SOLAR ELECTRIC

KOSTAL

KOSTAL Solar Plan

Planning tool for KOSTAL components

Operating manual

Legal notice

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Exclusion of liability

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General note on gender equality

KOSTAL Solar Electric GmbH is aware of how language impacts on gender equality and always makes an effort to reflect this in documentation. Nevertheless, for the sake of readability we are unable to use non-gender-specific terms throughout and use the masculine form instead.

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Contents

1. About this manual

Read this manual carefully in its entirety. It forms part of the KOSTAL Solar Plan application of KOSTAL Solar Electric GmbH and contains important information. Most of the user guidelines are self-explanatory.

If you have any technical questions, simply contact our service hotline.

Service and contact

Validity of this manual

This manual applies to all KOSTAL components and is aimed at system planners for PV systems.

The most recent version of the operating manual for the product is available in the download area at **www.kostal-solar-electric.com**.

Navigation in the document

In order to enable navigation through this document, it contains clickable areas.

The table of contents takes you to the specified chapter in one click.

You can navigate to the referenced points in the document within the instruction text using the cross-references.

2. Safety

This chapter provides you with important information on handling your product safely.

Contents

2.1 Proper use

The KOSTAL Solar Plan planning tool from KOSTAL Solar Electric GmbH is a free inverter configuration software.

Using the configuration software, the most appropriate string configuration for the PV systems can be identified automatically based on a specific location using a complex yield simulation. The software also enables a quick check up based on the technical limitations of an inverter with a PV module.

The resulting yield calculations are determined on the basis of historical weather data and may deviate from the actual yields.

Inappropriate planning can be hazardous and lead to injury or even death to the user or third parties.

Material damage to the device and other equipment can also occur.

2.2 Obligations of the planner

As the planner, you are responsible for the proper use of the product.

This includes the following obligations:

- ensuring that users have read and understood the manual for the product.
- ensuring that the manual is accessible to all users.
- instructing other users in the product.

2.3 Qualification

This manual is intended for PV system planners.

Specialist knowledge is required to use KOSTAL Solar Plan.

System planners should have the following knowledge/qualifications:

- Knowledge of how an inverter works and operates.
- Knowledge of the relevant laws, standards and guidelines.

2.4 Disclaimer

The KOSTAL Solar Plan may only be used for its intended purpose. Any use that differs from or goes beyond the stated intended purpose is considered inappropriate. The manufacturer accepts no liability for any damage resulting from this.

All names, trademarks, product names or other designations used in this manual may be legally protected even if this is not labelled as such (e.g. as a trademark). KOSTAL Solar Electric GmbH assumes no liability and provides no guarantee for their free usage. The illustrations and texts have been compiled with great care. However, the possibility of errors cannot be ruled out. The compilation is made without any guarantee.

Any instance of misuse of the KOSTAL Solar Plan will result in the termination of the warranty, guarantee and general liability of the manufacturer.

KOSTAL Solar Electric GmbH assumes no liability for any damage resulting from non-observance of this manual.

KOSTAL Solar Electric GmbH does not provide any quality guarantee when providing data specifications or other descriptions of the software, even if they refer to DIN standards and/or other standards.

KOSTAL Solar Electric GmbH provides no guarantee that the application will interact with third-party software programs and will not infringe on their rights.

The recommendation presented for the system configuration has been created based on the data transmitted and is non-binding. KOSTAL Solar Electric GmbH assumes no liability for damages or financial deviations of sizings that occur in connection with the operation of the planned photovoltaic system. The software planning results do not replace the user's own test of the system configuration. The Terms and Conditions of Use apply.

3. About KOSTAL Solar Plan

If a solar system is being planned, not only should the system work, it should produce as high a yield as possible. Without software support, such optimum planning is usually very time-consuming. That is why KOSTAL Solar Electric GmbH offers the free layout software KOSTAL Solar Plan for your KOSTAL inverter.

With the KOSTAL Solar Plan tool, KOSTAL Solar Electric GmbH facilitates the planner's work and supports them in finding the optimum KOSTAL inverter for each PV system.

The sizing is based on the technically feasible limits, which are determined individually for each combination of PV module type and inverter type.

Based on the user's specifications, the application determines the best combinations of several different string configurations consisting of PV modules, each with one inverter.

KOSTAL Solar Plan delivers all the relevant data and provides the most important energy and financial data, such as the self-consumption rate, the degree of self-sufficiency and various other parameters, including remuneration and savings on electricity costs.

INFO

The degree of self-sufficiency indicates the percentage of the annual power requirement that can be covered by self-generated energy.

The self-consumption rate shows the proportion of energy you use yourself in relation to the total energy generated.

The application works with global irradiation and climate databases and with a comprehensive PV module database that is regularly updated. The user's own PV modules can also be created.

4. Prerequisites and launching the application

4.1 System requirements

Certain conditions must be fulfilled in order to use KOSTAL Solar Plan:

- The end device (computer, tablet or smartphone) must be connected to the Internet.
- A supported web browser must be used.
- The web browser must support JavaScript.

The following web browsers are supported. Please always use the latest version of the web browser:

- Microsoft Edge
- Mozilla Firefox
- Google Chrome
- Opera
- Apple Safari

4.2 KOSTAL Solar Plan

INFO

Before you can launch the KOSTAL Solar Plan application, you require a business customer account in the KOSTAL Solar Terminal and must have been assigned the ***Planning*** role.

If you do not have a company user account, create one first.

Prerequisite:

- The user must be registered for the KOSTAL Solar Terminal.
  Create a business customer account: **Registering for the KOSTAL Solar Terminal, Page 16**

There are two ways of launching KOSTAL Solar Plan:

- Launch KOSTAL Solar Plan using the direct link **https://plan.kostal-solar-electric.com**.
- Launch KOSTAL Solar Plan via the KOSTAL Solar Terminal.

4.3 Launching KOSTAL Solar Plan via the KOSTAL Solar Terminal

1. Open the web browser.
2. To access the KOSTAL Solar Terminal, enter the following URL:
   https://terminal.kostal-solar-electric.com

   or go to the KOSTAL Solar Electric GmbH website by entering the URL **https://www.kostal-solar-electric.com** and then select the KOSTAL Solar Terminal from the menu bar.

➔ The log-in window will appear.

3. Enter your log-in details and confirm with ***Log in***.
   If you have forgotten your password, you can request a new one by clicking on ***Forgotten password?***.

➔ The KOSTAL Solar Terminal is displayed with various applications.

4. Launch the KOSTAL Solar Plan planning tool.

✓ KOSTAL Solar Plan is displayed.

4.4 Registering for the KOSTAL Solar Terminal

The KOSTAL Solar Terminal is a central hub for various applications. To use them, you have to register once. You will then be given a user account for all the applications offered in the KOSTAL Solar Terminal.

If you have already registered in the KOSTAL Solar Terminal, you can log in using your user details.

Creating a business customer account for the KOSTAL Solar Terminal

1. Open the web browser.
2. To access the KOSTAL Solar Terminal, enter the following URL: **https://terminal.kostal-solar-electric.com**

   or go to the KOSTAL Solar Electric GmbH website by entering the URL **https://www.kostal-solar-electric.com** and then select the KOSTAL Solar Terminal from the menu bar.

➔ The log-in window will appear.

3. To create a business customer account, select ***No account yet? Register here***.

INFO

You require a business customer account to use KOSTAL Solar Plan. This option is not available to installation operators (private or commercial).

4. Enter your details in full and confirm these by clicking ***Register***.

➔ You will then receive an e-mail containing an activation link.

5. Open the e-mail and confirm the registration.
6. Your organisation's administrator must then assign you the ***Planning*** role.

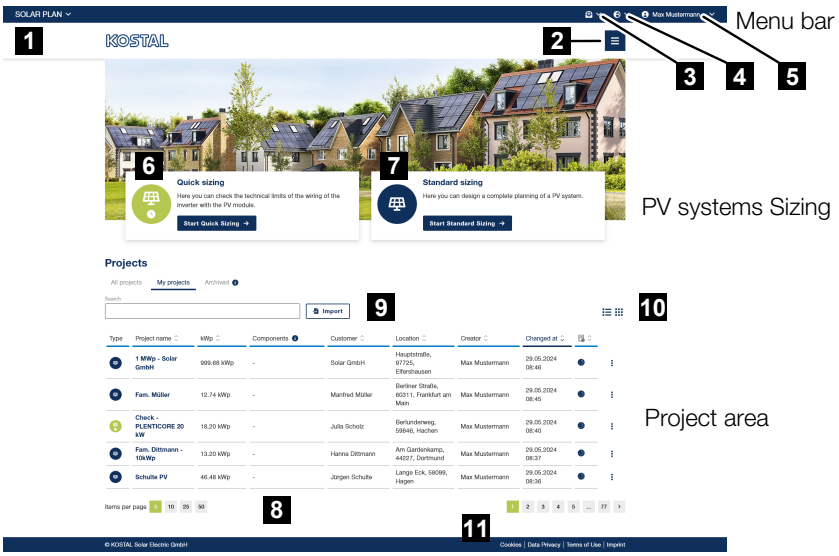
✓ A user account for the KOSTAL Solar Terminal has been set up for you.

5. User interface

5.1 Homepage

The homepage is divided into three areas.

- **Menu bar:**
  Offers you the option to launch other applications via the KOSTAL Solar Terminal, display messages, select the interface language and manage the user account. More information can be found at **Menu bar and menu, Page 19**
- **Create plan:**
  This area offers two sizing methods: quick sizing and standard sizing. More information can be found at **Creating a project/Performing planning, Page 20**
- **The project area:**
  Displays all projects that have been created. More information can be found at **Overview of projects, Page 21**



1 Launch other KOSTAL Solar Terminal applications
2 Menus (Homepage, Settings, Service & Support)
3 Message display
4 Language selection
5 Profile settings and log-out button
6 Quick sizing can be used to plan a PV system by entering just a few details.
7 Standard sizing can be used for complete PV system planning.
8 Project area
9 Import project
10 Change project view
11 Information on cookies, data privacy, terms of use and legal notice

5.2 Menu bar and menu

1 Menu bar

2 Menus

The menu bar

The menu bar contains the following functions:

- **Other KOSTAL applications**
  This menu item can be used to launch other applications offered in the KOSTAL Solar Terminal.
- **Messages**
  New messages are displayed here.
- **Select interface language**
  Select which language is used for the interface.
- **User account settings**
  The settings configured here are used as standard when creating a new sizing.
  - **My profile**
    View your personal contact details. These are also used for the PV system planning reports, which you can hand over to your customers. If the information is incorrect or details are missing, these can be changed via the KOSTAL Solar Terminal.
  - **Logout**
    Log out from KOSTAL Solar Plan

The menu

The menu can be used to quickly access the following items from any page:

- Opening the ***Homepage***
- Opening the Settings **Settings, Page 54**
- Opening **Service and support, Page 61**

5.3 Creating a project/Performing planning

New projects can be created on the homepage using two different available sizing methods:

- **Quick sizing**

Quick sizing enables you to create a plan quickly in just a few steps and to check the technical limitations for connecting the inverter with the PV module being used.
There is an option to select a consumption forecast (home consumption with or without battery) so that you can see an estimation of the yield.
More information can be found at **Quick sizing, Page 23**

- **Standard sizing**

The standard sizing is a complete planning of a PV system. It guides you step by step through planning the PV system, from selecting the location up to the yield and profitability simulation.
More information can be found at **Standard sizing, Page 31**

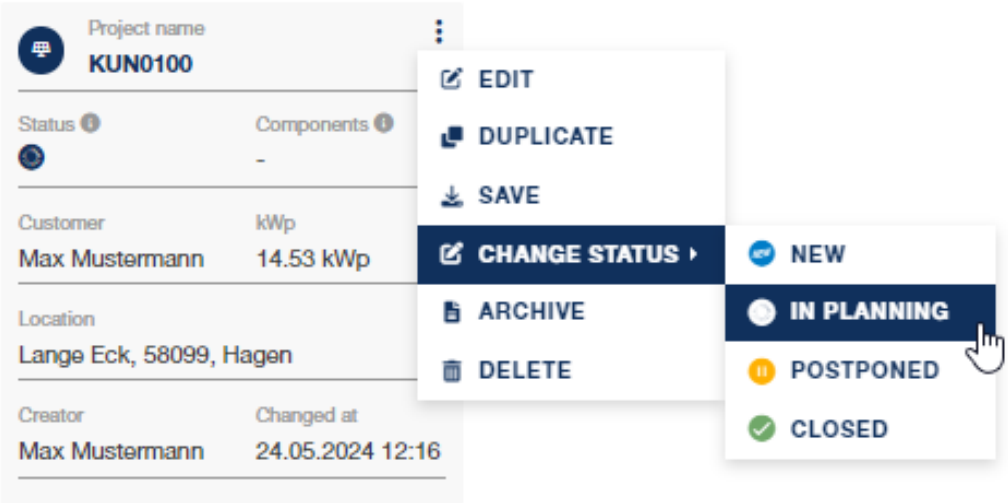
5.4 Overview of projects

All of the planned projects are displayed in the Projects section.

- **Project management**
  Here you can choose to view all of a company's planned projects (***All projects***), only the projects that you have planned (***My projects***) or archived projects (***Archived***).
- **Search function**
  Projects can be browsed based on specific criteria: project type, project name, project size, project component, customer, location (country, area, street), editor, changed on, project status.
- **Import**
  Project files saved on the local device with the file extension (*.kspw*) can be imported.
- **Change view**
  It is possible to switch between table and tile view.
- **Project information and filtering**
  The projects are displayed with the following information: type, project name, project size, project components, customer, location, creator, changed on and project status. The projects can be sorted using the headings or using the sort function in the tile view.

Editing projects

Projects created in the project view can be changed later.



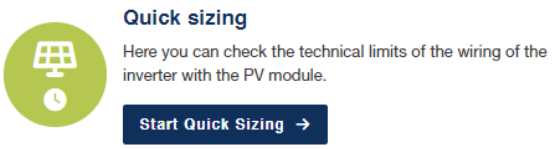
The following changes can be made:

- Edit project again
- Duplicate project
- Save project on the local computer
- Change project status (new, planned, in progress, completed)
- Archive project
- Delete project

6. Quick sizing

6.1 Starting quick sizing

To start quick sizing, select the item ***Start quick sizing*** on the homepage.



The quick sizing menu item performs system planning for an inverter.

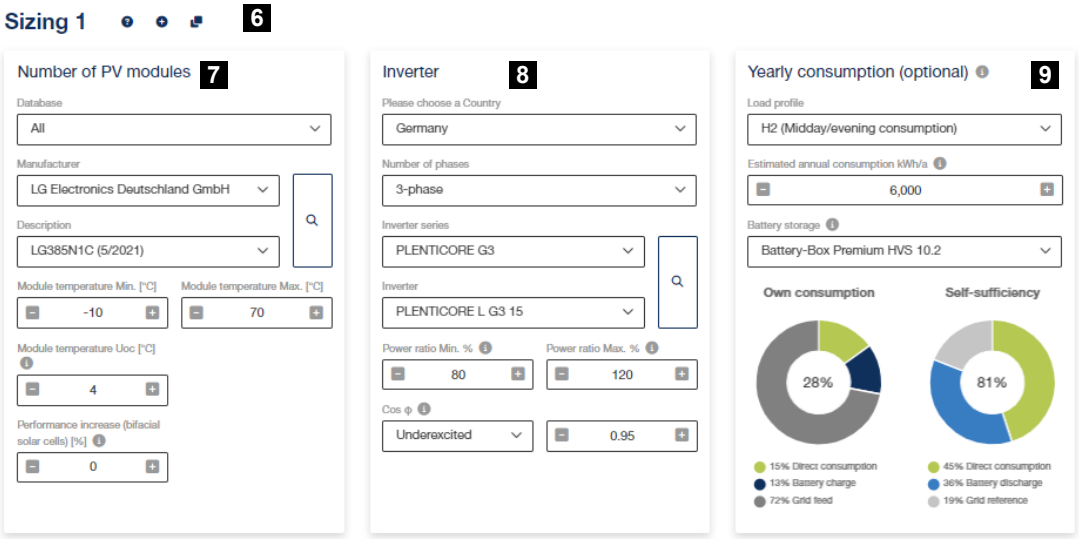
This includes selecting an inverter, the photovoltaic modules that are to be used, and the relevant string configuration. As a result, all the required information is displayed, showing to what extent the configuration created is within the technical limitations.

There is also an option to select consumption and a battery to obtain an estimate of the self-consumption and degree of self-sufficiency.

The (+) symbol can be used to create another plan. Both plans can be compared using the ***Comparison*** item.

The ***Report*** page can be used to save, export or print the plan once it is complete.

1 Project name
2 Project settings
3 Current plan
4 Other plans/Compare plans
5 Launch report

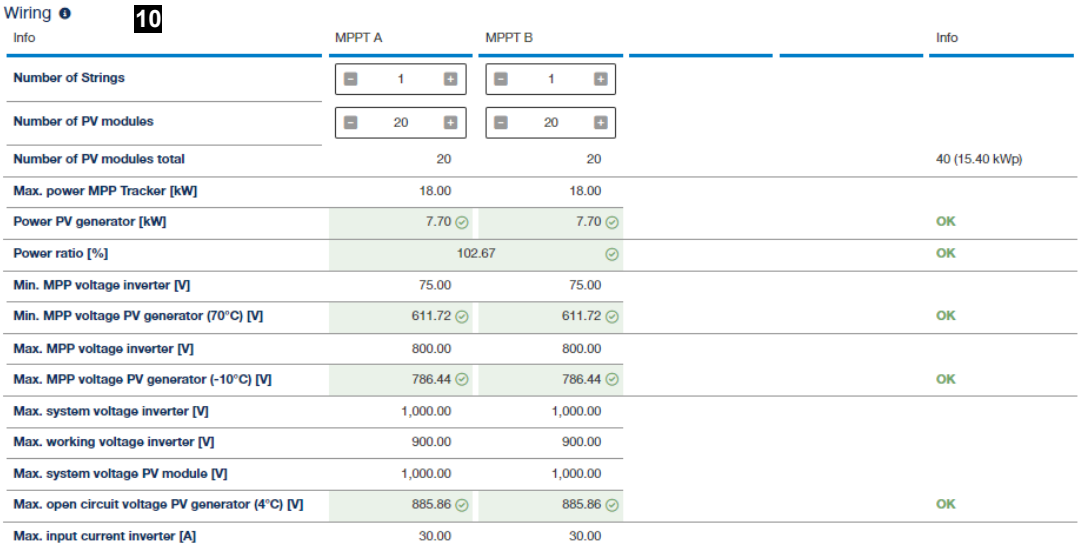


6 Name of the current sizing/create another sizing/delete sizing

7 PV module selection

8 Inverters selection

9 Consumption forecast selection



Info	MPPT A	MPPT B			Info
Number of Strings	1	1			
Number of PV modules	20	20			
Number of PV modules total	20	20			40 (15.40 kWp)
Max. power MPP Tracker [kW]	18.00	18.00			
Power PV generator [kW]	7.70	7.70			OK
Power ratio [%]	102.67				OK
Min. MPP voltage inverter [V]	75.00	75.00			
Min. MPP voltage PV generator (70°C) [V]	611.72	611.72			OK
Max. MPP voltage inverter [V]	800.00	800.00			
Max. MPP voltage PV generator (-10°C) [V]	786.44	786.44			OK
Max. system voltage inverter [V]	1,000.00	1,000.00			
Max. working voltage inverter [V]	900.00	900.00			
Max. system voltage PV module [V]	1,000.00	1,000.00			
Max. open circuit voltage PV generator (4°C) [V]	885.86	885.86			OK
Max. input current inverter [A]	30.00	30.00			

10 Plan and view string adjustment

Selecting a photovoltaic module

Select a photovoltaic module from a comprehensive database. First of all, select the manufacturer and the desired type.

Then you can search for suitable modules from the comprehensive module database in the pop-up window using filter criteria. If the module you are looking for is not in the database, you can create a module yourself.

Modules can be marked as favourites so that they can be reused in the next project by going to Favorite.

You can also enter sizing details, such as the minimum and maximum module temperature to be used and the module temperature for idling voltage.

If bifacial photovoltaic modules (photovoltaic modules that are active on both sides) are used, you can also enter the power gain.

Selecting an inverter

Next select the country in which the inverter will be used. Then the inverters can be filtered using the ***Number of phases*** filter, allowing either all inverters or just one- or three-phase inverters to be displayed. An inverter must be selected from these.

The minimum and maximum power ratio and the cos ϕ value must also be defined.

The String adjustment area displays columns related to the number of MPP trackers for the selected inverter. In these columns, the number of strings and modules per string are set.

These are used for a calculation shown in the String adjustment area, clearly showing whether the chosen inverter model is a valid combination with the PV modules. Invalid configurations are clearly marked and the tool also generates a warning or error if the configuration is no longer recommended.

Selecting the consumption forecast (optional)

To start the optional consumption forecast for the string adjustment, a load profile (commercial or private load profile) can be selected. This starts an annual consumption forecast with a yield simulation, which calculates the degree of self-sufficiency and the self-consumption for a default location within the selected country.

The degree of self-sufficiency indicates how much of the annual consumption will be covered by the PV system (including a battery storage system). Self-consumption indicates how much of the generated solar energy has been used by the system operator.

Compatible battery storage can also be selected for the planned inverter so that this can also be taken into consideration in the self-consumption and self-sufficiency calculation.

INFO

It is only possible to select one battery storage unit for each inverter that can be combined with battery storage.

String adjustment

Enter the number of strings and PV modules per MPP tracker (string). Then check the values of the sizing and correct if there are warnings or errors by changing the number of modules or the inverter.

Further sizing

It is possible to create another sizing result, which can be compared with the first sizing result. A maximum of two sizing results can be compared.

Compare sizing results

If another sizing result has been added, system plans can be compared using the ***Comparison*** menu item or a print-out can be generated for the report.

6.2 Reports

Creating a project

If no project data has been provided yet, you will be automatically asked to give the project a name when you open the Reports page.

Project data can also be entered via Settings (cogwheel).

1. Enter a project name.
2. There is also an option to provide a project status and planned date of commissioning and to assign the project to a customer.
3. Enter the customer details.

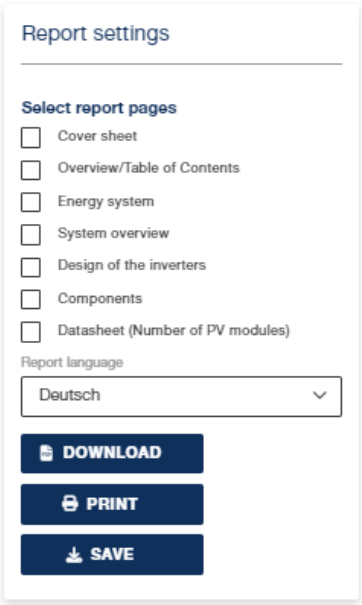
✓ Project data has been entered and is being used for the report.

Printing the report

The sizing can be printed in two variants:

- **Quick report:** Project overview with sizing result and project data on one page.
- **Partial reports:** Selection of individual partial reports, such as: project overview with sizing results and project data, sizing of PV modules and inverters, a consumption forecast, comparison of several plans and PV module data.

The report can also be downloaded directly as a PDF or printed out and the project can be saved locally.



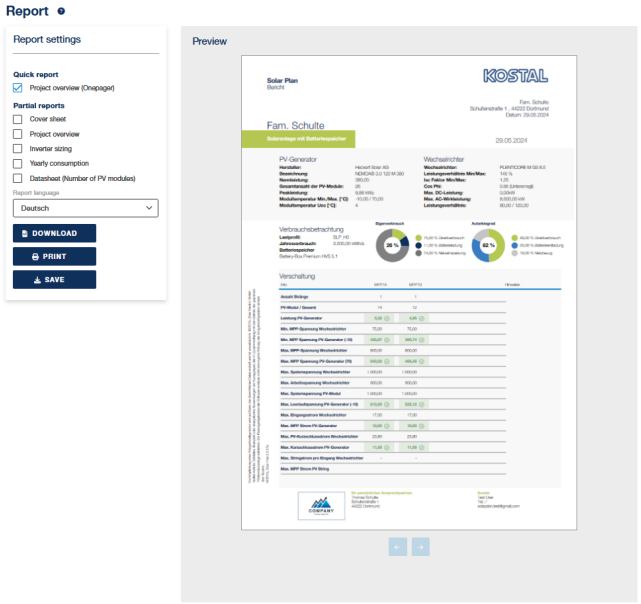
6.2.1 Quick report

The quick report consists of only one page and contains the most important information about the PV system planning.

The following information is included in the report:

- Project name with address details
- PV modules used
- Inverters used
- Consumption forecast
- String adjustment with additional information

The report can also be created in different languages, can be downloaded directly as a PDF, and can be printed or saved locally.

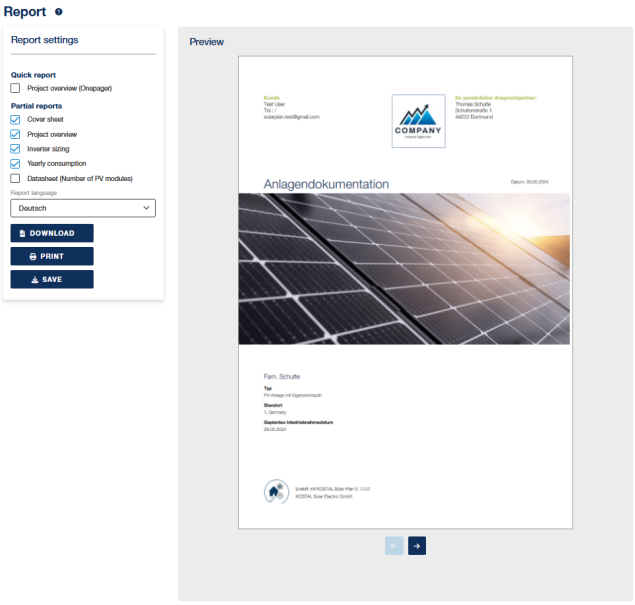


6.2.2 Partial reports

For the detailed report, you can choose for yourself what it should contain. If all the options are selected, the report contains the following items:

- Project overview
- Inverter sizing
- Consumption forecast
- Comparison of several plans
- Datasheet (PV module)

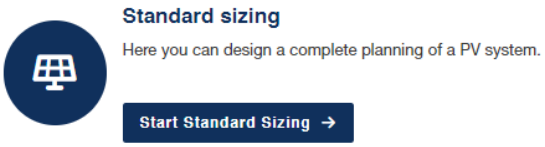
The report can also be created in different languages, can be downloaded directly as a PDF, and can be printed or saved locally.



7. Standard sizing

7.1 Starting standard sizing

Select the item ***Start standard sizing*** on the homepage to start the standard sizing.



This item allows you to create a project entirely tailored to the customer's requirements. The results can be saved and a report printed, which you can then send to the customer.

The following items are included in standard sizing:

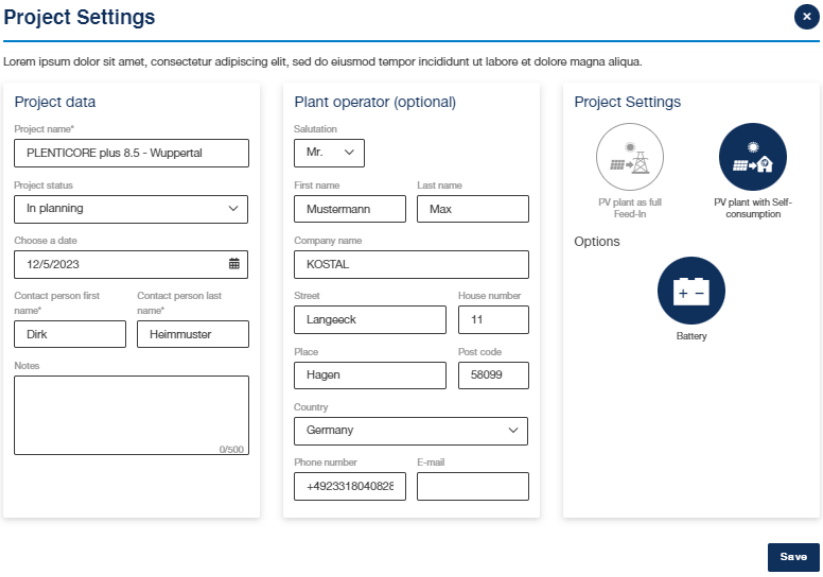
- Creating a project
- Selecting the location
- Selecting a usage profile for the customer
- PV generator planning, visual or manual
- Planning PV generators and selecting PV modules
- Sizing inverters automatically or manually
- Checking the plan
- Planning the PV system cabling
- Incorporating additional system components, such as energy meters and a battery
- Calculating the profitability of the PV system
- Planning results
- Creating, saving and printing a report

7.2 Creating a project

When the standard sizing is started, you can enter the project details. These can be changed subsequently by going to ***Settings*** (cogwheel on the menu bar).

The following project settings can be entered:

1. Under ***Project data***, you enter the project details (project name) and, as an optional detail, a contact person.
2. There is also the option to enter the details of the plant operator, which is also used in the report.
3. You then select a ***Presetting***. Depending on what is selected, various additional items are displayed or not displayed during the planning process.
   - ***PV plant as full Feed-In***.
   Here, the total generated power is fed into the public grid. Self-consumption is not scheduled, so the power cannot be stored in a battery or used for consumers.
   - ***PV plant with Self-consumption***
   You can select additional options for PV systems with self-consumption. These options guarantee a more accurate evaluation of the consumption data. Various parameters are queried for this during the planning phase.

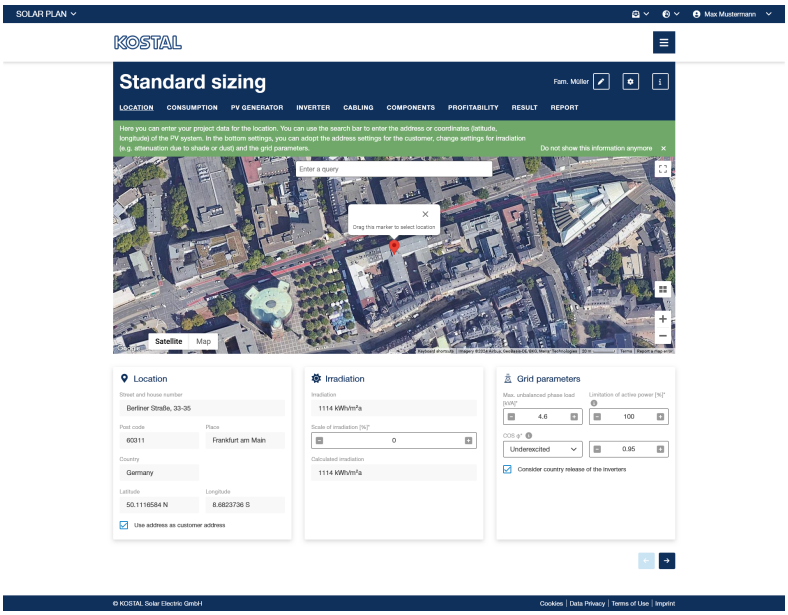


4. Confirm the entry via ***Start***.

✓ The project has been created

The project name can be changed again at any time by going to Edit (pencil symbol) and via Settings (cogwheel). The Info area (i symbol) provides you with all the information about the project that has been created.

7.3 Creating project master data/location



1. First of all, enter your project data for the location. You can use the search bar to specify the address or coordinates (latitude, longitude) for the planned PV system. The data is then automatically transferred into the ***Location*** fields and the customer address is updated.
   Tip: When entering the location, start with the house number to find the correct address more quickly.
2. You can adopt the standard value for solar irradiation at the location and the grid parameters or you can adapt them to your location and grid provider.

✓ Click on the right arrow to go to the next page.

INFO

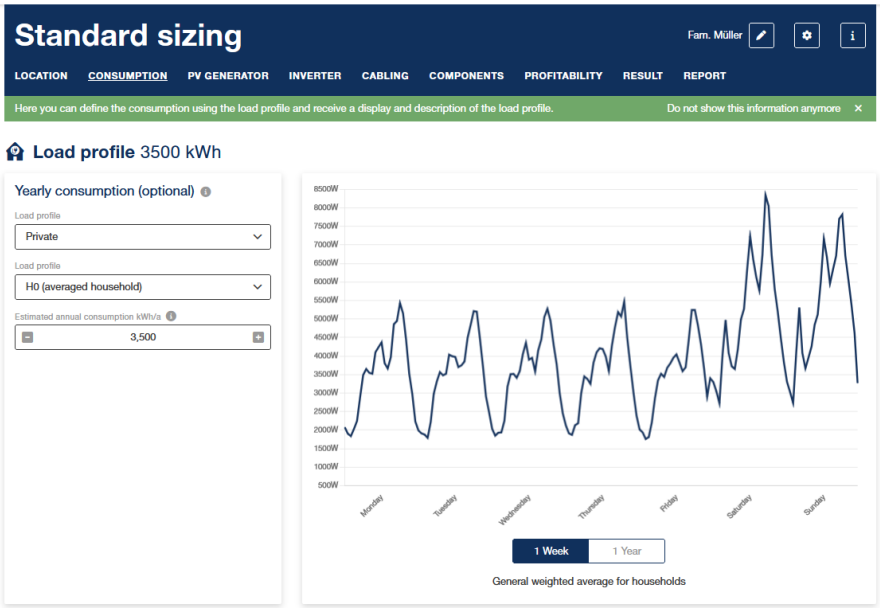
If the checkbox ***Use address as customer address*** has been checked, the PV system's location is automatically used as the customer address.

If the checkbox ***Consider country release of the inverters*** is checked, a check is carried out to ascertain which inverters are approved based on the location. The ***Inverter*** tab then only displays inverters that are approved.

Irradiation and climate databases

Different institutions provide KOSTAL Solar Electric GmbH with this data. Therefore, we cannot guarantee the completeness and/or accuracy of the data that we are given and that is shared with you.

7.4 Consumption



Under Consumption, you can select the load profile that is suitable for you from different standardised load profiles for private households or commercial premises.

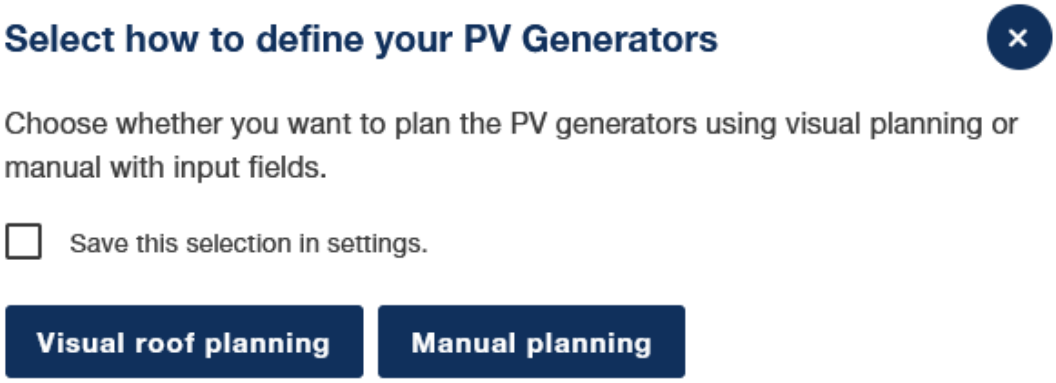
1. First select the load profile type, such as ***Private***.
2. Then select the load profile. Each load profile is explained below the diagram.
3. Then enter the annual consumption in kWh. You can get this value from the annual bill from the energy provider, for example.

On the right-hand side, you can display the load profile by week or by year. Under the graphic, you will find a description of the selected load profile.

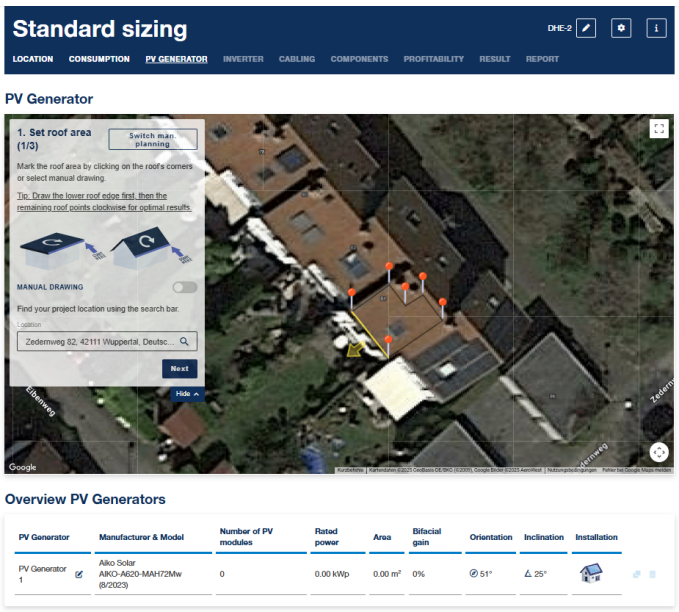
7.5 PV generators

PV planning can be undertaken visually using satellite images or manually by entering the planned PV generators. You can decide whether to use visual or manual PV generator planning after you have exited the consumption dialogue.

You can switch between visual PV generator planning and manual planning at any time. You do this by simply clicking on the switchover symbol in the manual PV generator plan or by terminating visual roof planning.



7.5.1 Visual roof planning



The PV generators on your roof can be planned directly using visual PV generator planning.

This includes the following:

- The location is taken straight from the location planning but can be changed.
- Mark the roof area in the view or create a manual roof drawing. Start the marking with the eaves of the roof.
- Define the edge of the roof (eaves)
- Enter the roof inclination
- Select modules and add to plan. Up to 4 module arrays can be planned.

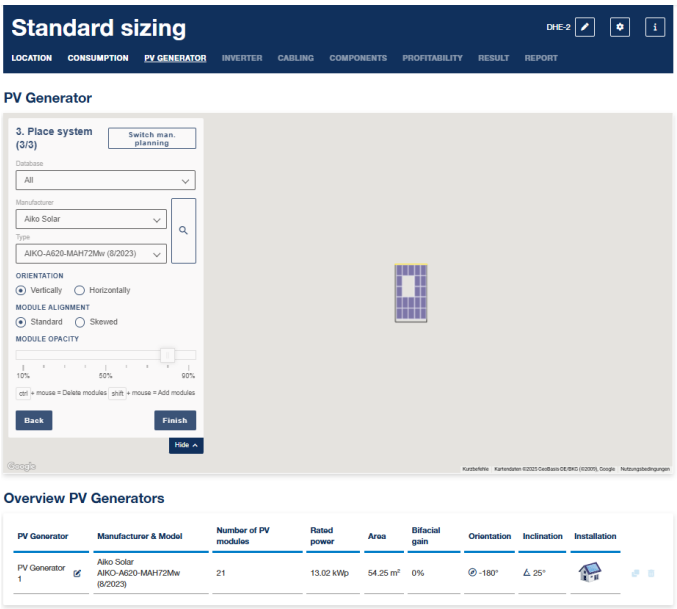
Creating visual generator plan

1. Roof area:
   For visual roof planning, mark the roof area by clicking on the roof corners. If you select a point by mistake, you can remove it or move it by simply right-clicking on the point in question.
2. Alignment of the roof area:
   Choose between pitched roof and flat roof. Using the ***Roof border*** button, you can mark the roof's eaves. To do this, simply press the button as many times as you need until the right side is marked.
   Finally, set the roof inclination.
3. Positioning the modules:
   Select the database from which you want to select the PV generators.
   Then select the PV module under manufacturer and type.
   Select how the PV modules are fitted on the roof.
   Using visibility, you can make the modules more transparent in order to view the original roof more clearly.
   Individual modules can be removed or added again by clicking on the module in question.
   There is also an option for rotating the module alignment if the image material available is distorted.
   If there are restricted areas on the roof, such as a chimney, windows etc., you can adjust the module visibility to 0% and remove the PV modules from these areas.
   The following short-cut keys can be used:
   - Ctrl + mouse = delete modules
   - Shift + mouse = add modules
   - WASD = move module array

➔ The PV generators are shown on the roof.

4. Press the ***Complete*** button to accept the plan.
5. If more PV generators are to be created, click on ***Add PV generators*** and repeat the above steps.
   Once you have completed the PV generator planning, use the right arrow key to go to the next page.

Creating a drawing for generator planning



1. Select ***Manual drawing***:
   Go to ***Manual drawing***.
2. Roof area:
   Specify the width, length and alignment of the roof area and position the roof.
3. Alignment of the roof area:
   Choose between pitched roof and flat roof. Using the ***Roof border*** button, you can mark the roof's eaves. To do this, simply press the button as many times as you need until the right side is marked.
   Finally, set the roof inclination.
4. Positioning the modules:
   Select the database from which you want to select the PV generators.
   Then select the PV module under manufacturer and type.
   Then select whether the PV modules are fitted on the roof in vertical or horizontal format.
   Using visibility, you can make the modules more transparent in order to view the ori-

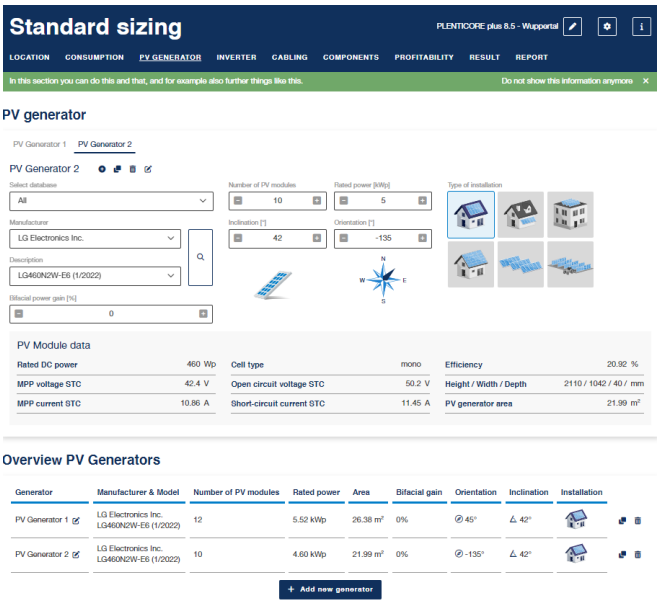
ginal roof more clearly.
Individual modules can be removed or added again by clicking on the module in question.

➔ The PV generators are shown on the roof.

5. If more PV generators are to be created, click on ***Add PV generators*** and repeat the above steps.
Once you have completed the PV generator planning, use the right arrow key to go to the next page.

✓ Click on the right arrow to go to the next page.

7.5.2 Manual planning



You can create up to four PV generators yourself by going to the ***PV generators*** menu item. The PV modules are selected from a database.

1. Select the database from which you want to select the PV generators.
2. Then select the PV module under manufacturer and type.
3. If the PV module is a bifacial module, you can enter a percentage for the assumed bifacial power gain.
4. Then select the number of modules, the roof incline and the orientation.
   The rated output is calculated automatically, but it can be changed.
5. Select the type of module installation.

➔ At the bottom you find an overview of the PV-Generators.

6. To create more PV generators, repeat the steps by clicking on the (+) symbol at the top or the ***Add new generator*** button.
   You can change the name of the PV generator by going to Edit (pencil symbol next to the name).

✓ Click on the right arrow to go to the next page.

Created PV generators

Once created, PV generators can be copied, deleted (bin) or renamed (pencil) using the symbols on the bar or at the top.

Overview PV Generators

Generator	Manufacturer & Model	Number of PV modules	Rated power	Area	Bifacial gain	Orientation	Inclination	Installation	
PV Generator 1	LG Electronics Inc. LG460N2W-E6 (1/2022)	12	5.52 kWp	26.38 m²	0%	45°	42°		
PV Generator 2	LG Electronics Inc. LG460N2W-E6 (1/2022)	10	4.60 kWp	21.99 m²	0%	-135°	42°		

+ Add new generator

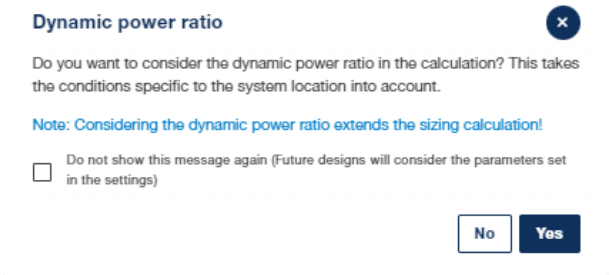
Dynamic performance ratio

Depending on the settings configured in the program options for **KOSTAL Solar Plan**, the dynamic performance ratio calculation is provided here.

When determining the performance ratio, the user can choose between a static and dynamic performance ratio calculation.

The dynamic performance ratio takes into account both the system location and the orientation and inclination of the PV modules, meaning that the performance ratio can be estimated with greater accuracy. This involves checking the maximum power that occurs simultaneously with surfaces with different orientations.

To perform the dynamic calculation, answer the question with ***Yes***.



Please note that it may take several minutes for the layout to be calculated because of the simulation running in the background. If it is taking too long, you can exit the calculation using the Cancel button.

INFO

The performance ratio is the ratio of a PV generator's output power to the power drawn by the associated inverter. This ratio depends on the efficiency at which the inverter is working, i.e. how much of the DC power present is being converted into usable AC power.

The static performance ratio is faster to calculate and uses the PV rated output that can be found in the inverter's technical data.

The dynamic performance ratio takes longer to calculate and is based on the power that can be achieved at the system location.

7.6 Inverter

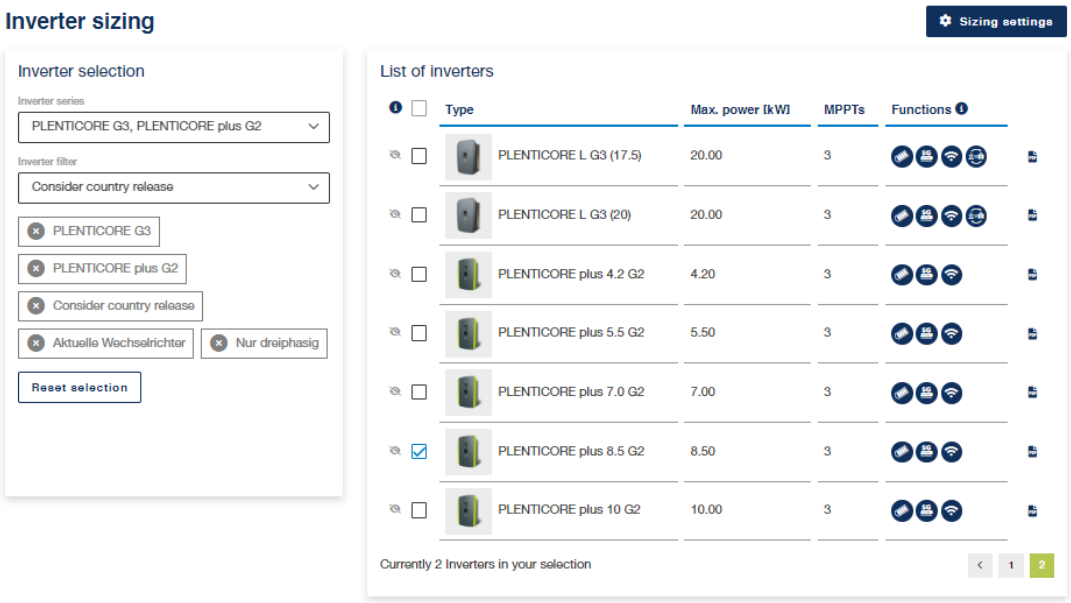
There are two ways to plan inverters.

- **Manual planning**
  With manual planning, you select the inverter yourself and can connect this with the PV modules that have already been planned.
- **Automatic planning**
  For automatic planning, the web tool suggests the optimal KOSTAL recommendation for the connection of the inverters.

Select the type of planning.

7.6.1 Automatic inverter planning

With automatic planning, the web tool suggests the optimal KOSTAL recommendation for the connection of the inverters.



With automatic planning, you can make a preselection of inverters using filters and presettings. The optimum string adjustment is recommended based on the preselection.

Selecting an inverter

1. Select an inverter series under ***Choose inverter***. You can also narrow down the selection further by using filters.
2. On the right-hand side, the inverters to be used for a calculation are selected. A maximum of 10 inverters can be selected. The symbols or the PDF document also provide you with additional information about the inverters.

INFO

If a PLENTICORE BI inverter is combined with an inverter from a third-party provider, the actual name of the third-party provider's inverter is not displayed in the inverter list. This is always listed as a 3rd party inverter.

If you cannot find the 3rd party inverter in the database, you can upload the datasheet using the button. After a check is performed, this is then added to the inverter database.

✓ Click on the right arrow to go to the next page.

Sizing settings for inverters/PV generators

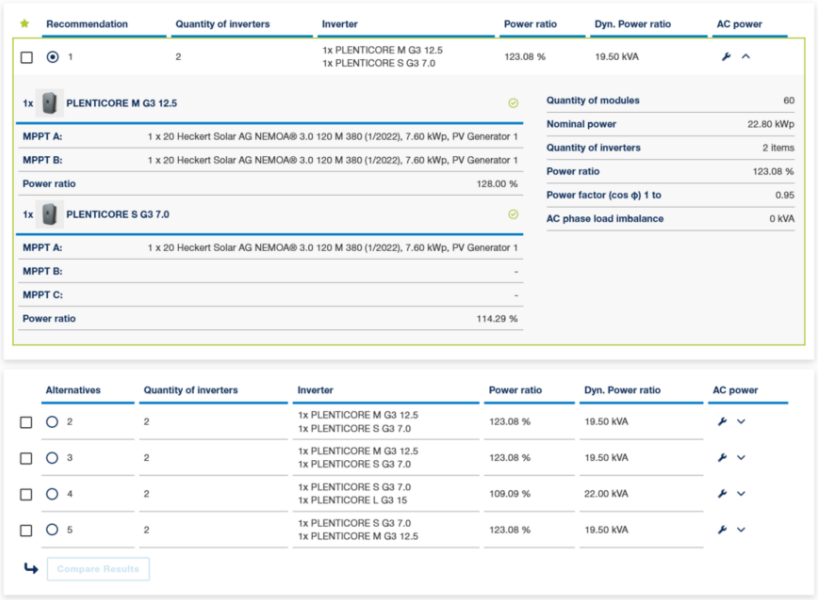
You can set several parameters for inverters and PV generators by going to the sizing settings. This more accurately restricts the sizing. Alternatively, you can use the standard settings.

Specify the following values here and save them:

Device	Parameters	
Inverter	Power ratio min./max.	Usually, inverters are sized smaller than the total generator power. Adopt the standard value or enter your own value here (20–200, standard values min. 80/max. 120).
	Cos phi (type) / (value)	Specify the type and value for cos phi.
	Limitation of the active power to [%]	Specify the active power that the inverter should be limited to when feeding into the public grid, e.g. 70%. The value is usually prescribed by the energy provider.
	Maximum unbalanced phase load [kVA]	Specify the maximum unbalanced phase load. In Germany, this is 4.6 kW, for example. (0–6, standard value 4.6)

Device	Parameters	
PV generator	Min./max. module temperature [°C]	Enter here the minimum and maximum module temperature (-50 – 200, standard value -10 / 70)
	Module temperature Uoc [°C]	Enter here the module temperature at idling voltage (-50 – 200, standard value 25)
	Isc factor	If the ***Isc factor*** should be taken into consideration, select this in the settings and enter a current safety factor. Using the value, you can take a current safety factor into consideration in the sizing.

Sizing result



You can select between the different sizing results.

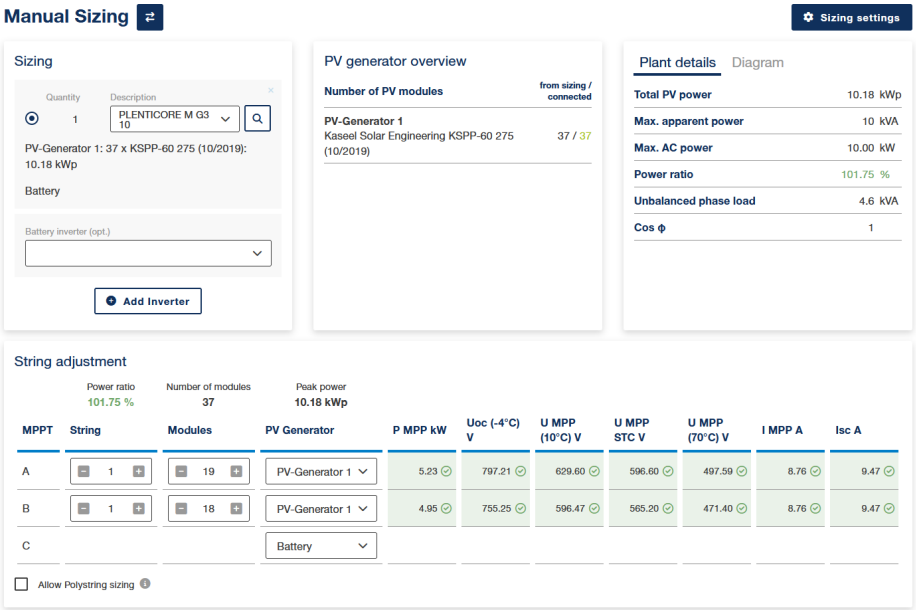
- A recommendation is provided (at the top) alongside four alternatives.
- For easier comparison, you can mark up to three variants using the left-hand checkbox and compare them by clicking ***Compare Results***.
- You can manually reconfigure the results by clicking on the tool symbol.

1. To conclude, select the variant you prefer.

✓ Click on the right arrow to go to the next page.

7.6.2 Manual inverter planning

With manual planning, you select the inverter yourself and can connect it with the PV modules that have already been planned.

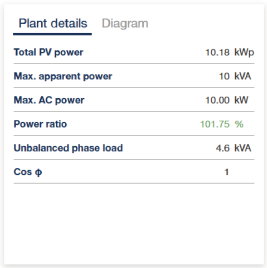


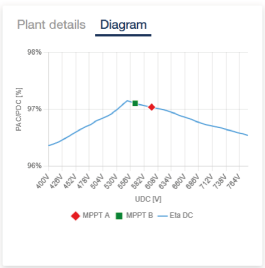
You can select the inverter from a database to use in the connection.

1. Firstly, go to ***Select inverter*** to select an inverter. You can also narrow down the selection further by using filters.
2. Connect the inverter with the PV modules that have already been planned. If a connection is outside of the inverter specifications, a notice, warning or error will be displayed.
3. Connect the battery to a hybrid inverter or alternatively select a battery inverter. Note: The battery can be connected to either the hybrid inverter or the battery inverter.

Switching view

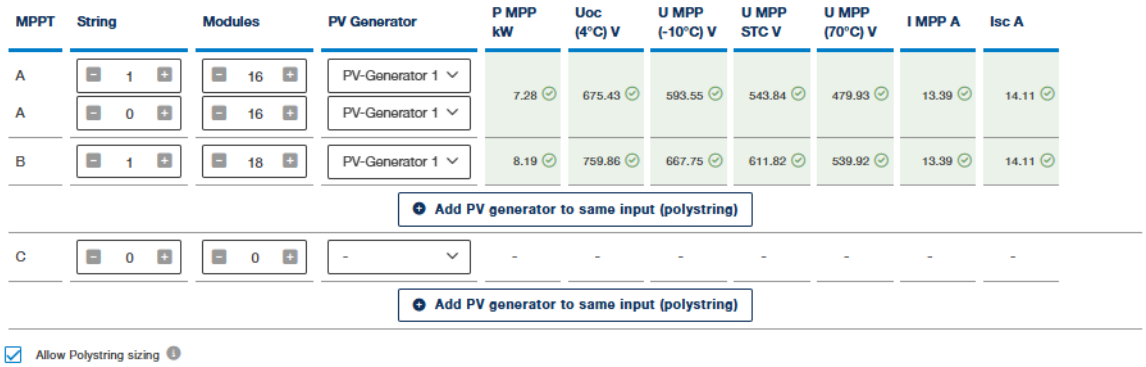
You can switch the view between system details and the MPPT diagram.





Polystring

When connecting the inverter, you can factor in a polystring connection. Using the polystring connection, different PV generators with the same PV module type can be connected to the same MPP tracker. The number of modules for the PV module type in the strings must be identical.



If you want to delete the polystrings again, untick the checkbox.

INFO

If you have completed visual planning, the exact number of PV modules must be taken into account in the manual connection.

Sizing settings for inverters/PV generators

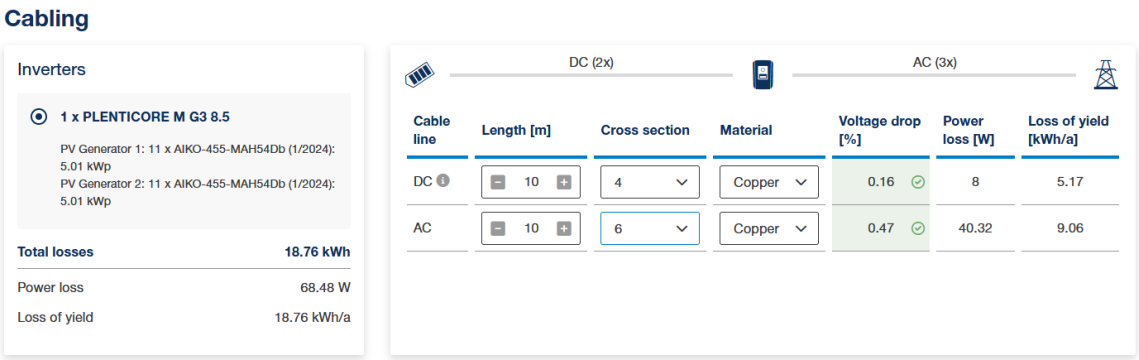
You can set several parameters for inverters and PV generators by going to the sizing settings. This more accurately restricts the sizing. Alternatively, you can use the standard settings.

Specify the following values here and save them:

Device	Parameters	
Inverter	Power ratio min./max.	Usually, inverters are sized smaller than the total generator power. Adopt the standard value or enter your own value here (20–200, standard values min. 80/max. 120).
	Cos phi (type) / (value)	Specify the type and value for cos phi.
	Limitation of the active power to [%]	Specify the active power that the inverter should be limited to when feeding into the public grid, e.g. 70%. The value is usually prescribed by the energy provider.

Device	Parameters	
	Maximum unbalanced phase load [kVA]	Specify the maximum unbalanced phase load. In Germany, this is 4.6 kW, for example. (0–6, standard value 4.6)
PV generator	Min./max. module temperature [°C]	Enter here the minimum and maximum module temperature (-50 – 200, standard value -10 / 70)
	Module temperature Uoc [°C]	Enter here the module temperature at idling voltage (-50 – 200, standard value 25)
	Isc factor	If the ***Isc factor*** should be taken into consideration, select this in the settings and enter a current safety factor. Using the value, you can take a current safety factor into consideration in the sizing.

7.7 Cabling

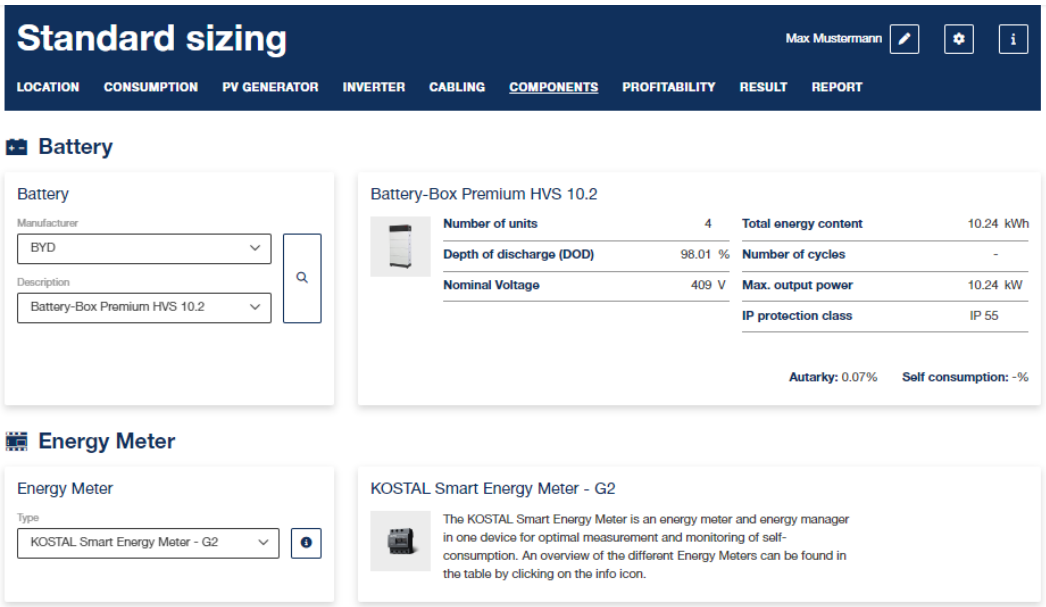


Under Cabling you must specify the lengths, cable cross-sections and material used between the PV generator and the inverter, as well as between the inverter and the AC connection.

1. Please enter the values for the cabling.
   Ensure that the power loss is under 1%.

✓ Click on the right arrow to go to the next page.

7.8 Additional components



Select additional components that are being installed in the PV system.

Components will not be displayed if they have not been selected in the project (e.g. battery). However, you can add components by going to the project settings.

1. Select the components or search for them in the database.

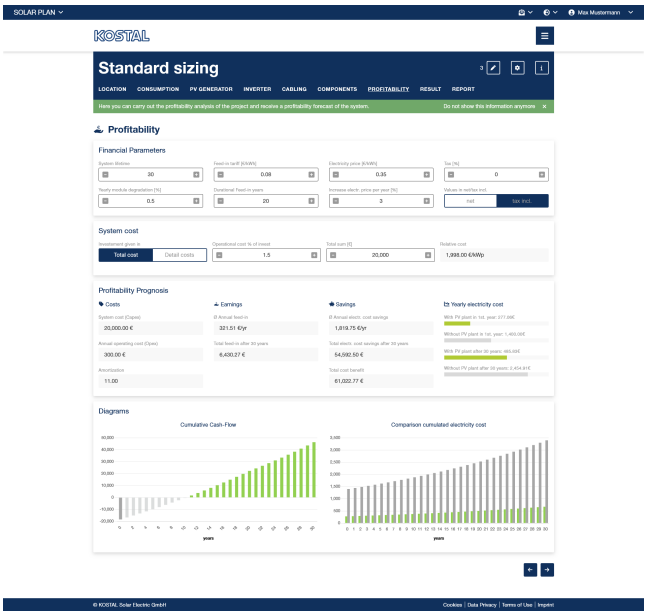
INFO

If a battery is selected, a compatible energy meter is immediately displayed as well. The selection can be cancelled. However, a smart energy meter is always required if using a battery.

➔ Information about the components is displayed.

✓ Click on the right arrow to go to the next page.

7.9 Profitability



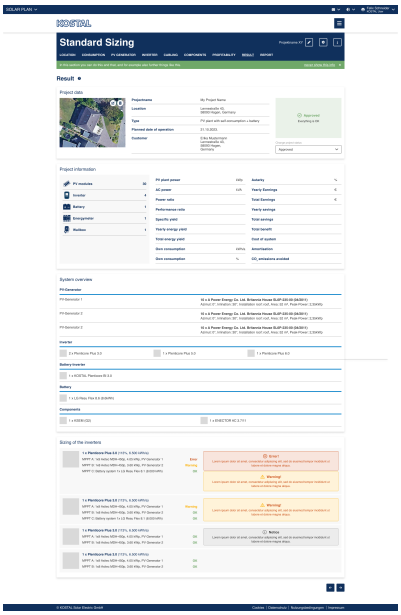
By entering the financial parameters, the profitability of the PV system can be calculated here.

1. Enter the financial parameters. Here, you can also store standard values in the settings.
2. Specify the system costs.
   For the costs, you can choose between a simple cost input (total cost) and a detailed cost input (list of all costs).

✓ The profitability forecast is displayed.

✓ Click on the right arrow to go to the next page.

7.10 Result

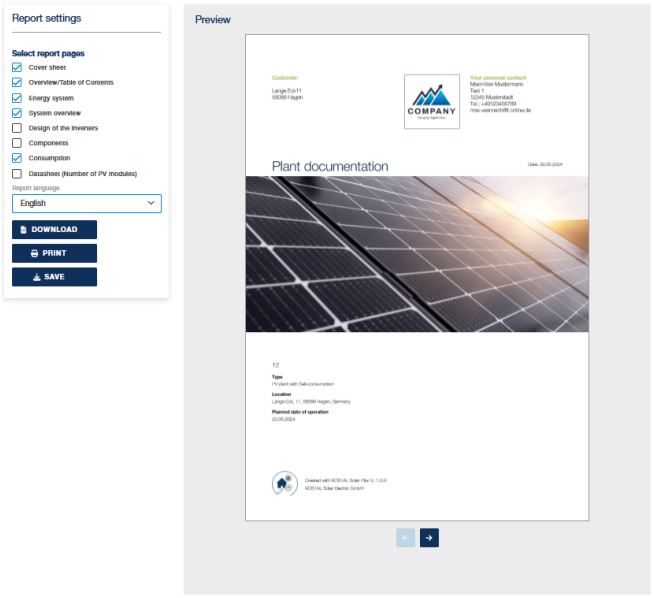


An overview of the PV system planning results is displayed. Check the settings and the results.

- **Project data**
  Here you will see the project data that you entered at the beginning. You can also change the project status here.
- **Project information**
  Overview of the installed components in the PV system and the most important figures for the PV system.
- **System overview**
  List of components that are taken into consideration in the project.
- **Inverter sizing**
  List of connection of the individual MPPTs and any warnings or errors. If there are still warnings and errors regarding the sizing, these must be checked and rectified.

Once you have checked the results, you can generate the report for the planned system on the next page.

7.11 Report



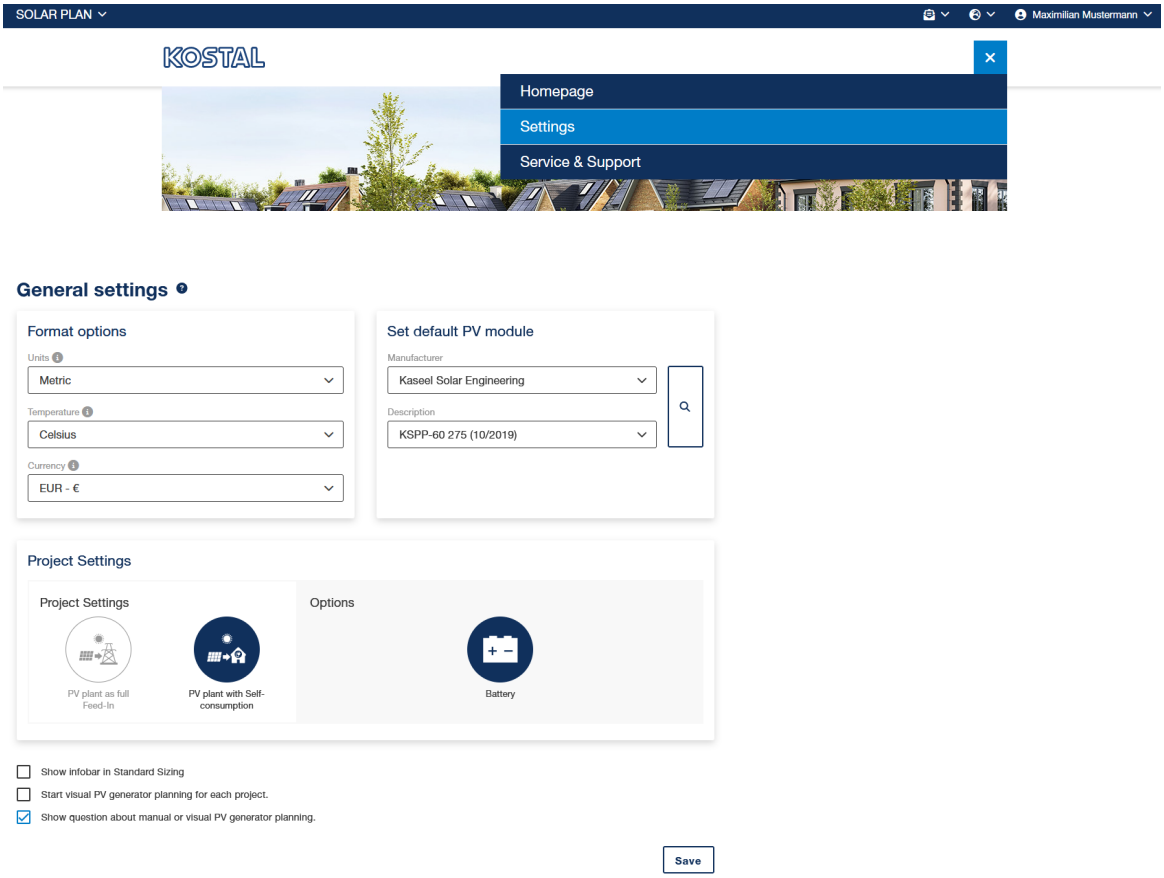
1. Select the pages that you want to appear in the report.
2. Select the language for the report.
3. You can download the report as a PDF, print it out or save the project.

8. Settings

8.1 Settings – General

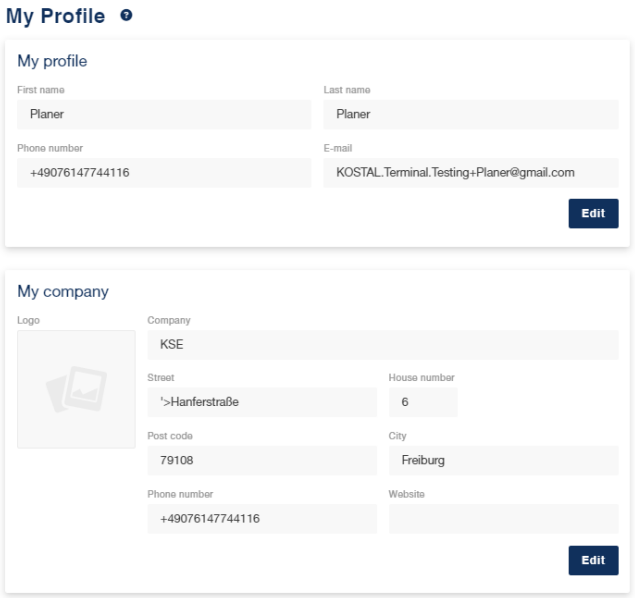
Under ***Settings***, you can specify presettings for all projects and manage the databases.

You can access the ***Settings*** from the homepage via the Settings menu item.



- **Format options**
  Selection of format options for the unit, temperatures and currency.
- **Standard PV module**
  Select a standard PV module that is preselected in the project.
- **Project presettings**
  Select what will be displayed as standard in the project settings.
  As well as displaying information, here you can configure the presettings for visual roof planning.

8.2 Settings - My Profile



This displays your personal details and your company's details.

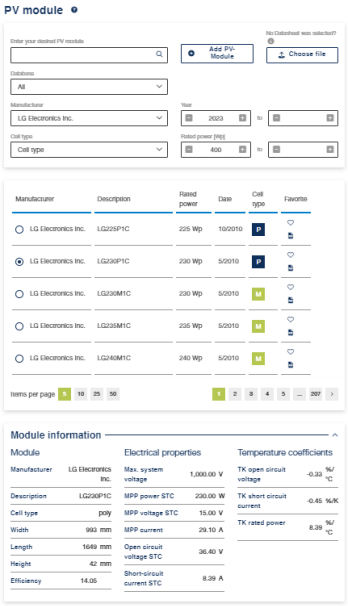
It is only possible to change these details via the KOSTAL Solar Terminal.

INFO

If the personal details have been changed, you may need to log in again.

The details are then automatically used in each new project.

8.3 Settings - PV modules



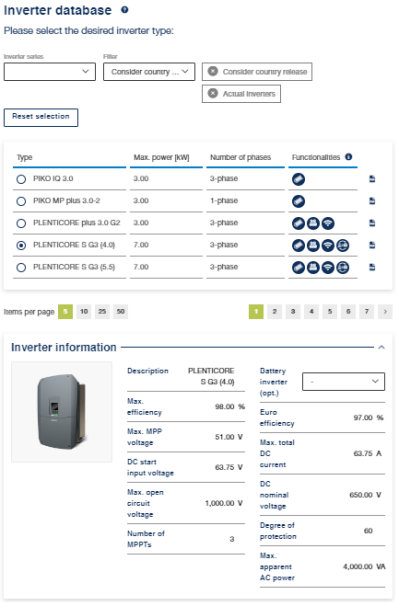
Manage your PV modules and create favourites or your own PV modules.

- Search for PV modules and mark them as a favourite.
- Add PV modules that are not available in the database.
  A new PV module can only be added by completing all input fields.
- Overview of the selected PV modules.
- Module information for the selected PV module.

INFO

The technical data used for the PV modules originate from publicly accessible information from the relevant module manufacturer. The content of the database is continually checked and updated. However, deviations cannot be ruled out, as the data is often changed. Therefore, we provide no guarantee that the PV module data is up to date, complete and/or correct (the values are not assured properties).

8.4 Settings - Inverter database



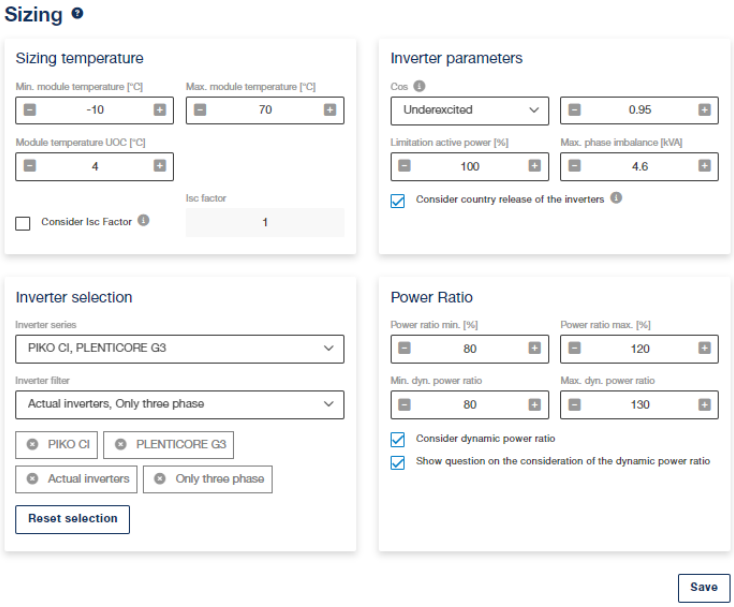
Here you will find further information on the inverters.

- List of inverters
- Filter functions
- Overview of the selected inverters
- Information about the selected inverter

INFO

The technical data used for the KOSTAL inverters in this database is continually checked and updated as necessary. Nevertheless, deviations and errors cannot be ruled out. Therefore, we provide no guarantee that the inverter data is up to date, complete and/or correct (the values are not assured properties).

8.5 Settings - Sizing

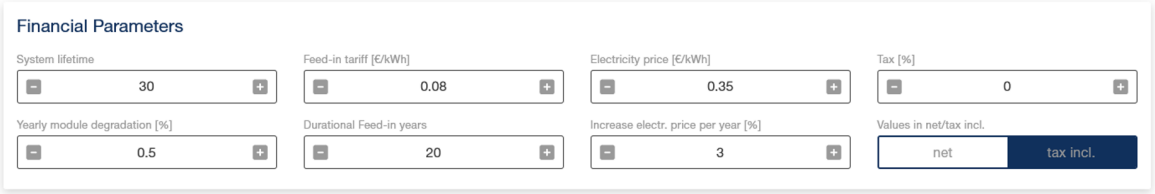


Set parameters for PV generators, inverters and the inverter preselection here. These will then be adopted as a preselection during the sizing process, but they can be changed at the relevant step of the process.

The settings for calculating the dynamic performance ratio are specified here and appear in the planning process depending on the setting.

Under dynamic performance ratio, the user can use a simulation to dynamically determine the performance ratio. The power that can be achieved at the system location is used for this calculation. This means that higher inverter utilisation is possible without overloading it. This involves checking the maximum power that occurs simultaneously with surfaces with different orientations.

8.6 Settings - Profitability



Specify values that you want to use as a presetting for profitability.

Parameter	Explanation
System run time	Specify the planned run time for the PV system. The profitability is calculated for this run time.
Feed-in tariff [€/kWh]	Specify here the compensation that you receive from the energy supplier per kWh fed in.
Electricity costs [€/kWh]	Specify the electricity costs per kWh here.
Tax rate	Specify the tax rate here (e.g. 19%)
Yearly module degradation	PV modules lose power over the years. Specify the value of the PV module's annual degradation.
Feed-in duration in years	Specify here the estimated feed-in time in years.
Electricity price increase per year	Specify the annual increase in electricity price as a percentage.
Net values/Gross values incl. tax	Select here whether the value has been specified as a net figure or gross including tax.

9. Service and support

The Service and support area contains further information that may assist you with planning and layout.

- **Instruction manuals**

  Here you will find the online instruction manual for KOSTAL Solar Plan.

- **Missing PV modules**

  If you have not found the PV module you want, you can upload the datasheet of the PV module using the relevant button. After a check is performed, the PV module will be added to the PV module database.

- **KOSTAL Solar Electric – YouTube** channel

  Find useful information about our products on our channel.

- **FAQs**

  Do you have any questions? Start by looking at our FAQs. You may find the answer you are looking for.

- **Service and contact**

  Go to **Service and support** to find the right contact for you and your problem.

- **Change log**

  Here you will find a change log, providing information about changes to the relevant version and details on the current version ofKOSTAL Solar Plan.

www.kostal-solar-electric.com

08/2025 - EN - DOC03169121-0003 - Subject to technical changes. Errors excepted.
You can find current information at www.kostal-solar-electric.com.