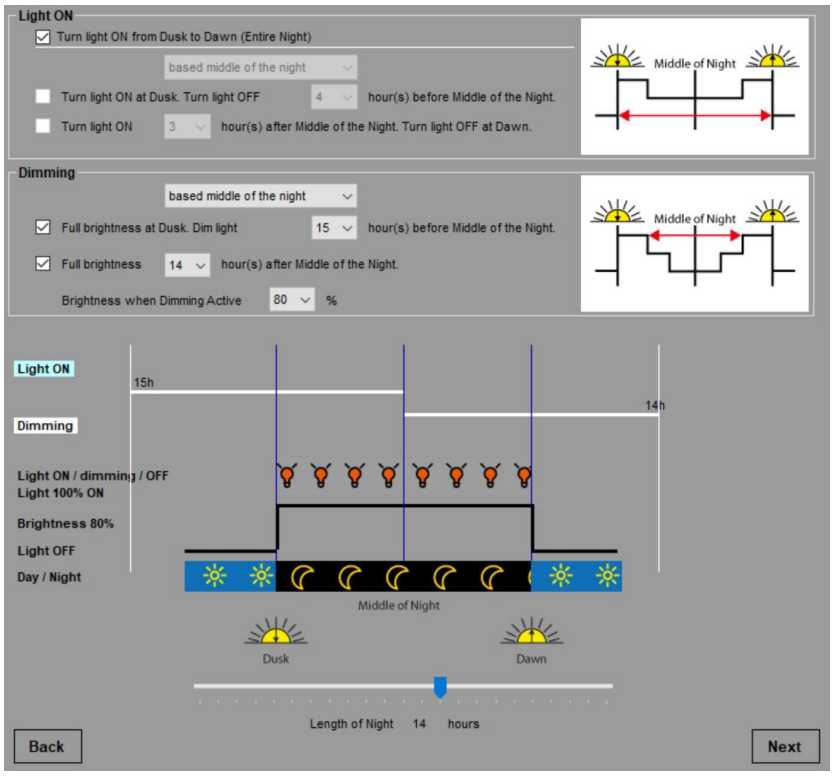


Figure 4.6: Dusk to Dawn with Dimming All Night

4.2 SOC / LVD

Low voltage disconnect (LVD) protects lead acid batteries from damage by preventing over discharge. Over discharge can lead to shortened battery lifespan.

Low voltage dimming extends run time of lights when the batteries are not fully charged due to bad weather or when batteries are aging and cannot hold a charge.

There are 2 modes of LVD and low voltage dimming:

- Voltage controlled
- State of Charge (SOC) controlled

Voltage controlled LVD considers battery voltage only. When the controller measures a battery voltage below the setting for a few minutes, it will disconnect (or dim) the load.

SOC controlled LVD considers battery voltage and load current. When load current is high, the controller will wait for a lower battery voltage before disconnecting (or dimming), and it will wait longer before disconnecting (or dimming). SOC settings are valuable because battery voltage alone is not a complete indicator of battery state of charge.

Battery voltage must be below the setting for longer than 2 minutes and up to 30 minutes for LVD or low voltage dimming to take effect. Low voltage dimming settings must be higher than LVD settings to take effect.

IMPORTANT: Program all settings for a 12V battery. CIS charge controllers will automatically detect 12 or 24V batteries and automatically adjust settings for 24V systems.

To determine when SOC settings will apply, you will need to know the load current consumption and the controller's load current rating. For example, CIS-N-MPPT-85/20 is rated for 20A. If a connected streetlight was consuming 14A, that would be 70%, or 0.7, of the controller's nominal current capacity. If SOC4 was selected, the graph below shows the battery voltage must drop below 11.55V for the controller to implement LVD. There is also a time delay.

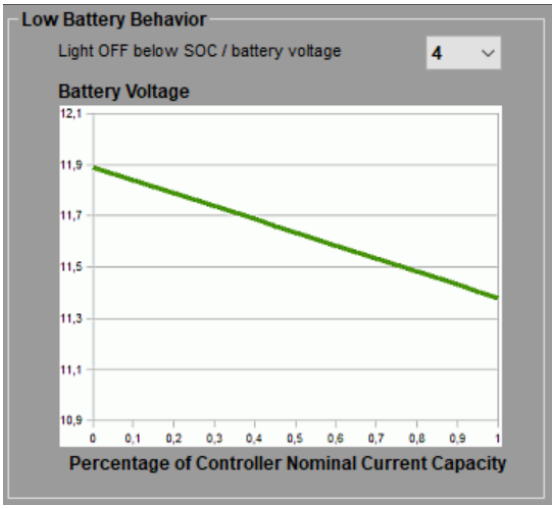


Figure 4.7: SOC4 Setting for LVD

4.3 Night Detection Threshold

As dusk turns to night, solar voltage drops to a very low level. As night turns into dawn, solar voltage increases from a low level up to levels that can be used for battery charging. CIS family charge controllers intelligently detect this change of state by utilizing the Night Detection Threshold setting.

Night Detection Threshold is only relevant for Dusk to Dawn or Evening/Morning load settings. Night Detection Threshold is the PV array open circuit voltage at which the controller will determine the night state. Night Detection Threshold + 1.5V is the level at which the controller will determine the day state.

Increasing the voltage means the load will turn on sooner at dusk and turn off later at dawn. Decreasing the voltage means the load will turn on later at dusk and turn off sooner at dawn. If this setting is too low and there is ambient light, then the controller might not be able to transition to night properly.

To change this setting, mark the checkbox and use the dropdown.

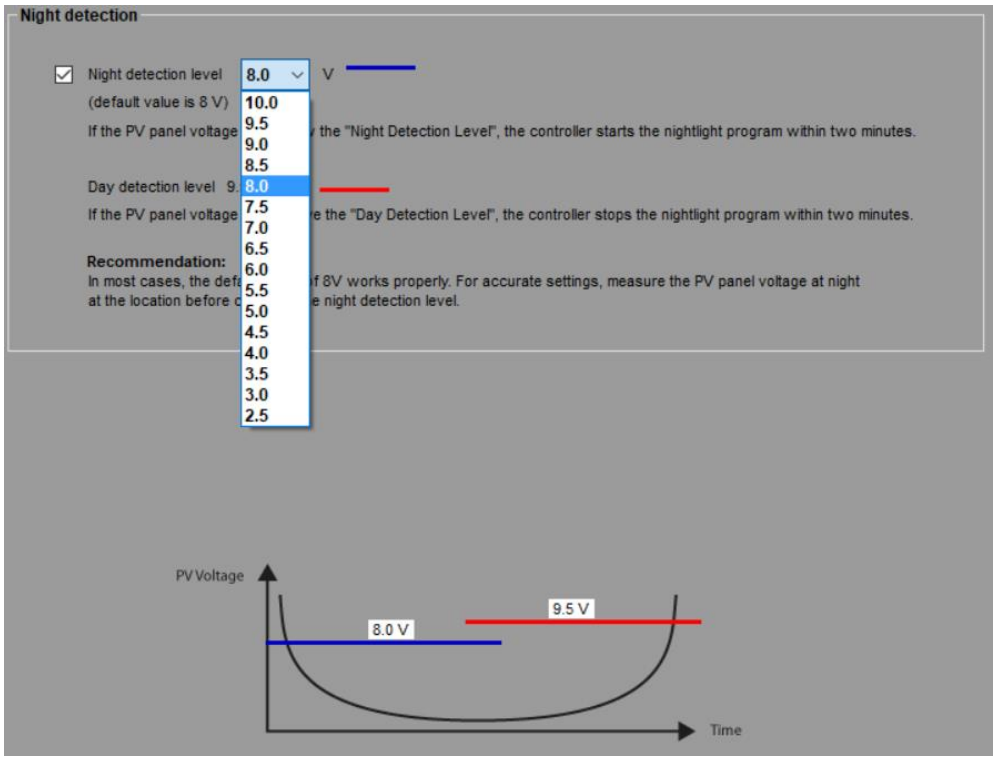


Figure 4.8: Night Detection Threshold Menu

4.4 Battery Type

The “Lead acid battery” setting enables equalization charging. This is intended for flooded or liquid electrolyte lead acid batteries. The “Sealed battery” setting disables equalization charging.

CAUTION: Always follow the charging recommendations of your battery manufacturer.

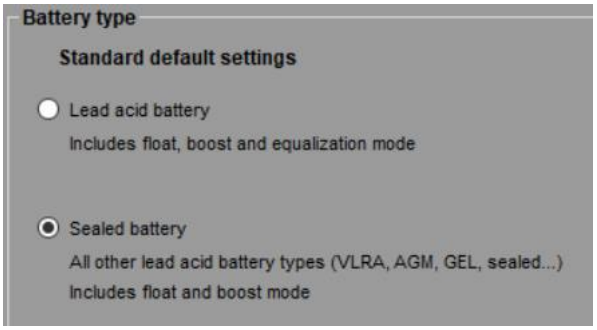


Figure 4.9: Battery Type Options to Enable or Disable Equalization Charging

4.5 Print or Send

Use the printer preview window or print buttons to trigger the Windows printer dialogue box and print a picture of the CIS-CU settings. Or, use the "Send Settings" button to transmit settings to a CIS family controller via the MXI-IR accessory.

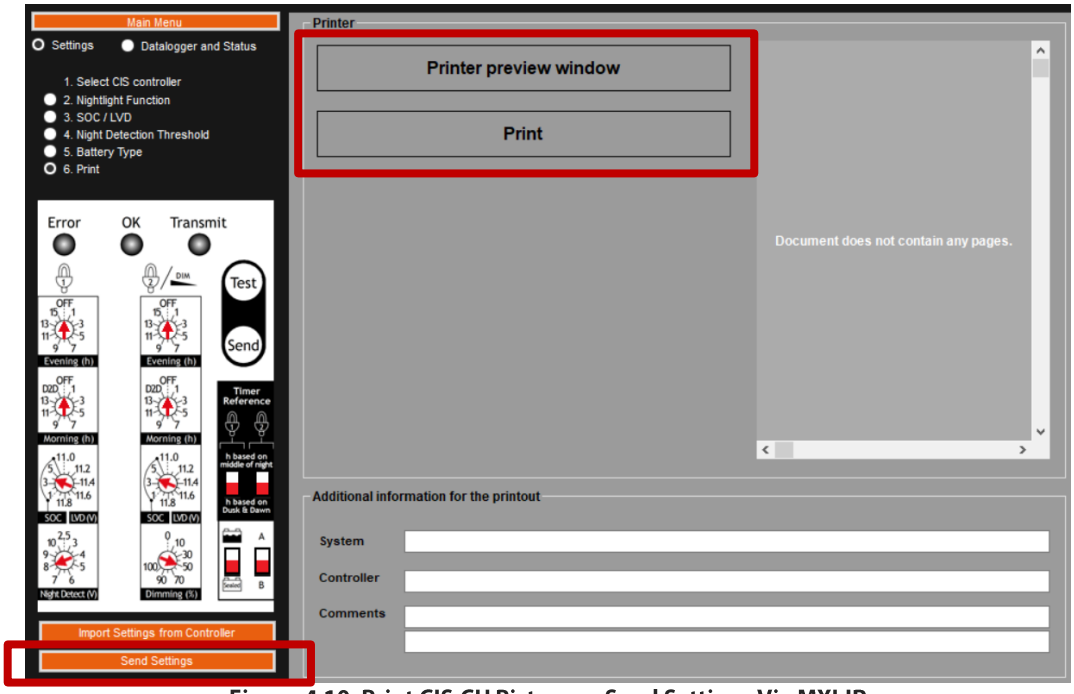


Figure 4.10: Print CIS-CU Picture or Send Settings Via MXI-IR

5.0 Expert Mode

Expert Mode is appropriate for users who:

- have lithium ion batteries
- need access to additional low voltage disconnect options (LVD)
- have CIS-N-MPPT-LED or CIS-N-LED and need to program the LED current
- need to save settings files for later use
- have experience with solar design, batteries and CIS family charge controllers

WARNING: Do not adjust settings in Expert Mode if you do not know the purpose or effect. Incorrect settings can damage batteries, cause excessive gassing, and create fire or explosion hazards.

CAUTION: Always follow the recommendations of your battery manufacturer.

IMPORTANT: Program all settings for a 12V battery. CIS charge controllers will automatically detect 12 or 24V batteries and automatically adjust settings for 24V systems.

5.1 Enable or Disable Expert Mode

To enable Expert Mode, select the "Expert Mode Disabled" status button from the main menu. To disable Expert Mode, select the "Expert Mode Enabled" status button from the main menu.

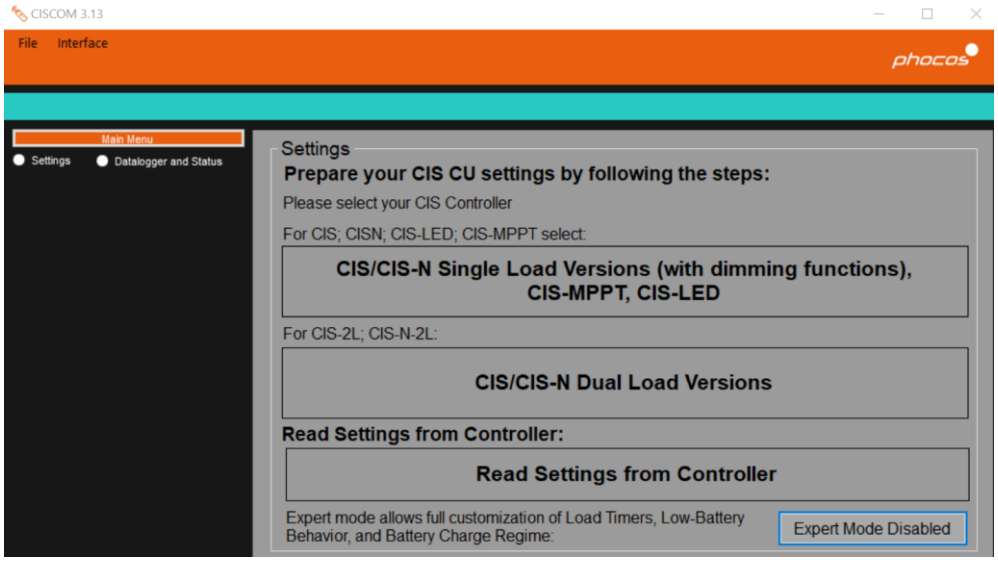


Figure 5.1: Non-Expert Mode

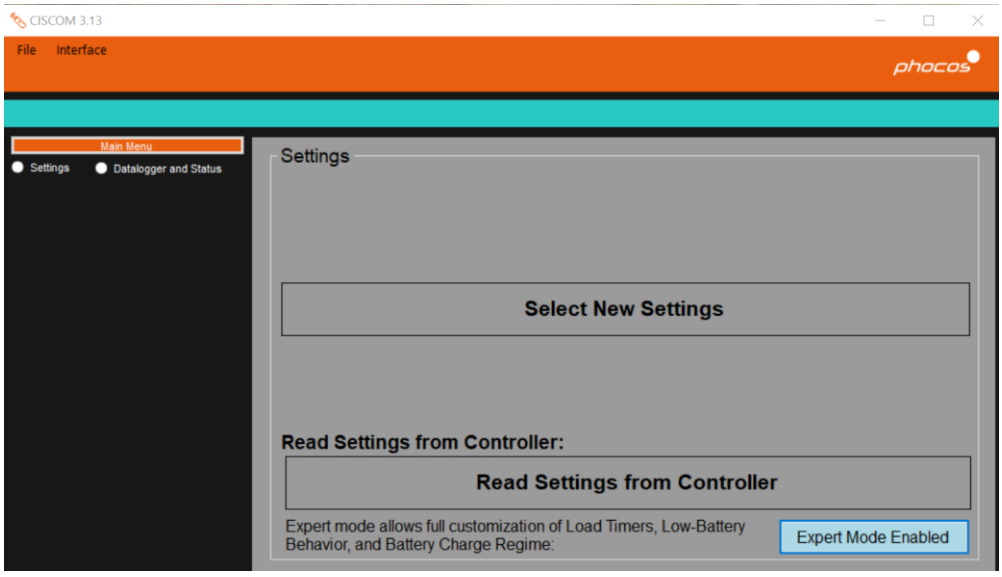


Figure 5.2: Expert Mode

5.2 Nightlight / Low Battery Settings

Load 1 is the load output for single load controllers such as CIS-N and CIS-N-MPPT. Load 2 is the dimming control signal for single load controllers.

NOTE: Load disconnect events will override the load programming timers. Day and night detection will override any load programming timers for D2D or Morning and Evening.

IMPORTANT: Program all settings for a 12V battery. CIS charge controllers will automatically detect 12 or 24V batteries and automatically adjust settings for 24V systems.

Nightlight / Low Battery Settings	Description
Nightlight Mode (Load 1)	No Nightlight will turn the load output on all the time. (Standard Controller) D2D will turn the load output on at dusk and off at dawn. Morning and Evening hours based on Dusk & Dawn will use dusk and dawn as reference points for hourly settings with evening hours after dusk and morning hours before dawn. Morning and Evening hours based on Middle of the night will use the midpoint between dusk and dawn as a reference point for hourly settings with evening hours before the middle of the night and morning hours after the middle of the night.
ON Hours After Dusk (Load 1)	With Morning and Evening hours based on Dusk & Dawn, this is the number of hours the load will be on after dusk. With Morning and Evening hours based on Middle of the night, this will be the number of hours before the middle of the night when the load will turn off.
ON Hours Before Dawn (Load 1)	With Morning and Evening hours based on Dusk & Dawn, this is the number of hours the load will be on before dawn. With Morning and Evening hours based on Middle of the night, this will be the number of hours after the middle of the night when the load will turn on.
LVD Indicator Type (Load 1)	SOC is a battery state of charge controlled low voltage disconnect. Voltage is a battery voltage controlled low voltage disconnect.
LVD load 1 Offset	With SOC LVD, higher numbers disconnect the battery at a higher SOC. Lower numbers disconnect the battery at a lower SOC. With Voltage only LVD, the setting will be the battery voltage offset added to the base voltage. The sum of these voltages will be the battery voltage level that triggers LVD.
LVD: Base + Offset (V)	This is the automatic calculation of the sum of the base voltage and offset voltage used to trigger LVD.

Nightlight Mode (Load 2)	No Nightlight will keep dimming off except by LVD. D2D for Load 2 is not applicable to dimming features at night. Setting No Nightlight for Load 1 and D2D for Load 2 will dim the light during the day and switch to full brightness at night. Morning and Evening hours based on Dusk & Dawn will use dusk and dawn as reference points for hourly settings with evening hours after dusk and morning hours before dawn. Evening hours are the delay after dusk until dimming is implemented. Morning hours are when dimming will end before dawn, and the light will switch to full brightness. Morning and Evening hours based on Middle of the night will use the midpoint between dusk and dawn as a reference point for hourly settings with evening hours before the middle of the night and morning hours after the middle of the night. Evening hours are the number of hours before middle of the night when dimming will start. Morning hours are the number of hours after middle of the night when dimming will end. The load must be on for dimming to take effect.
ON Hours After Dusk (Load 2)	With Morning and Evening hours based on Dusk & Dawn, this is the delay when dimming will take effect after dusk. With Morning and Evening hours based on Middle of the night, this will be the number of hours before the middle of the night when dimming will take effect. The load must be on for dimming to take effect.
ON Hours Before Dawn (Load 2)	With Morning and Evening hours based on Dusk & Dawn, this is the number of hours before dawn when dimming will stop. With Morning and Evening hours based on Middle of the night, this is the number of hours after the middle of the night when dimming will stop, and the light will switch to full brightness. The load must be on for dimming to take effect.
LVD Indicator Type (Load 2)	SOC is a battery state of charge controlled low voltage dimming. Voltage is a battery voltage controlled low voltage dimming.
LVD load 2 Offset	With SOC low voltage dimming, higher numbers implement dimming at a higher SOC. Lower numbers implement dimming at a lower SOC. With Voltage only low voltage dimming, the setting will be the battery voltage offset added to the base voltage. The sum of these voltages will be the battery voltage level that triggers low voltage dimming. The load must be on for dimming to take effect.
LVD: Base + Offset (V)	Automatic calculation of the sum of the base voltage and offset voltage used to trigger low voltage dimming. This must be higher than the value for Load 1 for dimming to take effect.

Day/Night Threshold	PV array voltage at which the controller will switch from day to night mode. The controller will switch from night to day at 1.5 / 3.0V above this level.
Battery Type	Gel disables Equalize Charging. Flooded enables Equalize Charging.
Dimming percentage	For CIS controllers with a dimming wire, 100% corresponds to a 10V signal, and 0% corresponds to a 0V signal on the dimming wire. There is a linear correspondence in between. For CIS controllers with integrated LED drivers, 100% corresponds to full brightness, and 0% corresponds to off. There is a linear correspondence in between. Dimming is accomplished by PWM.
Dimming Base Level Value	**For CIS-N-MPPT-LED:** This setting reduces LED output current linearly and is a percentage of the maximum 3500mA output. 100% corresponds to 3500mA, and 0% corresponds to 0mA with a linear correspondence in between. Linear LED output current before dimming = 3500mA * (Dimming Base Level Value %) For example, if the desired LED current before dimming is 2500mA, then select 70.0. (2500mA/3500mA)*100 = 71.4% 70.0% is the closest allowable value below 71.4%. Any Load 2 settings for dimming will apply the dimming percentage to the adjusted value, but dimming will be accomplished by PWM. **For CIS-N-LED:** This setting reduces LED output current by PWM and is a percentage of the nominal rated value. Any Load 2 settings for dimming will additionally apply the dimming percentage, and dimming will be accomplished by PWM.

5.3 Battery Charge Regime Settings

Battery Charge Regime Setting	Description
Emergency High Voltage	Fast acting protection intended primarily for a wiring error, when a fuse blows, or to stop charging when a secondary source (i.e. generator) is unregulated or in error.
Maximum Charge Voltage	Highest charge voltage allowed by temperature compensation. (Higher values can often be seen in the datalogger due to quick fluctuations from high C-rates.)

Equalize Voltage	Equalize voltage at 25°C. Only active when the Battery Type setting is selected as Liquid. It's disabled when Gel is selected. This stage is chosen if the battery was discharged <12.1/24.2V the night before. Overrides Main and Boost charge.
Boost Voltage	Boost (Absorption) voltage target at 25°C. Setting applies to both the 2hr Boost charge and the 30min Main charge. The 2hr is chosen if the battery was discharged <12.3/24.6V the night before. Overrides the 30min Main charge.
Minimum Boost Voltage	Lowest Boost (Absorption) or Equalize charge voltage allowed by temperature compensation.
Float Voltage	Float voltage at 25°C.
Minimum Charge Voltage	Lowest Float charge voltage allowed by temperature compensation.
Load Reconnect Voltage	After dimming due to low voltage or LVD has occurred, they will continue until the battery bank is charged above this level.
Emergency Low Voltage	Fast acting protection intended primarily for a wiring error or old batteries. Similar to LVD, but immediate.
Base Voltage LVD	Reference voltage for adjusting voltage controlled LVD settings. An offset is added to this voltage to create the final LVD or dimming voltage settings.
Base Voltage SOC	Reference voltage for adjusting SOC controlled LVD settings. This reference voltage will be the battery voltage when no load current is flowing.
Maximum step for SOC	A step for how the SOC LVD setting will compensate for load current.
Temperature Compensation	Units of millivolts. The "negative" is already in the internal calculation. It's the total for a 12V battery (6 cells). In cold weather, the target charge voltage will be increased by this amount for every degree below 25°C. In hot weather, the target charge voltage will be decreased by this amount for every degree above 25°C. Referencing K instead of °C helps avoid confusion with negative signs when the ambient temp is <0°C.

5.4 Saving Settings Files

To save settings files, either read the controller settings or program them. Select the "Save Data" radio button. Select the "Save CISCOM Data .cis" button. Use the file explorer to name and save the settings file.

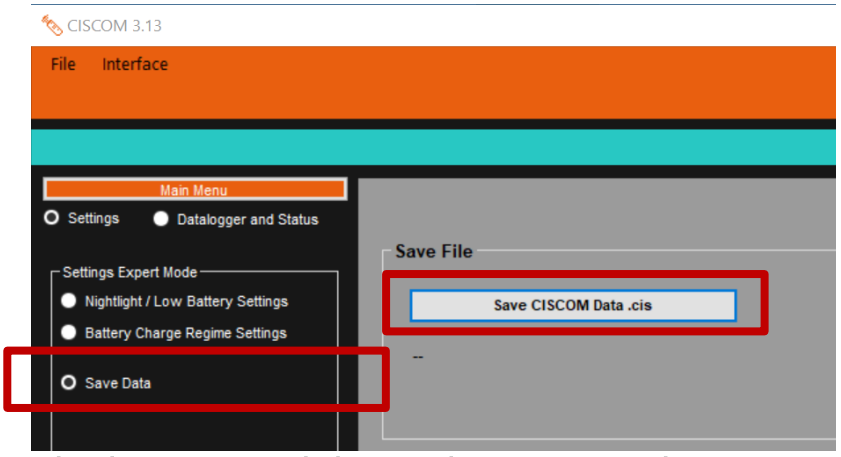


Figure 5.3: Select the "Save Data" radio button and Save CISCOM Data button to save settings files

6.0 Troubleshooting and Workarounds

6.1 Error Codes

Error Code	Error Code Dialogue Box Warning	Troubleshooting Steps
1	Communication failed. Unable to open the port.	Select a COM Port from the Interface menu. If none are available, select the refresh option. If none are available, install the MXI-IR drivers. See MXI-IR Driver Installation Guide available at www.phocos.com.
2	Communication failed. No data received.	Ensure the charge controller is powered on, there are no obstructions between IR transceivers, and the controller and MXI-IR are within 8m.
12	Communication failed. Wrong dataframe.	Remove any obstacles from between the IR transceiver of the MXI-IR and CIS family controller.

6.2 Workarounds

To save settings files when using non-expert mode, program a controller. Enter Expert Mode. Read the controller settings, and then save the settings file.

For easier load programming when only the battery charge regime Expert settings are required, use the graphical interface in non-expert mode. Program a controller. Enter Expert Mode. Read the controller settings. Adjust the battery charge regime settings, and either reprogram the controller or save the settings file.

7.0 Liability Exclusion

The manufacturer shall not be liable for damages, especially on the battery, caused by use other than as intended or as mentioned in this manual or if the recommendations of the battery manufacturer are neglected. The manufacturer shall not be liable if there has been service or repair carried out by any unauthorized person, unusual use, wrong installation, or bad system design.

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