REDUXI CONTROLLER · KNOWLEDGE BASE

Strategies for Reduxi Controller

Reduxi's strategies deliver the perfect balance of flexibility, cost efficiency, and eco-conscious solutions, all while safeguarding your systems and adapting seamlessly to price fluctuations - without ever compromising on comfort

- Reduxi Controller
- Strategies in the Reduxi Configurator
- AI modes for battery, EVSE and HVAC



📋 IN THIS ARTICLE

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1 Introduction to strategies

The Reduxi Controller empowers end users to manage energy consumption and production for local installations in homes or industrial facilities. Its strategies dynamically adapt to energy market price fluctuations, tariff time blocks, basic configurations (such as building-specific export/import limits), and other relevant factors. By uniting all consumer and producer installations into a single cohesive strategy, the Reduxi system enables real-time adjustments that optimize all variables simultaneously, ensuring they align with the user's specific needs.

As strategies are a key added value of the Reduxi system, we recommend that you read these instructions in depth and set up a strategy that will perfectly suit your needs.

2 Typical strategies for cost optimization

2.1. Charge your electric vehicle during the night (low price) and do not exceed the grid import limits

When charging an electric vehicle we need to respect the power limits from the grid, while keeping the costs of electricity low.

To define such a strategy, please follow the information in these sections:

- 3.4 Energy manager coordinator for PV, EVSE, battery, and heat pump
- Use 4.3.2. Schedule mode
- Use "Peak shaving" as a goal (in order to limit the power from the grid)
- And configure EVSE ("electric vehicle supply equipment" = charging station) advanced settings

2.2. Use electricity from your photo-voltaic power plant in combination with a heat pump

To get self-sustainable and save costs, it's optimal to use the electricity within your home or company. The electricity produced by your photo-voltaic power plant can be directly used by HVAC and/or electric vehicles.

To define such a strategy, please follow the information in these sections:

- 3.4 Energy manager coordinator for PV, EVSE, battery, and heat pump
- Use 4.3.1. Default mode
- Use "Self-consumption" as a goal (in order to consume self-produced energy)
- And configure HVAC advanced settings (or EVSE if you have an electric vehicle)

2.3. Get the most cost savings and highest earnings with your PV and/or battery

In order to get the most out of your battery and/or PV power plant, you need to use the dynamic (market, day ahead) prices. In this case you consume energy from the grid when the prices are low or even negative, and produce when the prices are high. At the same time you keep the comfort high.

To define such a strategy, please follow the information in these sections:

- 4.3.4. AI modes
- and define the pricing plan as defined in Reduxi price lists

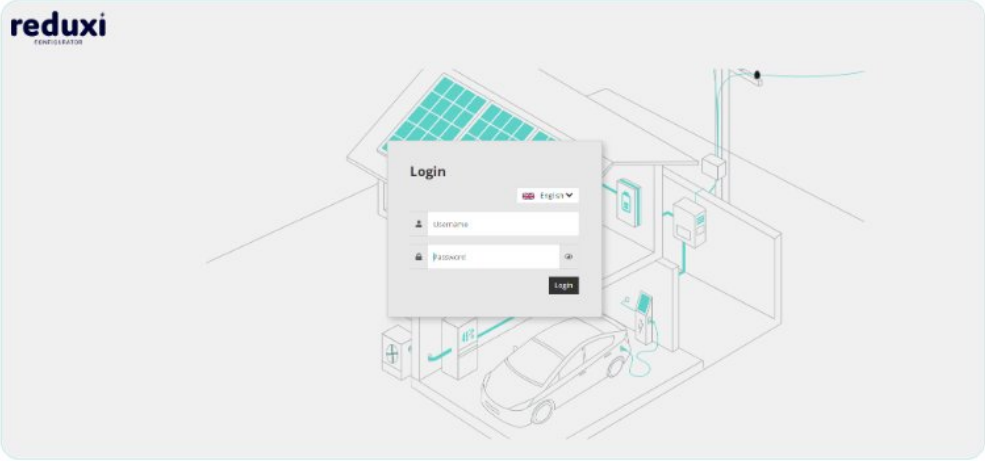
3 Strategy Configuration

The following strategies are available in the Reduxi Configurator:

- 1-phase current based ON/OFF control
- 3-phase current based ON/OFF control
- Power based on/off control
- Energy manager coordinator for PV, EVSE, battery, and heat pump (the most complete strategy - usually the most used one)

General steps for accessing strategies

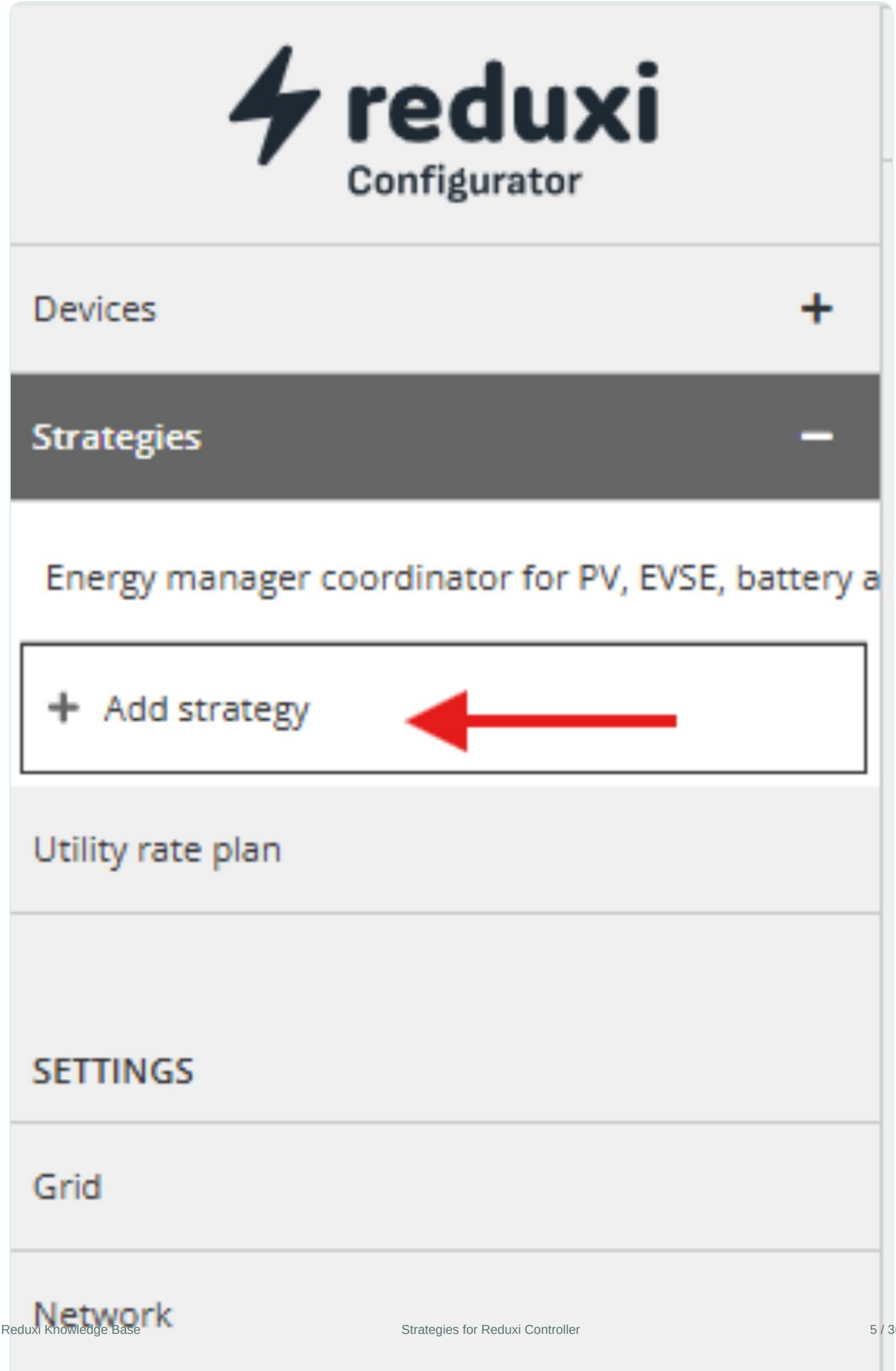
The first step is to log in to the Reduxi Configurator.



Login page of the Reduxi Configurator

Text description of this image

After logging into the configuration, click on the 'Add new strategy' button in the lower-left corner of the Reduxi Controller homepage.

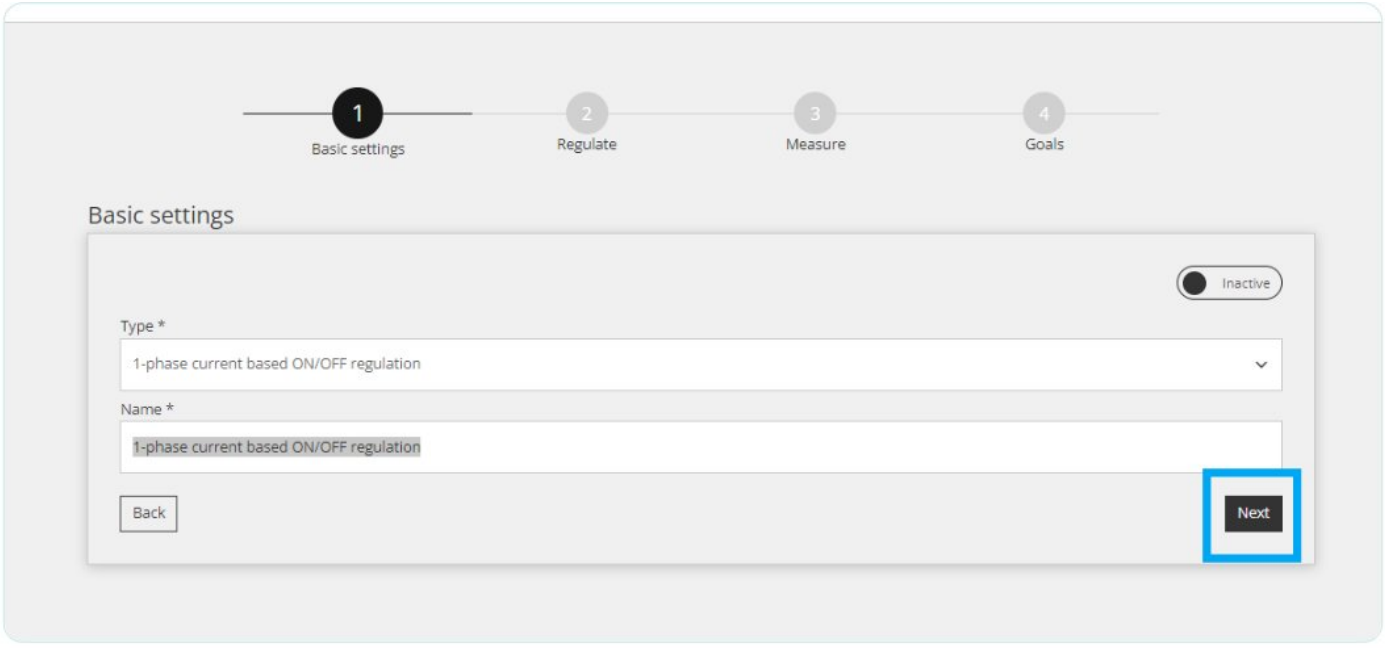

reduxi
Configurator
Devices
Strategies
Energy manager coordinator for PV, EVSE, battery a
Add strategy
Utility rate plan
SETTINGS
Grid
Network

3.1 1-phase current based ON/OFF control

This strategy is used to control ON/OFF states of electrical consumers based on a single-phase current measurement.

3.1.1 Basic settings

Select '1-phase current based ON/OFF control', rename it (not necessary), and click 'Next'.

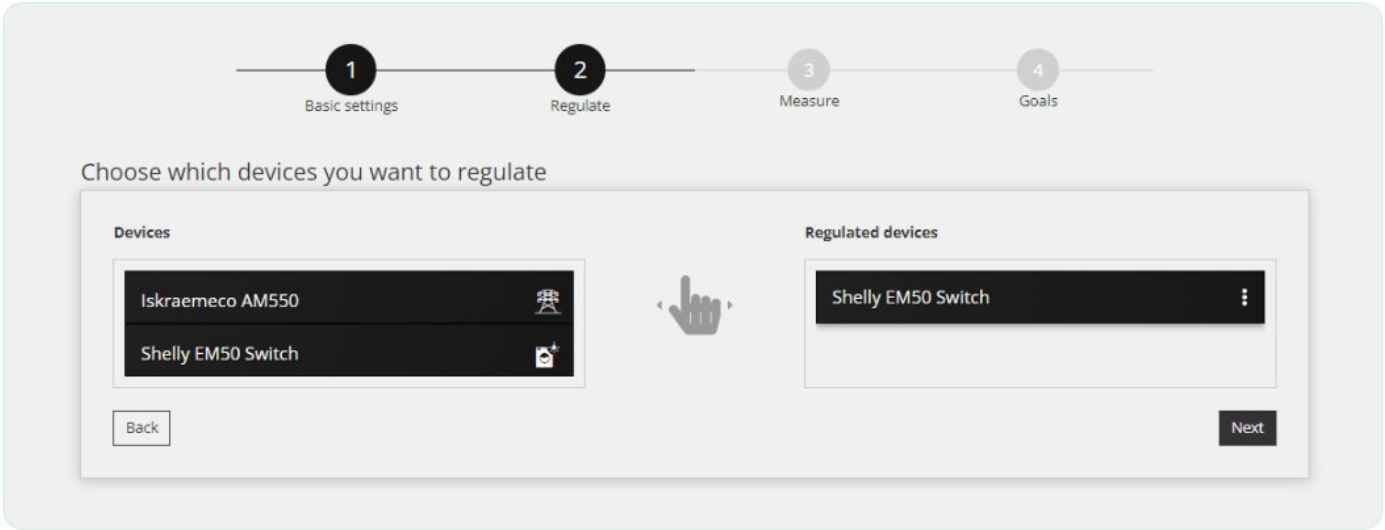


Basic settings: strategy type and name

Text description of this image

3.1.2 Regulate

It is important to choose the right device to be regulated. An example is shown in the figure below, which shows how to determine which device will be regulated. Drag the device for regulation from the "Devices" list to "Regulate Devices".

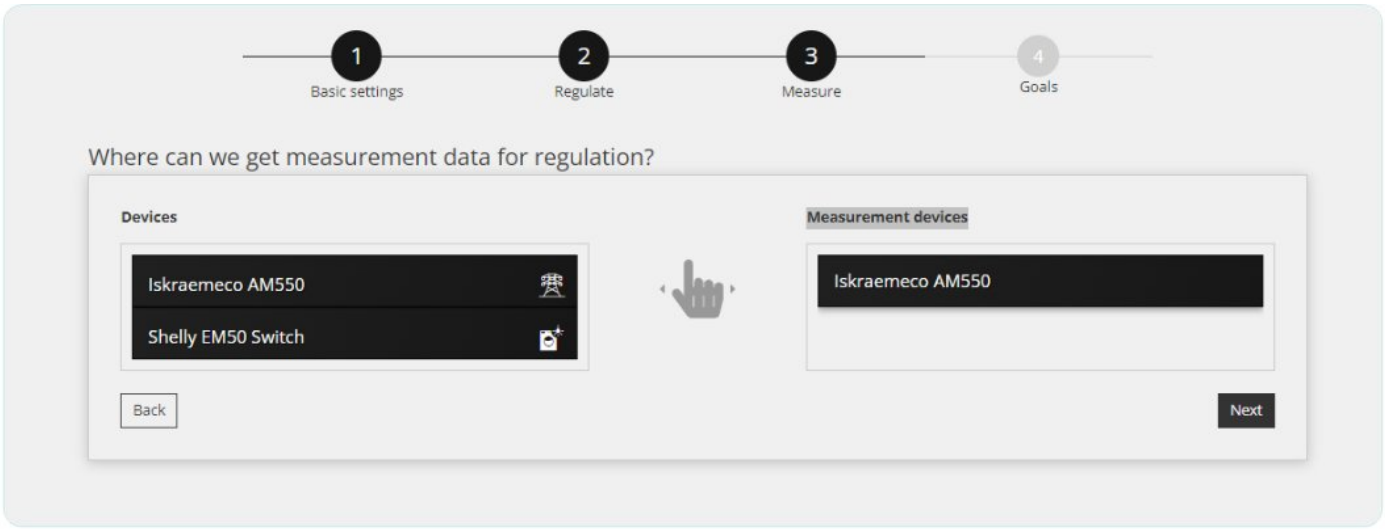


*Regulate: drag the device from **Devices** to **Regulate Devices***

Text description of this image

3.1.3 Measure

Similar to point 3.1.2, the correct device to be measured (usually the main grid) must be selected. Drag the device from the "Devices" box to the "Measuring Devices" box, as shown in the figure below. The measurement device is the device which measurement affects the regulated device.

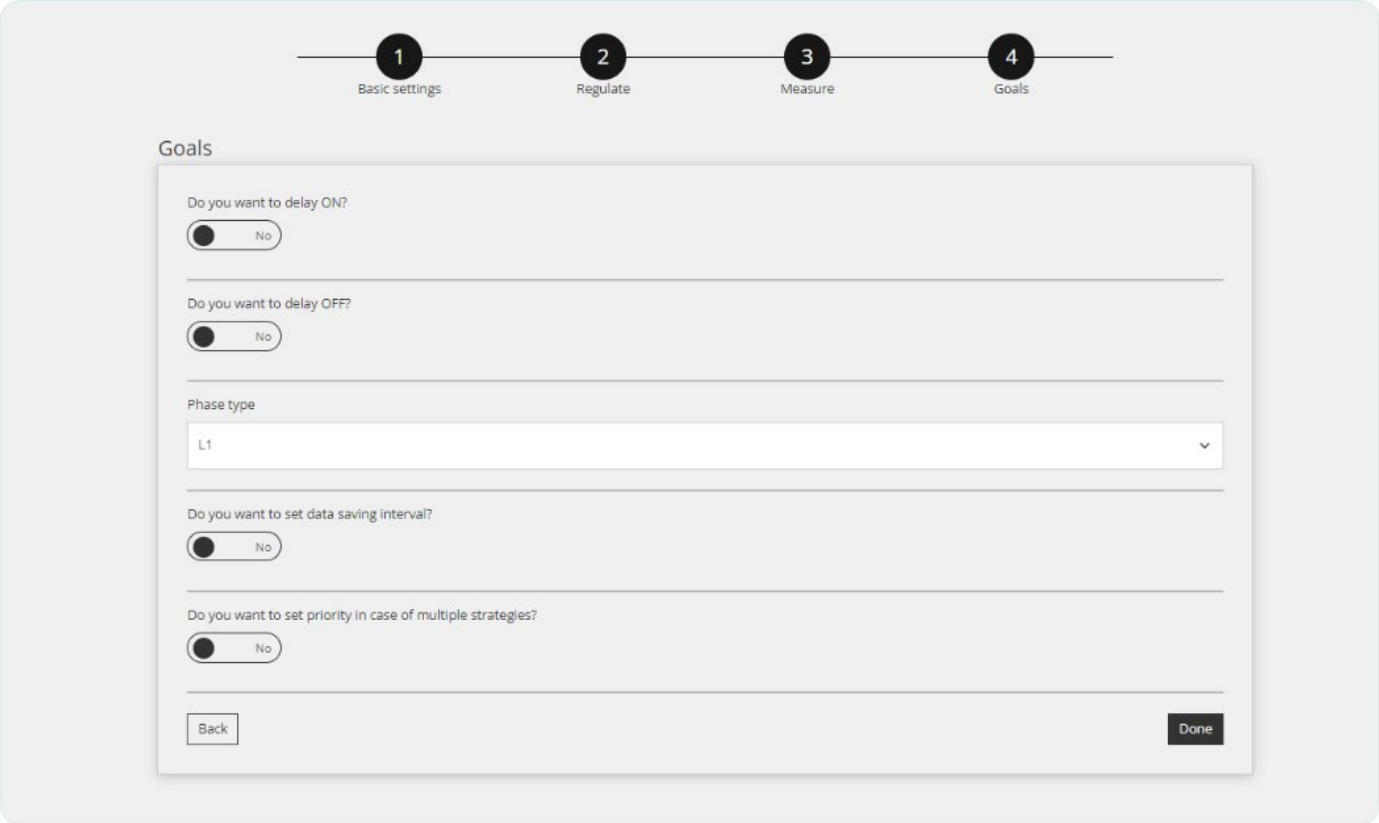


*Measure: drag the device from **Devices** to **Measuring Devices***

Text description of this image

3.1.4 Goals

Under the "Goals", the actions for regulation of one phase are defined. The image below shows possible settings and default values under the "Goals" step.



Goals: possible settings and default values

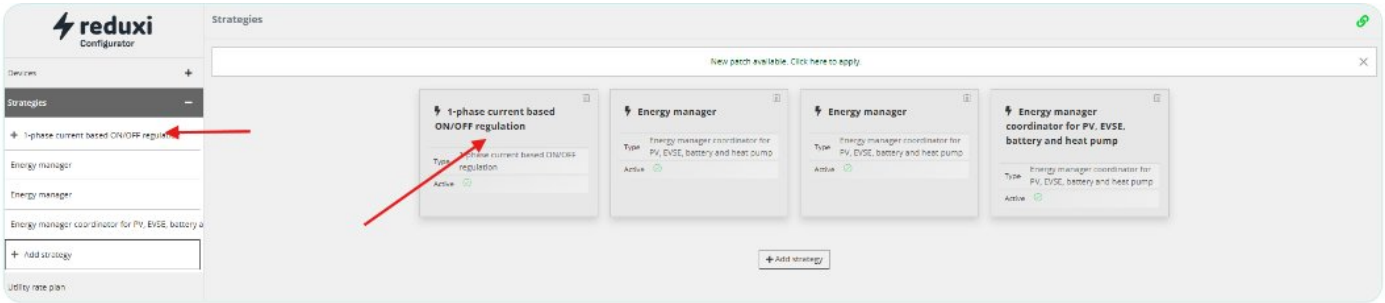
Text description of this image

Explanation for all settings under "Goals", see table.

INPUT FIELD	EXPLANATION
Do you want to postpone ON?	"Delay ON" is the time required for the device to switch to the ON state. The condition must be met for at least the Delay ON time (for example, the current is greater than 10 A for more than 5 seconds for the device to switch ON). This effectively prevents excessive switching, thereby preventing damage to the regulated device or relay. After the condition is met for 5 seconds, the device is turned on. Select YES if you want to change the default value.
Do you want to postpone OFF?	Same as the "postpone ON" defined above, but for the OFF state. Select YES if you want to change the default value.
Phase type	Select the phase that controls the ON/OFF action.
Do you want to set the interval for saving data? *(obsolete)*	Set the interval for storing data from measured and regulated devices. Select YES if you want to change the default value.
Do you want to prioritize multiple strategies? *(obsolete)*	Priority is important when multiple strategies are defined. Priority level between strategies affects the operation of the Reduxi system. For example, if the priority level is set to "Highest", Reduxi will automatically work within the chosen strategy and vice versa. Select YES if you want to change the default value.

3.1.5 Editing the strategy "1-phase current based ON/OFF control"

Once the strategy is set, we can configure all the settings by clicking on the corresponding strategy.



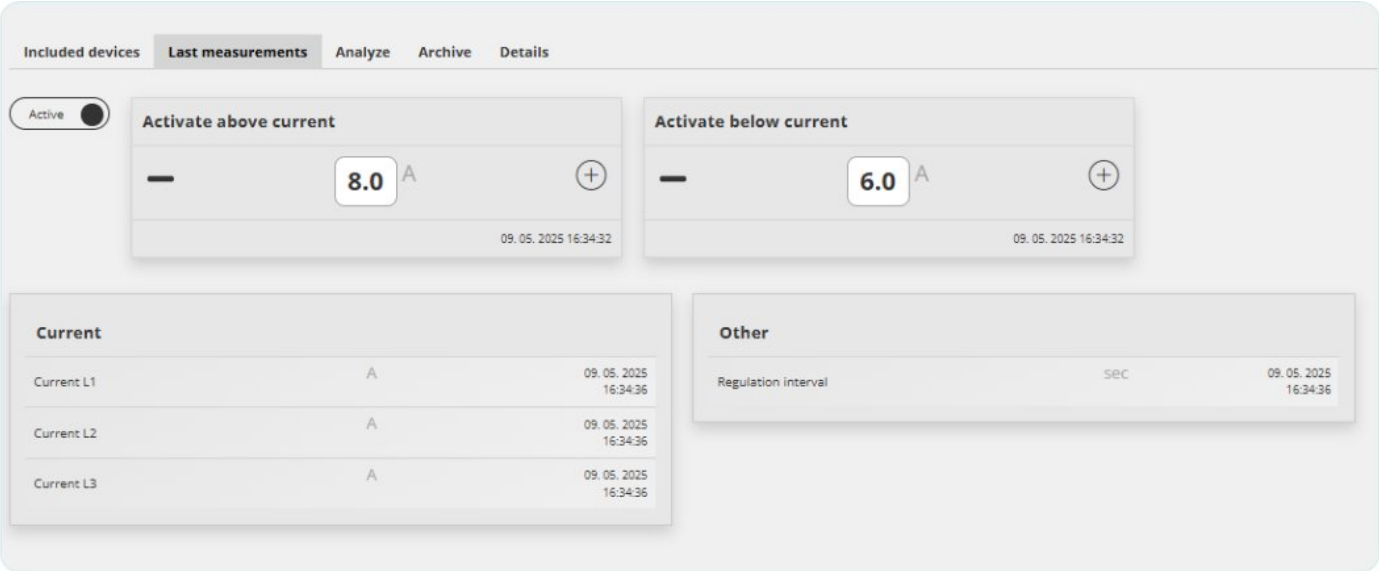
Click the strategy to edit its settings

Text description of this image

3.1.6. Configuration of strategy

For each strategy, the regulation parameters need to be configured. In this specific strategy, these are the currents of the switch on/off of the devices.

Here we define the current to switch the device off and or on, depending on the current measurement. Often these two currents differ in order to reduce the number of switches of the device.



Switch-on and switch-off current

Text description of this image

3.2. 3-phase current based ON/OFF control

Similar to the “1-phase current based ON/OFF control”, the 3-phase strategy is intended to switch phases (ON/OFF), with the difference that within the 3-phase strategy the control is set for all three phases.

3.2.1 Basic settings

See point 3.1.1.

3.2.2 Regulate

See point 3.1.2.

3.2.3 Measure

See point 3.1.3.

3.2.4 Goals

Same as in point 3.1.4, with the main difference being the 1-phase strategy is replaced with the 3-phase strategy.

3.2.5 Editing the strategy "3-phase current based ON/OFF control"

See point 3.1.5.

3.2.6. Configuration of strategy

See point 3.1.6.

3.3 Power-based ON/OFF control

3.3.1 Basic settings

See point 3.1.1.

3.3.2 Regulate

See point 3.1.2.

3.3.3 Measure

See point 3.1.3.

3.3.4 Goals

See point 3.1.4, where the main difference with the 1-phase strategy is that within the power strategy, it is not necessary to indicate which phase should be regulated, only the power.

3.3.5 Editing the strategy "3-phase current based ON/OFF control"

See point 3.1.5.

3.3.6. Configuration of strategy

See point 3.1.6.

3.4 Energy manager coordinator for PV, EVSE, battery, and heat pump

Within this strategy, multiple devices are regulated, making it the most complete and widely used strategy. It offers the most functionalities and is therefore also the most complex. As the name suggests, the strategy regulates:

- Photo-voltaic solar power plant (PV)
- Electric vehicle charging station (EVSE)
- Battery (BESS)
- Heating, ventilation, and air conditioning (HVAC)
- Others

3.4.1 Basic settings

See point 3.1.1.

3.4.2 Rules

See point 3.1.2.

3.4.3 Measure

See point 3.1.3.

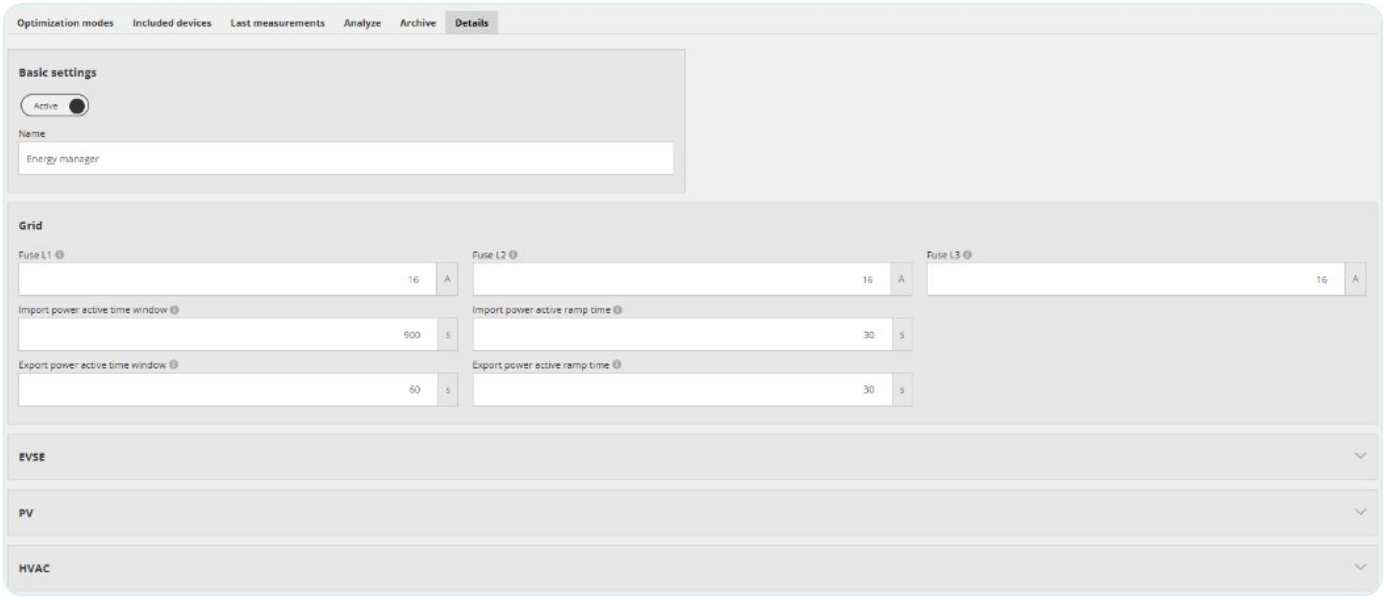
3.4.4. Advanced settings

This mode requires the configuration of the advanced settings, which will be described in details in the next section.

4 Advanced settings for the "Energy manager coordinator..." strategy

This section is related only to the strategy **3.4 Energy manager coordinator for PV, EVSE, battery, and heat pump**. The functionality differs from the other strategies, since advanced options are available and configurable. After you define the measured device from point **3.4.3** and click the "Done" button, a new menu will appear.

To get to this menu, please follow the steps defined in **point 3.1.6.**



Advanced settings menu

Text description of this image

At the top of the advanced menu, three additional tabs are available:

- General settings
- Regulated devices
- Optimization modes

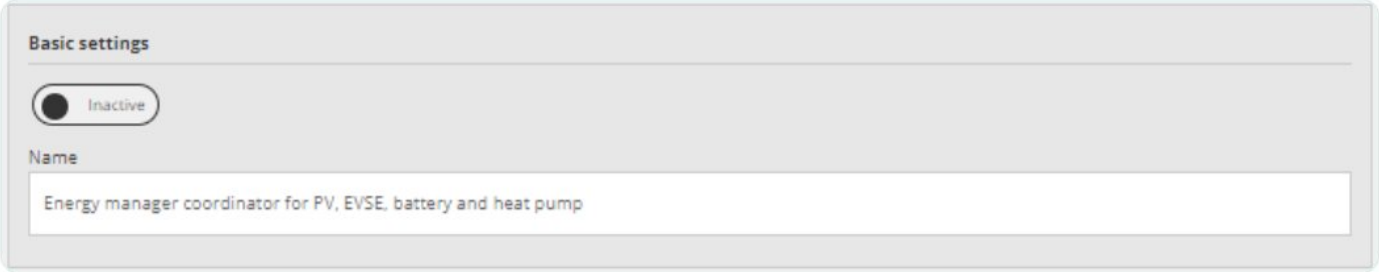
> **Note**
> All **the strategies can be tested with manual mode** as described in section 7.4. Manual control of device of **Reduxi Configurator**

4.1. Details

Details section include five different sections:

Basic settings:

- Set Strategy to Active/Inactive
- Rename Strategy



Basic settings

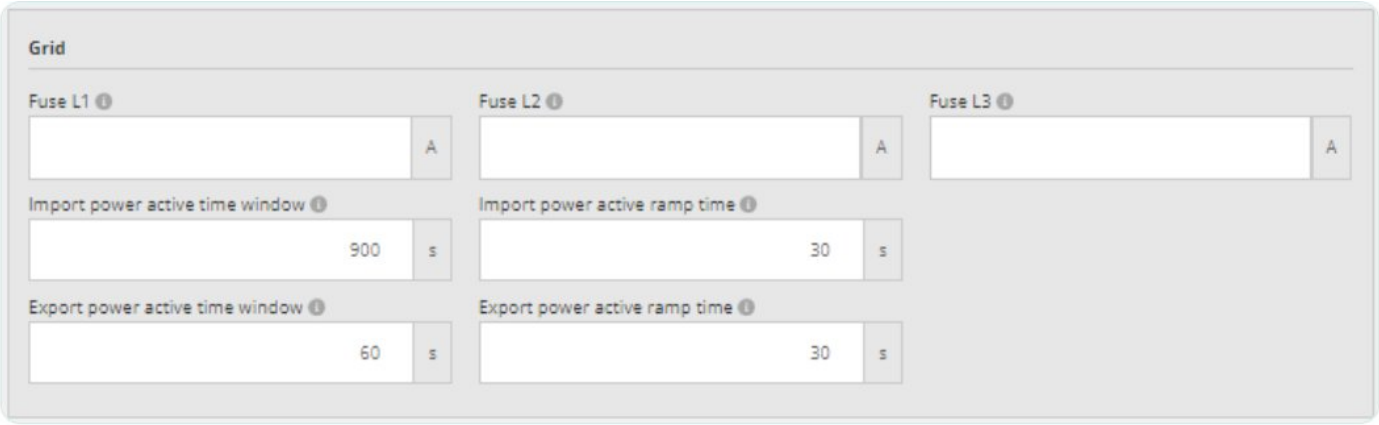
Text description of this image

Note: the info sign ⓘ at the right of the field name provides additional explanation.

Text description of this image

Grid settings:

- Fuses (L1, L2,3), set the current limit for each main power fuse. Fuse values are not strictly necessary.
- Import power active time window
- Export power active time window
- Active ramp time of the import power
- Active ramp time of the import power
- Note, fuses and import/export power are obtained from the Grid settings



Grid settings

Text description of this image

EVSE settings:

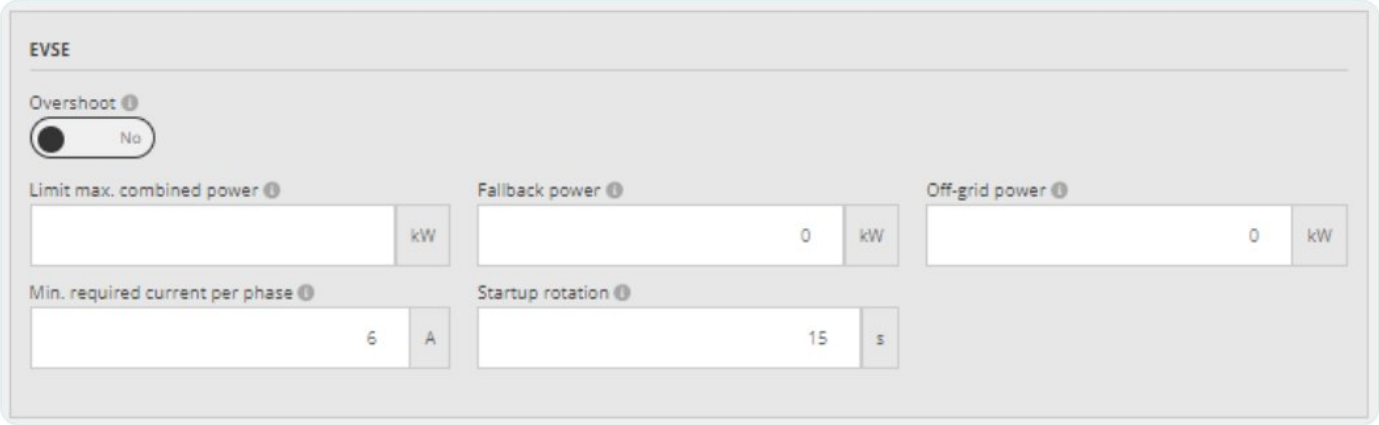
- Max combined power limit
- Min required current per phase
- Fallback capacity
- Startup rotation between multiple charging station in case power limit does allow running all in parallel
- Off-grid power

Specifics for multiple charging stations:

In case multiple charging stations are connected within the same setup, then the Reduxi system must coordinate the charging station so that the total consumption does not overload the limits

The logic is the following:

- When starting multiple charging sessions, not all charging stations start at the same time to prevent spikes in the consumption. The parameter “startup rotation” defines the interval for switching between the charging stations
- If multiple electric vehicles are connected and charging, the power of all is linearly decreased to keep the consumption within the limits. For example, if the limit is 80 kW and there is 10 electric vehicles connected, each of them gets 8 kW.
- If the minimal required current of all the connected vehicles would overload the import limit, then the charging station connected the last waits until power is available. It’s a principle of first come, first serve.

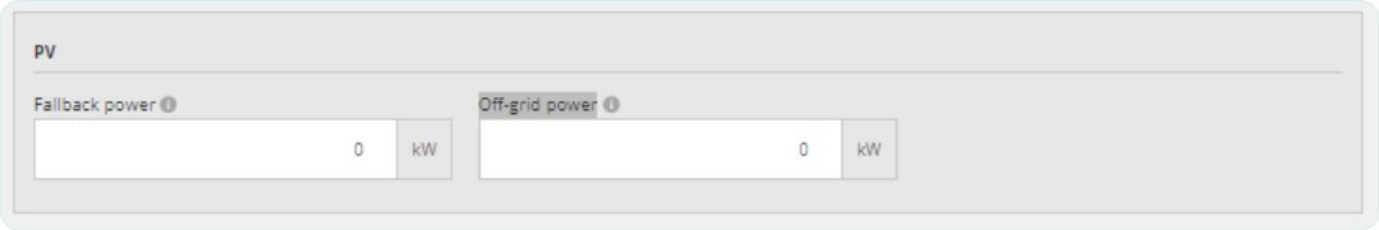


EVSE settings

Text description of this image

PV settings:

- Fallback power in case of lost connection
- Off-grid power

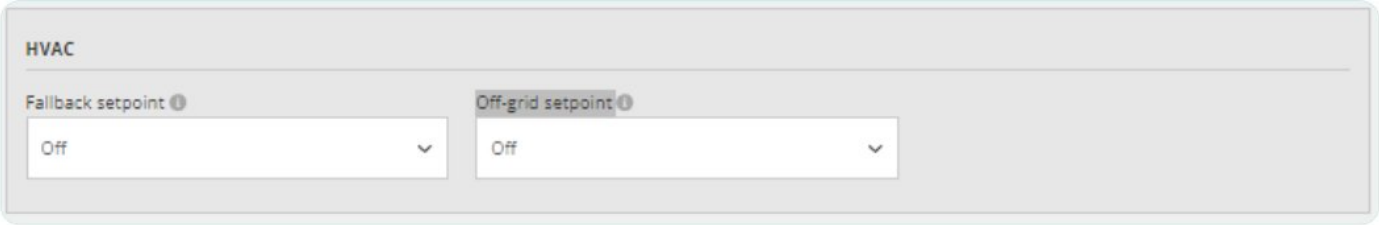


PV settings

Text description of this image

HVAC settings

- Fallback setpoint
- Off-grid setpoint



HVAC settings

Text description of this image

4.2. Regulated devices

See **point 3.1.2**.

4.3. Optimization modes

This part of the strategy is where the real added value of the strategy becomes clear. All the more complex functions/features are set up for each device included in the strategy. The following steps are shown for further explanation and are:

- **Default mode**
- **Schedule mode**
- **Negative price mode**
- **AI modes**

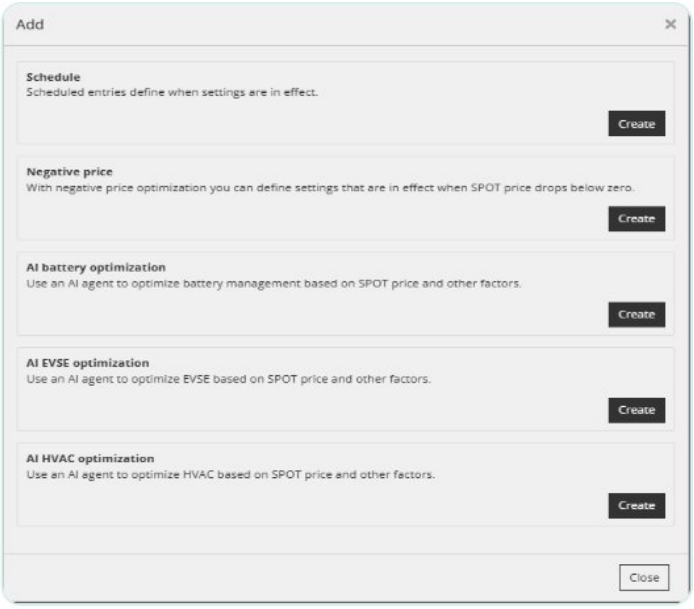
To add an additional optimization mode, first press the + button under the Default mode settings, then choose the additional optimization mode. The two images below show how to add an optimization mode.



1. Press the + button

Text description of this image

Screenshot of a table with columns Name, Event description, Export limit, Goal, Import limit, Advanced. One row: Name: Default mode; Event description: /; Export limit: 0 kW; Goal: Self-consumption (dropdown); Import limit: 5 kW; Advanced: edit icon (pencil on square). Below the table at the right is a dark square button with a plus sign, marked with a blue rectangle.



2. Choose the optimization mode

2. Text description of this image

The priority of the optimization modes is as follows

- AI mode
- Negative price mode
- Schedule mode
- Default mode

An example: The "Negative price mode" ensures that no electricity is exported when the price is negative. In the periods when the price is not negative, this mode does not work (has no effect). Therefore, the "Schedule mode" is used (if and when defined). Outside the scheduled periods, the "default mode" is used.

How limits work across optimization modes

- **Default mode** is the baseline. Its import limit, export limit and goal apply whenever no other mode is active.
- **Schedule mode** overrides Default mode inside its time window, including the import and export limits. Outside the window, Default mode applies again.
- **AI modes** override the goal and the other optimization settings, but always stay within the import and export limits of the mode that applies at that moment: Default mode, or Schedule mode inside its time window.

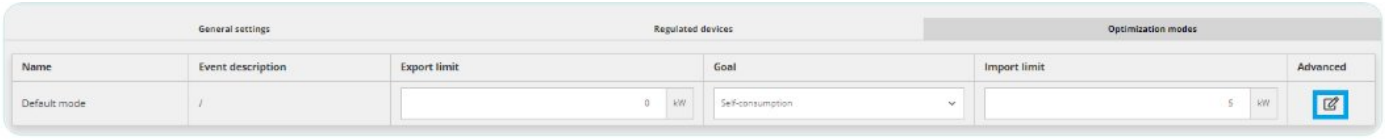
Example: Default mode has import 10 kW and export 5 kW. A Schedule mode for 06:00–22:00 has import 8 kW and export 4 kW. The AI energy manager is active.

TIME	LIMITS THE AI STAYS WITHIN
06:00–22:00	Import 8 kW, export 4 kW (Schedule mode)
22:00–06:00	Import 10 kW, export 5 kW (Default mode)

Set the Default and Schedule limits correctly also when the site runs on AI: they are the limits the AI keeps to.

4.3.1. Default mode

This mode links directly to the main power grid limits defined by the electro distributor. Export and import limits are defined to control the building's supply and demand. Next to the limits, the goals should also be defined. Advanced options can be configured on the right side (blue rectangle).



Default mode: limits, goals and advanced options

Text description of this image

Export/import limits

When the *export* limit is set, the Reduxi system will automatically limit the energy fed into the grid. This will affect the building's electricity production, such as photovoltaic production, battery production, and potentially other production sources so that they never exceed the export limit.



Export limit

Text description of this image

If the *import* limit is set, the Reduxi system will automatically limit the energy demand from the grid. This will affect the building's electricity consumption, such as electric vehicle charging, HVAC operation consumption, and other appliance so that the import limit is never exceeded.



Import limit

Text description of this image

Goals

There are several possible objectives to realize different ways of demand/supply management of a building:

- **Maximize production** is a mode where the Reduxi system forces the electrical production (i.e. PV production, battery production) to the maximum, but never exceeds the export power limit. If there is no limit, the production will operate at maximum power. This case is used when the user wants to reach the export power limit using all production resources. In case PV production cannot reach the export limit, the battery power (if implemented) will be used to provide excess power. Similarly, if the limit is reached and there is excess power from the PV, the battery will be charged.



Goal: Maximize production

2. Text description of this image

Screenshot of a table with columns Name, Event description, Export limit, Goal, Import limit, Advanced. One row: Name: Default mode; Event description: /; Export limit: 2 kW; Goal: Maximize production (dropdown, marked with a blue rectangle); Import limit: 10 kW; Advanced: edit icon (pencil on square).

- **Self-consumption** is a mode where Reduxi system tries to reach **zero** Export/Import net power if possible. Here the goal is that PV production covers all consumption needs, if the system is equipped with a battery, excess power from PV will charge the battery, and the power will be consumed later when there is no PV production to reach zero sum power on the main feed. In case there is still excess power from the PV, it will be exported to the grid until the export limit.

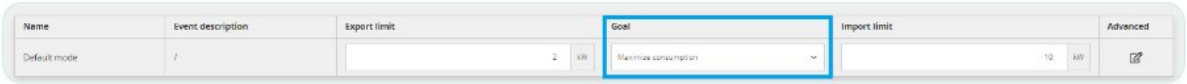


Goal: Self-consumption

4. Text description of this image

Screenshot of a table with columns Name, Event description, Export limit, Goal, Import limit, Advanced. One row: Name: Default mode; Event description: /; Export limit: 2 kW; Goal: Self-consumption (dropdown, marked with a blue rectangle); Import limit: 10 kW; Advanced: edit icon (pencil on square).

- **Maximize consumption** is a mode where Reduxi system tries to consume as much energy from the grid as possible and works at the import limit. If there is no import limit, the system works at the maximum power of all electrical consumers. This case is mostly used when the market prices are low or even negative, then for example the EVSE system works at full power, the battery is charged at its maximum power potential or the additional consumer is switched on.



Goal: Maximize consumption

6. Text description of this image

Screenshot of a table with columns Name, Event description, Export limit, Goal, Import limit, Advanced. One row: Name: Default mode; Event description: /; Export limit: 2 kW; Goal: Maximize consumption (dropdown, marked with a blue rectangle); Import limit: 10 kW; Advanced: edit icon (pencil on square).

- **Peak shaving** is a mode where the Reduxi system reduces the demand for power from the grid ("shaving the peak") so that the import power limit is never exceeded. In this case (mostly used in industry), the power of the consumers is reduced or in many cases switched off, so that no consumption peaks are generated, which also means that the building owner does not pay penalties for exceeding the power. Peak shaving mode also keeps the export limit (usually this means the PV production is reduced if needed)



Goal: Peak shaving

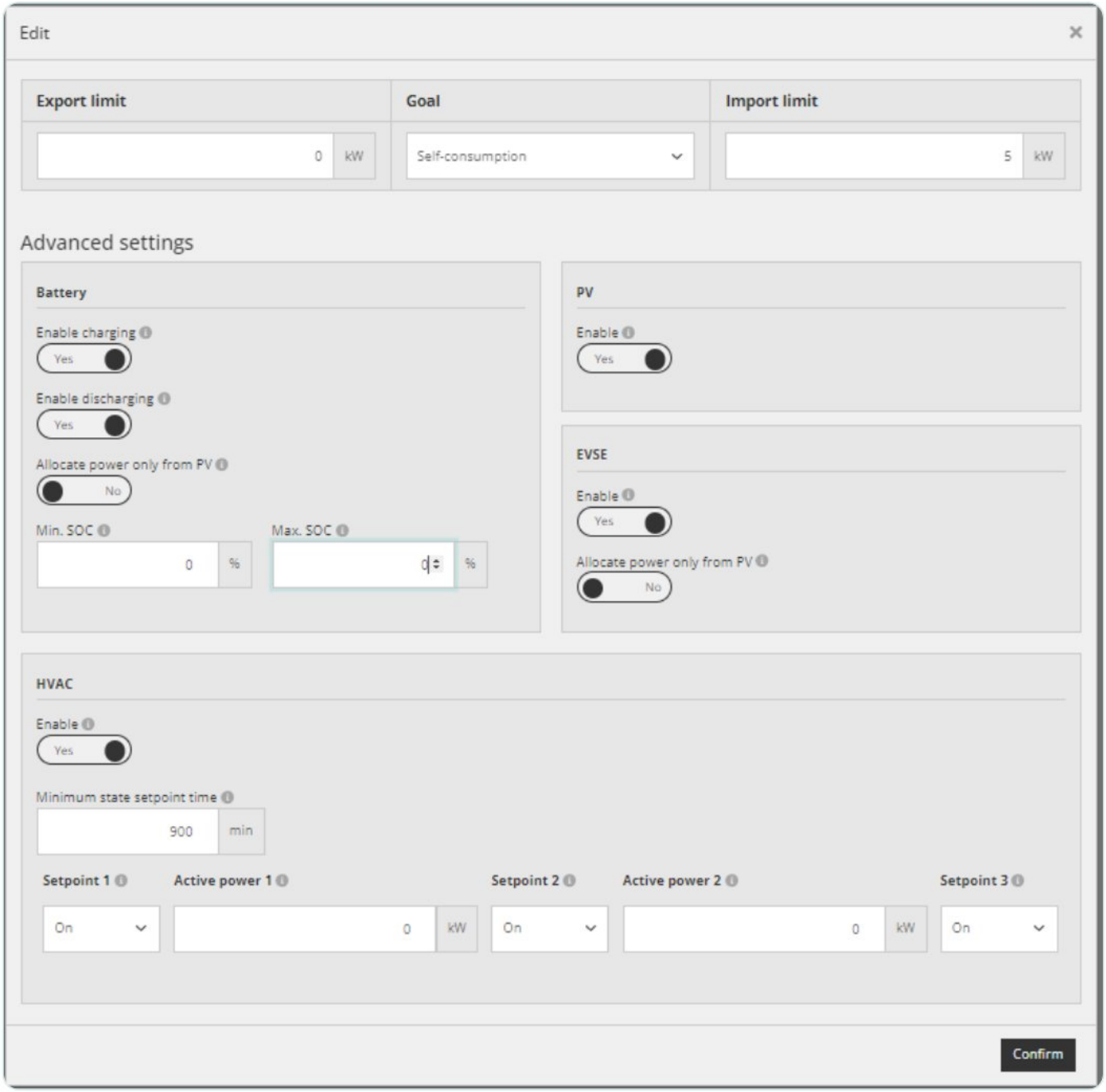
8. Text description of this image

Every mode may or may not control the battery, HVAC, PV, charging station. This can be configured through the advanced options ("Edit" button).

All the above strategies respect the import and export limit by default.

Advanced options

The advanced options are available through the "Edit" button at the far right. The advanced options are shown below.



Advanced options (Edit button)

Text description of this image

Additional available options are:

- Battery
- PV - photo-voltaic (solar power plant)
- EVSE - Electric vehicle supply equipment (car charging device)
- HVAC - Heating, ventilation, and air conditioning

Battery

- Enable Charging (Yes/No), if yes, the Reduxi system will charge the battery.
- Enable Discharging (Yes/No), if yes, the Reduxi system will discharge the battery.
- Allocate power from PV only. If this is the case, the Reduxi system will only charge the battery when there is excess power available from PV (typically used in **Self-Consumption mode**).
- Min/Max SOC (State of Charge) sets the limit to which the Reduxi system will charge or discharge the battery. In many cases, SOC is obtained from the battery itself (it is displayed when adding device, however, it should be entered manually in this menu). **Note:** set min/max SOC according to the value prescribed by the battery supplier. In case multiple batteries are connected, the most limiting min/max levels should be used.



Battery options

Text description of this image

PV

• Enable (Yes/No), if yes then Reduxi system will control the PV



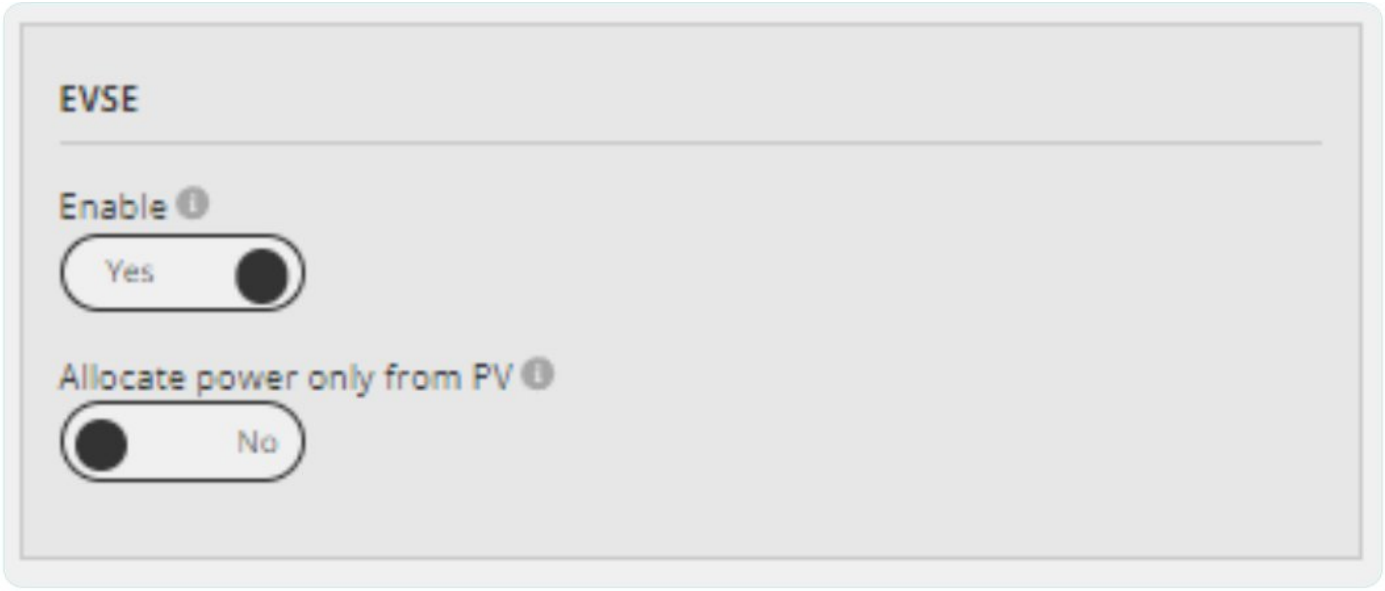
PV options

Text description of this image

EVSE

• Enable (Yes/No), if yes the Reduxi system will control the EVSE.

• Allocate power only from PV systems. If this is the case, the Reduxi system will only charge the electric vehicle when there is excess power available from PV systems.

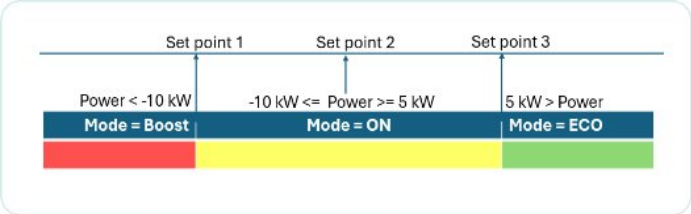


EVSE options

Text description of this image

Heating, ventilation, and air conditioning

- Enable (Yes/No), if yes then Reduxi system will control the HVAC
- Minimum state setpoint time, this field sets the period that must elapse before a new state point is set. This functionality effectively prevents frequent switching, thus preventing damage to the HVAC.
- Setpoints 1,2,3 are set based on the active power on the mains supply. It is divided into 3 parts. Below is an example explaining all three situations (setpoints).
    - In the first part, at the setpoint of Active power 1, HVAC will go into Boost mode, which means it will operate at full potential power. Boost mode will kick in when -10kW on main supply is reached, i.e. PV production is much higher than build consumption.
    - The second part, between the setpoints of Active power 1 and 2, the HVAC will work in ON mode, which is a mode of normal operation. ON mode will come into operation when the power on the mains supply is greater than -10 kW and less than 5 kW.
    - The third part, at the setpoint of Active power 2, the HVAC, will operate in ECO mode. This means it is in standby status or completely turned off. ECO mode will operate when the main power supply is greater than 5 kW.



HVAC options and setpoints

Text description of this image

Diagram of the three HVAC modes along a power axis,



HVAC setpoints example

2. Text description of this image

> **Note**
> SG ready heat pumps can behave differently depending on the its own configuration of eco(off)/on/boost modes. Mostly, the eco (off) mode is time limited. So even if the heat-pump is in eco (off) mode for a longer time, it will switch to normal automatically.

4.3.2. Schedule mode

To enable Schedule mode, first press the + button under all Default mode settings, then choose Schedule mode. Two images below show how to get into the Schedule mode.



1. Press the + button

Text description of this image

Screenshot of a table with columns Name, Event description, Export limit, Goal, Import limit, Advanced. One row: Name: Default mode; Event description: /; Export limit: 0 kW; Goal: Self-consumption (dropdown); Import limit: 5 kW; Advanced: edit icon (pencil on square). Below the table at the right is a dark square button with a plus sign, marked with a



2. Choose Schedule mode

2. Text description of this image

The next settings are the following:

- Name of the strategy
- Day of the week, choose days for scheduled mode operation
- Month, choose months for the scheduled mode of operation
- Valid from/to, choose a period in days for operation
- Start/End, select time in hours and minutes for operation in schedule mode

All other settings under the Advanced setting menu are the same as described before in the Default mode section.

The settings in the "Schedule" mode will only be active in the timeslots defined in the schedule. Outside of these timeslots, the default mode will be used.

4.3.3. Negative price mode

To enable Negative Pricing Mode, first press the + button under all the Standard Mode settings, then choose Negative Pricing Mode. The two images below show how to enter Negative Pricing Mode.



1. Press the + button

Text description of this image

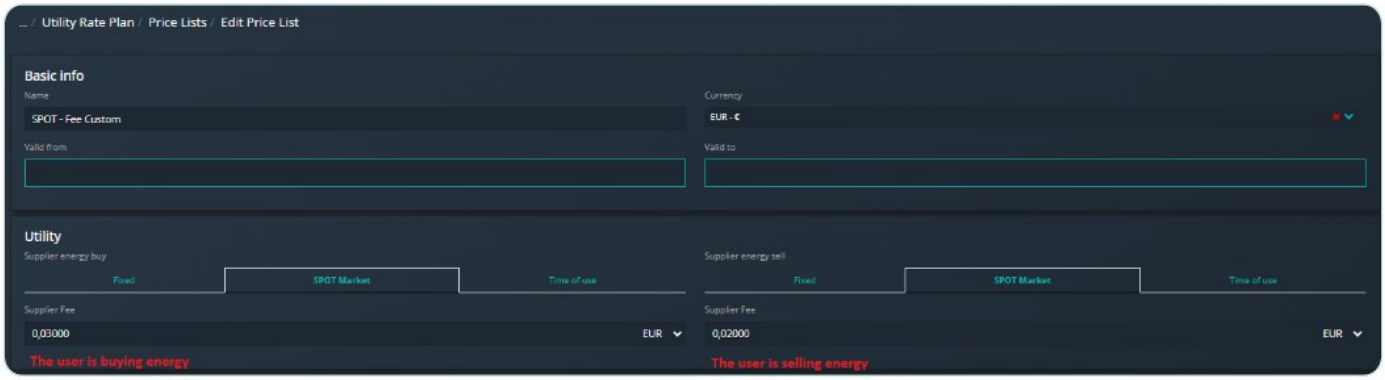
Screenshot of a table with columns Name, Event description, Export limit, Goal, Import limit, Advanced. One row: Name: Default mode; Event description: /; Export limit: 0 kW; Goal: Self-consumption (dropdown); Import limit: 5 kW; Advanced: edit icon (pencil on square). Below the table at the right is a dark square button with a plus sign, marked with a



2. Choose Negative Pricing Mode

2. Text description of this image

The negative price mode works in two different optimization scenarios, which depends on the price and the selling/buying fee. The feed needs to be defined for both directions as shown in the image below:



Buying and selling fee

Text description of this image

Let us present a few examples of how to calculate and activate the negative price mode:

For example: Fee = when the user buys energy: *3 ¢/kWh*; or when the user sells energy: *2 ¢/kWh* (1 ¢ = 0.01 €)

a. Energy price 10 ¢/kWh
Actual price when buying energy: = Price + fee = 10 ¢/kWh + 3 ¢/kWh = 13 ¢/kWh
Actual price (income) when selling energy: = Price - fee = 10 ¢/kWh - 2 ¢/kWh = 8 ¢/kWh (selling energy results in a profit reduced by a fee)

b. Energy price 3 ¢/kWh
Actual price when buying energy: = Price + fee = 3 ¢/kWh + 3 ¢/kWh = 6 ¢/kWh
Actual price (income) when selling energy: = Price - fee = 3 ¢/kWh - 2 ¢/kWh = 1 ¢/kWh (selling energy still results in a profit)

c. Energy price 1 ¢/kWh
Actual price when buying energy: = Price + fee = 1 ¢/kWh + 3 ¢/kWh = 4 ¢/kWh
Actual price (loss) of selling energy: = Price - fee = 1 ¢/kWh - 2 ¢/kWh = -1 ¢/kWh (selling energy is a loss, even though the price of energy is positive, but the fee is higher than the price)

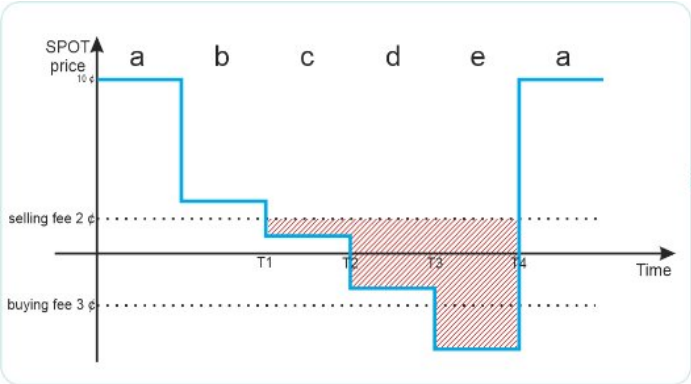
d. Energy price -2 ¢/kWh (negative energy price)
Actual price when buying energy: = Price + fee = -2 ¢/kWh + 3 ¢/kWh = 1 ¢/kWh (buying energy is a cost even though the energy price is negative. We still have to pay a fee)
Actual price (loss) of selling energy: = Price - fee = -2 ¢/kWh - 2 ¢/kWh = -4 ¢/kWh (the loss of selling increases when the price get more negative)

e. Energy price -5 ¢/kWh (negative energy price)
Actual price (income) of buying energy: = Price + fee = -5 ¢/kWh + 3 ¢/kWh = -2 ¢/kWh (buying energy is profitable even though we have to pay a fee)
Actual price (loss) of selling energy: = Price - fee = -5 ¢/kWh - 2 ¢/kWh = -7 ¢/kWh

Selling price optimisation

Selling price optimisation is used when the price is still positive but already below the selling fee. In this situation, the user is incentivised to **self-consumption**, as otherwise a cost would occur. In addition, we propose that in this case the export limit is set to 0 kW, thus avoiding costs in case of surpluses.

The optimisation by sales price is active in the ranges c, d, e.



Selling price optimisation, part 1

Text description of this image



Selling price optimisation, part 2

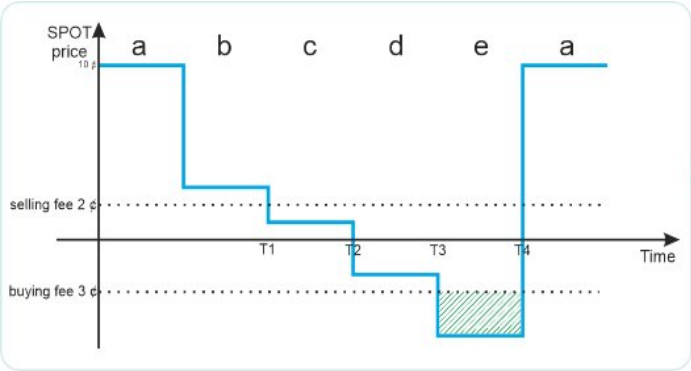
2. Text description of this image

Screenshot of a table header row with three columns and one row of fields. Export limit: 0 kW; Goal: Self-consumption (dropdown); Import limit: 5 kW.

Buying price optimisation

Buying price optimisation is used when the price is negative and also lower than the buying commission. In this situation, the user is encouraged to **maximise consumption** because the actual price is lower than zero. As above, we propose that in this case the export limit is set to 0 kW.

The optimisation by sales price is active in the range of e.



Buying price optimisation, part 1

Text description of this image



Buying price optimisation, part 2

2. Text description of this image

Screenshot of a table header row with three columns and one row of fields. Export limit: 0 kW; Goal: Maximize consumption (dropdown); Import limit: 5 kW.

All other functionalities in the menu of the negative price mode are the same as described in the Advanced options.

Prices required

In order for the negative price strategy to work, the **Reduxi Controller must receive information on current prices**. Prices can be fixed, set by time blocks or dynamic (exchange, day ahead). Information on setting up price lists is available on the **Reduxi price lists** and is configured the cloud application **https://app.reduxi.eu/**.

For other settings of the Reduxi Controller, please refer to the link: **Reduxi Controller**.

For other settings of the cloud application, see **Reduxi Cloud**.

4.3.4. AI modes

AI modes always stay within the import and export limits of the active Default or Schedule mode (see section 4.3).

AI modes are essential for achieving optimal performance on a Reduxi-controlled site. A dedicated article explains the AI control in detail: **Reduxi AI strategies**

See here for a short introduction in the AI modes: All AI modes are based on energy prices, which can be fixed, time of use or dynamic (market, day ahead). Prices need to be configured in the cloud application **https://reduxi.app** through the steps described in **Reduxi price lists**

4.3.4.1 AI battery optimization

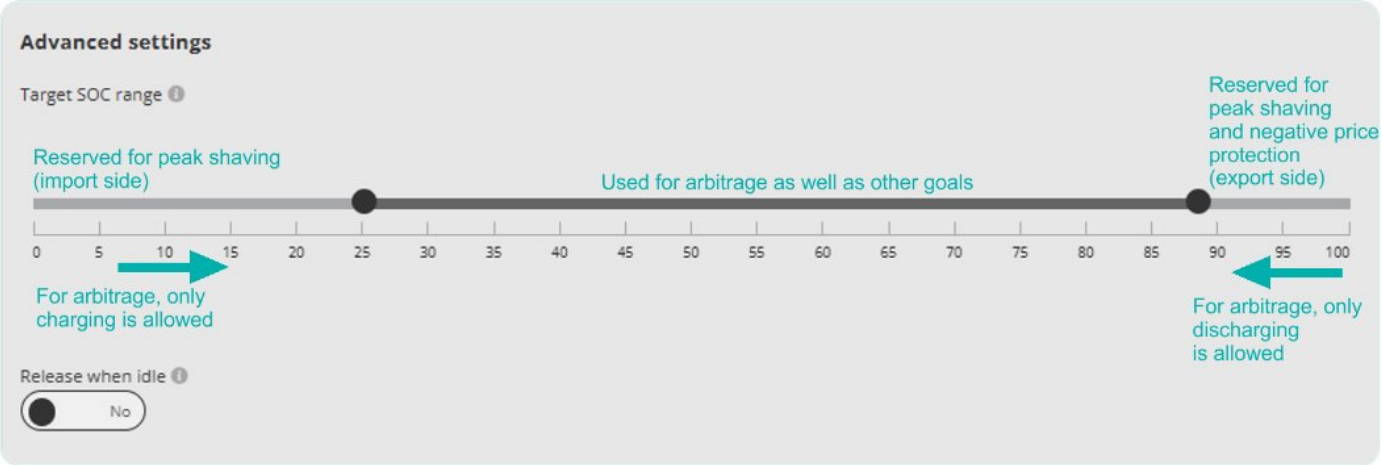
The primary goal of AI battery optimization is battery energy arbitrage. The AI optimization considers the pricing plan (e.g., **day-ahead prices)**. When the prices are low, the battery is being charged from the grid. When the prices are high, the battery exports the energy to the grid. This strategy aims to capitalize on the fluctuations **in electricity prices over time**.

This mode operates over a **36-hour** cycle. As soon as the next day's prices are known, the algorithm immediately considers that and optimizes the battery usage. It searches for the best timeslots for the charge/discharge, of course, by considering the import and export limits, battery limits, etc. In practice, there are two such cycles per day, but they can also be more or less, depending on the day's prices.

AI battery optimization consists of three different modules and one "Advanced settings" segment. Only one individual module can be enabled at a time; otherwise, different modules can conflict, and the system may not function as predicted. In the "Advanced settings" segment, the "**Target SOC range**" slider applies only to Earning optimization (battery arbitrage), the other two modules always use all the possible capacity. The "**Release when idle**" toggle applies to all segments. Its function is to allow the local system (e.g., the on-site inverter) to execute its own commands independently of the Reduxi Controller, working in self-use mode, peak-shaving, etc..

"**Target SOC range**" explanation:

Target SOC range specifies the range that is used for the battery arbitrage. The region out of the target SOC range can only be used by other modes (e.g., peak shaving).



Target SOC range

Text description of this image

"Release when idle" explanation: Allows the battery to be used by other modes (e.g., peak shaving, negative price control, self-use) when not controlled by the AI battery modes. Set this to No if the battery is dedicated to arbitrage only; set to Yes if it is also used for other modes.

Example for "**Release when idle = True**":

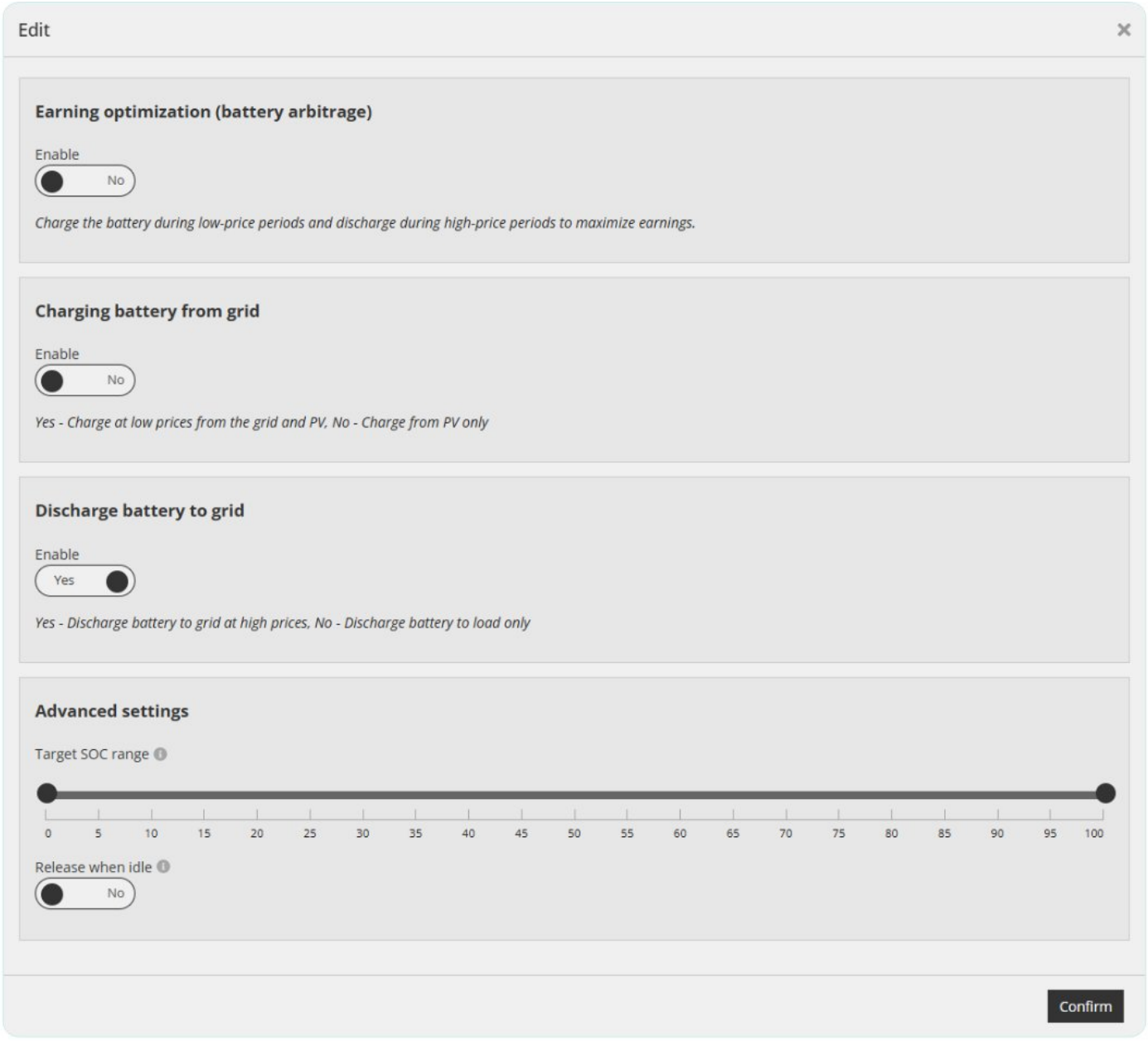
If the scheduled battery charge/discharge power is calculated as 0, the system will revert to its default mode (e.g., peak shaving, negative price control, self-use).

If the scheduled battery charge/discharge power is calculated as any value other than 0, the system will operate within the calculated power range, typically at the inverter's minimum or maximum rated power.

Example for "**Release when idle = False**":

The system will operate within the calculated power range, typically at the inverter's minimum or maximum rated power, and won't allow the system to revert to its own mode (e.g., peak shaving, negative price control, self-use).

Sub menu for **AI battery optimization** (all modules and Advanced settings segment), image:



AI battery optimization: modules and Advanced settings

Text description of this image

Earning optimization (battery arbitrage) module:

Through switching states for the toggle button, activation/deactivation for battery arbitrage is enabled/disabled.

- Earning optimization (battery arbitrage) (toggle default value: YES)
- Charging optimization/Discharging optimization (toggle default values: YES), toggles are locked (only visible), and both are enabled.

Min. earnings per cycle definition:

Min. earnings per cycle can be calculated using the formula = **Min. earnings per cycle** = complete investment for battery installation/estimated number of cycles for battery (information provided by manufacturer) = 10000€/num cycles (5000) = 20€/cycle.

If **Min. earnings per cycle** value is set to 0, then this calculation is ignored, and arbitrage will be executed no matter the price on the exchange.

A charge/discharge cycle is executed only if the expected earnings exceed the **Min. earnings per cycle.** The cycle in this case corresponds to the minimal and maximal allowed SOC (as defined by the battery or specified in the target SOC range under the "Advanced settings" segment).

Charging battery from the grid module:

This module is designed for sites where photovoltaic (PV) production does not meet local energy demand, or where grid energy is the only source. In these cases, it is optimal to import energy during low-price periods for later consumption, thus achieving energy cost reductions.

Module settings:

Earning optimization (battery arbitrage) = False
Charging battery from the grid = True
Discharging battery from the grid = False
Release on Idle = True. Note, this is important!



Charging battery from the grid: module settings

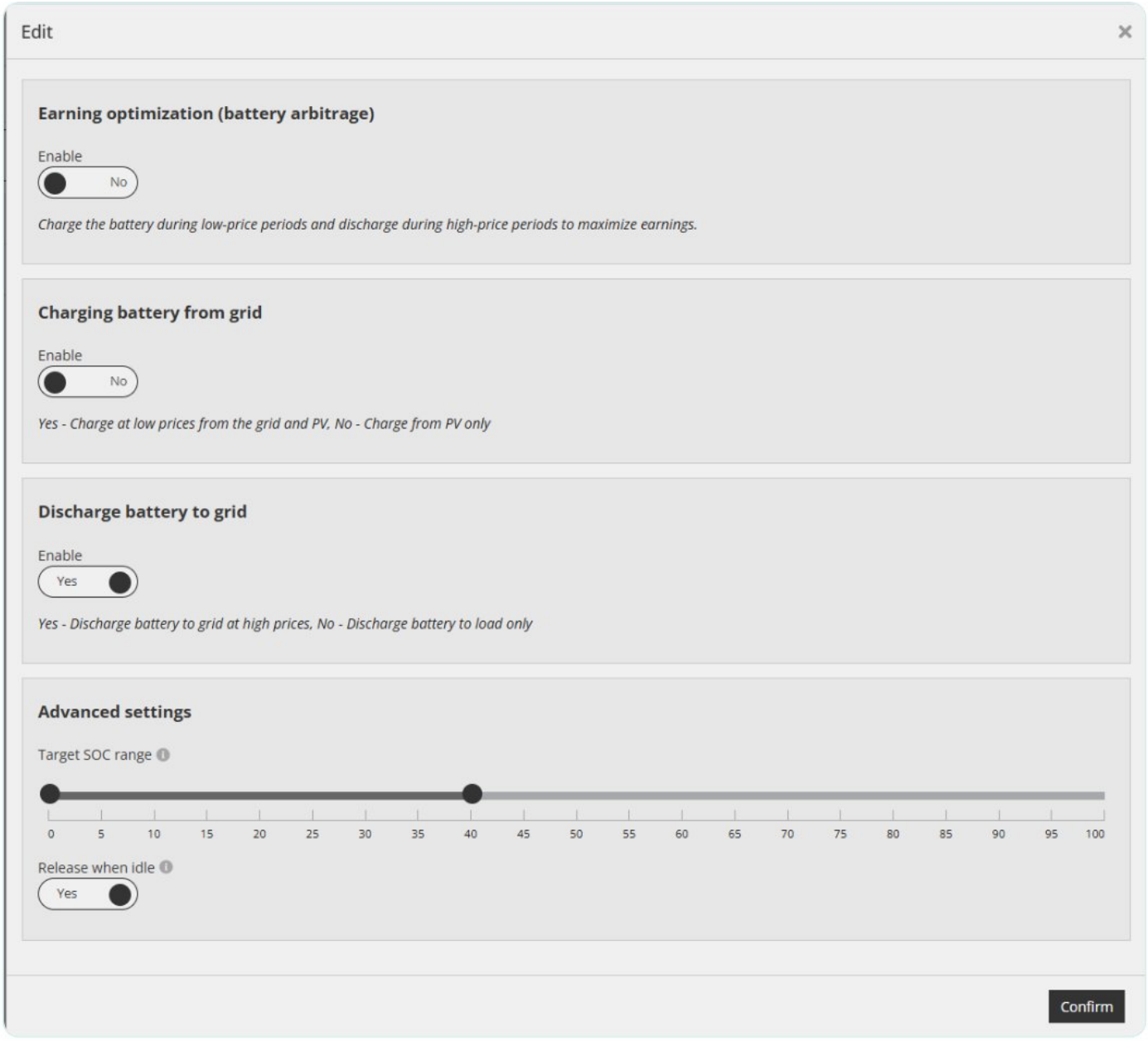
Text description of this image

Discharging battery from the grid module:

This module is designed for sites where photovoltaic (PV) production exceeds local energy demand. The system maximizes profitability by exporting surplus energy to the grid, typically based on SPOT market prices. A secondary benefit is that by discharging the battery to the Grid, it creates capacity to store excess PV generation. This is particularly advantageous for installations where the PV system's nominal power exceeds the maximum export power allowed to the Grid.

Module settings:

Earning optimization (battery arbitrage) = False
Charging battery from the grid = False
Discharging battery from the grid = True
Release on Idle = True. Note, this is important!



Discharging battery to the grid: module settings

Text description of this image

4.3.4.2 AI EVSE optimization

Similarly as above, also this AI optimization considers the pricing plan (e.g. **day ahead prices)**. Here, when the prices are low, the car is being charged from the grid. The rate of charging depends on the price. Lower the price, higher the charging current.

~~This mode uses a **24-hour** cycle. It looks for up-to 24 hours in the future and finds the best timeslot to charge, of course, by considering the import limits.~~

This mode looks until 6AM of the next day and finds the best timeslot to charge, of course, by considering the import limits.

Note, the state of charge of the car battery is not available, therefore, not used in the charging mode.

4.3.4.3 AI HVAC optimization

Also this AI optimization considers the pricing plan (e.g. **day ahead prices)**. Here, when the prices are low, the HVAC operates at the boost mode, when the prices are average, the HVAC operates in normal mode, and when the prices are high, the HVAC operates in eco (off) mode.

This mode uses a **24-hour** cycle. It looks for up-to 24 hours in the future and finds the best timeslot to activate the HVAC, of course, by considering the import limits.

4.4 Off-grid management

Reduxi assists in off-grid power management by controlling connected devices and reducing battery discharge from non-critical consumers.

A correct electrical installation is essential. The system must be properly designed and implemented by a qualified installer, including appropriate wiring and automatic transfer switching devices. This ensures that, during the transition to off-grid mode, no backfeed occurs into the public grid from third-party generation sources, especially AC-coupled devices such as PV inverters.

It is important that off-grid mode is enabled and managed by the battery inverter itself, or by additional automatic transfer switching devices that ensure fast and reliable disconnection from the grid.

In the event of a power outage, a compatible battery inverter (hybrid inverter) reacts within milliseconds. It detects the grid failure, disconnects from the grid, and immediately starts supplying power to the building. The availability of this functionality depends on the inverter and system design, so this should be confirmed with the installer.

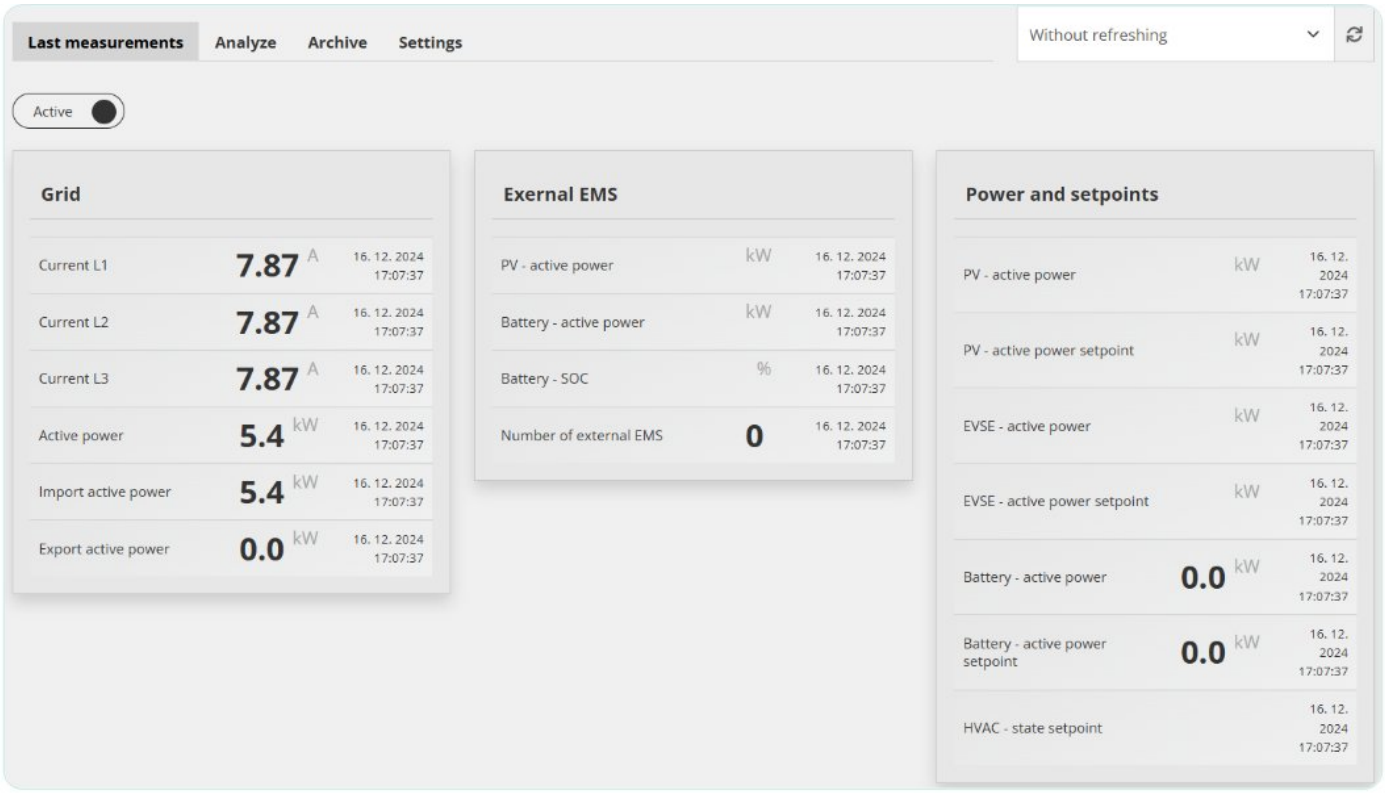
In an off-grid situation, Reduxi receives the off-grid status from the inverter and starts managing other connected devices to prevent premature battery discharge. This includes controlling loads such as EV chargers, HVAC and also PV.

For example, during a power outage, EV charging is automatically disconnected to preserve battery capacity. These behaviours must be properly configured in advance based on system priorities and user requirements.

5 Testing and analysis of strategies

In order to test and confirm a strategy is working according to the expectations, one can review the measurement data (currents, power from the meter etc.) and the strategy setpoints (PV power, HVAC SG ready setpoints etc.).

The strategy analysis is available by clicking Home/Strategies. Under the "Last measurement" and "Analyze" one can see the current status and historical data of the strategy performance.



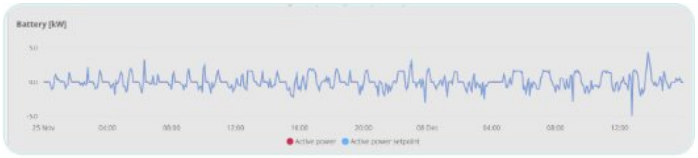
Strategy analysis: Last measurement and Analyze

Text description of this image



Last measurement

Text description of this image



Analysis

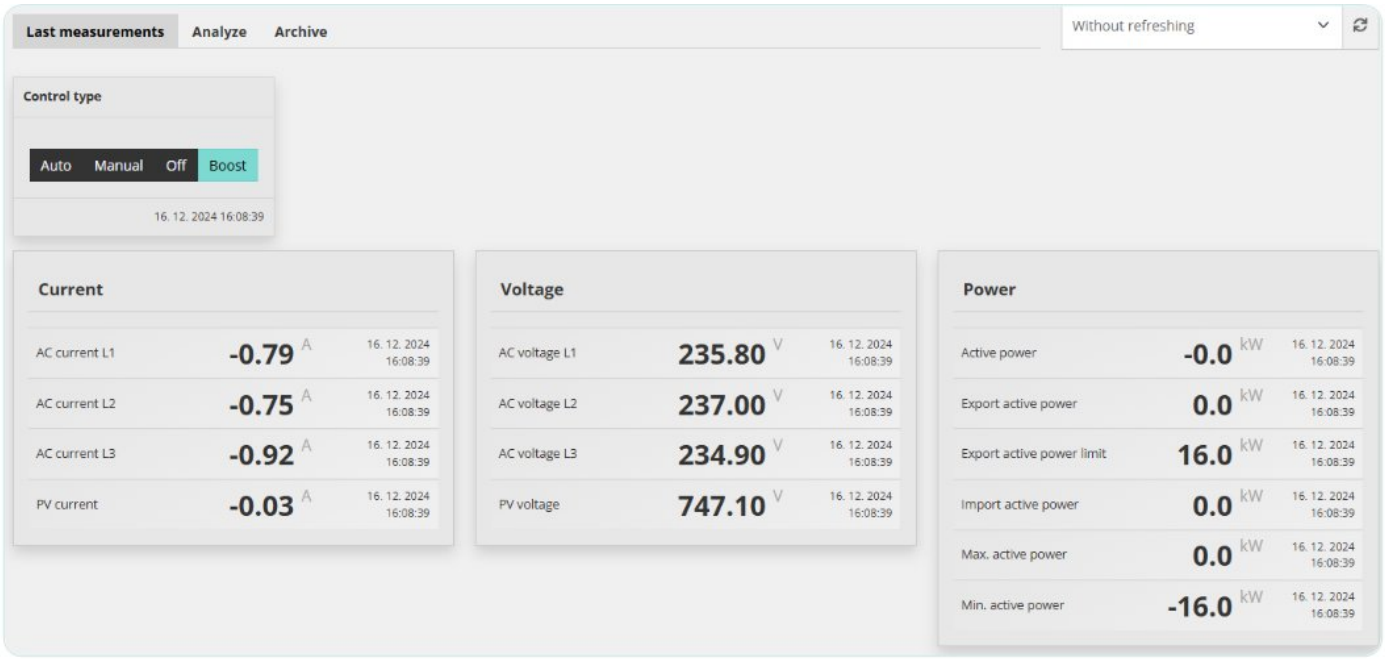
2. ### Text description of this image

Screenshot of a line chart titled Battery [kW]. Vertical axis: -5.0, 0.0, 5.0. Horizontal axis: time labels 25 Nov, 04:00, 08:00, 12:00, 16:00, 20:00, 08 Dec, 04:00, 08:00, 12:00 (the labels run from 25 Nov to 08 Dec). Legend below the chart: red dot Active power, blue

5.1 Manual mode

For testing one can switch a specific device from auto mode (where the device is controlled via a strategy) to a manual mode. See "**Manual control of device**" in the article Reduxi Configurator

The Manual mode allows us to verify if a device (a heat pump, battery, PV) works according to the expectations. Does it respect the setpoint, what is the response time...



Manual mode

Text description of this image

5.2. Overview of a strategy

You can access the strategy overview on the first page of Reduxi Configurator (left menu).

In the side menu, click:

- Strategies.
- The strategy for which you want a detailed insight into the measurements.

For each strategy you can see:

- Last measurement.
- Analysis.
- Archive.

5.2.1. Last measurements

The Last Measurements tab is intended to view the last recorded measurements for the selected strategy.

You can set the data refresh time interval (right).

You can change certain parameters here. Other parameters and advanced settings can be edited in the Settings/Strategies module.

> **Note**
> In case Reduxi is turned off due to a power outage or other problems, the controller will not record measurements during this time.

5.2.2. Analysis

Under the Analysis tab, you can view past data for the selected strategy. The data is displayed in graphic form. In the upper left, you can choose the time period for which you want data to be displayed.

5.2.3. Archive

Under the Archive tab, all past data and measurements from the moment you created the strategy are stored for the selected strategy. The archive allows you to display data in tables and export data in CSV format.

> **Note**
> In the Archive tab, the data is available until you delete the selected device from Reduxi Configurator

6 Disclaimer

> **Disclaimer**
> **All the strategies respect the export and import limit. However, sometimes the regulated devices do not react to the setpoints, or their reaction time is slow. For example, a reaction time of a heat pump is between 15 and 30 minutes. Therefore, it can happen that the import and export of energy can exceed the limit. To overcome this as much as possible, Reduxi implemented safety zones, so it regulates the devices before they reach the limits. The safety zones depend on the device type.**

✓ Summary

Basics (Points 1–2): Strategies adapt energy use to prices, tariffs and limits. Typical set-ups: night EV charging, PV with a heat pump, savings with dynamic prices.

Configure a strategy (Point 3): Log in to the Reduxi Configurator, click Add new strategy and choose one of four types. The Energy manager coordinator is the most complete one.

Advanced settings (Point 4): Set details, regulated devices and optimization modes: Default, Schedule, Negative price and AI modes. Off-grid management is covered in Point 4.4.

Test and limits (Points 5–6): Test with manual mode, review Last measurement, Analysis and Archive. Slow devices can briefly exceed the limits.

Common issues

ISSUE	SOLUTION
A device does not follow the strategy or the import/export limit is briefly exceeded	Some devices react slowly, a heat pump needs 15 to 30 minutes. Reduxi uses safety zones to regulate before the limits are reached (Point 6).
The negative price mode does not work	The Reduxi Controller must receive current prices. Set up the price list in the cloud application (Point 4.3.3).
AI battery modules conflict	Enable only one AI battery module at a time (Point 4.3.4.1).
You want to check a device before using the strategy	Switch the device to manual mode and check setpoint and response time (Point 5.1).

Related articles

Matching guides from the Reduxi knowledge base:

Reduxi AI strategies
AI control for battery, EVSE and HVAC explained

Device setup guides
All step-by-step guides for connecting devices to the Reduxi Controller

Strategies for the Reduxi Controller
Energy manager and other strategies explained