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Project name: VOYVODINOVO, 11.13 kWp

Location: Bulgaria / Kardzhali

Project number: ---

Grid voltage: 230V (230V / 400V)

System overview

42 x Hanwha Q.Cells GmbH Q.PRO BFR-G4 265 (09/2015) (South-east)

Azimuth angle: -37 °, Tilt angle: 25 °, Mounting type: Roof, Peak power: 11.13 kWp



1 x STP 10000TL-20

System Monitoring



Sunny Portal

PV design data

Total number of PV modules:	42	Annual energy yield*:	14,290.17 kWh
Peak power:	11.13 kWp	Energy usability factor:	99.9 %
Number of PV inverters:	1	Performance ratio*:	85.9 %
Nominal AC power of the PV inverters:	10.00 kW	Spec. energy yield*:	1284 kWh/kWp
AC active power:	10.00 kW	Line losses (in % of PV energy):	---
Active power ratio:	89.8 %	Unbalanced load:	0.00 VA

Signature

*Important: The yield values displayed are estimates. They are determined mathematically. SMA Solar Technology AG accepts no responsibility for the real yield value which can deviate from the yield values displayed here. Reasons for deviations are various external conditions, such as soiling of the PV modules or fluctuations in the efficiency of the PV modules.

Evaluation of design

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Ambient temperature:

Annual extreme low temperature: -11 °C

Average high Temperature: 25 °C

Annual extreme high temperature: 37 °C

Subproject 1

1 x STP 10000TL-20 (PV system section 1)

Peak power:	11.13 kWp
Total number of PV modules:	42
Number of PV inverters:	1
Max. DC power (cos φ = 1):	10.25 kW
Max. AC active power (cos φ = 1):	10.00 kW
Grid voltage:	230V (230V / 400V)
Nominal power ratio:	92 %
Dimensioning factor:	111.3 %
Displacement power factor cos φ:	1



STP 10000TL-20

PV design data

Input A: South-east

21 x Hanwha Q.Cells GmbH Q.PRO BFR-G4 265 (09/2015), Azimuth angle: -37 °, Tilt angle: 25 °, Mounting type: Roof

Input B: South-east

21 x Hanwha Q.Cells GmbH Q.PRO BFR-G4 265 (09/2015), Azimuth angle: -37 °, Tilt angle: 25 °, Mounting type: Roof

	Input A:	Input B:	
Number of strings:	1	1	
PV modules per string:	21	21	
Peak power (input):	5.57 kWp	5.57 kWp	
Typical PV voltage:	✓ 588 V	✓ 588 V	
Min. PV voltage:	545 V	545 V	
Min. DC voltage (Grid voltage 230 V):	150 V	150 V	
Max. PV voltage:	✓ 885 V	✓ 885 V	
Max. DC voltage:	1000 V	1000 V	
Max. MPP current of PV array:	✓ 8.6 A	✓ 8.6 A	
Max. operating input current per MPPT:	18 A	10 A	
Max. input short-circuit current per MPPT:	25 A	15 A	
Photovoltaic Output Circuit Current:	✓ 9.2 A	✓ 9.2 A	

PV/Inverter compatible

Wire sizing

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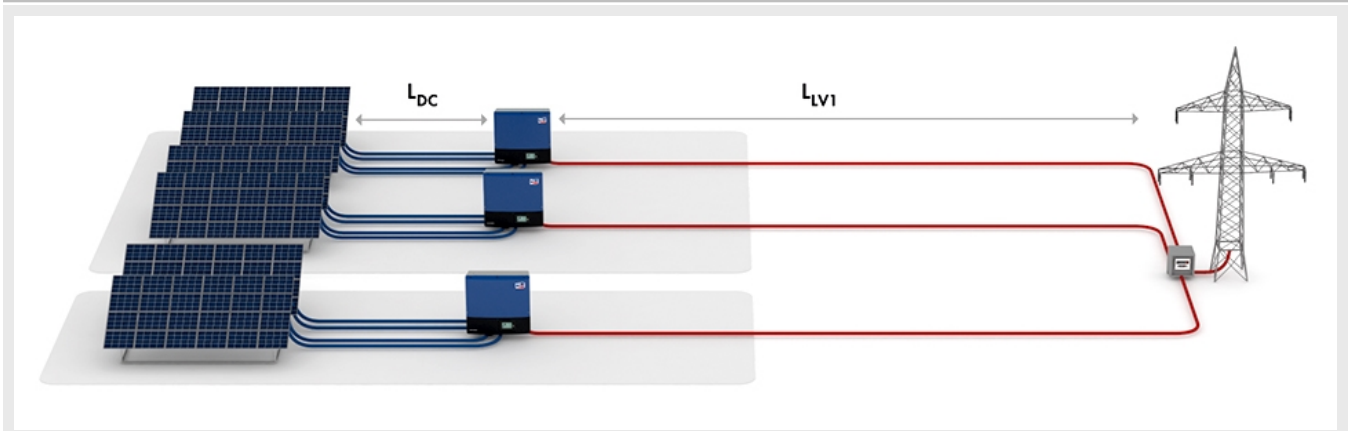
Location: Bulgaria / Kardzhali

Project number:

Overview

	✓ DC	✓ LV	✓ Total
Power loss at nominal operation	17.14 W	10.84 W	27.98 W
Rel. power loss at rated nominal operation	0.14 %	0.11 %	0.25 %
Total cable length	60.00 m	10.00 m	70.00 m
Cable cross-sections	6 mm ²	10 mm ²	6 mm ² 10 mm ²


Graphic



DC cables

	Cable material	Single length	Cross section	Voltage drop	Rel. power loss	
Subproject 1						
 1 x STP 10000TL-20 PV system section 1	A	Copper	15.00 m	6 mm ²	858.6 mV	0.14 %
	B	Copper	15.00 m	6 mm ²	858.6 mV	0.14 %

Lines LV1

	Cable material	Single length	Cross section	Line resistance	Rel. power loss
Subproject 1					
 1 x STP 10000TL-20 PV system section 1	Copper	10.00 m	10 mm ²	R: 5.733 mΩ XL: 0.750 mΩ	0.11 %

The displayed results are approximate values to give a general indication to users of possible operating results. The results are determined mathematically based on standardized assumptions. The actual operating results will be dictated significantly by the actual irradiation conditions, the actual efficiency, the genset operating conditions and the individual consumption behavior and can deviate from the calculated results. SMA SOLAR TECHNOLOGY AG THEREFORE ASSUMES NO LIABILITY FOR YIELD SHORTFALLS IN THE EVENT OF DEVIATIONS BETWEEN THE CALCULATED- AND ACTUAL OPERATING RESULTS.

System Monitoring

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PV system	System Monitoring	
Subproject 1  1 x STP 10000TL-20 PV system section 1		External  Sunny Portal Internet portal for monitoring PV systems and for the visualization and presentation of PV system data

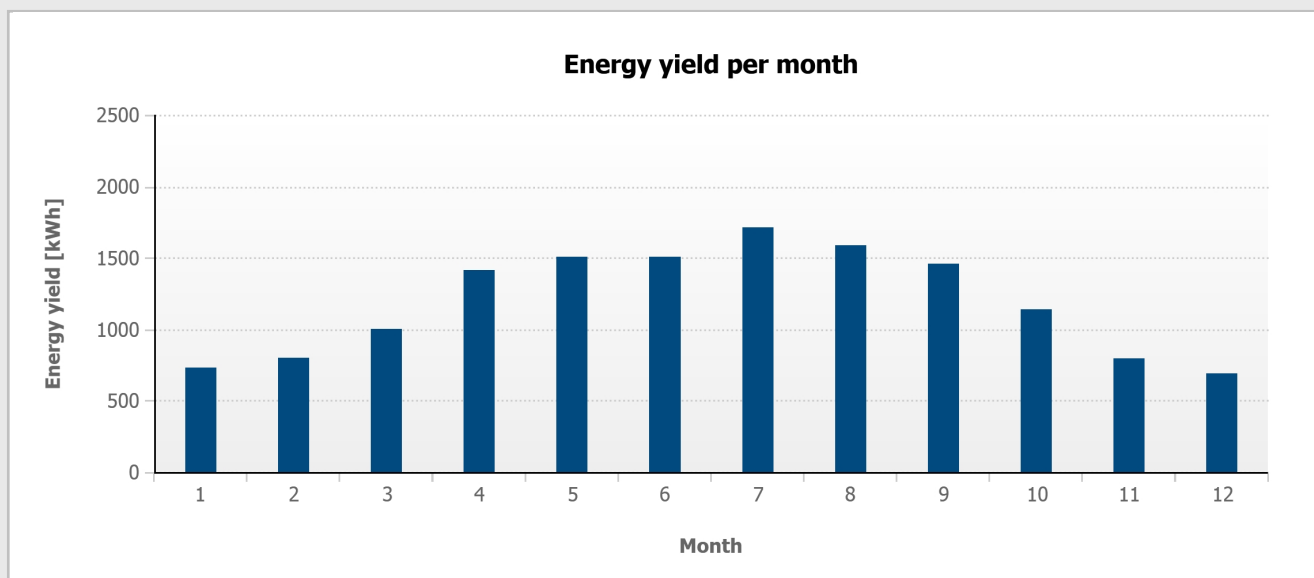
Monthly values

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Diagram



Table

Month	Energy yield [kWh]	Performance ratio
1	728 (5.1 %)	88 %
2	796 (5.6 %)	88 %
3	999 (7.0 %)	87 %
4	1408 (9.9 %)	87 %
5	1503 (10.5 %)	85 %
6	1499 (10.5 %)	84 %
7	1708 (11.9 %)	84 %
8	1583 (11.1 %)	84 %
9	1454 (10.2 %)	86 %
10	1133 (7.9 %)	87 %
11	792 (5.5 %)	87 %
12	687 (4.8 %)	88 %