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Setup
PV-led Charging

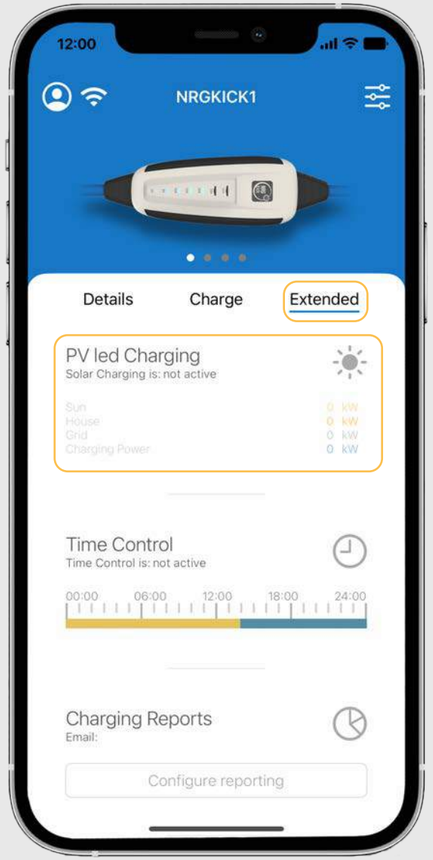
1. Initial setup
2. Options for charging strategies
3. Overview PV-led Charging
4. Time Controll and PV-led Charging
4. Contact/Support

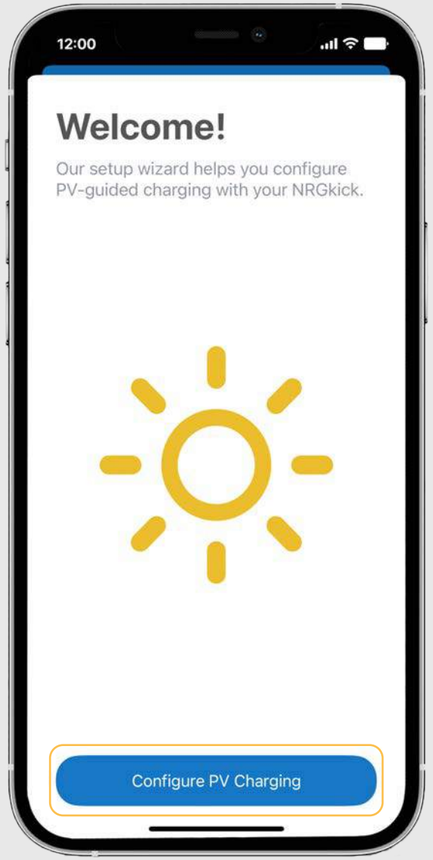
Version 2.1

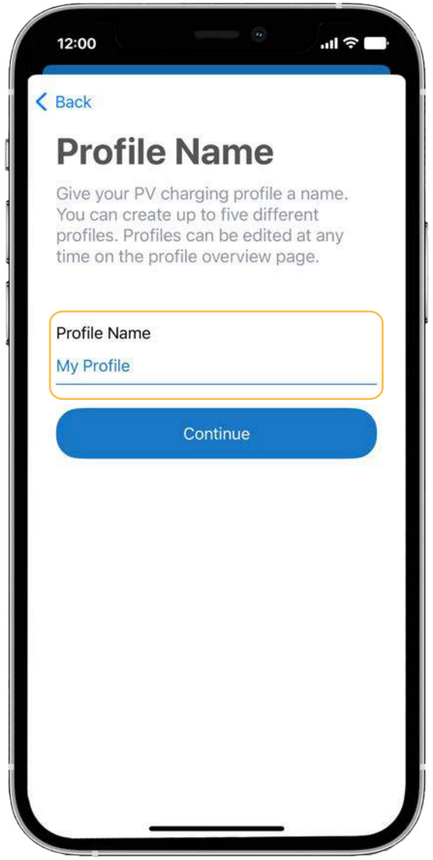
1. Initial setup

NRGkick requires a connection to the internet and must not be plugged into the EV, to be able to install the latest software.

1.1. In the section „Extended“ you will now find the function „PV guided charging“. Tap on „Configure PV charging“ to start the configuration.

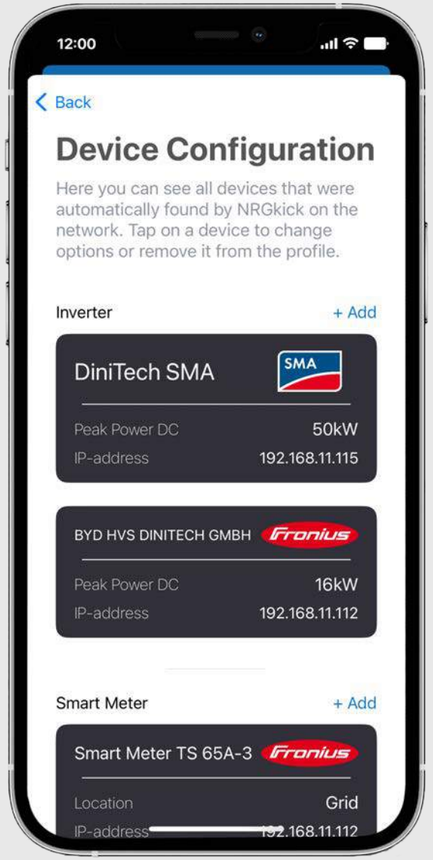






1.2. First you have to name your profile. Then tap on „Continue“.

1.3. Now all found devices in the network are automatically added to the profile. This only works for the brands Fronius and SMA, other devices can be added manually.

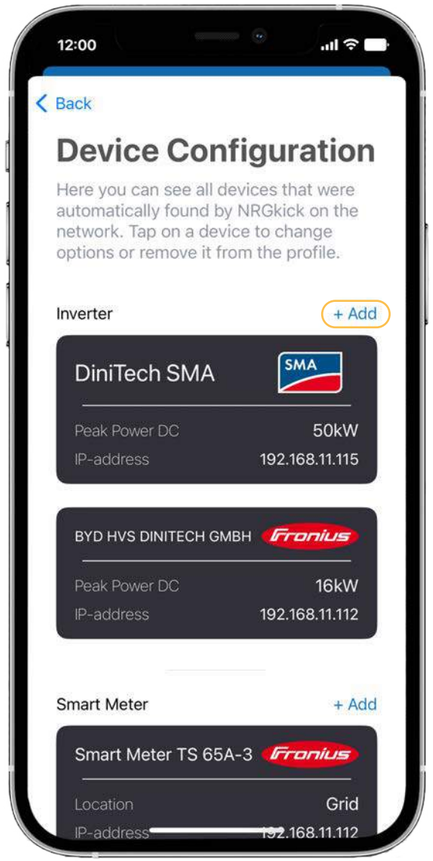


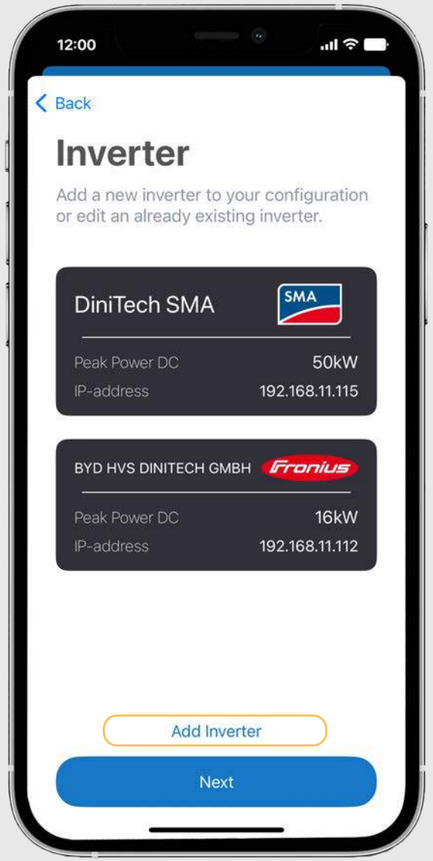
1. Initial setup

Explanation of devices:
You can add inverters, smart meters, batteries and smart loads.
Smart loads are smart devices such as heating elements that can be operated with PV surplus.

You can add up to five different devices per category. Battery and Smart Loads can have one device active at a time.

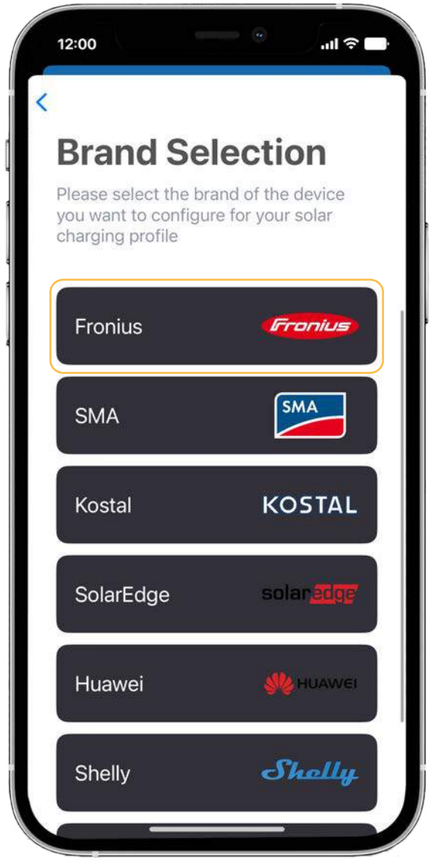
1.4. If devices are not found immediately, you can tap on „Add“ and there will be shown more devices.



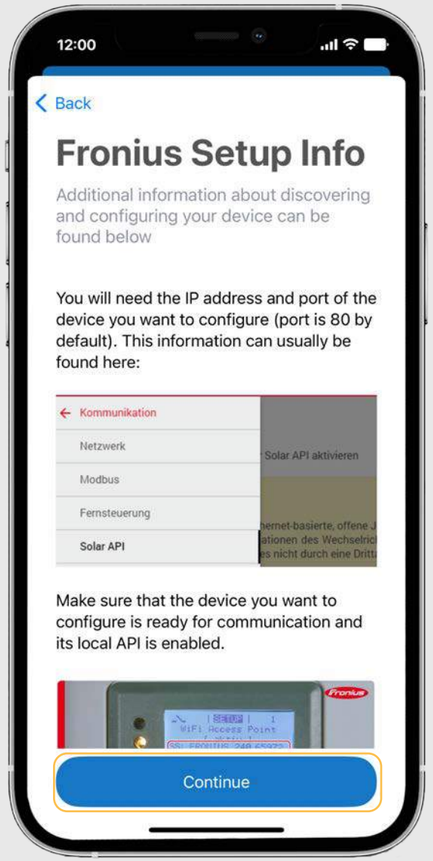


1.5. If you want to add the inverter manually, you can tap on „Add Inverter“.

1.6. First, you need to select the brand of your inverter.

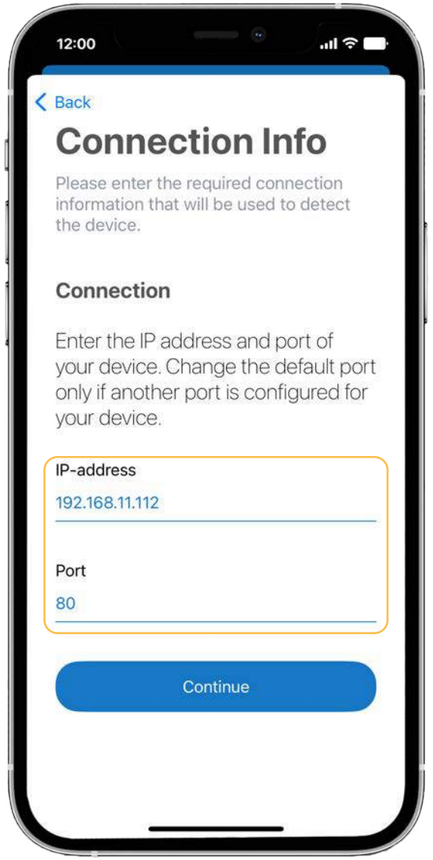


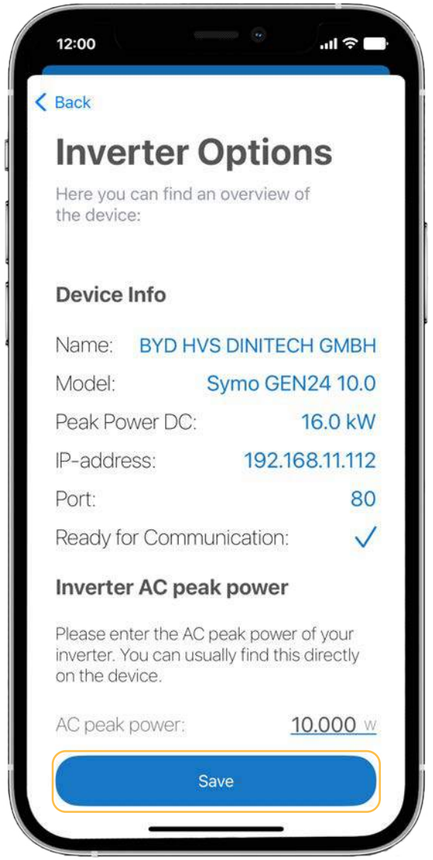
1. Initial setup



1.6. After that, you can read through the setup information and tap „Continue“.

1.6. Then enter the IP address and other information of the inverter and tap „Continue“.





1.7. In the overview you can check your entries and press „Save“ to return to the selection.

1.8. Now the inverter is added and you can proceed with the configuration.

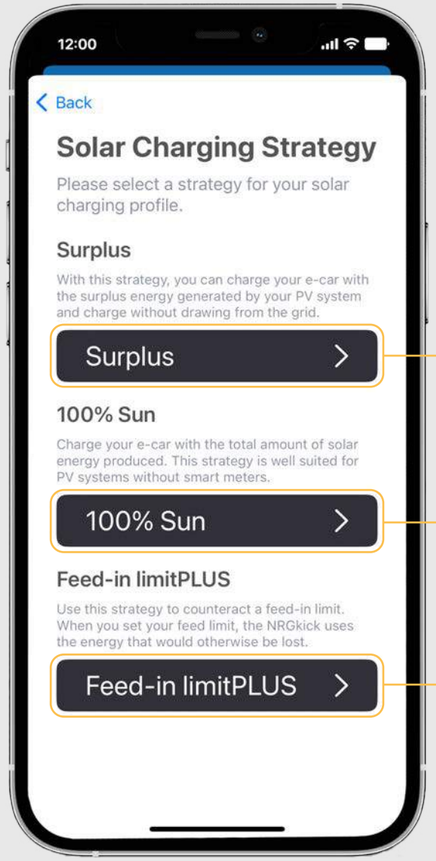


2. Options for loading strategies

Devices like smart meter, battery and smart loads can be integrated in the same way as in steps **1.5. to 1.8.**

You can find the further description of how to integrate your devices with Custom API in the document „Custom API“.

2.1. Now tap on the desired PV charging strategy.



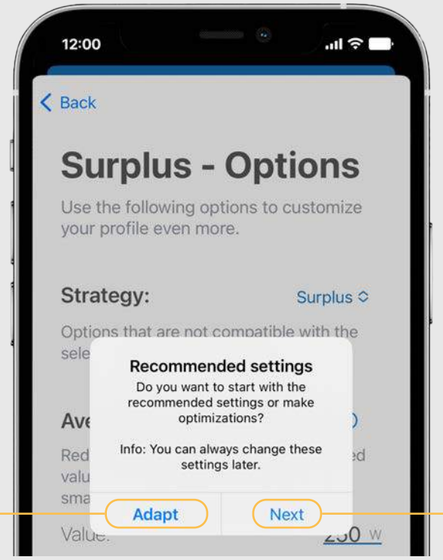
Recommendation 1 - Surplus:
If you have a smart meter, we recommend that you use the Surplus setting.

Recommendation 2 - 100% sun:
If you don‘t have a smart meter, we recommend the 100% sun setting.

Recommendation 3 - Feed-in limitPLUS:
If you want to charge your car and feed into the grid at the same time, we recommend the feed-in limitPLUS setting.

2.2. Now you can already start directly with the recommended default settings with the PV charging by tapping on „Next“! You will be forwarded directly to step **2.4.**

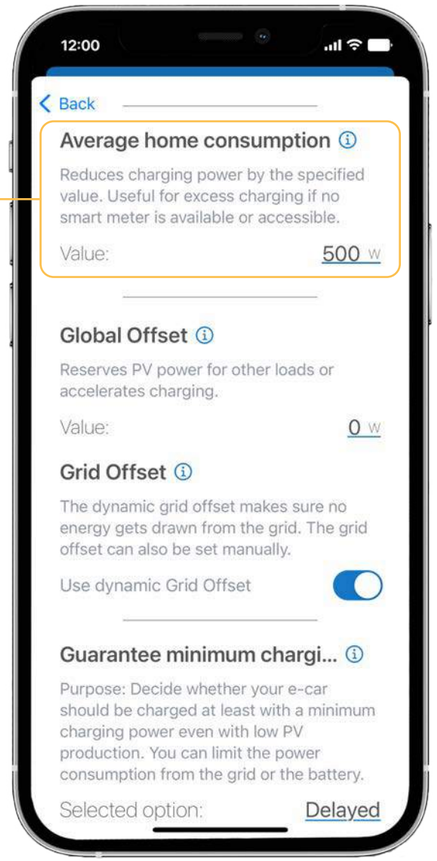
If you want to make changes, tap on „Customize“. The options are described in more detail on the next pages.



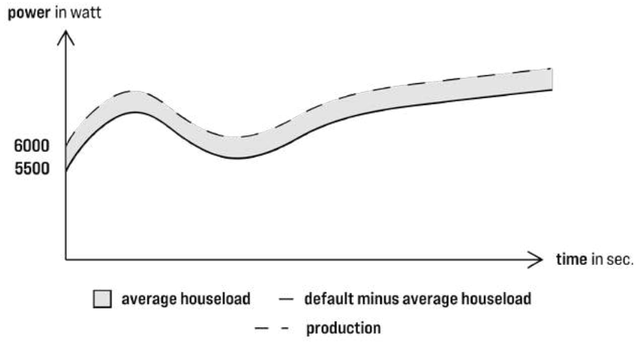
2. Options for loading strategies

AVERAGE HOUSELOAD:
Enter your average home consumption here. The charging power of the vehicle is reduced by this targer power.

In the case of the **Surplus** charging strategy, this value is only taken into account if communication to the smart meter fails or no smart meter is available.



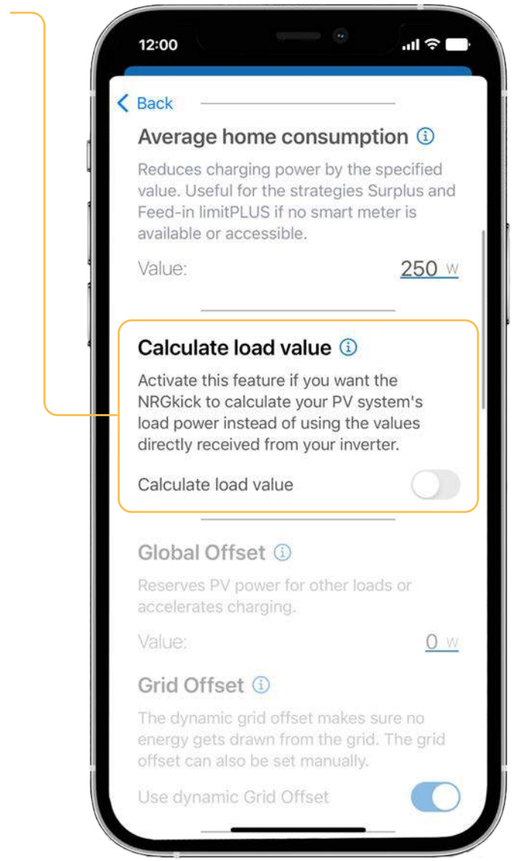
Example:
Production: 6000 w
Average Houseload: 500 w
6000-500= **5500 Watt Target**



CALCULATE LOAD VALUE:
In the case of **multiple inverters** installed in a PV system, different house load values can be calculated for each inverter module.

This setting can be used to find an average house load value.

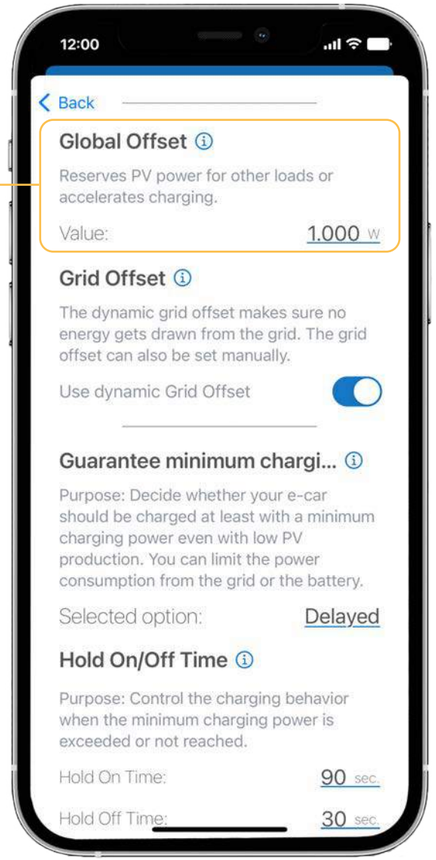
If this setting is active, NRGkick calculates the house load depending on all configured devices.



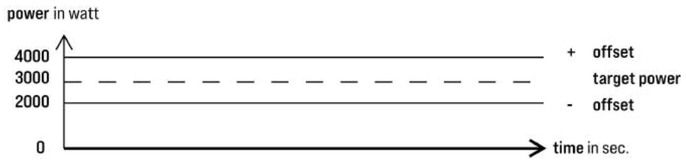
2. Options for loading strategies

GLOBAL OFFSET:
With this setting you can influence the preset charging power of the NRGkick.

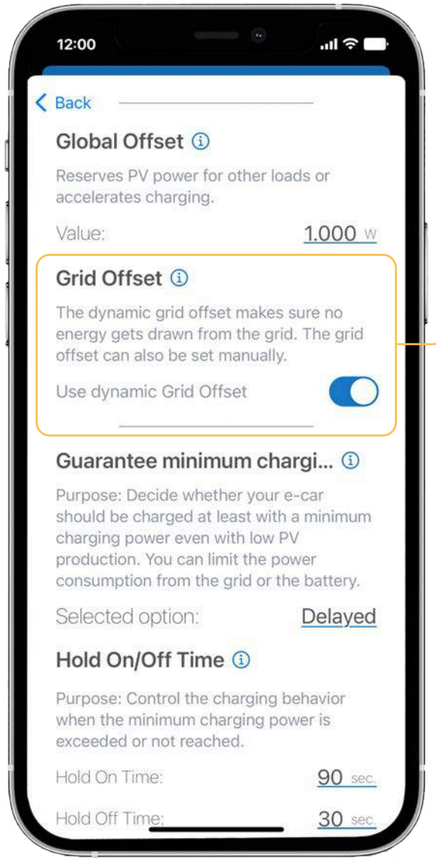
Set a positive value to increase the charging power. A negative value will decrease the charging power.



Example:
Surplus of 3kW
Offset +/- 1 kW = 3 +/- 1



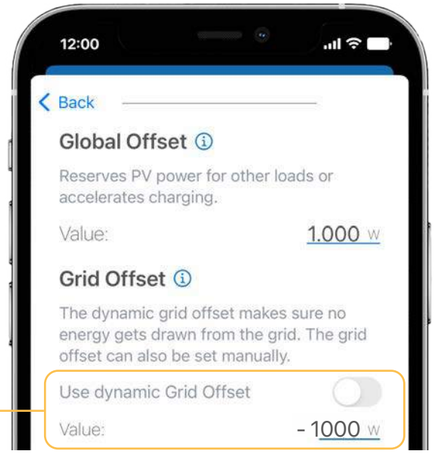
2. Options for loading strategies

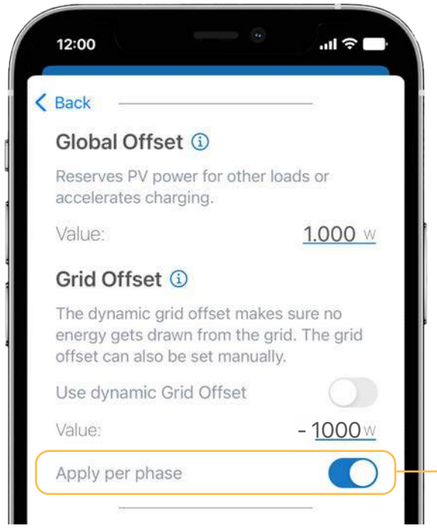


GRID OFFSET:
The grid offset can only be defined for the Surplus loading strategy. A dynamic grid offset is activated by default. This ensures that no energy is drawn from the grid.

If the dynamic grid offset is deactivated, this value can be defined manually, for example, to always feed into the grid with a certain power.

If the value is negative, power is fed in and if the value is positive, power is drawn from the grid.

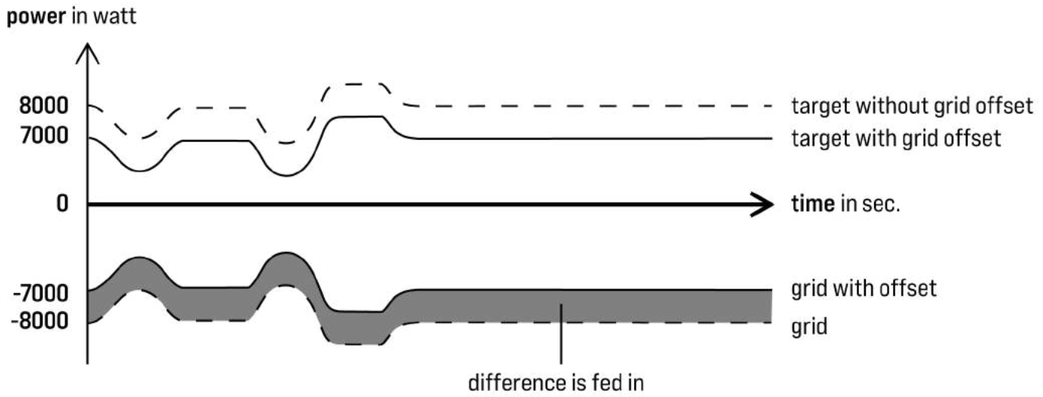




Additionally you can define if the grid offset is applied per active load phase. This is especially useful for phase switching, because the number of phases, changes at runtime.

This means that e.g. -1000 Watt is applied per active phase. So with three active phases, it‘s -3000 watts.

Example:

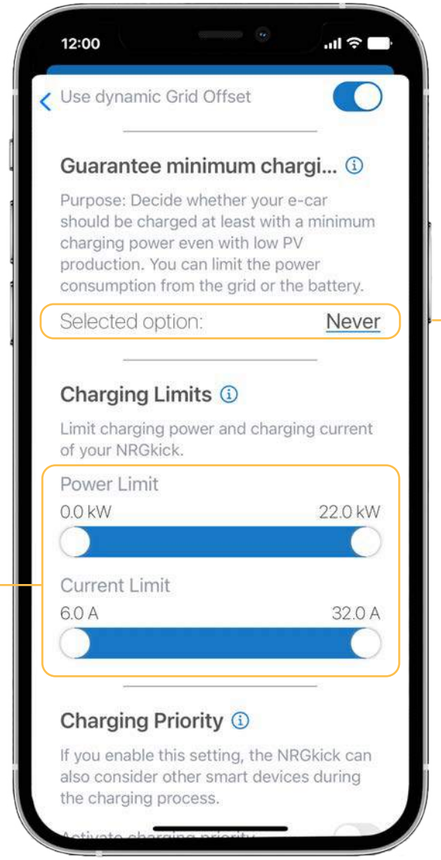


2. Options for loading strategies

GUARANTEE MINIMUM CHARGING POWER:
With this setting, you can define whether charging should continue with the minimum power even if PV production is too low. At least the minimum vehicle current (6A) is used for charging.

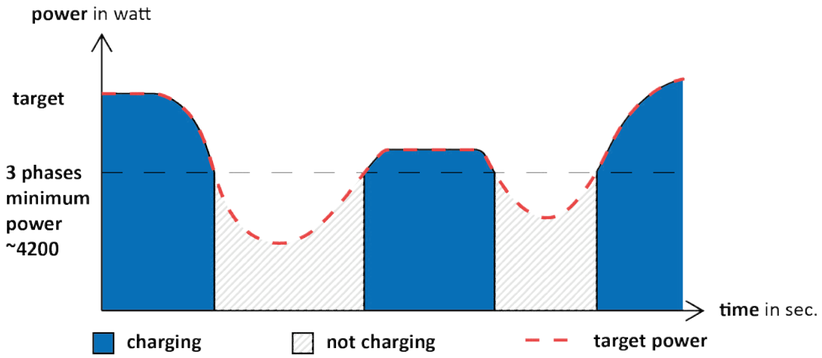
The **minimum charging power** ensures that your vehicle is charged even when PV production is low. You can also limit the power drawn from the grid or the battery.
The minimum charging power depends on the settings in the two sliders of the charging limits. If the lower power limit is below the minimum current, multiplied by the number of phases, multiplied by the voltage, the result of this calculation is used.

External energy sources include the battery, the grid and all smart loads that can draw excess energy.

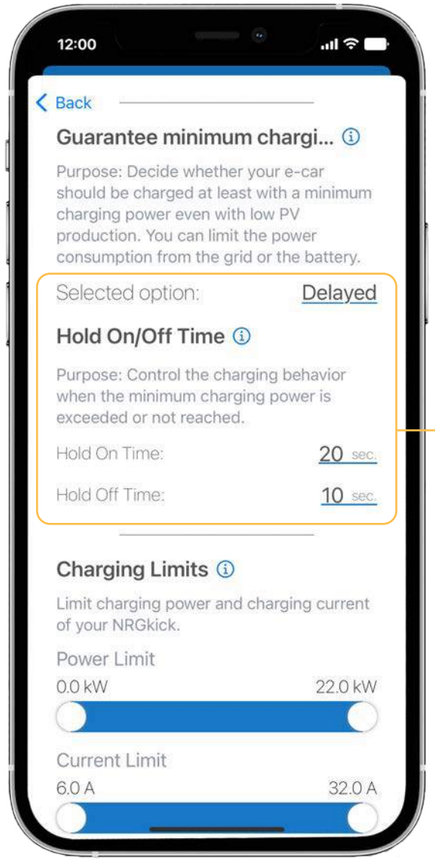


» **Never:**
As soon as the PV power exceeds the minimum charging power, charging is started. The charging process is stopped as quickly as possible if not enough PV power is produced to charge the vehicle.

Example:

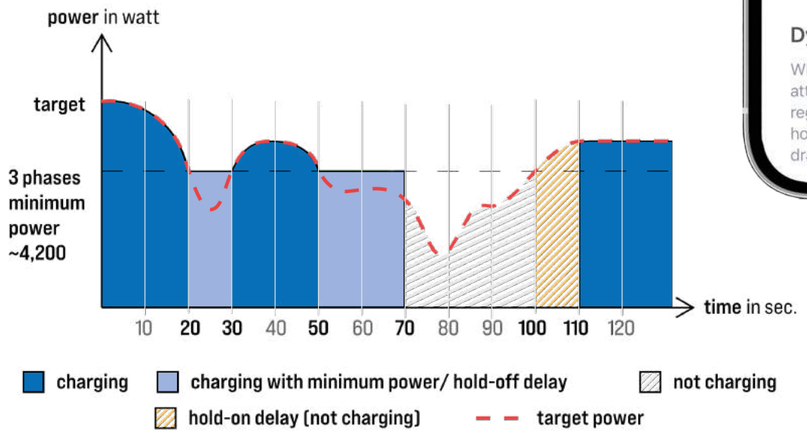


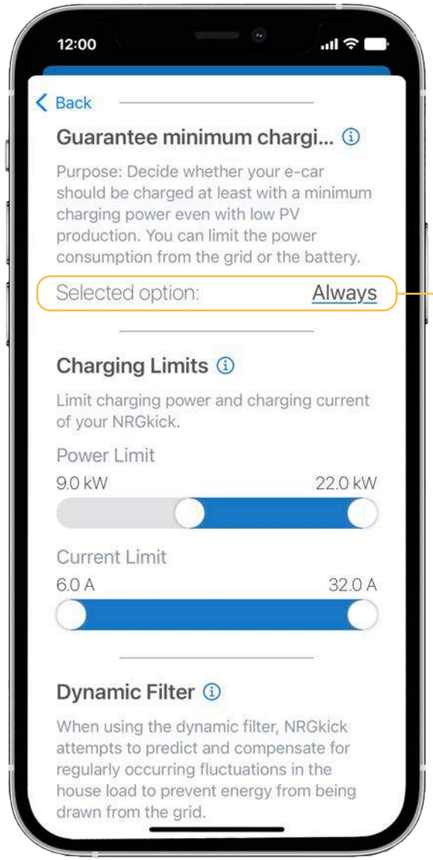
2. Options for loading strategies



» **Delayed:**
If the power falls below the minimum charging power, charging is stopped after the defined hold-off delay time. During this time, the energy required to reach this limit is drawn from external energy sources. As soon as the PV power exceeds the minimum charging power, charging is restarted after the defined hold-on delay time.

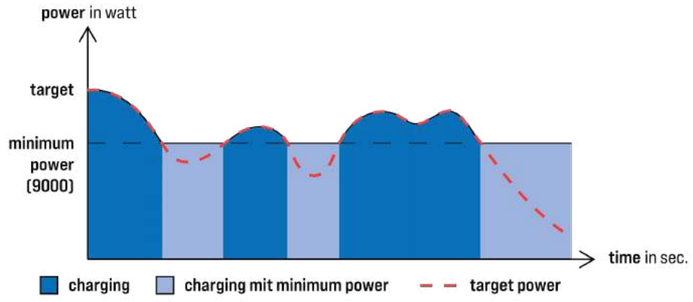
Example:



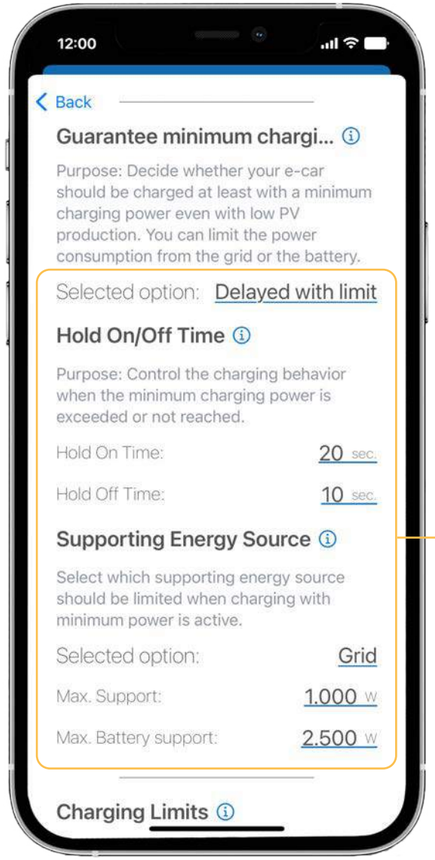


» **Always:**
If the minimum charging power is not reached, charging is continued with the set power limit. The energy required to reach this limit is drawn from external energy sources.

Example:

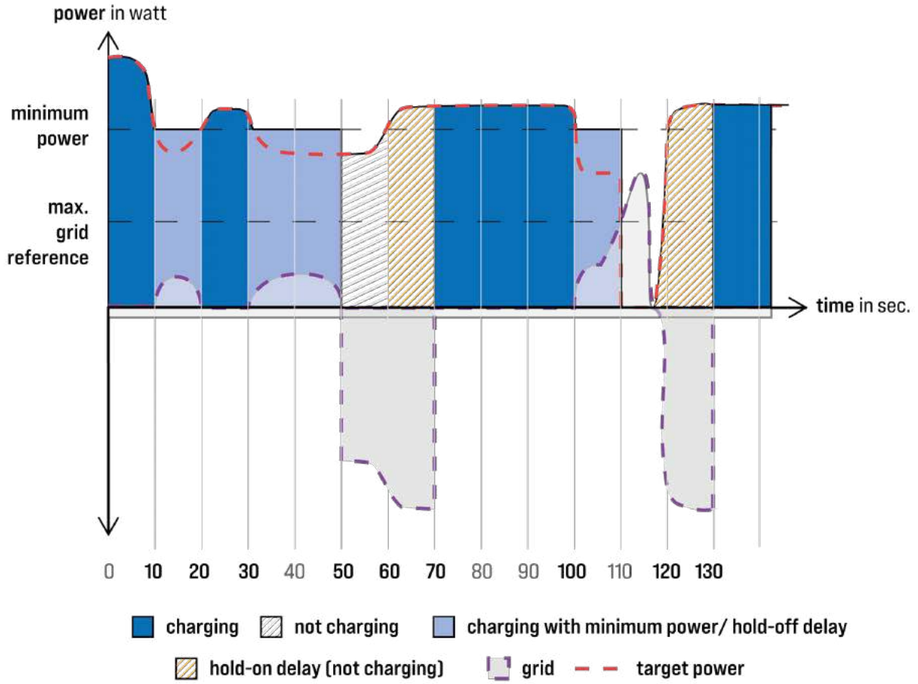


2. Options for loading strategies

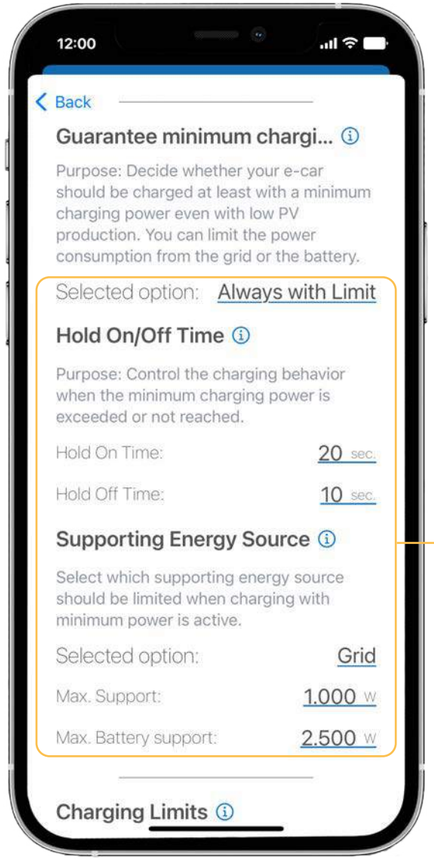


» **Delayed with limit:**
If the charging power falls below the minimum charge power, charging is stopped after the defined hold-off delay time. When the grid or external energy source limit is exceeded, charging is stopped as quickly as possible. As soon as the PV power exceeds the minimum charging power, charging is restarted after the defined hold-on delay time. If the grid is selected for the supporting energy source, the maximum discharge power of the house battery has to be defined as well.

Example:



2. Options for loading strategies



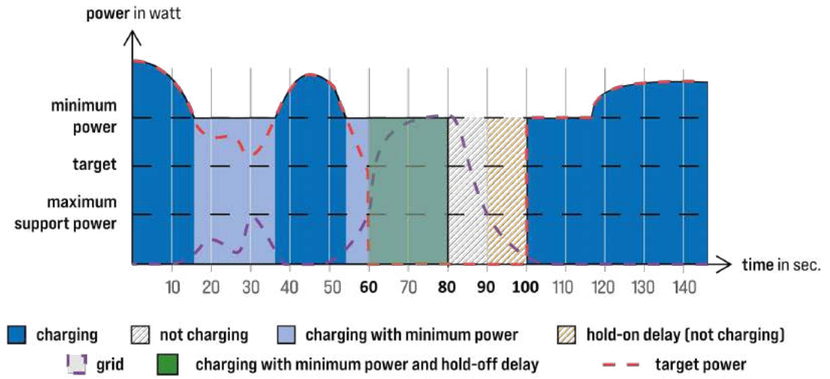
» **Always with Limit:**
In the case of insufficient PV production, charging is continued up to the set maximum grid or external energy source limit with the set minimum power. If this limit is exceeded, the charging process is stopped after the defined hold-off delay time. The charging process is restarted after the defined hold-on delay time when the power falls below the external energy source limit or grid.
If the grid is selected for the supporting energy source, the maximum discharge power of the house battery has to be defined as well.

The set maximum grid-/external energy source limit refers to all loads including NRGkick.

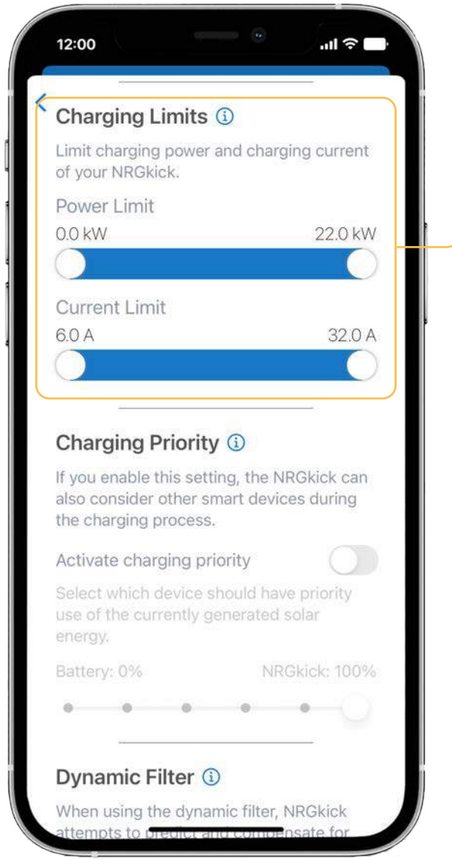
In order to avoid frequent hold-on and hold-off processes due to external influences (e.g.: measurement errors, communication delays, production fluctuations), the following standard or minimum times have been defined.

Minimum time:	**Standard:**
Hold-off delay = 20 seconds,	90 seconds
Hold-on delay = 10 seconds	30 seconds

Example:



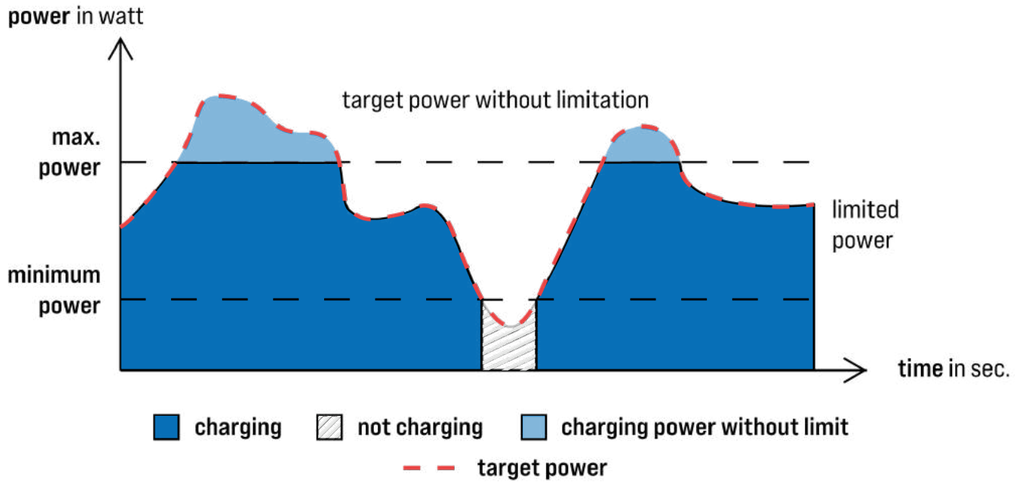
2. Options for loading strategies



CHARGING LIMITS:
Charging with the NRGkick can be limited in two ways:
1. power limit: Here you can limit the minimum and maximum power of the charging process.
2. current limit: Here you can limit the minimum and maximum current of the charging process.

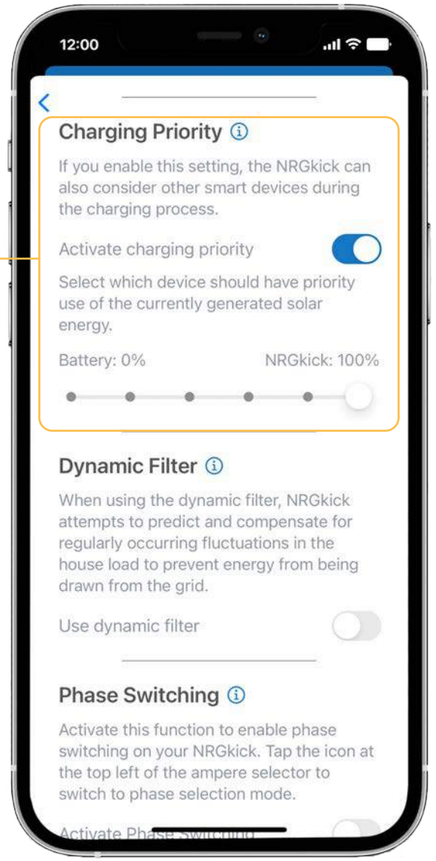
In general, the energy is limited by the smart attachment, the vehicle and the settings made in the app.

Example:



2. Options for loading strategies

CHARGING PRIORITY:
If you want your smart devices (home battery and smart loads) to be considered when charging, you can enable this setting.



If this setting is not enabled, the NRGkick will leave the priority to the other smart devices (Smart Load/House Battery).

After that, you have the option to split the produced PV power between NRGkick and house battery or to give your smart devices the highest priority in principle.

For example, if you want the house battery to always be fully charged first, you can set it to 100% battery and 0% NRGkick.

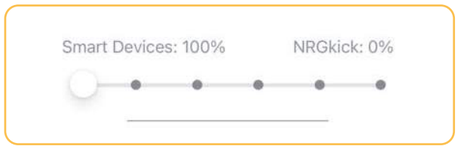
If you want to make sure your home battery is fully charged and the water is heated first (with Smart Load), you can set it to 100% Smart Devices and 0% NRGkick.

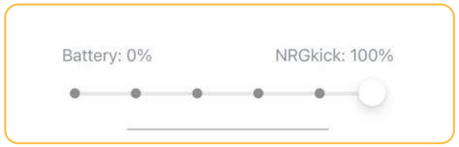
If you want to prioritize the charging of your car, you can set NRGkick to 100%. The excess energy used to charge the battery or to power smart devices (Smart Load) will then be used by NRGkick at 100% to charge the car.

More options:



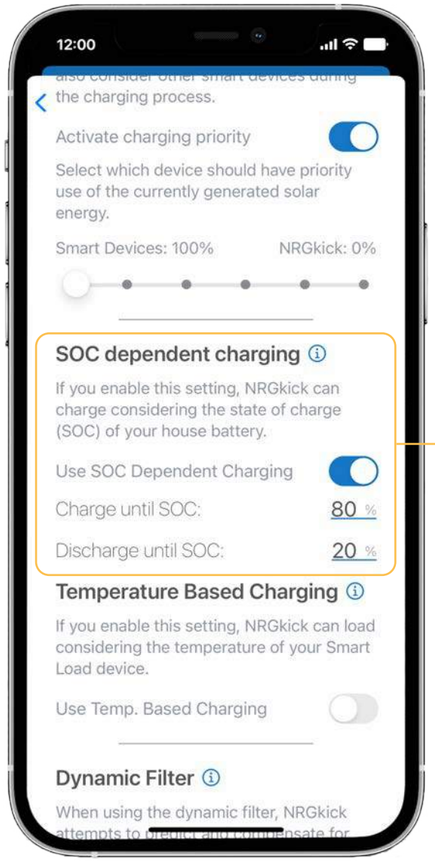






2. Options for loading strategies

Additionally you have the possibility to define a charge or discharge state limit under SOC dependent charging and a temperature upper or lower limit of the intelligent devices under temperature based charging.

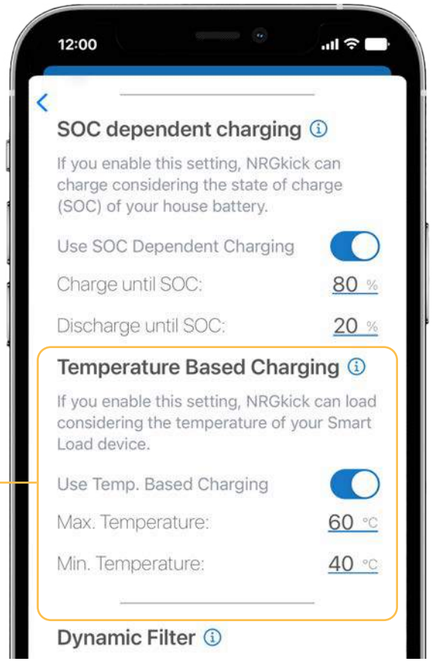


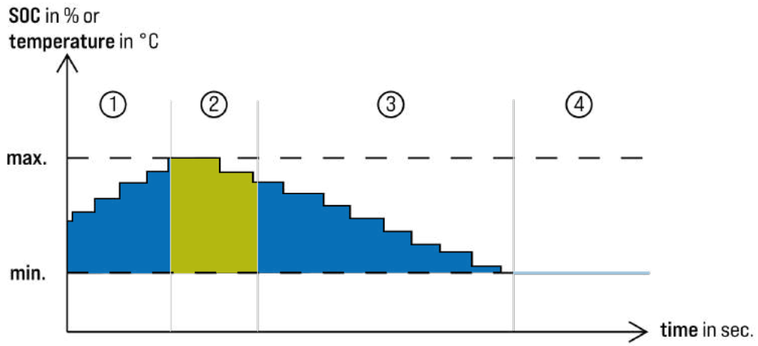
» **SOC (State of Charge) dependant charging:** With this setting, you can define a state of charge limit for the house battery if required. After exceeding this limit, the charging power of the house battery is withdrawn and diverted to the NRGkick.

In addition, you can define the discharge state limit of the battery if the option „Delayed with limit“ or „Always with limit“ is set.

» **Temperature based charging:** With this setting you can define a temperature upper limit of the smart devices if needed. After exceeding this limit, the charging power of the intelligent devices is withdrawn and diverted to the NRGkick.

In addition, if the option „Delayed with limit“ or „Always with limit“ is set, you can define the temperature lower limit of the intelligent devices. Up to this value, charging with the NRGkick is prevented in order to heat up as quickly as possible.





Example:

1. and 3. the NRGkick only takes the surplus energy which does not go into the battery or is used by intelligent devices.

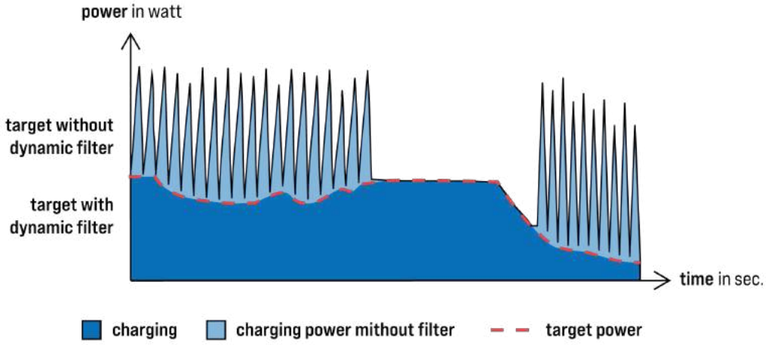
2. From here on, the energy used by the battery and intelligent devices is also used.

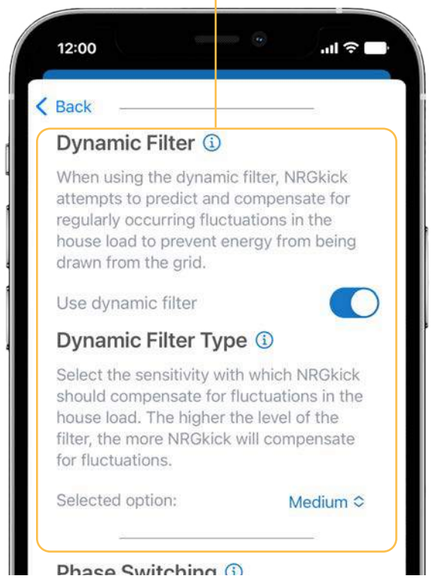
4. From here on, no more charging takes place.

2. Options for loading strategies

DYNAMIC FILTER:
When the dynamic filter is activated, strong fluctuations of the energy flow in the household are detected and compensated according to the defined setting of the charging priority. This attempts to prevent accidental consumption from the grid. By default, the filter is deactivated.

Example:



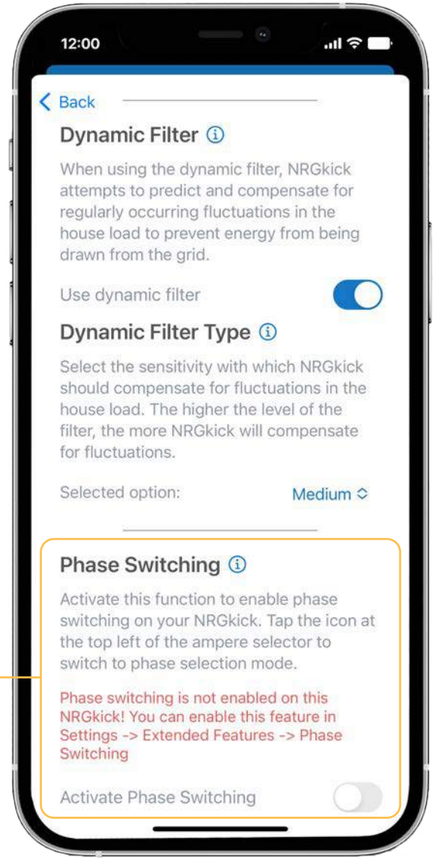


If the charging priority is set to 100% Smart Loads, the Smart Loads, battery and the grid are considered.

If the charging priority is set to 100% battery, the battery and the grid are considered.

When the charging priority is set to 100% NRGkick, the grid is considered.

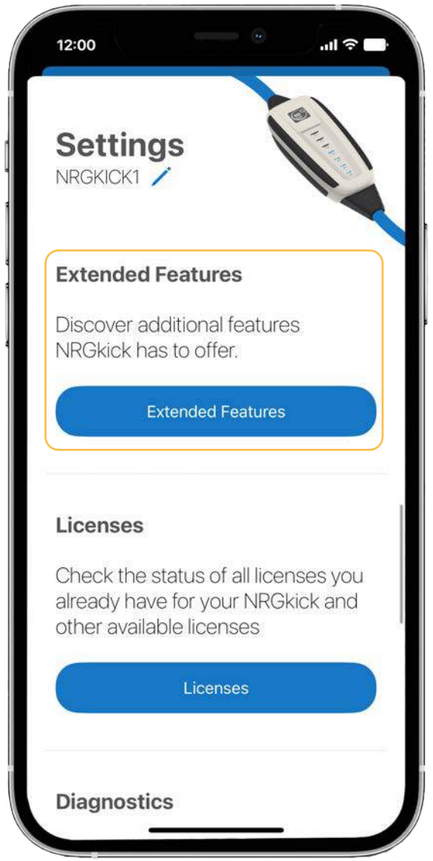
PHASE SWITCHING:
To be able to activate phase switching in the PV options, you have to activate it generally under Settings,...





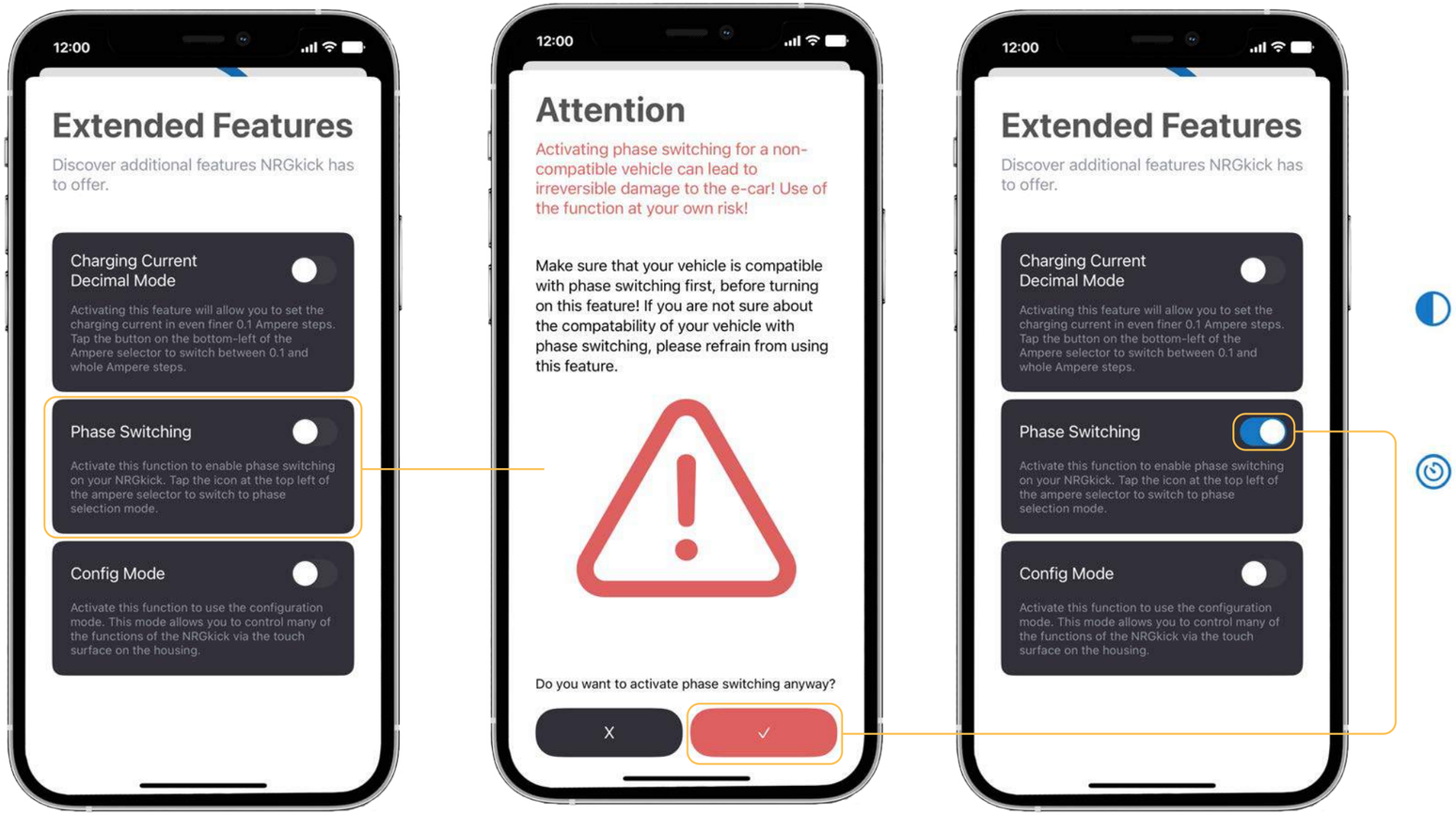
2. Options for loading strategies

... activate under „Extended Features“.



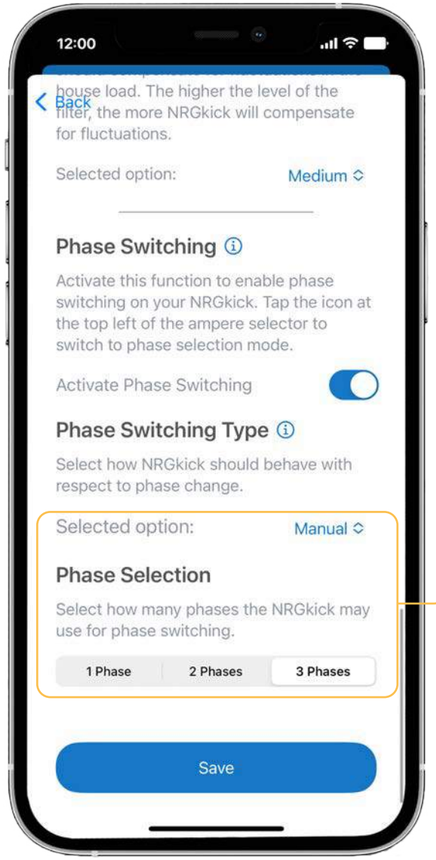
In the „Extended Features“ section, you will find the second option „Phase switching“. If you want to activate the phase switching, you will get a warning.

If you have read the warning and then activated the phase switching, you will see the Phase Switching activated in the „Extended Features“ section.

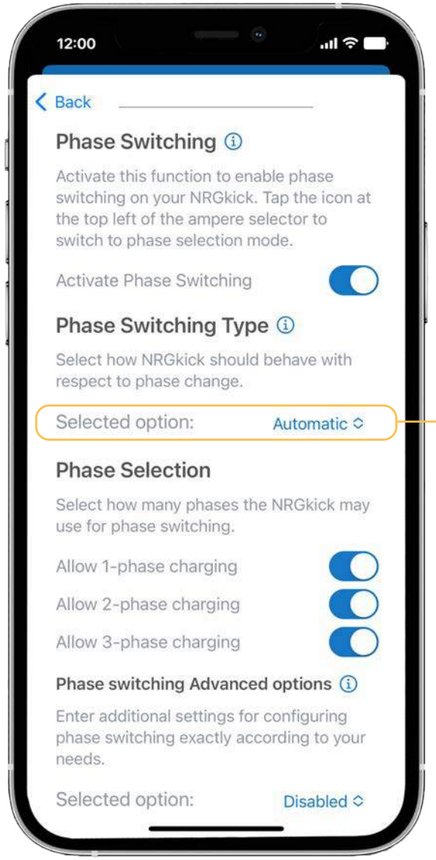


2. Options for loading strategies

After activating phase switching, you can now choose from one of four phase switching strategies:



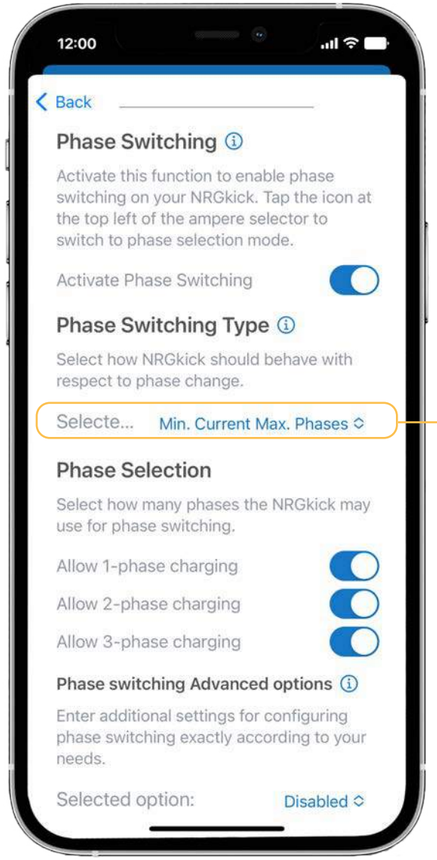
» **Manual:**
If Manual is selected, it is possible to manually specify with how many phases to charge during PV charging.



» **Automatic:**
With Automatic, an attempt is made to utilize the entire control range with minimum switching cycles. Switching between the configured phases is done as late as possible. Each number of phases can be allowed individually.

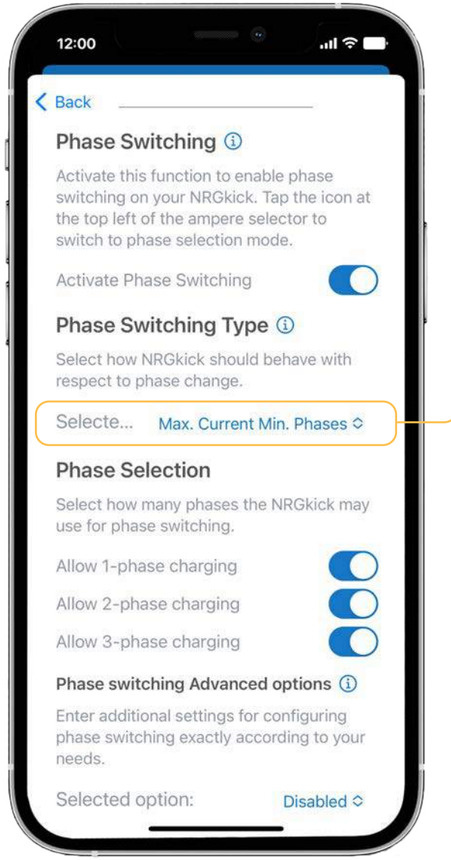
2. Options for loading strategies

After activating phase switching, you can now choose from one of four phase switching strategies:



» **Min. Current Max. Phases:**
Here, the maximum number of phases is switched up as early as possible. The number of phases is only reduced when the power falls below the minimum power of the current phase. The permitted phases can also be selected here.

Example:
In cases of insufficient power supply or power supply overload.

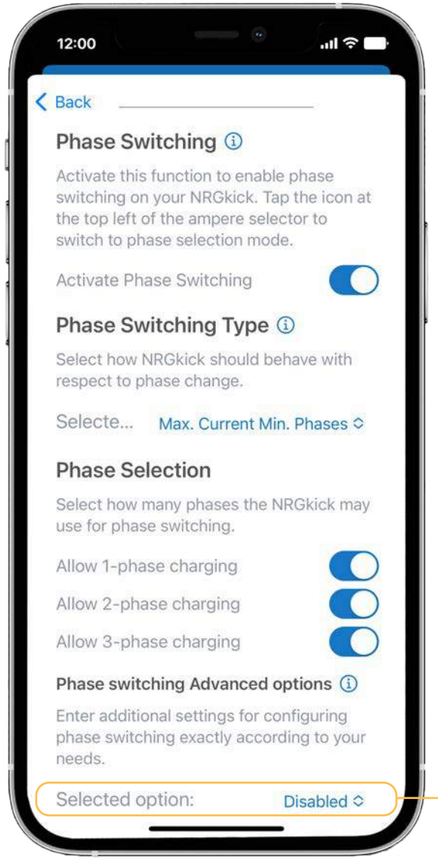


» **Max. Current Min. Phases:**
An attempt is made to charge with the lowest number of phases and the highest current. The number of phases is only reduced/increased if the specified power cannot be achieved with the current number of phases.

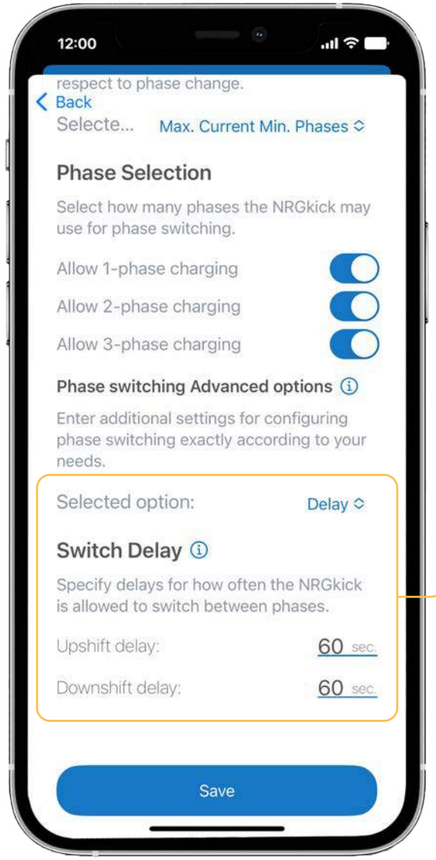
Example:
If the vehicle can optimize charging efficiency by increasing current flow, this provides the opportunity to complete charging in less time and improve the overall performance of the electric vehicle.

2. Options for loading strategies

In addition, the following extended options are available for phase switching, which can only be selected if phase switching is not manual:

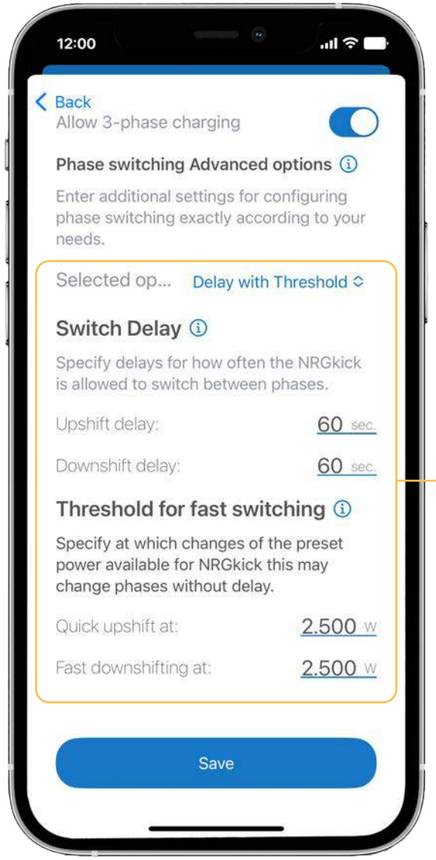


» **Disabled:** The Phases switch over as quickly as possible.



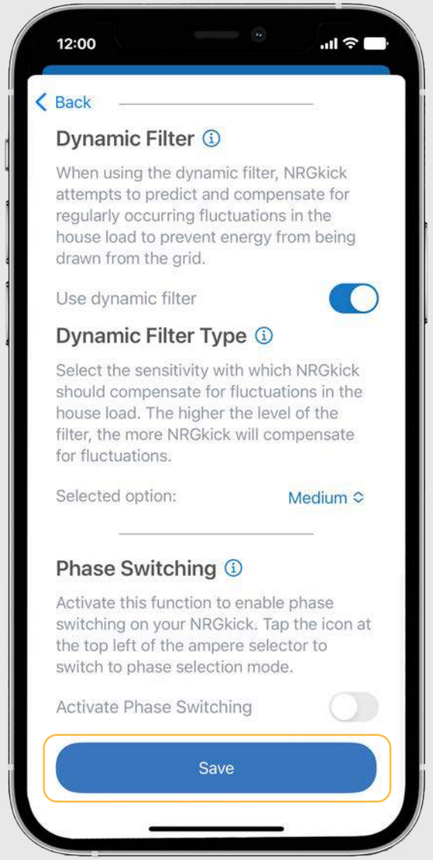
» **Delay:** An up-switching and down-switching delay time can be defined here. For the phase switch to take place, the specified power must exceed the power limit that applies to the number of phases for the specified time period.

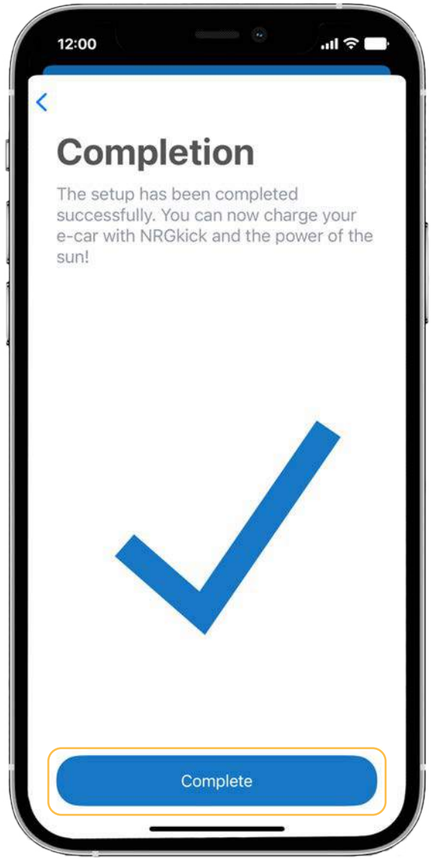
2. Options for loading strategies



» **Delay with threshold:**
A threshold value for immediate phase switch can also be defined here. If the power increases or decreases by this value since the last phase switch, the phase switch is performed as quickly as possible. It is important to note that switching is only performed when the necessary power limit for the number of phases is reached.

2.3. If you have made all the settings you want, tap „Save“.

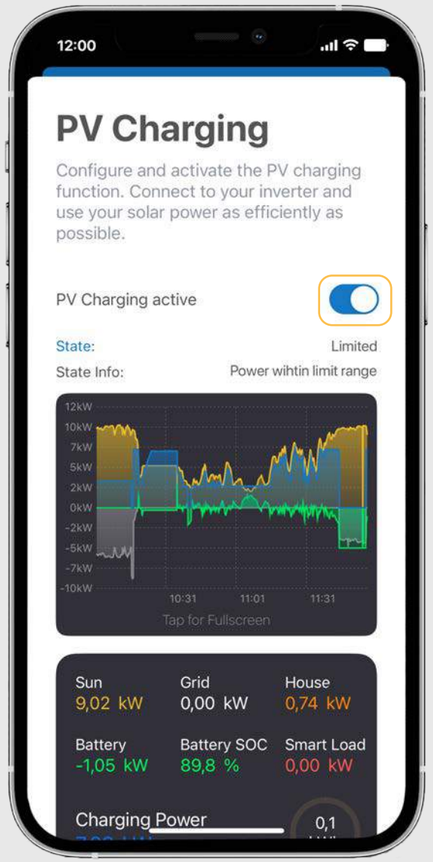




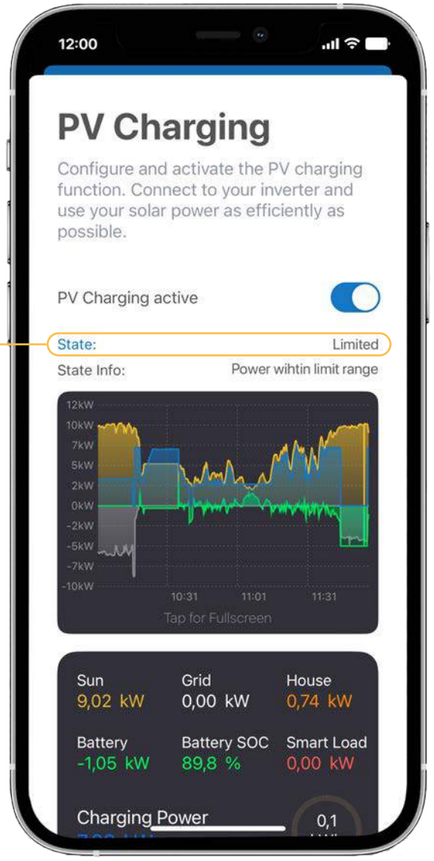
2.4. Tap on „Complete“ to finish the PV configuration.

3. Overview PV-led Charging

3.1. Once you have successfully set up your profile, you will be redirected to the overview page and just need to activate the PV-led Charging feature.



Status: The status provides information about the connection to the vehicle.

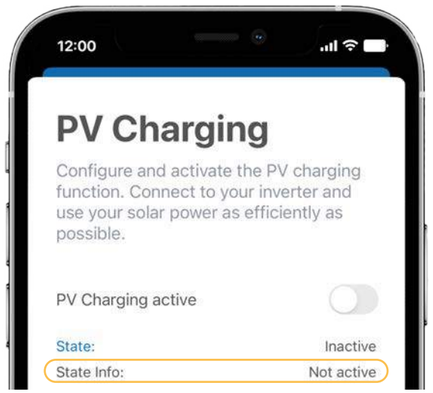


- **Inactive:** PV charging is deactivated.
- **Wait for EV:** PV charging is activated, waiting until vehicle is plugged in.
- **Init:** PV charging is preparing (vehicle is surveyed, duration up to two minutes).
- **Running:** PV control active, vehicle is being charged.
- **Limited:** Vehicle charging power is limited by the set limits or by the vehicle parameters.
- **Threshold:** Vehicle is not charged. Only when the PV production exceeds the minimum charging power and remains stable (for about two minutes), the charging process is continued.
- **Error:** An error has been detected that causes the vehicle not to be charged. This can happen if the vehicle does not respond to the charge command as expected during the initialization phase. In addition, the NRGkick will enter the error state if the vehicle draws significantly more power than intended by the NRGkick and no longer responds to the specified power setting. You can correct the error by deactivating and reactivating the PV function or reconnecting the NRGkick to the vehicle.

3. Overview PV-led Charging

Status Info: The status info provides information about the PV-guided charging function. Here you can find explanations to the different status infos.

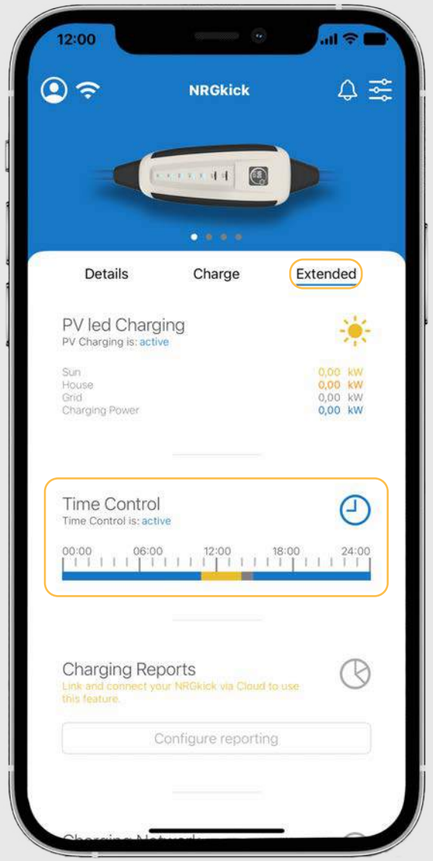
- **Not active:** PV charging is deactivated.
- **Power below limit:** The current target power of the NRGkick is below the minimum power. The vehicle is not charging.
- **Power within limit range:** The current target power of the NRGkick is within the set limits. Depending on the status, the vehicle charges or not.
- **Power limited:** The current target power of the NRGkick is limited to the power or current upper limit.
- **In hold-on phase:** The target power of the NRGkick has exceeded the minimum power, but not yet for the defined hold-on delay time. The vehicle is not charging at the moment.
- **In hold-off phase:** The target power of the NRGkick has fallen below the minimum power. Charging continues for the duration defined for the hold-off delay time.

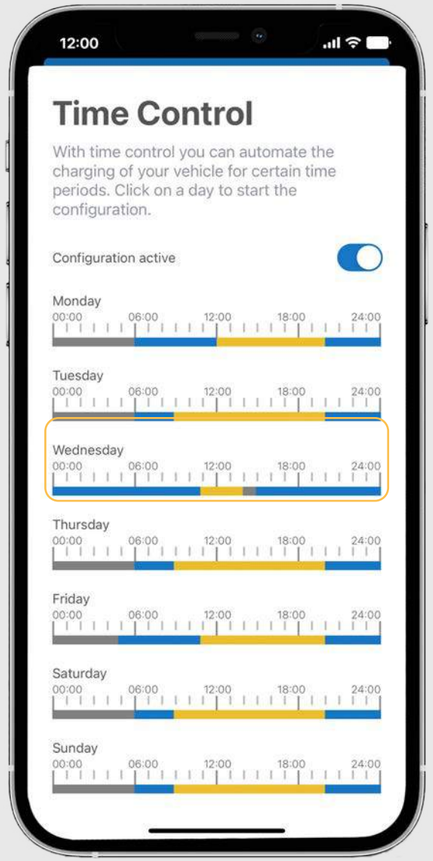


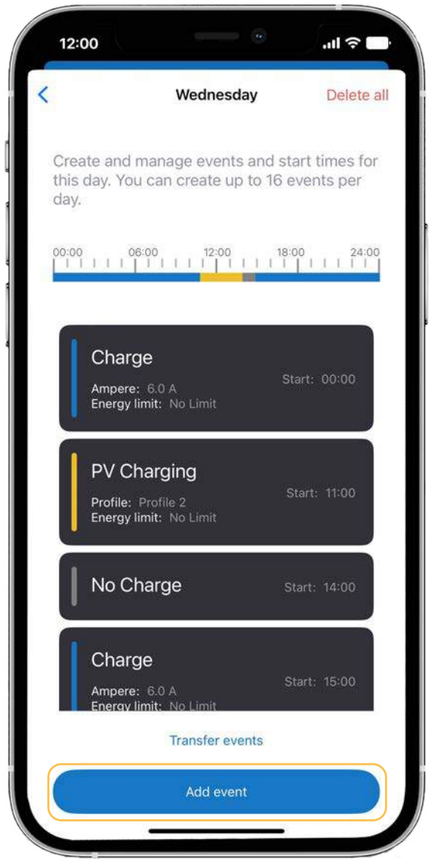
- **Charges with min. power:** The current tagret power of the NRGkick is given by the power or current lower limit. The vehicle is charging.
- **Max. support reached:** The maximum external energy source limit has been reached and charging has stopped. The vehicle is not charging.
- **Paused - no network connection:** The connection to the network has been lost and the load has been paused.
- **Error - no responding devices:** None of the configured devices is providing data at the moment.
- **Min. SOC reached:** The current state of charge of the house battery has reached the defined minimum state of charge and charging has been stopped.
- **Max. SOC reached:** The current state of charge of the house battery has reached the defined maximum state of charge and the now surplus power is charged into the vehicle.
- **Min. temperatur reached:** The current temperature of the smart load has reached the defined minimum temperature and the load has been stopped.
- **Max. temperatur reached:** The current state of charge of the Smart Load has reached the defined maximum temperature and the now surplus power is loaded into the vehicle.

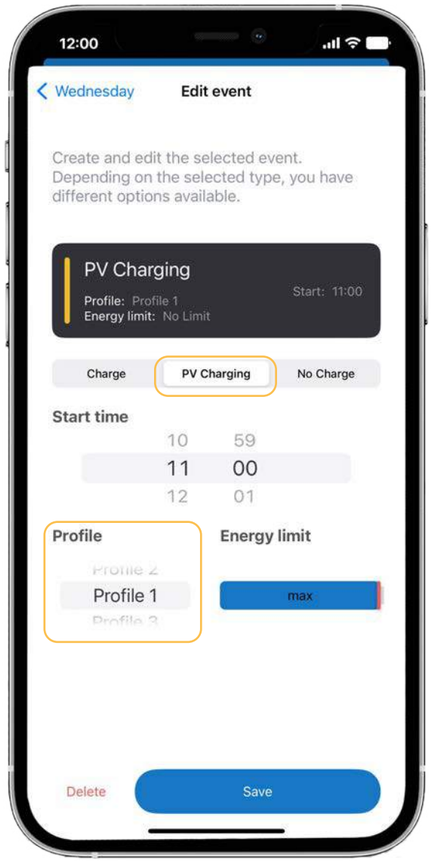
4. Time Controll and PV-led Charging

4.1. For time control, PV-led charging can now be defined in addition to charging and not charging. To do this, tap on „Time control“ under „Extended“. Tap on the desired day of the week.









4.2. Using the „Add event“ button, PV charging can now also be set and various PV profiles can also be selected.

4. Contact/Support



If you have any further questions or need help,
please feel free to contact us by phone or email:

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