

Swale House – 124.1 kWp PV Array - DRAFT

Executive Summary

I expect a 124.1 kWp PV array to generate in the region of 117,128 kWh pa, offsetting ~50% of the electricity currently consumed in Swale House annually. Just under 90% of the electricity generated by the array would be used on site with the remaining 10% exported to grid. At current electricity prices the savings/revenue generated by the array would be worth just over £32,740 annually. I would expect an investment in the region of £81,000 to reach payback between 2.5 to 3 years, depending on the cost of financing, with an internal rate of return approaching 40% after 10 years.

1. Background

The objective of this report is to provide evidence to establish, against a backdrop of severe constraints on local government funding, whether there is sufficient financial justification for Swale Borough Council to invest in installation of a large PV array on the roof of its headquarters building, Swale House.

It is the first of a series of reports for buildings owned/operated by Swale Borough Council.

This report has been prepared based on 13 years of experience with Invicta Clean Energy Ltd as a designer and installer of PV systems and with access to up-to-date pricing from one of the UK's largest and most longstanding wholesalers of PV equipment. However it is noted that this advice has been offered independently of my role as an installer.

2. Scope

Further to my recent site visit I have identified scope for installation of 6 separate PV arrays laid out across various roofs on Swale House, with a combined nominal output of 124.1 kWp. This utilises all the accessible flat roof surfaces and takes into account shading from buildings, a flagpole and several antennae.

The purpose of this report is to provide an outline specification and estimated costs for the arrays, estimates of their annual generation and to compare these to actual electricity consumption. From these the likely rates of self-consumption and self-sufficiency can be determined. This allows the prospective annual revenue (savings) to be estimated and compared to the estimated capital outlay to determine the project's simple payback period and IRR.

Because the proposed PV array achieves a relatively high self-consumption rate (89.6%, see Section 7 below), which means the surplus generated by the array over day-time uses would be relatively small, I have excluded battery storage from this specification. It would be possible to retrofit battery storage at a later date.

3. PV Array Layout

The roof survey identified 6 separate areas, each of which would be suitable for mounting a PV array, as set out in Figure 1 and Table 1 below. These are categorised according to level; A = lower level, B = upper level, C = roof of plant room 1. These areas have been selected taking into account shading from buildings (plant rooms 1 and 2 and the stairwells), a flagpole, antennae and also the need for access. They have been divided into 11 separate sub-arrays reflecting areas with (A2, B2, B4, B5, C1) and without (A1, A3, B1, B3, B6, C2) significant shading.

*Table 1 – Sub-arrays, shading, nominal capacity and number of PV modules

	Location	Shading	Array kWp	# of modules
A1	Lower level front	No significant shading	31.025	73
A2, A3	Lower level rear	Shading at front from stairwell building (A2), no shading at rear (A3)	23.375	55
B1	Top level front	No significant shading	2.125	5
B2, B3, B4	Top level middle	Shading from Plant Rm 1 (B4) and Plant Rm 2 (B6); no significant shading in middle section (B5).	27.2	64
B5, B6	Top level rear	Shading at front from Plant Rm 2 (B5), no shading at rear (B6)	21.25	50
C1, C2	Roof of plant room 1	Shading at front from flag pole and weather station antenna (C1); no shading at rear (C2).	19.125	45

Figure 1 – Swale House Roof PV Layout



4. Equipment and Design

The system design uses an Esdec Flat Fix Fusion mounting system with panels at 13° inclination (see Appendix 1). Panel orientation is SSW, 195°. A benefit of this mounting system is that it minimises the requirement for ballast.

The photovoltaic modules used in this analysis are JA Solar 425Wp Mono PERC Half-cell MBB LR Black Frame (see Appendix 2).

Each of the 6 arrays would have its own Solis 5G 3-phase inverter (see Appendix 3). These would be connected to grid via existing 3-phase sub-distribution boards in Plant Room 1 and Plant Room 2. Shaded and unshaded sub-arrays would be connected to separate MPPTs on the inverter. These would be linked by an Export Power Manager.

A system administrator would monitor the performance of each of the arrays using an online portal.

The equipment specified in this analysis conforms to industry standards. However it is likely that a contractor selected to undertake the project will propose alternatives.

5. PV Annual Generation

The estimated annual output for each of the 11 sub-arrays is set out in Table 2 below, taking into account inclination, orientation and shading (a shade factor of 0.75 has been applied to derate the output of the shaded sub-arrays). The overall estimated annual output of the combined 124.1 kWh array is 117,128 kWh.

Table 2 - Estimated Annual Output for PV Sub-Arrays

A. Installation data													
Total	A1	A2	A3`	B1	B2	B3	B4	B5	B6	C1	C2	Total	
Installed capacity of PV system - kWp (stc)	31.025	14.875	8.5	2.125	8.925	9.35	8.925	6.375	14.875	6.375	12.75	124.1	kWp
Degrees from south	15	15	15	15	15	15	15	15	15	15	15		°
Inclination of system - degrees from horizontal	13	13	13	13	13	13	13	13	13	13	13		°
Postcode region	2	2	2	2	2	2	2	2	2	2	2		
B. Calculations													
kWh/kWp (Kk) from table	1039	1039	1039	1039	1039	1039	1039	1039	1039	1039	1039		kWh/kWp
Shade Factor (SF)	1	0.75	1	1	0.75	1	0.75	0.75	1	0.75	1		
Estimated annual output (kWp x Kk x SF)	32235	11591	8832	2208	6955	9715	6955	4968	15455	4968	13247	117128	kWh
C. Other data													
CO2 saving	18.31	6.58	5.02	1.25	3.95	5.52	3.95	2.82	8.78	2.82	7.52	67	tonnes CO ₂
Estimated savings per annum*	£8,528.23	£3,066.66	£2,336.50	£584.13	£1,839.99	£2,570.15	£1,839.99	£1,314.28	£4,088.88	£1,314.28	£3,504.75	£30,988	*
Estimated export income per annum (SEG)**	£528.01	£189.87	£144.66	£36.16	£113.92	£159.13	£113.92	£81.37	£253.15	£81.37	£216.99	£1,919	**
Total estimated savings/income per annum	£9,056.24	£3,256.52	£2,481.16	£620.29	£1,953.91	£2,729.28	£1,953.91	£1,395.65	£4,342.03	£1,395.65	£3,721.74	£32,906	

The overall annual output on Table 2 above is represented in monthly format in Table 3 and Figure 2 below. This facilitates comparison with monthly consumption data. The monthly yield factors used are also presented in the table. These have been derived using output data from monitoring of active PV sites elsewhere in Kent.

Table 3 – Estimated Monthly Output

	kWh	Monthly Yield Factor
Jan	3112	2.7%
Feb	5652	4.8%
Mar	8171	7.0%
Apr	14314	12.2%
May	16133	13.8%
Jun	17247	14.7%
Jul	15053	12.9%
Aug	14610	12.5%
Sep	10634	9.1%
Oct	7092	6.1%
Nov	3420	2.9%
Dec	1689	1.4%
Total	117128	

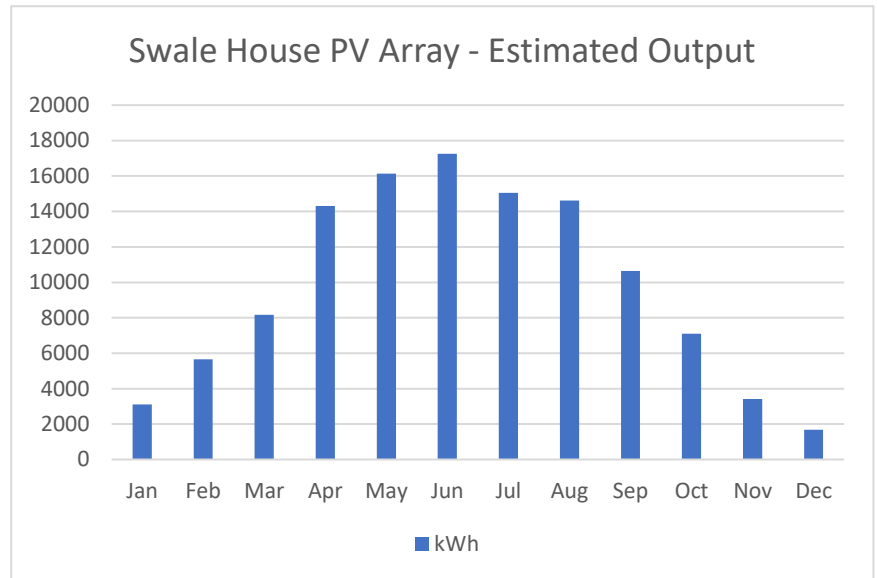


Figure 2 – Estimated Monthly Output

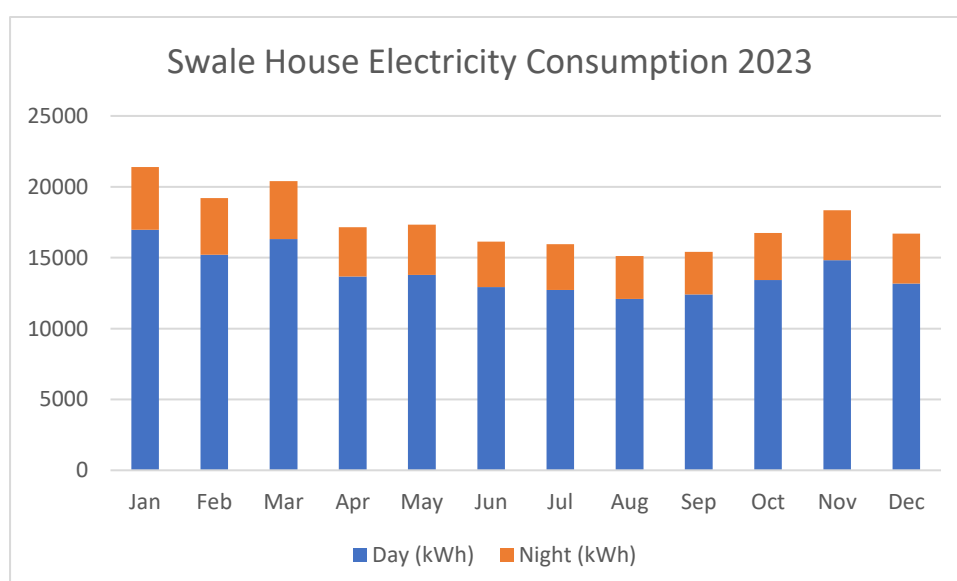
6. Electricity Consumption

Actual usage of electricity at Swale House during 2023 is presented in Table 4 below. Actual overall consumption over 12 months was 209,897 kWh, with ~80% consistently at the daytime tariff and ~20% at night time tariff. Excluding standing charges, at the current day and night time tariffs (29.105 p/kWh and 24.843 p/kWh respectively) the value of electricity consumed would have been £59,284.

Table 4 – Swale House Actual Day and Night Consumption (kWh)

	Day (kWh)	Night (kWh)	Total (kWh)	% Day	% Night
Jan	16968	4433	21401	79.3%	20.7%
Feb	15200	3997	19198	79.2%	20.8%
Mar	16309	4094	20403	79.9%	20.1%
Apr	13678	3475	17153	79.7%	20.3%
May	13789	3549	17338	79.5%	20.5%
Jun	12928	3216	16144	80.1%	19.9%
Jul	12724	3224	15948	79.8%	20.2%
Aug	12084	3024	15108	80.0%	20.0%
Sep	12406	3011	15417	80.5%	19.5%
Oct	13423	3315	16738	80.2%	19.8%
Nov	14829	3519	18348	80.8%	19.2%
Dec	13177	3526	16704	78.9%	21.1%
Total	167515	42383	209897	79.8%	20.2%
Value	£48,755	£10,529	£59,284		

Figure 3 – Actual Electricity Consumption – Swale House



7. Savings (self-consumption) and Revenue (export to grid)

The savings / revenue attributable to the PV installation derives from displacement of mains imported electricity at the daytime tariff rate, plus any surplus over consumption that is exported to the grid. Self-consumption is calculated by matching the output of the PV array to the day-time electricity consumption for each month. This is presented in Table 5 below.

Table 5 – Estimated PV Self-Consumption and Self-Sufficiency – Swale House

	PV Output (kWh)	Day-time Consumption (kWh)	Self-consumption (kWh)	Self-consumption Rate	Self-sufficiency Rate
Jan	3112	16968	3112	100%	14.5%
Feb	5652	15200	5652	100%	29.4%
Mar	8171	16309	8171	100%	40.0%
Apr	14314	13678	13678	96%	79.7%
May	16133	13789	13789	85%	79.5%
Jun	17247	12928	12928	75%	80.1%
Jul	15053	12724	12724	85%	79.8%
Aug	14610	12084	12084	83%	80.0%
Sep	10634	12406	10634	100%	69.0%
Oct	7092	13423	7092	100%	42.4%
Nov	3420	14829	3420	100%	18.6%
Dec	1689	13177	1689	100%	10.1%
Total	117128	167515	104974	89.6%	50.0%

The overall self-consumption rate is estimated at 89.6%, i.e. of the total power generated by the PV array, we can expect 89.6% to be utilised on site at Swale House, displacing power that would otherwise need to be imported from the grid. At the prevailing day-time tariff rate of 29.105 p/kWh this would be expected to save £30,553 annually.

On this basis the PV array would achieve a self-sufficiency rate of 50.0%, i.e. we would expect the PV array to supply around 50% of the total electricity consumed by Swale House (209,897 kWh, day and night).

In addition, between April and August surplus PV generation (~12,153 kWh) would be exported back to the grid. At a day-time export tariff rate of 18 p/kWh (e.g. Octopus Flux) this could be worth an additional £2,153 pa. Therefore the estimated total benefit from the PV array would be in the region of £32,740 annually.

These annual savings will be recurring over the lifetime of the project. Solar panels will typically come with a manufacturer's performance warranty of 25 years.

8. Equipment and Installation Costs

The main items of equipment are 292 x PV panels, 6 x inverters, an export power manager, roof mounting equipment, ballast and electrical switchgear and sundries. At current wholesale prices from our distributor (Segen Ltd) the cost of this equipment would be around £47,000 (ex VAT). Note that this excludes any supplier margin on equipment.

Estimated design, installation and commissioning costs for an array of this capacity are likely to be in the region of £20,000 (ex VAT).

In practice suppliers will charge a margin over wholesale prices on equipment which could be more than 30%, depending upon how competitively the selected contractor is prepared to price for the project. Allowing for a 30% margin on the cost of equipment, the overall project cost could be in the region of £81,000 (ex VAT).

This does not include any project financing/opportunity costs or internal administration costs. It also does not include any costs for ongoing maintenance, albeit in practice these ought to be minimal (~£500 pa).

9. Financial Analysis

Based on savings (section 7) and costs (section 8), excluding any project financing costs, the simple undiscounted payback period is likely to be in the region of 2.5 years, depending upon the terms that can be negotiated with the preferred contractor.

Based on these projected costs and revenues the project achieves an Internal Rate of Return (IRR) of 38.91% after 10 years.

Increases in the cost of electricity which occur post installation will improve the rate of return on investment. Likewise a fall in the cost of electricity would reduce the rate of return.



FLATFIX FUSION



www.esdec.com

THE ADVANTAGES OF FLATFIX FUSION



FLEXIBLE AND EASY

- Completely modular system
- Flexible installation: Easy to build around obstacles
- Aesthetic lightweight system
- Single or dual setup
- Suitable for residential and commercial projects
- Strong and durable clamping force with metal insert in high and low base
- For panels up to 1150mm wide and 2190mm long



RELIABLE

- Aerodynamic design with rounded corners and a smooth material finish
- Robust system thanks to connectors parallel and perpendicular to the panels
- Wind deflectors designed for maximum safety
- Tested to international standards
- 20-year warranty



SAFETY FOR THE ROOF

- For every type of roof
- Roof support with movable connectors
- Unique thermal decoupling prevents damage to roof material
- Optimum point pressure due to distributed ballast
- Integrated grounding and bonding in high and low base in accordance with IEC 60364 series
- Cable exits and cable guides (optional) for safe cable management



EASY TO INSTALL

- User-friendly click system
- Optimizer ready cable clip for easy attachment and safe cable removal
- Grounding clamp can easily be incorporated onto the end clamp
- Optimizer clip can also be used for most microinverters
- For the most common solar panels (angle of inclination 13°)
- Renewed end clamps for even more powerful and easier installation



COMPLETE AND FLEXIBLE INSTALLATION ON EVERY ROOF

FlatFix Fusion is the modular and flexible mounting system for solar panels on small and medium-sized roofs. Its modular design enables a customized configuration to be created for every roof. Installers can, for example, easily build around obstacles – such as chimneys – with this system. FlatFix Fusion can be set up either in dual or single configuration. FlatFix Fusion is a 100% Dutch product that has proven itself for years. In 2021, the system received an update of a number of components, which not only makes installation even easier for the installer, but also further increases the safety of the roof and the PV system. It is now possible to install solar panels up to 1150mm wide and 2190mm long with FlatFix Fusion.

Easy to install

Esdec was founded by professional installers, the interest of the installer always come first when designing our products. Simplicity and flexibility were therefore the starting points in the design of our FlatFix Fusion system. Smart click connections enable the system to be assembled quickly. Handy features on the dampers and on the wind deflectors make installation even easier.

Safety for the roof

The different components are connected using fast-click connectors. The roof supports with movable connectors allow the system to move (expand and shrink) to prevent damages of the roof material. As a result, the thermal movements of the building are not transmitted to the PV system and vice versa. The 2021 upgrade includes a safe and aesthetic solution for cable management: cables are guided through the wind deflectors with a cable exit guide.

Reliability

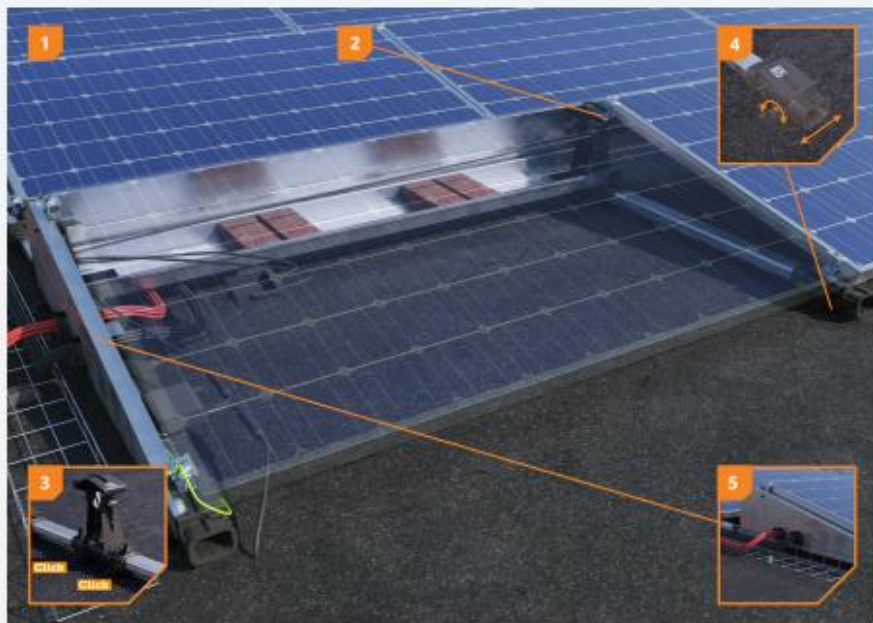
The patented FlatFix Fusion system has been extensively tested on fire safety, wind resistance and corrosion. With even stronger and durable damping force with a metal insert in the high and low base. FlatFix Fusion is a high-quality mounting solution. It complies with the strictest international standards and comes with a 20-year warranty.

ADVANTAGES FOR THE INSTALLER

- ✓ Modular mounting solution with click connection
- ✓ Flexible installation on any roof
- ✓ Integrated grounding and equipotential bonding
- ✓ Ease of installation with optimizer dip with integrated cable dip

ADVANTAGES FOR THE END USER

- ✓ Roof-specific configuration
- ✓ Safe and reliable
- ✓ No damage of the roof material
- ✓ 20-year warranty



1 Strong, lightweight system

The different components enable flexible row lengths. This makes it possible to create a roof-specific setup and, for example, to build around obstacles.

2 Easy maintenance

FlatFix Fusion is made of strong, lightweight materials. With the high and low base, with a metal insert, the damping force remains optimal after removal and reinstallation of panels.

3 Unique click connection

The revolutionary, unique click connection makes the FlatFix Fusion a very quick and easy-to-install mounting solution.











4 With thermal decoupling

The roof supports with movable connectors give the system space to expand thermally without damaging the roof material.

5 With integrated cable management



The cables and plugs of the solar panels can be safely and easily attached to the mounting solution. With the cable exits in the wind deflectors and with the cable exit guides, cables can be stowed and guided in a safe way.

SYSTEM COMPONENTS

	FlatFix Fusion roof support 1007012		FlatFix Fusion wind deflector left** 1007224 with base profile 940mm 1007226 with base profile 1030mm or 1077mm
	FlatFix Fusion low base 1007022 1007022-5 (with bonding)		FlatFix Fusion wind deflector right** 1007225 with base profile 940mm 1007227 with base profile 1030mm or 1077mm
	FlatFix Fusion high base 1007031 1007031-5 (with bonding)		FlatFix Fusion ballast container*/** 1007202
	FlatFix Fusion cable-clip optimizer ready*** 1007041		FlatFix Fusion stabilizer*/** 1007203
	FlatFix Fusion wind deflector rear*/** 1007201		FlatFix Fusion base profile 210mm 1007121** 370mm 1007137** 550mm 1007155** 750mm 1007175** 940mm 1007194** 1030mm 1007195 1077mm 1007196



* Also available in 1200, 1500, 1600, 1700, 1900, 2000 & 2100
 ** Also available in black
 *** Also suitable for most micro inverters

FASTENERS

	Esdec mounting screw*/** 6 x 55mm 1000655 6 x 70mm 1000670 6 x 12mm 1000612
	Esdec screw 6,0 x 25mm (self tapping) 1008085 6,3 x 32mm (self drilling) 1003015

* Depending on panel thickness and related end clamp
 ** Also available in black

CLAMPS

	FlatFix Fusion universal module clamp with bonding** 1003022
	FlatFix end clamp 30-50mm*/** 10043_... 10044_... (black)

* Depending on panel thickness (in mm)
 ** Also available in black

ACCESSORIES

	FlatFix Fusion grounding spring 1007502*		FlatFix Fusion roof support adapter 1007011
	FlatFix Fusion grounding clamp (6mm ²) 1007505		FlatFix Fusion low base extension 1007022-WP
	FlatFix Fusion grounding bracket 1007503		FlatFix Fusion Cable exit guide 1005570
	FlatFix Fusion TPO Mat 1007015		

* Also available ready assembled, see SYSTEM COMPONENTS

Calculator

In the Esdec calculator you can manage and calculate all your projects, for both pitched and flat roofs. One platform with all Esdec mounting systems for the most reliable calculation of your project.

Go to eu.esdec.com/en/calculator



Warranty

- Use of premium materials
- Thoroughly tested
- 20-year warranty



www.esdec.com



**QUICK
RELIABLE
INNOVATIVE**

Esdec has been developing, producing and supplying professional roof-mounting systems for solar panels since 2004. ClickFit and FlatFix are inspired by all installers who regularly install solar panels. Easy, quick, reliable installation using innovative, high-quality, durable mounting systems: Esdec makes it possible.

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JASOLAR

DEEP BLUE 3.0

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440W MBB 

- 
-  Higher output power
 -  Lower LCOE
 -  Better mechanical loading tolerance
 -  Less shading and lower resistive loss
 -  12-year product warranty
 -  25-year linear power output warranty

Half-cell Module
JAM54S30 LR
415-440

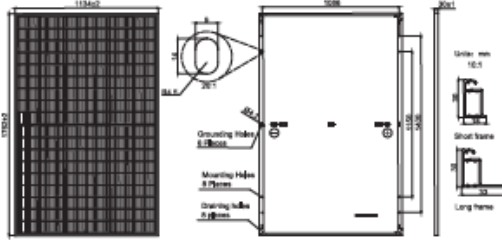
Comprehensive Certificates

- IEC 61215, IEC 61730/UL 61215, UL 61730
- ISO 9001:2015 Quality management systems
- ISO 14001:2015 Environmental management systems
- ISO 45001:2018 Occupational health and safety management systems
- IEC 62941:2018 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing





440W **415-440** LR Series
JAMS4S30



Remark: customized frame color and cable length available upon request

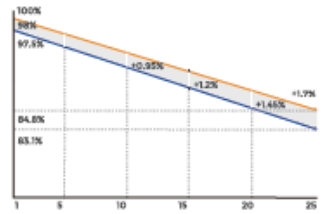
Cell	Mono
Weight	20kg
Dimensions	1762±2mm×1134±2mm×30±1mm
Cable Cross Section Size	4mm ² (IEC), 12 AWG(UL)
No. of cells	108(6x18)
Junction Box	IP68, 3 diodes
Connector	QC 4.10-3S/ MC4-EVO2A
Cable Length (Including Connector)	Portrait: 300mm(+)/400mm(-); 800mm(+)/800mm(-)(Leapfrog) Landscape: 1200mm(+)/1200mm(-)
Front Glass	2.8mm
Packaging Configuration	36pcs/Pallet, 936pcs/40ft Container

ELECTRICAL PARAMETERS AT STC

TYPE	JAMS4S30 -415/LR	JAMS4S30 -420/LR	JAMS4S30 -425/LR	JAMS4S30 -430/LR	JAMS4S30 -435/LR	JAMS4S30 -440/LR
Rated Maximum Power(Pmax) [W]	415	420	425	430	435	440
Open Circuit Voltage(Voc) [V]	37.55	37.73	37.91	38.09	38.27	38.45
Maximum Power Voltage(Vmp) [V]	30.92	31.11	31.30	31.49	31.68	31.86
Short Circuit Current(Isc) [A]	14.17	14.25	14.33	14.42	14.50	14.58
Maximum Power Current(Imp) [A]	13.42	13.50	13.58	13.65	13.73	13.81
Module Efficiency [%]	20.8	21.0	21.3	21.5	21.8	22.0
Power Tolerance	0→±5W					
Temperature Coefficient of Isc(α _{Isc})	+0.045%/°C					
Temperature Coefficient of Voc(β _{Voc})	-0.275%/°C					
Temperature Coefficient of Pmax(γ _{Pmp})	-0.350%/°C					
STC	Irradiance 1000W/m ² , cell temperature 25°C, AM1.5G					

Superior Warranty

0.55% Annual Degradation Over 25 years



- New linear power warranty
- Standard module linear power warranty

ELECTRICAL PARAMETERS AT NOCT

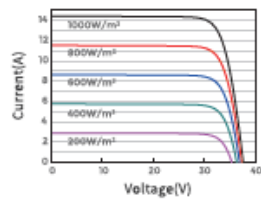
TYPE	JAMS4S30 -415/LR	JAMS4S30 -420/LR	JAMS4S30 -425/LR	JAMS4S30 -430/LR	JAMS4S30 -435/LR	JAMS4S30 -440/LR
Rated Max Power(Pmax) [W]	314	318	322	326	329	333
Open Circuit Voltage(Voc) [V]	35.53	35.70	35.87	36.04	36.21	36.38
Max Power Voltage(Vmp) [V]	29.26	29.44	29.62	29.80	29.98	30.15
Short Circuit Current(Isc) [A]	11.33	11.40	11.47	11.53	11.60	11.67
Max Power Current(Imp) [A]	10.74	10.80	10.86	10.92	10.99	11.05
NOCT	Irradiance 800W/m ² , ambient temperature 20°C, wind speed 1m/s, AM1.5G					

OPERATING CONDITIONS

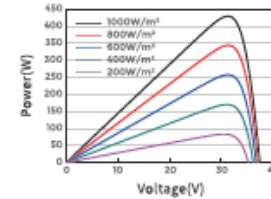
Maximum System Voltage	1000V/1500V DC
Operating Temperature	-40°C→+85°C
Maximum Series Fuse Rating	25A
Maximum Static Load, Front*	5400Pa(112lb/ft ²)
Maximum Static Load, Back*	2400Pa(50lb/ft ²)
NOCT	45±2°C
Safety Class	Class II
Fire Performance	UL Type 1

CHARACTERISTICS

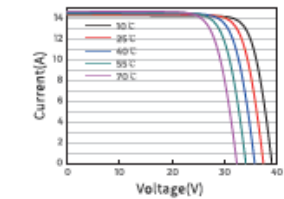
Current-Voltage Curve JAMS4S30-430/LR



Power-Voltage Curve JAMS4S30-430/LR



Current-Voltage Curve JAMS4S30-430/LR





S5-GC(25-40)K

Solis Three Phase Inverters



360 degree

Model:

400V: S5-GC25K S5-GC30K S5-GC33K S5-GC36K S5-GC40K



Efficient

- ▶ Max. efficiency 98.7%
- ▶ String current up to **16A**
- ▶ 3/4 MPPT design, supports multiple orientation system design
- ▶ Night time PID recovery function, increases overall system yield (optional)
- ▶ Wide voltage range and low startup voltage



Smart

- ▶ Supports export power control
- ▶ Intelligent string monitoring, smart I-V curve scan
- ▶ Supports RS485, WiFi, GPRS
- ▶ Scan to register on SolisCloud, supports remote upgrade and control



Safe

- ▶ IP66
- ▶ AFCI protection, proactively reduces fire risk
- ▶ Globally recognised branded componentry for longer life
- ▶ Intelligent redundant fan-cooling



Economic

- ▶ Supports GPRS/WiFi communication with less wiring and reduced installation costs
- ▶ > 150% DC/AC ratio
- ▶ Supports high power modules for lower installation costs
- ▶ Supports aluminium wire access to reduce cost

Datasheet

Model Name	SS-GC25K	SS-GC30K	SS-GC33K	SS-GC36K	SS-GC40K
Input DC					
Recommended max. PV power	37.5 kW	45 kW	49.5 kW	54 kW	60 kW
Max. input voltage	1100 V				
Rated voltage	600 V				
Start-up voltage	180 V				
MPPT voltage range	200-1000 V				
Max. input current	32 A / 32 A / 32 A			4*32A	
Max. short circuit current	50 A / 50 A / 50 A			4*50A	
MPPT number/Max. input strings number	3/6			4/8	
Output AC					
Rated output power	25 kW	30 kW	33 kW	36 kW	40 kW
Max. apparent output power	27.5 kVA	33 kVA	36.3 kVA	39.6 kVA	44 kVA
Max. output power	27.5 kW	33 kW	36.3 kW	39.6 kW	44 kW
Rated grid voltage	3/N/PE, 220 V / 380 V, 230 V / 400 V				
Rated grid frequency	50 Hz / 60 Hz				
Rated grid output current	38.0 A / 36.1 A	45.6 A / 43.3 A	50.1 A / 47.6 A	54.7 A / 52.0 A	60.8 A / 57.7 A
Max. output current	41.8 A	50.2 A	55.1 A	60.2 A	66.9 A
Power factor	>0.99 (0.8 leading - 0.8 lagging)				
THDI	<3%				
Efficiency					
Max. efficiency	98.5%		98.6%		98.7%
EU efficiency	98.1%		98.2%		98.3%
Protection					
DC reverse-polarity protection	Yes				
Short circuit protection	Yes				
Output over current protection	Yes				
Surge protection	DC Type II / AC Type II				
Grid monitoring	Yes				
Anti-islanding protection	Yes				
Temperature protection	Yes				
Strings monitoring	Yes				
I/V Curvescanning	Yes				
Integrated PID recovery	Optional				
Integrated AFCI (DC arc-fault circuit protection)	Yes ²⁾				
Integrated DC switch	Optional				
General Data					
Dimensions (W*H*D)	647*629*252 mm				
Weight	37 kg				
Topology	Transformerless				
Self consumption (night)	<1 W				
Operating ambient temperature range	-25 ~ +60° C				
Relative humidity	0-100%				
Ingress protection	IP66				
Cooling concept	Intelligent redundant fan-cooling				
Max. operation altitude	4000 m				
Grid connection standard	GB8 or G99, VDE-AR-N 4105 / VDE V 0124, EN 50549-1, VDE 0126 / UTE C 15 / VFR:2019, RD 1699 / RD 244 / UNE 206006 / UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, TOR, EIP5 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530				
Safety/EMC standard	IEC/EN 62109-1/-2, IEC/EN 61000-6-1/-2/-3/-4				
Features					
DC connection	MC4 connector				
AC connection	OT terminal				
Display	LCD				
Communication	RS485, Optional: WI-FI, GPRS				

2) Activation required.