



VarianHOME and RS48 Installation Guide

V2.7

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NOTE: This guide does not provide instructions for the physical installation of the RS48. Please refer to the instructions accompanying the charger.

1) VarianHOME Important Safety Information

Professional Installation Required

VarianHome Electric Vehicle Energy Management System (EVEMS) must be installed by a licensed and qualified electrician in accordance with all applicable electrical codes and standards.

Improper installation can create hazards that may result in severe injury, death, or equipment damage. Read and understand all instructions completely before beginning installation.

Critical Safety Warnings

- ⚠️ **DANGER - ELECTRICAL SHOCK AND FIRE HAZARD**
 - Risk of electrical shock or fire if installed improperly
 - Disconnect all power sources before installation or maintenance
 - Install only in suitable indoor locations
 - Follow all applicable electrical codes and standards

Installation Restrictions

- Installation must comply with National Electrical Code (NEC), Canadian Electrical Code (CEC), and all local codes
- Install only as part of an approved EVEMS installation
- Install only after verifying panel rating is under 200A and voltage is under 240V
- Maintain specified clearances and environmental conditions

Precautions During Installation and Operation

- Use appropriate personal protective equipment (PPE)
- Use proper tools rated for electrical work
- Do not modify or attempt to repair the unit
- Keep all covers and protective elements in place
- Maintain proper ventilation and operating conditions
- Follow all lockout/tagout procedures during installation and maintenance

Response to Failures or Malfunctions

- Immediately disconnect power if any abnormal conditions are observed
- Contact Variablegrid technical support for assistance
- Do not attempt repairs or modifications
- Document any observed issues or error codes
- Resume operation only after authorized service personnel have resolved the issue

2) Installation Support

Variablegrid tech support is available to provide priority telephone support to installers Monday to Friday from 6 am to 6 pm PT (9 am to 9 pm ET) at 800-645-2314. If not answered immediately, leave a voicemail and your call will be returned as soon as possible.

Support resources are also available at support@variablegrid.com and online at <https://support.variablegrid.com>.

3) VarianHOME Kit Components

Check to ensure the following are part of your VarianHome kit:

- 1 x VarianHome EVEMS
- 2 x 200A Current sensors (CTs)
- 1 x AC adapter (5V)
- 1 x Wi-Fi extender
- 1 x Ethernet cable (1m)
- 1 x Bag mounting screws and Velcro pads
- 1 x VarianHOME installation guide

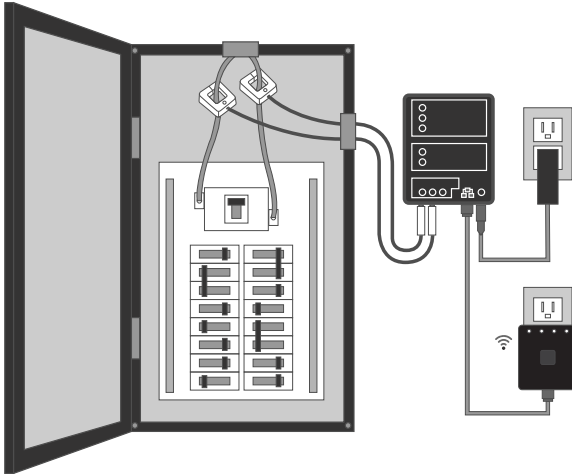
If any components are missing contact Variablegrid tech support.

NOTE: The current sensors provided must be installed only in main panels rated 200A or less.

4) VarianHOME Physical Installation

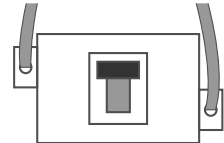
Block Diagram

The block diagram below provides an overview of the physical installation.



Turn off main panel power

Open the electrical panel and turn off the main breaker.



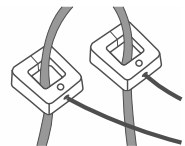
Remove panel cover

Remove the screws securing the panel cover to access the service mains.

WARNING: The service mains are always live!

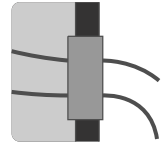
Install the current sensors

Carefully remove the bars on the top edge of the sensors, clamp the sensors around the service mains so that the arrows on the sensors are both facing towards the load.



Route sensor cables

Carefully route the two sensor cables through an opening in the panel close to where VarianHOME will be mounted. Ensure that there is no pressure on the sensor cables that could damage them over time.

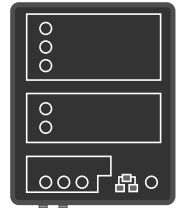


Replace panel cover and close the panel

Replace the panel cover carefully to ensure that there is no pressure on the sensor clamps that would cause them to open.

Mount VarianHOME

Using the provided screws or Velcro pads, mount VarianHOME close enough to the electrical panel for the sensor plugs to reach the L1 and L2 jacks on the bottom of VarianHOME, and in a location where the provided AC adapter can reach a power outlet.



Plug in the network cable

Plug a network cable between the Ethernet port on the bottom of VarianHOME and the Wi-Fi extender (or directly into your home router).

The Wi-Fi extender can be quickly paired to the home router by pressing the WPS button on both the home router and the extender. When configured and operating correctly the extender LED will turn Green.

NOTE: The Variablegrid Wi-Fi extender can also be configured manually using the instructions accompanying the extender.

Power on VarianHOME

Plug the AC adapter into the power jack on VarianHOME and into the power outlet. VarianHOME may perform a firmware update for several minutes when it powers on, indicated by an Amber LED.

Plug in the sensors

Fully insert the two sensor plugs into the L1 and L2 jacks on the bottom of VarianHOME. The LEDs should change from Red to Green (if current is detected).

5) Confirming Correct Sensor Operation

After plugging sensors into VarianHOME, it is essential to confirm the sensors are properly connected and providing valid readings.

Method 1: Controller Webform

View Live Sensor Data using the webform on the controller:

- 1) Using a notebook, tablet or phone connected to the home Wi-Fi network, open a browser and go to *varian.local*

NOTE: Some older networks require entry of the IP address assigned to the controller by the home network router.

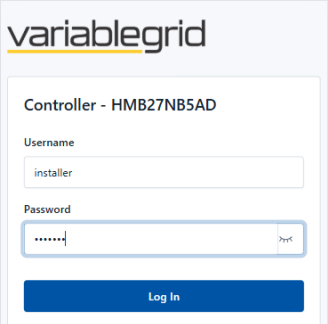
- 2) Enter *installer* and *Varian1* into the Login form and press Log In
- 3) Display menu items by pressing the 3-bars icon at the top left and click on Live Sensor Data
- 4) On the Live Sensor Data screen, confirm the SA (Sensor Amps) group is displaying data appropriate to the installation

NOTE: The third value in the SA group will be 0.

If any value is 0 or outside the expected range unplug and plug in the sensor cable.

If in doubt, contact Variablegrid tech support immediately for assistance.

NOTE: Swapping cables between jacks can aid in troubleshooting, but confirm cables are in the correct jacks before leaving the site.



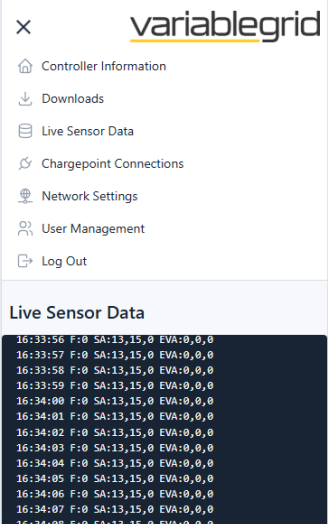
variablegrid

Controller - HMB27NB5AD

Username

Password

Log In



variablegrid

- Controller Information
- Downloads
- Live Sensor Data
- Chargepoint Connections
- Network Settings
- User Management
- Log Out

Live Sensor Data

```
16:33:56 F:0 SA:13,15,0 EVA:0,0,0
16:33:57 F:0 SA:13,15,0 EVA:0,0,0
16:33:58 F:0 SA:13,15,0 EVA:0,0,0
16:33:59 F:0 SA:13,15,0 EVA:0,0,0
16:34:00 F:0 SA:13,15,0 EVA:0,0,0
16:34:01 F:0 SA:13,15,0 EVA:0,0,0
16:34:02 F:0 SA:13,15,0 EVA:0,0,0
16:34:03 F:0 SA:13,15,0 EVA:0,0,0
16:34:04 F:0 SA:13,15,0 EVA:0,0,0
16:34:05 F:0 SA:13,15,0 EVA:0,0,0
16:34:06 F:0 SA:13,15,0 EVA:0,0,0
16:34:07 F:0 SA:13,15,0 EVA:0,0,0
16:34:08 F:0 SA:13,15,0 EVA:0,0,0
```

Method 2: Controller LEDs

Examine the L1, L2 LEDs on VarianHOME.

NOTE: The L3 LED will be off when no sensor is plugged in and Red when a sensor is incorrectly plugged in.

For each phase:

- 1) A Red LED indicates an unplugged sensor cable or the Sensor Amps detected has not exceeded 2% of the panel maximum in the past 24 hours. This warns of a potential sensor fault.

NOTE: Very low readings are uncommon but can occur if the panel is inactive. In this case, turn on some loads on the panel and confirm the LED turns Green.

- 2) A solid or blinking Green LED indicates the sensor is detecting Amps. The blink rate indicates the Sensor Amps detected as a percentage of the panel maximum:
 - a. Solid – 0-2%
 - b. Slow Blink – 2 to 50%
 - c. Medium Blink – 50 to 80%
 - d. Fast Blink – 80 to 100%

NOTE: Until the controller is fully configured, the sensed panel maximum defaults to 100A on VarianHOME.

- 3) A blinking Red LED indicates Sensor Amps detected are greater than 100% of the panel maximum. If this occurs, unplug any EV from the EV charger and contact Variablegrid tech support immediately for assistance.

If any LED is Red and the load on the panel is reasonably expected to be above 2%, unplug and plug in the sensor cable. If the issue remains, contact Variablegrid tech support immediately for assistance.

NOTE: Swapping cables between jacks can aid in troubleshooting, but confirm cables are in the correct jacks before leaving the site.

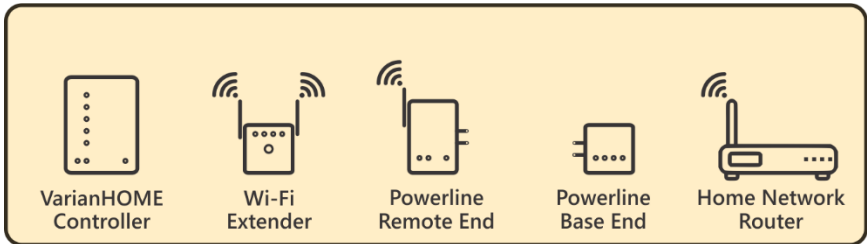
NOTE: Once a sensor is detecting Amps and displays a Green LED, the LED will remain Green even if the detected Amps falls to 0. To reset the sensor fault test, restart the controller or unplug and plug in the sensor cable.

6) VarianHOME Network Connection

VarianHOME connects to the home network using Ethernet only. It ships with a Variablegrid Wi-Fi extender and Ethernet cable to facilitate a Wi-Fi connection to the network.

NOTE: VarianHOME connects to the Internet for initial and periodic configuration, and to allow users to manage the EV Charger using the Variablegrid mobile app.

Key to Method Diagrams

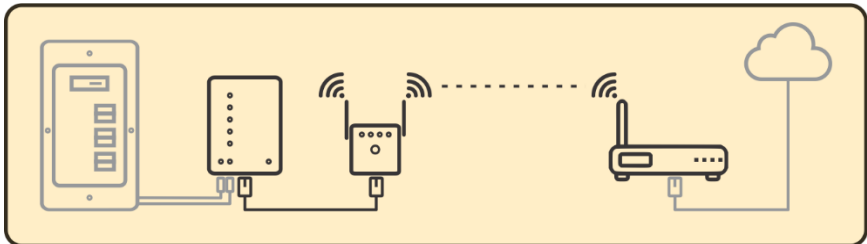


There are three methods of connection. Only one is required:

Method 1: Wi-Fi extender

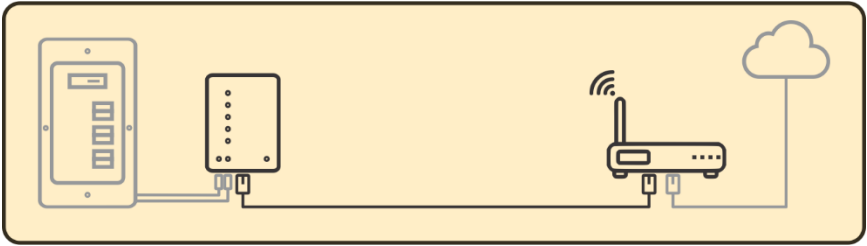
The supplied Variablegrid Wi-Fi extender must be plugged in at a location within Wi-Fi range of the home network router and within Ethernet cable range of VarianHOME.

Plug the supplied 1m or user-supplied Ethernet cable between VarianHOME and the extender.



Method 2: Direct cable connection

Plug a user-supplied Ethernet cable (100m maximum) between VarianHOME and the home network router.

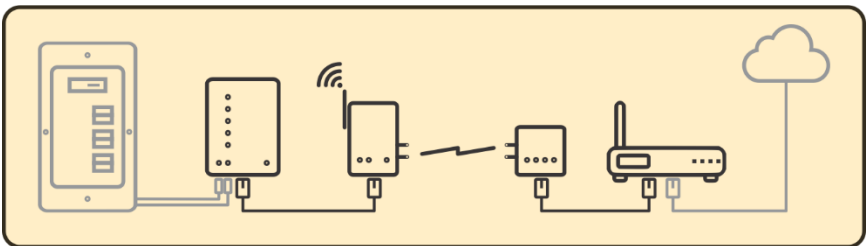


Method 3: User-supplied powerline extender

If the distance between VarianHOME and the home network router is too great for a Wi-Fi extender to function properly, a powerline extender may be used. This method transmits data through the existing home wiring. Both power outlets must run from the same subpanel.

To set up, connect an Ethernet cable between VarianHOME and the powerline extender's remote unit. Then, connect another Ethernet cable between the powerline extender's base unit and the home router.

NOTE: The extender must be configured and operating properly. If the extender is also to be used for EV Charger connectivity then it must have Wi-Fi capability, such as TL-WPA7517KIT.



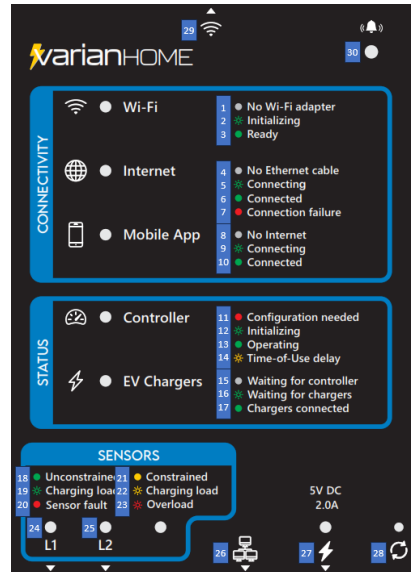
7) Confirming VarianHOME Connection

The Internet LED will turn Green when VarianHOME connects to the Internet. If the LED turns RED, check:

- 1) The Ethernet cable is securely connected (the Ethernet port on VarianHOME will display a blinking LED)
- 2) If using an extender, the LEDs on the extender indicate it is connected to the home network
- 3) The home Internet is working correctly

8) VarianHOME Indicators

Wi-Fi	
1	No Wi-Fi adapter inserted
2	Wi-Fi initializing
3	Wi-Fi connected
Internet	
4	No Ethernet cable installed
5	Ethernet initializing
6	Internet connected
7	Internet connection failure
Mobile App	
8	No Internet connection
9	Connecting to the cloud server
10	Connected to the cloud server
Controller	
11	Initial configuration required
12	Controller is initializing
13	Controller is operating normally
14	Time-of-Use delay period in effect
EV Chargers	
15	EV chargers waiting for the controller
16	Controller waiting for EV chargers
17	EV chargers detected
Sensors	
18	Building load is low
19	EVs are charging without restrictions
20	Sensor is faulty - Contact tech support
21	Building load is high - Controller is restricting charging
22	EVs are charging with restrictions
23	Building load is very high - Controller is suspending charging
24	L1 sensor input jack - Green LED detected, Red LED undetected
25	L2 sensor input jack - Green LED detected, Red LED undetected
Other	
26	Ethernet jack
27	5V power adaptor jack - Green LED power detected, Orange LED updating firmware
28	Reset button - Long-press to shutdown controller
29	USB Wi-Fi jack
30	SIGNAL button - Short-press to override the current or next Time-of-Use delay period



9) VarianHOME Configuration

After powering on VarianHOME, and waiting for the Internet LED to turn Green, follow these steps to configure settings:

- 1) Using a notebook, tablet or phone, open a browser and go to setup.variablegrid.com/VH

NOTE: Alternatively, scan the QR code printed on the back of VarianHOME.

- 2) Enter the Controller ID from the label on the back of VarianHOME (without "-") and press SUBMIT
- 3) Press the signal button at the top right corner of VarianHOME and press SUBMIT


- 4) Enter the settings in each section of the configuration form

NOTE: Do not touch Static IP Address unless instructed by Variablegrid.

NOTE: The RS48 serial number is the last 8 digits of the serial number printed on the case.

- 5) Complete the Warranty Registration section, click to accept the Terms of Service and press SUBMIT
- 6) Make note of the Access Code provided for linking to the Variablegrid mobile app

After VarianHOME has been on 6 to 8 minutes the Controller LED will turn Green to indicate the configuration has loaded successfully.

varianHOME
Configuration 

Controller ID : DKVONYS44B

Location Settings

Country

Region

Time Zone

Network Settings

Leave as is unless required by some older home networks. If required, enter an unassigned value (2 to 253) on the local subnet (251 is recommended). The full IP address must be manually configured in each charger.

Static IP Address

Electrical Settings

IMPORTANT: Electrical settings must be made by a qualified electrical contractor. Incorrect settings will result in improper operation and can result in injury and severe damage to the electrical system.

NOTE: Breaker Amps will be derated to 80%, i.e. 40 will allocate a maximum of 32 Amps.

Panel Amps

Sensor Amps

Breaker A Amps

Breaker B Amps

Breaker A Chargers

IMPORTANT: For Variablegrid RS40 Chargers enter ONLY the last 8 digits of the serial number.

Serial Number 1 *

Serial Number 2

10) RS48 Network Connection

The EV Charger connects to the home network using Ethernet or Wi-Fi. EV Charger configuration is explained in the next section.

NOTE: The EV Charger does not connect to the Internet but requires a connection to the home network to receive power allocations from VarianHOME.

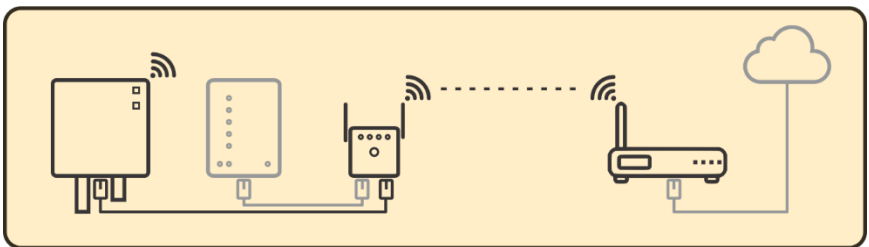
Method 1: Direct cable connection

For best performance, it is strongly recommended to install an Ethernet cable between the EV Charger and either (a) the home network router or (b) the 2-port Wi-Fi extender used by the VarianHOME (see Section 6, Method 1).

NOTE: Running the Ethernet cable to the extender is easiest if done at the same time as the electrical circuit for the EV Charger is installed.

Plug the Ethernet cable between the bottom of EV Charger and home network router or the 2-port Wi-Fi extender.

NOTE: The Wi-Fi interface remains active for EV Charger configuration but is not used for connectivity to the VarianHOME.

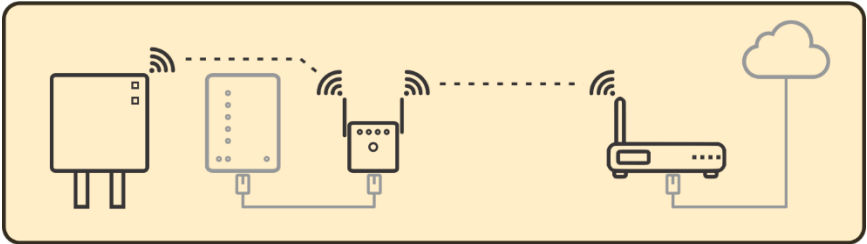
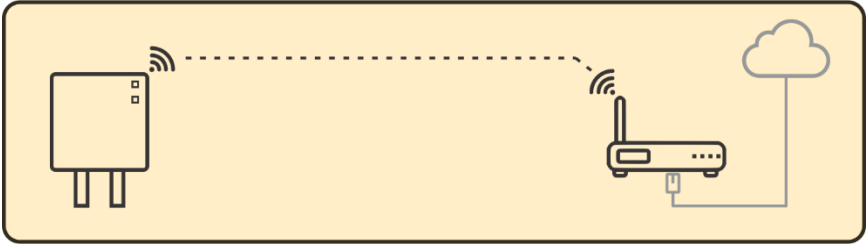


Method 2: Wi-Fi connection

When the distance between the EV Charger and either (a) the home network router or (b) the 2-port Wi-Fi extender is short, the signal strength of one or both SSIDs may be adequate for a Wi-Fi connection.

NOTE: Standing by the EV charger, use a phone or tablet to identify the strongest SSID on the home network. Use this SSID to configure the EV Charger in Section 11.

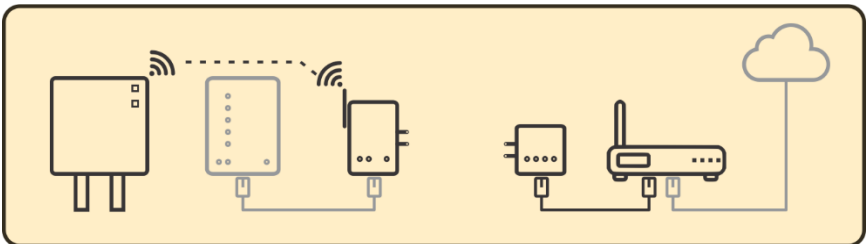
NOTE: A user-supplied extender with a strong signal may also be used.



Method 3: User-supplied powerline extender

If the distance between the EV Charger and the home network router is too great for a Wi-Fi extender to function properly, a powerline extender may be used. Both power outlets must run from the same subpanel.

NOTE: The extender must be properly configured and functioning. The extender must have Wi-Fi capability, such as TL-WPA7517KIT.



11) RS48 Configuration

The EV Charger connects to the home network using Ethernet or Wi-Fi. With no Ethernet cable inserted, access the RS48 configuration form:

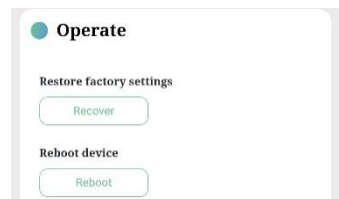
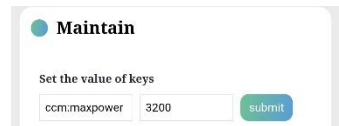
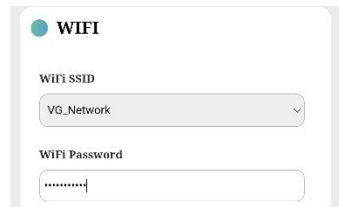
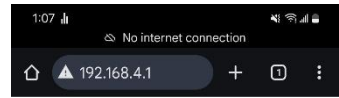
- 1) Using a notebook, tablet or phone, search for the open SSID EVC-xxxxxxx where xxxxxxx is the serial number of the EV Charger to be configured.

NOTE: The serial number is preconfigured as the last 8 digits of the serial number printed on the case.

- 2) Connect to the SSID (no password is required), open a browser and go to 192.168.4.1
- 3) Enter admin and admin into the Login page, and press Login
- 4) If using Wi-Fi, on the Device page choose the home Wi-Fi SSID with the strongest signal from the dropdown, enter the Wi-Fi Password, and press Submit

NOTE: Do not change any other fields on the Device page unless instructed by Variablegrid tech support.

- 5) If not using a 60A breaker, select the Maintain page, enter keys `ccm:maxpower` and `4000` (for 50A breaker) or `3200` (for 40A breaker), and press Submit
- 6) Power the RS48 off and on, or select the Operate page, and press Reboot



12) Confirming RS48 Network Connection

The upper LED on the EV Charger will initially blink Blue as the EV Charger attempts to connect to the Wi-Fi network. If it turns from Blue to Red the Wi-Fi connection has failed. If it turns from Blue to blinking Green the Wi-Fi connection has succeeded.

NOTE: The LED will then change to Green if the connection to VarianHOME has succeeded, or to Red if it has failed. See next section.

If an extender is used, the LED is only confirming a connection to the extender. LEDs on the extender confirm connection to the home router.

13) Confirming RS48 Connection to VarianHOME

The EV Charger requires a continuous connection to VarianHOME controller to receive the power allocations needed to charge the EV.

VarianHOME is ready to accept a connection from the EV Charger 6 to 8 minutes after powering on. The Controller LED will turn Green.

NOTE: If the Controller LED remains Red then VarianHOME has not received the configuration. Power VarianHOME off and on and wait 6 to 8 minutes.

When VarianHOME accepts a connection from the EV Charger the EV Chargers LED on VarianHOME will turn Green. If it remains off, check:

- 1) The serial number entered during VarianHOME configuration matches the Serial number field on the EV Charger configuration screen, and correct if needed
- 2) The Internet LED on VarianHOME is Green, indicating it is connected to the home network
- 3) The upper LED on the EV Charger is Green, indicating it is connected to the Wi-Fi and to VarianHOME

NOTE: The EV Chargers LED on VarianHOME will blink Green when VarianHOME is allocating power to the EV Charger.

If any checks fail power off the EV Charger and VarianHOME, power on VarianHOME and wait 6 to 8 minutes for the Controller LED to turn Green, then power on the EV Charger and wait 2 minutes.

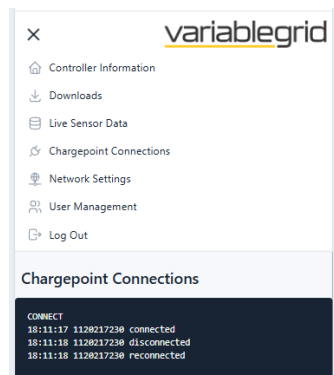
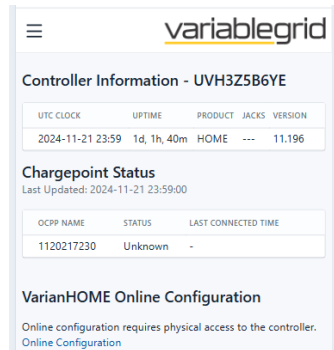
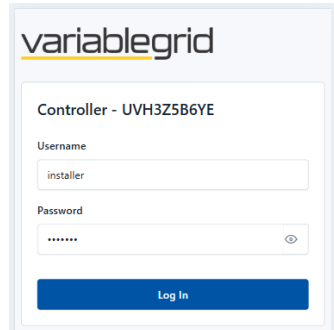
14) VarianHOME Advanced Troubleshooting

If the EV Chargers LED remains off, then advanced troubleshooting is available using the webform on VarianHOME.

- 1) Using a notebook, tablet or phone, open a browser and go to *varian.local*

NOTE: Some older networks require entry of the IP address assigned to VarianHOME by the home network router in place of varian.local.

- 2) Enter installer and Varian1 into the Login form and press Log In
- 3) The Controller Information screen provides basic information about the controller
- 4) If using a phone, display additional menu items by pressing the 3-bars icon at the top left
- 5) On the Live Sensor Data screen, the SA group displays the sensor current readings, and the EVA group displays the amps allocated to EV Chargers. The third value in each group will be 0
- 6) The Chargepoint Connections screen displays the Serial Number of EV Chargers as they connect and disconnect from VarianHOME. If this screen is empty then no EV Chargers have connected to VarianHOME. Contact support@variablegrid.com for assistance



15) Additional Troubleshooting Tips

Sensor Issues

⚠ Loose Sensor Clamps

- Problem: Intermittent readings due to poorly secured sensor clamps
- Prevention: Ensure locking bars are fully reinserted after installation
- Solution: Check and reseal sensor clamps, verify secure fit

⚠ Loose Sensor Cables

- Problem: Intermittent readings due to poorly seated sensor cables
- Prevention: Ensure plugs are fully plugged into jacks
- Solution: Unplug and replug sensor cables into jacks

Network Configuration Issues

⚠ Weak Wi-Fi Signal

- Problem: Intermittent connection between VarianHome and charger
- Prevention: Test signal strength before finalizing installation locations
- Solution: Install Wi-Fi extender or use powerline extender

⚠ IP Address Conflicts

- Problem: Network connection issues due to static IP conflicts
- Prevention: Only use static IP when specifically required and verified with Variablegrid tech support
- Solution: Reconfigure EV charger with correct URL

⚠ Incorrect Wi-Fi Settings

- Problem: Failed Wi-Fi connection due to invalid SSID or password
- Prevention: Double-check settings before submission
- Solution: Reconfigure EV charger with correct credentials

Configuration Issues

⚠ Incorrect Panel Capacity Settings

- Problem: VarianHOME using wrong maximum amp settings
- Prevention: Verify panel ratings before configuration
- Solution: Update configuration with correct panel rating

⚠ EV Charger Not Connecting to VarianHOME

- Problem: Missing or incorrect charger serial numbers in configuration
- Prevention: Confirm serial numbers before completing setup
- Solution: Update configuration with correct serial numbers

⚠ Time Zone Misconfiguration

- Problem: Incorrect charging schedules due to wrong time zone
- Prevention: Verify time zone during initial setup
- Solution: Update configuration with correct time zone

Troubleshooting Response Protocol

If issues cannot be resolved by the installer:

- Document the specific problem
- Take photos if applicable
- Contact Variablegrid tech support immediately for assistance

16) Variablegrid Mobile App

VarianHOME allows users to monitor and control EV charging using the Variablegrid Mobile App for iOS and Android. Installation steps:

- 1) Using a tablet or phone, search the Apple App Store or the Google Play Store for Variablegrid
- 2) Install and open the Variablegrid app
- 3) Click Allow Notifications if asked
- 4) Click Sign up at the bottom of the screen
- 5) Enter the 8-digit Access Code provided during VarianHOME configuration into the invitation code and press Continue
- 6) Complete the Create Account form and press Sign-up
- 7) Enter the chosen email and password and press Login

Users can also view a summary of recently completed transactions by opening a browser and entering *varianhome.com/{Access Code}*

VarianHOME Technical specifications

WEIGHT, DIMENSIONS, OPERATING TEMPERATURE

0.36 kg (0.8 lbs)

140 x 133 x 45 mm (5.5 x 5.25 x 1.75 in)

-40C to +50C (-40F to +122F)

POWER ADAPTER

120V 50/60Hz, Output 5V DC 2.0A

Cable length: 1.5 m (5 ft)

CURRENT SENSORS

Clamp-on 200A current transformers

Opening diameter: 19 mm (0.75 in)

Cable length: 2.4m (8 ft)

Contact Information



Address

Variablegrid Adaptive Power Inc.

969 W 1st St

North Vancouver, BC V7P 1A4



Phone

1-800-645-2314



Support Email

support@variablegrid.com



Website

www.variablegrid.com