User Guide

Pixii Home Outdoor Cabinet

Grid tied energy storage system

Shaping the power of the future

Public

Document number: 16138, rev. 1.0
Author: Christoffer Jonsson
Issue date: 10.09.2024

System safety and environmental precautions

Product warranty becomes invalid if following precautions are not followed during handling, storage, installation, commissioning and operation of Pixii energy storage systems.

General precautions

Although this system incorporates protective circuits and other security features, it may still be destroyed, damaged, work poorly or shorten its lifetime if exposed to improper handling during transportation, installation or operation. Always handle the system with care, use proper lifting techniques, do not roll, climb or drill holes in the cabinet or enclosure.

Opening the equipment may cause serious injury even when the AC power is disconnected. Dangerous voltage may be present inside, as system can be still running from batteries or capacitors may still be charged.

Environmental precautions

Some devices can reach high temperatures during normal operation. It is very important to ensure that airflow through equipment is not blocked, filters are in good condition and fans can rotate freely. If other equipment is installed in close proximity, secure that inlets and outlets are not blocked.

Electronic devices installed in the energy storage system are designed for indoor environment with pollution degree 2. When installed in an outdoor enclosure (open or closed loop heat management system), it is important to ensure, that the enclosure is closed and sealed during normal operation, to avoid external air with increased level of humidity and dust from entering. In addition, in open loop systems, filters maintenance must be properly planned. In case of indoor systems, operating environment must be of pollution degree 2, without increased level of dust and humidity.

Installer is responsible to protect system against current surges, over-voltages, etc. caused by lightning, electrostatic discharges, etc. To avoid system damage, it is mandatory to always install proper SPDs.

Installation precautions

Read carefully user documentation before installation and using this equipment. Follow all commands, always use recommended tools and torque values as described. Commissioning and configuration of equipment should be done only by Pixii personnel or by other authorized and qualified persons.

For safety reason, before you start installation, ensure all external power sources are disconnected, as well as internal battery and load fuses/breakers. To avoid injuries caused by high leakage/touch current you must always start installation by connecting earthing wire (PE), before you connect other AC input wires (phases, neutral).

If system contains batteries, they represent major energy hazard. To avoid short circuit on batteries, do not operate with full metallic tools close to battery poles. Be careful also about other objects (rings, watches, necklaces, etc.).

All Pixii devices are certified according to international safety, environmental and EMC standards. If any other devices will be installed inside this product, it might influence parameters and violate original approvals. Installer is responsible that during installation environmental properties of this device are not impaired and installation is according to local regulations.

Document number: 16138, rev. 1.0

Battery safety and environmental precautions

For safety reasons, installers are responsible for familiarizing themselves with the contents of battery installation manual and all warnings before performing installation. Failure to observe the precautions described in this section can cause serious injury to persons or damage to property.

General precautions

The voltage of this battery module is strong enough to cause electric shock.

- Do not disassemble the battery module.
- Do not touch the battery module with wet hands.
- Do not expose the battery module to moisture or liquids.
- Keep the battery module away from children and animals.

The battery module may explode.

- Do not subject the battery module to strong impacts.
- Do not crush or puncture the battery module.
- Do not dispose of the battery module in a fire.

Keep the battery module away from open flame or ignition sources.

- Do not expose the battery module to temperatures in excess of 60°C.
- Do not place the battery module near a heat source, such as a fireplace.
- Do not expose the battery module to direct sunlight.
- Do not allow the battery connectors to touch conductive objects such as wires.

Risks of damage to the battery module.

- Do not allow the battery module to get in contact with liquids.
- Do not subject the battery module to high pressures.
- Do not place any objects on top of the battery module.

Environmental precautions

The battery module may leak corrosive electrolyte. Avoid contact with the leaking liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns.

The battery module should not be disposed of with household waste at the end of its working life.

The battery module should be disposed of at a proper facility for environmentally safe recycling

Installation precautions

Read the battery installation manual before installing and operating the battery module.

- Disconnect the charging source prior to connecting or disconnecting battery terminals.
- Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.

Wear appropriate personal protective equipment when dealing with the battery module.

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.

The battery module is heavy enough to cause severe injury.

Document number: 16138, rev. 1.0

Response to emergency situations

While the battery module comprises multiple battery cells that are designed to prevent hazards resulting from failures, Pixii can not guarantee their absolute safety.

In the event that hazardous quantities of electrolyte are released, or in case of smoke, or fire, leave the battery room and contact the fire brigade.

Leaking batteries

If the battery module leaks electrolyte, avoid contact with the leaking liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, do these actions:

Inhalation:

Evacuate the contaminated area, and seek medical attention immediately.

Eye contact:

Rinse eyes with flowing water for 15 minutes, and seek medical attention immediately.

Skin contact:

Wash the affected area thoroughly with soap and water, and seek medical attention immediately.

Ingestion:

Induce vomiting, and seek medical attention immediately

Rinse mouth and wash around the mouth with water.

Burns:

If burns are caused, treat them accordingly. Likewise, immediate medical attention shall be obtained.

Fire

In case of a fire, make sure that an ABC or carbon dioxide extinguisher is nearby. If a fire breaks out where the battery module is installed, do these actions:

1. Extinguish the fire before the battery module catches fire.
2. If the battery module has caught fire, do not try to extinguish the fire. Evacuate people immediately.

!!! Warning !!!

The battery module may catch fire when heated above 150°C.

If the battery catches fire, it will produce noxious and poisonous gases. Do not approach.

Wet batteries

If the battery module is wet or submerged in water, do not try to access it. Contact Pixii or your distributor for technical assistance.

Damaged batteries

Damaged batteries are dangerous and must be handled with extreme caution. They are not fit for use and may pose a danger to people or property. If the battery module seems to be damaged, pack it in its original container, and then return it to Pixii or your distributor.

!!! Caution !!!

Damaged batteries may leak electrolyte or produce flammable gas. If you suspect such damage, immediately contact Pixii for advice and information.

Document number: 16138, rev. 1.0

Revision	Date	Comment
1.0	10.09.2024	Initial

Document number: 16138, rev. 1.0

Table of Contents

Document number: 16138, rev. 1.0

Document number: 16138, rev. 1.0

1 Introduction

The purpose of this user manual is to provide you with comprehensive instructions on how to use and care for Pixii Home Outdoor cabinet.

It includes detailed descriptions, step-by-step guidance, troubleshooting tips, and essential safety information.

Read it carefully and follow all recommendations to be sure system is running in correct environment under good conditions and installation reached all safety requirements.

1.1 Thermal management system (TMS)

Cabinet thermal management system provides appropriate thermal conditions inside the cabinet. Solution is integrated on the cabinet door with controlled air flow inside the cabinet.

NOTE:
Do NOT block the air vents and check their permeability on regular basis.

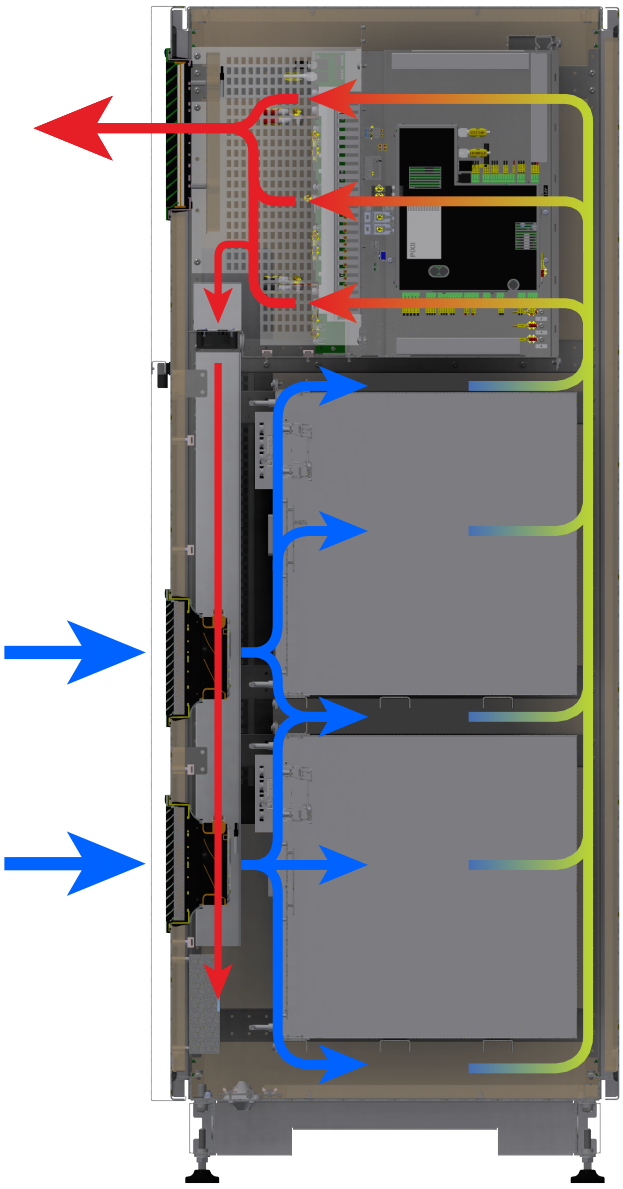


Figure 1.1 Airflow diagram in the cabinet

Document number: 16138, rev. 1.0

1.2 Installation block diagram

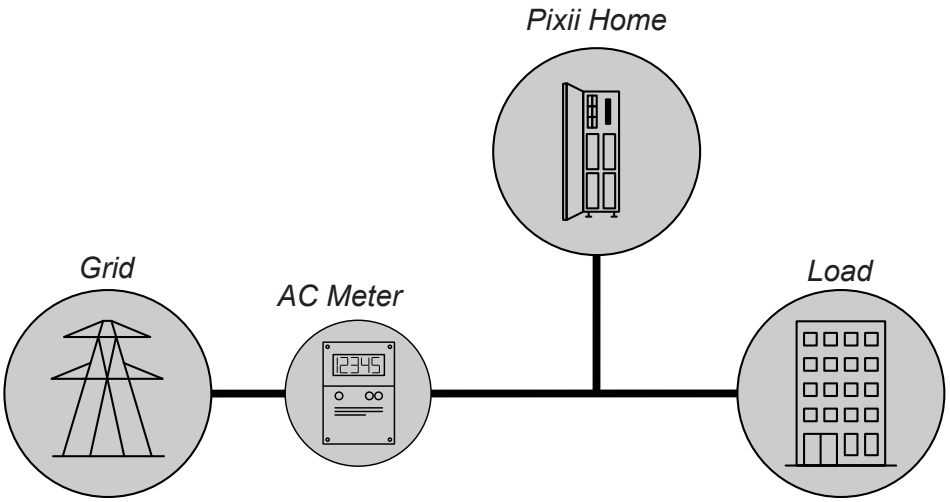


Figure 1.2 Single line installation block diagram - behind the meter (Peak shaving)

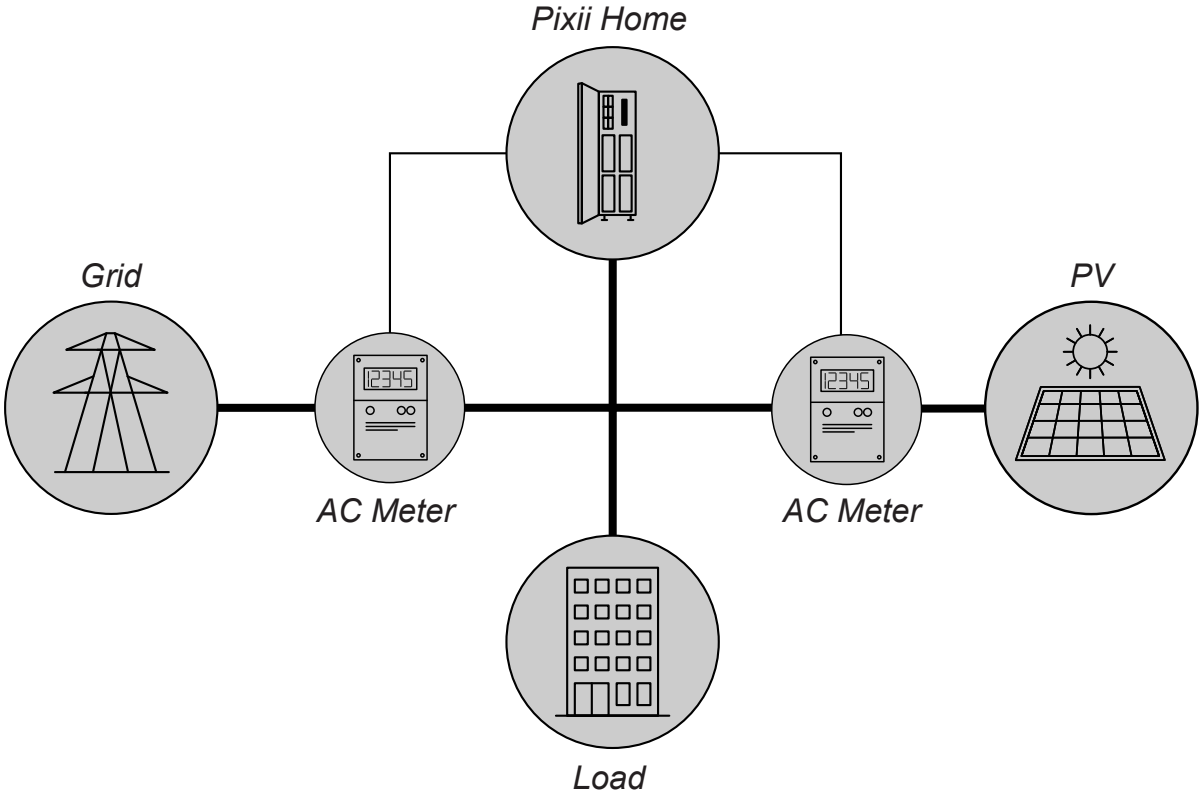


Figure 1.3 Single line installation block diagram - behind the meter with PV (PV self sufficiency)

Document number: 16138, rev. 1.0

1.3 System ratings

1.3.1 Electrical specifications

The Pixii Home consist of modular converters, each of them providing transformers with Reinforced insulation between AC side and the DC side.

AC Mains Type	TN
Max. Active Power (charge and discharge)	20kW
Max. Apparent Power (charge and discharge)	20kVA
AC voltage	400/230V, 3Ph+N+PE
Max. AC current	32Arms, 3Ph+N+PE
Nominal AC current	29Arms, 3Ph+N+PE
Frequency range	45Hz to 66Hz
Cos φ range	0.5 inductively to 0.5 capacitively
Protective class	Class I
Overvoltage category	OVC II
Max. short circuit current	10kA
Prospective short-circuit current (min. required)	630A
Max. Energy	20kWh
Max. DC voltage	44V to 58V
Max. DC current	400A

Table 1. Electrical specifications

Type of the battery	Shoto SDA10-48100
Nominal capacity	100Ah
Nominal energy	5.12kWh
Operating voltage	40V-57.7V
Max. charge/discharge current	100A

Table 2. Battery specifications

	P_{st}	P_{lt}	Z
Measured using Z_{test}	0,645	0,603	0,013Ω+j0,002Ω
Maximum permissible network impedance, Z_{max}	-	-	0,093Ω+j0,093Ω

Table 3. Voltage fluctuations and flicker:

Document number: 16138, rev. 1.0

1.3.2 Environmental specifications

Operating temperatures	-20°C to +45°C
Humidity	5% to 95% RH (non-condensing)
Storage and transportation temperatures	-30°C to +60°C*
Storage and transportation humidity	5% to 95% RH (non-condensing)
Storage (less than 12 months)	State of Charge (SoC): 25%
Acoustic noise (maximum)	<60dBA at 1m distance
Maximum altitude	2000m
Ingress protection rating	IP55
Pollution degree	3
Wet locations	Yes
Current (inrush)	25Apeak
Maximum output fault current	200Apeak/1ms
Inverter topology	Isolated
Env. cat. (IEC 62040-1:2017)	Outdoor
Env. cat. (IEC 62109-1)	Outdoor
Env. cat. (IEC 62477-1)	Outdoor

Table 4. Environmental specifications

***** Without batteries installed.

Document number: 16138, rev. 1.0

1.3.3 Mechanical specifications

Height	1717 mm
Width	684 mm
Depth	387 mm
Weight (without modules and batteries)	62 kg
Door Cover	3,5 kg
Module	2 kg
Shoto 3U battery	42 kg

Table 5. Mechanical specifications

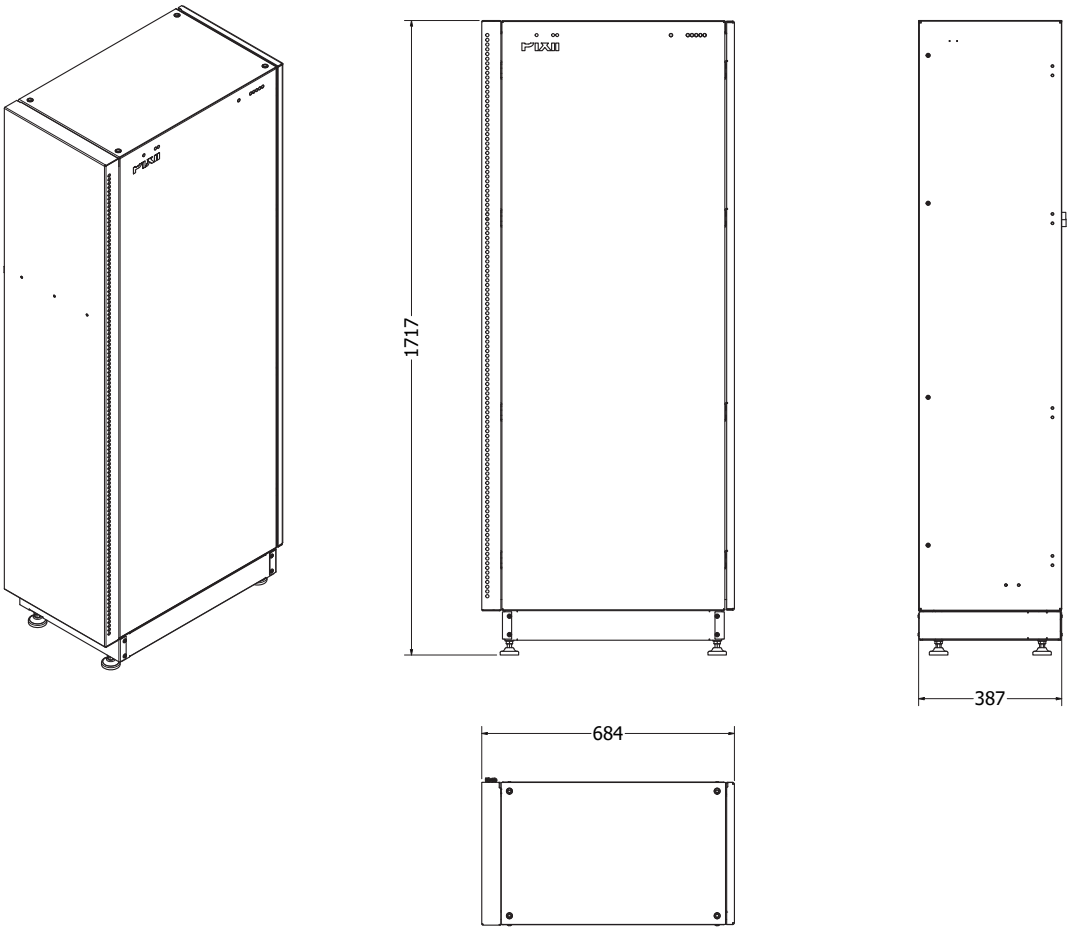


Figure 1.4 Dimensions

Document number: 16138, rev. 1.0

1.4 Installation site

	Minimum distance	Suggested distance
Front	60cm	80cm
Rear	3cm	5cm
Top	15cm	30cm
Sides	45cm	60cm

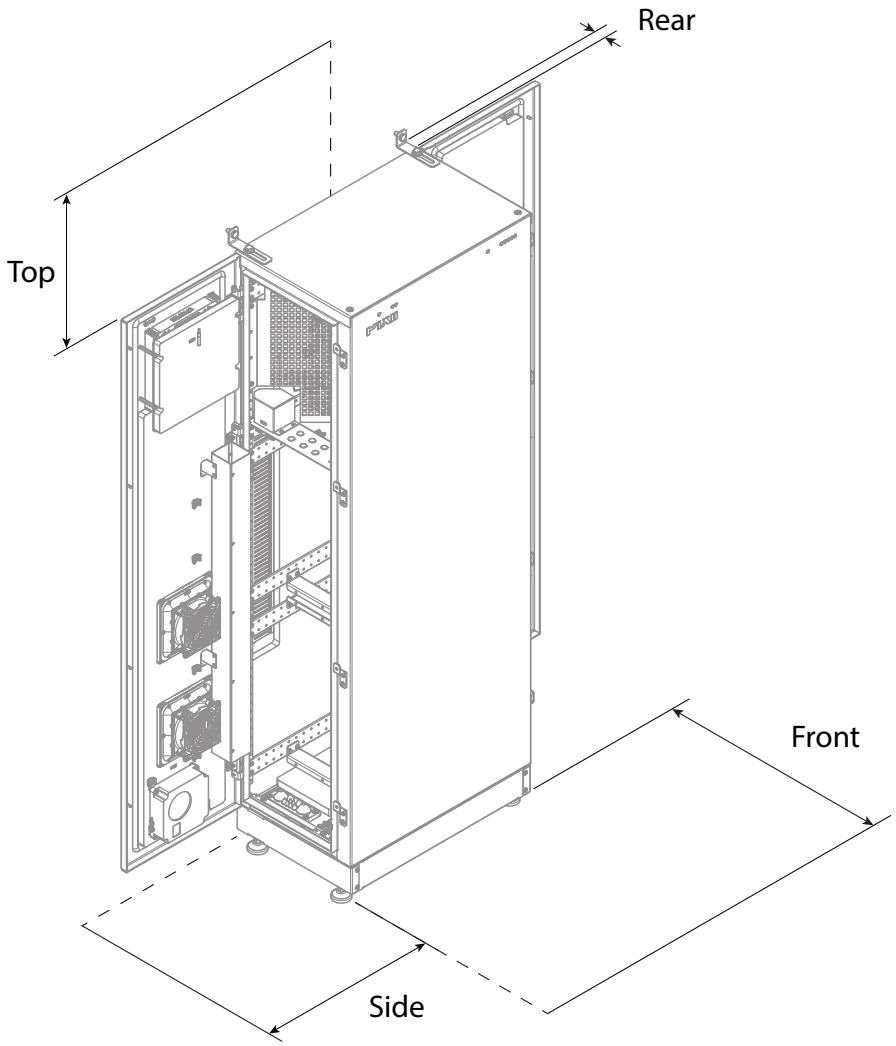


Figure 1.5 Distances and clearances

NOTE:
It is strictly required to follow local regulations if separation distances larger than the table above are required.

NOTE:
If the energy storage system is installed indoor, automatic sprinkler system is highly recommended and sometimes required. Local regulations must be adhered to.

Document number: 16138, rev. 1.0

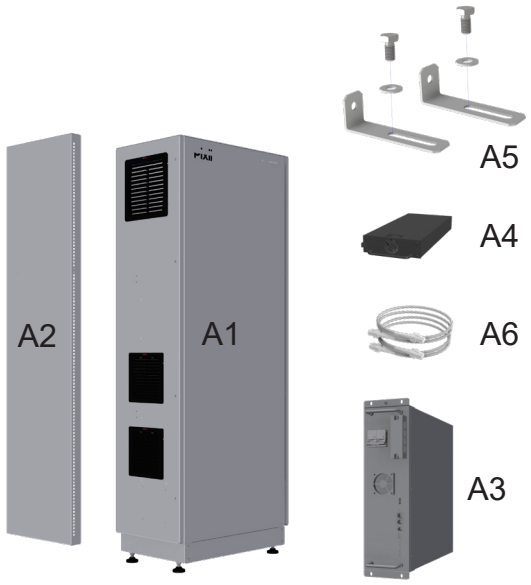
1.5 Packaging

Standard:

- Cabinet 1x(A1)
- Door cover 1x(A2)
- Batteries 2x(A3)
- PixiiBoxes 3x(A4)
- Wall mounting kit 1x(A5)
- Cable kit 1x(A6)

Extension kit (Optional):

- Batteries 2x(A3)
- PixiiBoxes 3x(A4)



1.6 System label

PixiiHome system is marked with 2 system labels. One label is located on the inside of the cabinet (on the cabinet door) and one label is a separate sticker with the documentation.

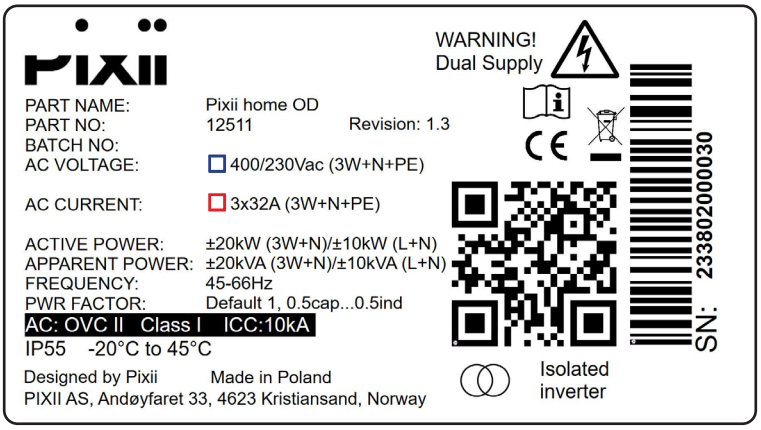


Figure 1.6 System label

Document number: 16138, rev. 1.0

2 Function

This section explains the different possibilities on how the system can be used. Some of them may depend on a 3rd party integration.

2.1 Self consumption

In this mode the system aims to set your consumption from the grid to zero, or as low as possible. The produced energy will firstly be used for self consumption or storing in the battery, only after these 2 criteria are met, will the excess energy feed into the grid. And without production the system will discharge only so much energy as I needed in the house or if needed more, as much as it can provide.

2.1.1 PV integrated inverter

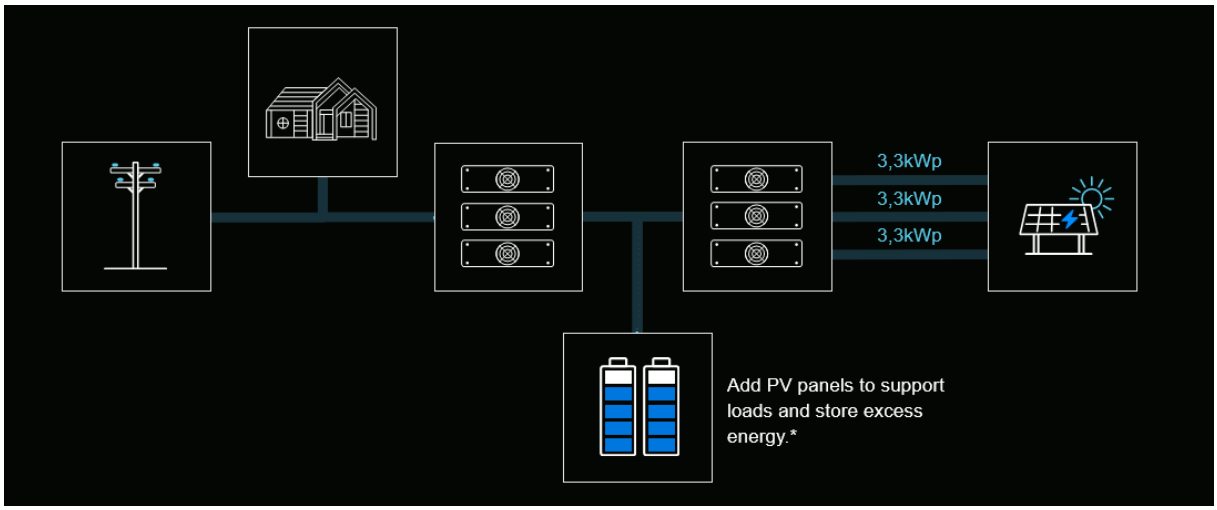


Figure 2.1 PV integrated inverter

2.1.2 PV external inverter

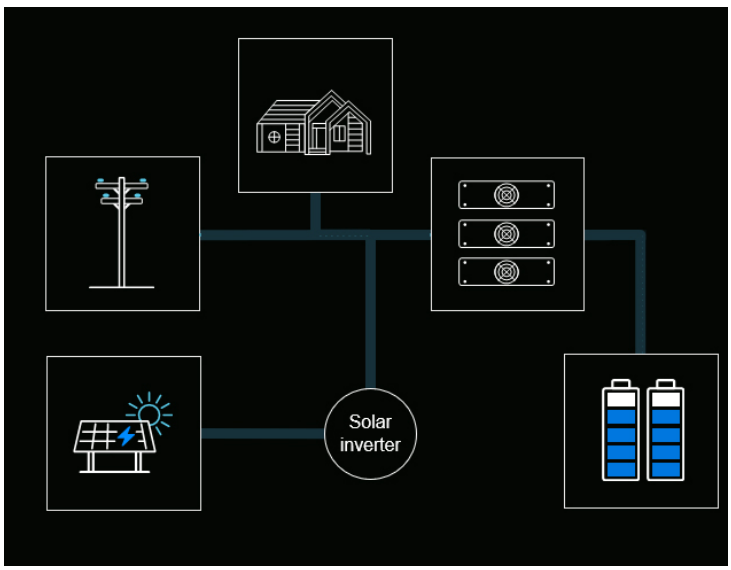


Figure 2.2 PV external inverter

Document number: 16138, rev. 1.0

2.2 Peakshaving

The purpose of the peak shaving functionality is to discharge power from the battery when a meter value goes above a configurable threshold, and charge when the meter value goes below another configurable threshold.

NOTE:
This may be used in several cases, such as reducing demand charges ans supporting photovoltaic self-consumption.

Different peak shaving strategies/parameters for different time periods can also be configured through the Scheduler functionality.

2.3 Arbitrage

The purpose of the Arbitrage is to optimize the batteries charge and discharge according to the electrical prices.

NOTE:
The function is not yet released for Pixii Home. But can be used through some aggregators.
The integrated function are set to be released Q3/Q4 2024.

2.4 Frequency Services

To use Pixii Home for frequency services, it will be operated through one of our supported aggregators. Some aggregators require external hardware, while others use our integrated MQTT protocol. Please speak with your installer for more information.

The aggregators take full control over the systems, sending commands to Pixii Home on when and how it should charge or discharge. You need to consult with the aggregator to determine how it should be controlled.

2.5 2.5 Back-up

The Backup function is set to be released in Q3/Q4 2024. It will be a three-phase full backup power solution, requiring an external backup box to be installed in front of the Pixii Home. The backup box contains several relays and electrical components. Please note that local regulations need to be checked before installing a backup box.

Document number: 16138, rev. 1.0

3 Switching ON the system

3.1 Main Breaker ON-OFF

To switch ON the system, switch ON the external upstream breakers first.

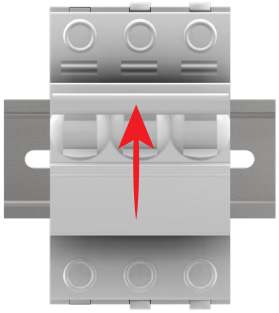


Figure 3.1 External breaker

Switch ON internal battery breakers, if it has been turned OFF.

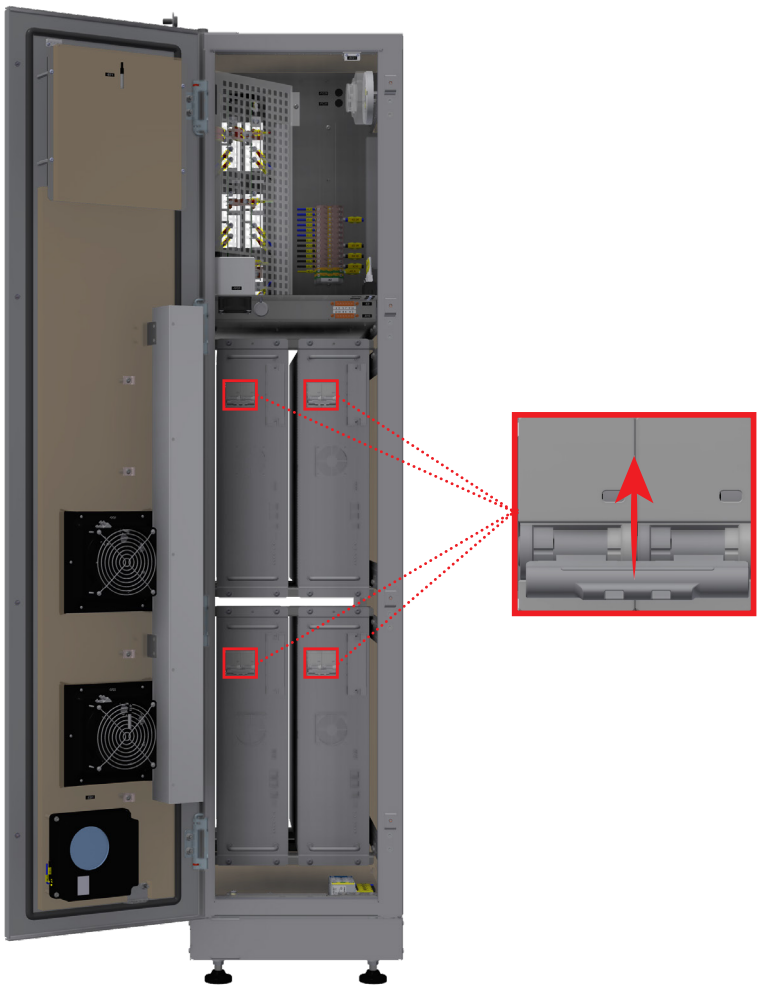


Figure 3.2 Battery breakers

NOTE:
We recommend qualified electrician to open the cabinet and switch the batteries ON/OFF.

Document number: 16138, rev. 1.0

3.2 Indicator LEDs

The Pixii Home system comes equipped with 6 RGB LED located on the cabinet exterior. The purpose of these LEDs is to show the various states of operation the cabinet can be in. The LEDs will also indicate if any warnings are present in the web user interface.

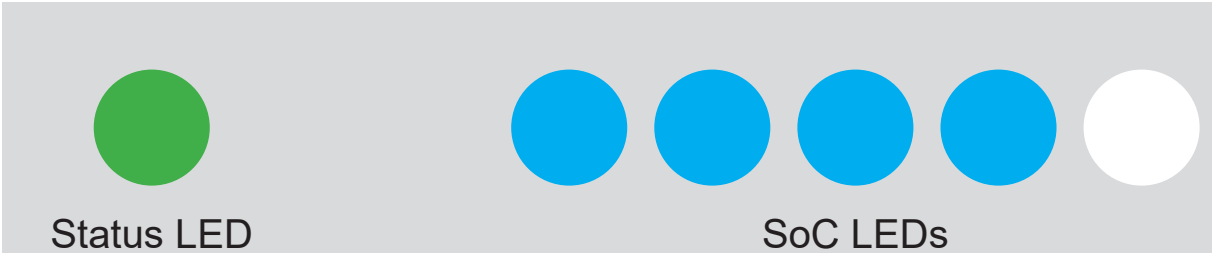


Figure 3.3 Indicator LEDs

The left most offset LED is the status indicator. This will show a green light during normal operation, but will change to yellow or red during a status update, depending on the severity of the present issue. The right side LEDs show current SoC (State of charge) status, charging and discharging.

3.2.1 Status LED

Normal/info

If the status LED is showing a green light, it means the system is in normal or info mode.

Info in this case means that there could some informations regarding the operation of the system in the web user interface, but it is not critical for the operation of the system.

Warning

A yellow light means “Warning“, this means there could be something preventing normal operation of the system.

An example for this would be if the sensor located in the doors of the cabinet is triggered, this shuts OFF the system fans and shows a “door alarm“ in the web user interface.

Error

If the status LED shows red, this means the system has entered “Error“ state.

This means there is a critical error preventing normal operation of the system. This could for example be an issue with the cabinet smoke detector or an issue with the batteries. This state should have your immediate attention.

Document number: 16138, rev. 1.0

3.2.2 SoC LEDs

The right side SoC LEDs are animated based on the current operation of the system. Below you can find a description of the different light configurations and their meaning.

Charging

This configuration shows the battery SoC between 40-60%. The SoC LED 4 and 5 is animated and flash towards the right, indicating the system is charging.

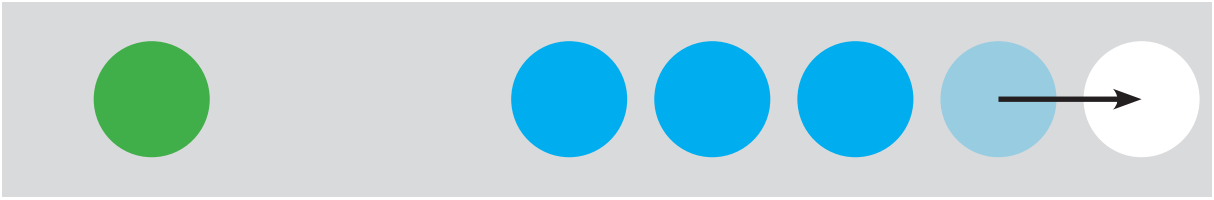


Figure 3.4 Charging

Discharging

This configuration shows the battery SoC between 60-80%. The SoC LED 4, 3, 2 and 1 is animated and flash towards the left, indicating discharging of batteries.

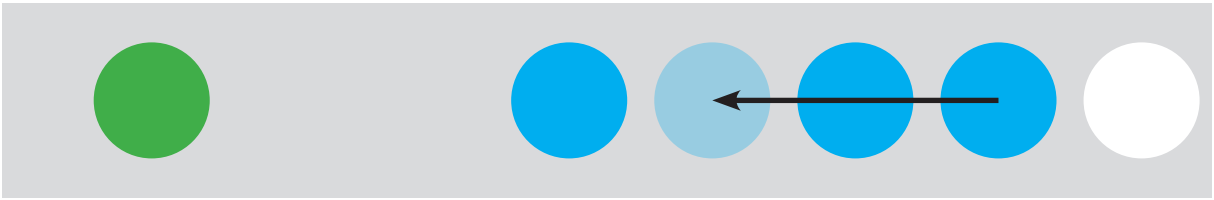


Figure 3.5 Discharging

Off-grid operation

When the system is installed for off-grid operation, all SoC LEDs will light up green.

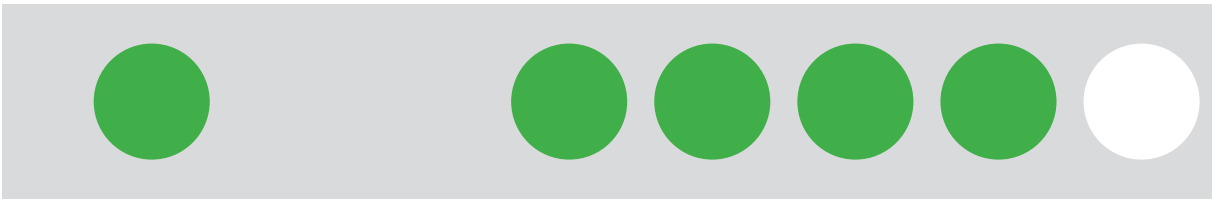


Figure 3.6 Off-grid operation

SoC less the reserved

If the current SoC is lower than reserved amount, LED 1 will show as yellow.

Figure 3.7 SoC less the reserved

Document number: 16138, rev. 1.0

4 Internet Portal / App

4.1 Web interface, Local network

To access the dashboard through Pixii user web interface you need to connect to the Pixii Home cabinet through the local network.

The IP-adress can be found through your network settings. Login details you will get from your installer.

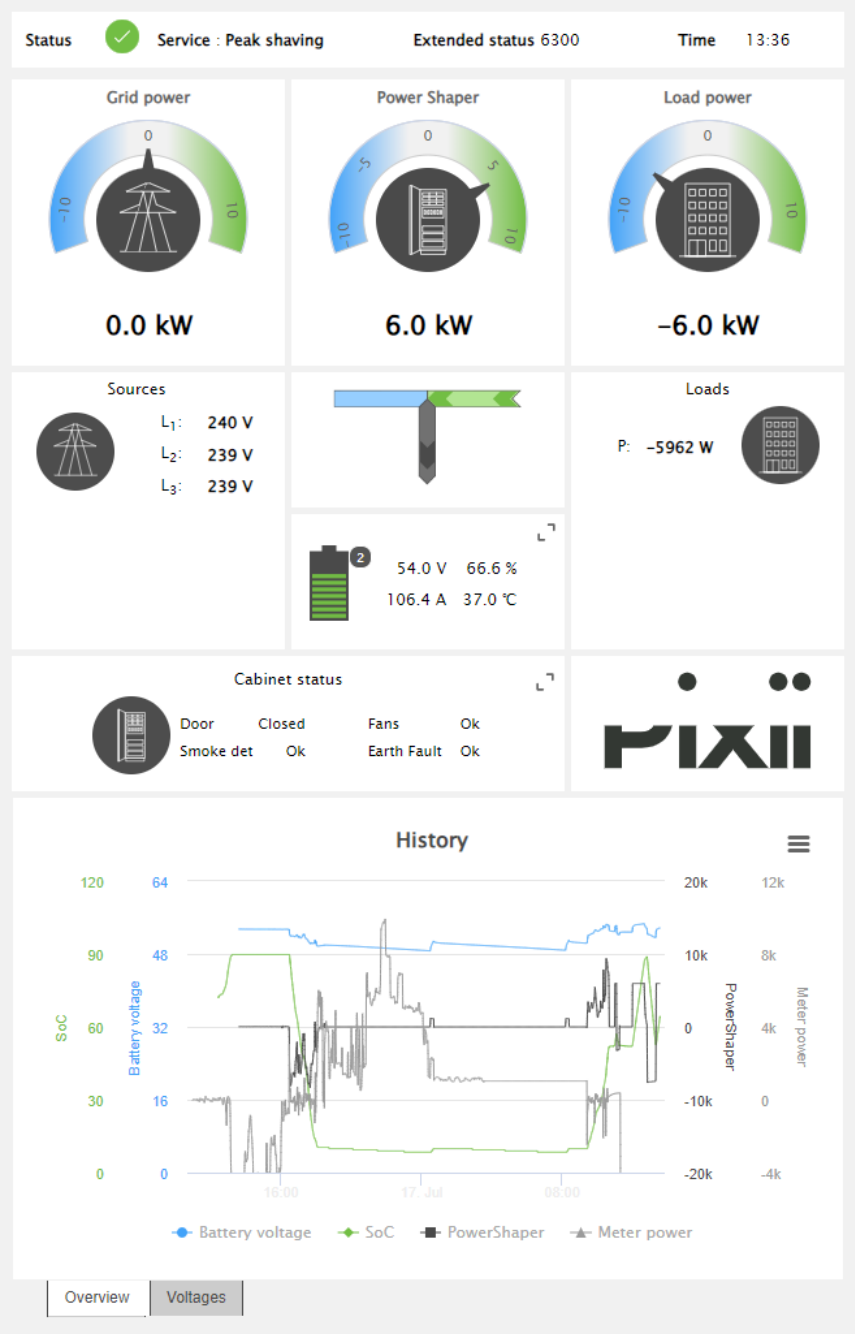


Figure 4.1 Web user interface

In the dashboard you will find out if you have any alarms and what service the system are running at any given point.

Document number: 16138, rev. 1.0

4.1.1 PixiiBoxes

If you want to have any more information on PixiiBoxes you can click on the upper right corner on the PixiiBox icon.

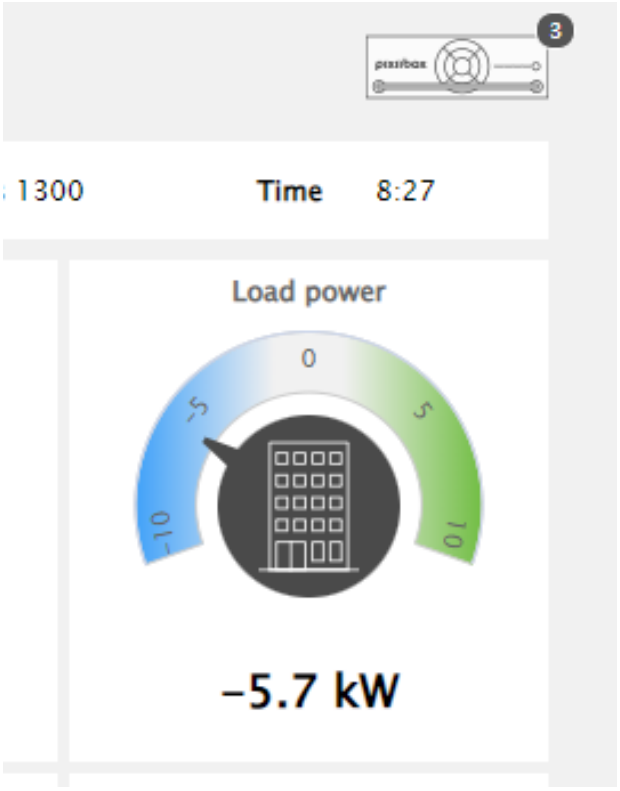


Figure 4.2 PixiiBox icon for more information

PixiiBox information menu appears.

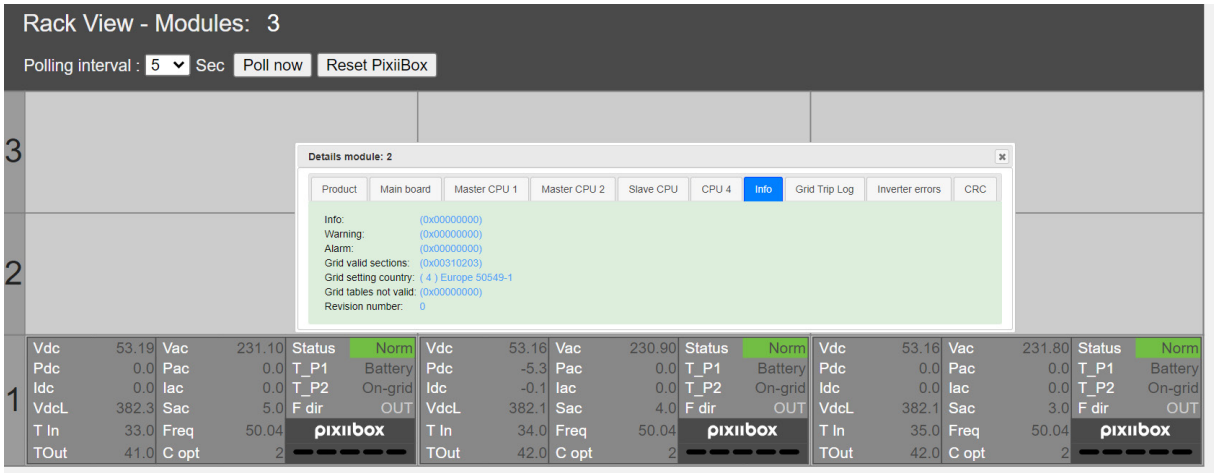


Figure 4.3 PixiiBox information menu

Document number: 16138, rev. 1.0

4.1.2 Batteries

For more information of Batteries, click on the battery icon.

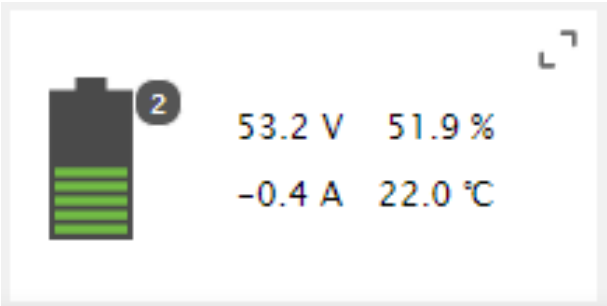


Figure 4.4 Battery icon for more information

Battery information menu appears.

Battery info

ID	Total		Batt. 1	Batt. 2
Status	normal		normal	normal
Voltage	53.18	V	53.17	53.17
Current	-0.4	A	-0.2	-0.2
SoC	51.9	%	52.2	51.6
SoH	-	%	99.9	99.9
Temp	22.0	°C	22.0	22.0
Charge Limit	240.0	A	120.0	120.0
Disch. Limit	240.0	A	120.0	120.0
ChPlim	-	W	6768.0	6768.0
DisChPlim	-	W	6768.0	6768.0
Alarm	0x0	i	0x0	0x0
Warning	0x0	i	0x0	0x0
Info 1	-	i	0x0	0x0
Info 2	-	i	0x0	0x0
Info 3	-	i	10	10
Status	-	i	0xe	0xe
Serial number	-		-	-
Revision	-		-	-

Click "Refresh" to update the values.
The battery module values are read one pack at a time, 2 seconds apart.

Refresh

Figure 4.5 Battery information menu

Document number: 16138, rev. 1.0

4.1.3 Service settings

For changing services, click to the “Service settings” menu in the main menu. Here you can choose what services are active and in what priority.

If you are connected to an aggregator you should not change anything here.

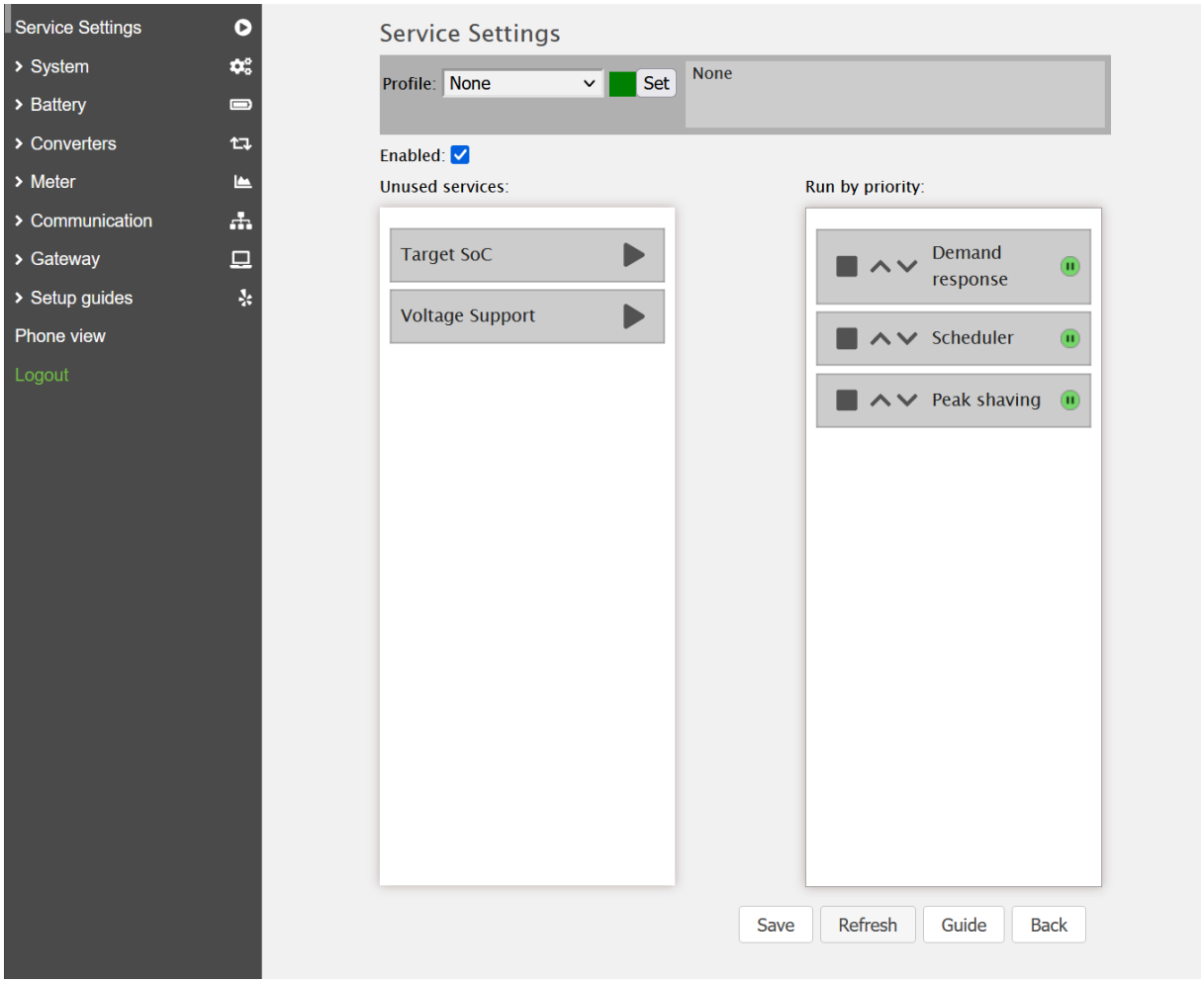


Figure 4.6 Service settings menu

NOTE:
If you are connected to an aggregator you are NOT allowed to change anything here.

4.2 Pixii Home app

With the Pixii Home app you can easily see and configure your Pixii Home system.

You will be able to see how the system is operating. If there are any alarms and set user specific settings and services for your home needs.

To learn more about the Pixii Home app please see xxxx_Pixii Home App – End user manual.

Document number: 16138, rev. 1.0

5 Maintenance

5.1 Checking

The Maintenance needs to be done at least every second year. You will get a notification in your Pixii Home app when it is due. Then you need to contact your Pixii Certified installer do come out and do a maintenance on the system. The installer will then get a protocol on what needs to be done and checked. You will then get the protocol sent to your Pixii Home app for future use.

NOTE:

Over the course of the lifetime of the system it is crucial that any objects that can block the airflow are removed. If there are any physical damages to the cabinets this needs to be checked by an Pixii certified installer.

5.2 Cleaning

Clean the cabinet on the outside with the sponge and water.

CAUTION:

Do NOT use aggressive cleaning agents!

5.3 Service

If their needs to be any services and parts needs to be replaced, the Pixii Certified installer needs to fill in an RMA-Form for Pixii and a new part will be sent out.

5.4 Pixii Certified installer maintenance check

Remove all objects around cabinet that can block air flow.

Check for physical damage on the cabinet body. Repair scratches with RAL 9006 paint. If the cabinet body has severe damage, like deformation or holes, the system should immediately be taken out of operation and replaced with a new cabinet.

Check the door hinges and apply oil or grease if needed.

Check that the door gasket has no visible damage.

Check that all cabinet entry points are correctly sealed and there is no possibility of water and dust entering the cabinet.

Check the batteries, look for possible leakage and mechanical damage.

Check that all accessible cables are not mechanically damaged.

The filters needs to be replaced at least every two years, depending on the environmental conditions.

Check that the mains input cable well tightened (see chapter *“1.1 Recommended tools and torque” on page 8* in the document *15342_Installation guide_Pixii Home Outdoor Cabinet*).

Document number: 16138, rev. 1.0

6 De-Installation procedure

Switch OFF internal breakers (-FC4).

Switch OFF external upstream breaker.

Check if the system is completely voltage free.

Disconnect input cable.

Remove all modules.

Disconnect battery cables and then the batteries.

Lose the cabinet from the wall by removing the wall mounting kit.

7 Common troubleshooting

7.1 System fans are failing

Close the cabinet doors. Fans automatically shut off when doors are opened due to sensors in the doors. If doors are opened for a long period, Pixii Home will show a warning.

If warning does not disappear when doors are closed, turn on a trigger to set the fans to 50% in Gateway > Test cabinet features.

7.2 Power failure and the Pixii Home wont connect to your network

Restart your network.

Turn ON the Pixii Home system.

- Unplug the ethernet cable connected to your Pixii home
- Start up Pixii Home
- Plug in the Ethernet cable

Check in your network settings if you see Pixii Home in the connected units.

Check in the TCP/IP settings if the networks settings have been changed or if a new IP-adress will need to be set.

Document number: 16138, rev. 1.0