CHILICON POWER GATEWAY

Visual User Manual
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The CP-GATEWAY is a user interactive device that serves multiple roles in the lifecycle of a solar photovoltaic installation and also provides extensions to access zWave enabled wireless peripherals. In relation to Chilicon Power microinverters, the CP-GATEWAY performs the following functions:

- Securely communicate with inverters and provide graphical feedback of current PLC line conditions
- Graphically represent PV module configuration and > 20 data fields associated with each inverter
- Relay data with cloud.chiliconpower.com
- Is remotely upgraded by Chilicon servers
- Performs inverter remote upgrades
- Displays PV array energy production information

The Chilicon Power communication stack employs advanced forward error correction and encryption. The system also implements a multi-rate physical layer that automatically adjusts throughput to maintain link reliability.
## CP-Gateway Operating Specifications

### INPUT (AC)

| 120V | Neutral and Phase |

### MECHANICAL DATA

| Ambient temperature range | -40° C to +65° C |
| Dimension (W x H x D) including connectors | 8.5” x 6” x 1.75” (or x 0.2” if flush mount to wall) |
| Weight | 0.63 kg (1.4 lbs) |
| Enclosure rating | Indoor by default / Outdoor with additional NEMA 4x enclosure |

### FEATURES

| Communication | Power line (130.2 kHz carrier) |
| Monitoring | Free monitoring via gateway or online software |
| Compliance | FCC 15 Part B, CISPR 22 Class B |
Quick Start Guide
Dec 31, 2011
4:00 PM
Energy Produced: 0 Wh

Push on the menu button
Push on the Help button
On Screen Help Pages

(INCASE YOU DON’T HAVE THIS DOCUMENT WITH YOU AT JOB SITE)

**Step 1: Gateway Configuration**

Start by setting up Wi-Fi or plugging in Ethernet cable. To configure Wi-Fi, choose the network you would like to associate with. Enter the pass phrase and click done. To assist in entering the pass phrase, check the ‘Pass Phrase Visible’ box. After the ‘Successfully joined Network’ message is displayed, click Close. The Network connection is now completed!

**Step 2: Find a good socket**

Push on the Advanced Settings icon and select the Survey Socket icon. Click the checkbox for Split Phase or Tri-Phase. Most residential systems are split phase. Click View Stats. Confirm that at least one of the PLC success rates is > 90%. If not > 90%, try another socket.

**Step 3: Connecting the Inverters**

Push on the inverter Wizard icon. There, enter the number of microinverters installed and click start. The Gateway will automatically discover and bind the microinverters. A success message will appear when all micros are connected to the Gateway.

**Step 4: Cloud Setup**

This step is to allow the Gateway to connect to the Cloud. Press Advanced Settings and push on Cloud Setup. Obtain and write down the 8 digit “Authentication Code”. This code must be used within 30 days to link the Gateway to your Cloud account. Within 30 days you can then register this Gateway on the online portal.

**Step 5: Configure the Array Layout**

To configure the layout of the array for the first time, press on the gauge in the top right portion of the home screen. Then select the “Setup” button and choose “Add”. Fill out the form and enter ok. You can then arrange the individual panels by selecting “Arrange” icon.

More support can be obtained online or by contacting Chilicon Power by phone or email. At (714) 878 6648 or info@chiliconpower.com.
Push on the WiFi button

Skip this step if Ethernet is connected
**Choose, Enter Password, and Join WiFi Network**

- Enable Wi-Fi
- Choose a network...
  - CJ_Guest (-70 dBm, wpa2)
  - CJ_Great_Room (-80 dBm, wpa2)
  - sandova12 (-84 dBm, wpa2)
  - HP-Print-7e-LaserJet 300 (-86 dBm, open)

[Image of Wi-Fi network selection screen]
Connecting Inverters

Push on the Advanced Settings Button
Push on the Survey Sockets Button
(180) Split-Phase, (150, 210) Tri-Phase == Good Socket
(0) Split-Phase, (30, 90, 270, 33) Tri-Phase == Bad Socket
You should let the evaluation run to completion
or the phase will not be changed from the default (180 deg)
Push on the Inverter Wizard Button
Enter the number of inverters installed, and hit Start
Push on the Cloud Setup Button
Record the Gateway ID and Authentication Code. Use them within 30 days to associate the gateway with cloud.chiliconpower.com
Push on the power dial
Push on Setup, then push on Add

After pushing add, read the on screen information to draw the array.
### Selecting Parameter to Display

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>97 W</td>
<td>99 W</td>
</tr>
<tr>
<td>95 W</td>
<td>101 W</td>
</tr>
<tr>
<td>98 W</td>
<td>100 W</td>
</tr>
<tr>
<td>81 W</td>
<td>98 W</td>
</tr>
</tbody>
</table>

Push on Select Param to change the inverter parameter displayed.
In-Wall Installation
Front view when placed
Rear View when Placed (if you could see from inside the wall)

Open rear panel, remove plug and wire in ROMEX *before placing in wall*. Then Replace rear panel and screws.
Step1: Spring Placement
Step1: Spring Placement
Step 1: Spring Placement
Step 1: Spring Placement
Step2: Wall Hole
Step 3: Lower pair of springs placed first

**Warning**! Make sure removable rear socket is connected to ROMEX and plugged into unit, and rear cover is fixed back in place, before installing in wall.
Step 4: Retract and place upper pair of springs

**Warning**! Make sure removable rear socket is connected to ROMEX and plugged into unit, and rear cover is fixed back in place, before installing in wall.
Step 5: Let unit come to rest inside wall

**Warning**! Make sure removable rear socket is connected to ROMEX and plugged into unit, and rear cover is fixed back in place, before installing in wall.
Rear View Detail
Rear View Detail
CONFIGURING MICROINVERTER EXTENDED RANGES
The following slides show the step-by-step instructions to enable (forever) extended AC voltage and frequency ranges on the micros bound to the gateway.

Prerequisite:
- Gateway powered up
- All microinverters connected to the Gateway and communicating with it

The procedure takes about 2 minutes if the power line communication link is good.

The next slides show instructions. Note that the bubbles point to the region of the screen where the user has to push with his finger.
June 16, 2014
9:25 AM
54

Energy Produced: 217 kWh
Equivalent to powering a store for a day

Generated Today: 7.991 kWh

Push on the menu button
Push in the very top-left corner of the screen to bring up the DEV menus.
A password prompt appears to gate access to the DEV menus. Enter the password “revolution” (10 letters) to access the DEV menus.
Select the Settings Menu
Uncheck the “Auto Start Inverter Polling”, Then wait for a time equal to 6 second * Number of Micros Bound (for example 30 seconds if 5 micros)
Set the 4 Volt and Freq buttons as shown
Hit this Button 3 times, with 5 seconds between each press
ReCheck the “Auto Start Inverter Polling”, The procedure is now complete.
PLC Advanced Modes
In some cases it’s useful to get a more detailed view of power line communication operation and/or to fine-tune power line communication settings. Functionality provided by the gateway for this includes:

- Communication rate and phase offset adjustment settings
- Communication quality measurements
- Communication noise oscilloscope view
- Communication packet view
- Manual Inverter Discovery and Binding
- Changing the gateway default Local or Global ID
Rate and Phase Offset Selection

Push on the menu button
Rate and Phase Offset Selection

Push Advanced Settings
Rate and Phase Offset Selection

Push Power Line Communication
RATE AND PHASE OFFSET SELECTION

Highest Rate

Lowest Rate

Lagging phases

Leading phases

Default phase offset adjustment
Push in the very top-left corner of the screen to bring up the DEV menus.
A password prompt appears to gate access to the DEV menus. Enter the password “revolution” (10 letters) to access the DEV menus.
Select the OOK Menu
Reliable links: Barker Soft Correlation Sum, Avg > 80%. Data Soft Correlation Sum, Avg > 80%
If lower, then decrease the default rate (11.5 to 5.75 for example)
Reliable links: Data Soft Correlation Sum, Avg > 80%
If lower, then decrease the default rate (11.5 to 5.75 for example)
Press to see oscilloscope view
Displays the average carrier energy detected in one grid line cycle. Interferers can be visualized when blue energy appears even when no transmission is occurring. Sinks can be visualized when no energy appears at some part of the cycle even though transmission is occurring.
Packets fields being decoded by the gateway are displayed in real time, each small rectangular ‘cell’ is one grid line cycle of time. The legend on left color codes the part of the packet that is being decoded.
Press for manual Discovery menu
The list and count of inverters that are currently “Bound” to this gateway.

Press to enter manual Discovery mode
Enter the number of inverters you would like to discover. Only UnBound inverters can be discovered this way, Bound inverters can be rediscovered using the 'Disc Lost' icon. Discovered inverters will appear in a list on left. Then 'Bind All' to pair them with the gateway.
Press to Force Bind a single inverter
Force Bind overrides any existing inverter state (bound or unbound) and forces an inverter to pair with the gateway. You can specify a Local ID for the inverter in the second field, or leave this field blank to have the gateway automatically assign an inverter local ID (LId).
**Change Local or Global Gateway ID**

![Diagram showing a table with various options including 'Change Local or Global Gateway ID'.]
Valid IDs are [0,14]. This is useful if a neighboring building also has a Chilicon system installed.

This is used only in the event of a gateway RMA procedure. Contact info@chiliconpower.com for support.
zWave Wireless Power Meter Installation
The Chilicon Power gateway interfaces with up to 16 wireless energy meter modules. Each energy meter comes with 2 clamps and one voltage sensor.

Voltage Lines: Connect across 120V and Grid Neutral. (DO NOT CONNECT TO 240Volts)
Clamp 1: Connect to any producing or consuming circuit of interest, up to 200 Amps
Clamp 2: Connect to any producing or consuming circuit of interest, up to 200 Amps

General placement guidelines
- Do not install the power meter inside a metal electrical panel or box.
- When installed indoors, terminals on power meter can face up or down
- When installed outdoors, terminals MUST face down to prevent slow water ingress
EXAMPLE: INDOOR INSTALLATION
EXAMPLE: OUTDOOR INSTALLATION
June 16, 2014
9:25 AM

Energy Produced: 217 kWh

Equivalent to powering a store for a day
Push Advanced Settings
Push Measurement Setup
Push Add
Press the button the zWave device to pair it, device must be within range of Gateway. Repeaters can be used to extend the range, but repeaters must be paired in proximity to the Gateway, we first pair a repeater.
Confirmation of pairing appears as a message, hit OK
Push Add (to add another device)
Press the button the zWave device to pair it, device must be within range of Gateway. This time, we pair an Energy Meter. The order was not important, the repeater could be paired second, or there could be no repeater at all.
Now we’ll setup the clamps on the Energy Meter
Select the mode for each clamp and the voltage of the circuit it is clamping. Note that the voltages are scaling factors, the voltage the meter is plugged into with the supply lines must not exceed 150 Vrms)
Performing Microinverter Firmware Upgrade
The following slides show the step-by-step instructions to upgrade the firmware of microinverters connected to a Gateway.

Prerequisite:
- Gateway powered up
- All microinverters connected to the Gateway and communicating with it

The procedure takes about 25 minutes if the power line communication link is good. It may take longer otherwise.

The next slides show instructions. Note that the bubbles point to the region of the screen where the user has to push with his finger.
Push on the menu button
Push in the very top-left corner of the screen to bring up the DEV menus.
A password prompt appears to gate access to the DEV menus. Enter the password “revolution” (10 letters) to access the DEV menus.
Select the Settings Menu
Uncheck the “Auto Start Inverter Polling”

Then revert to the Main Menu
Select the OOK Menu
Press the Upgrade Inv. button
A dialog info box appears. Wait a few seconds for the latest firmware to get downloaded from the Cloud server and press the OK button.
Click on the upgrade button to start the automated upgrade process.
After the upgrade process is completed, the microinverters will automatically reboot on their own and so the Gateway will momentarily lose communication with them (which is why it will display an error message at the end stating that not all micros were successfully updated. However, that message can be dismissed. We can manually verify they all upgraded properly as follows

Press on the Main Menu button
Go to Re-enable the Automatic Polling

Select the Settings Menu
CHECK the “Auto Start Inverter Polling” then revert to the Main Menu.
Press on the User Menu button
Push on the Gauge button to access the individual panel screen.
This screen will show the individual modules. Let’s make sure they are all running the latest firmware.

Press on the Select Param button
Press on the Firmware Ver. Button to display the firmware version of each micro
This screen finally displays the firmware version of all microinverters. Make sure to wait a few minutes so that all micros have had time to get polled by the Gateway so they show their latest firmware version. It should show 163 followed by a “L” or a “H”. If it does not, some micros did not get upgraded properly and we need to restart the procedure.