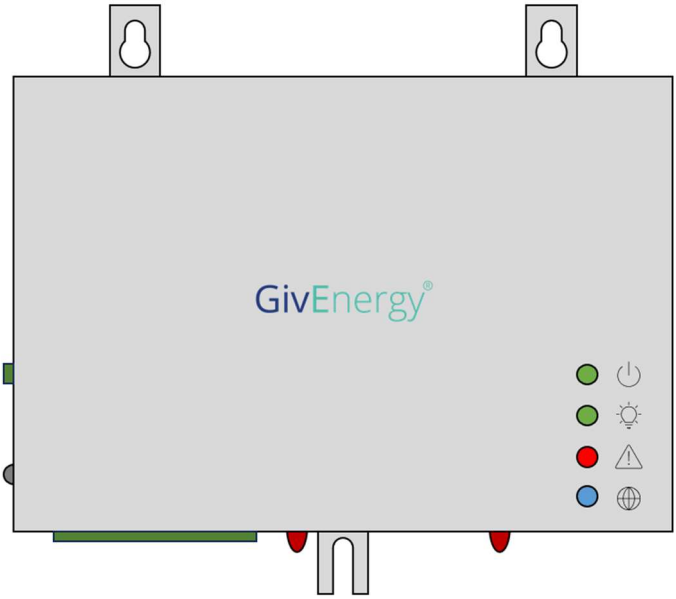


GivEnergy®
Commercial

EMS-C installation manual

1 Version history

1	Darren Brown	First release	17/11/2024
2	Darren Brown	Updates to match latest firmware version	02/01/2024
3	Darren Brown	Updated with more details on connectivity (pages 14-15)	07/01/2025
4	Darren Brown	Added additional steps to programming of CANBus ID's based on installer feedback	09/01/2024

Please note: *These instructions are up to date based on firmware version db_a1_23 released on 20/12/2024.*

This guide is intended for installers only, it must not be shared with End Users unless the default access passwords for the installer login are changed – Details on how to do this can be found in this manual.

2 Acronyms

CAIO – GivEnergy Commercial All in One. A 69kWh battery cabinet with built in 30kW inverter.

EMS – Energy management system. The controller of all components, this unit has all devices connected to it and allows the system to be programmed in the desired way.

SSID – Service set identifier, the name given to a WiFi network.

RSSI - Received Signal Strength Indicator, is a measurement of the strength of a wireless signal. It's a value that indicates how well a device can receive signals from a wireless access point or router.

Web Browser – The program on your device used to access the internet. Examples are Edge, Chrome and Safari.

Master – The main device with an ID number of 1. When fitting multiple CAIO's together one of them must be defined as the master. Master units have the EMS fitted to them.

Slave – Sub devices, when fitting multiple CAIO's together you have one master and the others are slaves. Slaves do not have an EMS installed to them.

CANBus - Controller Area Network Bus - This is a robust communication protocol that allows devices to share data efficiently and reliably in automotive, industrial, and automation systems.

EOL Resistor – End of line resistor. In a CANBus communication network devices are wired in series. At the end of the chain a 120Ω resistor is to be fitted. Each CAIO is fitted with a EOL resistor, these may need to be left fitted or removed as per this instruction manual.

3 Introduction to the EMS

EMS-C is our second-generation EMS, used to control Commercial Energy storage systems and designed for the Commercial All in One (CAIO).

EMS-C brings multiple Inverters, Batteries and Meters together to create one point of control for multiple CAIO's and other Commercial systems.

The EMS is the user interface for the CAIO and the point of connection to the online portal allowing users to monitor and control their system remotely.

3.1 Installation instructions

EMS-C simply hooks on the door of a CAIO, it is then locked into place with a securing bolt. The WiFi antenna can then also be attached to the EMS along with LAN cable if fitted.

Full installation instructions can be found in the CAIO installation manual, a few key points to check to ensure successful commissioning of an EMS-C are;

- A 'master' CAIO is defined, this cabinet should be at the start or end of the communication cables joining the CAIO's together. We recommend that the EMS is installed in the left most CAIO.
- The CANBus BMS links are removed from all CAIO's apart from the one furthest away from the Master CAIO and EMS. We recommend that the BMS link is only left installed in the right most CAIO.

Once the EMS is installed, power it up by pressing the Red power button on the high voltage box in the Master CAIO, the same unit that the EMS is fitted to.

3.2 Training

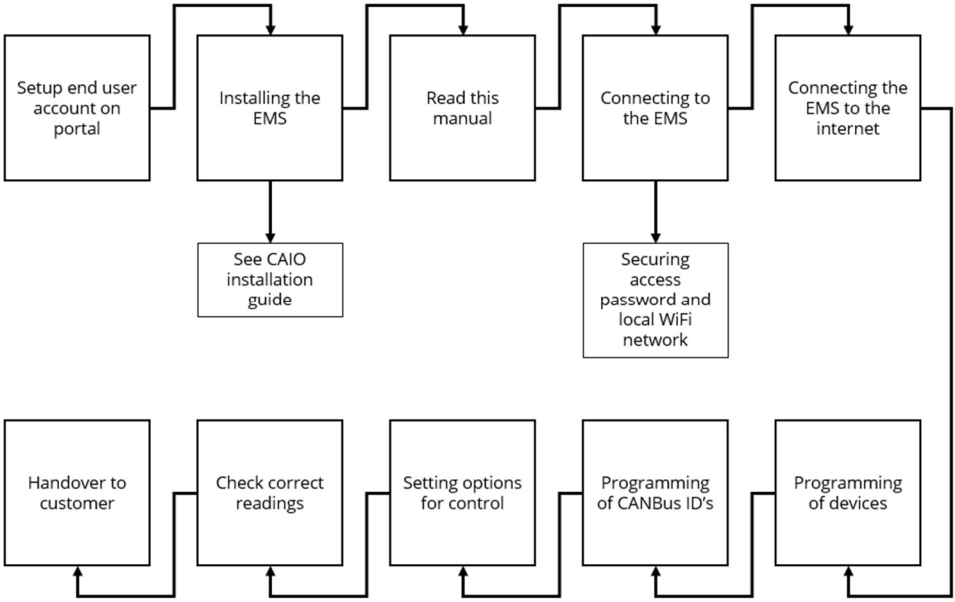
GivEnergy Commercial All-in-One's and EMS-C must be installed by trained persons only, the training course can be found and booked via Eventbrite.

3.3 Portal

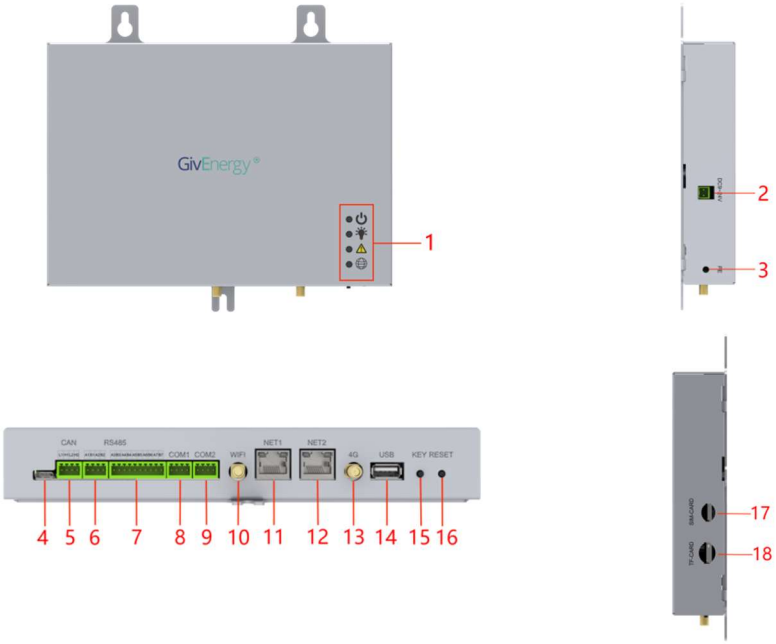
The EMS must be connected to our online portal, to achieve this your customer will require an End User account, you will require an Engineer and Company account to set this up.

4 Quick start checklist

5 Commissioning stages



6 Description of lights and connectors



1	Status LED's	7	RS485 interface (3, 4, 5, 6, 7 & 8)	13	4g antenna connector
2	24v power supply	8	Com1 interface	14	USB A
3	Ground terminal	9	Com2 interface	15	Key button
4	USB C	10	WiFi antenna connector	16	Reset button
5	CAN interface (1 & 2)	11	NET1 - Setup	17	SIM card
6	RS485 interface (1 & 2)	12	NET2 - Internet	18	TF card
Items in Grey are not currently used/support					

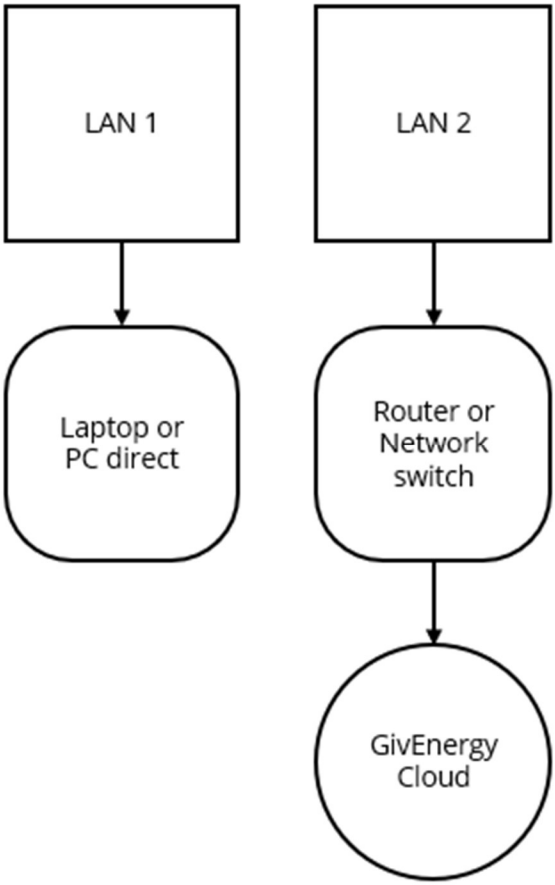
Hint: *Take a picture of the details on the back of the EMS, these will be useful in the setup process.*

6.1 WiFi connections

Please make sure the WiFi ariel is securely screwed onto the WiFi antenna connection point. The antenna can be found in the EMS-C box.

6.2 LAN connections

EMS-C has two LAN connections, port 1 is used for local direct communication and setup, port 2 is used for internet/LAN network connectivity.

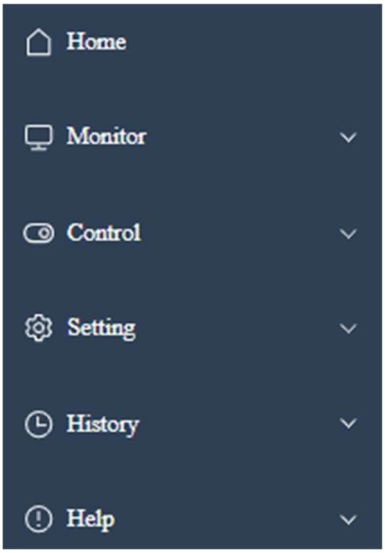


7 EMS-C user interface

The user interface is design to be simple to use and give full access to information regarding the systems operation. End Users should normally use the online monitoring portal to view and control their system, but local access is possible.

7.1 Menu layout

The EMS has 6 main menu options on the left;



Home – Display's basic information for the EMS and the devices connected to it.

Monitor – Displays detailed information from the EMS and the devices connected to it.

Control – Used for initial system setup and diagnostic purposes.

Setting – Used to adjust all parameters related to system setup and control.

History – Displays historic system data and faults.

Help – Displays debugging and version information.

At the top right of the screen 3 icons show;

Left - Language switch – Toggles display language.

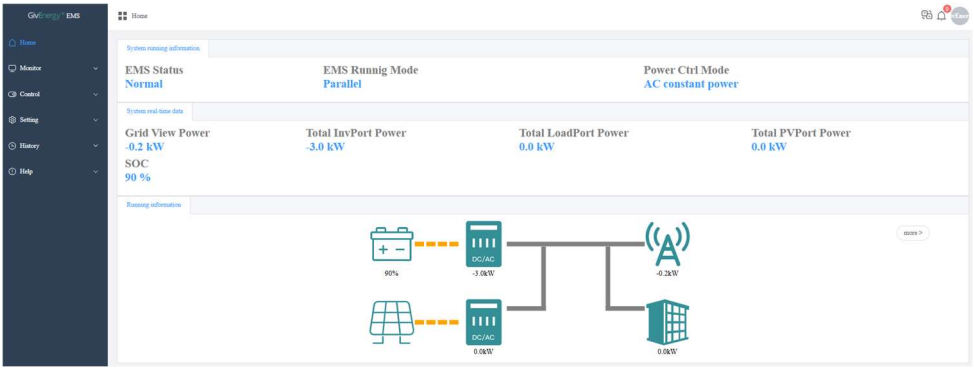
Centre - Alarms – Shortcut to alarms page.

Right - User information – Displays current user and links to logout and change current user password.

7.2 Home

The home screen displays in two different ways. By default, it will display the EMS summary page.

7.2.1 EMS Summary



This page has three sections;

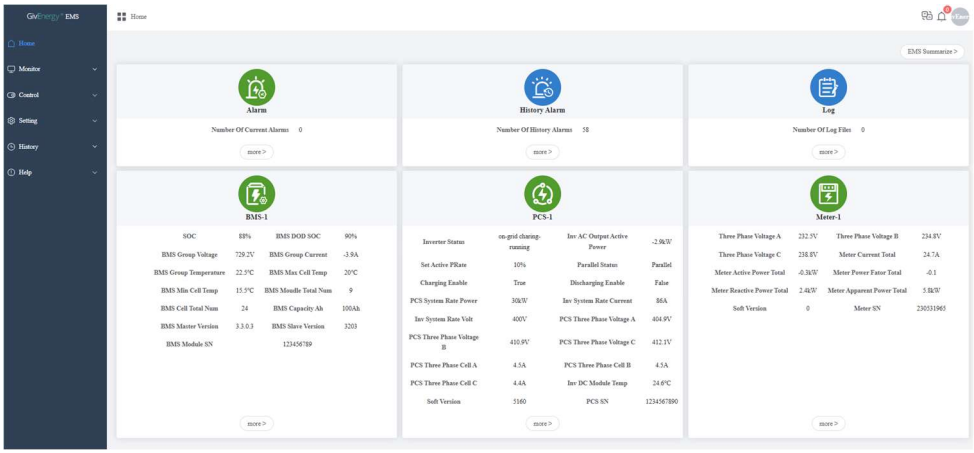
System running information – Basic operation details

System real-time data – Basic overall system power levels

Running information – Pictural display of system power levels

Clicking the more button within Running information will toggle the display to EMS details overview.

7.2.2 EMS detailed overview



This page has a section for each of the device's setup and connected to the EMS, the number of sections displayed will vary depending on the current quantity of Meter, PCS and BMS setup.

Each section shows basic operating data from the device and includes a button to display more detailed data of that device – See Monitor section of this guide for information.

This page will always display Alarm, History Alarm and Log at the top.

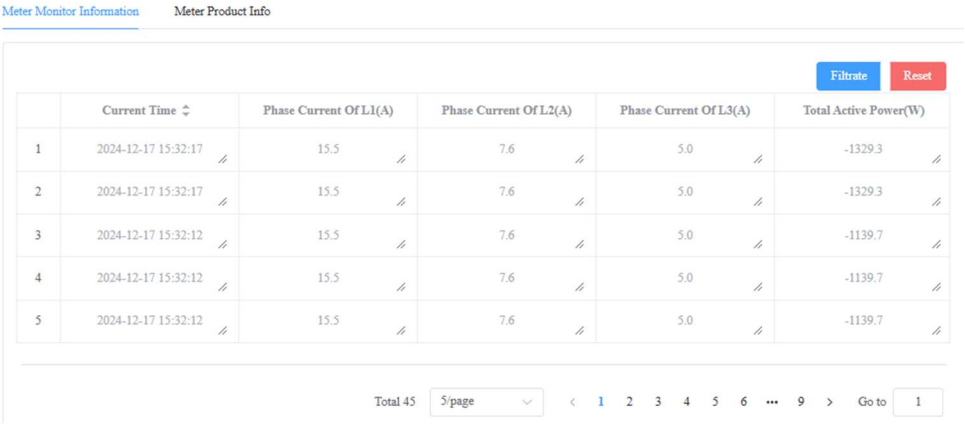
The Icon colour of each PCS, BMS and Meter will be Green if a device is actively connected or Grey if lost.

Note: *It can take approximately 30 seconds for an item to be registered as lost/disconnected.*

7.3 Monitor

These pages display detailed information of each of the devices connected to the EMS along with active Alarms. Each device and the EMS has own sub-menu under Monitor on the main menu so the number of menu items will vary depending on the current quantity of Meter, PCS and BMS setup.

These pages can also be accessed by pressing the more button on any section with EMS Detailed Overview.



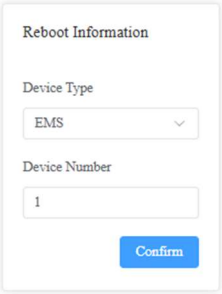
The data displayed on each devices monitor page can be adjusted to any of the available parameters, use the filter button at the top to select the required parameters and then confirm to set them up.

By default, this data is updated every 1 second.

7.4 Control

These pages allow for remote control of the EMS and each of the devices connect to it.

7.4.1 EMS



EMS info – This section allows the programming of the CANBus ID's of the PCS and BMS within each CAIO – please see page 17-18 for more details.

Reboot - This section allows the EMS or any of the connected PCS or BMS to be restarted. Please note that none of the CAIO should be running when performing a restart, turn them off following the shutdown instructions before restarting.

7.4.2 PCS

Each of the connected PCS has its own sub-menu under Control. On each PCS Control page it is possible to see the current charge or discharge kW being requested of the EMS.

The start/stop button can be used to turn On/Off individual PCS, leaving other units operational.

7.5 Setting

These pages allow for operation parameters to be adjusted.

7.5.1 System

UI Control – Adjust the frequency of how often the EMS user interface updates, default is 1 second.

Sys time – Adjust the EMS time and date.

Network – Adjust networking parameters.

Update – Upload and install updates local to the EMS.

7.5.2 EMS

EMS info – configure the setup parameter of the system.

Charge periods – Set up to 10 charge periods and the maximum SOC % for each.

Discharge periods – Set up to 10 discharge periods and the minimum SOC % for each.

Import energy prices, Export energy prices and Energy price settings – Reserved for future half hour based tariff control.

7.5.3 BMS

View and Set BMS details including serial number, number of battery packs, number of cells and cell Ah – This information is auto completed and should not require user input.

7.5.4 PCS

View PCS serial number.

8 Connecting to EMS-C

The first step of commissioning is to connect a laptop or equivalent mobile device to EMS-C.

8.1 Connecting via WiFi

A WiFi network with a SSID of the WiFi serial number of EMS-C will be available, this will follow the format of '**WC1234G123**', this can also be found on the rear of the EMS. The default password for this network is '**123456789**'.

Note 1: *Some older version of firmware may have the WiFi SSID set to '**test**' not the WiFi serial number, this name can be changed in the WiFi settings page.*

Note 2: *If a WiFi network cannot be seen please see troubleshooting at the end of this guide.*

8.2 Connecting via LAN

Connect your laptop via network portal LAN1 – Setup, set your LAN network to the same IP address range as the EMS.

EMS IP address: **192.168.100.230**
Subnet: **255.255.255.0**
Gateway: **192.168.100.230**

Note: *Set your IP address between 192.168.100.1 and 192.168.100.255, excluding 192.168.100.230.*

8.3 Establishing connection

Once connected to the EMS' network via WiFi or LAN open a web browser and navigate to '**https://192.168.100.230/index.html**'. The username required for installers is '**Installer**' and a default password is '**12345678'**, when you first login a prompt will require the default password to be changed. This password should be unique and **must not** be shared with the end user.

8.4 Direct connection for an end user

If the end user wishes to login to their system directly, a different username is available for them to use, the method to access the system is the same. The username '**User**' password '**12345678'**, when they first login a prompt will require the default password to be changed also.

Three connection options existing;

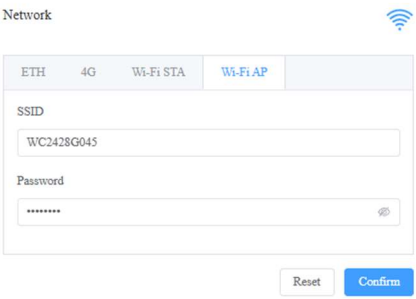
1. As per the instructions in step **8.1**
2. As per the instructions in step **8.2**
3. As per the instructions in step **8.5**

8.5 Finding EMS-C on a local network

It is possible to find and connect to EMS-C once it is connected to a local network, if the IP address is static or known open a web browser and navigate to **https://xxx.xxx.xxx.xxx/index.html** where **x** represents the IP address. If the IP address is not known this can be found in the network equipment's connected devices list or via a number of different methods which can be found by an internet search "How to find the IP addresses of devices connected to my network".

8.6 Securing the EMS access

Both the network used to connect to EMS-C and the login password must be secured and the default password changed, the EMS will prompt you to do this every time you login if not changed.

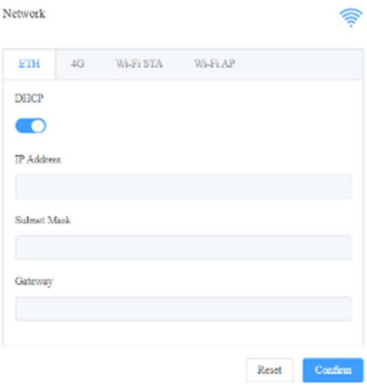


To change the settings of the local network go to **Menu > Setting > System > Wi-Fi AP**.

We recommend setting the SSID to the WiFi serial number of EMS-C, this can be found on the rear of the EMS and will follow the format of 'WC1234G123'.

9 Configuring internet connectivity

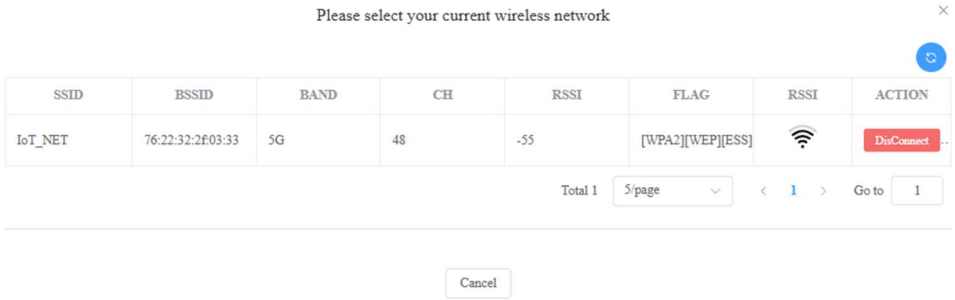
EMS-C can be connected to the internet via WiFi or LAN.



If using LAN simply plug the cable into NET2 of the EMS, it is possible to setup a static IP address if required. The settings for this can be found under **Menu > Settings > System > Network > ETH.**

Note: The system is automatically set to DHCP, turn Off the slider to enable static IP.

If using WiFi this can be setup under **Menu > Setting > System > Wi-Fi STA**, press the Blue WiFi symbol to reveal the WiFi search page. Select the required network from the list and then enter the password as required.



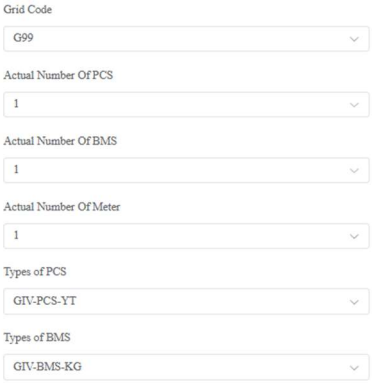
Note 1: An RSSI of between 0 and -60 represents a strong signal.

Note 2: It is also possible to enter the network details manually, be careful to ensure correct spelling, Capital letters and spaces as any characters that do not exactly match will prevent the EMS from connecting to the network.

Successful connection to the internet is defined by the Blue status LED on the front of the EMS.

10 Programming of devices

The EMS needs to be setup to communicate with the correct number of PCS, BMS and meters. This step should be completed before turning on the AC or DC MCB's in any of the CAIO's.



Go to **Menu > Setting > EMS**, in the **EMS info** section check and adjust as required the following settings;

Grid code	G99
Actual number of PCS	Quantity of CAIO installed (1 to 6)
Actual number of BMS	Quantity of CAIO installed (1 to 6)
Actual number of Meter	Quantity of Meters installed (1 to 3) 1 – Grid meter 2 – PV meter 1 3 – PV meter 2
Type of PCS	GIV-PCS-YT
Type of BMS	GIV-BMS-KG

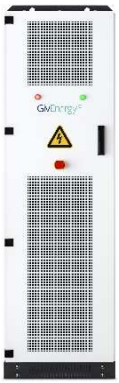
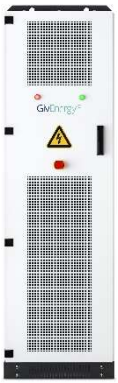
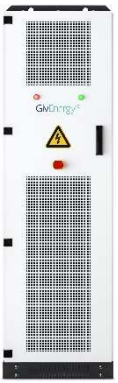
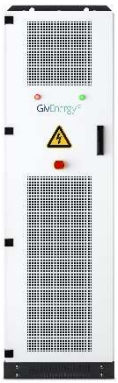
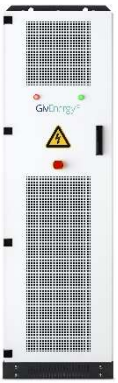
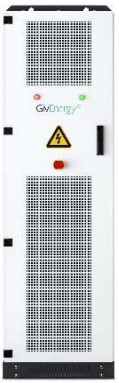
Press **Confirm** to save settings.

Once complete EMS detailed overview, Monitor, Control and Settings menus will all update with the number of CAIO's and meters that have been programmed.

11 Programming of CANBus ID's

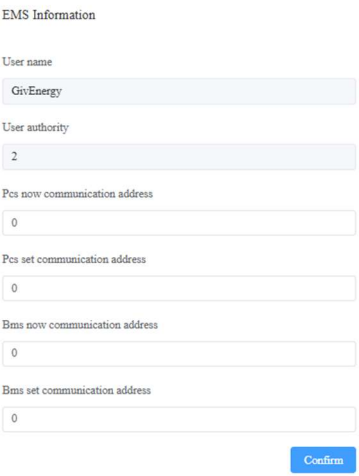
This section does not apply when only one CAIO is fitted.

When installing multiple CAIO's the CANBus ID of each of the PCS and BMS must be configured as from the factory they are all set to ID #1.

						
ID	Master	Slave 1	Slave 2	Slave 3	Slave 4	Slave 5
EMS	Yes	No				
EOL resister	No					Yes
CANBus ID PCS	1	2	3	4	5	6
CANBus ID BMS	1	2	3	4	5	6

As per the installation instruction of the CAIO, EMS-C should be fitted to one end of a line of CAIO's and the end of line resister only left in place in the opposite end.

Please ensure the steps on the next page are followed carefully, they are written in an order to achieve successful commissioning. If the steps are not followed correctly it will require troubleshooting.



The EMS is powered up from BMS within the Master cabinet so this must be the last unit to be programmed, the BMS in the master CAIO must be turned on throughout all steps of this process. The programming page is accessed by navigated to **Menu > Control > EMS > EMS Info.**

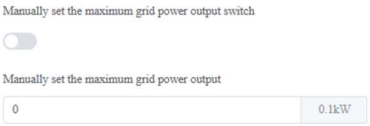
1. Ensure that the BMS power is On in the master cabinet containing the EMS, this will need to stay On throughout steps 2 - 9.
2. Turn On the AC MCB and BMS power button in the CAIO to be programmed, starting with CAIO 2 then 3, 4, 5 and 6 as required.
3. Set 'PCS now comm addr' and 'BMS now comm addr' to **1**.
4. Set 'PCS set comm addr' and 'BMS set comm addr' to the required number.
5. Click **Confirm.**
6. Turn Off AC MCB and BMS power button in the CAIO being programmed.
7. Repeat steps 2 – 5 for all remaining slave units, adjusting the number in step 3 each time.
8. In the above steps the BMS in the master CAIO will be set to address 2, this now needs to be put back.
9. Set 'BMS now comm addr' to **2** and 'BMS set comm addr' to **1.**
10. Turn off BMS power of the Master CAIO to restart the EMS and BMS.
11. Turn On all AC MCB's and BMS power buttons.

To confirm successful programming navigate to the home page and select EMS detailed overview, you should now see battery voltage on all BMS and AC voltage on all PCS. If not, please refer to troubleshooting.

12 Control options

The EMS will by default aim to keep grid import/export to 0kW by adjusting charge and discharge rates of the battery system. Three additional settings are available to give further control.

12.1 Import limitation



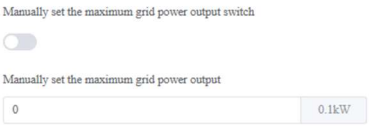
This setting is used to restrict the charge rate of the system to prevent grid import going above the set limit during an AC charge period.

To enable this setting;

1. Navigate to **Menu > Setting > EMS > EMS info**
2. Turn on 'Max input grid power switch'
3. Set 'Max input grid power' to the desired value in 0.1kW increments
4. Press **Confirm**

E.g. to set a grid import limit to 150kW the value used would be 1500.

12.2 Export limitation



This setting is used to restrict the discharge rate of the system to prevent grid export caused by the battery during Automatic or timed discharge operation.

To enable this setting;

1. Navigate to **Menu > Setting > EMS > EMS info**
2. Turn on 'Max out grid power switch'
3. Set 'Max out grid power' to the desired value in 0.1kW increments
4. Press **Confirm**

E.g. to set a grid export limit of 50kW the value used would be 500.

12.3 Peak shaving

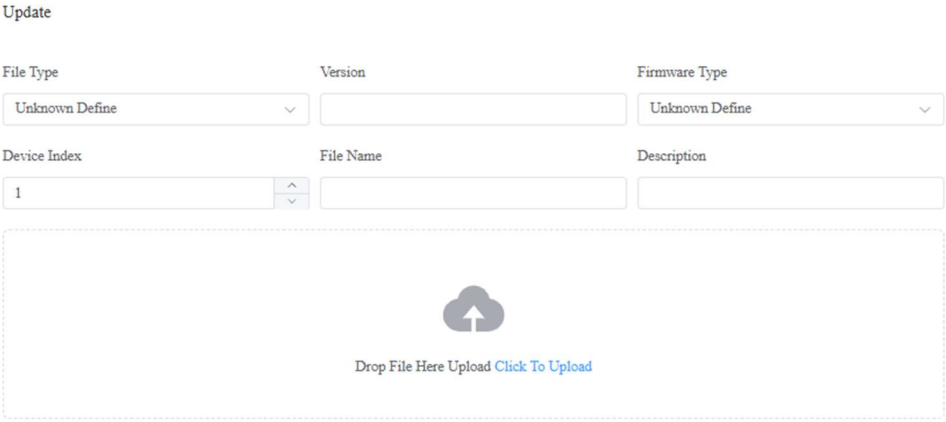
This setting is used to alter the point at which the battery discharges, it is useful if a site needs to reduce the peak energy usage but not have the battery discharge to all loads.

To enable this setting;

1. Navigate to **Menu > Setting > EMS > EMS info**
2. Turn on 'Cut Peak Power switch'
3. Set 'Cut peak power' to the desired value in 0.1kW increments
4. Press **Confirm**

E.g. to set peak shaving at 40kW the value used would be 400, this will mean that the battery will only begin to discharge when import is greater than 40kW.

13 Updating the firmware



The firmware update is simple, drag all given files into the drag and drop area on the firmware page, this can be accessed by **Menu > Setting > System > Update**

Once completed the EMS then needs to be restarted. See page 11 for details.

Current firmware version can be found under **Menu > Help > About.**

Installer and End User firmware updates should not normally be required and in most circumstances firmware updates can be completed using the online portal remotely.

14 Troubleshooting

14.1 No WiFi network showing – How to connect via LAN

If no WiFi network is being transmitted by the EMS it may be on an older firmware version, version db_a1_19 or newer is required for WiFi setup functionality.

Try using an Ethernet cable to connect a laptop directly to NET1 on the EMS.

The EMS' local access WiFi details can now also be checked as per the instructions earlier in this guide.

14.2 No data showing from one or more PCS / BMS

If you have made a mistake or the programming seems not to have saved, it is easy to identify and correct.

Turn all Slave PCS' and BMS' Off, navigate to EMS detailed overview on the home page and review which PCS and BMS ID's are showing as green – please note that the system may take up to 30 seconds to change between green and grey. The master CAIO should show PCS-1 and BMS-1 as green, if any others are green then the CANBus ID's are set incorrectly. Take note of which ID is green and use this number in step 2 of the programming CANBus ID's section.

This process can then be repeated for the other CAIO's, remember that the Master CAIO BMS must be left turned on to power the EMS – this may cause the Master BMS to change from ID #1 so this will have to be checked and reset at the end of the process.

Note: *If you need to only program the CANBus ID of a BMS or PCS individually setting an address of 0 will prevent unwanted changes to the other device.*

15 Support

The GivEnergy Commercial team are on hand to support if you do get stuck or have any questions/problems with your installation.

The best way to get in touch is via email – commercial@givenergy.co.uk

Alternatively you can call us on 01377 252 874 and ask for the GivEnergy Commercial team.

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