



## **Commissioning and configuration of reactive power control of systems in the low-voltage grid in accordance with VDE-AR-N-4105**

# 1 Introduction

This document describes which settings you need to make in order to configure systems with and without the System Manager in the low-voltage grid in accordance with VDE-AR-N-4105. The VDE-AR-N-4105 requires using inverter terminals as the reference point for grid management services.

In connection with an energy meter, an SMA System Manager takes over closed-loop control at the point of interconnection and can control or regulate subordinate inverters. The System Manager also takes over system monitoring and communication to the Sunny Portal powered by ennexOS.

An SMA Data Manager, a Sunny Tripower X or Sunny Boy Smart Energy can be used as the System Manager. The Sunny Home Manager can also be used as a System Manager. However, the Sunny Home Manager cannot be used for reactive power control.

The commissioning wizard of the SMA System Manager is designed to help you configure the reactive power control in accordance with VDE-AR-N-4110. The VDE-AR-N-4110 requires using the point of interconnection as the reference point for grid management services. It is therefore not possible to use the commissioning wizard and the grid management service configuration wizard to configure the reactive power control of systems in the low-voltage grid in accordance with VDE-AR-N-4105. In this case, the commissioning wizard or grid management service configuration wizard can only make the settings for active power control at the point of interconnection.

## Also see:

- [Procedure for systems with System Manager ⇒ page 2](#)
- [Procedure for systems with Sunny Home Manager ⇒ page 3](#)

# 2 Procedure for systems with System Manager

If the system consists of one or several inverters and there is a System Manager (e.g., SMA Data Manager or an inverter as the System Manager), use the following procedure for commissioning and configuration.

## Configuring the inverter as a subordinate device

During commissioning, a prompt asking whether the inverter is to be configured as a System Manager or as a subordinate inverter is displayed when Sunny Tripower X and Sunny Boy Smart Energy inverters are being configured. This prompt is not displayed when inverters of an older generation are used. These inverters can be configured with the System Manager. They do not have to be configured separately with the installation wizard of the inverter.

Procedure	See
1. Put each inverter and the System Manager into operation.	Manual of the inverter, manual of the System Manager
2. Only for Sunny Tripower X or Sunny Boy Smart Energy inverters: If the inverter is to be subordinate to a System Manager, start the commissioning wizard and configure the inverter as a subordinate device in the device configuration.	Manual of the Sunny Tripower X or Sunny Boy Smart Energy
3. Put the device that is used as the System Manager into operation and start the commissioning wizard.	Manual of the System Manager
4. Use the commissioning wizard to configure the System Manager.	Section 4.1, page 3
5. To configure the reactive power control for all subordinate devices, use the System Manager's user interface.	Section 4.2, page 3

### 3 Procedure for systems with Sunny Home Manager

If there is a Sunny Home Manager in the system, use the following procedure for commissioning and configuration.

Procedure	See
1. Put each inverter into operation and use the commissioning wizard or installation wizard to configure them. Sunny Tripower X or Sunny Boy Smart Energy inverters must be configured as subordinate inverters.	Manual of the inverter
2. Only for Sunny Tripower X or Sunny Boy Smart Energy inverters: For each inverter, use the device parameters on the inverter's user interface to set the country data set.	Section 5.1, page 4
3. For each inverter, use the device parameters on the inverter's user interface to set the reactive power control.	Section 5.2, page 4
4. Put the Sunny Home Manager into operation and register all inverters in the Sunny Home Manager.	Manual of the Sunny Home Manager

## 4 Configuring the reactive power control with System Manager

### 4.1 Configuring the System Manager via the commissioning wizard

#### Requirements:

- Devices that are to be subordinate to the System Manager have been put into operation and, if necessary, configured as subordinate devices via the respective commissioning wizard.
- The System Manager has been into operation and the commissioning wizard is started.

#### Procedure:

1. For SMA inverters: In the device configuration step, select **Inverter as System Manager**.
2. For SMA Data Manager: In the device configuration step, configure the Data Manager as an **Independent master** or a **Superordinate master**.
3. In the **Country data set** step, select the appropriate country data set for the country and the intended use and set it for all devices in the system (e.g., **[DE] VDE-AR-N4105:2018 Generator >4.6 kVA** for Germany).
4. In the **Type of control** step, select **Active power** only and set the active power control in the following steps.
5. Select **[To the system]**.

### 4.2 Configuring reactive power control for all inverters in the system via the System Manager

#### Requirements:

- The configuration of the System Manager via the commissioning wizard has been completed successfully.
- The user interface of the System Manager is open.

#### Procedure:

1. In the **Configuration** menu, select the menu item **Device parameter adjustment**.
2. Select **[System parameter assistant]**.
3. Select all inverters in the system.
4. Click on **[Next]**.
5. In the search field, enter the parameter name **Reactive power mode in case of active power output**.

6. In the **Value** drop-down list, select the mode required by the grid operator for the reactive power control.
7. If the **cos  $\varphi$ , manual setting** procedure was selected as the procedure, enter the parameter name **Manual cos  $\varphi$  setting, cos  $\varphi$  nominal value in case of active power generation** in the search field and enter the cos  $\varphi$  nominal value required by the grid operator.
8. Click on **[Next]**.
9. In step 3 of the system parameter assistant, check the values and select **[Save]**.
- ☒ The reactive power control is configured for all inverters in the system. It may take some time until all inverters have applied the changes.

## 5 Configuring the reactive power control without System Manager or with Home Manager

### 5.1 Country standard

By default, a generally valid country data set is set. To enable the inverter to start operation, set a country data set suitable for the installation site and intended use.

#### **i** The country data set must be set correctly.

If you select a country data set which is not valid for your country and purpose, it can cause a disturbance in the PV system and lead to problems with the grid operator. When selecting the country data set, you must always observe the locally applicable standards and directives as well as the properties of the PV system (e.g. PV system size, grid-connection point).

- If you are not sure which standards and directives are valid for your country or purpose, contact the grid operator.

Channel	Name	Group
Country	Set country standard	Grid monitoring

### 5.2 Reactive Power Mode

If there is no System Manager (e.g., SMA Data Manager or inverter as the System Manager) in the system, use the user interface of each inverter to configure the reactive power control for each inverter in the system. This section lists the parameters for reactive power control that must be set in accordance with the specifications of the grid operator.

The basic procedure for changing parameters is described in the manual of the inverter.

Channel	Name	Group
Inverter.VArModCfg.VArModOut	Reactive power mode in case of active power output	Inverter

If the reactive power mode **cos  $\varphi$ , manual setting (PFCnst)** is set, the cos  $\varphi$  nominal value required by the grid operator must also be configured using the following parameter.

Channel	Name	Group
Inverter.VArModCfg.PFCnstCfg.PFOut	Manual cos $\varphi$ setting, cos $\varphi$ nominal value in case of active power generation	Inverter