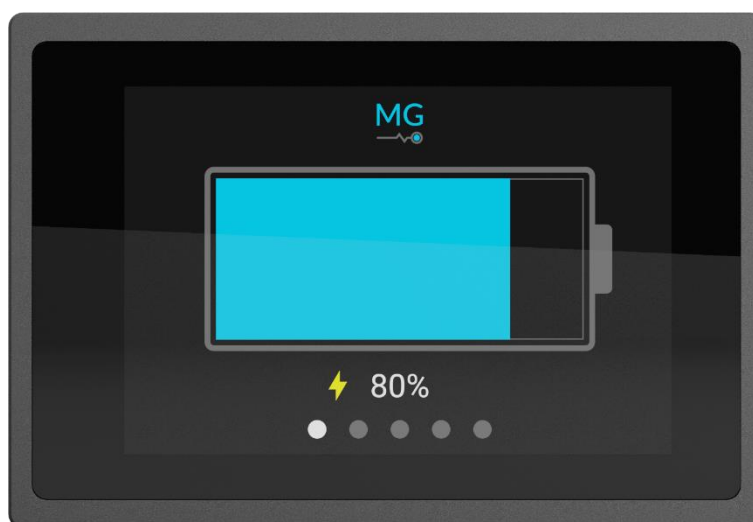


MG Energy Monitor

MGEMD010001

User Guide EN



Version: 1.0
Date: 26-03-2020

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1 Table of contents

1	GENERAL	5
1.1	Document history	5
1.2	Terms, definitions, and abbreviations	5
2	User interface.....	6
2.1	General information.....	6
2.1.1	Status icons	6
2.1.2	Default interactions	7
2.2	Page map.....	8
2.3	Main page indication	9
2.4	Minimal start.....	9
2.5	Expanded start.....	9
2.5.1	Value selection.....	9
2.6	Devices	10
2.6.1	System.....	10
2.6.2	Master.....	11
2.6.3	Battery.....	12
2.7	Alarms	13
2.7.1	Detailed alarm.....	13
2.8	Settings.....	14
2.8.1	About.....	14
2.8.2	Device settings	15
2.8.3	System settings	16
2.9	Pop-ups	17
3	Commonly used interactions	18
3.1	Navigating the main pages.....	18
3.2	Navigating tabbed pages.....	19
3.3	Navigating lists	19
3.4	Using the keyboard	20
3.5	Change system name	21
3.6	Change protection level.....	22
3.7	Change extended start page parameters	23
3.8	Enable Wi-Fi	24
3.9	Change display brightness	25

3.10 Change battery strategy..... 26

4 CONTACT DETAILS..... 27

1 GENERAL

Before continuing, read the information in this chapter carefully and be sure this is fully understood. If there are questions after reading, please consult MG Energy Systems.

1.1 Document history

Table 1 - Document history

Revision	Date	Changes	Revision author
0.1	26-03-2020	Initial document.	Diederik Glashouwer
1.0	15-5-2020	Minor changes.	Mark Scholten

1.2 Terms, definitions, and abbreviations

Battery system	A battery system consists of one or more battery modules in combination with one or more battery management controllers.
BMS	<i>Battery Management System</i> ; The BMS is the electronics that monitors the battery cell parameters to keep it within the operation specifications.
EMS	<i>Energy Management System</i> ; The EMS controls all power sources and consumers in a system.
CAN-bus	<i>Controller Area Network bus</i> ; CAN-bus is a standard serial data bus that provides data communication between two or more devices.
SoC	<i>State-Of-Charge</i> ; is the remaining capacity in a battery cell or module in percent (%).

2 User interface

2.1 General information

The display has a number of main pages the user can switch between, each page has a different function suited for a specific purpose. Generally, there are a number of default colours used to indicate certain states or properties of a value, namely:

- White: variable or active item
- Grey: description or inactive item
- Blue: highlight, description or active button
- Orange: warning
- Red: error











On both of the start screens (see 2.3 and 2.5) an orange warning or red error icon can be shown, touching this icon will take the user to the relevant page. Here a status message will be shown indicating what is causing the issue.

The Energy Monitor has a capacitive touchscreen allowing smooth and accurate user interaction. Using the touchscreen, the user can swipe left and right to switch between the different main pages described in the rest of the sections in this document, while swiping up or down will scroll through lists. In Table 3 a number of common buttons are shown, these are used across the user interface of the Energy Monitor and are used for most of the user interactions.

2.1.1 Status icons

A number of status icons can appear in the top right of each of the main pages. These give the user a quick indication about the status of the Energy Monitor.










Table 2 - Status icons

Icon	Function
	Wi-Fi connected
	Establishing Wi-Fi connection
	Wi-Fi connection failed
	Portal connected
	Establishing connection to portal
	Portal connection failed
	Full synchronisation detected
	Synchronising with the system failed
	Developer mode unlocked
	Demo mode enabled

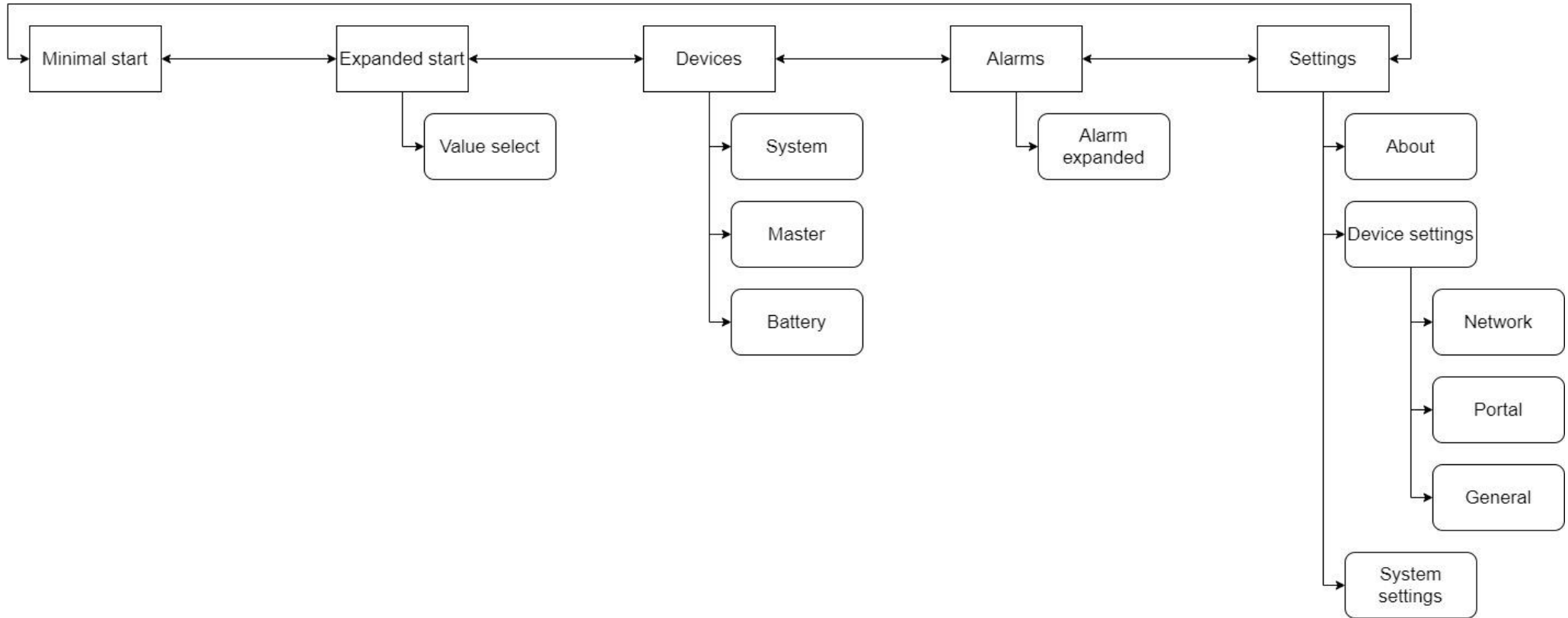
2.1.2 Default interactions

The Energy Monitor has a capacitive touchscreen allowing smooth and accurate user interaction. Using the touchscreen, the user can swipe left and right to switch between the different main pages, while swiping up or down will scroll through lists. In Table 3 a number of common buttons are shown, these are used across the user interface of the Energy Monitor and are used for most of the user interactions.

Table 3 - Default buttons

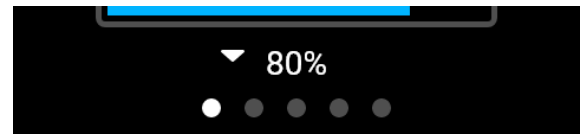
Icon	Function
	Go back to previous page
	Scroll up or down on a list. Greyed out icons indicate the end of a list.
	Toggle button. Enables or disables a particular setting or function.
	Increment or decrement the value. When not available the icon will turn grey.
	Touch to show keyboard.
	Show or hide variable, used for fields like passwords.
	General purpose button, will have text indicating its function.
	Clicking this button will show a page where more information will be available.
	Icons indicating which one of the main pages the user is looking at.

2.2 Page map



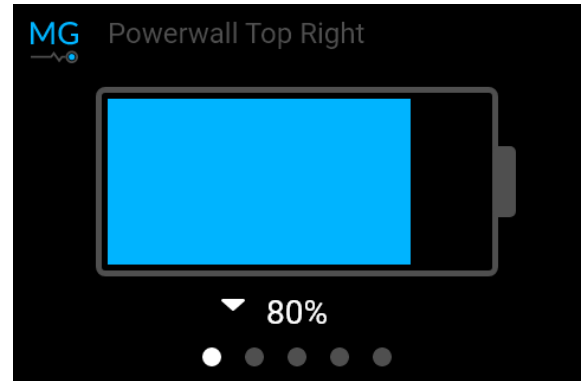
2.3 Main page indication

There are five main pages. These pages are indicated at the bottom of the screen with five dots. The white dot is the current page. Swiping to left or right will change from page.



2.4 Minimal start

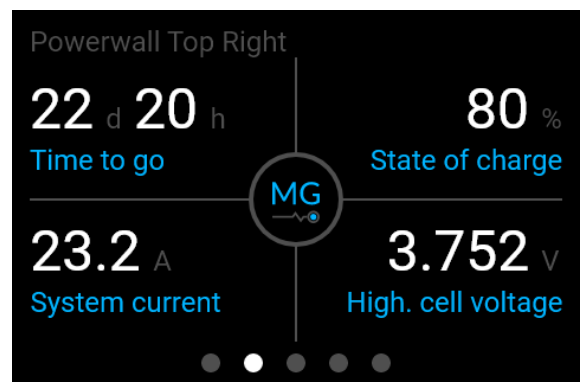
This page shows a graphical representation of the state of charge of the system, as indicated by the percentage of the battery icon that is filled in. Below this icon is the current state of charge as a numerical percentage. If the system is currently charging or discharging this is indicated by an arrow pointing respectively up or down.



The minimal start page is one of the two options for the default start up screen of the Energy Monitor. Default the monitor will use minimal start as the start screen.

2.5 Expanded start

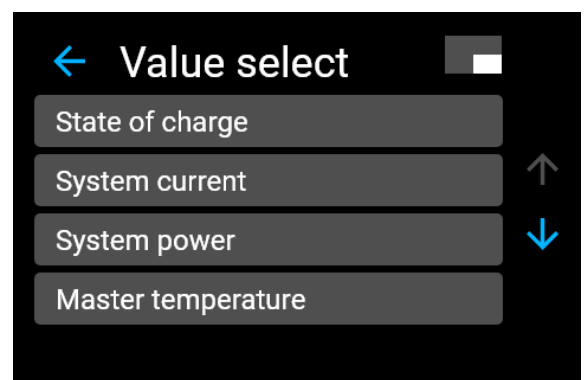
Expanded start shows 4 parameters in an easy to read way. The four parameters shown are customisable by the user, allowing the user to adapt the Energy Monitor to their specific use case. The parameters can be chosen from a list of values. To change what parameters are shown all the user has to do is touch and hold down any of the 4 values for a short while. This will show the 2.5.1 Value selection Page



The expanded start page is the second of the two options for the default start up screen of the Energy Monitor.

2.5.1 Value selection

On the value selection page, the user can choose a new value for any of the four quadrants of the extended start page. An icon in the top left indicates where the new value will be shown, this value can be selected from a scrollable list. Swiping up or down will scroll through the list, as will pressing the up and down buttons.

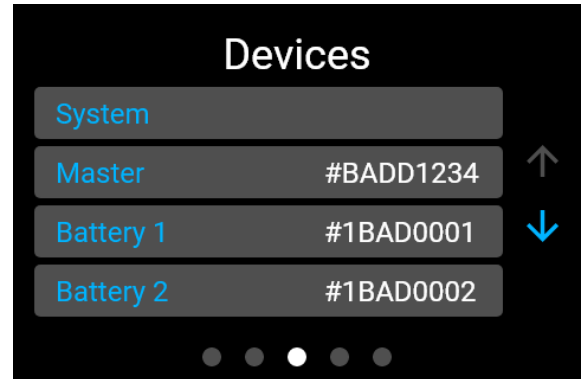


When the user presses on the new selection the view will go back to the previous page and the selection will be saved. If the user wants to go back without saving their selection, pressing the back button will change the view back to the previous page without making any

changes. The selection of variables depends on what type of master unit is connected.

2.6 Devices

The Devices page shows an overview of all the devices in the connected system. By using the arrow buttons or swiping up or down it is possible to scroll through the devices. Clicking on any of the buttons will show specific information about the selected device.

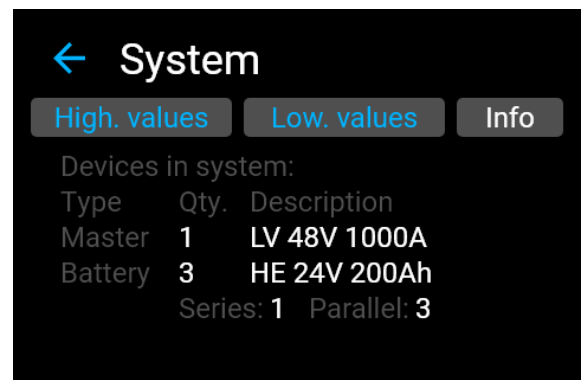
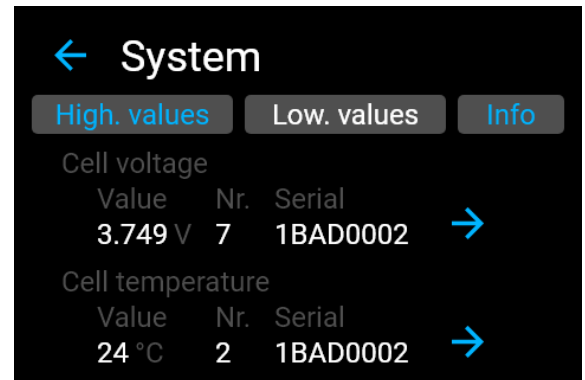
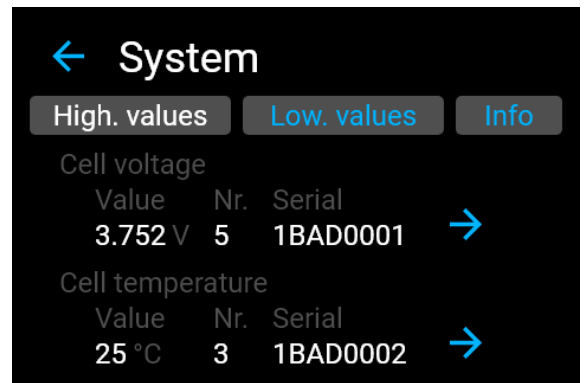


2.6.1 System

On the System page the user has a choice of three tabbed pages: highest values, lowest values or information about the system.

On the highest and lowest values pages the extremes of the voltages and temperatures detected in the system will be shown. For each value the sensor number and unique serial number of the battery that detected them is shown along with a button to directly jump to that battery.

On the information tab the user can see information about the connected system, like the number of batteries in series or parallel.



2.6.2 Master

On the Master page a number of variables collected by the connected master are shown. What values are available depends on the type of master connected.

The current status messages of the connected master are shown on the status tab. This list contains messages like: contactor closed, battery temperature warning or charge allowed. These messages allow the user to monitor the system and allow for the possibility of pinpointing an issue before it becomes a problem.

The user can get information about the selected device on the info tab. On this page the type and the version numbers of the device are shown.

← Master: BADD1234

Values	Status	Info
System voltage:	25.425	V
System current:	-0.121	A
State of charge:	63	%
Master temperature:	23.59	°C
IO plus voltage:	25.425	V
IO minus voltage:	23.719	V

← Master: BADD1234

Values	Status	Info
Started up		
Charge allowed		
Discharge allowed		↑
Contactor closed		
Programmable relay activated		↓

← Master: BADD1234

Values	Status	Info
State:	OK	
Type:	LV 48V 1000A	
Version number		
Hardware:	0.6	
Software:	1.15	

2.6.3 Battery

The battery page has three tabbed pages where information about the selected device can be found. The unique identifier of the selected device is shown in the title of the page.

The cell voltages page shows the voltage of each individual voltage sensor in the selected battery. The number of sensors and values varies for each battery type.

Selecting the temperatures tab will show the temperatures of the internal battery modules. The number of sensors varies by battery type.

On being pressed by the user the value will turn blue and show the sensor number, this is to easily identify what sensor number corresponds to what value being displayed.

On the info page the battery type and the version numbers of the device are shown, as well as the current status of the device.

← Battery: 1BAD0001

Cell voltages	Temperatures	Info
3.738	3.738	3.738
3.738	3.738	3.738
3.738	3.738	14
3.738	3.738	3.738
3.738	3.738	3.738

In Volts

← Battery: 1BAD0001

Cell voltages	Temperatures	Info
25	25	25
25	25	25
25	25	17
25	25	25

In degrees Celsius

← Battery: 1BAD0001

Cell voltages	Temperatures	Info
State: OK		
Type: HE 24V 200Ah		
Version number		
Hardware: 0.4		
Software: 1.8		

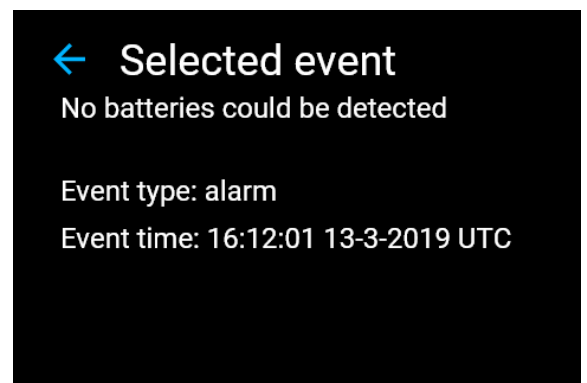
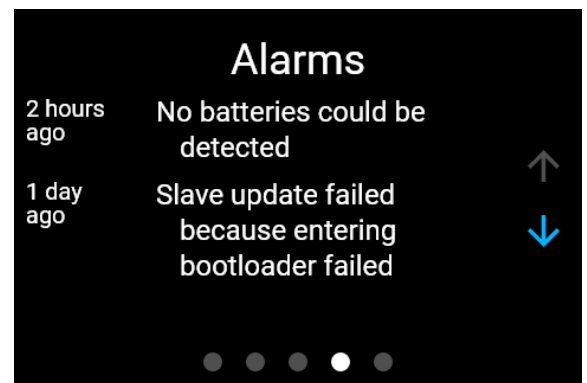
2.7 Alarms

The Alarms page shows a list of all the errors that were reported or stored by the connected MG Master unit. It is possible to scroll through the list by either using the buttons to the side or swiping up or down. Clicking on an event will show the **Fout! Verwijzingsbron niet gevonden**. Detailed alarm information page.

2.7.1 Detailed alarm

This page will show more information about the selected event. Where available, additional variables about the event will be given, like: the unique identifier of the device that did not respond or the voltage and cell number of the device that triggered the over voltage error.

The event type as well as the time the event occurred is shown. The time keeping of the connected master device is used for this value, to change it please refer to the master device specific manual.



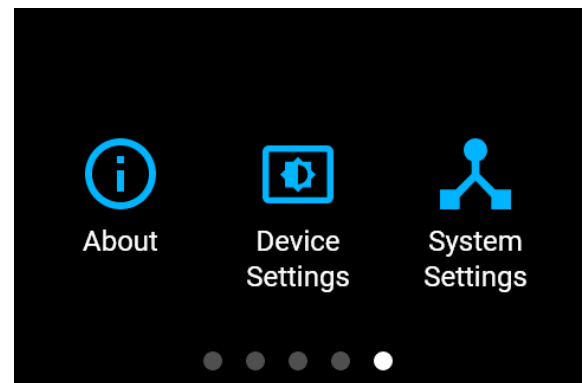
2.8 Settings

The settings page offers the user the option to jump to 3 specific pages:

About: information about the Energy Monitor being used

Device settings: settings applicable to the Energy Monitor

System settings: settings applicable to the system the Energy Monitor is connected to.

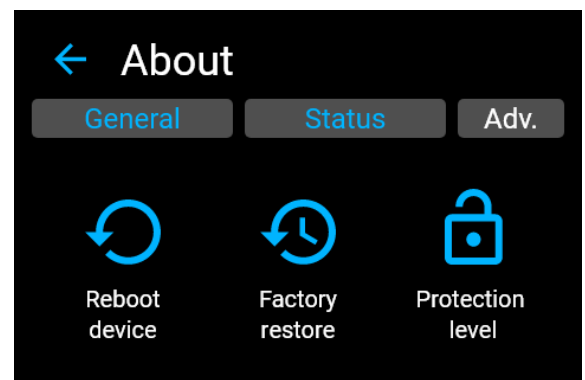
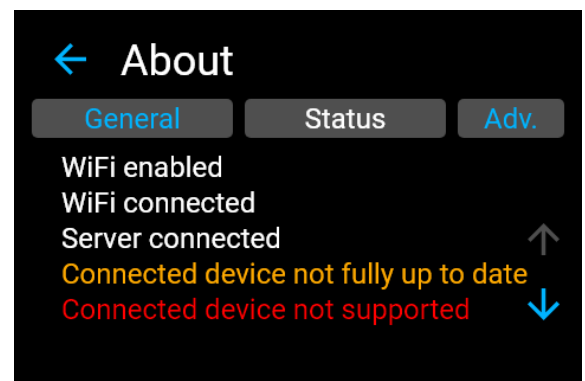
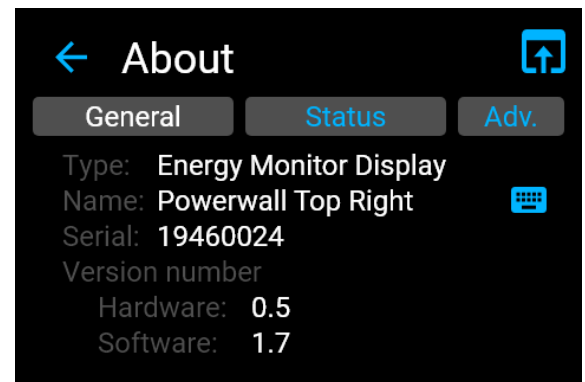


2.8.1 About

The About page shows information about the MG Energy Monitor being used. The information is shown across three tabbed pages and includes the device type, serial number, status messages and version numbers of the device. It also allows the user to name the device.

The advanced tab shows a button to go to a page where the current protection level can be set. This protection level is used to set a level of access to the users of the display limiting some of its functionality. To change the protection level the user needs to enter a set password. The different levels and their effects are:

- All access
 - All device and system settings are available
- Local access
 - Changes are only allowed to device settings. System settings are locked.
- Protected access
 - System and device settings are locked. Only a limited selection of general device settings is still available.
- Developer mode
 - Requires a separate password. All access with some experimental features enabled, including demo mode



2.8.2 Device settings

The Device settings page allows the user to change a range of parameters about the monitor, including the brightness of the display or what wireless network it should connect to. Depending on the monitor's access level some of these settings may be locked, preventing the user from making changes, but not from viewing them.

2.8.2.1 Network settings

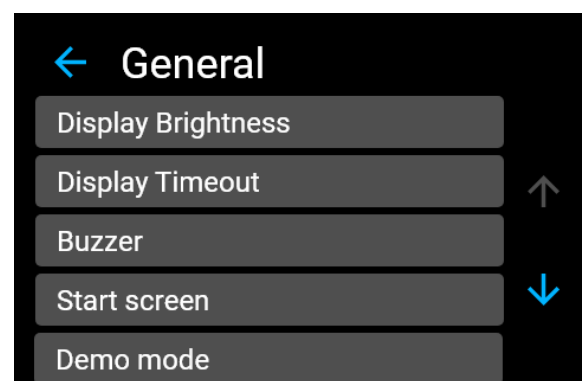
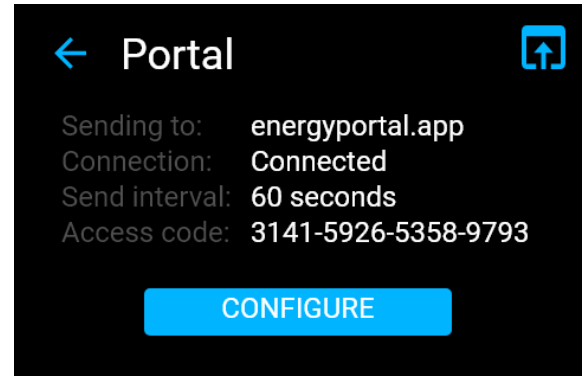
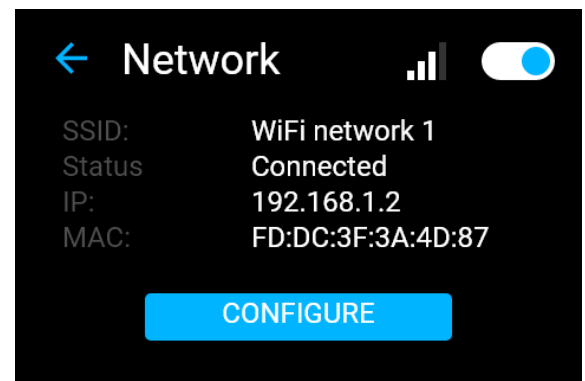
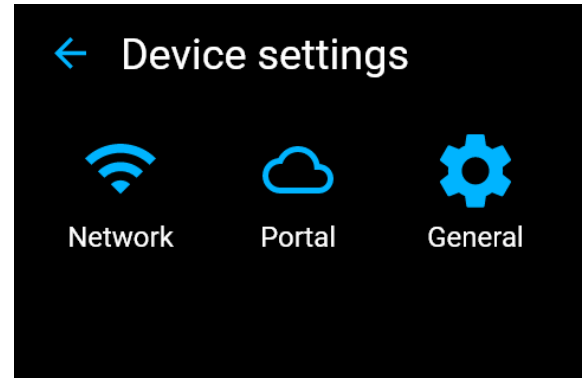
This page shows the user information about the current network connection. The toggle button in the top right enables or disables the Wi-Fi module. To view what other networks are available and to change the chosen network the user can click on the configure button. The page that appears shows all the networks detected by the Energy Monitor. This is only available if the Wi-Fi module is turned on, if a network does not appear make sure it is in range and the SSID is set to visible.

2.8.2.2 Portal settings

On the portal settings page the user can find information about the status of the connection to the online MG Energy Portal. The access code used to register the device to your online account can also be found here. Using the configure button the user can change the interval at which the Energy Monitor sends the system data to the portal. This value represents a choice between the update rate of values and the data usage of the device.

2.8.2.3 General settings

A list of more general list of setting that apply to the Energy monitor can be found on this page. Settings like the brightness of the display or if the buzzer should be enabled can be changed here. The option to switch between Celsius and Fahrenheit can also be found here, please note that MG Master generated alarms will always be shown using the Celsius scale.



2.8.3 System settings

Clicking System Settings will show the user a list of settings applicable to the connected MG Master device. Before making any changes please refer to the manual of the MG Master device being used before making any changes. Where available a more information button is shown on the individual settings pages, clicking this will bring up a page where the user can learn more about the setting in question. In the manual of the master device a full rundown of all the available settings and their effects can be found.

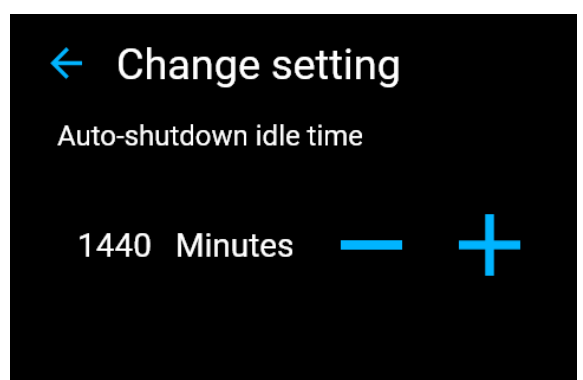
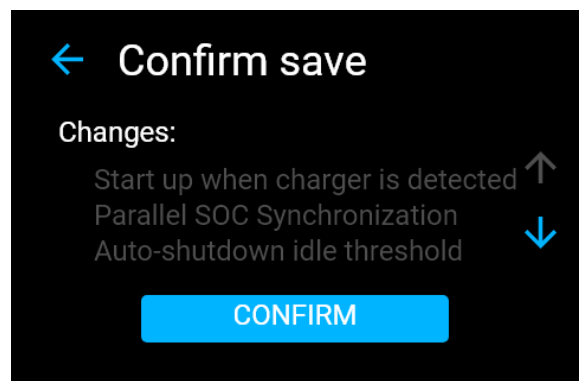
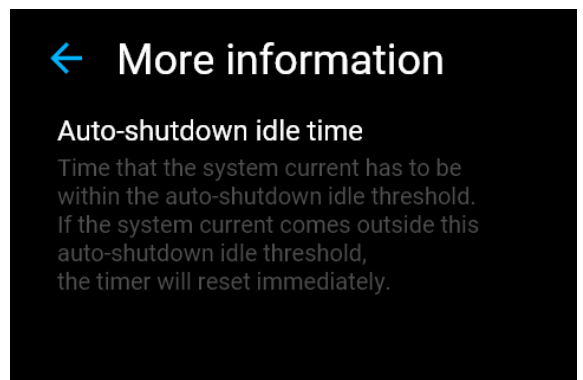
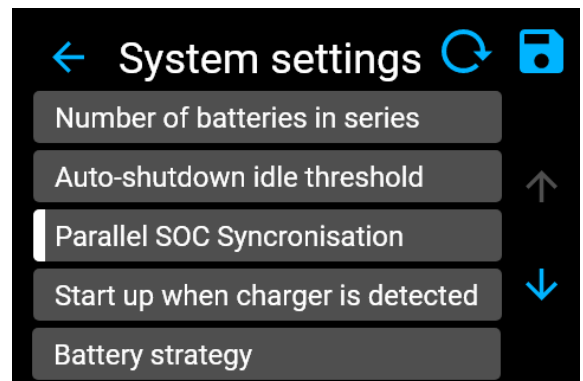
The icons in the top right are used to refresh or save the settings. If any changes were made the monitor will ask for confirmation before committing the action. A changed setting is indicated by a white mark on the left edge of the button.

There are a number of different setting types and each of these shows a different type of page.

Numerical settings show the current value combined with a set of plus and minus buttons. Pressing these buttons will change the value.

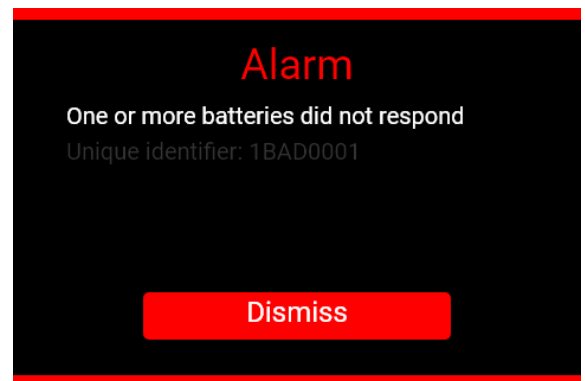
Yes/no and on/off settings show two large buttons with the two possibilities. Pressing either one will change the selection. The white border of the button indicates the currently active value.

For settings where there are a number of different options or selections possible a list will be shown. Using the arrow buttons on the side or by swiping up and down it is possible to scroll through the list of options, if either end of the list is reached the buttons will turn grey. Just like the yes/no page the currently selected value is indicated with a white outline and changing the selection is done by pressing on the button with the desired value.



2.9 Pop-ups





A pop-up will appear if an issue is encountered by either the Energy Monitor or the connected MG Master. This pop-up will show the user what kind of issue occurred and it will give a description of what caused the issue or what can be done to solve it. If an issue is resolved by itself the pop-up will automatically clear. If the issue is still active when the user has clicked the dismiss button an icon on the start screens will indicate that the issue is ongoing.



3 Commonly used interactions

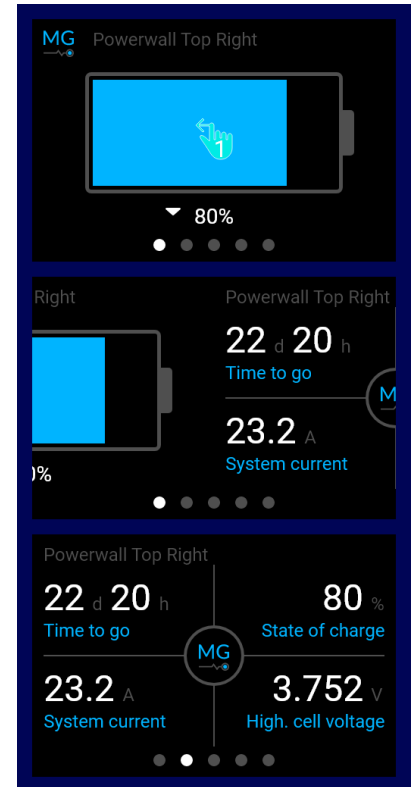
In this chapter a set of icons are used to illustrate the user interaction with the touchscreen on the Energy Monitor. These Icons are listed in Table 4 - Interaction icons.

Table 4 - Interaction icons

Icon	Function
	Tap. Touching the screen just briefly.
	Hold. Pressing down on the screen and holding one's finger down for a little while (0.5 seconds).
	Swipe in the indicated direction. Touching the screen and moving one's finger in a given direction.
	Arrow pointing to an area of interest.

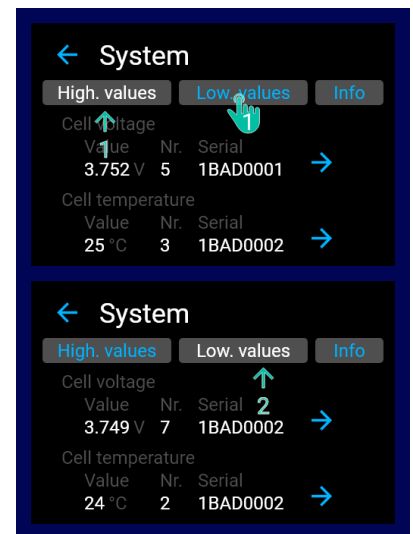
3.1 Navigating the main pages

1. Swipe left or right to change the active main page. Swiping is done by holding down one's finger on the screen and dragging it left or right. In the example the finger is dragged to the left. The next page will slide into view, just as the current one slides out.



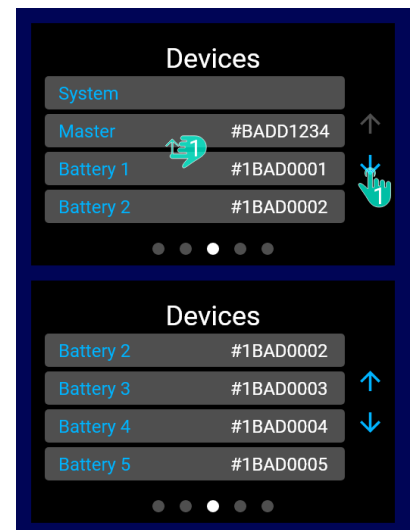
3.2 Navigating tabbed pages

1. The currently active tab has its name written using white letters. By pressing on one of the tabs with their name in blue the view switches to that tab.
2. The change in active tab is indicated with the name of the now active tab turning white.



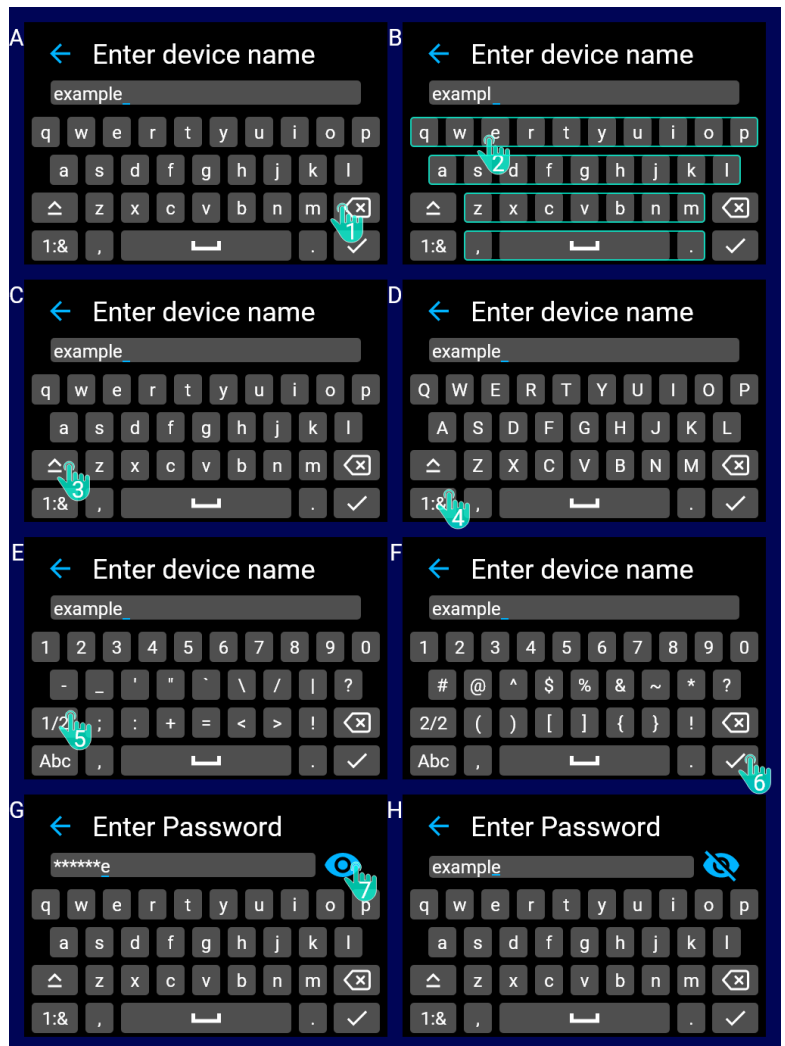
3.3 Navigating lists

1. Pressing the up or down button will move the list one row in that direction. Swiping will move the list 3 positions at a time.



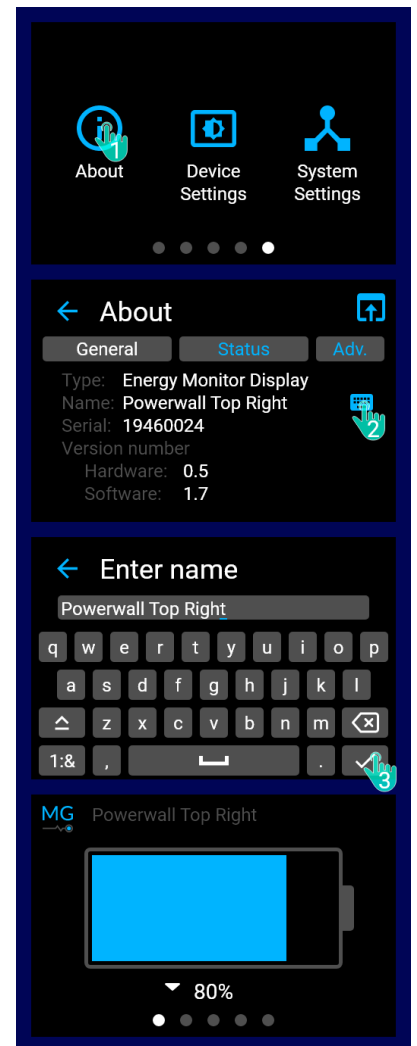
3.4 Using the keyboard

1. Clicking the backspace key will remove the last character.
2. Pressing any of the buttons inside the marked area as shown in view "B" will add that character to the text.
3. To switch to uppercase press the caps lock button.
4. To switch to numbers and symbols press the button labelled "1:&"
5. There are 2 sets of symbols to switch between them use the button labelled "1/2" and "2/2" where the first number indicates the current set.
6. To save the entered text press the submit button.
7. If the keyboard is used to enter a password the text, by default, only the last character is readable. To view the entire text press on the unhide icon. To later hide the text simply press the button again.



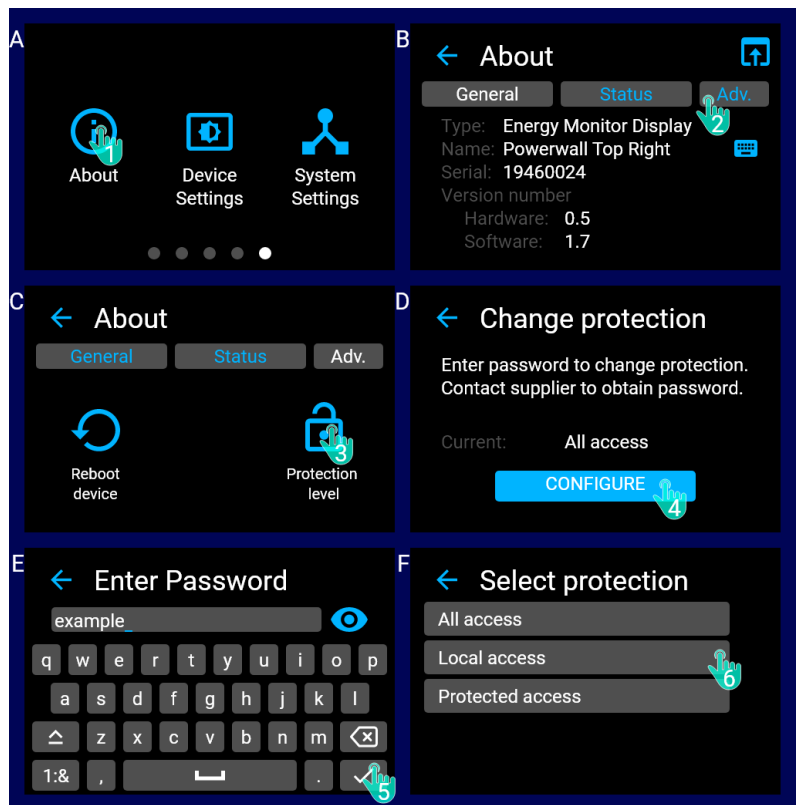
3.5 Change system name

1. Press the about button from the settings page.
2. Click on the keyboard icon.
3. Using the keyboard (see section 3.4) enter the desired name for the system. press the submit button to save the new name.



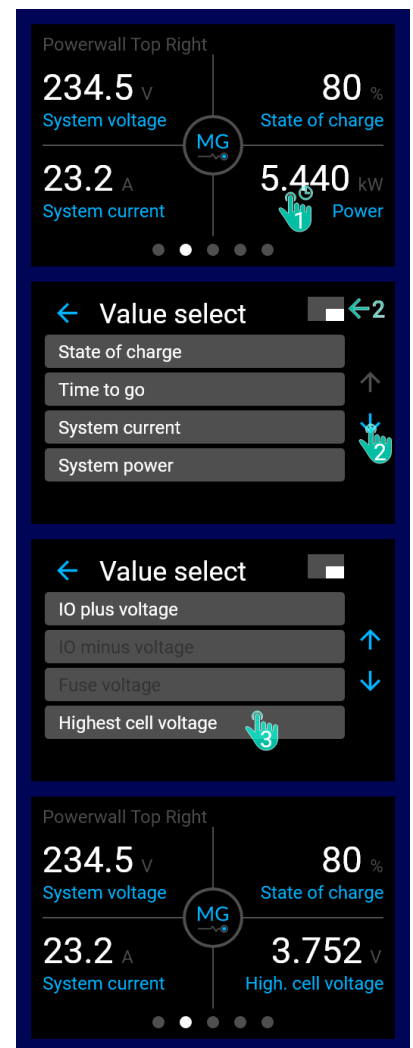
3.6 Change protection level

1. While on the settings page, go to the about page by clicking on the button labelled "About".
2. Navigate to the advanced tab, "adv." for short.
3. Click on the protection level button.
4. To change the protection level the user needs to click on the configure button, a password field will appear.
5. Enter the correct password to unlock the changing of the protection level. Clicking on submit will check the password.
6. On success a page will appear where the user can select the new protection level.



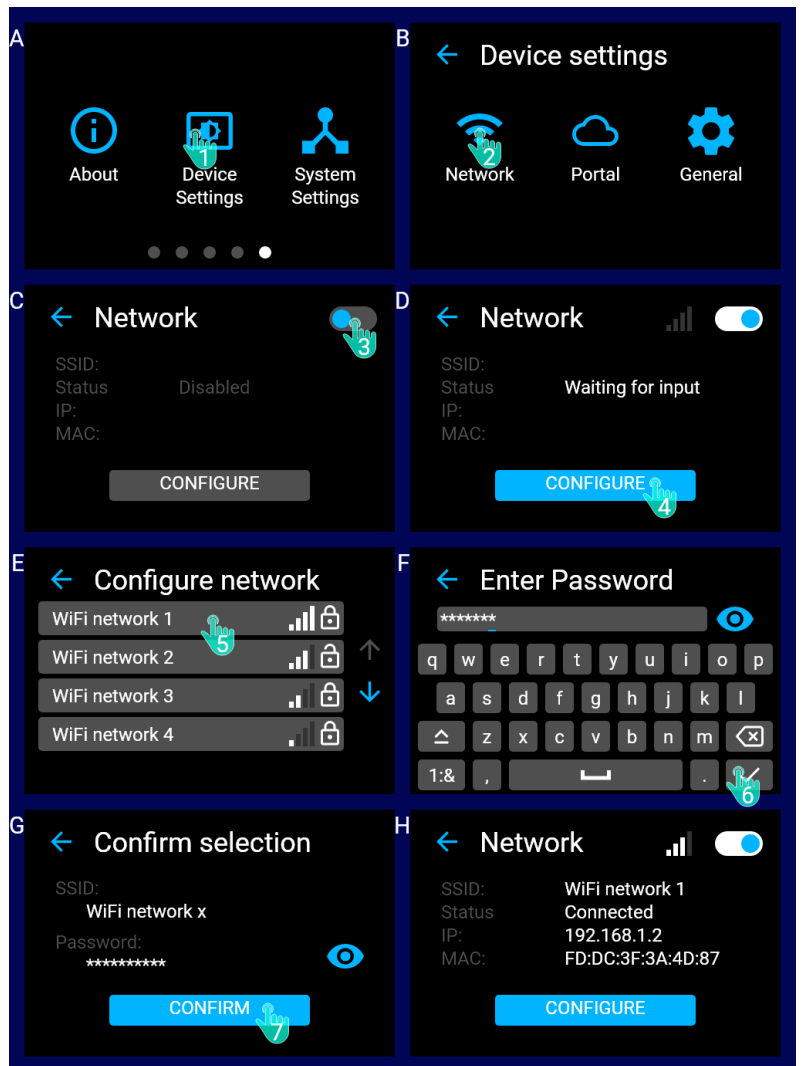
3.7 Change extended start page parameters

1. On the Extended start page hold down on the quadrant containing the value to be changed for half a second.
2. The icon in the top right corner indicates what quadrant will be changed. Navigate the list until the requested variable has been found.
3. Pressing on the requested variable name will save the selection. The greyed-out names are for variables that are not currently available in the system.



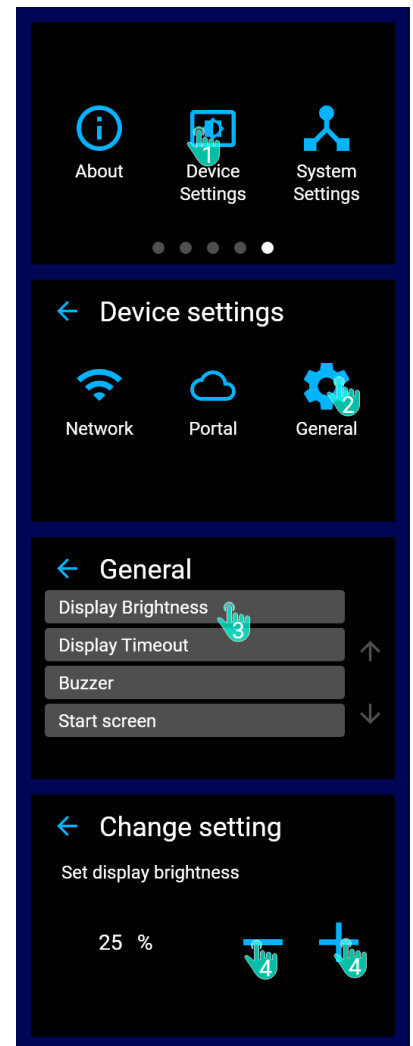
3.8 Enable Wi-Fi

1. From the settings page, press on the device settings button.
2. Select the network settings.
3. Click on the toggle switch to turn the Wi-Fi on.
4. If is no stored network available click on the configure button.
5. A list of networks details is shown for networks that could be detected. To select a network press on its button. Depending on the protection of the network the page indicated with "F" will be shown. If not the view jumps directly to the "G" page and the user can skip step 6.
6. Enter the password by using the keyboard (see section 3.4 for details about the keyboard). Clicking submit will show the confirmation page.
7. The user can review their selection on the confirmation page. Pressing the back button will cancel the network selection process. By clicking confirm the user saves the selection and the Wi-Fi module will attempt to connect to the newly selected network.



3.9 Change display brightness

1. From the settings page, press on the device settings button.
2. Select the general settings.
3. Press on the "Display Brightness" button
4. Use the add and subtract buttons to change the brightness of the display. A grey button indicates a limit was reached for the brightness.



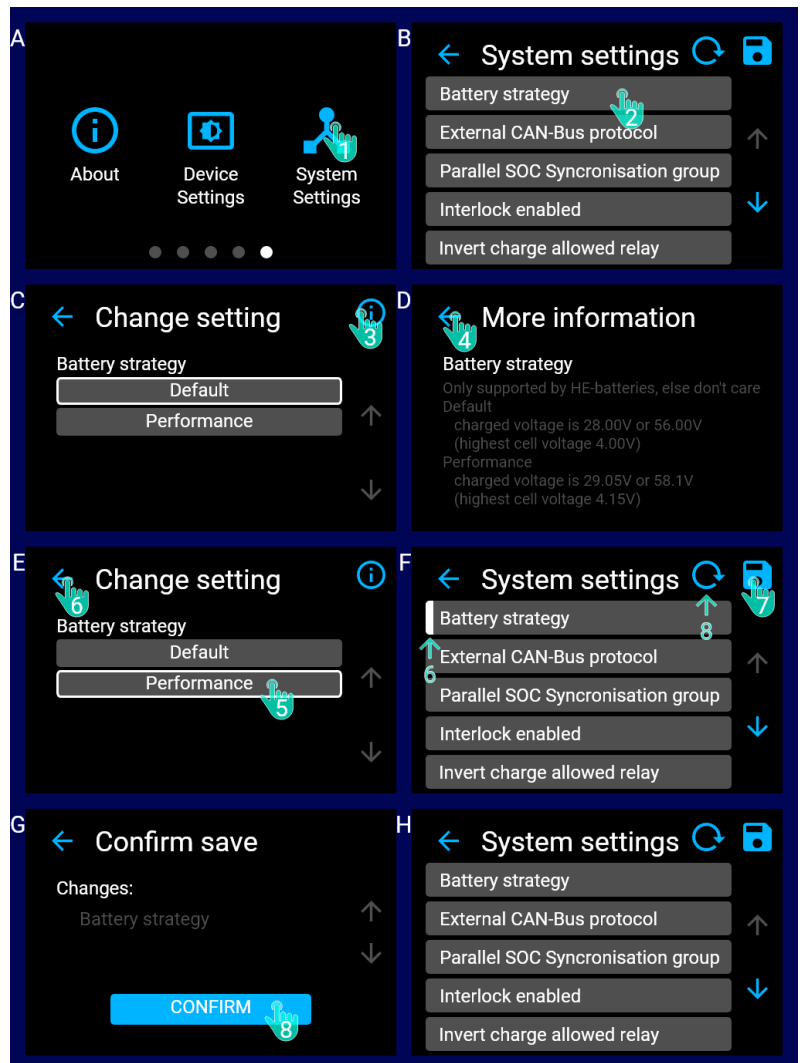
3.10 Change battery strategy

NOTICE:



Before changing any of the system settings read the documents for the devices in the effected system. Changing system settings may have a negative effect on the lifespan of the products affected. For more information please contact MG Energy Systems.

1. While on the settings page, press on the system settings button.
2. Select the battery strategy setting.
3. Where available, go the more information page to read more about the setting in question before making any changes.
4. Click the back button to return to the settings screen.
5. The white outline of the button indicates the current selection. To change the selection press on the requested value.
6. Pressing the back button will remember any changes that were made, as indicated by the white mark on the selected settings button in page "F".
7. To save the changes press the save button. Before committing the changes, a confirmation page will be shown. This will list all the changes made by the user.
8. If the user presses the "confirm" button the settings will be saved to the master unit. To cancel go back to the previous page "F" and refresh the settings, this will retrieve the active settings from the MG Master device.



4 CONTACT DETAILS

For specific questions please feel free to contact us.



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