

PIKO Plan 2.0

Software

Version 1.0

02/2013

EN

Smart
connections.

Operating Instructions

Planning tool PIKO Plan 2.0
for PIKO Inverter

Service information

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General note on gender equality

KOSTAL Solar Electric GmbH is aware of the importance of language with regard to the equality of women and men and always makes an effort to reflect this in the 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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This manual is subject to technical changes and printing errors.

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General instructions

Read this manual carefully in its entirety. It contains important information on using the PIKO Plan 2.0 software. This manual applies to software version 1.0 and higher.

KOSTAL Solar Electric GmbH assumes no liability for damages arising from the non-observance of this manual.

Proper use

The PIKO Plan 2.0 software from KOSTAL Solar Electric GmbH is a free inverter layout software. The resulting yield calculations are determined on the basis of historical weather data and may deviate from the actual yields. Please always be sure to use the most recent version of the software.

Exclusion of liability

All names, trademarks, product names or other designations given 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 or warranty 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 PIKO Plan software will result in termination of the warranty, guarantee and general liability of the manufacturer.

About this manual

These instructions for the PIKO Plan 2.0 layout software are designed as a step-by-step instruction set. We recommend you print these instructions out and carry out the inverter layout step-by-step with the printout in your hand.

Most of the user guidelines are self-explanatory. On each layout page you will find help texts and notes near the bottom.

Target group

This manual is intended for installers who plan, install and commission PV plants. Technical expertise is required to use PIKO Plan.

Remarks concerning the software

False layout of a plant can result in reduced yields and/or damage to the inverter.

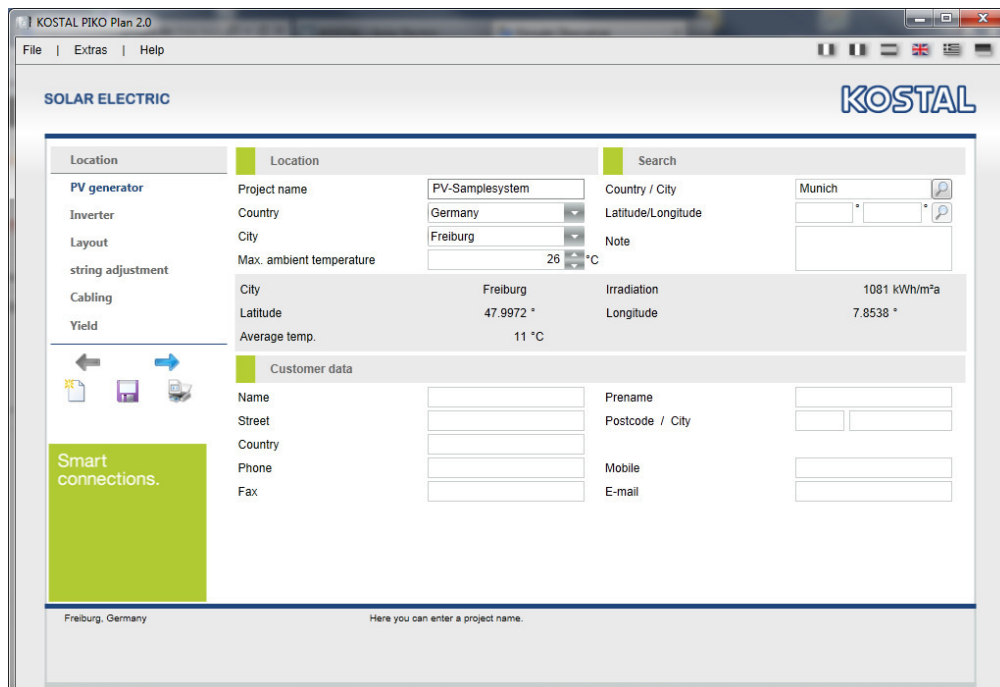
System prerequisites

Windows operating system

First steps

Download the PIKO Plan 2.0 planning tool from the homepage of KOSTAL Solar Electric (www.kostal-solar-electric.de) under "Download" > "PIKO Multi-String Inverters" and install the tool on your Windows system.

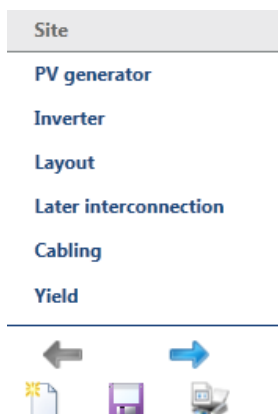
Please note the limitations of liability relating to usage and layout when installing.



Explanation of the main functions



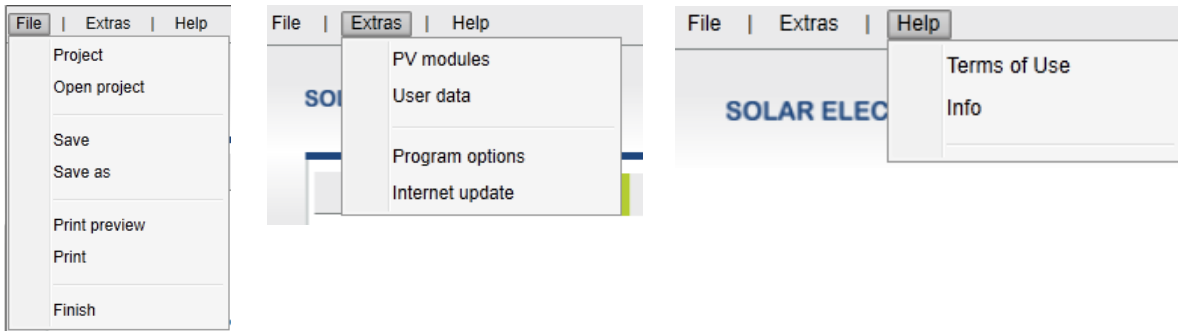
You can select the desired language at the top right.



To the left is the navigation bar, where you can see where you are in the project.

In order to move one step back or forward, use the blue arrow in the desired direction, or directly click the desired step, such as "Layout".

Beneath the arrows you will find "New planning", "Save planning" and "Print preview" in PDF format ordered from left to right.



With the menu bar you can make use of the corresponding control functions or update the program. You will find the individual functions of the menu at the bottom.

File

Project:	Create new project
Open project:	Load saved project
Save:	Save current project. When this has not yet been saved, it will be saved under a new project designation with the suffix ".kse"
Save as:	Save current project under a new project designation with the suffix ".kse"
Print preview:	Print preview of the current project
Print:	Print the current project
Finish:	End program

Extras

PV modules:	Opens the module database, in which favourites can be selected or to which own modules can be added
User data:	Entry of the user data (installer data)
Program options:	Entry of proxy and general settings for updates/currency and module variance
Internet update:	Update check

Help

Terms of use:	Terms of use for PIKO Plan
Info:	Locations/contact data of the companies

User data

With the menu point "Extras" > "User data", all necessary information concerning your company that is subsequently to appear in the offer can be entered. Choose the "Search" function to insert a company logo.

The screenshot shows the 'User data' section of the KOSTAL PIKO Plan 2.0 software. The interface is divided into a sidebar on the left and a main content area. The sidebar includes a 'Location' section and a 'Smart connections' section. The main content area contains a 'User data' section with various form fields for entering company information. The fields are organized into two columns. The first column includes 'Contact person', 'Street', 'Country', 'Phone', 'Fax', and 'E-mail'. The second column includes 'Company', 'Postcode / City', 'Mobile', 'Internet site', and 'Company logo'. A 'Search' button is located next to the 'Company logo' field. The software title 'KOSTAL PIKO Plan 2.0' is visible in the top left corner, and the 'KOSTAL' logo is in the top right corner.

PV modules

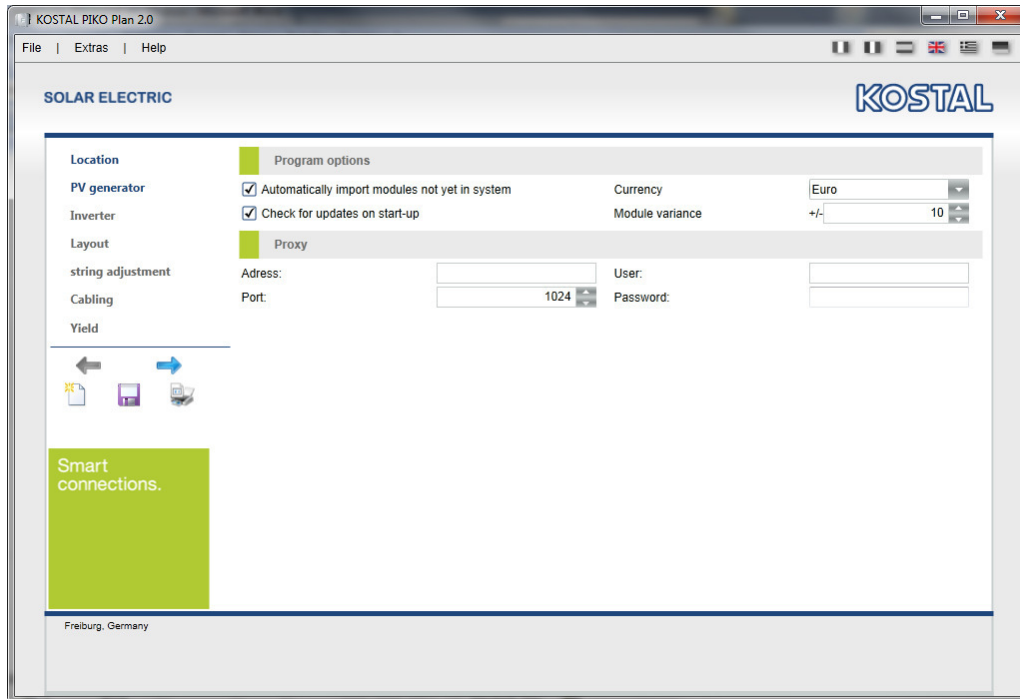
Own modules can be entered with the menu point "Extras" > "PV modules" or limited to certain favourites in the database. To do so, choose the star next to a module type, which then adds all modules of a manufacturer to your favourites.

The screenshot shows the 'PV modules' section of the KOSTAL PIKO Plan 2.0 software. The interface is divided into a sidebar on the left and a main content area. The sidebar includes a 'Location' section and a 'Smart connections' section. The main content area contains a 'PV modules' section with a table of PV modules and a form for entering module specifications. The table has columns for 'Manufacturer', 'Designation', 'Rated power', 'Cell technology', and 'Favourites'. The form includes fields for 'Manufacturer', 'Designation', 'Max. system voltage', 'MPP power', 'MPP voltage', 'MPP current', 'open circuit voltage', 'short-circuit current', 'TC open circuit voltage', and 'TC short-circuit current'. A 'Save' button is located at the bottom right of the form. The software title 'KOSTAL PIKO Plan 2.0' is visible in the top left corner, and the 'KOSTAL' logo is in the top right corner.

Program options

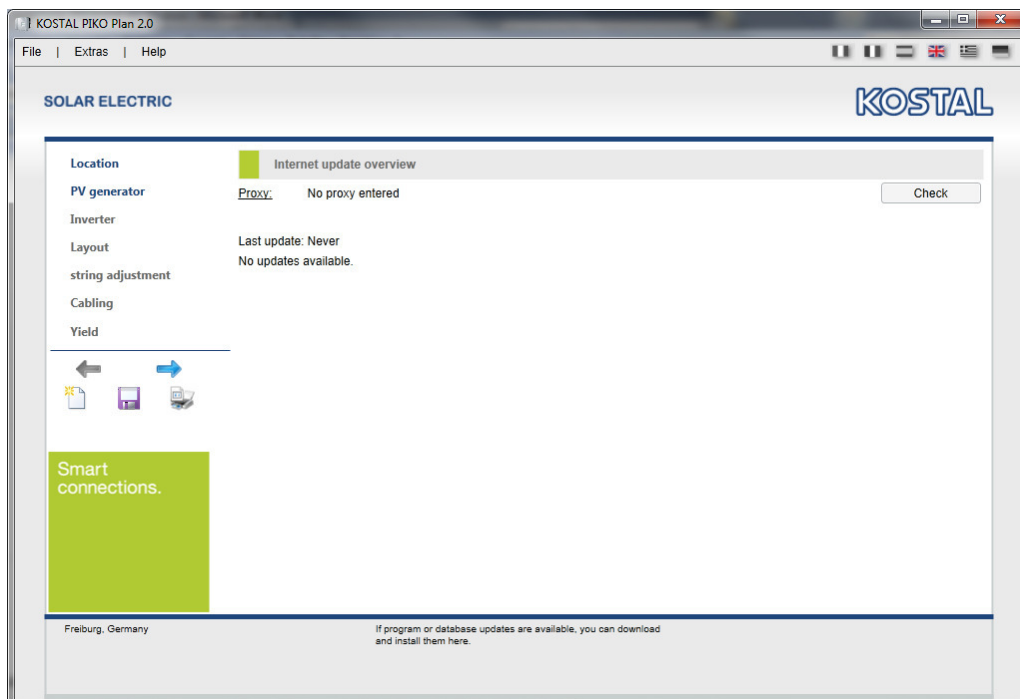
With the menu point "Extras" > "Program options", automatic updates of modules can be set up and a check for updates initialised after the program is started.

In the event that a proxy server is used in the network, the necessary access data of the proxy server must be entered here.



Internet update overview

With the menu point "Extras" > "Internet update overview", the program checks manually whether a current internet update is available or can check whether the entered proxy server settings are correct.



Use of PIKO Plan for inverter layout

Location

In order to commence with new planning, one must first enter the location. To this purpose call up the menu point "Location" on the left side.

Now enter the project name, the layout location and the customer data in order that these data can later be used in the print file. The indicated location is necessary for layout with relation to the irradiation and temperature data saved on location.

The screenshot displays the KOSTAL PIKO Plan 2.0 software window. The 'Location' menu is selected on the left sidebar. The main area is divided into two sections: 'Location' and 'Customer data'.

Location Section:

- Project name:** PV-Samplesystem
- Country:** Germany
- City:** Freiburg
- Max. ambient temperature:** 26 °C
- City:** Freiburg
- Latitude:** 47.9972 °
- Average temp.:** 11 °C
- Country / City:** Munich
- Latitude/Longitude:** (empty fields)
- Note:** (empty field)
- Irradiation:** 1081 kWh/m²a
- Longitude:** 7.8538 °

Customer data Section:

- Name:** (empty field)
- Street:** (empty field)
- Country:** (empty field)
- Phone:** (empty field)
- Fax:** (empty field)
- Prenome:** (empty field)
- Postcode / City:** (empty fields)
- Mobile:** (empty field)
- E-mail:** (empty field)

At the bottom of the window, a status bar shows 'Freiburg, Germany' and a message: 'Here you can enter the location and customer data.'

PV generator

Here a max. of 3 different PV generators (roofs incl. inclination and alignment) with modules (manufacturer and designation) and the desired rated output or the number of modules can be indicated. The entered data is confirmed by pressing the "Create" button.

In the event that one or more of the already created PV generators is to be processed, deleted or copied, use the buttons (pencil to edit, X to delete, letter to copy, diskette to save) next to the created generator. The diskette symbol is used to confirm the change.

An automatic calculation of the performance ratio (PR) with reference to the alignment is only possible for one created generator. The PR is to be determined manually when using up to 3 generators.

KOSTAL PIKO Plan 2.0

File | Extras | Help

SOLAR ELECTRIC **KOSTAL**

Location

PV generator

Generator	Manufacturer	Designation	Number o...	Rated DC p...	Orientation	Inclina...
West roof	Solar-Fabrik AG	Premium ince...	53	12.46 kWp	90 °	35 °

Inverter

Layout

string adjustment

Cabling

Yield

Smart connections.

Name of PV generator: Generator 2

Installation: On-roof - large clearance

Manufacturer: Solar-Fabrik AG

Number of PV modules: 53

Inclination: 35 °

Database: Standard

Designation: Premium incell L mono...

Rated power: 12.46 kWp

Orientation: 90 °

Create

Designation	Premium incell L mono - 235	Rated DC power	235 Wp
MPP voltage STC	29.70 V	MPP current STC	7.90 A
open circuit voltage STC	37.20 V	Short-circuit current STC	8.50 A

Freiburg, Germany
West roof 12.46 kWp
53 x Solar-Fabrik AG Premium incell L mono - 235
Inclination: 35°
Alignment: 90°

Here you can define the module arrays for your installation.

Inverter

Here the required grid settings (in some cases) prescribed by the grid operator are to be entered. In the event that an inverter is to be excluded from the layout calculation, this can be deselected with the help of the corresponding check to the right.

KOSTAL PIKO Plan 2.0

File | Extras | Help

SOLAR ELECTRIC

Location

PV generator

Inverter

Layout

string adjustment

Cabling

Yield

Inverter settings

Min./Max. Module temperature: -10 / 70 °C

Min./Max. Power Ratio: 0.90 / 1.25

Max. unbalanced phase load: 4.6 kVA

Electricity grid: Low voltage

Cosine φ: Under-ex... 0.95

Feed-in management: Dimensioning

Inverter

Pos	Designation	Rated AC power
<input checked="" type="checkbox"/>	PIKO 3.0	3.00
<input type="checkbox"/>	PIKO 3.6	3.60
<input checked="" type="checkbox"/>	PIKO 4.2	4.20
<input checked="" type="checkbox"/>	PIKO 5.5	5.50
<input checked="" type="checkbox"/>	PIKO 7.0	7.00

Selection

☒ **PIKO 10.1**

Designation	PIKO 10.1	efficiency (europ)	96.40 %
Max. efficiency	97.00 %	Min. MPP voltage	180 V
Max. MPP voltage	850 V	Max. DC current	37.5 A
Max. open circuit voltage	950 V	Degree of protection	IP 55
Installation site	Outdoor	Transformer	No
Number of MPPT	3	DC switch	Yes

Smart connections.

Freiburg, Germany
West roof 12.46 kWp
53 x Solar-Fabrik AG Premium inoell L mono - 235
Inclination: 35°
Alignment: 90°

Here you have to select min. one inverter.

Layout

In this step PIKO Plan calculates the 5 favourable inverter layouts. The most favourable layout for the installer that can possibly be interconnected again in the next step is to be selected.

KOSTAL PIKO Plan 2.0

File | Extras | Help

SOLAR ELECTRIC

Location

PV generator

Inverter

Layout

string adjustment

Cabling

Yield

Layout

Pos.	String Configuration	String Configuration	String Configuration
<input checked="" type="radio"/>	1 x PIKO 7.0 (1x16 / 1x16)	1 x PIKO 4.2 (1x21 / 0x0)	String Configuration
<input type="radio"/>	1 x PIKO 7.0 (1x17 / 1x17)	1 x PIKO 4.2 (1x19 / 0x0)	
<input type="radio"/>	1 x PIKO 7.0 (1x17 / 1x16)	1 x PIKO 4.2 (1x20 / 0x0)	
<input type="radio"/>	1 x PIKO 7.0 (1x18 / 1x17)	1 x PIKO 4.2 (1x18 / 0x0)	
<input type="radio"/>	1 x PIKO 8.3 (1x20 / 1x20)	1 x PIKO 3.0 (1x13)	

Number	Inverter	PR	PV gener...	Number of...	Rated DC output	AC power
1	PIKO 7.0	1.13	West roof	32	7.52 kWp	6.65 kW
1	PIKO 4.2	1.24	West roof	21	4.94 kWp	3.99 kW

Smart connections.

Total PV power	12.5 kWp	Number of modules	
Apparent power	11.20 kVA	West roof	53
AC power max.	10.64 kW		
Power Ratio	1.17		
Unbalanced phase load	0.0 kVA		
Cosine φ	0.95		

Freiburg, Germany
West roof 12.46 kWp
53 x Solar-Fabrik AG Premium inoell L mono - 235
Inclination: 35°
Alignment: 90°

Here you select the result you want to use on the following screens.

String adjustment

The individual inverters from the previous layout calculation are processed here. In the "Number of MPPT" column it is possible to select whether the standard inputs are to be used or whether the inputs should be connected parallel. In the lines below it is then possible under "Modules" to vary the respective number of modules, the connected strings and the selected PV generators.

KOSTAL PIKO Plan 2.0

File | Extras | Help

SOLAR ELECTRIC

Location

PV generator

Inverter

Layout

string adjustment

Pos	Num...	Inverter	Number of M...	PR	PV generator	Number of modules	Restriction	Rated DC power
1	PIKO 7.0	PIKO 7.0...	1.13	West roof	32	100 %	7.52 kWp	
2	PIKO 4.2	PIKO 7.0 (2) PIKO 7.0 Parallel (1)	1.24	West roof	21	100 %	4.94 kWp	

Cabling

Yield

MPPT | String | Modules | PV generator | U OC (-10) | U MPP (-10) | U MPP STC | U MPP (70°) | Max. DC current

MPPT	String	Modules	PV generator	U OC (-10)	U MPP (-10)	U MPP STC	U MPP (70°)	Max. DC current
A	1	16	West roof	664.08 V	528.92 V	475.20 V	406.13 V	7.91 A
B	1	16	West roof	664.08 V	528.92 V	475.20 V	406.13 V	7.91 A

Total PV power: 12.5 kWp
 Apparent power: 11.20 kVA
 Max. AC power: 10.64 kW
 Power Ratio: 1.17
 Unbalanced phase load: 0.0 kVA
 Cosine φ: 0.95
 Number of modules: 53

Freiburg, Germany
 West roof 12.48 kWp
 53 x Solar-Fabrik AG Premium in cell L mono - 235
 Inclination: 35°
 Alignment: 90°

Cabling

The lengths, cable cross-sections and material used between the PV generator and the inverters, as well as between the inverters and the AC connection, are to be indicated under this point. These are incorporated into the calculation of the yield.

KOSTAL PIKO Plan 2.0

File | Extras | Help

SOLAR ELECTRIC

Location

PV generator

Inverter

Layout

string adjustment

Cabling

Yield

POS	Number	Inverter	PR	PV Generator	Number of PV modules	Rated DC power
1	PIKO 7.0	1.13	West roof	32	7.52 kWp	
2	PIKO 4.2	1.24	West roof	21	4.94 kWp	

DC 1 (2x)

10.0 m
 4.00 mm²
 Copper

AC (3x)

10.0 m
 2.50 mm²
 Copper

DC 1 voltage drop: 0.1 %
 DC 1 power loss: 5.6 W
 DC 1 loss of yield: 5.0 kWh/a

AC Voltage drop: 0.3 %
 AC power loss: 7.4 W
 AC loss of yield: 1.5 kWh/a

Freiburg, Germany
 West roof 12.48 kWp
 53 x Solar-Fabrik AG Premium in cell L mono - 235
 Inclination: 35°
 Alignment: 90°

Yield

Because the yield calculation is more complicated to explain, this will be done here using examples.

Here ("First period") you should enter the number of years and the value of the remuneration in cent for which you are guaranteed remuneration. If, like in the example shown below, you are only remunerated with 70%, set the left control to 70% and enter your costs for the power provided by the supplier into the field now appearing. In the event that you use the remaining 30% power yourself (internal consumption), the monetary value of this 30% (in relation to the generated kWh) will be incorporated into the total calculation.

The "Second period" can be used if you receive less remuneration after a certain period of time. The yields from internal consumption can be entered just as in "First period".

An overview of the yield calculation (e.g. yield, remuneration, avoided CO₂ emissions) is found in the bottom area.

KOSTAL PIKO Plan 2.0

File | Extras | Help

SOLAR ELECTRIC **KOSTAL**

Location

PV generator

Inverter

Layout

string adjustment

Cabling

Yield

First period

70 % 30 %

Payment (70 %) 20 Years 15.00 ct /kWh

Grid demand costs (30 %) 25.00 ct /kWh

Second period

100 % 0 %

Payment (100 %) 5 Years 20.00 ct /kWh

Overview

Number	Inverter	Annual yield	Specific yield	Performance Ratio (PR)	AC power
1	PIKO 7.0	6251 kWh/a	831 kWh/kWp/a	80.89 %	6.65 kW
1	PIKO 4.2	4363 kWh/a	884 kWh/kWp/a	86.04 %	3.99 kW

Smart connections.

Total PV power	12.46 kWp	Total apparent power	11.20 kVA
Total AC power	11.20 kW	Specific total yield	852.22 kWh/kWp/a
Transmission losses	10.48 kWh/a	Total yield	10614.34 kWh/a
Power Ratio	1.17	Total payment	48828.78 €
Total Performance Ratio	83.46 %	CO ₂ emissions avoided	6368.60 t

Freiburg, Germany
West roof 12.46 kWp
53 x Solar-Fabrik AG Premium in cell L mono - 235
Inclination: 35°
Alignment: 90°

Here you can view and edit the yield result for your system.

Print preview

After all entries have been completed and the calculation has been carried out, with the "Print preview" button it is possible to view, save and/or print out the summarised PDF document with all necessary data (incl. your contact data) in order to make it available to the customer.

Print preview - KOSTAL PIKO Plan 2.0

SOLAR ELECTRIC

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Project name: PV-Samplesystem 1/8

Location

Country	Germany
City	Freiburg
Longitude	7.8538 °
Latitude	47.9972 °
Irradiation	1081 kWh/m²a
Average temp.	11 °C
Note	

Customer data

Name Prenom	
Street	
Postcode / City	
Country	
Phone	
Mobile	
Fax	
E-mail	

West roof - Modul data

Manufacturer	Solar-Fabrik AG
Module type	Premium incell L mono - 235
Number of PV modules	53 Piece
Total DC nominal power	12,46 kWp

Smart connections.

Contact person	DH
Company	Installation House
Country	Germany
Phone	
Mobile	
Fax	
E-mail	Max.Muster@kostal.com
Website	www.kostal-solar-electric.com

KOSTAL

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