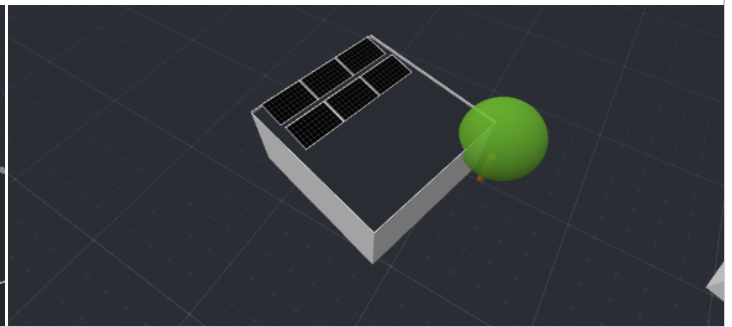
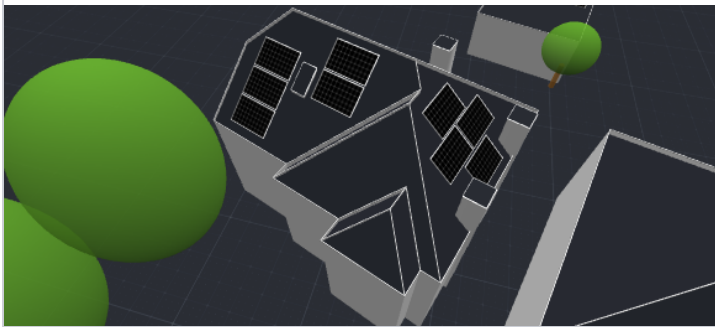
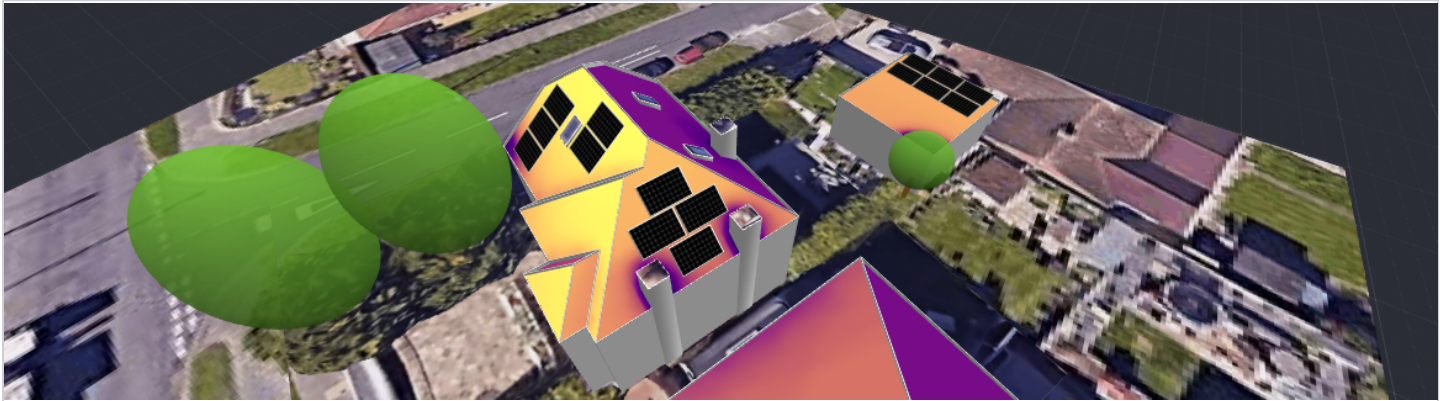


SHIELA LUMSDEN

Northdown Road 437, Margate, CT9 3LB, United Kingdom | Shiela Lumsden | 13 Oct 2023



SYSTEM OVERVIEW



15 PV modules



1 Inverter



15 Optimizers



1 Battery

FINANCIAL OVERVIEW

Net Payments

£ 12,500

Lifetime Bill Savings (NPV)

£ 57,878

System Profit (NPV)

£ 45,378

Internal Return Rate (IRR)

15.79 %

Payback Period

7.4 years

SIMULATION RESULTS



Installed DC Power

6.53 kWp



Max Achieved AC Power

5.99 kW



Annual Energy Production

6.22 MWh



CO2 Emission Saved (Annually)

1.2 t



Equivalent Trees Planted (Annually)

55



Max Achieved DC Power

5.98 kW



DC/AC Oversizing

100 %



Max Active AC Power

6.00 kW



Performance Ratio

82 %



Performance Index

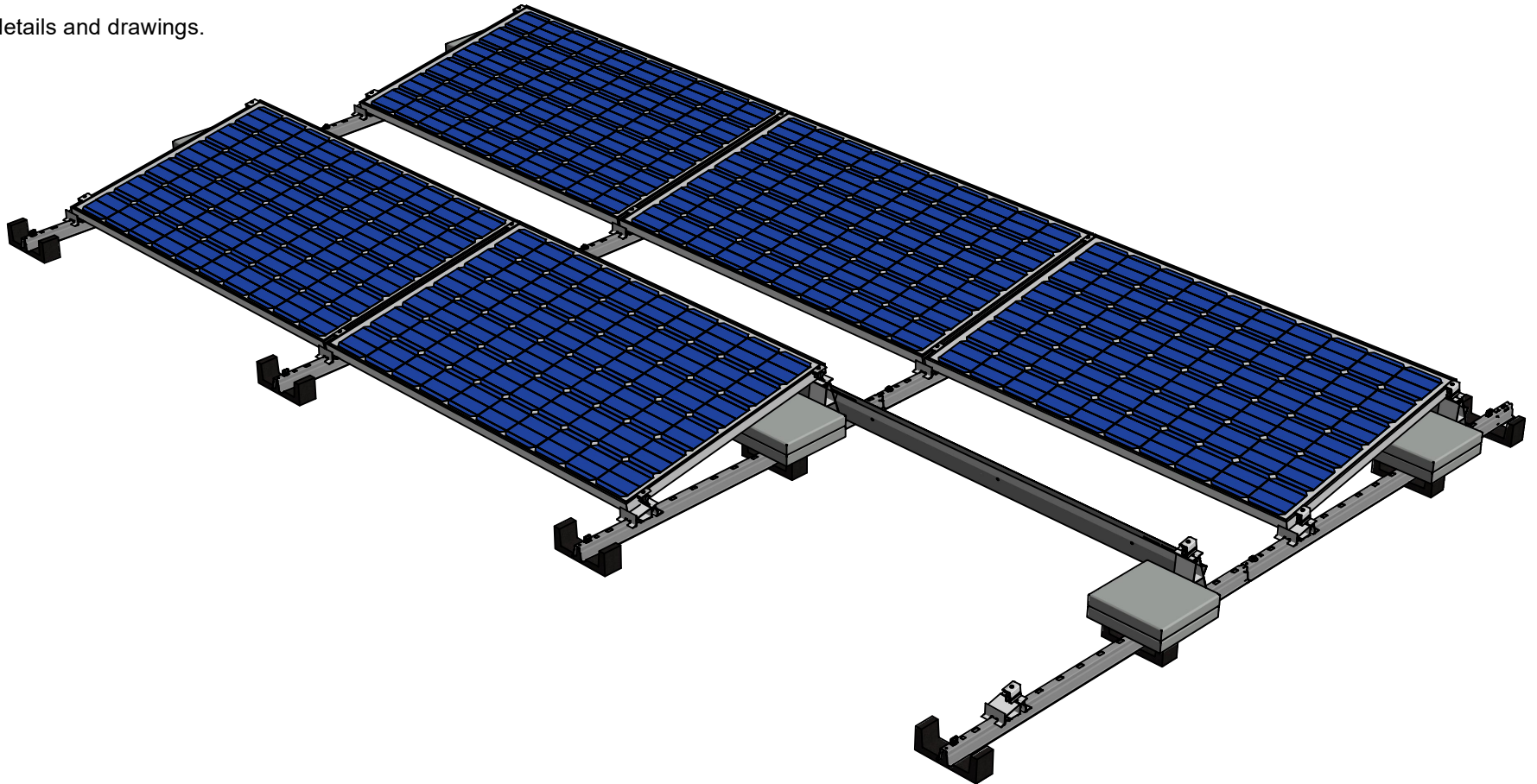
953 kWh/kWp



ValkPro+ Landscape 10°

Suitable panel length:	1520 - 2320 mm
Suitable panel width:	977 - 1350 mm
Panel inclination:	10°
Available pitch:	1300 - 1600 mm (default 1500 mm)
Maximum projection from roof:	310 mm

* See next page for system details and drawings.



Tiger Neo N-type 54HL4R-B 420-440 Watt ALL-BLACK MODULE

N-Type

Positive power tolerance of 0~+3%

IEC61215(2016), IEC61730(2016)

ISO9001:2015: Quality Management System

ISO14001:2015: Environment Management System

ISO45001:2018

Occupational health and safety management systems



Key Features



SMBB Technology

Better light trapping and current collection to improve module power output and reliability.



PID Resistance

Excellent Anti-PID performance guarantee via optimized mass-production process and materials control.



Durability Against Extreme Environmental Conditions

High salt mist and ammonia resistance.



Hot 2.0 Technology

The N-type module with Hot 2.0 technology has better reliability and lower LID/LETID.

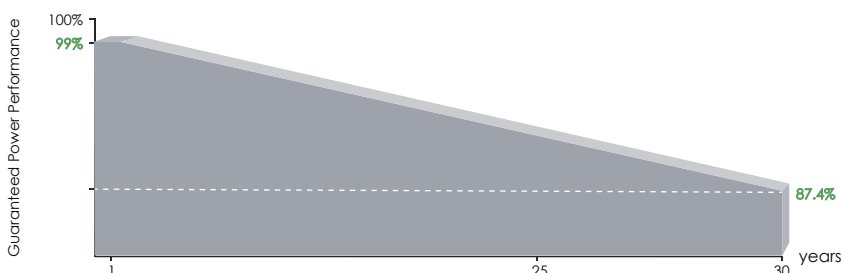


Enhanced Mechanical Load

Certified to withstand: wind load (2400 Pascal) and snow load (5400 Pascal).



LINEAR PERFORMANCE WARRANTY

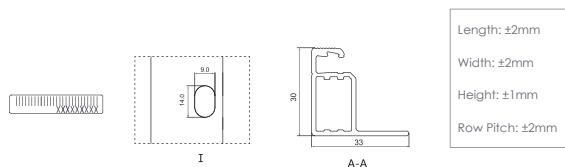
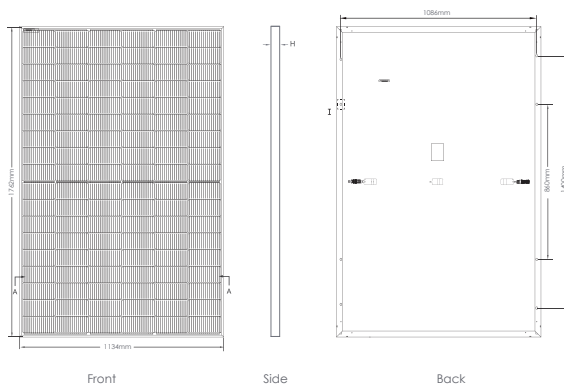


25 Year Product Warranty

30 Year Linear Power Warranty

0.40% Annual Degradation Over 30 years

Engineering Drawings



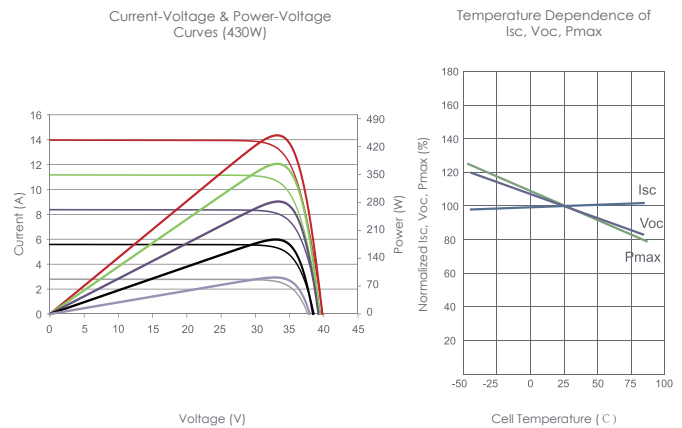
*This tolerance range applies only to the four-angle distance of the module as indicated above.

Packaging Configuration

(Two pallets = One stack)

36pcs/pallets, 72pcs/stack, 936pcs/ 40'HQ Container

Electrical Performance & Temperature Dependence



Mechanical Characteristics

Cell Type	N type Mono-crystalline
No. of cells	108 (6×18)
Dimensions	1762×1134×30mm (69.36×44.65×1.18 inch)
Weight	22 kg (48.50 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 (+): 400mm, (-): 200mm or Customized Length

SPECIFICATIONS

Module Type	JKM420N-54HL4R-B		JKM425N-54HL4R-B		JKM430N-54HL4R-B		JKM435N-54HL4R-B		JKM440N-54HL4R-B	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax)	420Wp	316Wp	425Wp	320Wp	430Wp	323Wp	435Wp	327Wp	440Wp	331Wp
Maximum Power Voltage (Vmp)	32.16V	29.95V	32.37V	30.19V	32.58V	30.30V	32.78V	30.50V	32.99V	30.73V
Maximum Power Current (Imp)	13.06A	10.55A	13.13A	10.60A	13.20A	10.66A	13.27V	10.72A	13.34A	10.77A
Open-circuit Voltage (Voc)	38.74V	36.80V	38.95V	37.00V	39.16V	37.20V	39.36V	37.39V	39.57V	37.59V
Short-circuit Current (Isc)	13.51A	10.91A	13.58A	10.96A	13.65A	11.02A	13.72A	11.08A	13.80A	11.14A
Module Efficiency STC (%)	21.02%		21.27%		21.52%		21.77%		22.02%	
Operating Temperature(°C)	-40°C~+85°C									
Maximum system voltage	1000VDC (IEC)									
Maximum series fuse rating	25A									
Power tolerance	0~+3%									
Temperature coefficients of Pmax	-0.29%/°C									
Temperature coefficients of Voc	-0.25%/°C									
Temperature coefficients of Isc	0.045%/°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

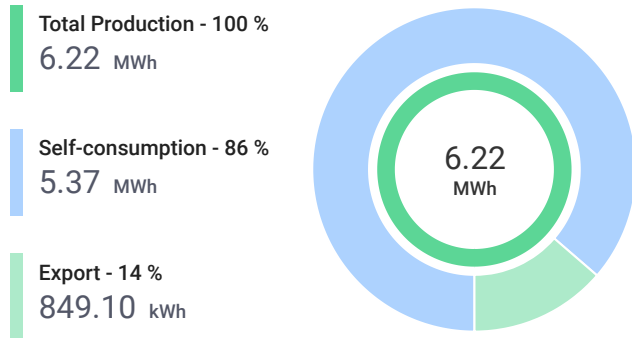
Wind Speed 1m/s

SHIELA LUMSDEN

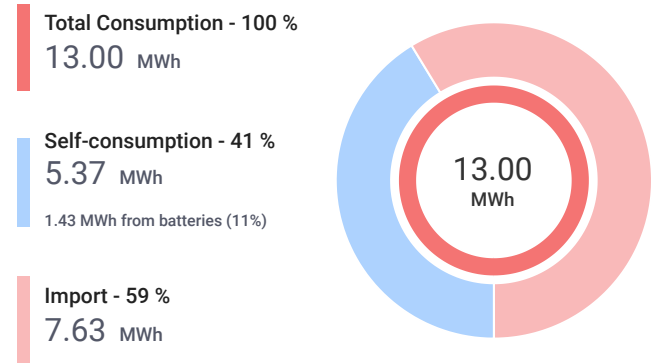
Northdown Road 437, Margate, CT9 3LB, United Kingdom | Shiela Lumsden | 13 Oct 2023



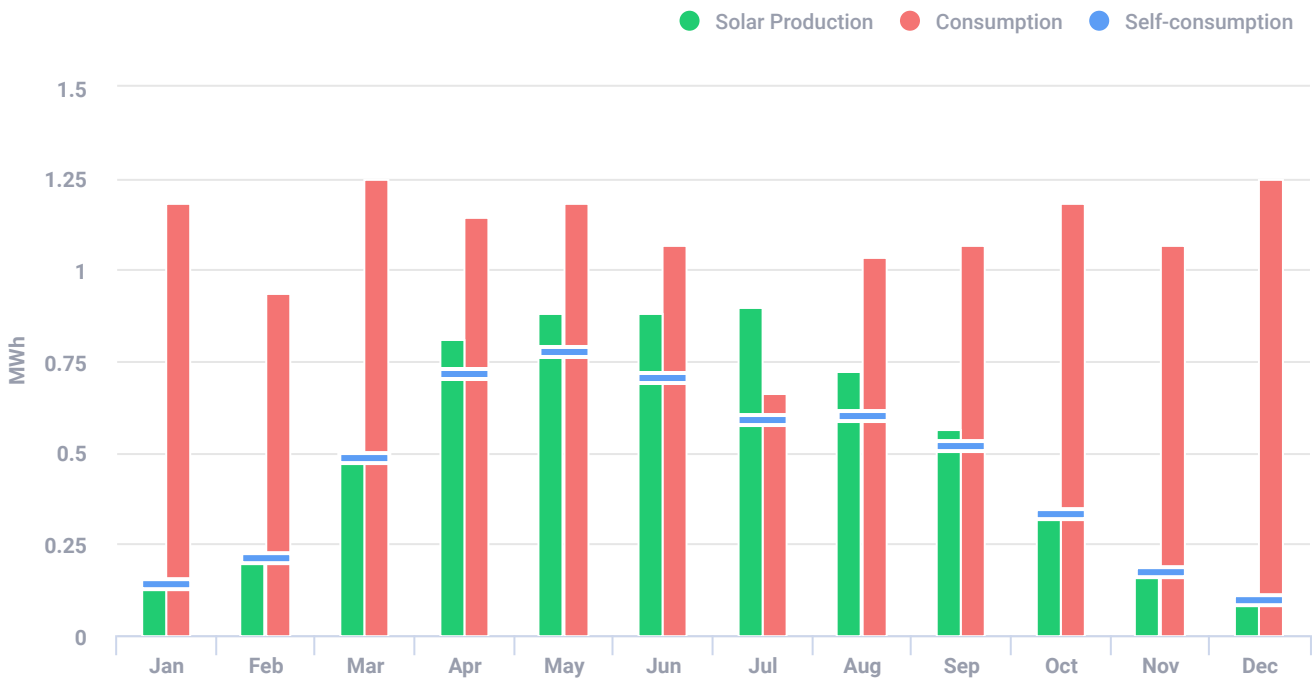
SYSTEM PRODUCTION



CONSUMPTION



ESTIMATED MONTHLY ENERGY



Total clipped energy: 0%

SHIELA LUMSDEN

Northdown Road 437, Margate, CT9 3LB, United Kingdom | Shiela Lumsden | 13 Oct 2023

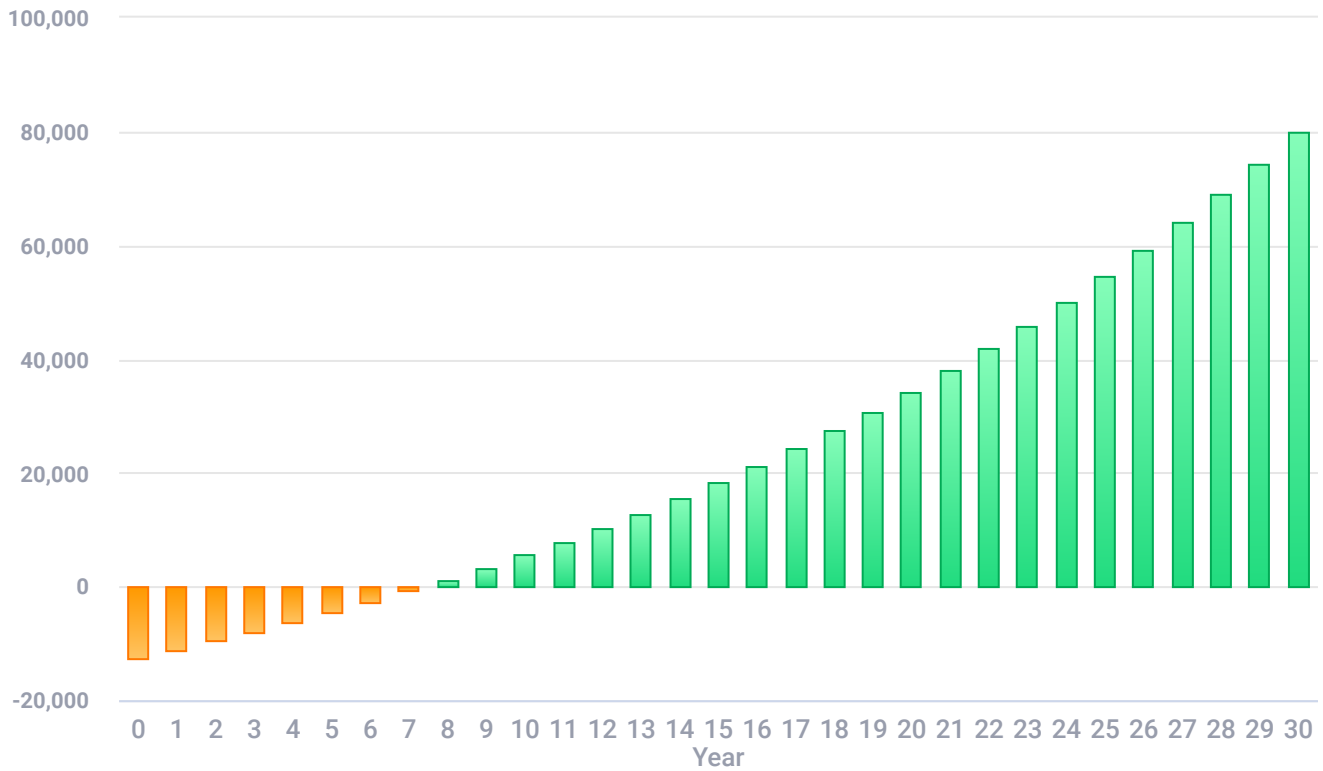


DETAILED FINANCIAL ANALYSIS

System Price	Maintenance Cost (NPV)	Returns from Incentives (NPV)	Net Payments	Lifetime Bill Savings (NPV)
£ 12,500	£ N/A	£ N/A	£ 12,500	£ 57,878

System Profit (NPV)	Internal Return Rate (IRR)	Return Of Investment (ROI)	Levelized Cost Of Energy (LCOE)	Payback Period
£ 45,378	15.79 %	363.03 %	£/kWh 0.105	7.4 years

Cumulative Cash Flow



YEARLY CASH FLOW

# Year	System Price	Net Bill Savings	Annual Cash Flow	Cumulative Cash Flow
0	£ -12,500.00	£ 0.00	£ -12,500.00	£ -12,500.00
1		£ 1,449.07	£ 1,449.07	£ -11,050.93

SHIELA LUMSDEN

Northdown Road 437, Margate, CT9 3LB, United Kingdom | Shiela Lumsden | 13 Oct 2023



YEARLY CASH FLOW (CONTINUED)

# Year	System Price	Net Bill Savings	Annual Cash Flow	Cumulative Cash Flow
2		£ 1,518.34	£ 1,518.34	£ -9,532.58
3		£ 1,590.91	£ 1,590.91	£ -7,941.68
4		£ 1,666.88	£ 1,666.88	£ -6,274.79
5		£ 1,746.47	£ 1,746.47	£ -4,528.33
6		£ 1,829.85	£ 1,829.85	£ -2,698.48
7		£ 1,917.19	£ 1,917.19	£ -781.29
8		£ 2,008.69	£ 2,008.69	£ 1,227.40
9		£ 2,104.52	£ 2,104.52	£ 3,331.92
10		£ 2,204.91	£ 2,204.91	£ 5,536.83
11		£ 2,310.04	£ 2,310.04	£ 7,846.87
12		£ 2,420.18	£ 2,420.18	£ 10,267.05
13		£ 2,535.49	£ 2,535.49	£ 12,802.54
14		£ 2,656.25	£ 2,656.25	£ 15,458.79
15		£ 2,782.74	£ 2,782.74	£ 18,241.53
16		£ 2,915.23	£ 2,915.23	£ 21,156.76
17		£ 3,053.95	£ 3,053.95	£ 24,210.71
18		£ 3,199.20	£ 3,199.20	£ 27,409.91
19		£ 3,351.32	£ 3,351.32	£ 30,761.23
20		£ 3,510.70	£ 3,510.70	£ 34,271.94
21		£ 3,677.60	£ 3,677.60	£ 37,949.54
22		£ 3,852.45	£ 3,852.45	£ 41,801.99
23		£ 4,035.53	£ 4,035.53	£ 45,837.52
24		£ 4,227.24	£ 4,227.24	£ 50,064.77
25		£ 4,428.07	£ 4,428.07	£ 54,492.84
26		£ 4,638.32	£ 4,638.32	£ 59,131.16
27		£ 4,858.54	£ 4,858.54	£ 63,989.70
28		£ 5,089.14	£ 5,089.14	£ 69,078.84

SHIELA LUMSDEN

Northdown Road 437, Margate, CT9 3LB, United Kingdom | Shiela Lumsden | 13 Oct 2023



YEARLY CASH FLOW (CONTINUED)

# Year	System Price	Net Bill Savings	Annual Cash Flow	Cumulative Cash Flow
29		£ 5,330.61	£ 5,330.61	£ 74,409.45
30		£ 5,583.41	£ 5,583.41	£ 79,992.86
Total:		£ 92,492.86	£ 79,992.86	

SIMULATION PARAMETERS



LOCATION & GRID

Time zone	BST (London)
Weather station	Margate (1.87 km away)
Station altitude	7 m
Station data source	Meteonorm 7.1
Grid	400V L-L, 230V L-N



LOSS FACTORS

Near shading	Enabled
Albedo	0.20
Bi-Facial Albedo	0.30
Soiling/Snow	0%
Incidence angle modifier (IAM), ASHRAE b0 param.	0.05
Thermal loss factor Uc (const) Flush mount	20
Thermal loss factor Uc (const) Tilted	29
LID loss factor	0%
System unavailability	0%

S5-EH1P(3-6)K-L

Solis Energy Storage Inverters

>> Models:

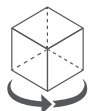
S5-EH1P3K-L

S5-EH1P3.6K-L

S5-EH1P4.6K-L

S5-EH1P5K-L

S5-EH1P6K-L



360° View



Features:

- Max. string input current **15A**
- Uninterrupted power supply, 20ms reaction
- 5kW backup power to support more important loads
- With shifting and peak shaving capabilities friendly to grid
- Multiple working modes to make maximize self-consumption, increase benefit
- Higher charge-discharge efficiency, improving the economic benefits
- AFCI protection, proactively reduces fire risk
- Compatible with lithium & lead-acid batteries, increased more choice in different markets
- Fanless design, long lifespan
- Intelligent EMS function, improving battery's reliability
- With high-frequency isolation technology, making system safer and long lifespan
- 24-hour fully intelligent energy management, Real-time grasp of PV plant status
- Remotely control & upgrade function, making digital power plant maintenance at your fingertips

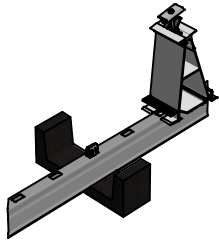
DATASHEET**S5-EH1P(3-6)K-L**

Models	3K	3.6K	4.6K	5K	6K
Input DC (PV side)					
Recommended max. PV power	4.8 kW	5.7 kW	8 kW	8 kW	8 kW
Max. input voltage	600 V				
Rated voltage	330 V				
Start-up voltage	120 V				
MPPT voltage range	90-520 V				
Max. input current	15 A / 15 A				
Max. short circuit current	22.5 A / 22.5 A				
MPPT number/Max. input strings number	2/2				
Battery					
Battery type	Li-ion / Lead-acid				
Battery voltage range	42 - 58 V				
Battery capacity	50 - 2000 Ah				
Max. charge / discharge power	3 kW		5 kW		
Max. charge / discharge current	62.5 A		100 A		
Communication	CAN				
Output AC (Back-up)					
Rated output power	3 kW		5 kW		
Max. apparent output power	4.5 kVA, 10SEC		7 kVA, 10SEC		
Back-up switch time	<20 ms				
Rated output voltage	1/N/PE, 220 V / 230 V				
Rated frequency	50 Hz / 60 Hz				
Rated output current	14 A / 13.5 A		23 A / 22 A		
THDv (@linear load)	<2%				
Input AC (Grid side)					
Input voltage range	187-265 V				
Max. input current	20.5 A / 20 A	25 A / 23.5 A	31.5 A / 30 A	34.5 A / 33 A	34.5 A / 33 A
Frequency range	45-55 Hz / 55-65 Hz				
Output AC (Grid side)					
Rated output power	3 kW	3.6 kW	4.6 kW	5 kW	6 kW
Max. apparent output power	3.3 kVA	4 kVA	4.6 kVA	5.5 kVA	6.6 kVA
Operation phase	1/N/PE				
Rated grid voltage	220 V / 230 V				
Rated grid frequency	50 Hz / 60 Hz				
Rated grid output current	13.7 A / 13.1 A	16.4 A / 15.7 A	20.9 A / 20 A	22.8 A / 21.7 A	27.3 A / 26.1 A
Max. output current	15 A	18.5 A	21 A	25 A	30 A
Power factor	>0.99 (0.8 leading - 0.8 lagging)				
THDi	<2%				
Efficiency					
Max. efficiency	>97.1%				
EU efficiency	>96.5%				
Protection					
DC reverse-polarity protection	Yes				
Short circuit protection	Yes				
Output over current protection	Yes				
Surge protection	DC Type II / AC Type II				
Ground fault monitoring	Yes				
Integrated AFCI (DC arc-fault circuit protection)	Yes ⁽¹⁾				
Protection class/Over voltage category	I/II				
General Data					
Dimensions (W*H*D)	333*505*249 mm				
Weight	18.3 kg				
Topology	High frequency isolation (for battery)				
Operating ambient temperature range	-25 ~ +60°C				
Ingress protection	IP65				
Cooling concept	Natural convection				
Max. operation altitude	3000 m				
Grid connection standard	G98 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, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530, MEA, PEA				
Safety/EMC standard	IEC/EN 62109-1/-2, EN 61000-6-2/-3				
Features					
DC connection	MC4 connector				
AC connection	Quick connection plug				
Display	7.0" LCD color screen display				
Communication	RS485, Optional: Wi-Fi, GPRS				

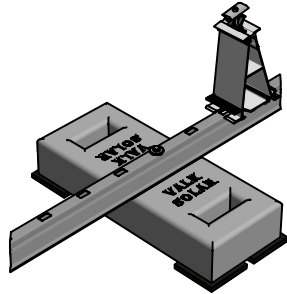
(1) Activation required.



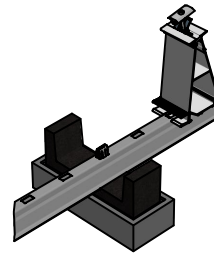
Foundation types:



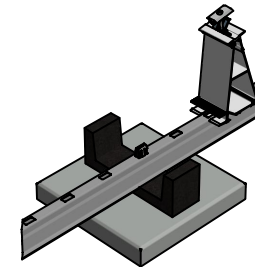
Rubber tile carriers:
Bitumen / EPDM / Concrete / PVC



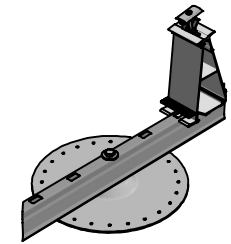
Mass blocks:
Roof or field systems



Elevation blocks:
for gravel roofs

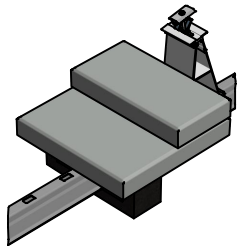


Foundation tile:
for sedum / green roofs
or field systems

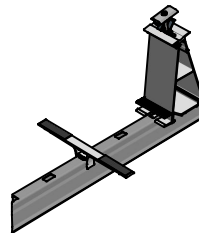


ValkSolarFix:
for mechanical fixation

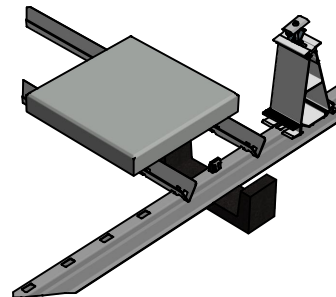
Ballast options:



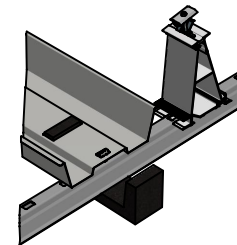
Rubber tile carriers



Ballast wings

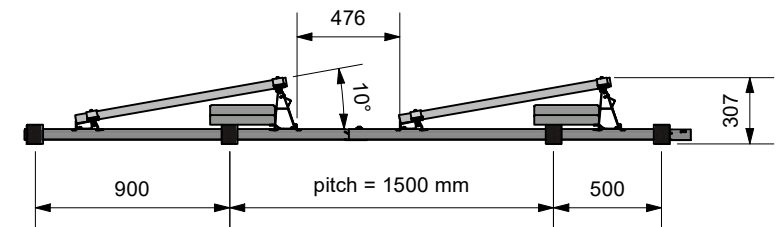
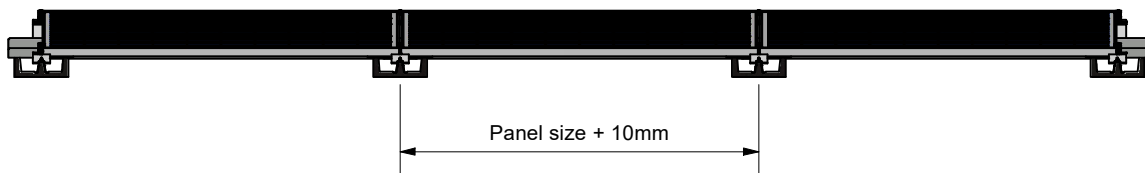


Mass carriers



Ballast trays

Technical dimensions:





TS4-A-O

Module-level PV Optimizer

The TS4-A-O (Optimization) is the advanced add-on optimization solution that brings smart module functionality to standard PV modules for higher reliability. Improve energy efficiency by upgrading underperforming PV systems or adding smart features to new installations.

The TS4-A-O complies with NEC 2017 and 2020 690.12 Rapid Shutdown specifications when installed on each module and accompanied by the Tigo Access Point (TAP) and the Cloud Connect Advanced (CCA). Module-level DC production data, as well as data from other Modbus connected devices, can be analyzed via Tigo's Energy Intelligence Software when connected to the cloud.

The TS4-A-O with UHD-Core technology and expanded specifications supports PV modules up to 700W, and 15A.

Included Features



Module-level **optimization** for increased energy yield and greater design flexibility



Manual or automatic module-level **shutdown**. Complies with NEC 2017 and 2020.



Module-level **monitoring** for energy production tracking and system management

Easy Installation

Snap to standard module frame or remove clips for rack mounting

Smart Commissioning

Configure and commission with your Android or iOS mobile device



TS4-A-O SPECIFICATIONS

Environmental

Operating Temperature Range	-40°C to +70°C (-40°F to +158°F)
Outdoor Rating	IP68, NEMA 3R
Maximum Elevation	2000m

Mechanical

Dimensions	W=138.4mm, L= 139.7mm, H= 22.9mm
Weight	520g

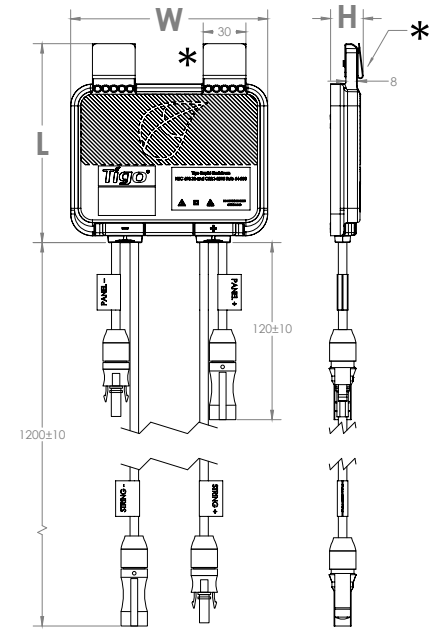
Electrical

Max Input Voltage (V _{OC} @ Lowest Temperature)	80V
Input Voltage Range	16 - 80V*
Maximum Cont. Current (I _{max})	15A
Maximum Short Circuit Current (I _{sc})	20A
Maximum Power	700W
Cable Length (in/out)	0.12/1.2m (standard), 0.62/1.2m (optional)
Connectors	MC4 (standard), EVO2 (optional)
Communication Type	Wireless
Recommended Fuse Rating	30A
Rapid Shutdown Time Limit	30 secs or less**
Conductor AWG Range	10-12 AWG
PVRSE Controlled Conductors	≤30 Vdc, ≤240VA, ≤8A**

TAP required for module-level shutdown and CCA required for monitoring with TS4-A-O.

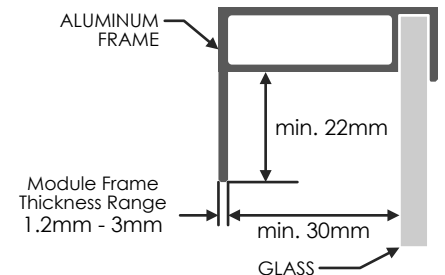
*V_{MOD MAX} of the connected panel = TS4-A-O V_{DCU MAX}

**Limits are based on NEC 690.12 rapid shutdown requirements.



*Clips can be removed for rack mounting

Module frame specifications for mounting TS4-A



ORDERING INFORMATION

461-00252-32	TS4-A-O, 15A, 700W, 1500VUL/1000V IEC, 1.2M Cable, MC4
461-00252-62	TS4-A-O, 15A, 700W, 1500VUL/1000V IEC, 0.62/1.2M Cable, MC4
461-00261-62	TS4-A-O, 15A, 700W, 1500VUL/IEC, 0.62/1.2M Cable, EVO2
461-00261-32	TS4-A-O, 15A, 700W, 1500VUL/IEC, 1.2M Cable, EVO2
462-00252-32	TS4-A-O, 15A, 700W, 1000VIEC, 0.12/1.2M Cable, MC4
462-00252-62	TS4-A-O, 15A, 700W, 1000VIEC, 0.62/1.2M Cable, MC4
462-00261-32	TS4-A-O, 15A, 700W, 1500VIEC, 0.12/1.2M Cable, EVO2
462-00261-62	TS4-A-O, 15A, 700W, 1500VIEC, 0.62/1.2m Cable, EVO2

For sales info:

sales@tigoenergy.com

For product info:

Visit tigoenergy.com/products

For technical info:

Visit support.tigoenergy.com

For additional info and product selection assistance, use Tigo's online design tool at tigoenergy.com/design

