CHILICON POWER GATEWAY

Advanced Microinverter Monitoring and Home Automation Gateway
(CP-100)

Congratulations on your purchase of the Chilicon Power Gateway. It is the most sophisticated Gateway available in the industry for solar system monitoring.

OVERVIEW

The CP-100 Gateway is capable of monitoring any Chilicon Power microinverter, assisting with the array setup and creation of the installation for Cloud monitoring purposes. And it can do a lot more on the home automation front by monitoring an entire home power consumption and/or generation. Thanks to its wireless connectivity, it is also able to serve as a basic home alarm security controller.

For warranty reasons, Chilicon Power microinverters should always be installed with a Gateway which enables their firmware to be upgraded if necessary.

MICROINVERTER MONITORING SETUP

The first step is to electrically connect the microinverters to the panels and then to the grid. Wait for the microinverters to be DC powered with enough sun light (LEDs will be continuously blinking) before turning on the AC grid.

After the AC is turned on, the next step is to bind the inverters with the Gateway.

Connect the Gateway to a power outlet and wait until it is finished booting. If this is the first time the Gateway is powered, it will request you to register this new installation with the Cloud. This enables monitoring on the web at http://cloud.chiliconpower.com. The system owner and installer email addresses are required to add this new installation to their respective accounts. If an account does not exist yet, it will be created using the email address. Once the new installation registration form is filled out, press the save button.

POWER OUTLET SELECTION

The next step is to find all the inverters and bind them to the Gateway so they can start relaying telemetry data. To do that, go to the settings screen by pressing the Menu button ☰ on the home screen. The first step is to find a suitable power outlet that is in phase with the inverters since inverters only use one of the two lines and neutral to communicate. So on average, half of the outlets will have the line used for communicating with the inverters and the others won't. If you desire to connect the Gateway to a power outlet that is on the wrong line, simply swap the two lines on the solar array so that the right one will now be in common with that outlet. In order to survey which outlet is suitable, use the "survey socket" feature of the Gateway by pressing the "Advanced Settings" button ✖ and then the "Survey Socket" one ❮. The PLC socket evaluation will check the current outlet for each phase and select the one with the strongest communication to the inverters. If the socket survey returns with a message indicating the wrong phase, it is strongly advised to swap the power lines on the array (simply swap the two lines feeding into the disconnect box or the main panel).

BINDING OF INVERTERS TO THE GATEWAY

To bind inverters, on the settings screen, select the Inverter Wizard button ✳. In the first box, enter the total number of microinverters to be bound to the Gateway (same as the number of inverters installed) and the press start. The Gateway will find all the inverters and bind them after a few minutes.

INVERTER ARRAY CONFIGURATION

The last step in setting up the inverters is to create the array layout and to assign the inverters to their correct location in the array. Proceed back to the home screen and click on the gauge in the top right quadrant of the screen. If this is the first time and there is no array configured yet, the new installation array setup dialog box will pop up.

This dialog box assists with the creation of a rectangular array or an irregular set of rows. For instance, to create a triangular array of 10 panels, one would enter the number of rows to be 4 and then on the next line, the size of each rows as follows: 1.2.3.4. The next set of buttons is to specify the orientation of the panels that will be generated. If there is a mix of landscape and portrait orientation, the array will have to be built in two steps by making it with two sub-arrays. The last check box "Add new array to existing array"" should be checked for that purpose if you want to add this new array to any existing one (else this new array will replace any existing one). Here is the result of the previous example (triangular array of 10 panels):
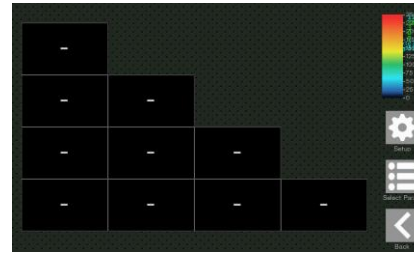
The next step is to arrange the array by either moving panels around or swapping them. If the array has the right topology, then you only need to swap panel IDs around. Press the "Toggle Swap Mode" button to enter (or leave) the swap mode. Then select a two panels and their location will be swapped. The default mode of operation (instead of the swap mode) is the Pan & Zoom mode. The mode is shown in the top left corner. In "Pan & Zoom" mode, select one or more panels by tapping on them or drawing a selection rectangle around them. To move the selection around, press on the display for about 1.5 seconds. The "Drag Mode" will appear in the top left corner. Then just move the panels in the desired location. Extra panels can easily be deleted by selecting them and pressing the "Delete Modules" button.

If the inverter of a panel has to be replaced, add a new array, swap the panel IDs (which are really the inverter IDs) and then delete the extraneous panel that was added to fetch the new ID.

SOLAR SYSTEM MONITORING USER GUIDE

Here is the main home screen of the Gateway:

It has four quadrants and two buttons in the bottom right corner (the "Arm" button is only present when a home alarm security system is configured).

The top left quadrant shows the date. Press on it if you want to change the format of the time and date.

The bottom left quadrant shows an animation of the energy flow between the solar array, home (and grid in the case a consumption monitoring device is installed – highly recommended!). After some time, it switches to another graphic showing the total generation or consumption since the system was installed.

The top right quadrant shows the gauge with one or more needles (in case an extra monitoring device is installed) depicting the instant power generated or consumed. Pressing on it opens another screen that shows the configuration of the array with each individual panel's production. Other parameters may be selected and displayed for each panel (like voltage, temperature, grid voltage, …). This screen may be disabled in the settings to simplify the end customer view of the system.

The bottom quadrant is a live graph of the power generated (and consumed if an extra monitoring device is present) throughout the day. Tapping on it expands the graph to a full screen view. Swiping to the right shows the previous day.

INSTALLING Z-WAVE HOME ENERGY METER

PAIRING THE HEM (HOME ENERGY METER)

The first step is to pair the HEM with the Gateway so that they can communicate with each other over the Z-Wave wireless network. It is easier to pair HEM with the Gateway BEFORE installing them in the circuit box or disconnect panels. This ensures they are in range of each other and that the wireless link is strong. Only Gen2 (DSB28-ZWUS) and Gen5 (AEOZW095-US) Aeotec Home Meter Energy are currently supported by the Gateway but we highly recommend to use the Gen5 version since it is more reliable and has better RF range.

From the home screen, press the Menu button ☰. On the Settings screen, press "Advanced Settings" ✖ and then "Measurement Setup" ☰. The first step is to enable the Z-Wave communication hardware on the Gateway if that has not been done yet. For that, make sure the box in front of "Enable Z-Wave communication" is checked (a dot inside the box indicates it is checked). Below it will

list the paired devices which at first will show that there are no devices paired yet.

The next step is to add the HEM to the list of paired devices. Press the "Add" button and then press the button on the back of the HEM device once. If your meter has been successfully paired to your network, its light will remain solid. If the pairing was unsuccessful, the light will blink. If that is the case, try repeating the procedure again.

Once the HEM is paired, you will be prompted to specify the number of clamps used (usually it will be 2) and whether the HEM is used for generation metering (PV array only) or consumption (net home metering or any home appliance). After exiting that window, the new paired device should show up in the list of paired devices. Note each HEM is associated with an ID number.

The next step is to finish the setup of the meter. Press the "Auto-Setup Meter" button in the bottom left. This will automatically setup the meter either as a NET METER or as a PV METER. A dialog box will prompt for that choice at the end of the setup. Note that most users will choose the NET METER option since that enables consumption monitoring while the PV array monitoring is accomplished by the microinverters themselves. The PV METER option is only in the case you have an additional meter setup solely for the purpose of measuring a generating solar array. This is redundant with the monitoring of Chilicon microinverters and would only be used to monitor another manufacturer's equipment. The next 3 sections are for advanced use only and are not part of a normal setup.

DEFINING LOGICAL METERS (ADVANCED)

This section is to manually override the definition of logical meters. They are called logical because they are not physical hardware but based on a mathematical expression. Logical meters are used to record and display the information gathered by the HEMs. To set up, press the "Manage Meters" button. This opens up the logical meter setup. The first UI object is a pull down menu showing the list of defined logical meters. Press the "New" button ⊕ to add a new logical meter. Typically, you would add two logical meters per HEM. One to measure the instant power and one for the total energy harvested (the sum of powers over time).

EXAMPLE OF LOGICAL METERS FOR NET METERING (ADVANCED)

Let's assume you have installed a HEM to measure the entire house consumption (a net meter). Let's first setup a power meter. For that, let's called the new logical meter "Home Power". Enter that in the appropriate box. Then select the type as "Cons. Meter" for consumption meter.

Under expression, enter the expression that sums up the two clamp power values. For that, use the "node ID-clamp-param" pull down box and select "N4-1-W" assuming the HEM node ID is 4. Then press "Insert Device" ⊕ and it will add the term in the expression box. Then click on the expression box and a keyboard will pop up. Press the "+" key to add another term to the expression. Then add the second clamp power measurement by selecting "N4-2-W" from the pull-down box and press "Insert Device" ⊕ again. The expression is now complete. In order to tell the Gateway this is the meter of the entire home (net meter), we check the box "The Net Meter". Since the power measurement is an instant measurement, we also check the "Show Gauge Needle" box so that it appears on the large gauge display on the home page. In addition, we can plot it on the graph by checking the "Plot on Graph" checkbox.

Now that the Home Power meter is setup, let's setup the Home Energy meter that measures the total energy ever consumed (or produced) as well as the daily usage (or production). Again, we press ⊕ to add a new logical meter. Under the name, enter "Home Energy". The type is also "Cons. Meter". Under expression, enter "(N4-1-kWh)+ (N4-2-kWh)" to sum up the energy from both clamps. For the energy meter, check the "Energy Measurement" box and the "The Net Meter" one as well for this example. No need to check the other boxes because the gauge display and the graph are for displaying power.

COMMON MISTAKE

If you do not pay attention to the current direction on the clamps when installing the clamps of the HEM, there is a 50% chance that the power measurement for the two clamps will cancel each other leading to unexpected power measurements. If that is the case, either reverse the current direction of the clamps or simply change the expression by using a "-" in front of the clamp that is reversed.

SETTING UP HOME SECURITY

The Gateway is also capable of acting as a basic home alarm security controller thanks to its Z-Wave connectivity and software. By installing Z-Wave devices like door and window sensors as well as infrared sensors and sirens, the Gateway is able to detect unwanted intrusion and warn the owner by ringing the siren.

Different users with different authorization codes can be programmed to enable tracking in and out of the home for instance.

In the future, the Gateway will also accommodate for lighting control based on human presence and other programming.

FEATURE ACTIVATION

On the Settings screen, press "Advanced Settings" ⚒ and then "Home Security Setup" 🏠. First check the "Enable Home Security" box to tell the Gateway we want to activate the Home Security feature.

MANAGING USERS

By default, a user called "Default" is created with the password 13579 and admin permissions (meaning it has access to all controls). You should change the default user's name and passwords to a more appropriate one. To manage users, press the "Users" button then select the user from the pull-down box and select an action. To modify the name, password (called code on the Gateway) and permission of an existing user, select the "Edit" button ▤. To create a new user, press the "Add" button ⊕. And use the "Delete" one ⊗ to remove a user.

There must always be at least one admin in the system to be able to modify the setup. Only users with admin permission are allowed to modify users and devices.

MANAGING DEVICES

The next step is to pair sensors and at least one siren with the Gateway (if there is no siren, the alarm won't ring). Press on the "Devices" button to start setting up those devices. Then select the "Add" button ⊕. Press on the button of the sensor and wait for a few seconds until it binds with the Gateway. The "New Device" window will then open up. First enter a descriptive name for the newly bound device. Ideally, it indicates the location of the device and its type. Examples of good names would be "Garden door", "Front door", "Garage door", "Kitchen window", … Below the name are the different options available that depend on the type of sensor paired. You may decide to have some sensors not trigger alarm in certain modes or to not record events for instance. The "Delayed Trigger" gives a 60 second delay to any intruder to turn off the alarm system by entering the proper pass code. This is useful when you open your front door and don't want the alarm to ring immediately but give yourself a bit of time to disarm the system first.

The "edit" ▤ and "delete" ⊗ buttons under "Device Setup" work as expected to change the attributes of a device and to delete the device respectively.

ALARM ACTIVATION

The alarm has two main modes: activated or de-activated. When it is de-activated, it is not turned on and will never ring the siren. When it is activated, any sensor programmed to do so will trigger the alarm if opened.

To switch between activation modes, go to the home page of the Gateway and press on the "Arm" button 🔒 in the bottom right of the screen. It should be green if none of the sensor is open. If any sensor is already open, it will be yellow 🔒. If trying to arm then system when a sensor is open (yellow icon), it will first ask you to confirm that that sensor won't be used to trigger the alarm until it is re-armed with the sensor closed.

When the alarm is activated, an icon of a red disarm lock 🔓 is displayed. Press on it to disarm the alarm and it will ask for your pass code. If the pass code entered is correct, it will disarm the alarm and record the event.

FURTHER SUPPORT

If you have further questions or if this document is not clear enough on certain aspects, please email support@chiliconpower.com and you will get a response within a day.

For a list of compatible Z-Wave devices, refer to: http://www.chiliconpower.com/products/gateway