

FEMS App Self-Consumption Optimization

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1. Introduction

Dear customer,

Thank you for choosing the "FEMS App Self-Consumption Optimization". You are welcome to send us your suggestions so that we can further improve the quality of our products.

2. Installing the app

The FEMS App Self-Consumption Optimization is installed by default on all FENECON Home and Commercial systems.

With FENECON Industrial S, Self-Consumption Optimization can be optionally selected during installation. For all other Industrial systems, FENECON carries out the installation of the app.

3. FEMS App Self-Consumption Optimization

In combination with a PV system, a combined heat and power plant (CHP) or a wind turbine, the Self-Consumption Optimization is the most common application for an electrical energy storage system.

3.1. Functionality

The control algorithm ensures that the proportion of self-used energy ("self-consumption") is optimized. To this end, the electrical energy storage system is always charged when generation is greater than consumption and discharged when generation is insufficient to supply the electrical consumer loads. This is technically equivalent to an adjustment to "0" at the grid connection point, i. e. avoiding grid withdrawal and grid feed-in. Netted active power values (totaled across all three phases) are used here.

3.2. Visualization and configuration in the Online Monitoring

The amount of self-consumption can be viewed in Online Monitoring via the associated flat widget:

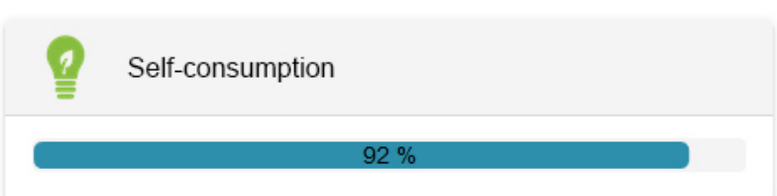


Image 1. Flat widget — Self-consumption optimization

In the example above, self-consumption is 92 %. This means that 92 % of the electricity generated is consumed.

A click on the "History" tab displays the self-consumption as follows:

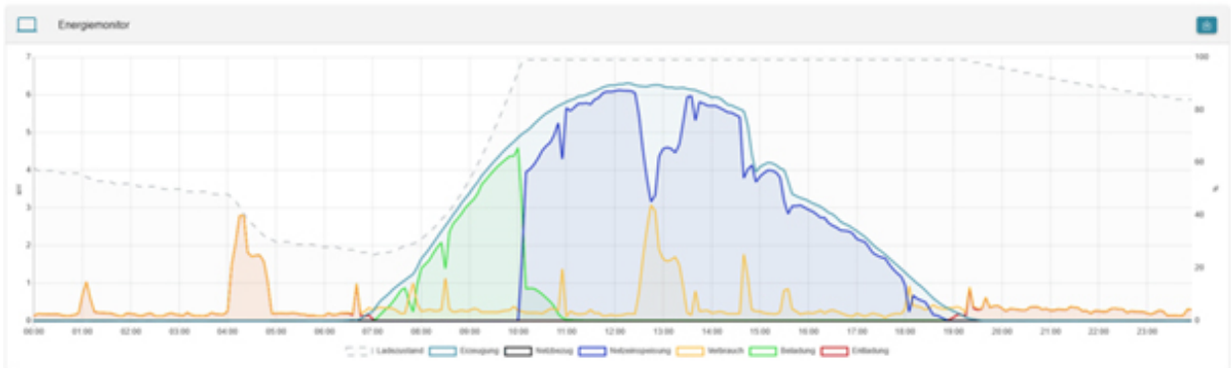


Image 2. Self-consumption optimization — History in the Online Monitoring

The picture shows: The energy produced by the PV system that is not directly consumed charges the battery (green) until it is full (dashed line). From then on, the surplus energy is fed into the public grid (blue). In the evening, the electrical energy storage system discharges again (red) to supply consumers (yellow).

3.3. Configuration in the FEMS App Center

The controlled electrical energy storage system and the meter for adjustment can be selected in the App Center. The default settings are ess0 and meter0: grid meter.

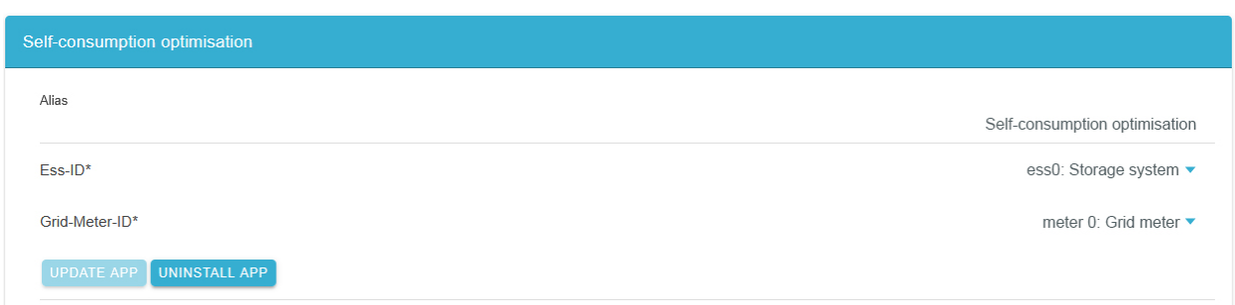


Image 3. Configuration of the FEMS App Self-Consumption Optimization

4. Self-consumption optimization 2.0

FENECON offers various FEMS Apps that extend self-consumption optimization and make the electrical energy storage system demonstrably more grid-friendly and economical.

- FEMS App Grid-Optimized Charging
- FEMS App Time-of-use tariff

It is also possible to use surplus PV in controlled consumer loads:

- Power-to-Heat
- E-Mobility

5. Specification of the curtailment point via write access

The `SetGridActivePower` function makes it possible to specify the behavior of the entire energy management system at the grid connection by dynamically setting the control point of the "self-consumption optimization" controller via Modbus.



This is set to zero by default (in the normal EVO).

5.1. Configuration in the write access widget

The following apps must be installed to use this function:

- FEMS App Write Access
- FEMS App Self-Consumption Optimization

The component `ctrlBalancing0` must be added to the FEMS App write access:

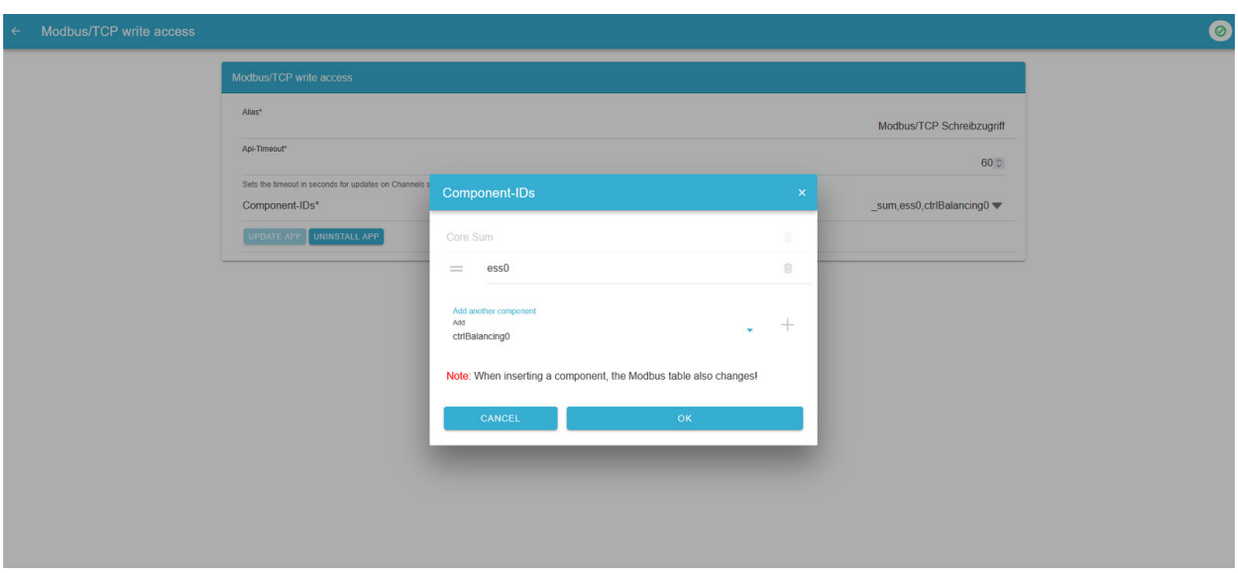


Image 4. Adding the component ctrlBalancing0 — FEMS App Self-Consumption Optimization

After updating the app, the Modbus data point list must be checked again, as registers may move. An example Modbus list:

890	Component-ID	string16	"ctrlBalancing0"	RO
906	Length of block "ctrlBalancing0"	uint16	"180"	RO
910	Hash of "OpenemsComponent"	uint16	"0xb3dc"	RO

911	Length of block "OpenemsComponent"	uint16	"80"	RO
912	ctrlBalancing0/State	enum16	0:Ok, 1:Info, 2:Warning, 3:Fault	RO
990	Hash of "ControllerEssBalancingImpl"	uint16	"0xb8b0"	RO
991	Length of block "ControllerEssBal-ancingImpl"	uint16	"100"	RO
992	ctrlBalancing0/SetGridActivePower	float32		WO

Table 1. Example — Modbus list

In this example, you can write to 992 to move the setpoint of the self-consumption controller.

5.2. Functionality

`SetGridActivePower` makes it possible to specify the behavior of the entire energy management system at the grid connection.

5.2.1. Standard case: Adjustment to zero

The system keeps the grid connection as close to zero as possible:

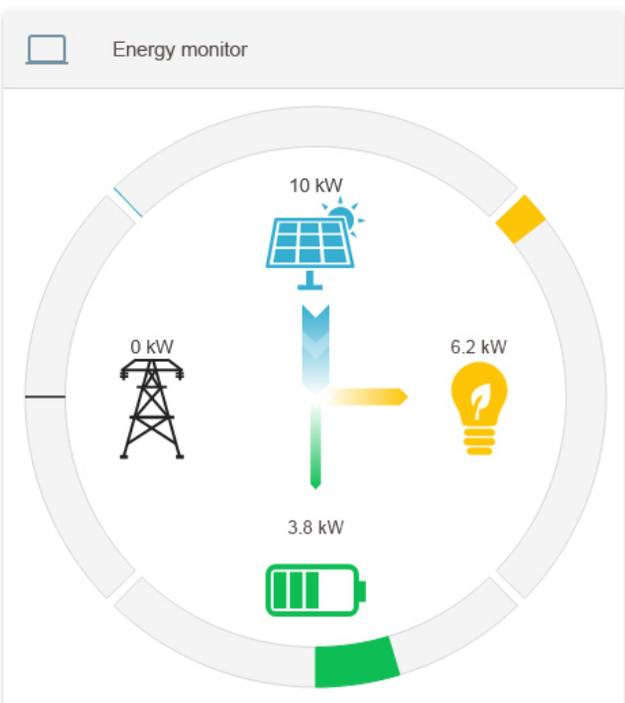


Image 5. Standard case: Adjustment to zero

5.2.2. Default: Negative value (grid feed-in)

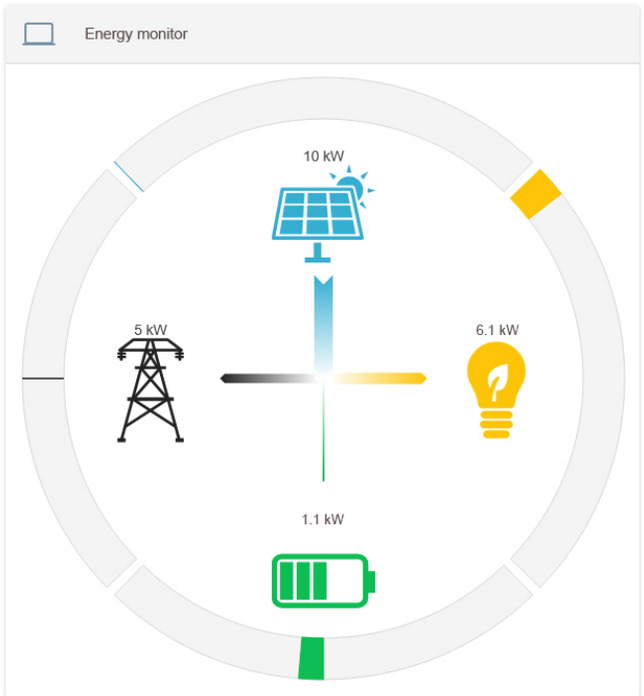


Image 6. Default: Negative value (grid feed-in)

If a negative value is set for `SetGridActivePower`, the EMS feeds in 5 kW at the grid connection in the example. The electrical energy storage supplements generation and consumption. The generator cannot be controlled.

5.2.3. Default: Positive value

If a positive value is specified, power is drawn from the grid.

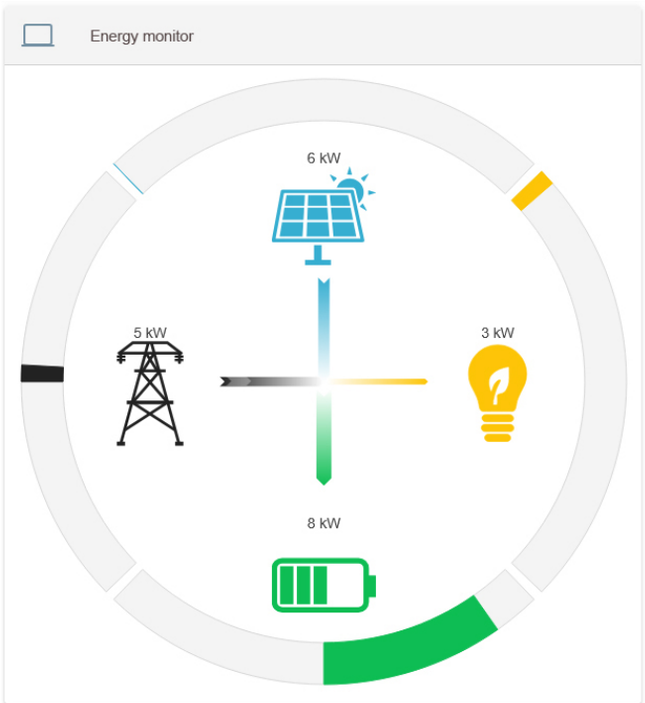


Image 7. Default: Positive value

5.3. Borderline cases in implementation

Especially when the electrical energy storage system reaches the limits of its operating range, it may no longer be possible to convert the value. Corresponding consumption or generation can compensate for this. However, this is not controlled by the EMS.

5.3.1. Storage capacity exhausted

If the electrical energy storage is full or empty, the specifications are not fully implemented.

5.3.2. Storage capacity exhausted

In this example, the electrical energy storage system has a maximum charging and discharging capacity of 10 kW. As this is already exhausted, the 5 kW draw cannot be fully implemented.

5.3. Borderline cases in implementation

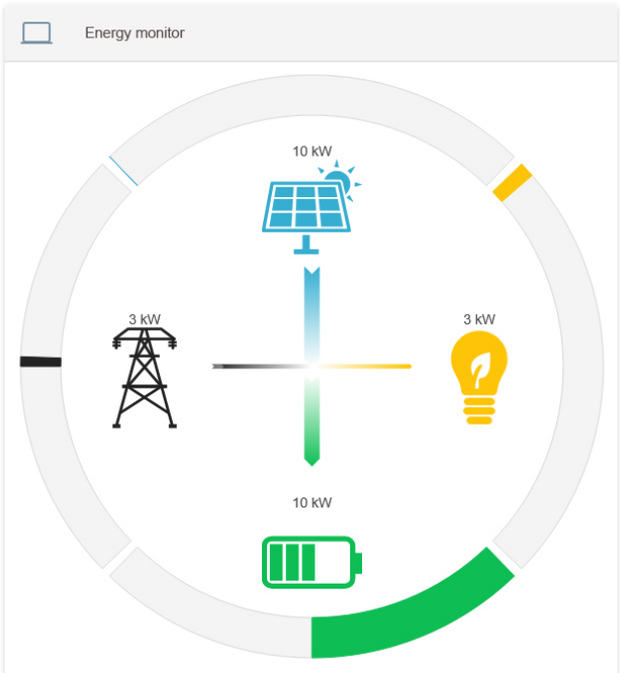


Image 8. Borderline case: Storage capacity exhausted

6. Contact us

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7. Directories

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