



REGIONE: SICILIA	PROVINCIA: PALERMO
COMUNE: CAMPOFELICE DI FITALIA	LOCALITA': C/da Cozzo d'Agnello

TIPO PROGETTO: PD	OGGETTO: Progetto per la realizzazione di un impianto agrovoltaico denominato 'Agrovoltaico Campofelice' per la produzione di energia elettrica con una potenza installata di 49,694 MW, potenza di immissione di 46,000 MW e potenza del sistema di accumulo di 10 MW, per la produzione agricola di beni e servizi oltre alle opere connesse e alle infrastrutture indispensabili nell' area identificata nel comune di Campofelice di Fitalia (PA)
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TAVOLA N.: RE 05.024	IMPIANTO: AGROFOTOVOLTAICO CAMPOFELICE	SCALA
	ELABORATO: Report PVsyst	COD. DOC. _____ REV. _____

PROPONENTE: FRI-ELSUN	RESPONSABILE: <i>Timbro e Firma</i>	APPROVATO DA: <i>Timbro e Firma</i>
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PROGETTISTA 	DIRETTORE TECNICO: ARCH: FRANCESCO LAUDICINA 	REDATTO DA:
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REV.	DATA	REDATTO	DESCRIZIONE
0			
1			
2			
3			

Ordine Nazionale dei Biologi
 Sez. A - N. AA. 083791
 Dott. Salvatore Gambria

Allegato alla relazione tecnica illustrativa di progetto

SCHEDA DI SINTESI DATI DI PROGETTO
con Smart Inverter String

POTENZA TOT - 49694,40 Kw							
Campo FV 05_1-A		Potenza 1294,56 Kw					
Stringhe	3x15	Stringa da 1x24 moduli					
Stringhe	3x16						
N. pannelli	2232						
N. inverter	6						
N. cabine	1						
Campo FV 05_2-B		Potenza 8546,88 Kw					
Sottocampo FV 05_2-B1		Potenza 4134,24 Kw		Sottocampo FV 05_2-B2		Potenza 4412,64 Kw	
Stringhe	7x15	Stringa da 1x24 moduli		Stringhe	19x15	Stringa da 1x24 moduli	
Stringhe	12x16			Stringhe	2x16		
N. pannelli	7128			N. pannelli	7608		
N. inverter	19			N. inverter	21		
N. cabine	1			N. cabine	2		
Campo FV 05_3-C		Potenza 3215,52 Kw					
Stringhe	9x15	Stringa da 1x24 moduli					
Stringhe	6x16						
N. pannelli	5544						
N. inverter	15						
N. cabine	1						
Campo FV 05_4-D		Potenza 8825,28 Kw					
Sottocampo FV 05_4-D1		Potenza 4412,64 Kw		Sottocampo FV 05_4-D2		Potenza 4412,64 Kw	
Stringhe	19x15	Stringa da 1x24 moduli		Stringhe	19x15	Stringa da 1x24 moduli	
Stringhe	2x16			Stringhe	2x16		
N. pannelli	7608			N. pannelli	7608		
N. inverter	21			N. inverter	21		
N. cabine	2			N. cabine	1		
Campo FV 05_5-E		Potenza 2853,60 Kw					
Stringhe	3x15	Stringa da 1x24 moduli					
Stringhe	10x16						
N. pannelli	4920						
N. inverter	13						
N. cabine	1						
Campo FV 05_6-F		Potenza 6236,16 Kw					
Stringhe	16x15	Stringa da 1x24 moduli					
Stringhe	13x16						
N. pannelli	10752						
N. inverter	29						
N. cabine	3						
Campo FV 05_7-G		Potenza 3507,84 Kw					
Stringhe	4x15	Stringa da 1x24 moduli					
Stringhe	12x16						
N. pannelli	6048						
N. inverter	16						
N. cabine	2						
Campo FV 05_8-H		Potenza 11122,08 Kw					
Sottocampo FV 05_8-H1		Potenza 3633,12 Kw		Sottocampo FV 05_8-H2		Potenza 3633,12 Kw	
Stringhe	11x15	Stringa da 1x24 moduli		Stringhe	11x15	Stringa da 1x24 moduli	
Stringhe	6x16			Stringhe	6x16		
N. pannelli	6264			N. pannelli	6264		
N. inverter	17			N. inverter	17		
N. cabine	1			N. cabine	1		
Sottocampo FV 05_8-H3		Potenza 487,2 Kw		Sottocampo FV 05_8-H4		Potenza 3368,64 Kw	
Stringhe	1x11	Stringa da 1x24 moduli		Stringhe	14x15	Stringa da 1x24 moduli	
Stringhe	2x12			Stringhe	2x16		
N. pannelli	840			N. pannelli	5808		
N. inverter	3			N. inverter	16		
N. cabine	-			N. cabine	2		
Campo FV 05_9-I		Potenza 4092,48 Kw					
Stringhe	10x15	Stringa da 1x24 moduli					
Stringhe	9x16						
N. pannelli	7056						
N. inverter	19						
N. cabine	2						
N. tot. pannelli		85680					
N. tot. inverter		233					
N. tot. cabine		20					

PVsyst - Simulation report

Grid-Connected System

Progetto: Impianto PV_CAMPOFELICE

Località: Campofelice di Fitalia (PA)

Inseguitore singolo + Struttura fissa

System power: 49.69 MWp

Villafrati - Italia



Progettisti





Project: Progetto PV_ASIA Project

Variant: Nuova variante di simulazione - CAMPO FELICE

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12/05/21 13:48
with v7.1.1

Project summary

Geographical Site Villafrati Italia	Situation Latitude 37.91 °N Longitude 13.48 °E Altitude 458 m Time zone UTC+1	Project settings Albedo 0.20
Meteo data Villafrati PVGIS api TMY		

System summary

Grid-Connected System	Inseguitore singolo + Struttura fissa		
PV Field Orientation Tracking plane, horizontal N-S axis Axis azimuth 0 °	Near Shadings Linear shadings	User's needs Unlimited load (grid)	
System information			
PV Array		Inverters	
Nb. of modules 85680 units		Nb. of units 233 units	
Pnom total 49.69 MWp		Pnom total 46.60 MWac	
		Pnom ratio 1.066	

Results summary

Produced Energy 93601 MWh/year	Specific production 1884 kWh/kWp/year	Perf. Ratio PR 84.76 %
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General parameters

Grid-Connected System		Inseguitore singolo + Struttura fissa	
PV Field Orientation			
Orientation		Backtracking strategy	Models used
Tracking plane, horizontal N-S axis		Nb. of trackers	200 units
Axis azimuth	0 °	Single array	
		Sizes	
		Tracker Spacing	10.00 m
		Collector width	4.80 m
		Ground Cov. Ratio (GCR)	48.0 %
		Top inactive band	0.02 m
		Bottom inactive band	0.02 m
		Backtracking limit angle	
		Phi limits	+/- 60.9 °
Horizon		Near Shadings	User's needs
Average Height	6.6 °	Linear shadings	Unlimited load (grid)

PV Array Characteristics

PV module		Inverter	
Manufacturer	Jinkosolar	Manufacturer	Huawei Technologies
Model	JKM580M-7RL4	Model	SUN2000-215KTL-H0
(Custom parameters definition)		(Original PVsyst database)	
Unit Nom. Power	580 Wp	Unit Nom. Power	200 kWac
Number of PV modules	85680 units	Number of inverters	233 units
Nominal (STC)	49.69 MWp	Total power	46600 kWac
Array #1 - Campo Fv_05_1A			
Number of PV modules	2232 units	Number of inverters	6 units
Nominal (STC)	1295 kWp	Total power	1200 kWac
Modules	93 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	
Pmpp	1166 kWp	Operating voltage	500-1500 V
U mpp	967 V	Max. power (=>33°C)	215 kWac
I mpp	1206 A	Pnom ratio (DC:AC)	1.08
Array #2 - Campo Fv_05_2B-1			
Number of PV modules	7128 units	Number of inverters	19 units
Nominal (STC)	4134 kWp	Total power	3800 kWac
Modules	297 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	
Pmpp	3724 kWp	Operating voltage	500-1500 V
U mpp	967 V	Max. power (=>33°C)	215 kWac
I mpp	3850 A	Pnom ratio (DC:AC)	1.09
Array #3 - Campo Fv_05_2B-2			
Number of PV modules	7608 units	Number of inverters	21 units
Nominal (STC)	4413 kWp	Total power	4200 kWac
Modules	317 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	
Pmpp	3975 kWp	Operating voltage	500-1500 V
U mpp	967 V	Max. power (=>33°C)	215 kWac
I mpp	4109 A	Pnom ratio (DC:AC)	1.05



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PV Array Characteristics

Array #4 - Campo Fv_05_3C

Number of PV modules	5544 units	Number of inverters	15 units
Nominal (STC)	3216 kWp	Total power	3000 kWac
Modules	231 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	2896 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.07
I mpp	2994 A		

Array #5 - Campo Fv_05_4D-1

Number of PV modules	7608 units	Number of inverters	21 units
Nominal (STC)	4413 kWp	Total power	4200 kWac
Modules	317 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	3975 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.05
I mpp	4109 A		

Array #6 - Campo Fv_05_4D-2

Number of PV modules	7608 units	Number of inverters	21 units
Nominal (STC)	4413 kWp	Total power	4200 kWac
Modules	317 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	3975 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.05
I mpp	4109 A		

Array #7 - Campo Fv_05_5E

Number of PV modules	4920 units	Number of inverters	13 units
Nominal (STC)	2854 kWp	Total power	2600 kWac
Modules	205 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	2570 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.10
I mpp	2657 A		

Array #8 - Campo Fv_05_6F

Number of PV modules	10752 units	Number of inverters	29 units
Nominal (STC)	6236 kWp	Total power	5800 kWac
Modules	448 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	5617 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.08
I mpp	5807 A		

Array #9 - Campo Fv_05_7G

Number of PV modules	6048 units	Number of inverters	16 units
Nominal (STC)	3508 kWp	Total power	3200 kWac
Modules	252 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	3160 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.10
I mpp	3267 A		



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PV Array Characteristics

Array #10 - Campo Fv_05_8H-1

Number of PV modules	6264 units	Number of inverters	17 units
Nominal (STC)	3633 kWp	Total power	3400 kWac
Modules	261 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	3272 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.07
I mpp	3383 A		

Array #11 - Campo Fv_05_8H-2

Number of PV modules	6264 units	Number of inverters	17 units
Nominal (STC)	3633 kWp	Total power	3400 kWac
Modules	261 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	3272 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.07
I mpp	3383 A		

Array #12 - Campo Fv_05_8H-3

Number of PV modules	840 units	Number of inverters	3 units
Nominal (STC)	487 kWp	Total power	600 kWac
Modules	35 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	439 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	0.81
I mpp	454 A		

Array #13 - Campo Fv_05_8H-4

Number of PV modules	5808 units	Number of inverters	16 units
Nominal (STC)	3369 kWp	Total power	3200 kWac
Modules	242 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	3034 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.05
I mpp	3137 A		

Array #14 - Campo Fv_05_9I

Number of PV modules	7056 units	Number of inverters	19 units
Nominal (STC)	4092 kWp	Total power	3800 kWac
Modules	294 Strings x 24 In series		
At operating cond. (50°C)		Operating voltage	500-1500 V
Pmpp	3686 kWp	Max. power (=>33°C)	215 kWac
U mpp	967 V	Pnom ratio (DC:AC)	1.08
I mpp	3811 A		

Total PV power

Nominal (STC)	49694 kWp
Total	85680 modules
Module area	234255 m²
Cell area	328806 m²

Total inverter power

Total power	46600 kWac
Nb. of inverters	233 units
Pnom ratio	1.07



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Array losses

Thermal Loss factor

Module temperature according to irradiance
Uc (const) 29.0 W/m²K
Uv (wind) 0.0 W/m²K/m/s

Module Quality Loss

Loss Fraction -0.8 %

Module mismatch losses

Loss Fraction 2.0 % at MPP

Strings Mismatch loss

Loss Fraction 0.1 %

IAM loss factor

Incidence effect (IAM): Fresnel smooth glass, n = 1.526

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.998	0.981	0.948	0.862	0.776	0.636	0.403	0.000

Spectral correction

FirstSolar model

Coefficient Set	C0	C1	C2	C3	C4	C5
	0	0	0	0	0	0

DC wiring losses

Global wiring resistance 0.35 mΩ
Loss Fraction 1.5 % at STC

Array #1 - Campo Fv_05_1A

Global array res. 10 mΩ
Loss Fraction 1.1 % at STC

Array #2 - Campo Fv_05_2B-1

Global array res. 4.2 mΩ
Loss Fraction 1.5 % at STC

Array #3 - Campo Fv_05_2B-2

Global array res. 3.9 mΩ
Loss Fraction 1.5 % at STC

Array #4 - Campo Fv_05_3C

Global array res. 5.4 mΩ
Loss Fraction 1.5 % at STC

Array #5 - Campo Fv_05_4D-1

Global array res. 3.9 mΩ
Loss Fraction 1.5 % at STC

Array #6 - Campo Fv_05_4D-2

Global array res. 3.9 mΩ
Loss Fraction 1.5 % at STC

Array #7 - Campo Fv_05_5E

Global array res. 6.1 mΩ
Loss Fraction 1.5 % at STC

Array #8 - Campo Fv_05_6F

Global array res. 2.8 mΩ
Loss Fraction 1.5 % at STC

Array #9 - Campo Fv_05_7G

Global array res. 4.9 mΩ
Loss Fraction 1.5 % at STC

Array #10 - Campo Fv_05_8H-1

Global array res. 4.8 mΩ
Loss Fraction 1.5 % at STC

Array #11 - Campo Fv_05_8H-2

Global array res. 4.8 mΩ
Loss Fraction 1.5 % at STC

Array #12 - Campo Fv_05_8H-3

Global array res. 36 mΩ
Loss Fraction 1.5 % at STC

Array #13 - Campo Fv_05_8H-4

Global array res. 5.2 mΩ
Loss Fraction 1.5 % at STC

Array #14 - Campo Fv_05_9I

Global array res. 4.2 mΩ
Loss Fraction 1.5 % at STC



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Horizon definition

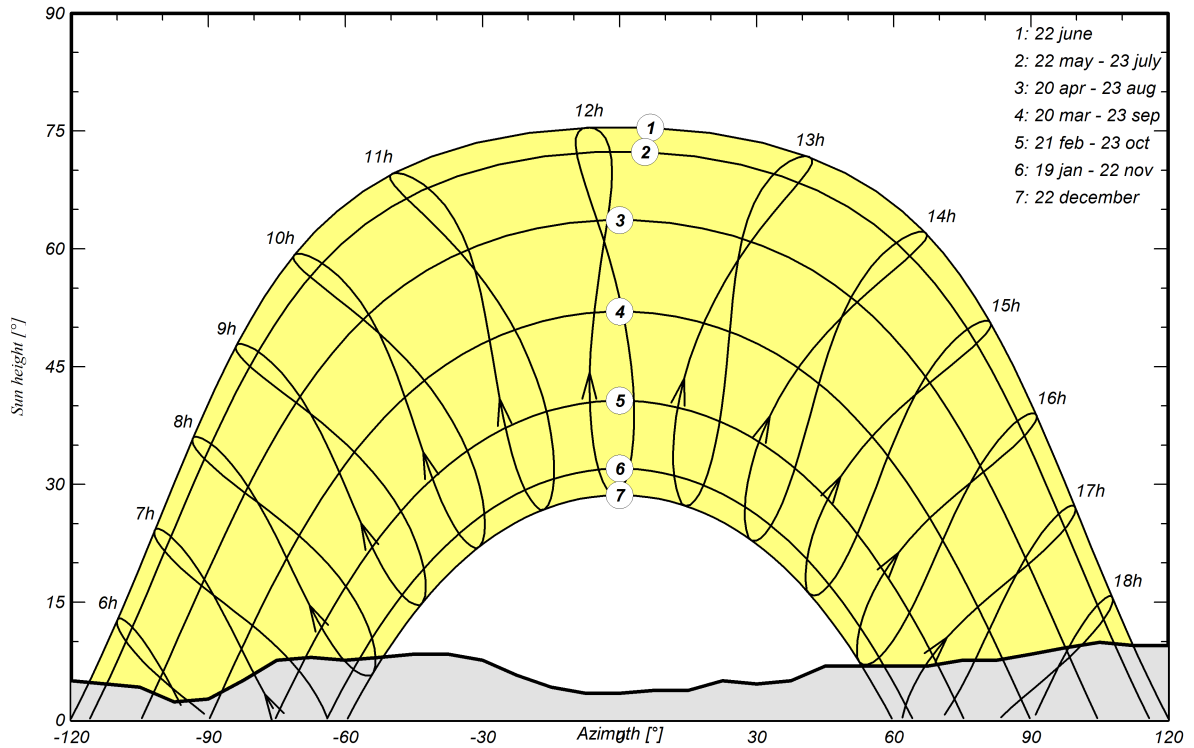
Average Height 6.6 ° Albedo Factor 0.59
Diffuse Factor 0.92 Albedo Fraction 100 %

Horizon profile

Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-113	-105	-98	-90	-83
Height [°]	6.9	8.4	8.4	5.7	5.0	5.0	5.3	5.3	5.0	4.6	4.2	2.3	2.7	5.0
Azimuth [°]	-75	-68	-60	-53	-45	-38	-30	-23	-15	-8	0	8	15	23
Height [°]	7.6	8.0	7.6	8.0	8.4	8.4	7.6	5.7	4.2	3.4	3.4	3.8	3.8	5.0
Azimuth [°]	30	38	45	68	75	83	90	98	105	113	158	165	173	180
Height [°]	4.6	5.0	6.9	6.9	7.6	7.6	8.4	9.2	9.9	9.5	9.5	5.0	5.0	6.9

Sun Paths (Height / Azimuth diagram)

Horizon from PVGIS website API, Lat=37°54'48', Long=13°28'53', Alt=458m



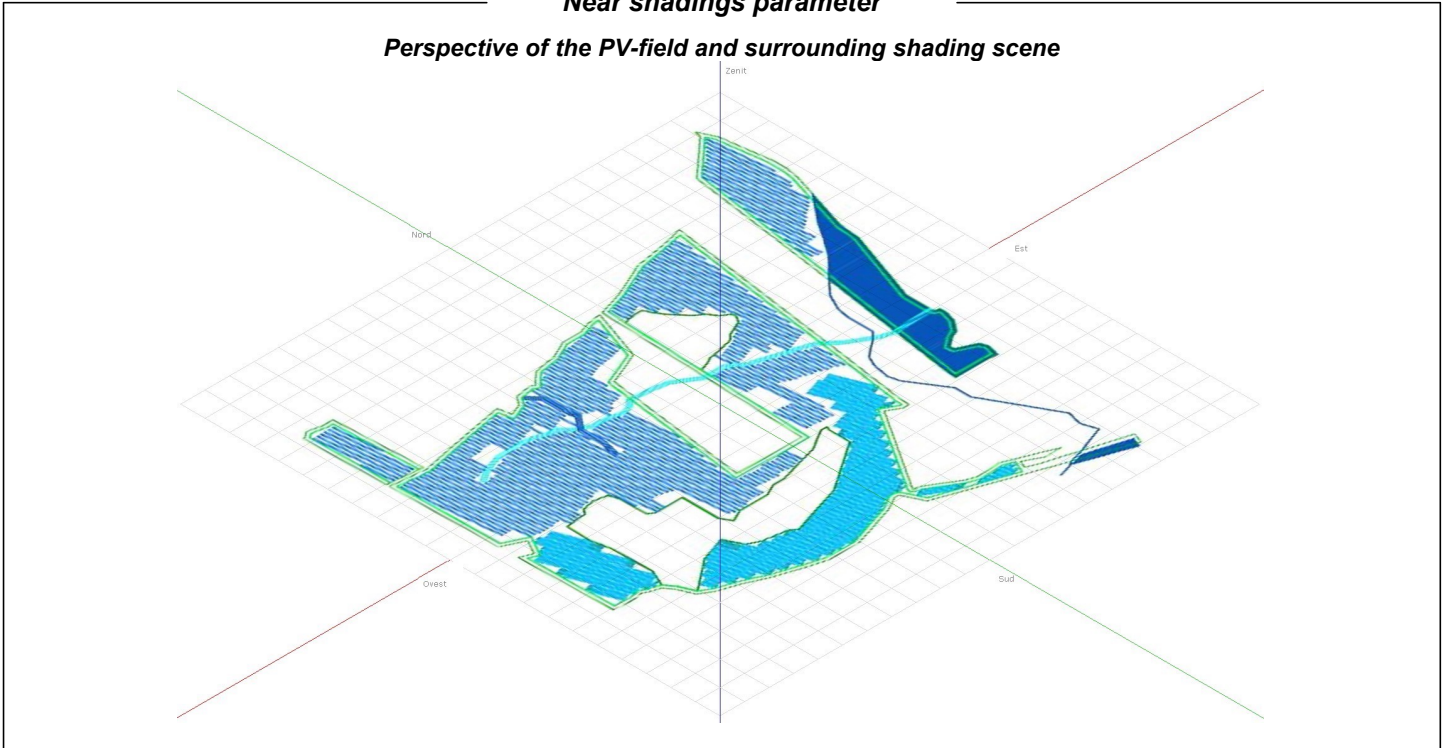


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Near shadings parameter

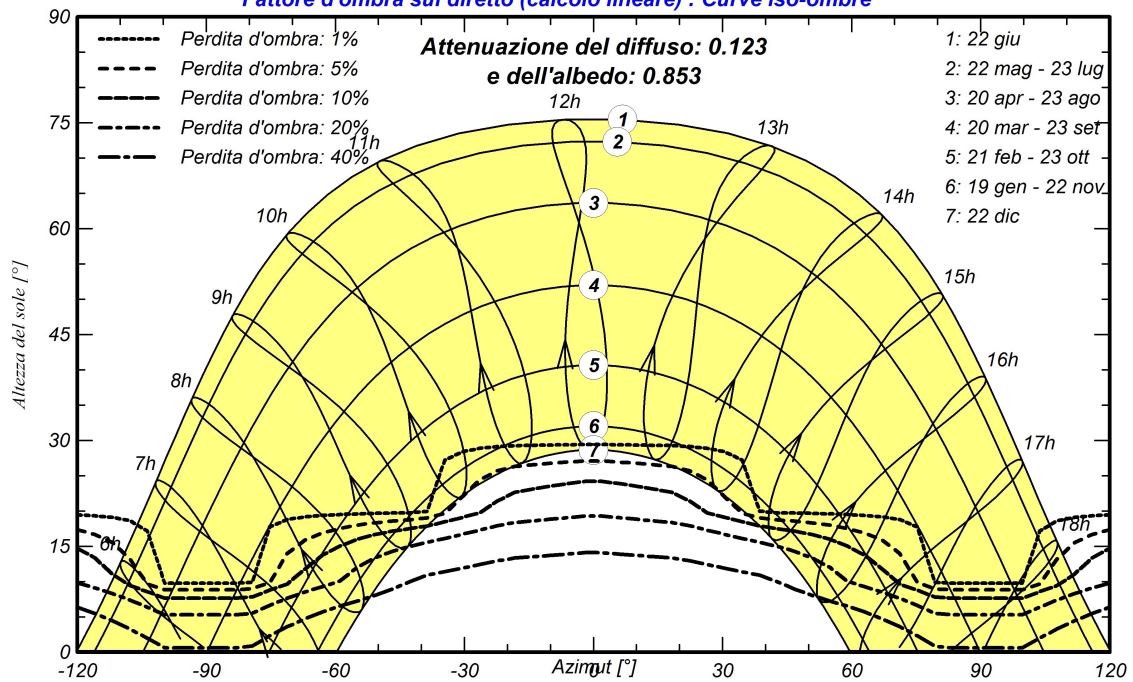
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Progetto PV_ASIA Project

Fattore d'ombra sul diretto (calcolo lineare) : Curve iso-ombre





Project: Progetto PV_ASIA Project

Variant: Nuova variante di simulazione - CAMPO FELICE

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Main results

System Production

Produced Energy 93601 MWh/year

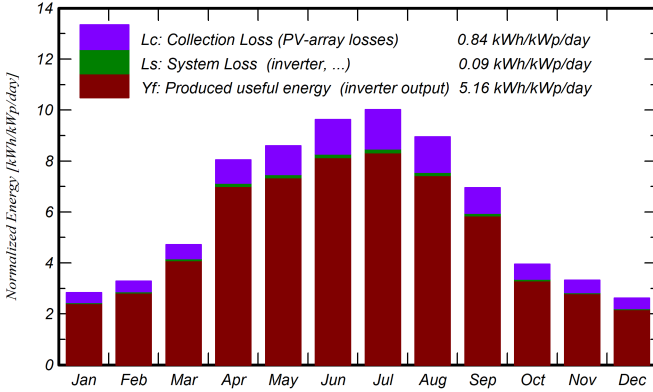
Specific production

1884 kWh/kWp/year

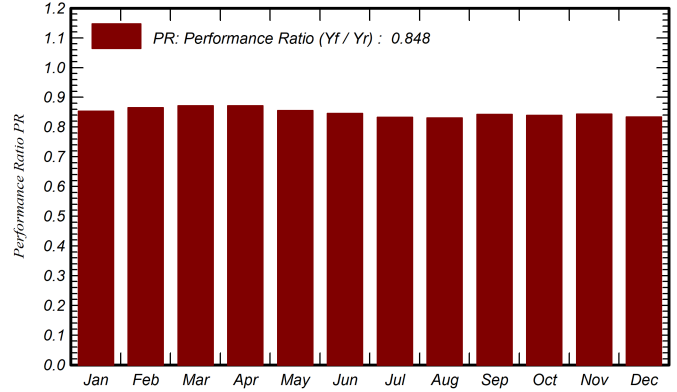
Performance Ratio PR

84.76 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR	EArray
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	MWh	MWh	ratio	MWh
January	68.3	30.08	11.80	87.8	80.7	3781	3721	0.853	3781
February	74.4	41.14	9.23	91.8	85.6	4011	3947	0.865	4011
March	116.5	55.59	11.28	146.1	138.8	6430	6326	0.871	6430
April	191.1	66.95	12.93	241.5	232.6	10637	10460	0.872	10637
May	211.9	70.26	16.76	266.3	257.1	11522	11324	0.856	11522
June	228.4	72.24	20.29	289.0	279.6	12356	12141	0.845	12356
July	241.2	63.14	24.89	310.5	301.4	13073	12841	0.832	13073
August	214.0	61.78	24.67	277.6	268.3	11663	11460	0.831	11663
September	162.4	56.12	22.34	208.6	200.6	8879	8730	0.842	8879
October	99.6	49.47	19.16	122.3	115.4	5188	5102	0.840	5188
November	77.0	32.21	16.30	99.7	92.5	4250	4182	0.844	4250
December	64.4	32.69	12.85	81.3	73.4	3421	3366	0.834	3421
Year	1749.2	631.68	16.93	2222.3	2126.0	95212	93601	0.848	95212

Legends

GlobHor Global horizontal irradiation

DiffHor Horizontal diffuse irradiation

T_Amb Ambient Temperature

GlobInc Global incident in coll. plane

GlobEff Effective Global, corr. for IAM and shadings

EArray Effective energy at the output of the array

E_Grid Energy injected into grid

PR Performance Ratio

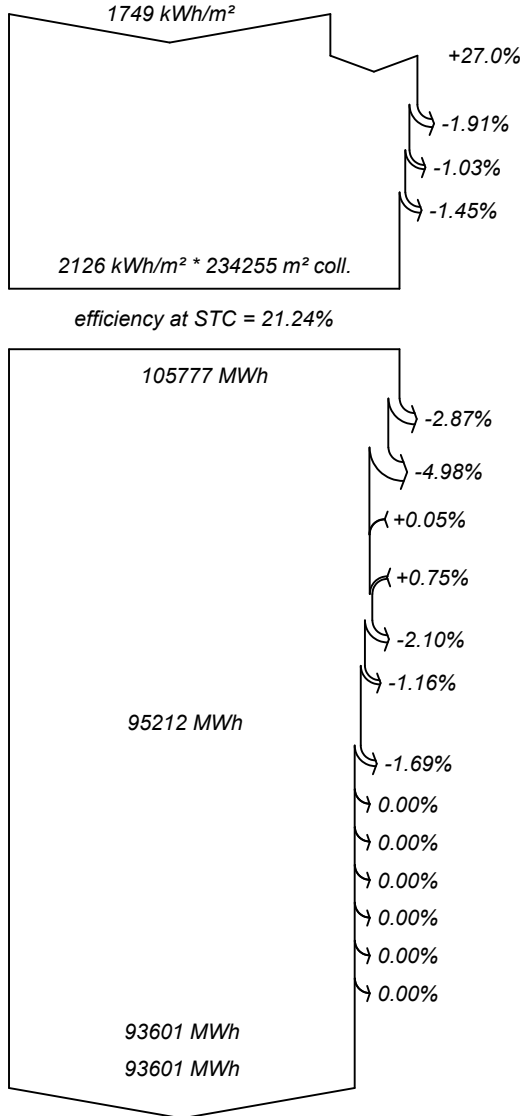
EArray Effective energy at the output of the array



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Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Far Shadings / Horizon

Near Shadings: irradiance loss

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Spectral correction

Module quality loss

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

Available Energy at Inverter Output

Energy injected into grid

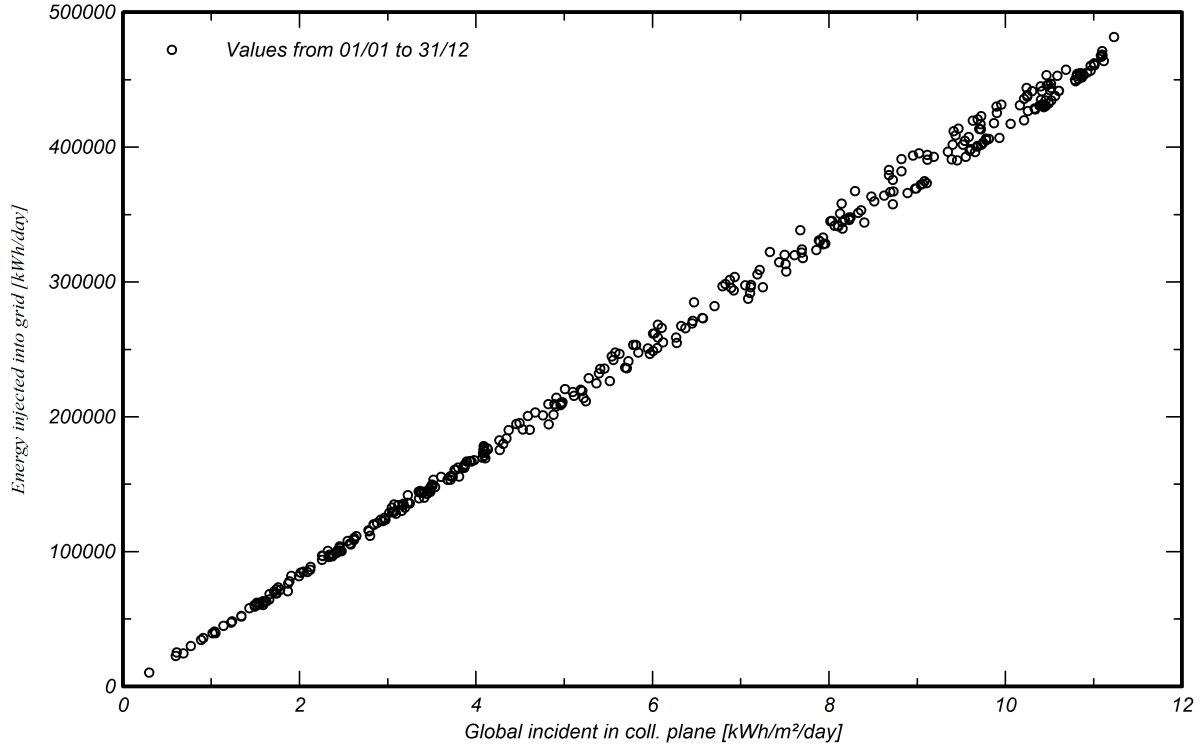


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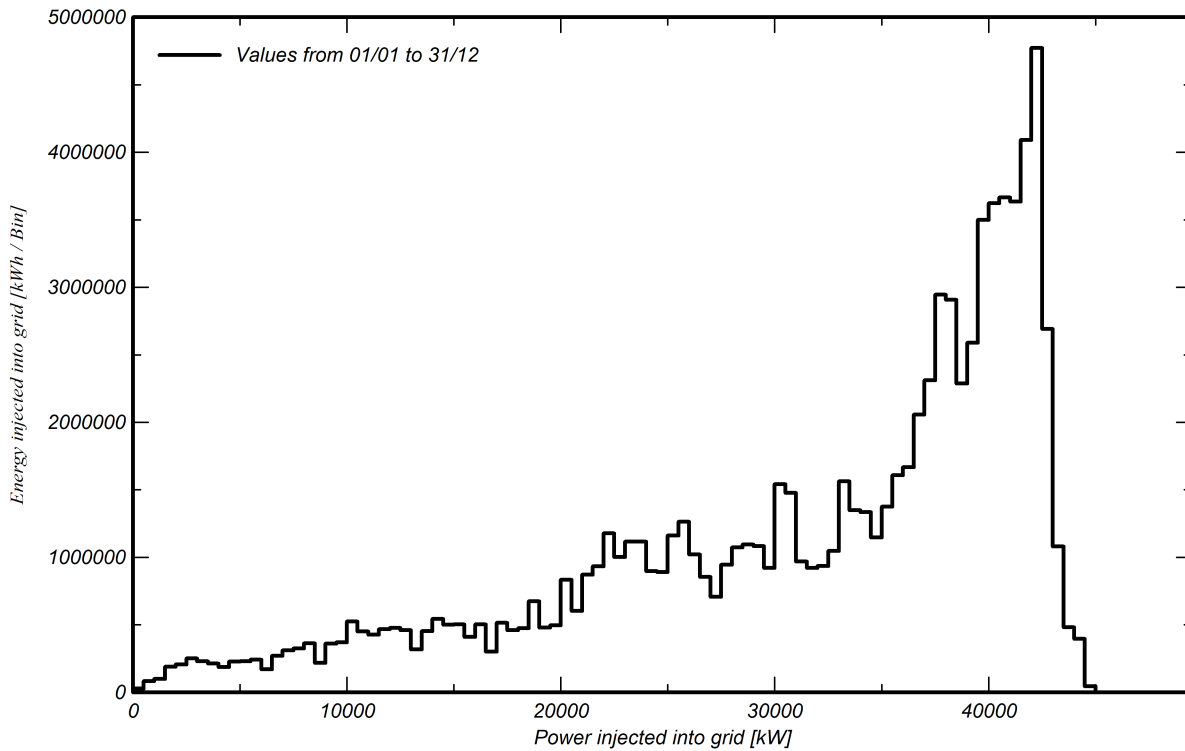
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Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema





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P50 - P90 evaluation

Meteo data

Meteo data source	PVGIS api TMY
Kind	Own measured
Year	TMY
Year-to-year variability(Variance)	2.5 %

Specified Deviation

Year deviation from average	0.0 %
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Global variability (meteo + system)

Variability (Quadratic sum)	3.1 %
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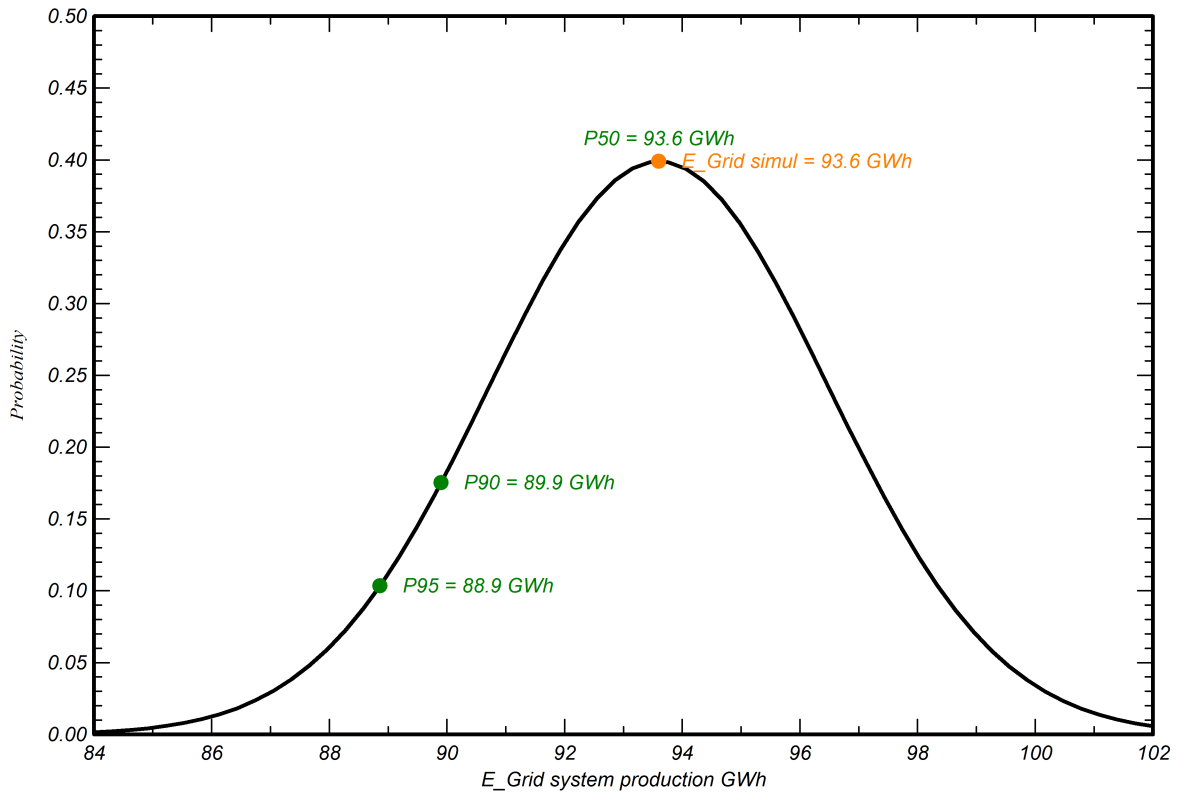
Simulation and parameters uncertainties

PV module modelling/parameters	1.0 %
Inverter efficiency uncertainty	0.5 %
Soiling and mismatch uncertainties	1.0 %
Degradation uncertainty	1.0 %

Annual production probability

Variability	2.9 GWh
P50	93.6 GWh
P90	89.9 GWh
P95	88.9 GWh

Probability distribution



Allegato alla relazione tecnica illustrativa di progetto

SCHEDE TECNICHE

Moduli Fotovoltaici
Inverter Fotovoltaici
Cabine di Trasformazione

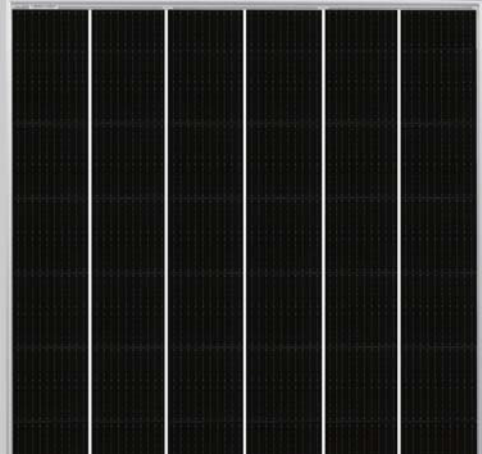
TR 78M 560-580 Watt Mono-facial

Tiling Ribbon (TR) Technology

Positive power tolerance of 0~+3%

(Draft)

TIGER Pro



KEY FEATURES



TR technology + Half Cell

TR technology with Half cell aims to eliminate the cell gap to increase module efficiency (mono-facial up to 21.21%)



MBB instead of 5BB

MBB technology decreases the distance between bus bars and finger grid line which is benefit to power increase.



Higher lifetime Power Yield

2% first year degradation,
0.55% linear degradation



Best Warranty

12 year product warranty,
25 year linear power warranty



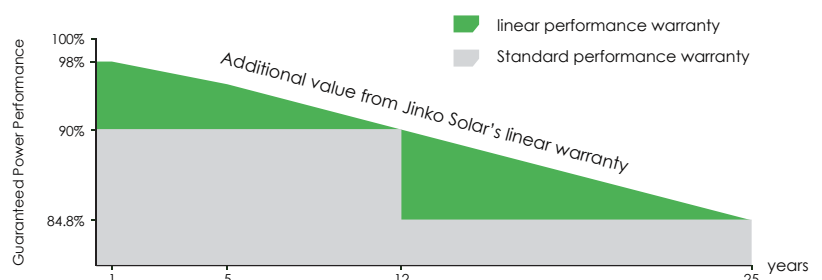
Strengthened Mechanical Support

5400 Pa snow load, 2400 Pa wind load



LINEAR PERFORMANCE WARRANTY

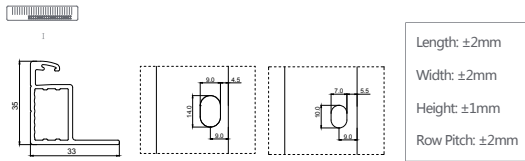
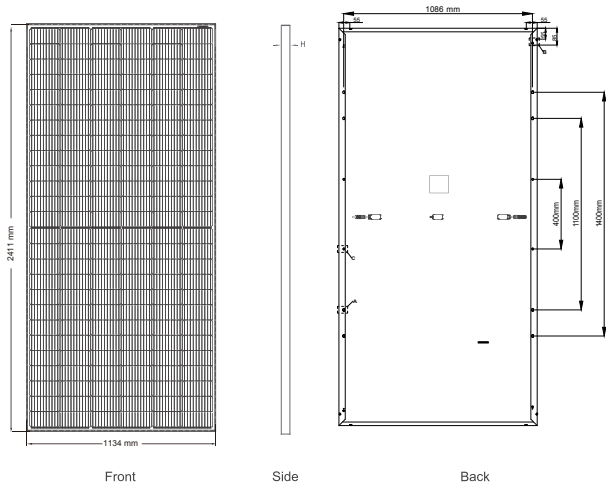
12 Year Product Warranty • 25 Year Linear Power Warranty
0.55% Annual Degradation Over 25 years



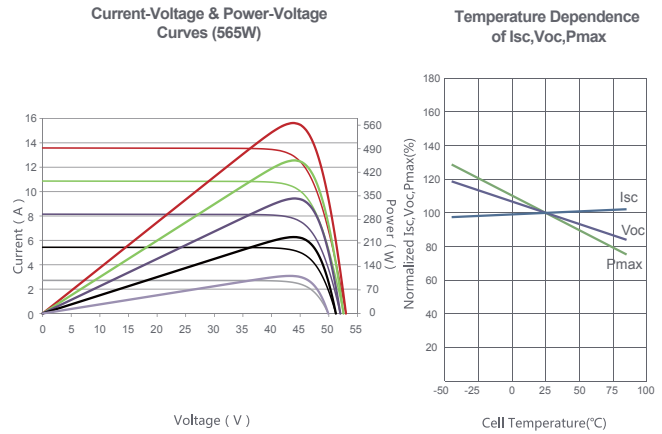
ISO9001:2015, ISO14001:2015, ISO45001:2018 certified factory

IEC61215, IEC61730 certified product

Engineering Drawings



Electrical Performance & Temperature Dependence



Mechanical Characteristics

Cell Type	P type Mono-crystalline
No. of cells	156 (2×78)
Dimensions	2411×1134×35mm (94.92×44.65×1.38 inch)
Weight	30.93 kg (68.2 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68 Rated
Output Cables	TUV 1×4.0mm ² (+): 290mm, (-): 145 mm or Customized Length

Packaging Configuration

(Two pallets = One stack)

31pcs/pallets, 62pcs/stack, 496pcs/ 40'HQ Container

SPECIFICATIONS

Module Type	JKM560M-7RL4-V		JKM565M-7RL4-V		JKM570M-7RL4-V		JKM575M-7RL4-V		JKM580M-7RL4-V	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	560Wp	417Wp	565Wp	420Wp	570Wp	424Wp	575Wp	428Wp	580Wp	432Wp
Maximum Power Voltage (Vmp)	44.31V	40.63V	44.43V	40.72V	44.55V	40.80V	44.67V	40.89V	44.78V	40.97V
Maximum Power Current (Imp)	12.64A	10.25A	12.72A	10.32A	12.80A	10.39A	12.88A	10.46A	12.96A	10.53A
Open-circuit Voltage (Voc)	52.90V	49.93V	53.00V	50.03V	53.10V	50.12V	53.20V	50.21V	53.30V	50.31V
Short-circuit Current (Isc)	13.50A	10.90A	13.58A	10.97A	13.66A	11.03A	13.74A	11.10A	13.82A	11.16A
Module Efficiency STC (%)	20.48%		20.67%		20.85%		21.03%		21.21%	
Operating Temperature(°C)	-40°C~+85°C									
Maximum system voltage	1500VDC (IEC)									
Maximum series fuse rating	25A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.35%/°C									
Temperature coefficients of Voc	-0.28%/°C									
Temperature coefficients of Isc	0.048%/°C									
Nominal operating cell temperature (NOCT)	45±2°C									

* STC: ☀ Irradiance 1000W/m² 📏 Cell Temperature 25°C

☁ AM=1.5

NOCT: ☀ Irradiance 800W/m² 📏 Ambient Temperature 20°C

☁ AM=1.5

🌀 Wind Speed 1m/s

* Power measurement tolerance: ± 3%

SUN2000-215KTL-H0

Smart String Inverter



9
MPP Trackers



99.0%
Max. Efficiency



String-level
Management



Smart I-V Curve
Diagnosis Supported



MBUS
Supported



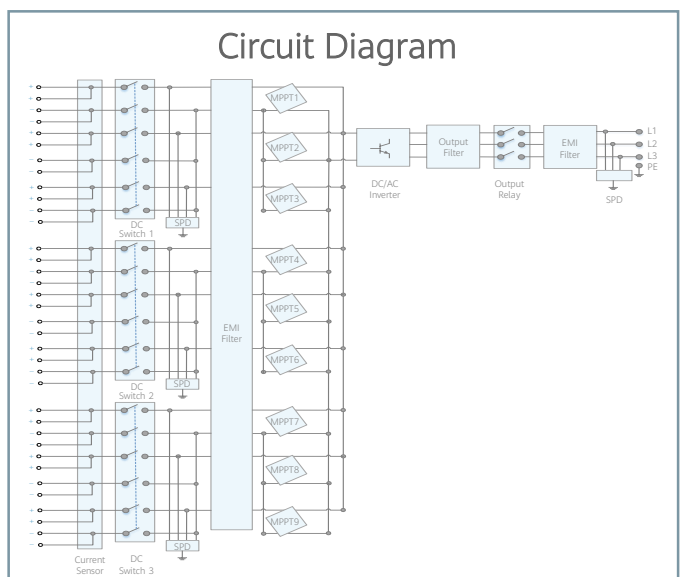
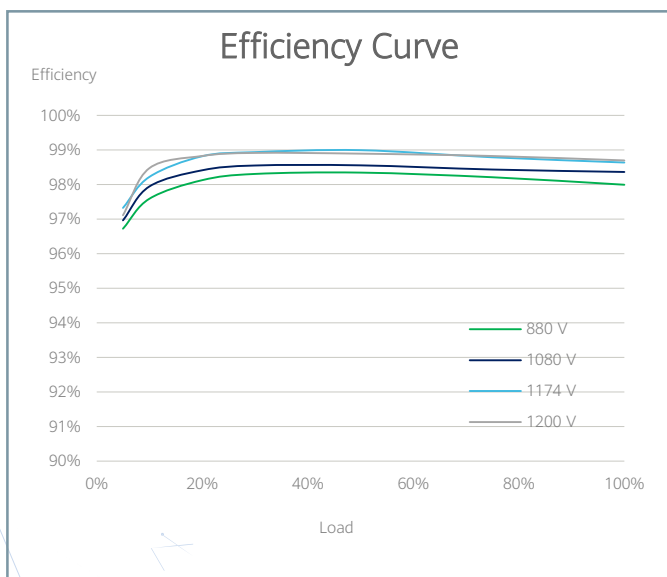
Fuse Free
Design



Surge Arresters for
DC & AC

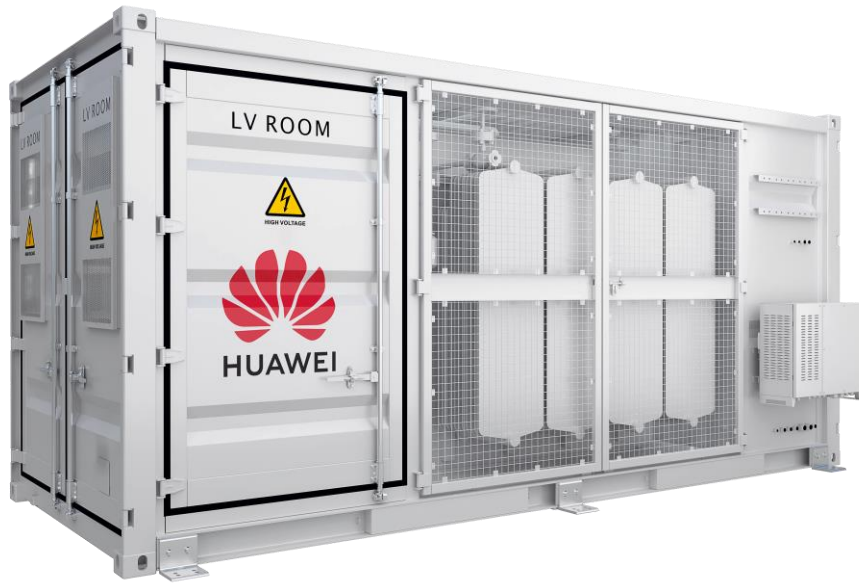


IP66
Protection



Technical Specifications

Efficiency	
Max. Efficiency	≥99.00%
European Efficiency	≥98.60%
Input	
Max. Input Voltage	1,500 V
Max. Current per MPPT	30 A
Max. Short Circuit Current per MPPT	50 A
Start Voltage	550 V
MPPT Operating Voltage Range	500 V ~ 1,500 V
Nominal Input Voltage	1,080 V
Number of Inputs	18
Number of MPP Trackers	9
Output	
Nominal AC Active Power	200,000 W
Max. AC Apparent Power	215,000 VA
Max. AC Active Power (cosφ=1)	215,000 W
Nominal Output Voltage	800 V, 3W + PE
Rated AC Grid Frequency	50 Hz / 60 Hz
Nominal Output Current	144.4 A
Max. Output Current	155.2 A
Adjustable Power Factor Range	0.8 LG ... 0.8 LD
Max. Total Harmonic Distortion	< 1%
Protection	
Input-side Disconnection Device	Yes
Anti-islanding Protection	Yes
AC Overcurrent Protection	Yes
DC Reverse-polarity Protection	Yes
PV-array String Fault Monitoring	Yes
DC Surge Arrester	Type II
AC Surge Arrester	Type II
DC Insulation Resistance Detection	Yes
Residual Current Monitoring Unit	Yes
Communication	
Display	LED Indicators, WLAN + APP
USB	Yes
MBUS	Yes
RS485	Yes
General	
Dimensions (W x H x D)	1,035 x 700 x 365 mm (40.7 x 27.6 x 14.4 inch)
Weight (with mounting plate)	≤86 kg (189.6 lb.)
Operating Temperature Range	-25°C ~ 60°C (-13°F ~ 140°F)
Cooling Method	Smart Air Cooling
Max. Operating Altitude without Derating	4,000 m (13,123 ft.)
Relative Humidity	0 ~ 100%
DC Connector	Staubli MC4 EVO2
AC Connector	Waterproof Connector + OT/DT Terminal
Protection Degree	IP66
Topology	Transformerless



Simple

Prefabricated and pre-tested, no onsite internal cabling
Compact 20'HC container design for easy transportation



Efficiency

Eco-design Transformer Suitable for All
Lower Self-consumption for Higher Yields



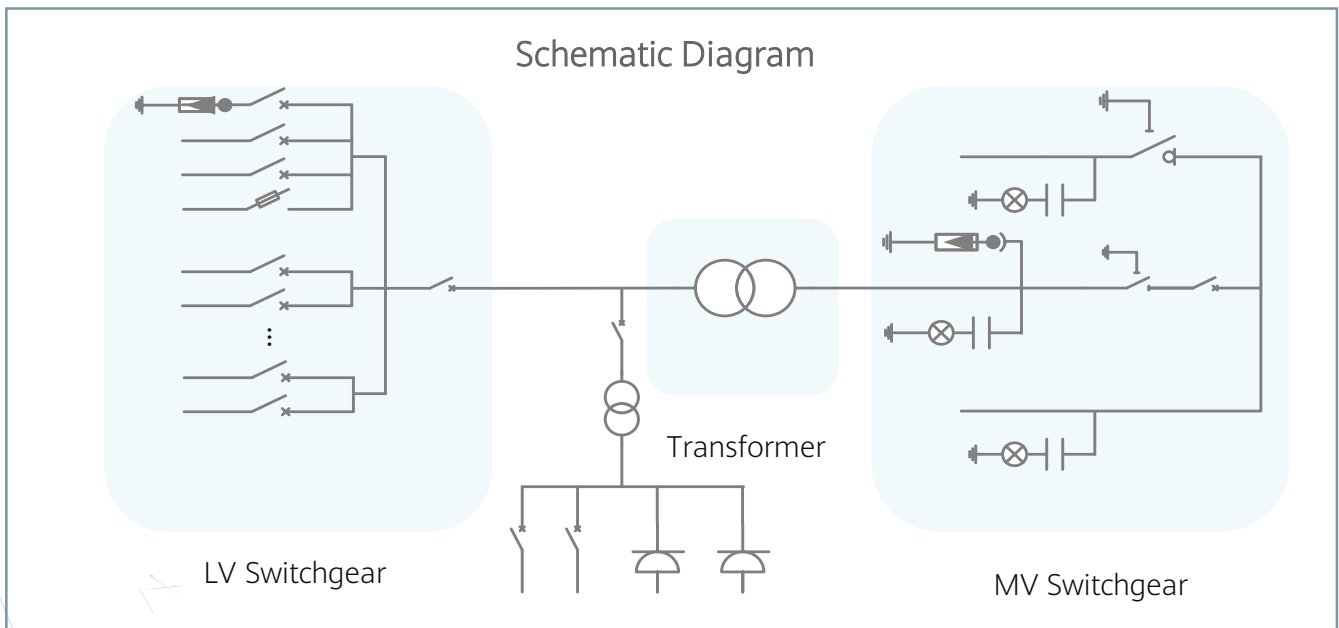
Smart

Real-time monitoring of transformer, LV and MV switchgear
0.2% high precision of electricity parameters collection
Remote control of ACB and MV Circuit Breaker



Reliable

Robust design against harsh environments
Innovative cooling design, easy maintenance
Comprehensive tests from components, device to solutions



STS-3000K-H1, Ecodesign
Technical Specifications

Input							
Available Inverters	SUN2000-185KTL-H1						
AC Power	3,150 kVA @40°C / 2,700 kVA @50°C ¹						
Max. Inverters Quantity	18						
Rated Input Voltage	800 V						
Max. Input Current at Nominal Voltage	2428 A						
LV Panel Type	ACB (2500 A / 800 V / 3P, 1*1 pcs), MCCB (250 A / 800 V / 3P, 1*18 pcs)						
Output							
Rated Output Voltage	10 kV	20 kV	22 kV	30 kV	33 kV	34.5 kV	35 kV
Frequency	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	60 Hz	50 Hz
Transformer Type	Oil-immersed, Conservator Type						
Tappings	± 2 x 2.5%						
Transformer Oil Type	Mineral Oil						
Transformer Vector Group	Dy11						
Minimum Peak Efficiency Index	In accordance with EN 50588-1						
Transformer Load Losses	27.5 kW	27.5 kW	27.5 kW	30.25 kW	30.25 kW	30.25 kW	30.25 kW
Transformer No-load Losses	2.2 kW	2.2 kW	2.2 kW	2.53 kW	2.53 kW	2.53 kW	2.53 kW
Impedance	7% (0 ~ +10%) @3150 kVA						
MV Switchgear Type	SF6 Gas Insulated, 3 Feeders						
Auxiliary Transformer	5 kVA, Dyn11, Ratio Varies according to Customization						
Protection							
Protection Degree of MV & LV Room	IP 54						
Internal Arcing Fault MV Switchgear	IAC A 20 kA 1s						
LV SPD	Type I+II						
General							
Dimensions (W x H x D)	6,058 x 2,896 x 2,438 mm (20' HC Container)						
Weight	< 15 t						
Operating Temperature Range	-25°C ~ 60°C ² (-13°F ~ 140°F)						
Relative Humidity	0% ~ 95%						
Max. Operating Altitude	2000 m	2000 m	2000 m	2000 m	2000 m	2500 m	2000 m
Applicable Standards	IEC 60076, IEC 62271-200, IEC 62271-202, EN 50588-1, IEC 61439-1						
Features							
Auxiliary Transformer(50 kVA, Dyn11)	Optional ³ , Ratio Varies according to Customization						
1.5 kVA UPS	Optional ³						
Updated to CVC or CCV MV Switchgear	Optional ³						
IMD	Optional ³						
STS Interlocking	Optional ³						

1 - More detailed AC power of STS, please refer to the de-rating curve.
 2 - When ambient temperature ≥55°C, awning shall be equipped for STS on site by customer.
 3 - Extra expense needed for optional features which standard product doesn't contain.



Allegato alla relazione tecnica illustrativa di progetto

SCHEDA DI SINTESI DATI DI PROGETTO
con inverter centralizzato

PVsyst - Simulation report

Grid-Connected System

Progetto: Impianto PV_CAMPOFELICE

Località: Campofelice di Fitalia (PA)

Inseguitore singolo + Struttura fissa

System power: 49.69 MWp

Villafrati - Italia



Progettisti





Project: Progetto PV_ASIA Project

Variant: Nuova variante di simulazione - CAMPO FELICE

PVsyst V7.1.1

Simulation date:
31/03/22 21:50
with v7.1.1

Project summary

Geographical Site Villafrati Italia	Situation Latitude 37.91 °N Longitude 13.48 °E Altitude 458 m Time zone UTC+1	Project settings Albedo 0.20
Meteo data Villafrati PVGIS api TMY		

System summary

Grid-Connected System	Inseguitore singolo + Struttura fissa		
PV Field Orientation Tracking plane, horizontal N-S axis Axis azimuth 0 °	Near Shadings Linear shadings	User's needs Unlimited load (grid)	
System information			
PV Array		Inverters	
Nb. of modules	85680 units	Nb. of units	10 units
Pnom total	49.69 MWp	Pnom total	42.00 MWac
		Pnom ratio	1.183

Results summary

Produced Energy	93873 MWh/year	Specific production	1889 kWh/kWp/year	Perf. Ratio PR	85.00 %
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Table of contents

Project and results summary	2
General parameters, PV Array Characteristics, System losses	3
Horizon definition	5
Near shading definition - Iso-shadings diagram	6
Main results	7
Loss diagram	8
Special graphs	9
P50 - P90 evaluation	10



PVsyst V7.1.1

Simulation date:
31/03/22 21:50
with v7.1.1

General parameters

Grid-Connected System		Inseguitore singolo + Struttura fissa	
PV Field Orientation			
Orientation		Backtracking strategy	Models used
Tracking plane, horizontal N-S axis		Nb. of trackers	200 units
Axis azimuth	0 °	Single array	
		Sizes	
		Tracker Spacing	10.00 m
		Collector width	4.80 m
		Ground Cov. Ratio (GCR)	48.0 %
		Top inactive band	0.02 m
		Bottom inactive band	0.02 m
		Backtracking limit angle	
		Phi limits	+/- 60.9 °
Horizon		Near Shadings	User's needs
Average Height	6.6 °	Linear shadings	Unlimited load (grid)

PV Array Characteristics

PV module		Inverter	
Manufacturer	Jinkosolar	Manufacturer	SMA
Model	JKM580M-7RL4	Model	Sunny Central 4200 UP
(Custom parameters definition)		(Original PVsyst database)	
Unit Nom. Power	580 Wp	Unit Nom. Power	4200 kWac
Number of PV modules	85680 units	Number of inverters	10 units
Nominal (STC)	49.69 MWp	Total power	42000 kWac
Modules	3570 Strings x 24 In series	Operating voltage	921-1325 V
At operating cond. (50°C)		Pnom ratio (DC:AC)	1.18
Pmpp	44.76 MWp		
U mpp	967 V		
I mpp	46278 A		
Total PV power		Total inverter power	
Nominal (STC)	49694 kWp	Total power	42000 kWac
Total	85680 modules	Nb. of inverters	10 units
Module area	234255 m²	Pnom ratio	1.18
Cell area	328806 m²		

Array losses

Thermal Loss factor		DC wiring losses		Serie Diode Loss	
Module temperature according to irradiance		Global array res.	0.22 mΩ	Voltage drop	0.7 V
Uc (const)	29.0 W/m²K	Loss Fraction	0.9 % at STC	Loss Fraction	0.1 % at STC
Uv (wind)	0.0 W/m²K/m/s				
Module Quality Loss		Module mismatch losses		Strings Mismatch loss	
Loss Fraction	-0.8 %	Loss Fraction	2.0 % at MPP	Loss Fraction	0.1 %

IAM loss factor

Incidence effect (IAM): Fresnel smooth glass, n = 1.526

0°	30°	50°	60°	70°	75°	80°	85°	90°
1.000	0.998	0.981	0.948	0.862	0.776	0.636	0.403	0.000



PVsyst V7.1.1

Simulation date:
31/03/22 21:50
with v7.1.1

Array losses

Spectral correction

FirstSolar model

Precipitable water estimated from relative humidity

Coefficient Set	C0	C1	C2	C3	C4	C5
Monocrystalline Si	0,85914	-0,02088	-0,0058853	0,12029	0,026814	-0,001781



PVsyst V7.1.1

Simulation date:
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with v7.1.1

Horizon definition

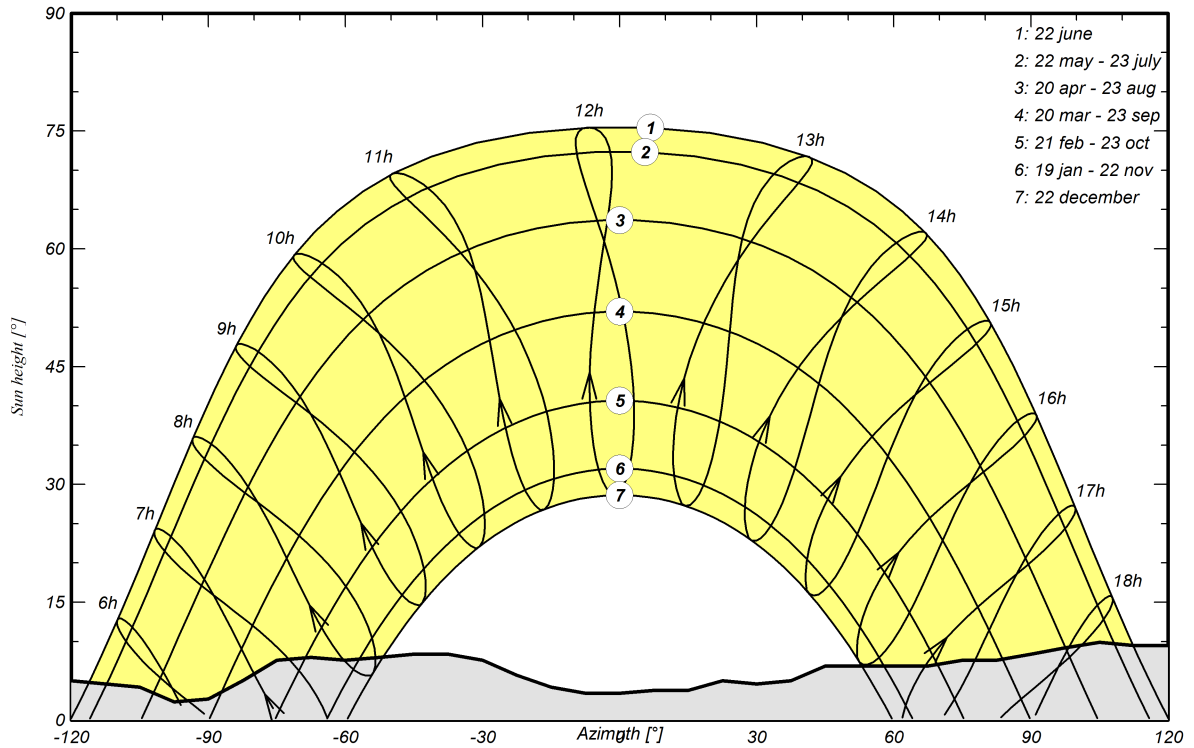
Average Height 6.6 ° Albedo Factor 0.59
Diffuse Factor 0.92 Albedo Fraction 100 %

Horizon profile

Azimuth [°]	-180	-173	-165	-158	-150	-143	-135	-128	-120	-113	-105	-98	-90	-83
Height [°]	6.9	8.4	8.4	5.7	5.0	5.0	5.3	5.3	5.0	4.6	4.2	2.3	2.7	5.0
Azimuth [°]	-75	-68	-60	-53	-45	-38	-30	-23	-15	-8	0	8	15	23
Height [°]	7.6	8.0	7.6	8.0	8.4	8.4	7.6	5.7	4.2	3.4	3.4	3.8	3.8	5.0
Azimuth [°]	30	38	45	68	75	83	90	98	105	113	158	165	173	180
Height [°]	4.6	5.0	6.9	6.9	7.6	7.6	8.4	9.2	9.9	9.5	9.5	5.0	5.0	6.9

Sun Paths (Height / Azimuth diagram)

Horizon from PVGIS website API, Lat=37°54'48', Long=13°28'53', Alt=458m



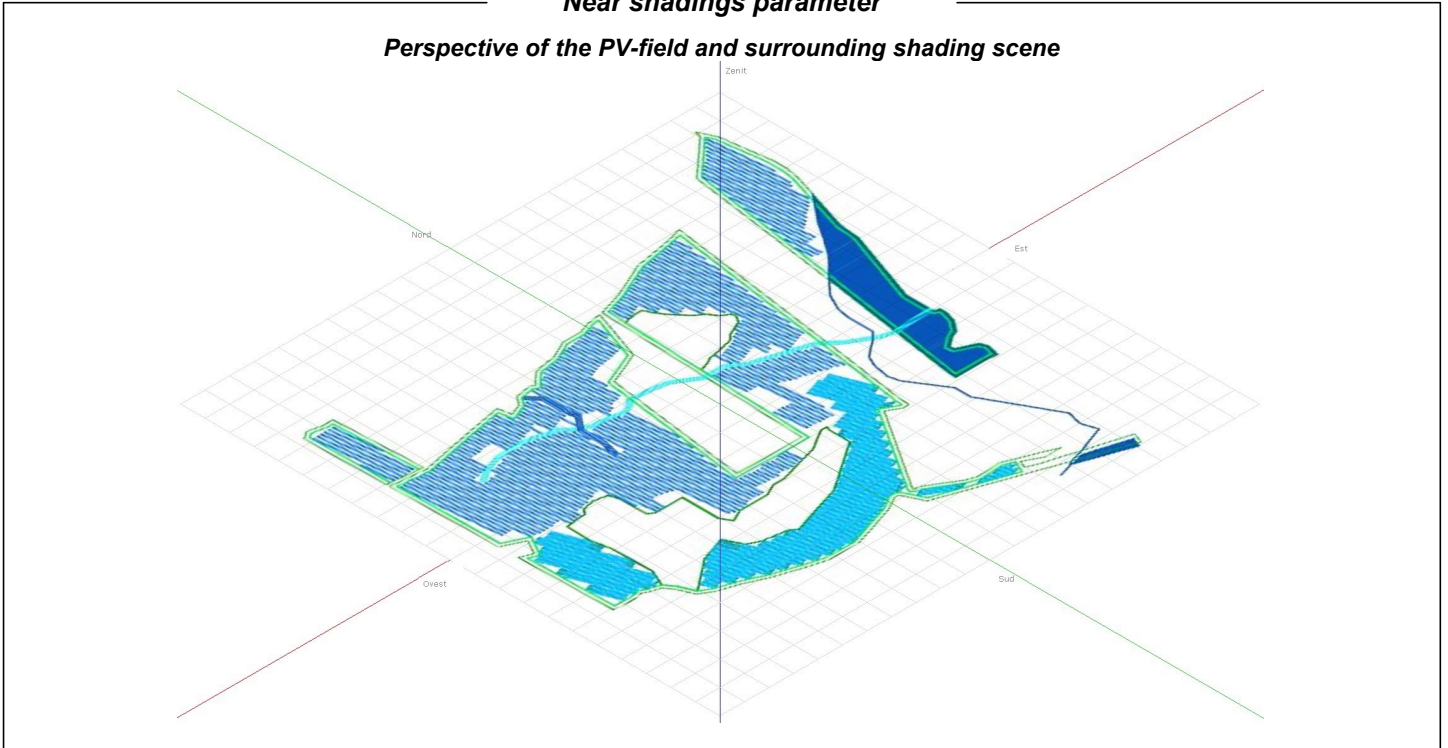


PVsyst V7.1.1

Simulation date:
31/03/22 21:50
with v7.1.1

Near shadings parameter

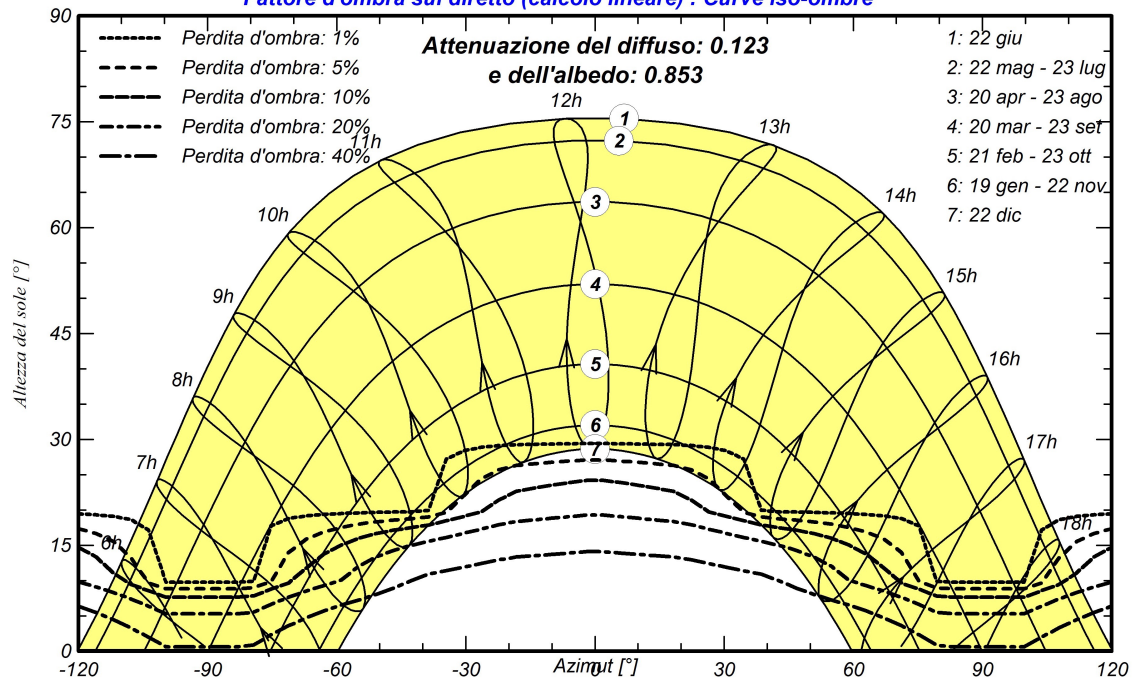
Perspective of the PV-field and surrounding shading scene



Iso-shadings diagram

Progetto PV_ASIA Project

Fattore d'ombra sul diretto (calcolo lineare) : Curve iso-ombre





Project: Progetto PV_ASIA Project

Variant: Nuova variante di simulazione - CAMPO FELICE

PVsyst V7.1.1

Simulation date:
31/03/22 21:50
with v7.1.1

Main results

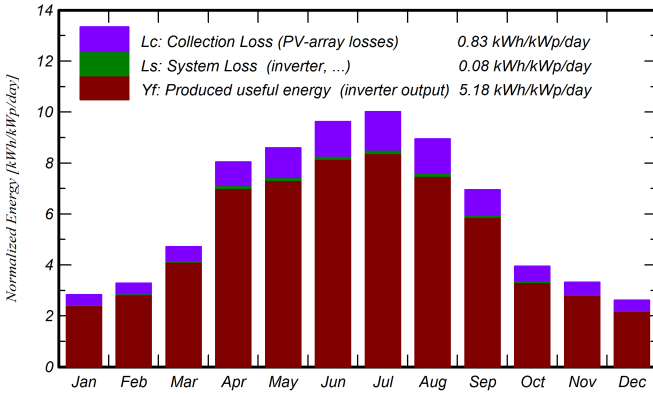
System Production

Produced Energy 93873 MWh/year

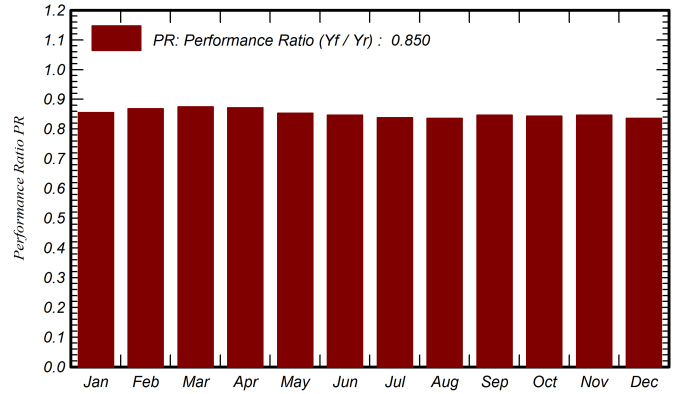
Specific production
Performance Ratio PR

1889 kWh/kWp/year
85.00 %

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor	DiffHor	T_Amb	GlobInc	GlobEff	EArray	E_Grid	PR	EArray
	kWh/m ²	kWh/m ²	°C	kWh/m ²	kWh/m ²	MWh	MWh	ratio	MWh
January	68.3	30.08	11.80	87.8	80.7	3788	3732	0.856	3788
February	74.4	41.14	9.23	91.8	85.6	4019	3959	0.868	4019
March	116.5	55.59	11.28	146.1	138.8	6449	6350	0.875	6449
April	191.1	66.95	12.93	241.5	232.6	10624	10454	0.871	10624
May	211.9	70.26	16.76	266.3	257.1	11473	11289	0.853	11473
June	228.4	72.24	20.29	289.0	279.6	12351	12157	0.847	12351
July	241.2	63.14	24.89	310.5	301.4	13124	12923	0.838	13124
August	214.0	61.78	24.67	277.6	268.3	11711	11534	0.836	11711
September	162.4	56.12	22.34	208.6	200.6	8909	8778	0.847	8909
October	99.6	49.47	19.16	122.3	115.4	5199	5124	0.843	5199
November	77.0	32.21	16.30	99.7	92.5	4257	4197	0.847	4257
December	64.4	32.69	12.85	81.3	73.4	3426	3377	0.836	3426
Year	1749.2	631.68	16.93	2222.3	2126.0	95329	93873	0.850	95329

Legends

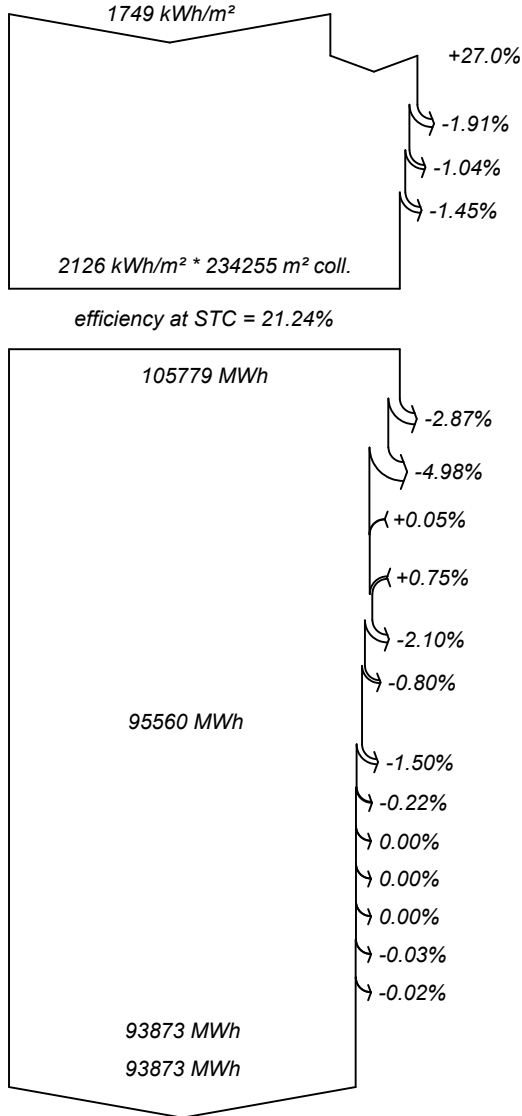
GlobHor	Global horizontal irradiation	EArray	Effective energy at the output of the array
DiffHor	Horizontal diffuse irradiation	E_Grid	Energy injected into grid
T_Amb	Ambient Temperature	PR	Performance Ratio
GlobInc	Global incident in coll. plane	EArray	Effective energy at the output of the array
GlobEff	Effective Global, corr. for IAM and shadings		



PVsyst V7.1.1

Simulation date:
31/03/22 21:50
with v7.1.1

Loss diagram



Global horizontal irradiation

Global incident in coll. plane

Far Shadings / Horizon

Near Shadings: irradiance loss

IAM factor on global

Effective irradiation on collectors

PV conversion

Array nominal energy (at STC effic.)

PV loss due to irradiance level

PV loss due to temperature

Spectral correction

Module quality loss

Mismatch loss, modules and strings

Ohmic wiring loss

Array virtual energy at MPP

Inverter Loss during operation (efficiency)

Inverter Loss over nominal inv. power

Inverter Loss due to max. input current

Inverter Loss over nominal inv. voltage

Inverter Loss due to power threshold

Inverter Loss due to voltage threshold

Night consumption

Available Energy at Inverter Output

Energy injected into grid

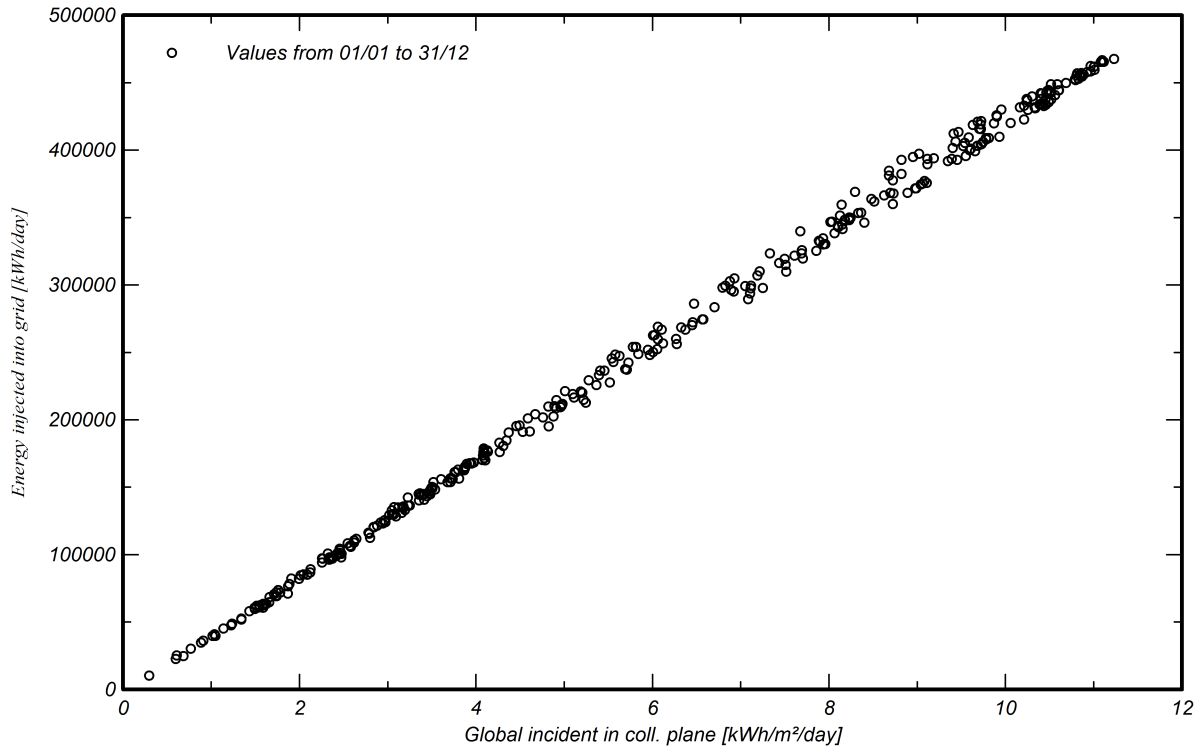


PVsyst V7.1.1

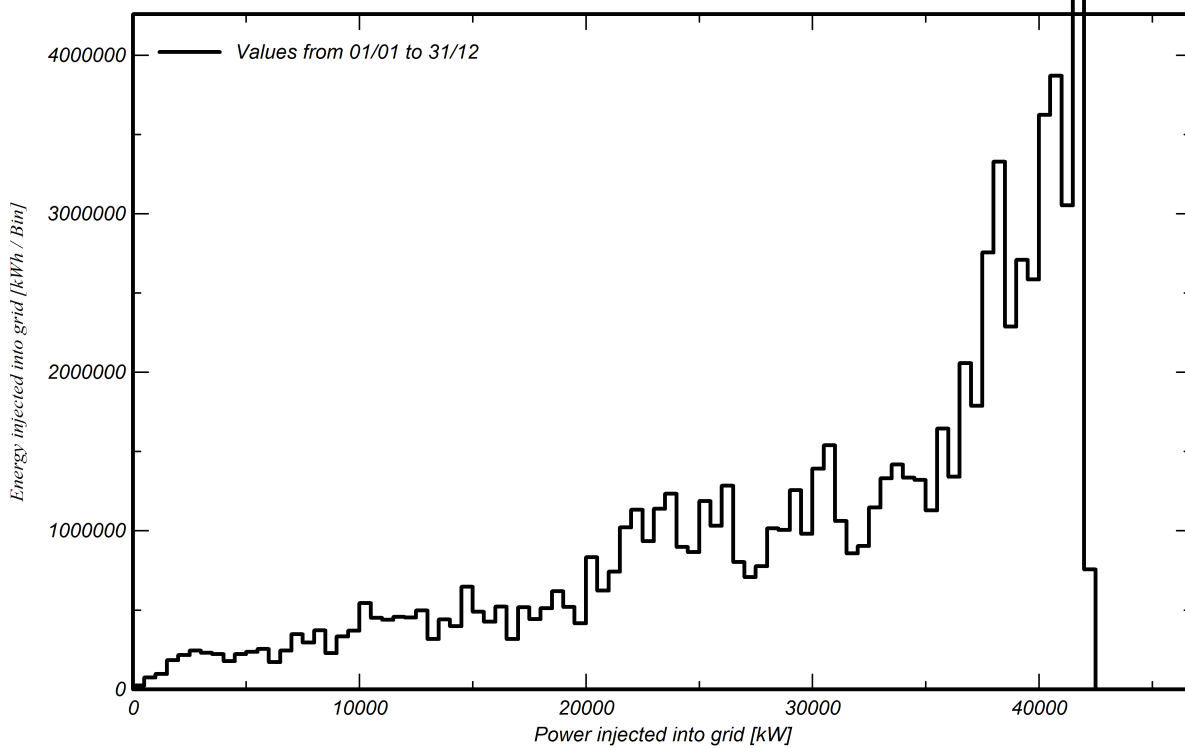
Simulation date:
31/03/22 21:50
with v7.1.1

Special graphs

Diagramma giornaliero entrata/uscita



Distribuzione potenza in uscita sistema





PVsyst V7.1.1

Simulation date:
31/03/22 21:50
with v7.1.1

P50 - P90 evaluation

Meteo data

Meteo data source	PVGIS api TMY
Kind	Own measured
Year	TMY
Year-to-year variability(Variance)	2.5 %

Specified Deviation

Year deviation from average	0.0 %
-----------------------------	-------

Global variability (meteo + system)

Variability (Quadratic sum)	3.1 %
-----------------------------	-------

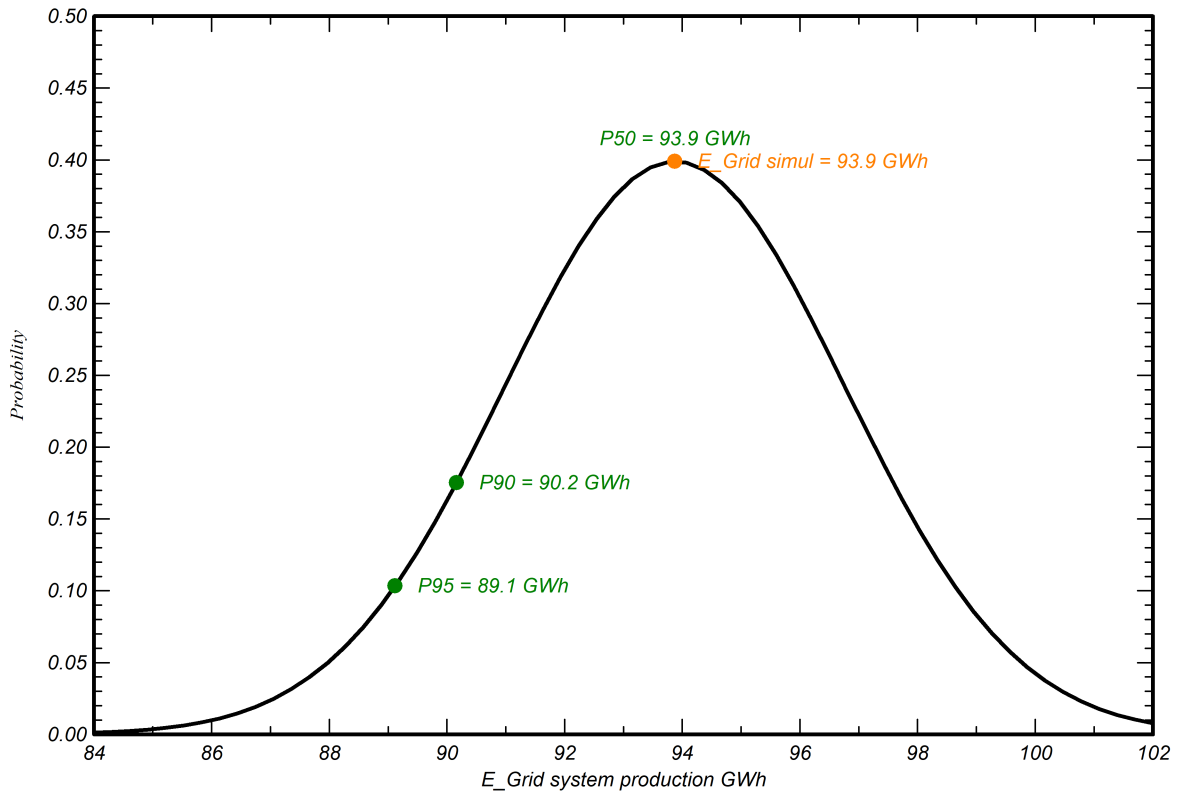
Simulation and parameters uncertainties

PV module modelling/parameters	1.0 %
Inverter efficiency uncertainty	0.5 %
Soiling and mismatch uncertainties	1.0 %
Degradation uncertainty	1.0 %

Annual production probability

Variability	2.9 GWh
P50	93.9 GWh
P90	90.2 GWh
P95	89.1 GWh

Probability distribution



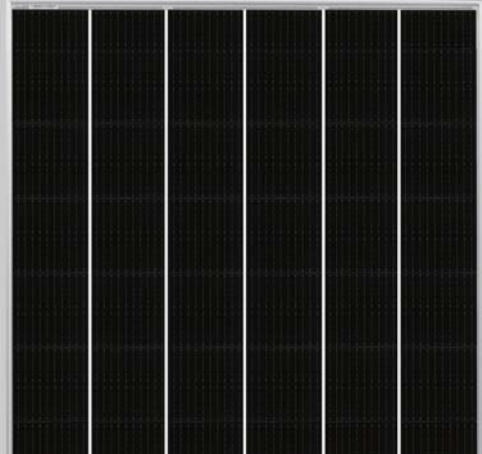
TR 78M 560-580 Watt Mono-facial

Tiling Ribbon (TR) Technology

Positive power tolerance of 0~+3%

(Draft)

TIGER Pro



KEY FEATURES



TR technology + Half Cell

TR technology with Half cell aims to eliminate the cell gap to increase module efficiency (mono-facial up to 21.21%)



MBB instead of 5BB

MBB technology decreases the distance between bus bars and finger grid line which is benefit to power increase.



Higher lifetime Power Yield

2% first year degradation,
0.55% linear degradation



Best Warranty

12 year product warranty,
25 year linear power warranty



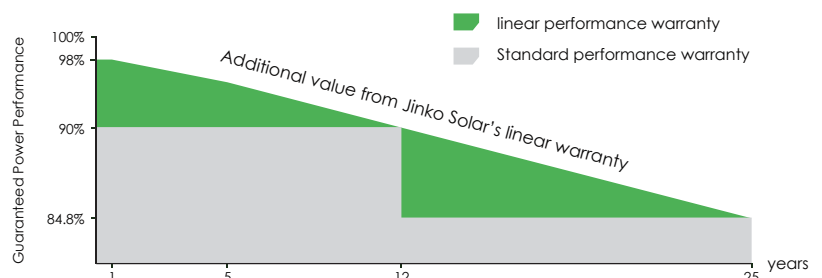
Strengthened Mechanical Support

5400 Pa snow load, 2400 Pa wind load



LINEAR PERFORMANCE WARRANTY

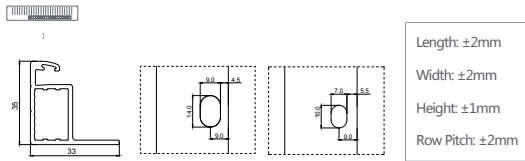
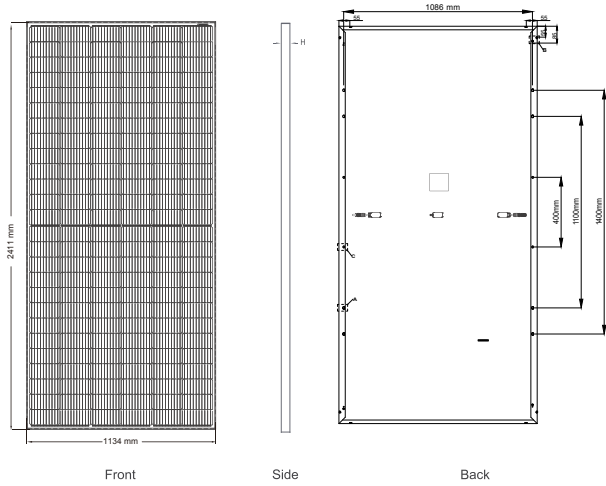
12 Year Product Warranty • 25 Year Linear Power Warranty
0.55% Annual Degradation Over 25 years



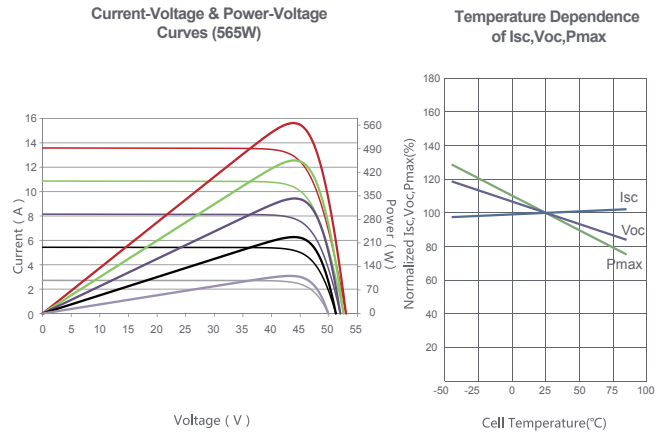
ISO9001:2015, ISO14001:2015, ISO45001:2018 certified factory

IEC61215, IEC61730 certified product

Engineering Drawings



Electrical Performance & Temperature Dependence



Mechanical Characteristics

Cell Type	P type Mono-crystalline
No. of cells	156 (2×78)
Dimensions	2411×1134×35mm (94.92×44.65×1.38 inch)
Weight	30.93 kg (68.2 lbs)
Front Glass	3.2mm, Anti-Reflection Coating, High Transmission, Low Iron, Tempered Glass
Frame	Anodized Aluminium Alloy
Junction Box	IP68 Rated
Output Cables	TUV 1×4.0mm ² (+): 290mm, (-): 145 mm or Customized Length

Packaging Configuration

(Two pallets = One stack)

31pcs/pallets, 62pcs/stack, 496pcs/ 40'HQ Container

SPECIFICATIONS

Module Type	JKM560M-7RL4-V		JKM565M-7RL4-V		JKM570M-7RL4-V		JKM575M-7RL4-V		JKM580M-7RL4-V	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	560Wp	417Wp	565Wp	420Wp	570Wp	424Wp	575Wp	428Wp	580Wp	432Wp
Maximum Power Voltage (Vmp)	44.31V	40.63V	44.43V	40.72V	44.55V	40.80V	44.67V	40.89V	44.78V	40.97V
Maximum Power Current (Imp)	12.64A	10.25A	12.72A	10.32A	12.80A	10.39A	12.88A	10.46A	12.96A	10.53A
Open-circuit Voltage (Voc)	52.90V	49.93V	53.00V	50.03V	53.10V	50.12V	53.20V	50.21V	53.30V	50.31V
Short-circuit Current (Isc)	13.50A	10.90A	13.58A	10.97A	13.66A	11.03A	13.74A	11.10A	13.82A	11.16A
Module Efficiency STC (%)	20.48%		20.67%		20.85%		21.03%		21.21%	
Operating Temperature(°C)	-40°C~+85°C									
Maximum system voltage	1500VDC (IEC)									
Maximum series fuse rating	25A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.35%/°C									
Temperature coefficients of Voc	-0.28%/°C									
Temperature coefficients of Isc	0.048%/°C									
Nominal operating cell temperature (NOCT)	45±2°C									

* STC: ☀ Irradiance 1000W/m² 📏 Cell Temperature 25°C ☁ AM=1.5
 NOCT: ☀ Irradiance 800W/m² 📏 Ambient Temperature 20°C ☁ AM=1.5 🌀 Wind Speed 1m/s

* Power measurement tolerance: ± 3%

MV POWER STATION

4000-S2 / 4200-S2 / 4400-S2 / 4600-S2



MVPS-4000-S2 / MVPS-4200-S2 / MVPS-4400-S2 / MVPS-4600-S2



Resistente

- La stazione e tutti i componenti sono sottoposti a test
- Perfetta per condizioni ambientali estreme

Pratica

- Sistema "plug and play"
- Completamente preassemblata per un'installazione e messa in servizio semplice

Conveniente

- Semplicità di progetto e installazione
- Costi di trasporto ridotti grazie alla piattaforma da 20 piedi

Flessibile

- Un unico design per tutto il mondo
- DC-Coupling Ready
- Numerose opzioni

MV POWER STATION 4000-S2 / 4200-S2 / 4400-S2 / 4600-S2

Soluzione chiavi in mano per centrali fotovoltaiche

Con la potenza fornita dai nuovi inverter centralizzati Sunny Central UP e Sunny Central Storage UP e i componenti di media tensione appositamente studiati, la nuova MV Power Station offre una densità di potenza maggiore e può essere fornita chiavi in mano in tutto il mondo. Ideale per la nuova generazione di centrali fotovoltaiche da 1500 V_{CC}, la soluzione integrata nel container da 20 piedi assicura semplicità di trasporto e rapidità di montaggio e messa in servizio. La MVPS e tutti i componenti sono sottoposti a test. La MV Power Station garantisce la massima sicurezza dell'impianto, massimi rendimenti energetici, e minimi rischi operativi. Naturalmente la MV Power Station è predisposta per i collegamenti CC.

MV POWER STATION

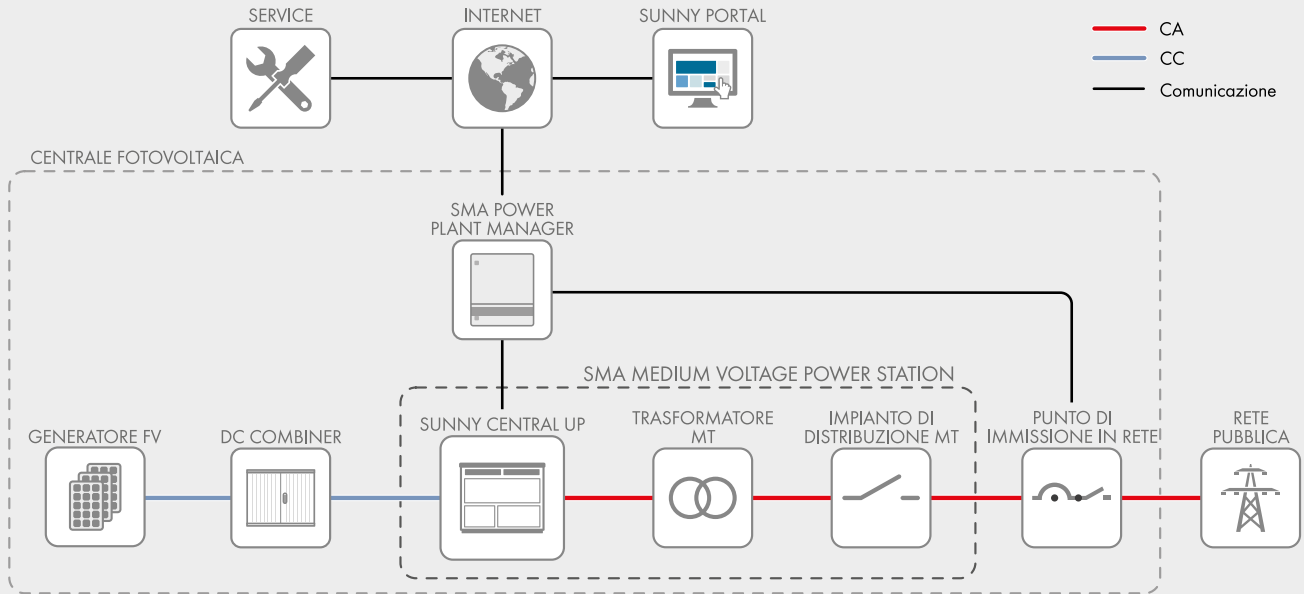
4000-S2 / 4200-S2 / 4400-S2 / 4600-S2

Dati tecnici	MVPS 4000-S2	MVPS 4200-S2
Ingresso (CC)		
Inverter selezionabili	1 x SC 4000 UP oppure 1 x SCS 3450 UP oppure 1 x SCS 3450 UP-XT	1 x SC 4200 UP oppure 1 x SCS 3600 UP oppure 1 x SCS 3600 UP-XT
Tensione d'ingresso max	1500 V	1500 V
Numero ingressi CC	a seconda dell'inverter scelto	
Zone Monitoring integrato	○	
Amperaggi disponibili dei fusibili (per ciascun ingresso)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Uscita (CA) lato di media tensione		
Potenza nominale con SC UP (da -25°C a +35°C / 40°C opzionale 50°C) ¹⁾	4000 kVA / 3600 kVA	4200 kVA / 3780 kVA
Potenza nominale con SCS UP (da -25°C a +25°C / 40°C opzionale 50°C) ¹⁾	3450 kVA / 2930 kVA	3620 kVA / 3075 kVA
Potenza di carica SCS UP-XT (da -25°C a +25°C / 40°C opzionale 50°C) ¹⁾	3590 kVA / 3000 kVA	3770 kVA / 3150 kVA
Potenza di scarica con SCS UP-XT (da -25°C a +25°C / 40°C opzionale 50°C) ¹⁾	4000 kVA / 3400 kVA	4200 kVA / 3570 kVA
Tensioni nominali tipiche CA	da 10 kV a 35 kV	da 10 kV a 35 kV
Frequenza di rete CA	50 Hz / 60 Hz	50 Hz / 60 Hz
Gruppo vettoriale del trasformatore Dy11 / YNd11 / YNy0	● / ○ / ○	● / ○ / ○
Tipo di raffreddamento del trasformatore	KNAN ²⁾	KNAN ²⁾
Perdite standard a vuoto del trasformatore / Eco Design 1 / Eco Design 2	● / ○ / ○	● / ○ / ○
Perdite standard di corto circuito del trasformatore / Eco Design 1 / Eco Design 2	● / ○ / ○	● / ○ / ○
Fattore massimo di distorsione	< 3%	
Immissione di potenza reattiva (fino a max 60% della potenza nominale)	○	
Fattore di potenza a potenza nominale / fattore di sfasamento regolabile	1 / 0,8 induttivo fino a 0,8 capacitivo	
Rendimento inverter		
Grado di rendimento max ³⁾ / Grado di rendimento europeo ³⁾ / Grado di rendimento CEC ⁴⁾	98,8% / 98,6% / 98,5%	98,8% / 98,7% / 98,5%
Dispositivi di protezione		
Dispositivo di disinserzione lato ingresso	Sezionatore di carico CC	
Dispositivo di sgancio lato uscita	Interruttore a vuoto MT	
Protezione contro sovratensioni CC	Scaricatore di sovratensioni tipo I	
Separazione galvanica	●	
Resistenza ad archi elettrici cabina elettrica MT (secondo IEC 62271-202)	IAC A 20 kA 1 s	
Dati generali		
Dimensioni (L / A / P)	6058 mm / 2896 mm / 2438 mm	
Peso	< 18 t	
Autoconsumo (max / carico parziale / medio) ¹⁾	< 8,1 kW / < 1,8 kW / < 2,0 kW	
Autoconsumo (stand-by) ¹⁾	< 370 W	
Temperatura ambiente da -25°C a +45°C / da -25°C a +55°C / da -40°C a +45°C	● / ○ / ○	
Grado di protezione secondo IEC 60529	Cabine elettriche IP23D, elettronica inverter IP54	
Ambiente: standard / critico	● / ○	
Grado di protezione secondo IEC 60721-3-4 (4C1, 4S2 / 4C2, 4S4)	● / ○	
Valore massimo ammissibile per l'umidità relativa	95% (per 2 mesi/anno)	
Altitudine operativa max. s.l.m. 1000 m / 2000 m	● / ○	
Fabbisogno d'aria fresca inverter	6500 m ³ /h	
Dotazione		
Collegamento CC	Capicorda	
Collegamento CA	Connettore angolare conico esterno	
Tap changer per trasformatore di media tensione: senza / con	● / ○	
Avvolgimento di schermatura per trasformatore MT: senza / con	● / ○	
Pacchetto monitoraggio	○	
Colore involucro cabina	RAL 7004	
Trasformatore per utilizzatori esterni: senza / 10 / 20 / 30 / 40 / 50 / 60 kVA	● / ○ / ○ / ○ / ○ / ○ / ○	
Impianto di distribuzione in media tensione: senza / 1 feeder / 3 feeder	● / ○ / ○	
2 feeder con sezionatore di carico, 1 feeder trasformatore con interruttore di potenza, resistenza ad arco elettrico interno IAC A FL 20 kA 1 s secondo IEC 62271-200	● / ○ / ○	
Resistenza ai cortocircuiti impianto di distribuzione in media tensione (20 kA 1 s / 20 kA 3 s / 25 kA 1 s)	● / ○ / ○	
Accessori dei quadri di distribuzione in media tensione: senza / contatti ausiliari / motore per feeder trasformatore / collegamento a cascata / monitoraggio	● / ○ / ○ / ○ / ○	
Contenitore di raccolta olio integrato: senza / con	● / ○	
Standard (per ulteriori standard si veda la scheda tecnica dell'inverter)	IEC 60076, IEC 62271-200, IEC 62271-202, EN50588-1, CSC Certificate	
● Dotazione di serie ○ Opzionale – Non disponibile		
Denominazione del tipo	MVPS-4000-S2	MVPS-4200-S2

- 1) Dati riferiti all'inverter. Per ulteriori dettagli si veda la scheda tecnica dell'inverter.
 2) KNAN = estere con raffreddamento naturale ad aria
 3) Efficienza misurata sull'inverter senza autoalimentazione
 4) Efficienza misurata sull'inverter con autoalimentazione

Dati tecnici	MVPS 4400-S2	MVPS 4600-S2
Ingresso (CC)		
Inverter selezionabili	1 x SC 4400 UP oppure 1 x SCS 3800 UP oppure 1 x SCS 3800 UP-XT	1 x SC 4600 UP oppure 1 x SCS 3950 UP oppure 1 x SCS 3950 UP-XT
Tensione d'ingresso max	1500 V	1500 V
Numero ingressi CC	a seconda dell'inverter scelto	
Zone Monitoring integrato	○	
Amperaggi disponibili dei fusibili (per ciascun ingresso)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Uscita (CA) lato di media tensione		
Potenza nominale con SC UP (da -25°C a +35°C / 40°C opzionale 50°C) ¹⁾	4400 kVA / 3960 kVA	4600 kVA / 4140 kVA
Potenza nominale con SCS UP (da -25°C a +25°C / 40°C opzionale 50°C) ¹⁾	3800 kVA / 3230 kVA	3960 kVA / 3365 kVA
Potenza di carica SCS UP-XT (da -25°C a +25°C / 40°C opzionale 50°C) ¹⁾	3950 kVA / 3300 kVA	4130 kVA / 3455 kVA
Potenza di scarica con SCS UP-XT (da -25°C a +25°C / 40°C opzionale 50°C) ¹⁾	4400 kVA / 3740 kVA	4600 kVA / 3910 kVA
Tensioni nominali tipiche CA	da 10 kV a 35 kV	da 10 kV a 35 kV
Frequenza di rete CA	50 Hz / 60 Hz	50 Hz / 60 Hz
Gruppo vettoriale del trasformatore Dy11 / YNd11 / YNy0	● / ○ / ○	● / ○ / ○
Tipo di raffreddamento del trasformatore	KNAN ²⁾	KNAN ²⁾
Perdite standard a vuoto del trasformatore / Eco Design 1 / Eco Design 2	● / ○ / ○	● / ○ / ○
Perdite standard di corto circuito del trasformatore / Eco Design 1 / Eco Design 2	● / ○ / ○	● / ○ / ○
Fattore massimo di distorsione	< 3%	
Immissione di potenza reattiva (fino a max 60% della potenza nominale)	○	
Fattore di potenza a potenza nominale / fattore di sfasamento regolabile	1 / 0,8 induttivo fino a 0,8 capacitivo	
Rendimento inverter		
Grado di rendimento max ³⁾ / Grado di rendimento europeo ³⁾ / Grado di rendimento CEC ⁴⁾	98,8% / 98,7% / 98,5%	98,8% / 98,7% / 98,5%
Dispositivi di protezione		
Dispositivo di disinserzione lato ingresso	Sezionatore di carico CC	
Dispositivo di sgancio lato uscita	Interruttore a vuoto MT	
Protezione contro sovratensioni CC	Scaricatore di sovratensioni tipo I	
Separazione galvanica	●	
Resistenza ad archi elettrici cabina elettrica MT (secondo IEC 62271-202)	IAC A 20 kA 1 s	
Dati generali		
Dimensioni (L / A / P)	6058 mm / 2896 mm / 2438 mm	
Peso	< 18 t	
Autoconsumo (max / carico parziale / medio) ¹⁾	< 8,1 kW / < 1,8 kW / < 2,0 kW	
Autoconsumo (stand-by) ¹⁾	< 370 W	
Temperatura ambiente da -25°C a +45°C / da -25°C a +55°C / da -40°C a +45°C	● / ○ / ○	
Grado di protezione secondo IEC 60529	Cabine elettriche IP23D, elettronica inverter IP54	
Ambiente: standard / critico	● / ○	
Grado di protezione secondo IEC 60721-3-4 (4C1, 4S2 / 4C2, 4S4)	● / ○	
Valore massimo ammissibile per l'umidità relativa	95% (per 2 mesi/anno)	
Altitudine operativa max. s.l.m. 1000 m / 2000 m	● / ○	
Fabbisogno d'aria fresca inverter	6500 m ³ /h	
Dotazione		
Collegamento CC	Capicorda	
Collegamento CA	Connettore angolare conico esterno	
Tap changer per trasformatore di media tensione: senza / con	● / ○	
Avvolgimento di schermatura per trasformatore MT: senza / con	● / ○	
Pacchetto monitoraggio	○	
Colore involucro cabina	RAL 7004	
Trasformatore per utilizzatori esterni: senza / 10 / 20 / 30 / 40 / 50 / 60 kVA	● / ○ / ○ / ○ / ○ / ○ / ○	
Impianto di distribuzione in media tensione: senza / 1 feeder / 3 feeder	● / ○ / ○	
2 feeder con sezionatore di carico, 1 feeder trasformatore con interruttore di potenza, resistenza ad arco elettrico interno IAC A FL 20 kA 1 s secondo IEC 62271-200	● / ○ / ○	
Resistenza ai cortocircuiti impianto di distribuzione in media tensione (20 kA 1 s / 20 kA 3 s / 25 kA 1 s)	● / ○ / ○	
Accessori dei quadri di distribuzione in media tensione: senza / contatti ausiliari / motore per feeder trasformatore / collegamento a cascata / monitoraggio	● / ○ / ○ / ○ / ○	
Contenitore di raccolta olio integrato: senza / con	● / ○	
Standard (per ulteriori standard si veda la scheda tecnica dell'inverter)	IEC 60076, IEC 62271-200, IEC 62271-202, EN50588-1, CSC Certificate	
● Dotazione di serie ○ Opzionale – Non disponibile		
Denominazione del tipo	MVPS-4400-S2	MVPS-4600-S2

Schema impianto con Sunny Central UP



Schema impianto con Sunny Central Storage UP

