

Technical Information

SMA SMART HOME

Energy Management with Loads via EEBUS

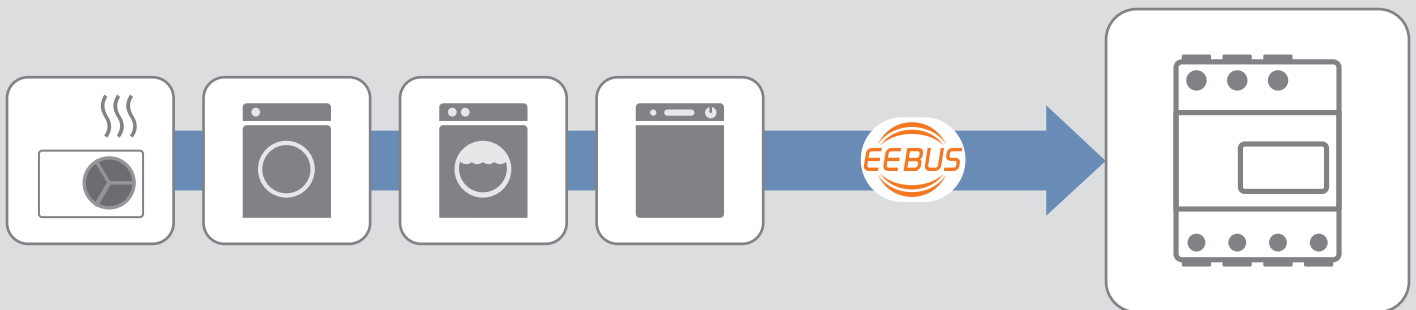


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1 Advantages of Pairing using EEBUS in Energy Management

When SMA inverters are operated together with the Sunny Home Manager as part of the SMA Smart Home, selected loads can easily be incorporated into energy management systems. To this end, the EEBUS communication standard has to be integrated into both the Sunny Home Manager and the load control.

Easy Installation

Both the Sunny Home Manager and the loads are connected to the local network (router). This means that no other components are required to establish a connection between the devices. Since all devices use EEBUS as joint communication standard, the connection can easily be initiated (see Section 3 "Pairing Sunny Home Manager and Loads", page 6).

Easy to Use

Once the loads have been prepared for operation, all specifications for the operating procedure can be configured on the Sunny Home Manager. The Sunny Home Manager and the loads automatically exchange all information required for ensuring efficient energy management.

Cost Savings and Greater Independence

With intelligent energy management, the Sunny Home Manager ensures that the loads use electric current economically. A maximum percentage of the self-generated PV energy is used by the loads. If the power supply company offers time-of-use electricity tariffs and these tariffs are saved in the Sunny Home Manager, the Sunny Home Manager automatically uses these tariffs to optimize cost savings.

Terms Used

Term	Explanation
EEBUS	<p>EEBUS is an international communication standard for intelligent networking of electrical devices in the household.</p> <p>The EEBUS communication standard enables automatic data exchange for efficient use of energy.</p>
Energy management	<p>The total of all measures for optimizing the consumption of the energy made available by a PV system.</p> <p>The objective of energy management is either the highest possible self-sufficiency quota or the highest possible self-consumption quota.</p>

2 Connecting Devices in a Local Network

2.1 System Structure

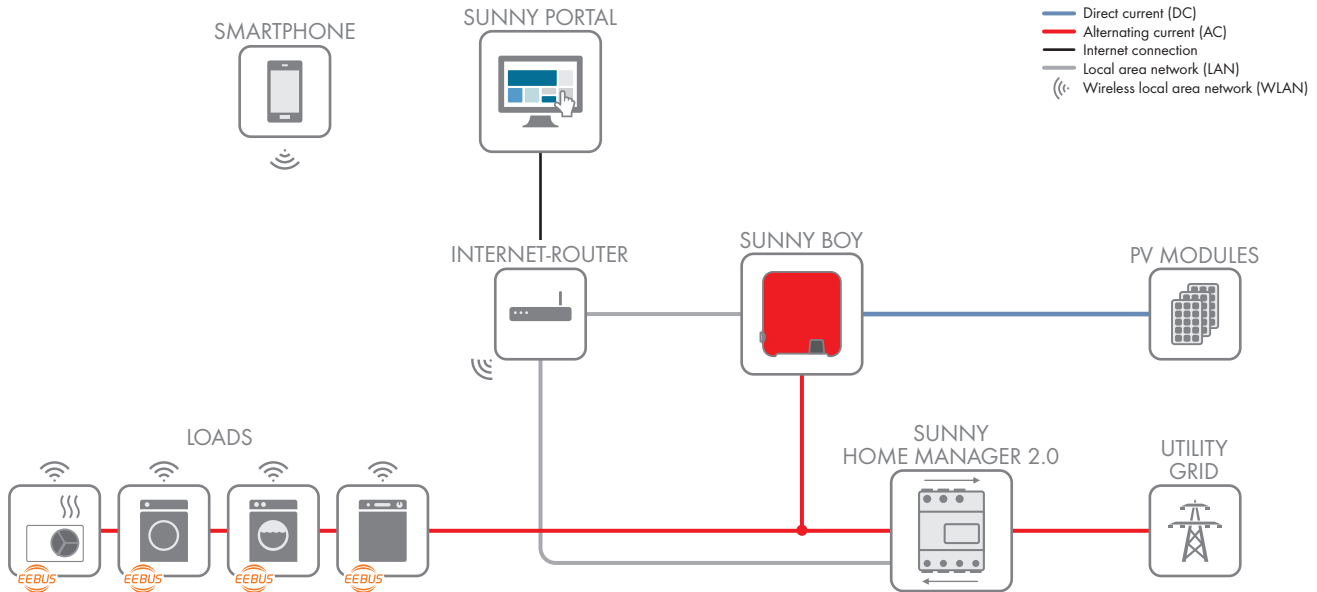


Figure 1: Sunny Home Manager and loads in a local network with EEBUS

The Sunny Home Manager and the loads are connected to the local network via a router. EEBUS makes use of this connection to exchange data between the Sunny Home Manager and the home appliance.

i EEBUS Compatibility list

Only selected loads support the connection to the Sunny Home Manager via EEBUS (see technical information "SMA SMART HOME - EEBUS Compatibility List for Loads").

2.2 Activating EEBUS in Sunny Home Manager

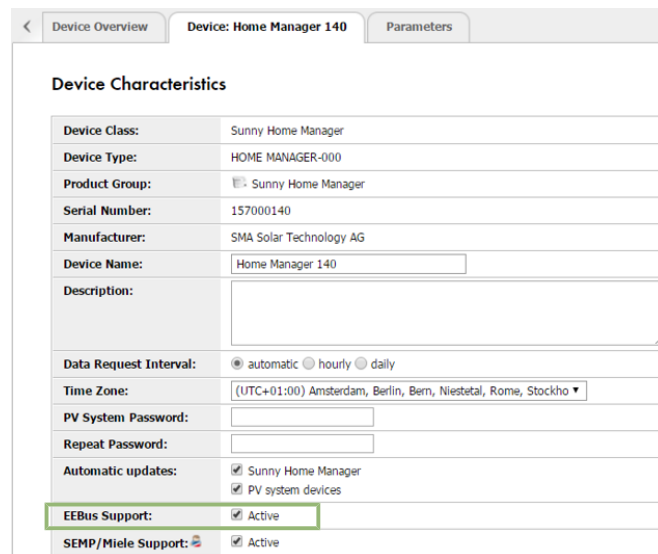


Figure 2: EEBUS Support in Sunny Home Manager

Requirements:

- The Sunny Home Manager has been correctly connected and put into operation (see manual under www.SMA-Solar.com).
- The PV system has been fully set up in Sunny Portal and correctly displays the system status, energy flows, etc.

Procedure:

- Activate the **EEBUS Support** option under **Configuration > Device Overview > Sunny Home Manager > Properties** in Sunny Home Manager (deactivated by default).

2.3 Activating EEBUS in the Loads

EEBUS Compatibility list

Only selected loads support the connection to the Sunny Home Manager via EEBUS (see technical information "SMA SMART HOME - EEBUS Compatibility List for Loads").

Typically, the loads are connected to the local router via an internal communication assembly or via an external communication device.

Bosch/Siemens home appliances are typically connected to the local router over WLAN using an integrated "COM" module.

The Vaillant heat pumps are connected to the Vaillant communication unit (VR 920) over LAN or WLAN, and to the local router via the communication unit.

Procedure:

1. Activate WLAN on all loads and terminal devices (e.g. smartphone).
2. Log in to the user interface of the load:
 - For Bosch/Siemens home appliances, use the Home Connect app.
 - For Vaillant heat pumps, use the Vaillant multiMATIC app.
3. Configure other settings at the loads in accordance with the manufacturer's specifications.

3 Pairing Sunny Home Manager and Loads

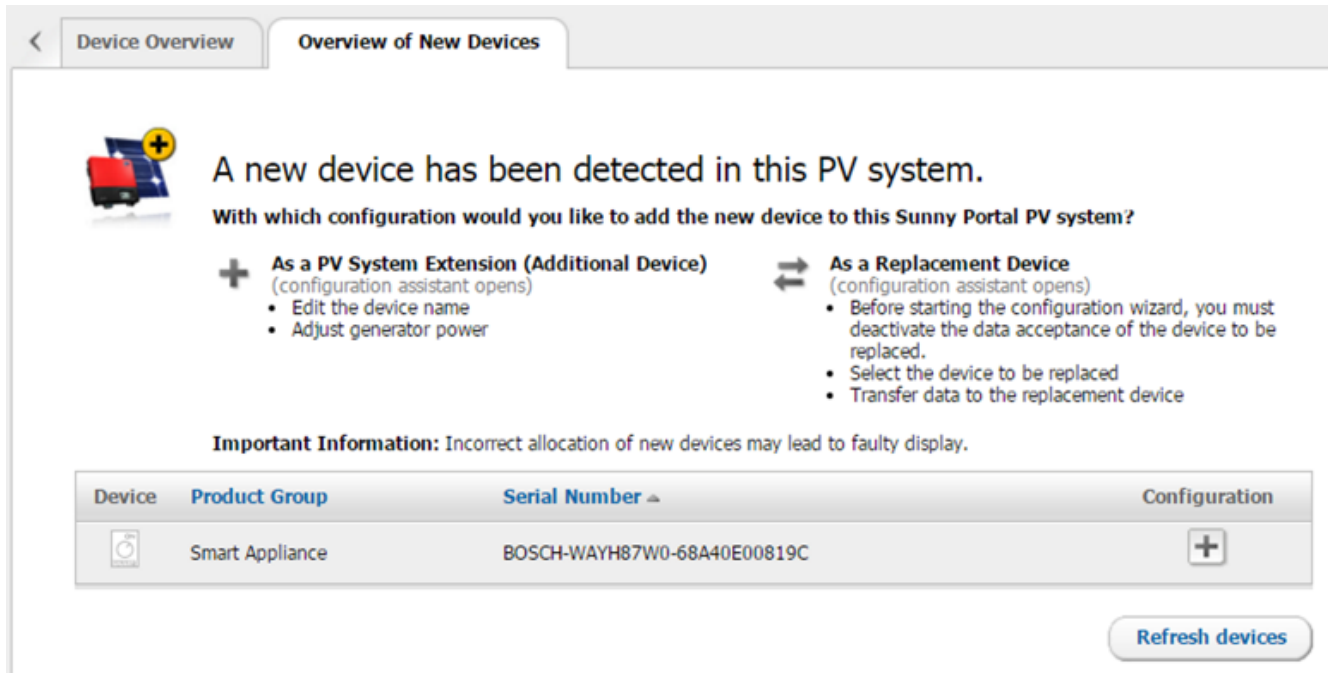


Figure 3: Target: Washing machine as new load on Sunny Portal (example)

After the load and the Sunny Home Manager have been connected using EEBUS, both devices have to be paired. This pairing has to be performed for each load and in principle consists of 2 steps:

- Pairing the load with the Sunny Home Manager via EEBUS
- Pairing the Sunny Home Manager with the load via EEBUS

i Loss of data due to the Sunny Home Manager being reset to default settings

The Sunny Home Manager is reset to its default settings if the Reset button is pressed briefly (2 to 6 seconds).

During a reset, all data saved in the Sunny Home Manager is deleted. The data saved in the Sunny Portal can be retransmitted to the Sunny Home Manager after calling up the PV system again in Sunny Portal. Devices that were paired to the Sunny Home Manager via EEBUS have to be paired again.

- For a restart of the Sunny Home Manager, press the Reset button significantly longer than 6 seconds.

Requirement:

- Some loads can only be paired if the SKI device identification of the Sunny Home Manager is known (e.g. Vaillant heat pumps). The SKI device identification of the Sunny Home Manager can be called up in the Sunny Portal by using the **EEBUS SKI device identification** parameter.

Procedure:

1. Open the user interface of the Sunny Home Manager. Sunny Portal serves as the user interface of the Sunny Home Manager (see www.SunnyPortal.com).
2. Open the user interface of the load. Tip: To open the user interface of the load, use the app of the manufacturer (see manufacturer's manual).
3. Pair the load with the Sunny Home Manager via EEBUS. To do so, go to the user interface of the load and select the menu item for pairing with the energy management (see manufacturer's manual).
4. Pair the Sunny Home Manager with the load via EEBUS. To do so, perform the following steps within 2 minutes:
 - Restart the Sunny Home Manager. To do so, use a sharp object to press and hold the Reset button of the Sunny Home Manager for longer than 6 seconds, until all LEDs on the Sunny Home Manager goes out.


- In the energy management system of the load, add the Sunny Home Manager as a known EEBUS device. When prompted by the user interface, enter or confirm the SKI device identification of the Sunny Home Manager.
5. If the Sunny Home Manager is not displayed in the energy management system of the load, the Sunny Home Manager has possibly connected to another EEBUS device. Restart the Sunny Home Manager again.
 6. Call up the Sunny Portal and select [**Refresh devices**].
 7. Check whether the new load is displayed in the Sunny Portal. If the load is not displayed, the pairing took too long: Repeat the pairing of load and Sunny Home Manager.
- When the new load is displayed in the list in the Sunny Portal, as **Smart Appliance**, the pairing has been completed successfully.
 - The new load is identified by its serial number. Serial numbers are created using the following pattern: "Manufacturer - Type - Network ID".

i Remove loads from the overview of new devices

The overview of the Sunny Portal can list loads that do not exist anymore in the household or that exist but should not be added to the system. To remove a load from the overview, proceed as follows:


- Add load to the system (see Section 4, page 8).
- In the load properties in Sunny Portal, select the [**Delete**] button.

4 Adding Devices to Sunny Portal

1. Press the  button to add the new load to the Sunny Portal system. Please note that it will take a moment to add the new load to the Sunny Portal system.

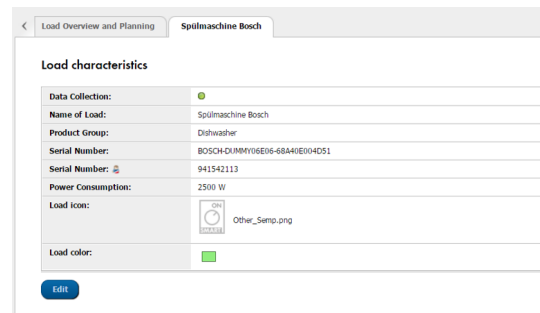
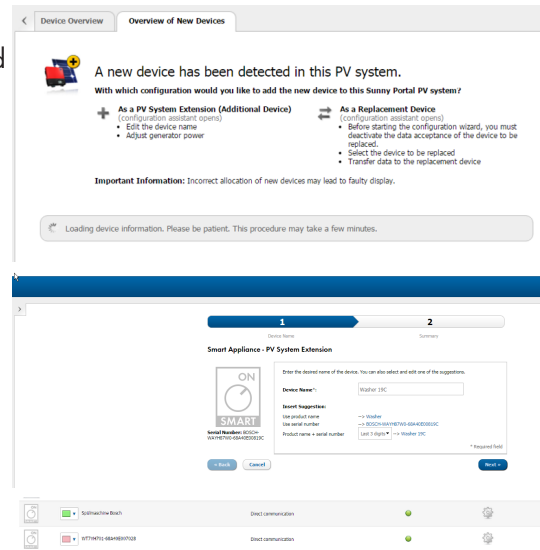
2. Assign a device name.

- The new load is displayed on the **Configuration > Load Overview and Planning** page in Sunny Portal and automatically removed from the list of new devices.

3. Press the  button to open the **Load characteristics** page.
4. Press the **Edit** button to edit the load properties.

5. The following load properties can be edited as needed:

- **Data collection**
- **Name of load**
- **Load icon**
- **Load color**



5 Operation as Part of Energy Management

Generally, the available operating information of the loads is displayed in Sunny Portal. The precise information displayed depends on the respective load and the degree of implementation of the EEBUS standard (for more information on potential limitations: (see Section 7, page 11)).

To operate a load within the scope of the energy management, different steps have to be taken, depending on the selected load.

Example: Vaillant heat pumps

Heat pumps (e.g. from Vaillant) have to be connected with EEBUS and integrated into the energy management system of the Sunny Home Manager. An energy management strategy has to be selected using the user interface of the heat pump (e.g. the Vaillant multiMATIC app). Then the Sunny Home Manager takes over control of the heat pump.

Example: Bosch/Siemens home appliances

Home appliances (e.g. from Bosch/Siemens) also have to be connected with EEBUS and integrated into the energy management system of the Sunny Home Manager. To use the home appliance within the scope of the energy management during live operation, the operating mode "Flexible Start" has to be activated prior to each start of the home appliance.

Operation of Bosch/Siemens Home Appliances

When Bosch/Siemens home appliances are operated within the scope of the energy management, the home appliance has to be in the "Flexible Start" operating mode. Then the Sunny Home Manager takes over control of the appliance.

For Bosch/Siemens home appliances, the operating mode can be activated both from the control console of the appliance and per smartphone using the Home Connect app. However, to activate the flexible start via the Home Connect app, this option first has to be approved in the menu of the appliance's control console.

Example: Flexible start with a dishwasher

The user specifies the latest possible time for the dishwasher to finish the rinse cycle and gives control of the cycle to Sunny Home Manager. Sunny Home Manager uses its energy planning function to determine when the dishwasher should start. Thus, it also ensures that during the cycle, the dishwasher maximizes its use of inexpensive, locally generated PV energy. PV self-consumption increases, lowering the energy costs for the user. Meanwhile, less power is fed into the utility grid, thereby relieving the strain on the distribution grids.

6 Control Sequence in Energy Management

When the operating mode for intelligent control by the Sunny Home Manager has been selected at the load, the following control sequence starts:

Device	Action
Load	Transmission of the selected data to the Sunny Home Manager via EEBUS
Sunny Home Manager	Assessment of the following: <ul style="list-style-type: none"> • The PV yield forecast • The learned load characteristics of the home • The electricity rate of the electric utility company
Sunny Home Manager	Drafting an initial plan for cost-optimized operation based on the following device data: <ul style="list-style-type: none"> • Pmax specification of the device (e.g. 2 kW) • For Bosch/Siemens home appliances: <ul style="list-style-type: none"> - Reported operating time (e.g. 90 minutes for a rinsing cycle) - Reported ending time of the time window (e.g. the latest time the rinsing cycle can end)
Sunny Home Manager	Assessing the changes: <ul style="list-style-type: none"> • In the PV yield forecast • In the home's load at present <p>If any conditions have changed, a new schedule for obtaining cost optimization is made.</p>

The user can also start the load manually at any time. In such cases, Sunny Home Manager gives up the control and clears the currently drafted schedule.

7 Troubleshooting

7.1 Responsibility for Service Support

Potential problem areas are listed below together with the respective responsibility area as it relates to service support. Please contact the service point in charge of the problem area in question.

Problem area	Service point
Connection between Vaillant multiMATIC app and heat pump/communication unit VR 920	Vaillant
EEBUS connection between heat pump and Sunny Home Manager In the case of Vaillant heat pumps, the Sunny Home Manager is displayed in the Vaillant multiMATIC app with different status messages (see manufacturer's manual).	Vaillant/SMA Solar Technology AG
Connection between home appliance and Home Connect app	Bosch/Siemens
Connection between device and Sunny Home Manager.	Bosch/Siemens SMA Solar Technology AG
Home Connect app: Expected messages are not in the app	Bosch/Siemens
Control console of the home appliance: Expected messages are not on the device display	Bosch/Siemens
Compatibility of Bosch/Siemens home appliances with EEBUS	Bosch/Siemens
Problems with devices from SMA Solar Technology AG and questions about energy management (inverter from a third-party company, etc.)	SMA Solar Technology AG
Inquiries regarding SMA systems and retrofitting options	SMA Solar Technology AG
Sunny Portal (registration in Sunny Portal, problems adding a load, display in Sunny Portal, etc.)	SMA Solar Technology AG

7.2 Possible Limitations during Operation

When loads are operated in combination with the Sunny Home Manager, various limitations can occur. These limitations are described in the table below.

Bosch/Siemens home appliances

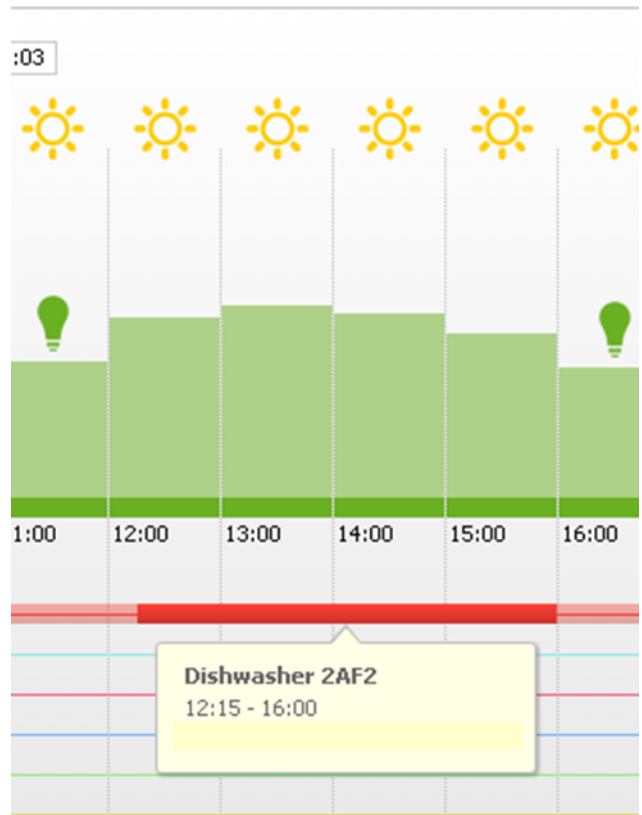
Possible limitation	Explanation
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After starting a device run controlled by Sunny Home Manager, a device start time is displayed in the Home Connect app that corresponds to the latest possible start time. But the Sunny Home Manager actually starts the device at another time.

In the Home Connect app, the latest possible theoretical time is displayed by default. Scheduling in Sunny Home Manager is actually more precise. It determines a cost-optimized switch-on time. The switch-on time that Sunny Home Manager uses depends on the weather forecast and the consumption situation in the home at present. Because the conditions can be changing constantly, the planned switch-on time also changes.

The current Sunny Home Manager schedule can be viewed in the Sunny Home Manager system, on the **Current status and forecast** page in Sunny Portal.

Example:



The dishwasher is currently scheduled to start at 12:15 pm. The weather is sunny and no clouds are expected. Nevertheless, an electric stove may be used for cooking in the middle of the day, resulting in a lack of sufficient PV power. In this case, the dishwasher operation would be rescheduled accordingly.

Due to the latest end time for the rinsing cycle (as defined by the user), the dishwasher still starts on time automatically when there is not sufficient PV power so it can complete the cycle by the defined end time.

In the Sunny Portal, no performance data is displayed for paired Bosch/Siemens home appliances. (only 0 W or 0 Wh and no energy mix information)

In the current implementation of the pairing between a Siemens home appliance and Sunny Home Manager, no performance data is transferred from the Siemens home appliance to Sunny Home Manager. As a result, no information can be displayed.

An additional radio-controlled socket can be used to measure the power consumption of the Siemens home appliance using a separate channel and display this value in Sunny Portal.

Possible limitation	Explanation
Though a much later end time for washing machine operation was selected in the Home Connect app, operation is completed earlier. This applies to the operation with and without control by Sunny Home Manager.	To prevent odors from forming, this system also ensures that laundry does not remain in the washing machine for more than 6 hours after the end of the cycle. As such, a special function of the device controller allows for automatic adjustment of the end time. Sunny Home Manager operates based on the information it receives from the device over the data connection.
Though a washing cycle with low power requirements has been selected, Sunny Home Manager does not start the device until substantially more PV power is available.	In the current implementation of the pairing between a device and the Sunny Home Manager, the Sunny Home Manager receives the highest reported consumption requirements from the device. If a 60°C wash cycle with a power consumption of 2 kW has been selected once for a washing machine, this same power consumption value is used for subsequent cycles. This continues to apply even if the selected cycle requires substantially less power (e.g. 500 W for a pure spin cycle).
Why are dishwasher cycles no longer scheduled by Sunny Home Manager?	Settings for "Flexible Start" may be lost after a power outage or if WiFi is switched off for the Bosch/Siemens appliance. As a result, the dishwasher starts at the scheduled, delayed start time.

All Loads

Possible limitation	Explanation
Initial operation after adding a device to the Sunny Home Manager system: Though a delayed start was set for the device, the device starts immediately.	The pairing between the load and the Sunny Home Manager might require an initial synchronization run. After this run, the Sunny Home Manager correctly notes the time delay in the device's control system.
Even after a device paired over EEBUS is deleted from the Sunny Portal system and is no longer available in the network, it is still displayed in the list of new devices.	In the current implementation of the pairing between a load and the Sunny Home Manager, a device paired over EEBUS potentially cannot be completely deleted from the Sunny Portal system. The cause might be in the outdated firmware version.

