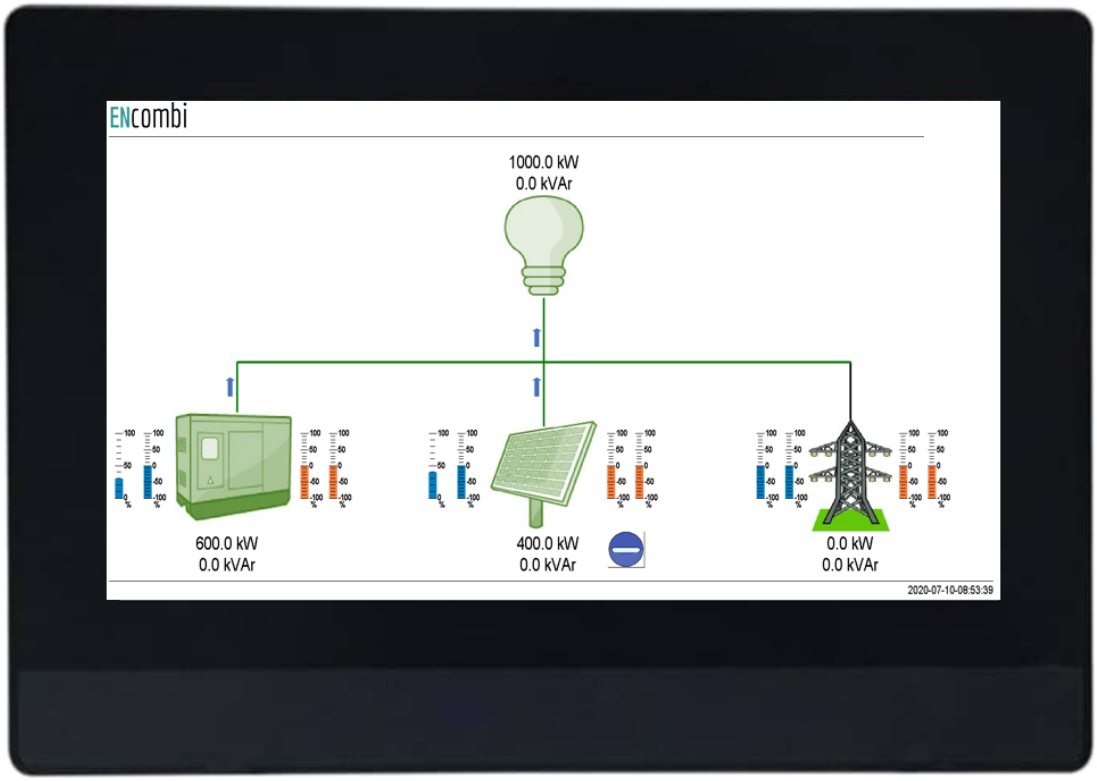
ENcombi



ECpanel

User manual

Document change log

2019-10-29	Release 1.00.0 First version compatible with ECpv 1.12.0
2020-04-07	Release 1.01.0. Updated to support ECpv release 1.19.0.
2020-07-10	Release 1.02.0. Updated to support ECpv release 1.24.0
2020-08-18	Release 1.04.0. Updated to support ECpv release 1.41.0
2020-10-02	Release 1.05.0. Updated to support ECpv release 1.46.0
2021-01-12	Release 1.06.0 Updated to support ECpv release 1.52.0
2021-03-30	Release 1.07.0 Updated to support ECpv release 1.60.0

Introduction

Is the ENcombi plug and play HMI operator control and monitoring interface. Connect with any of the ECpv variants out of the box. No need for customization or application design - all has been made ready for you! Just connect the ECpanel to the ECpv via ethernet and you are up and running.

In the ECpanel you have access to set control values in your ECpv directly.

You will be able to monitor your inverters, power meters and gensets in real-time values and via the builtin 24h trend curves for load, production, and consumption.

Main Features

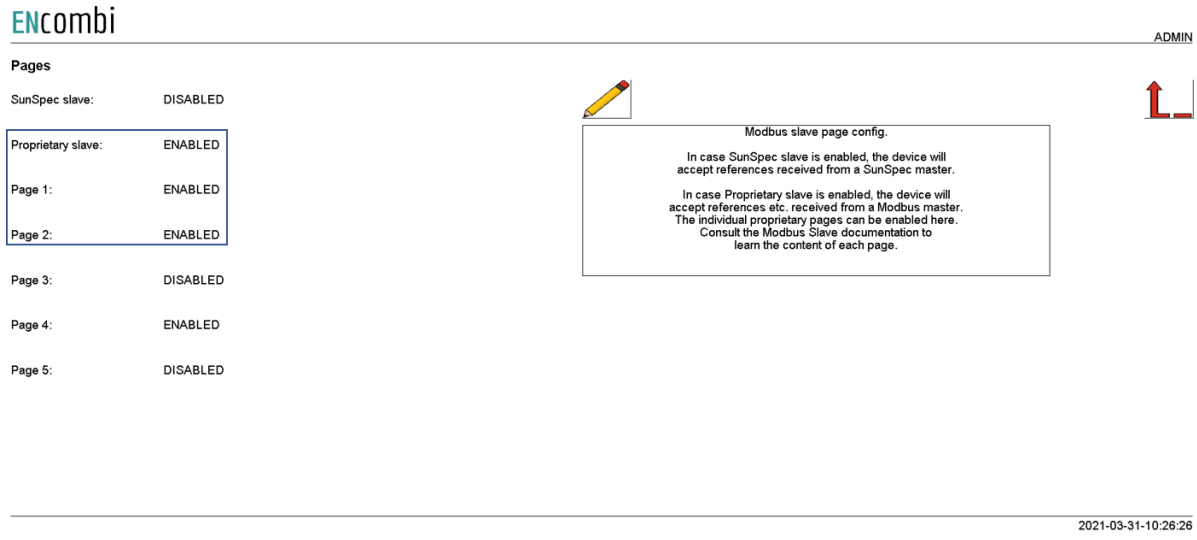
- Plant start/stop
- Setting control scheme
- Acknowledge of alarms
- Plant overview
- Individual overview pages for
    - Solar inverters
    - Power meters
    - Genset Controller
    - Sensors
- 24h trend curve display of
    - Power production of genset, PV and grid
    - Power references
    - Load
    - Irradiances and temperatures
- Events and alarm logs display
- 365 days of trend data logged on SD card in CSV format
- 100.000 Events and alarm logged on SD card in CSV format
- Remote access via VNC client

The hardware is a high quality, fast and cost-efficient unit which you can build into your own cabinet - or as a part of our ECcube offering.

The ECpanel is intended for the daily operation and monitoring of the ECpv.
It is not intended for commissioning of the ECpv.
This has to be done via ECweb.

Getting started

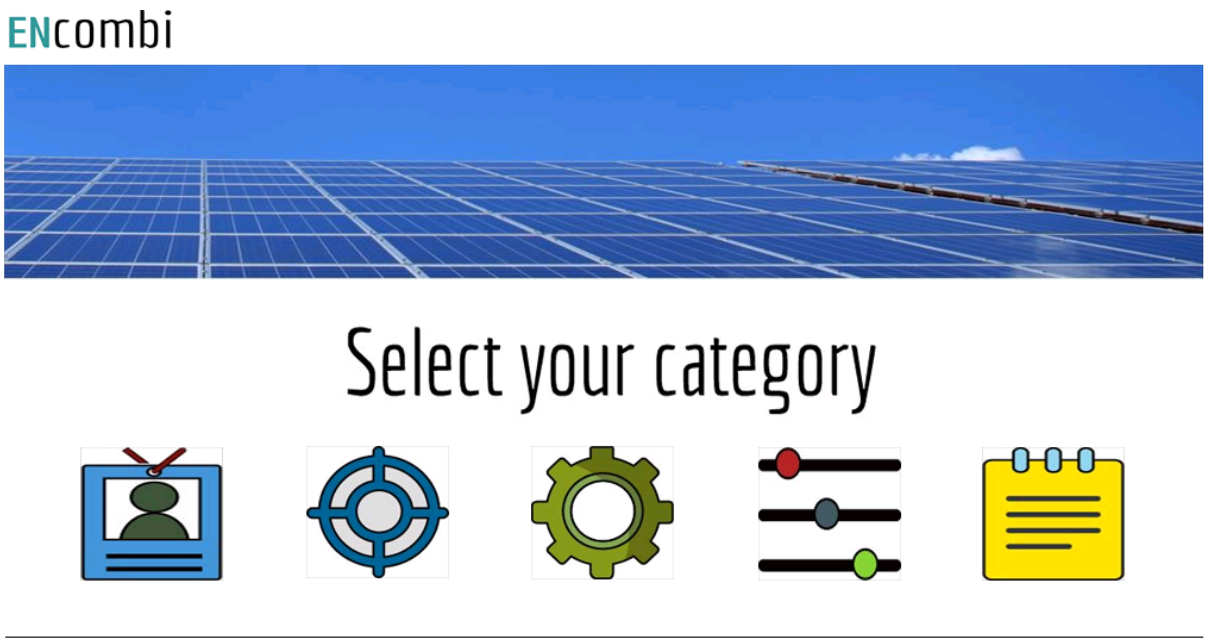
The ECpanel communicates with the ECpv on ethernet via Modbus TCP.
In order for the ECpanel to be able to change settings and give commands to the ECpv the proprietary modbus slave and the associated pages 1 & 2 need to be enabled.
This is to be set up via ECweb.



After that it is just a matter of connecting the ECpanel to the ECpv via an ethernet cable and do the network settings as described latter in the Control chapter to establish the connection.

Navigating the ECpanel

First page to be displayed after an initial welcome page when connection is established is the front page of ECpanel.



Whenever navigating around the ECpanel you can always return to this page by clicking the ENcombi logo in the upper left corner.

In the lower left corner ECpanel will display any info and warning messages from the ECpv. Some messages will clear themselves automatically. Others demand user action to be acknowledged first. In that case a dedicated button with garbage can symbol will be presented alongside with the messages.

In the lower right corner is the internal clock of the ECpanel displayed.

In the lower center a total of five menu tiles are available. These are from the left:

1. “Identifiers” gives access to overview of the SW version installed in both the ECpanel itself as well as in the ECpv.
2. “Monitoring” provides a high level overview of the installation as well as detailed information about each individual inverter and power meter.
3. “Control” gives access to set up of ECpanel controller related parameters such as IP configuration, screen settings, VNC server, Internal clock handling etc.
4. “Settings” give access to set up of control scheme related parameters of the ECpv.
5. “Logs” give access to the 24h trend curves as well as the alarm and event logs.

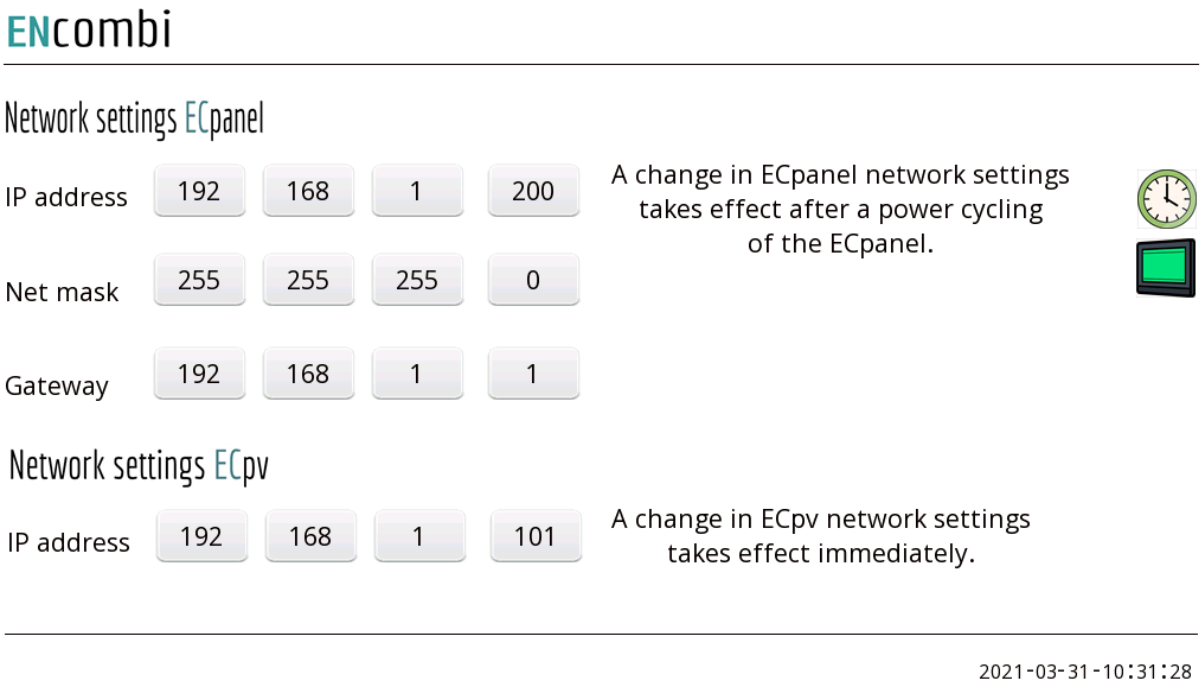
In the following chapters the content of the five menu tiles are discussed in detail.

Control

Under this tile set up of ECpanel related parameters for IP configuration, Internal clock handling etc. are found.

Network settings

First page presented when clicking the Control tile is the below page where network settings of the ECpanel as well as the IP address of the ECpv to connect with is set up.

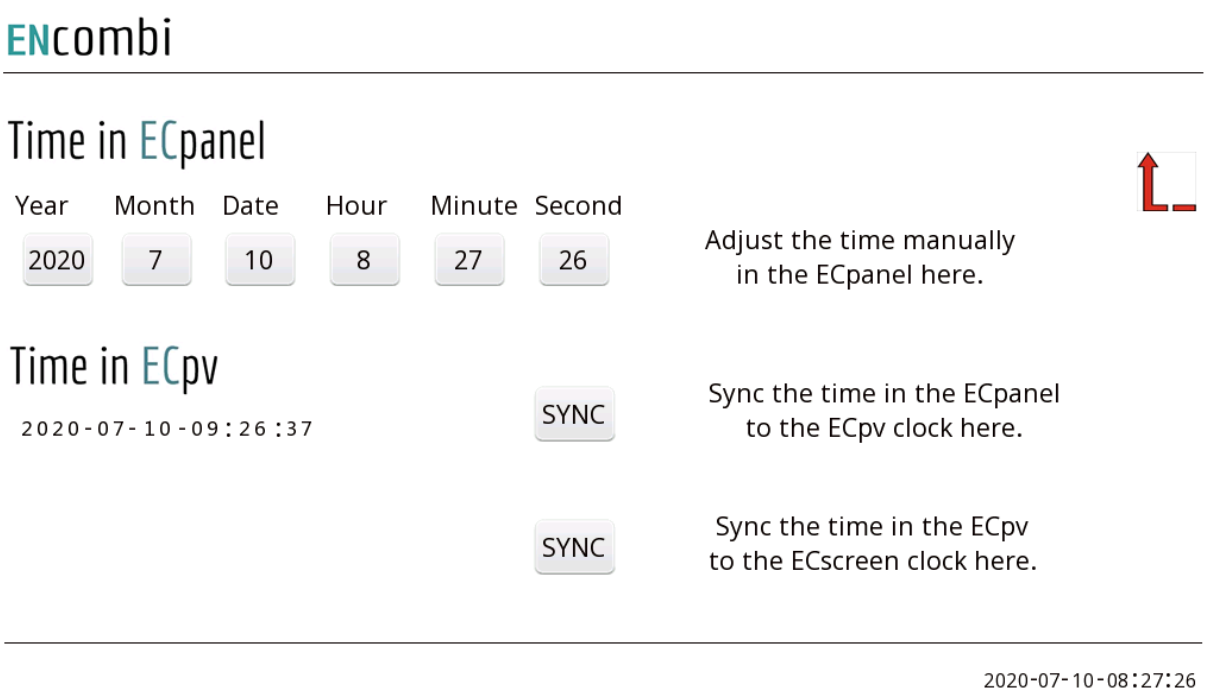


On the right hand side there are four submenus for.

1. Internal clock.
2. Screen settings.

Internal clock

Clicking the clock button leads to the page below where the internal clock can be set manually or synchronized against the clock in the ECpv. Also the clock in the ECpv can be synchronized to the internal clock of the ECpanel.

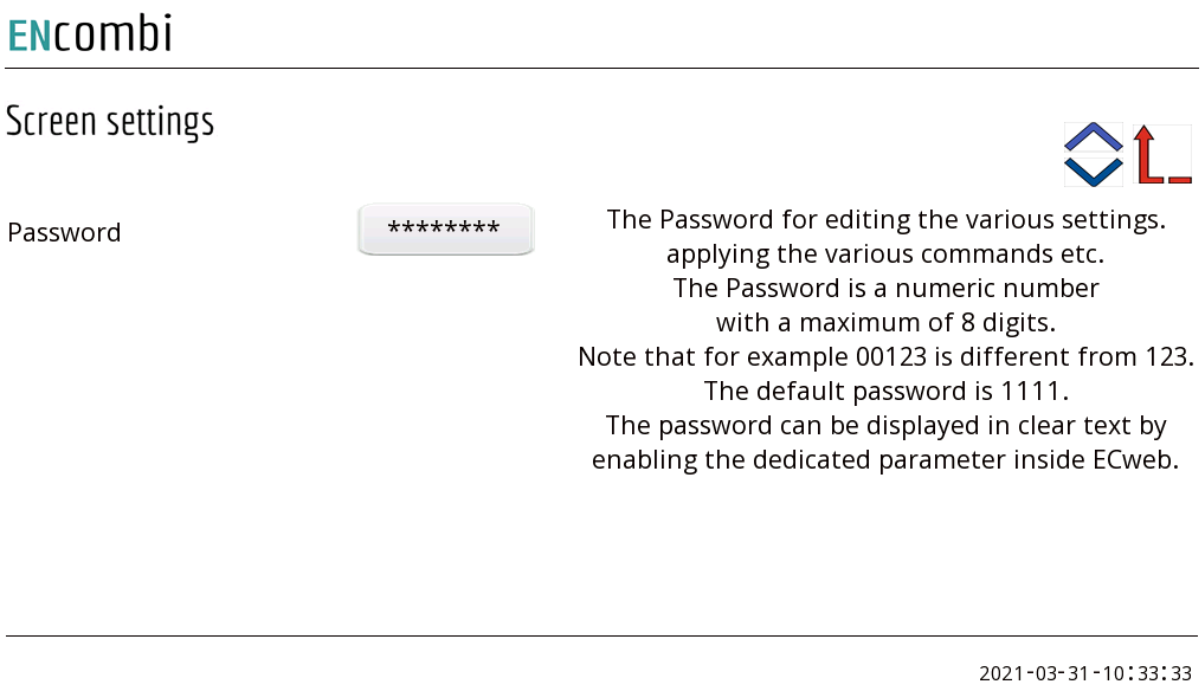


Screen settings

Clicking the screen button leads menus for setup of various screen settings.

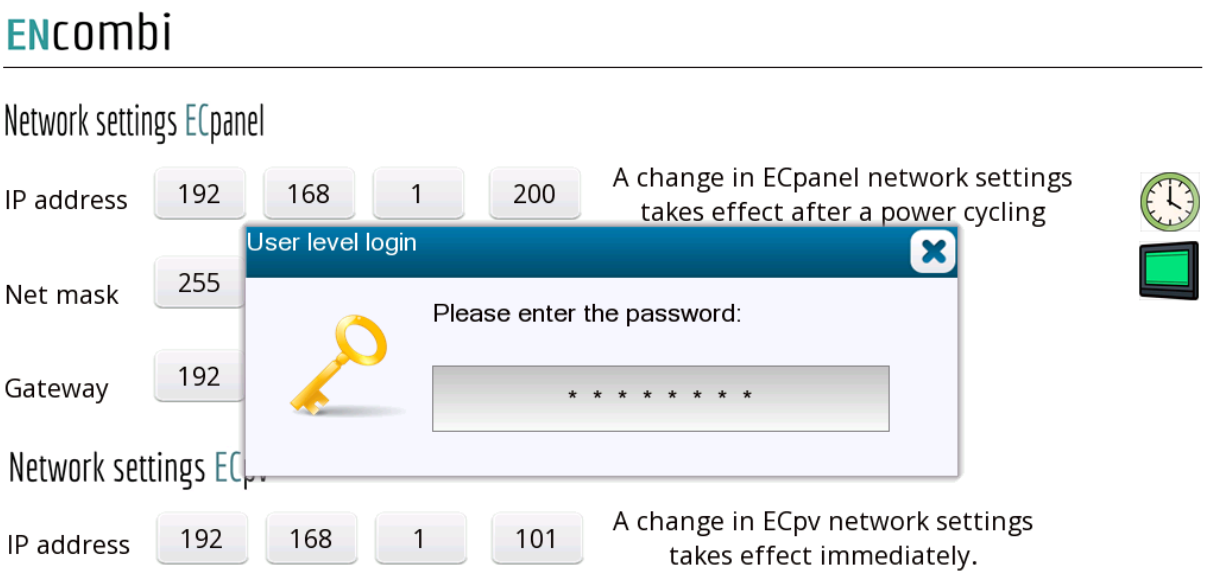
Password

The first landing page is where the password for editing settings, starting/stopping the plant etc. is set up.



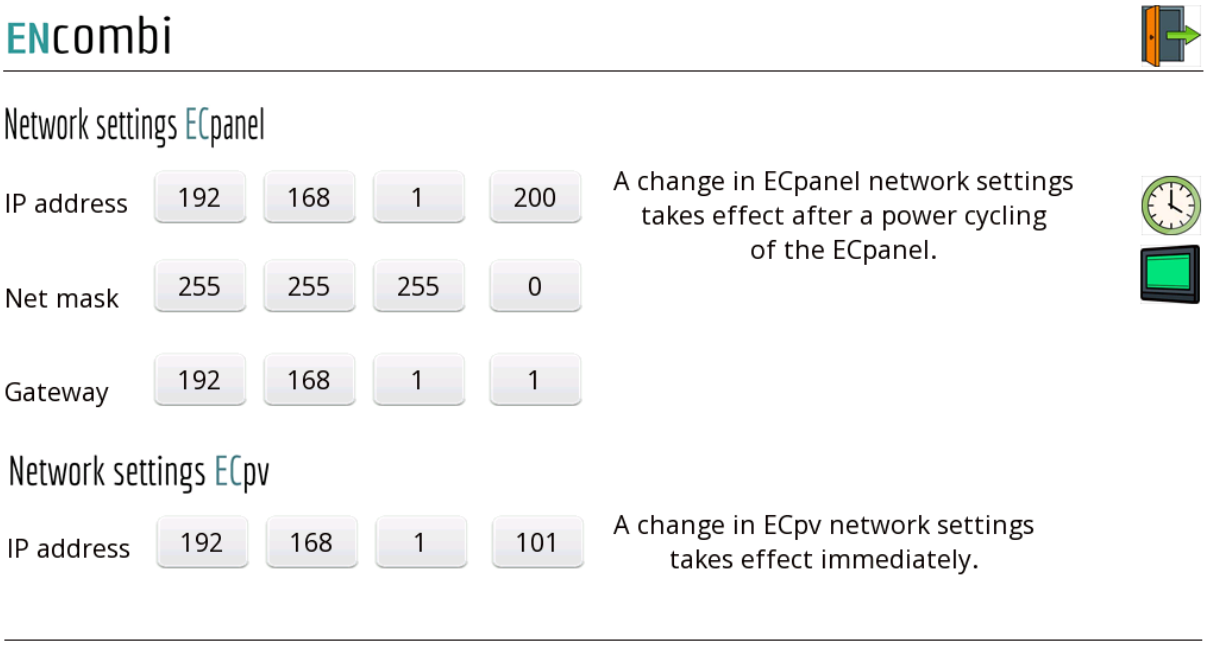
The password is hidden but can be displayed in clear text by connecting to ECweb and enable the dedicated setting for this.

Whenever the user tries to do any action that is protected by password he will be prompted for the password. Here an example when trying to change the Network setup.



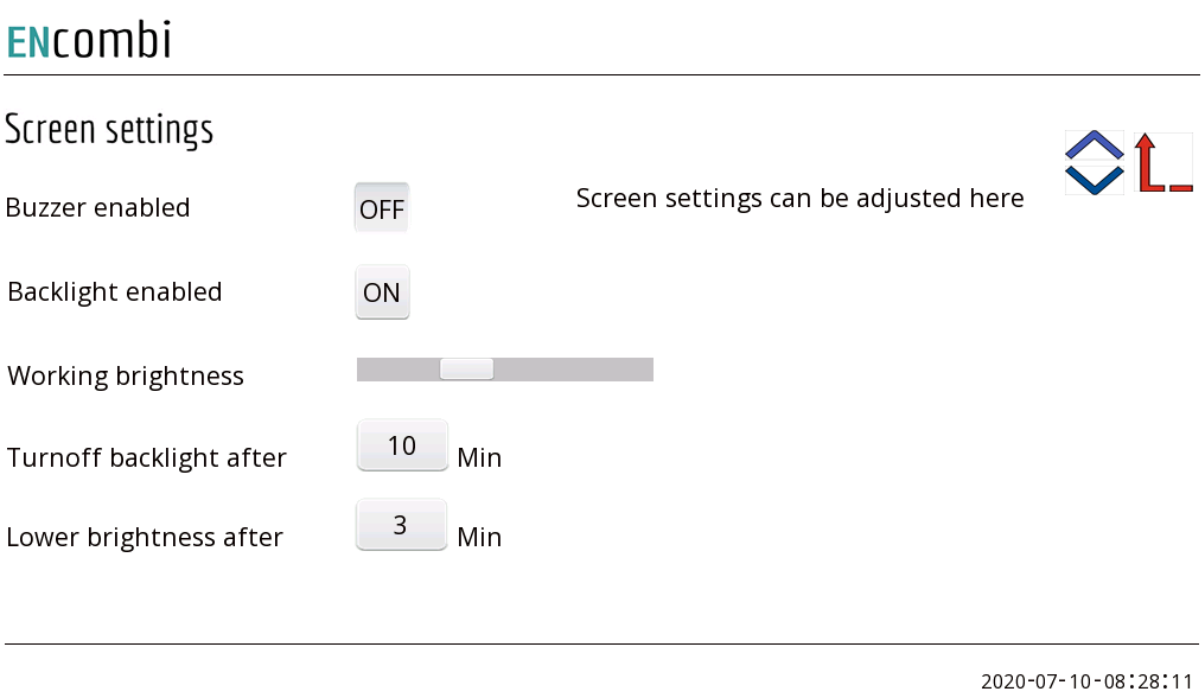
After successful login the setting can be adjusted.

When a user is logged in, a button will appear in the upper right corner with which the user can log out again.



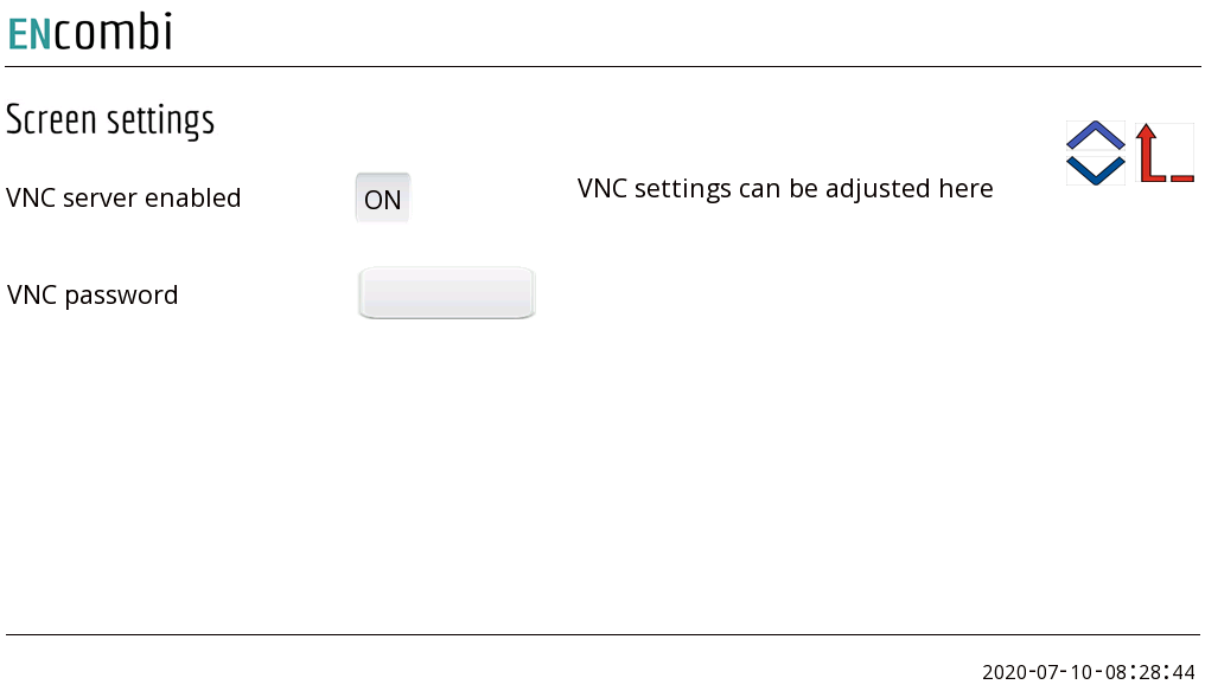
Buzzer, Brightness & Backlight

Clicking the screen button leads to the page below where the buzzer, brightness etc of the ECpanel can be set up.



VNC server

Clicking the up/down arrows will lead to the below page where the VNC server of the ECpanel can be enabled/disabled and password access can be set. Empty password as below means that there is no access required when connecting to the VNC server.



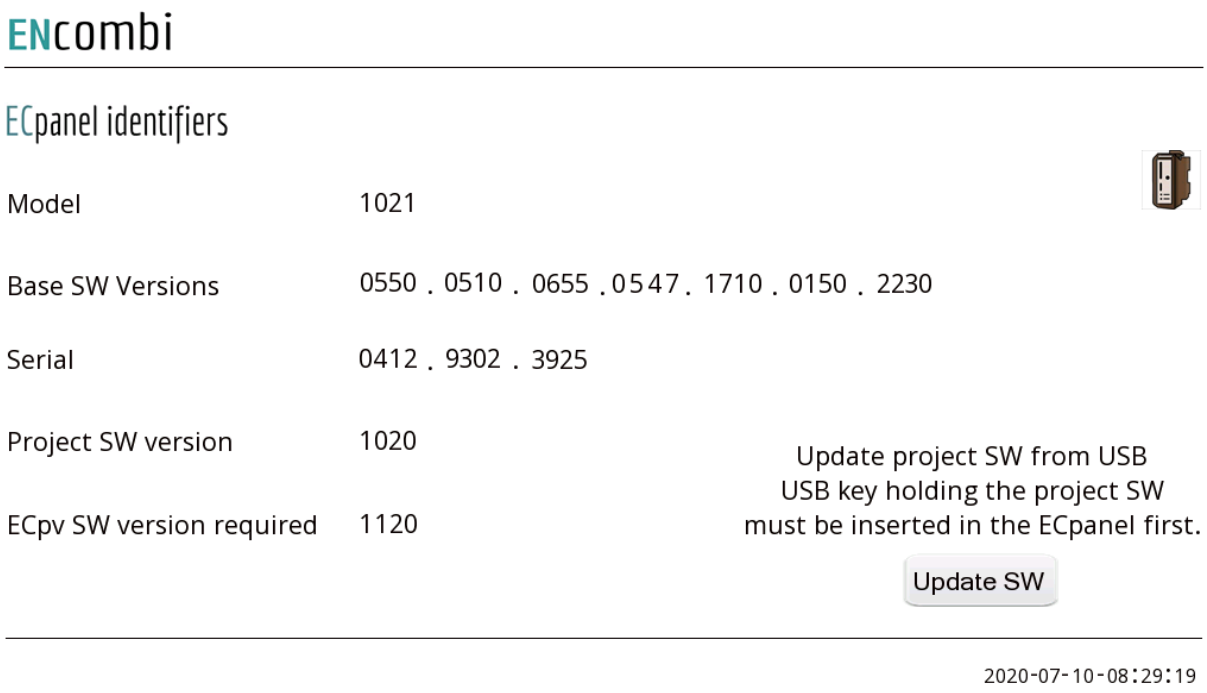
The VNC server runs on port 5900.
Any VNC client such as “VNC Viewer” can be used for connecting.
https://www.realvnc.com/en/connect/download/viewer/windows/

Identifiers

Under this tile overview of SW version installed in both the ECpanel as well as in the ECpv are found.

ECpanel information

First page presented when clicking the Identifiers is the below page where various details about the ECpanel can be found.



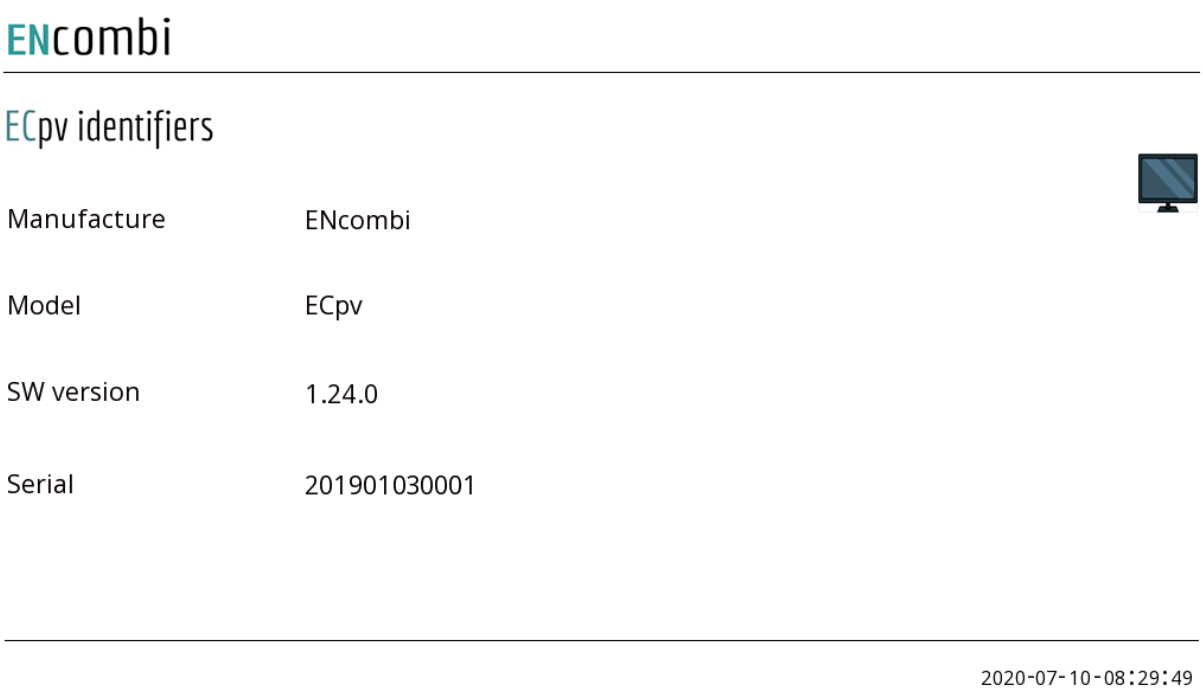
In the lower right corner there is a button for updating the project SW in the ECpanel. How this is done is described later in this document in its own separate chapter.

On the right hand side there is one button available for submenu switching.

1. ECpv information.

ECpv information

Clicking the ECpv button leads to the below page where ECpv details can be found.



On the right hand side there is one button available for submenu switching.

1. ECpanel information.

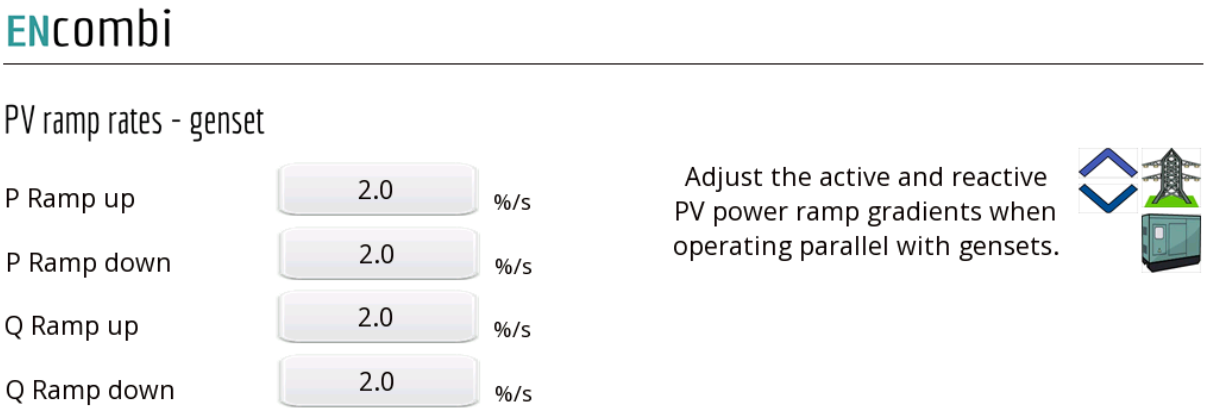
Clicking this will lead back to the page with ECpanel information.

Settings

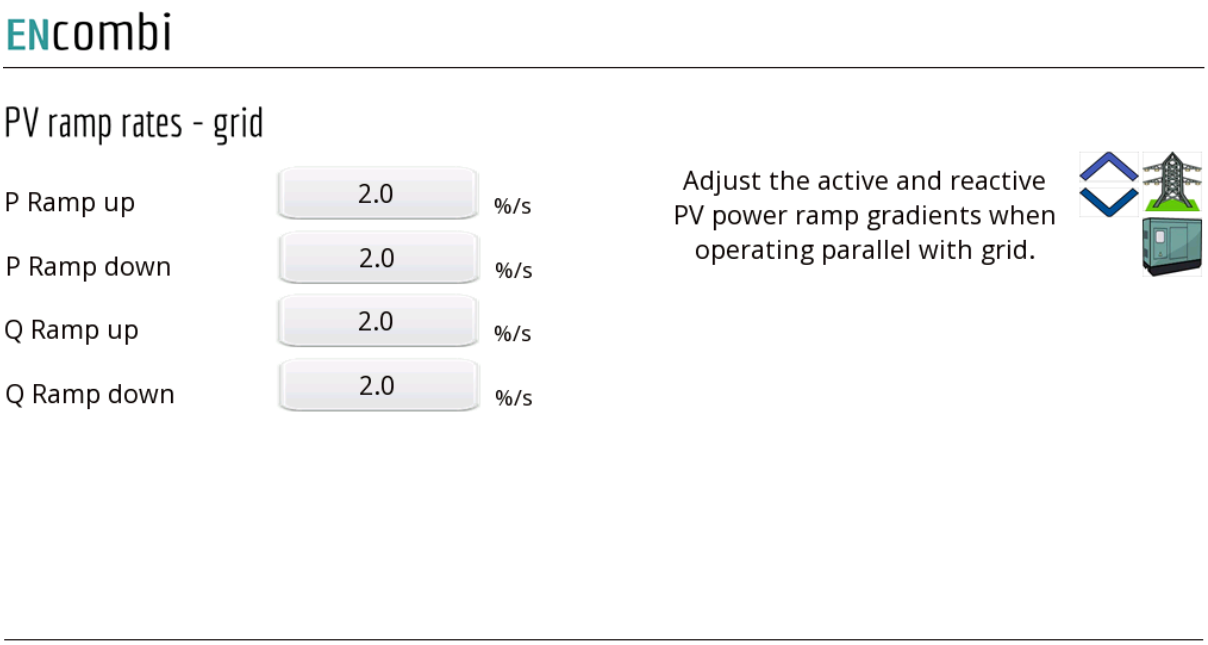
Under this tile the setup of key parameters for the control schemes, ramp rates etc. are found.

PV ramp rates

First page presented when clicking the Settings button is the below page where settings related to the active and reactive power ramp rates when PV is operating with genset can be adjusted.



Clicking up/down arrows will lead to the similar page below where the active and reactive power ramp rates when PV is operating with grid can be adjusted.



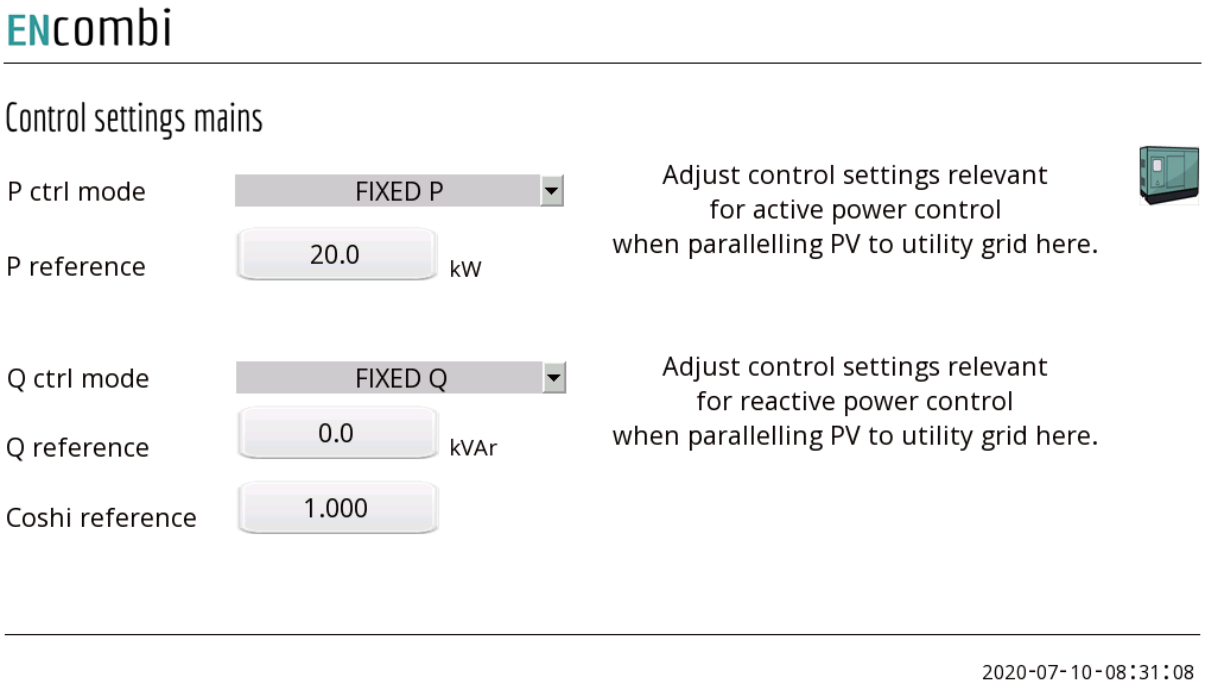
On the right hand side there is one button available for submenu switching.

1. Grid settings.
2. Genset settings

These buttons will lead to setup of grid and genset relevant settings respectively.

Grid control scheme

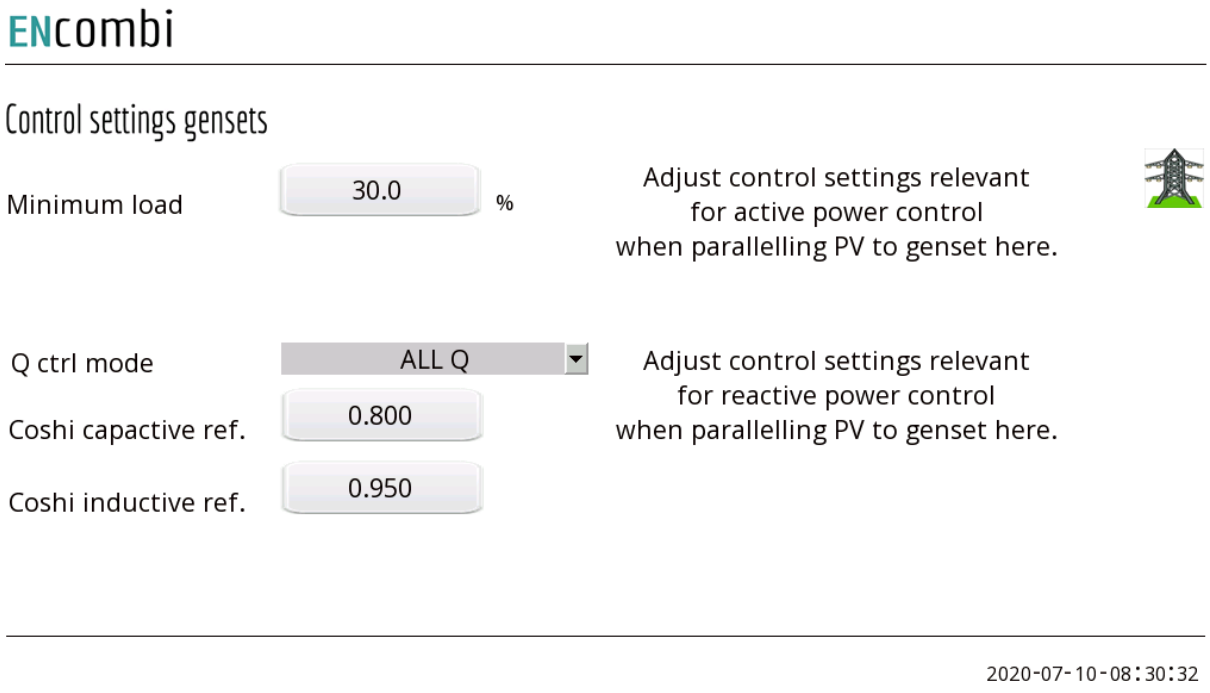
Clicking the grid button leads to the below page where settings related to behaviour of the ECpv when operating with grid are found.



Consult the ECpv manual on ENcombi website for description of detailed information of the various settings.
http://www.encombi.com/products/ecpv/

Genset control scheme

First page presented when clicking the Genset button is the below page where settings related to behaviour of the ECpv when operating with gensets are found.



Consult the ECpv manual on ENcombi website for description of detailed information of the various settings.
http://www.encombi.com/products/ecpv/

Clicking the up/down arrows will lead to the pages described in the following chapter.

Genset rated powers

The Genset rated powers can be adjusted on the below page. Clicking the up/down arrows will lead to similar pages for the remaining 16 gensets supported.

ENcombi

Genset rated power settings

Genset 1	100.0	kW
Genset 2	100.0	kW
Genset 3	100.0	kW
Genset 4	100.0	kW
Genset 5	100.0	kW
Genset 6	100.0	kW
Genset 7	100.0	kW

Adjust the rated power of the gensets present here.

2020-10-02-11:57:59

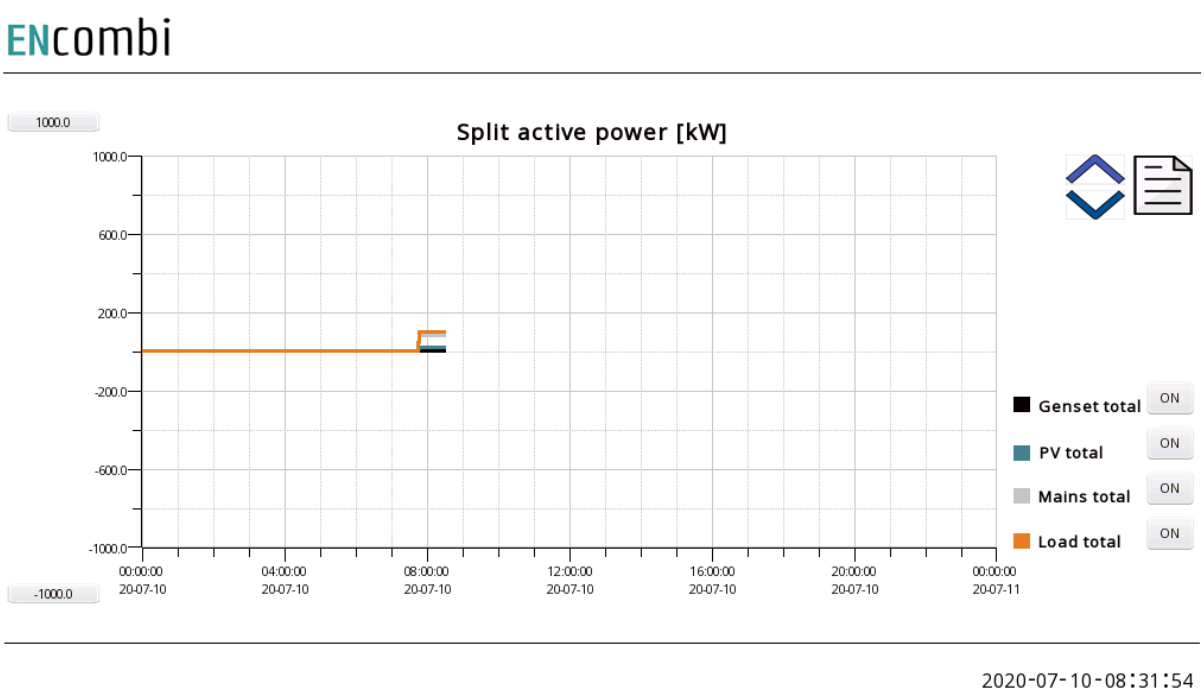
Logs

The ECpanel offers time series data as well as alarm and event logging. Both are stored locally on SD-card.

Time series data

The ECpanel holds 365 days of data on the SD card in csv format. The time series data of the current day is displayed directly on the ECpanel. If to analyse data from previous days the SD card can be removed and the csv file extracted for the analysis.

First page presented when clicking the Logs button is the below page where a 24h trend curve of the split between genset, PV and grid is shown.



The min/max of the y-axis can be set to match the readings and the display of the individual curves on the plots can be enabled/disabled.

Clicking the up/down arrows will lead to similar pages where 24h trend curves for

- PV capacity, production and reference.
- Genset capacity, production and reference.
- Irradiances (POA and GHI).
- Temperatures (BOM and ambient).

are displayed.

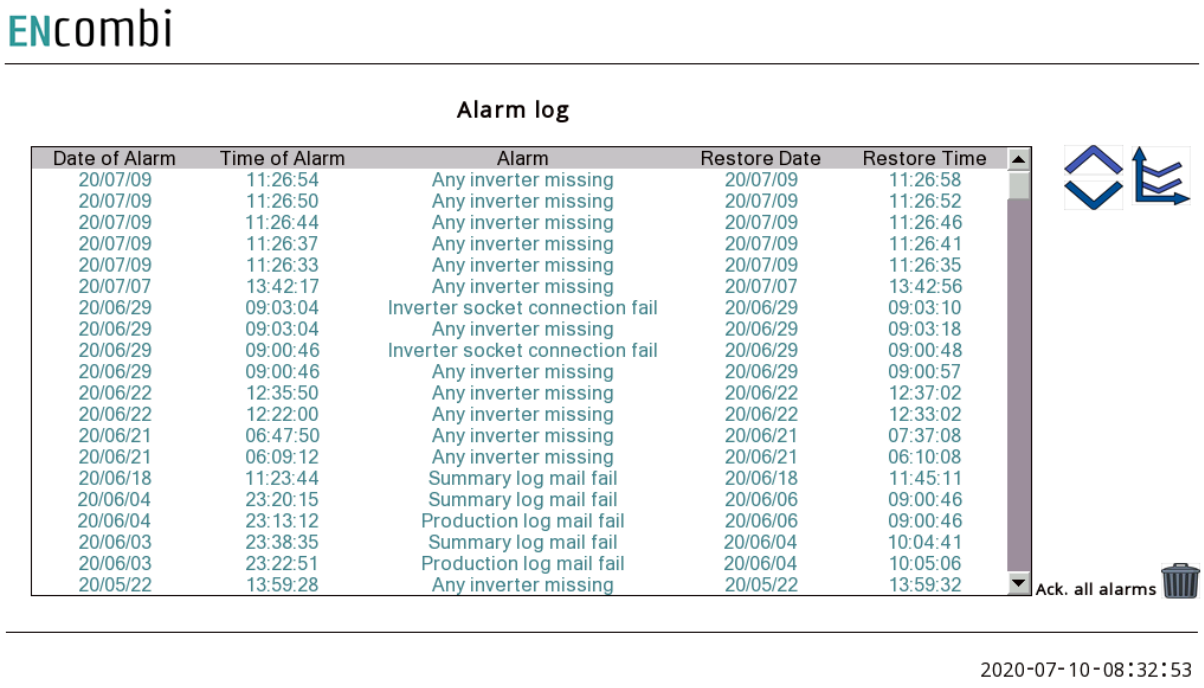
On the right hand side there is one button available for submenu switching.

1. Alarm/event logs.

Alarm and event logs

The ECpanel holds 100.000 log entries on the SD card in csv format. The logs are displayed directly on the ECpanel but the SD card can also be removed and a csv file can be extracted for analysis.

First page presented when clicking the event/alarm log button is the below page where the alarm log is displayed.



The data and time of the occurrence of the alarm as well as the clearance of the alarm is shown. Acknowledgement of all alarms can be done on the designated button in the lower right corner.

Clicking the up/down arrow will lead to a similar page holding the event log.

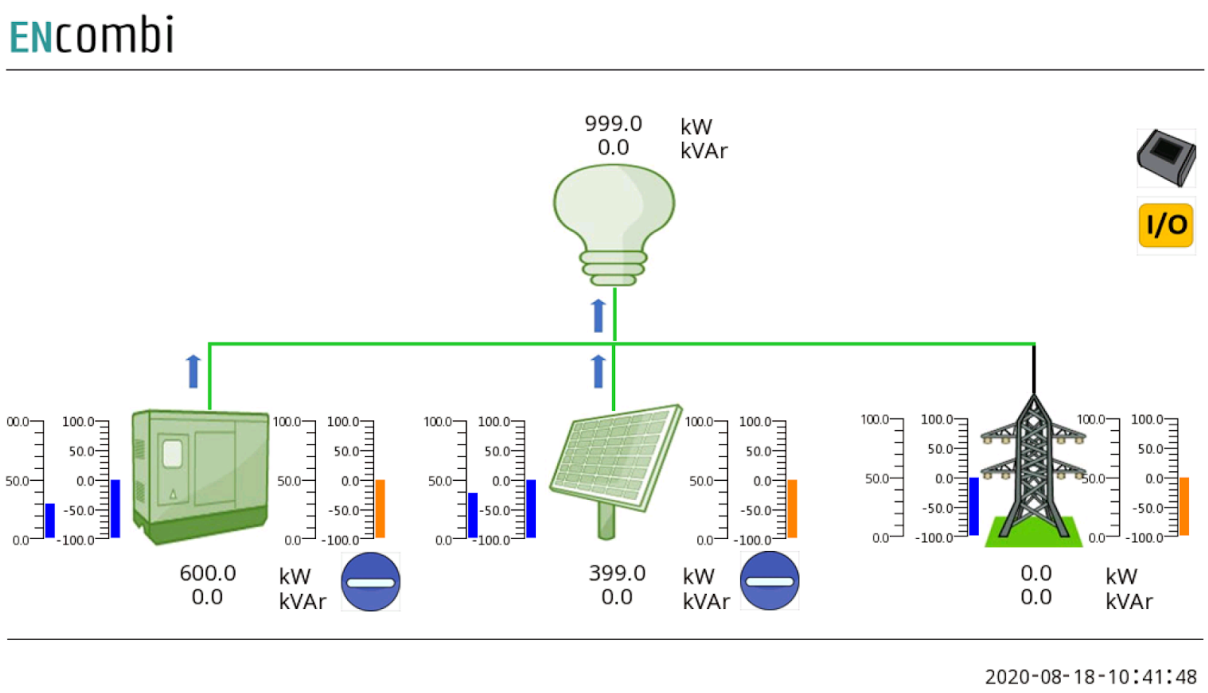
On the right hand side there is one button available for submenu switching.

1. Time series data.

Clicking this will lead back to the 24h trend curves.

Monitoring

The site monitoring provided by ECpanel is quite similar to what is known from ECweb. It provides a high level overview of the installation as well as detailed information about each individual inverter and power meter. Below an example of the first page presented under the Monitoring tile.



In case genset, PV or utility symbol is greyed out it means that no configuration for sensing of the associated power is made and therefore the source is interpreted as not being present by the ECpv. The accumulated powers of the three sources as well as total consumptions are displayed.

In case the genset symbol is neither green nor grey it means that all genset breakers are off. In case the genset symbol is green it means that at least one genset breaker is on.

In case the utility symbol is neither green nor grey it means that all mains breakers are off. In case the utility symbol is green it means that at least one mains breaker is on.

In case the PV symbol is neither green nor grey it means that the start signal is not present. In case the PV symbol is green it means that the start signal is present.

In case the PV start button has a vertical line it means that a stop signal is present and the button can be clicked to start the PV plant. In case the PV button has a horizontal it means that the start signal is present and the button can be clicked to stop the PV plant.

In case the genset start button has a vertical it means that a stop signal is present and the button can be clicked to start the genset plant. In case the genset button has a horizontal it means that the start signal is present and the button can be clicked to stop

the genset plant. Note that this button is only visible in case Genset management functionality is enabled.

Blue and orange arrows indicate active power and reactive power flow direction respectively.

On the left hand side of the sources two blue bar graphs are shown. The one to the left shows the active power loading of the source in percentage. The one to the right shows the deviation from the active power reference in percentage.

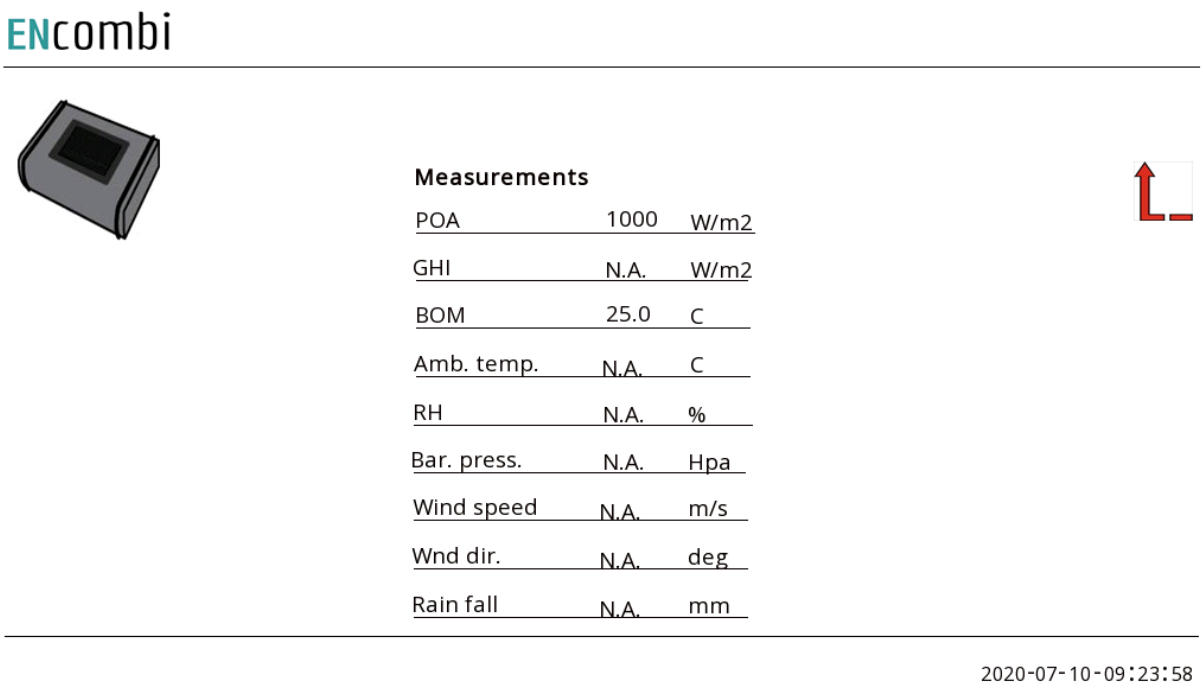
On the right hand side of the sources two orange bar graphs are shown. The one to the left shows the reactive power loading of the source in percentage. The one to the right shows the deviation from the reactive power reference in percentage.

In the upper right corner two buttons are shown.

1. Sensor data.
2. IO module data.

Sensor data

Clicking the sensor button will lead to the page below where an overview of all the meteorological readings is provided. In case a reading is not supported or communication to the sensor or inverter providing the reading is failing, the readings will be displayed as “N.A”.

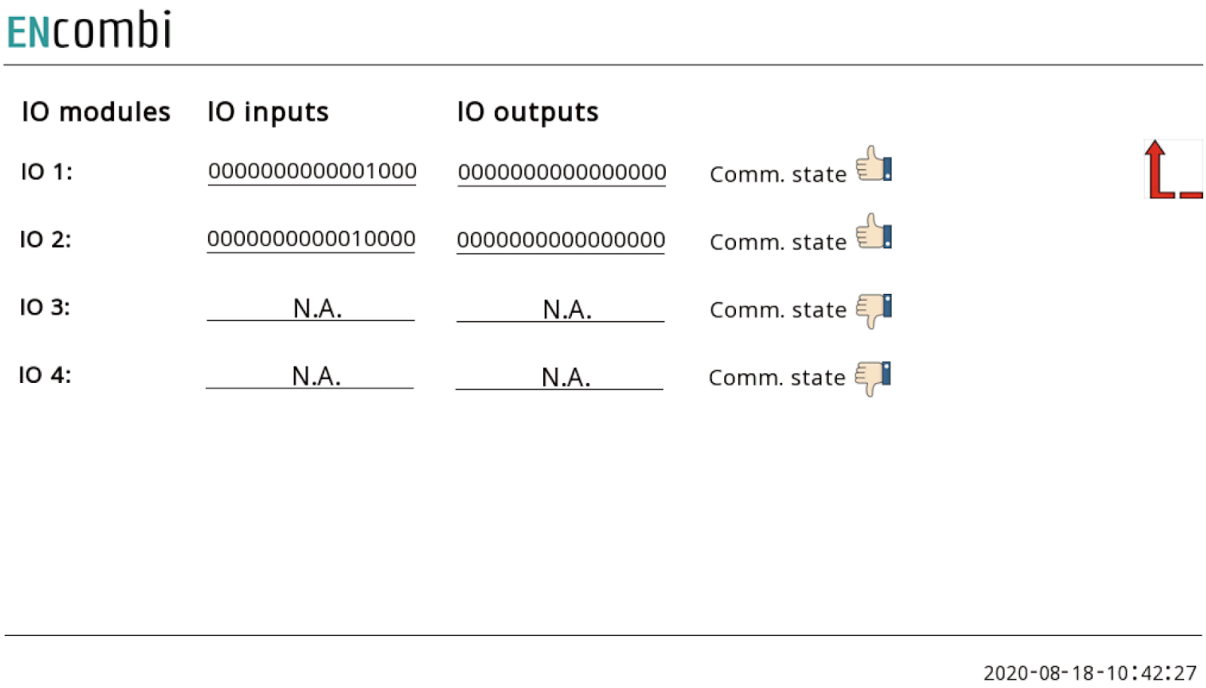


Consult the Modbus master documentation on ENcombi website for detailed information about what data is read from the various sensor and inverter models:

http://www.encombi.com/products/ecpv/

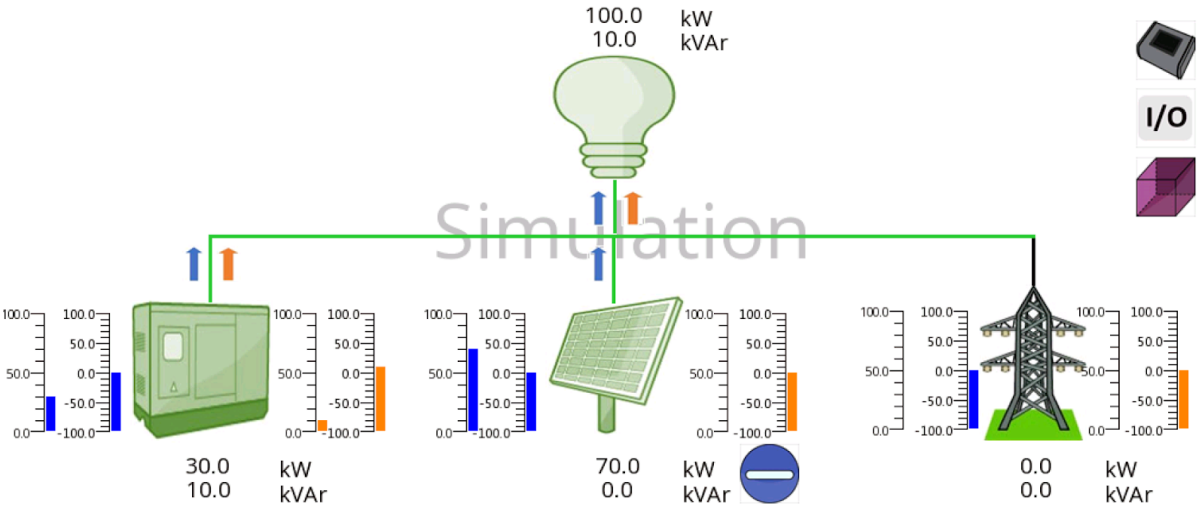
IO module data

Clicking the IO module button will lead to the page below where an overview of all the IO module readings is provided. In case communication to the IO module is failing, the readings will be displayed as “N.A”.

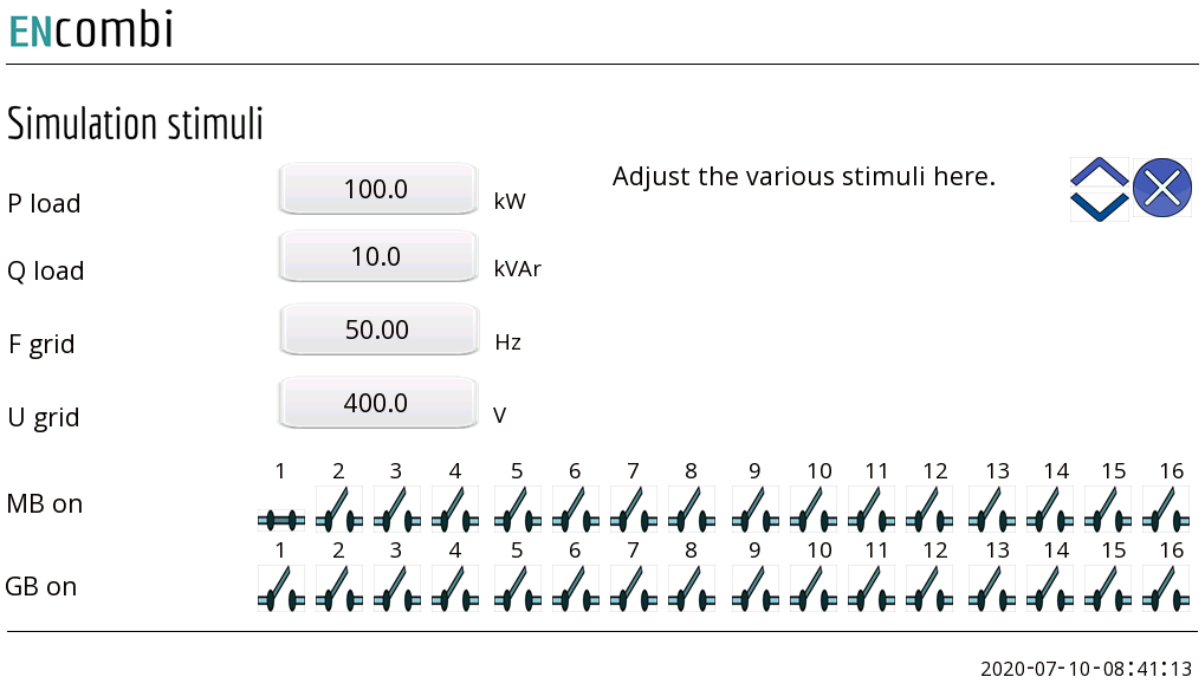


Simulation

In case simulation is enabled it will be indicated by a watermark.



Furthermore, an additional button will appear in the upper right corner. Clicking this will lead to the Stimuli page below.

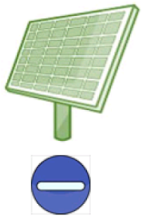


Fom in here various stimuli can be applied. Closing the window will lead back to the monitoring page.

PV

Clicking the PV icon leads to the below pages where more detailed information of the PV plant can be found. Clicking the up/down arrows will browse through them.

ENcombi

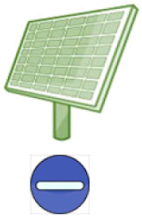


References		
GC	20.0	kW
PTAR	20	kW
PREF	20	kW
QTAR	0	kVAr
QREF	0	kVAr

Production		
P	30.4	kW
Q	-1.2	kVAr
S	30.4	kVA
PF	0.999	

2021-01-12 09:48:37

ENcombi

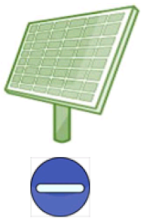


Produced			Available			Curtailed		
Total	4	kWh	Total	3	kWh	Total	0	kWh
Year	4	kWh	Year	3	kWh	Year	0	kWh
Month	4	kWh	Month	3	kWh	Month	0	kWh
Day	4	kWh	Day	3	kWh	Day	0	kWh

Penetration			Performance		
Total	26.2	%	Total	100.0	%
Year	26.2	%	Year	100.0	%
Month	26.2	%	Month	100.0	%
Day	26.2	%	Day	100.0	%

2021-01-12 09:50:42

ENcombi

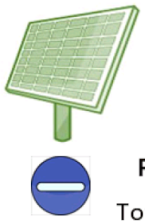


PV export save		
Total	500	Euro
Year	350	Euro
Month	250	Euro
Day	100	Euro

Mains import save		
Total	100	kg
Year	80	kg
Month	60	kg
Day	40	kg

2021-01-12 10:01:31

ENcombi



Fuel save		
Total	1100	liter
Year	600	liter
Month	300	liter
Day	100	liter

Fuel expense save		
Total	1500	Euro
Year	1400	Euro
Month	850	Euro
Day	200	Euro

CO2 emission save		
Total	1000	kg
Year	500	kg
Month	75	kg
Day	5	kg

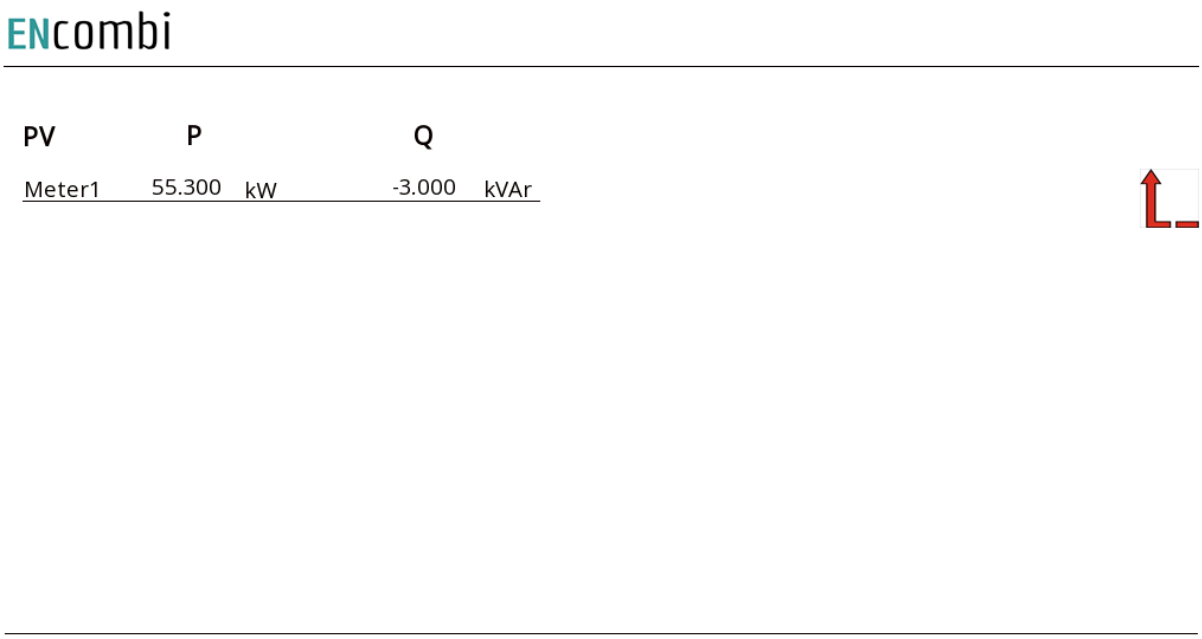
2021-01-12 10:00:55

On the right hand side of the above pages two buttons are presented that will lead to pages with more information about.

1. PV meter data.
2. Inverter data.

PV meter data

Clicking the meter icon will lead to the below page where overview of power and reactive power readings from all PV meters is provided. In the example below, only one PV meter is present. In case communication to a PV meter is failing, the readings will be displayed as “N.A”.



Clicking on a PV meter label, “Meter1” being the only option in the above example, will lead to pages with more detailed information about that specific PV meter. Clicking the up/down arrows will browse through them.

ENcombi

PV meter 1

Active power			Apparant power			Active energy		
P1	58.700	kW	S1	N.A.	kVA	Total	1253873	kWh
P2	0.000	kW	S2	N.A.	kVA	Imp.	1253873	kWh
P3	0.000	kW	S3	N.A.	kVA	Exp.	0	kWh
P	58.700	kW	S	N.A.	kVA			

Reactive power			Power factor		Reactive energy		
Q1	-2.900	kVAr	PF1	0.626	Total	97948	kVArh
Q2	0.000	kVAr	PF2	0.000	Imp.	0	kVArh
Q3	0.000	kVAr	PF3	0.000	Exp.	97948	kVArh
Q	-2.900	kVAr	PF	0.626			

Status

Dig. 0000000000000000

Comm. state

2020-07-10-09:04:25

ENcombi

PV meter 1

Line-neutral voltage			Current		
L1N	229.1	V	L1	408.000	A
L2N	0.0	V	L2	0.000	A
L3N	0.0	V	L3	0.000	A
			N	407.000	A

Line-line voltage			Frequency		
L1L2	229.1	V	L1	49.98	Hz
L2L3	0.0	V	L2	N.A.	Hz
L3L1	229.1	V	L3	N.A.	Hz

Comm. state

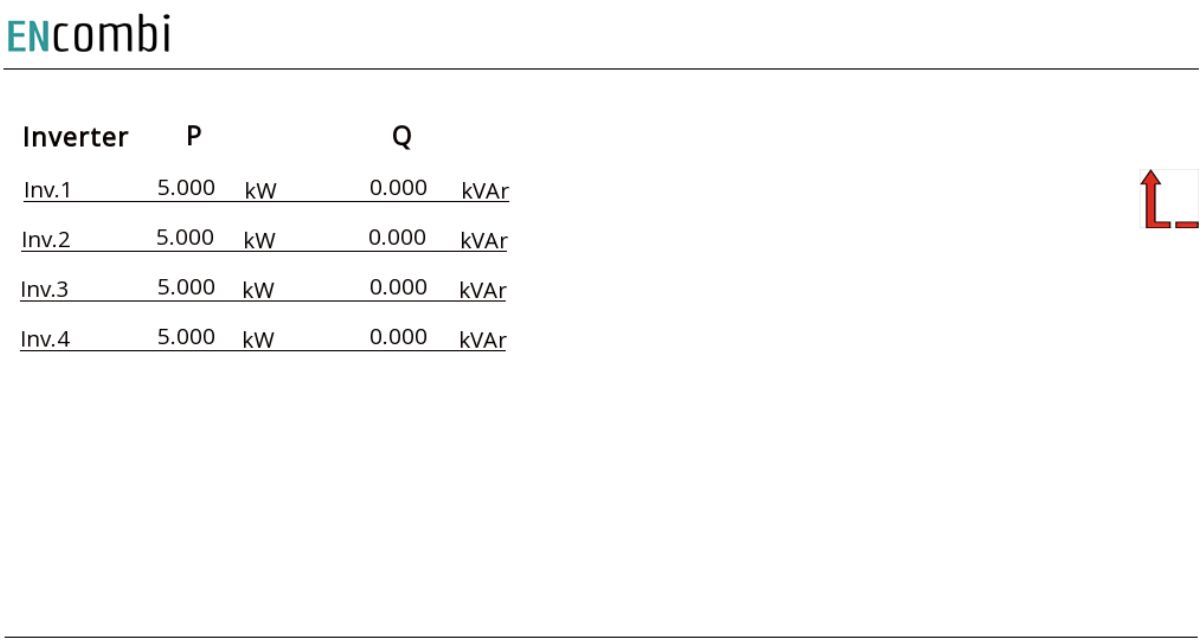
2020-07-10-09:05:10

In the lower right corner communication status for the specific PV meter is shown.

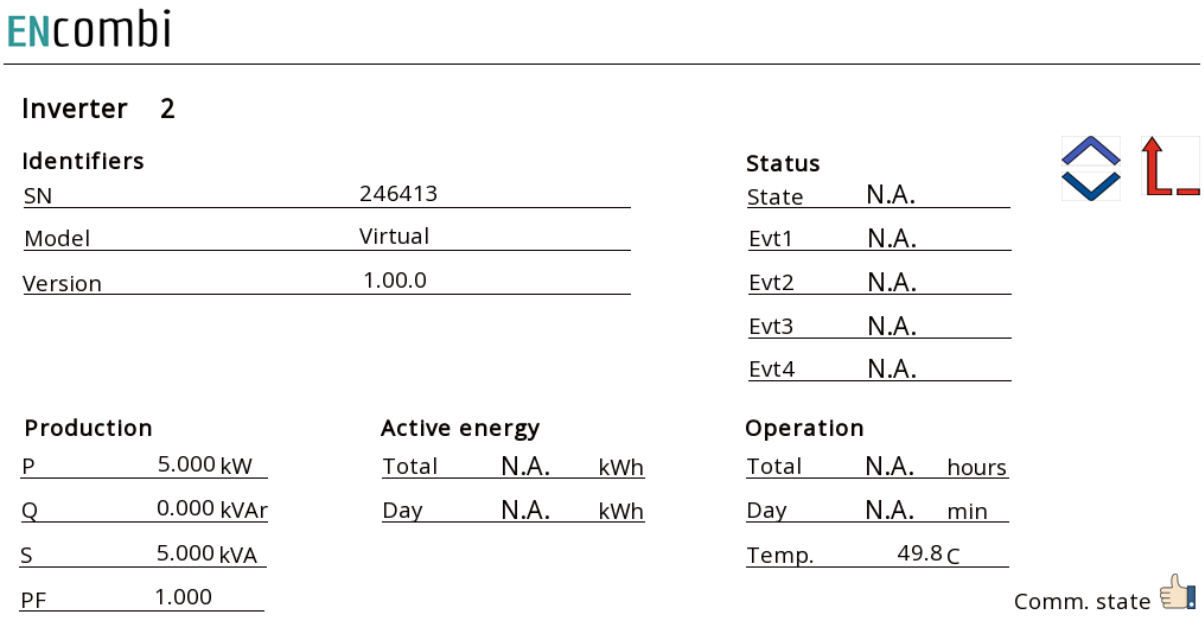
Not all data shown is read/displayed from all meter models supported and will in that case show “N.A”. Consult the Modbus master documentation on ENcombi website for detailed information about what data is read from the various meter models.
http://www.encombi.com/products/ecpv/

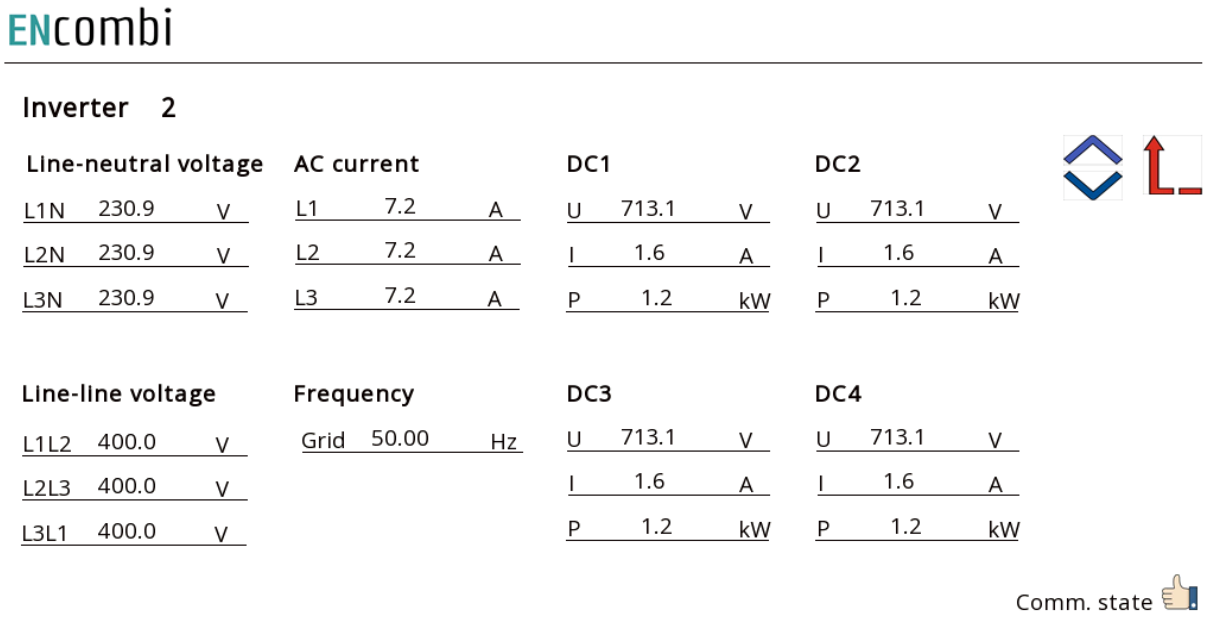
Inverter data

Clicking the inverter icon will lead to the below page where overview of power and reactive power readings from all inverters is provided. In case communication to an inverter is failing, the readings will be displayed as “N.A”. In the below example four inverters are installed.



Clicking on an inverter label will lead to below pages with more detailed information about that specific inverter. Clicking the up/down arrows will browse through them.



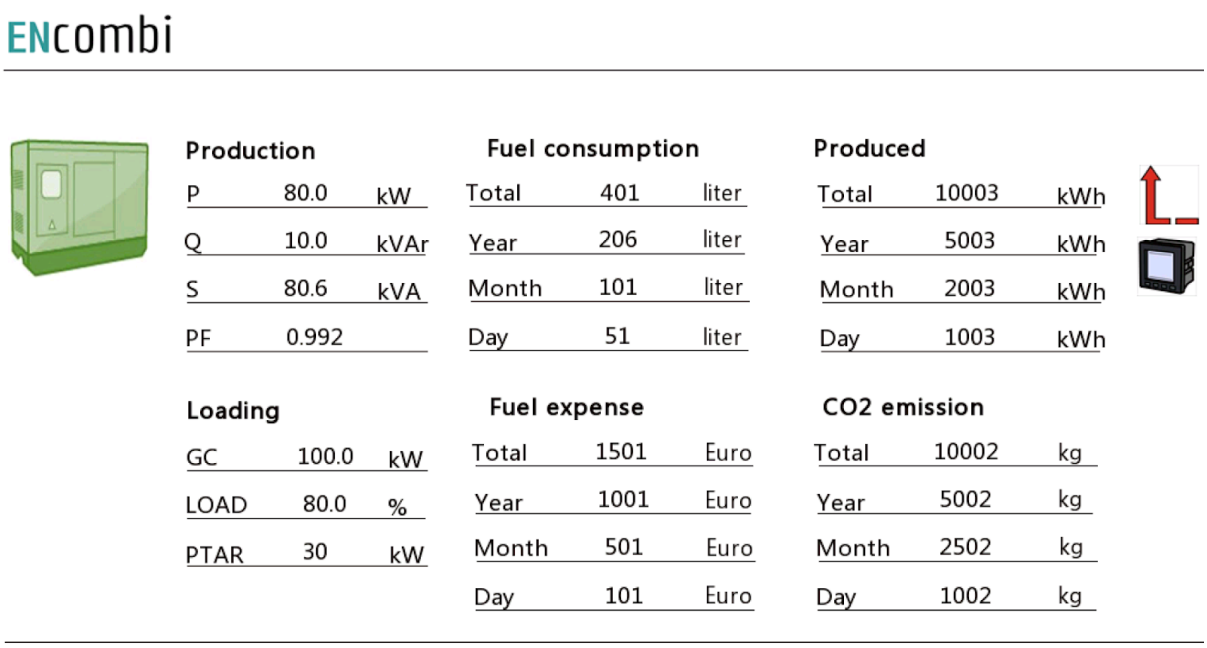


In the lower right corner communication status for the specific inverter is shown.

Not all data shown is read/displayed from all inverter models supported and will in that case show “N.A”. Consult the Modbus master documentation on ENcombi website for detailed information about what data is read from the various inverter models.
http://www.encombi.com/products/ecpv/

Genset

Clicking the genset icon leads to the below page where more detailed information of the genset plant can be found.


ENcombi

Production			Fuel consumption			Produced		
P	80.0	kW	Total	401	liter	Total	10003	kWh
Q	10.0	kVAr	Year	206	liter	Year	5003	kWh
S	80.6	kVA	Month	101	liter	Month	2003	kWh
PF	0.992		Day	51	liter	Day	1003	kWh

Loading			Fuel expense			CO2 emission		
GC	100.0	kW	Total	1501	Euro	Total	10002	kg
LOAD	80.0	%	Year	1001	Euro	Year	5002	kg
PTAR	30	kW	Month	501	Euro	Month	2502	kg
			Day	101	Euro	Day	1002	kg

2021-01-12 10:07:38

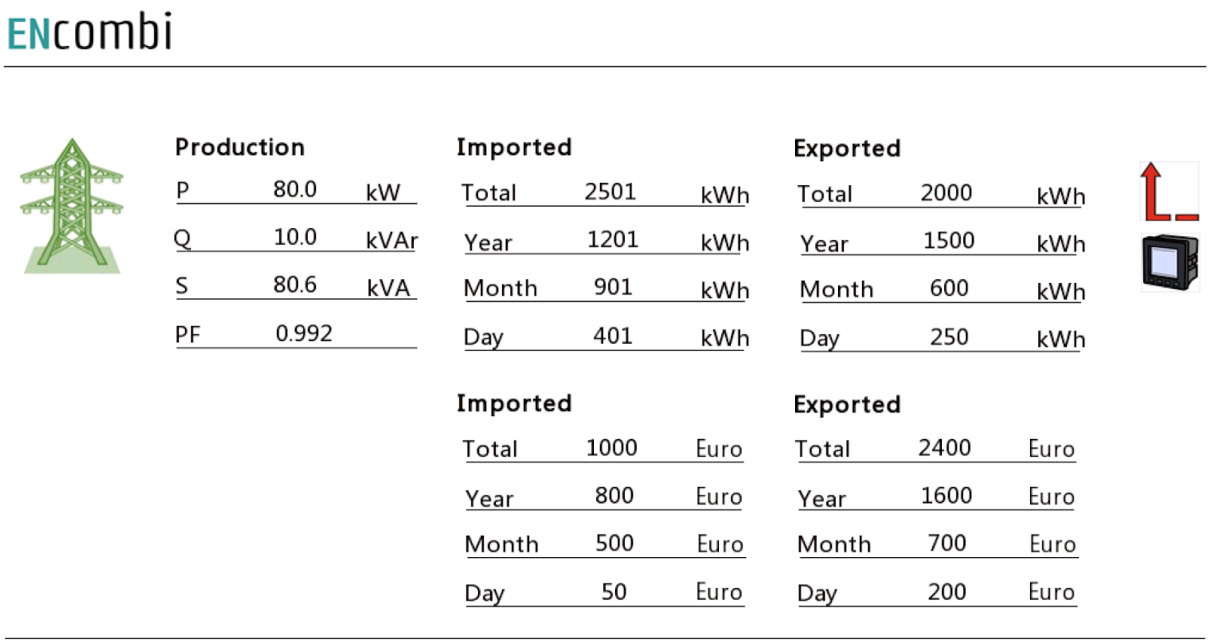
On the right hand side of the above pages three buttons are presented that will lead to pages with more information about genset meters.

Genset meter data

Clicking the meter icon will lead to similar pages holding genset meter data as already documented previously for PV meters. Refer to that chapter for more information.

Mains

Clicking the utility icon leads to the below page where more detailed information of the utility can be found.



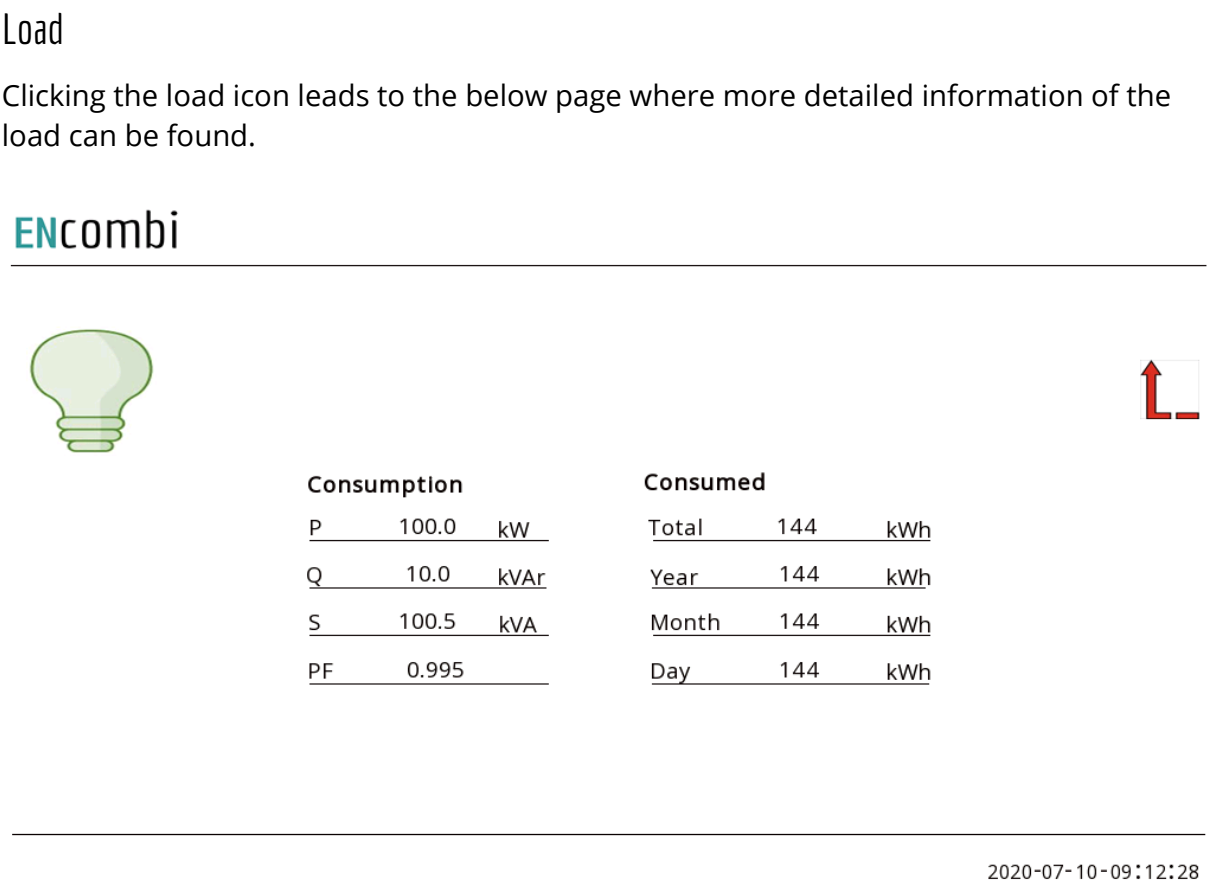
On the right hand side of the above pages a button is presented that will lead to pages with more information about mains meters.

Mains meter data

Clicking the meter icon will lead to similar pages holding mains meter data as already documented previously for PV meters. Refer to that chapter for more information.

Load

Clicking the load icon leads to the below page where more detailed information of the load can be found.



Project SW update

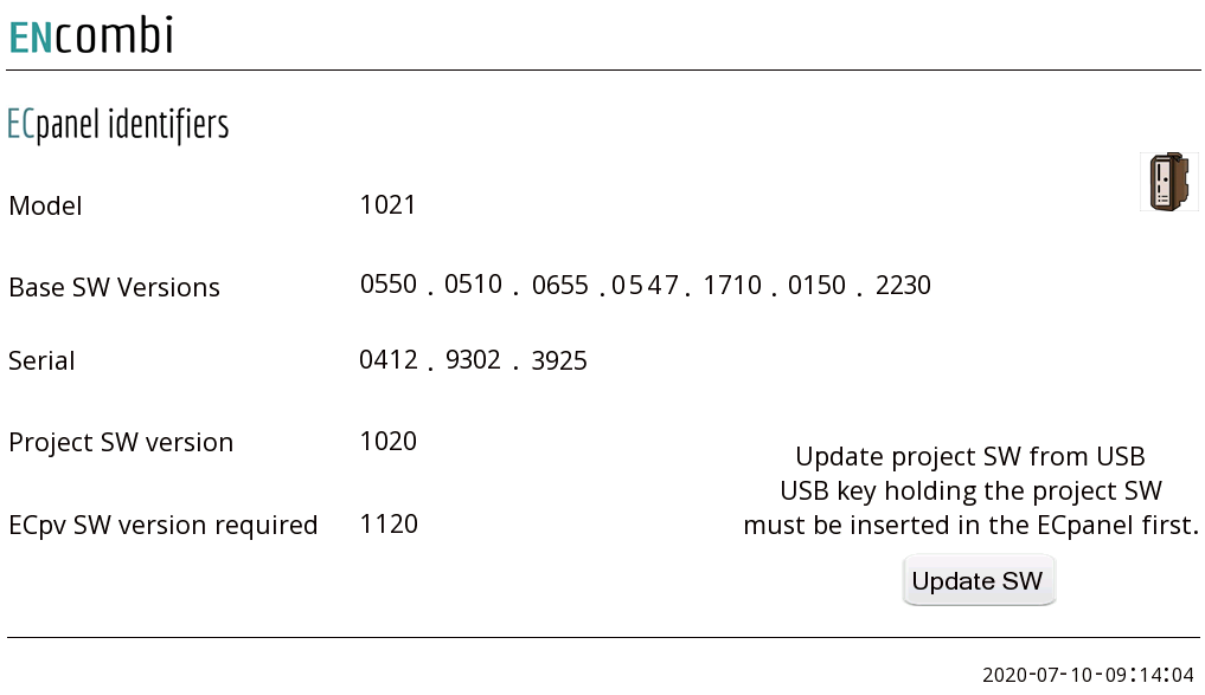
The project SW in the ECpanel can be updated from a USB memory stick.
The newest project file can be retrieved from the ENcombi website.
http://www.encombi.com/products/ecpanel/

Follow the below procedure when to update the project SW.

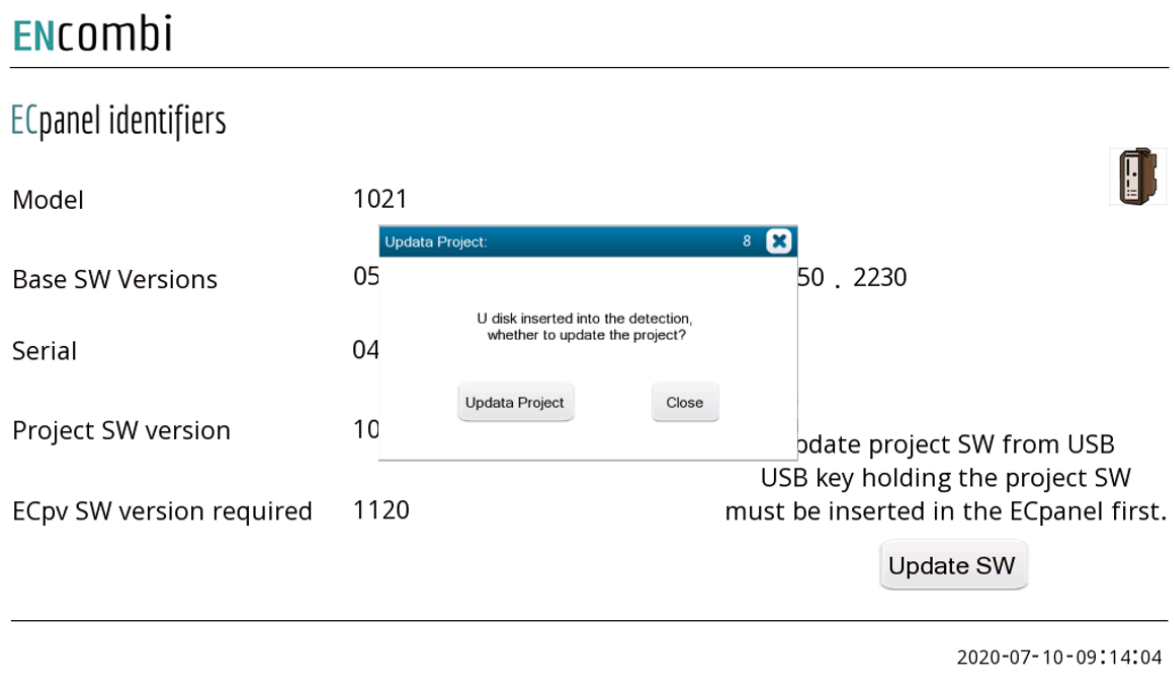
1: Download the project file from ENcombi website and put it in the root of a USB memory stick.

2: Insert the USB memory stick in the ECpanel.

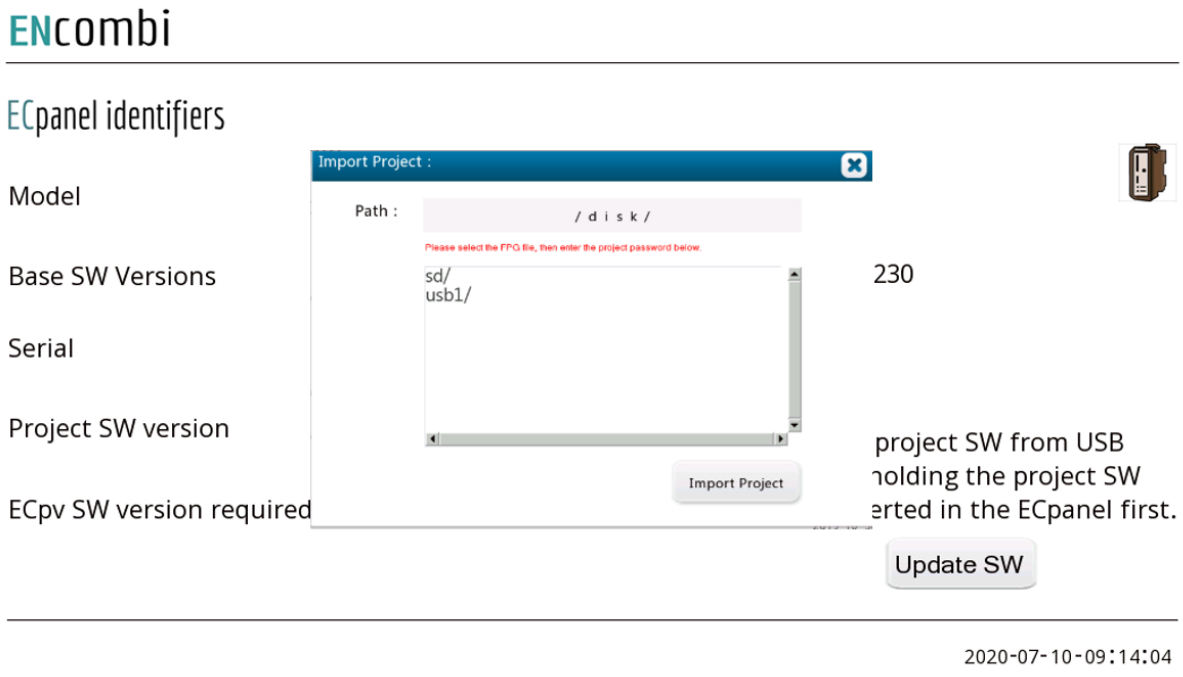
3: Navigate to the Identifiers page and click the “Update SW” in the lower right corner.



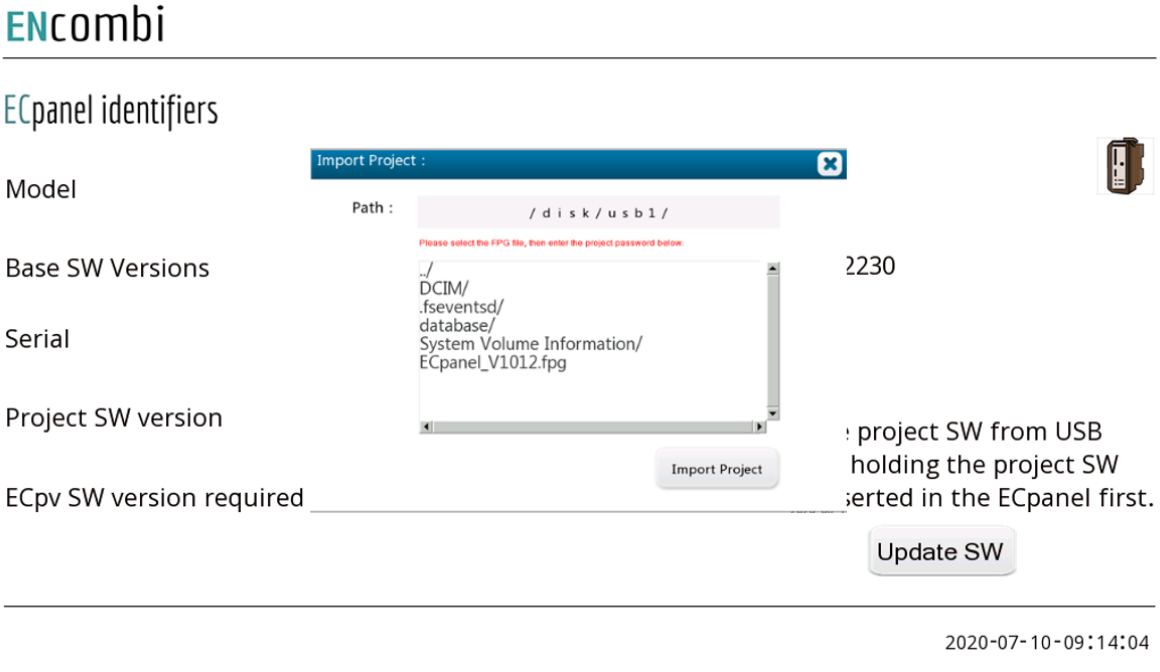
This will populate the following window:



4: Click the “Update project” button.
This will populate the following window.



5: Click on the “usb1/” line.
This will take you to the root of the USB memory stick.



Locate the ECpv project file and click on it.
Afterwards click the “Import Project” button.
This will populate the following window.

Enter the password (12345) for SW update and click “Import Project”.
The project is now being updated.
When SW update is complete and ECpanel boots up and reverts to the welcome page the USB memory stick can be removed.