

## Solar PV - Technical Submittal (TSM)

**Project:** New Cross Residential, Oldham Road  
**Project No:** MC1160  
**TSM No:** D464-AME-XX-XX-TS-M-0028  
**Revision:** PO1

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CARBONCONSULTANTS



**ameon**

Building Services Engineering



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|              |                                                          |
|--------------|----------------------------------------------------------|
| PROJECT      | OLDHAM ROAD-NEW CROSS                                    |
| LOCATION     | OLDHAM ROAD<br>CHADDERTON STREET<br>MANCHESTER<br>M4 5DW |
| WORK ELEMENT | Solar PV                                                 |
| REVISION.    | -0.0                                                     |
| DATE         | 01/08/22                                                 |



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SECTION 01 – TECHNICAL COMPLIANCY STATEMENT

|                               |           |
|-------------------------------|-----------|
| Project: OLDHAM ROAD          |           |
| Material Item: Solar PV Array | Rev: -0.0 |

|                                                                          |
|--------------------------------------------------------------------------|
| Proposed Specialist Contractor/Supplier: Navitas Solar Installations Ltd |
|--------------------------------------------------------------------------|

|                                                                         |
|-------------------------------------------------------------------------|
| Specification Reference (s):<br>as Specification – 25.41kWp requirement |
|-------------------------------------------------------------------------|

|                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Information Attached: -<br>✓ Equipment / Manufacturers Schedules: Product Data sheets included<br>✓ Certified Performance Levels: Potential Yields included in document<br>✓ Certified Drawings –<br>✓ Non-Compliance Schedule –<br>☐ Specification Clauses: -<br>☐ Design Calculations:<br>☐ Off Site Testing: |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                           |
|-------------------------------------------|
| Compliance Statement: Parts Non-Compliant |
|-------------------------------------------|

|                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Further Information to be Issued: - None<br>Off Site Testing Required    N/A<br>Method Statements Required: Yes<br>Scope:- Design & Installation of Solar PV |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|

|               |                        |
|---------------|------------------------|
| Signed:       | Approval Status: ----- |
| Name:         | Reviewer: -----        |
| On Behalf of: | On Behalf of: -----    |
| Date:         | Date: -----            |



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## SECTION 02 – INTRODUCTION

### 2.1 – Services Overview

To supply, install and commission a 25.41kW solar PV system to the available roof area of the proposed development at Oldham Road to produce 21,000kWh per annum 132m<sup>2</sup> in panel area

## SECTION 03 – TECHNICAL DATA SHEETS

- Inverters
- Solar panels
- Fixing methods

## SECTION 04 – CERTIFIED DRAWINGS

TBC

## SECTION 05 – SPECIFICATION

The main specification of the system consists of:

### 1.1 Solar Panels: 66 x JA 385W MONO Solar PV modules with twelve-year product warranty and twenty-five-year performance guarantee.

- Dimensions : 1776mm X 1052mm X 35mm
- Weight of panels: 20.7kg
- Module Efficiency Rating: 20.3%
- Warranty Details: Twelve-year product warranty and a twenty-five-year performance guarantee.
- Power Tolerance: Up to +5%
- Certifications : MCS, CE, TUV, IEC 61215, IEC 61730, ISO9001:2008, ISO 14001:2004, BS OHSAS 18001:2007, SA 8000.

### 1.2 Inverter: 1 x Solis 30K 4G Three phase inverter with five-year product warranty.

- Efficiency Rating: 98.6%
- Warranty Details: 5 year warranty.
- IP Rated to IP65
- Automatic monitoring, shutdown and re start function along with visual display screen.
- Inverter sized to withstand predicted maximum voltage.

### 1.3 Mounting Structure: Wagner Tric F duo

- Ten-year warranty



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**SECTION 06 – NON-COMPLIANCE**

6.1

| DEVIATION | EMPLOYERS REQUIREMENTS | NAVITAS SOLAR | REASON FOR CHANGE |
|-----------|------------------------|---------------|-------------------|
| N/A       | N/A                    | N/A           | N/A               |

**SECTION 07 – Performance Data & Potential Yields****SYSTEM PERFORMANCE**

| <b><u>Expected Performance Yields</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                            |                                 |                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------|------------------------------------------------|
| <p>The annual performance of a grid connected PV system depends on a large number of factors. The methodology below is a simplified version that is used to achieve a reasonable estimation of performance.</p> <p><u>“The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the Government’s standard assessment procedure for energy ratings of buildings (SAP) and is given as guidance only. It should not be considered as a guarantee of performance”</u></p> |                            |                                 |                                                |
| Installed Capacity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | System Orientation         | System Inclination              | Postcode Region                                |
| 25.41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (TBC)                      | 10                              | 7E (S)                                         |
| kW P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Degrees from South<br>(Kk) | Degrees from Horizontal<br>(Kk) | Taken from Annex D<br>Guide to PV systems 2012 |

| <b><u>Expected Performance Yields</u></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                           |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------|
| <p>By using the Standard Assessment Procedure (SAP 2012) we can reliably predict the expected performance of the proposed Solar PV system. This allows us to see how much energy the system will typically produce and to calculate the financial benefits through Feed in Tariff payments, as well as the export income and potential savings on your electricity bills.</p> <p>The SAP procedure calculates the estimated annual output of the PV system by taking the amount of annual sun received in the area multiplied by the system size, multiplied by the orientation SAP figure, and finally by the possible shading factor. This gives the expected kWh per year (kWh-PA).</p> |                           |              |
| System Design Size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Orientation / Inclination | Shade Factor |
| 25.41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 820                       | 1.0          |
| kW peak                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Kk Factor                 | (SF)         |
| <p>Using the above calculation, it is estimated that the proposed system will produce</p> <p><b>21,798kWh per annum</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           |              |



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**PREDICTED FINANCIAL BENEFIT**

The main financial benefits to be had from the installation of a Solar PV System is savings made from not having to purchase the amount of electricity that the system produces.

| <b><u>Estimated Return via Savings from Electricity Bills</u></b>                                                                                                                                                                                                                                                        |                                  |                                  |                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------|---------------------------------|
| Based upon the expected annual yield, we can estimate the potential savings made against the existing electricity bill. We have made an assumption that electricity prices will increase by 6% per year . We have assumed a 100% usage rate for the purpose of this calculation. A rate of 28p per kwh has been applied. |                                  |                                  |                                 |
| <b>Predicted Yield</b>                                                                                                                                                                                                                                                                                                   | <b>Electricity Saving Year 1</b> | <b>Electricity Saving Year 5</b> | <b>Electricity Saving Total</b> |
| <b>21,798</b>                                                                                                                                                                                                                                                                                                            | <b>£5834</b>                     | <b>£32,887</b>                   | <b>£295,768</b>                 |
| kWh per year                                                                                                                                                                                                                                                                                                             | £0.28 per kWh.                   | Rate of 6%                       | Over 25 years                   |

# Harvest the Sunshine

Mono

## 390W MBB Half-Cell Module

JAM60S20 365-390/MR Series

### Introduction

Assembled with multi-busbar PERC cells, the half-cell configuration of the modules offers the advantages of higher power output, better temperature-dependent performance, reduced shading effect on the energy generation, lower risk of hot spot, as well as enhanced tolerance for mechanical loading.



Higher output power



Lower LCOE



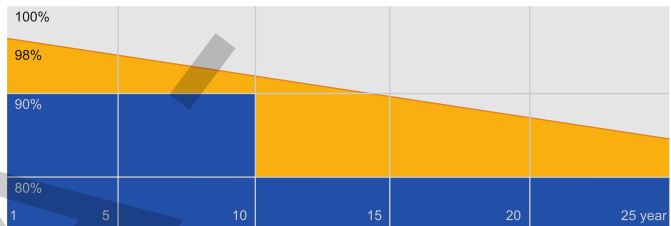
Less shading and lower resistive loss



Better mechanical loading tolerance

### Superior Warranty

- 12-year product warranty
- 25-year linear power output warranty



■ JA Linear Power Warranty ■ Industry Warranty

### Comprehensive Certificates

- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- OHSAS 18001: 2007 Occupational health and safety management systems
- IEC TS 62941: 2016 Terrestrial photovoltaic (PV) modules – Guidelines for increased confidence in PV module design qualification and type approval



JASOLAR

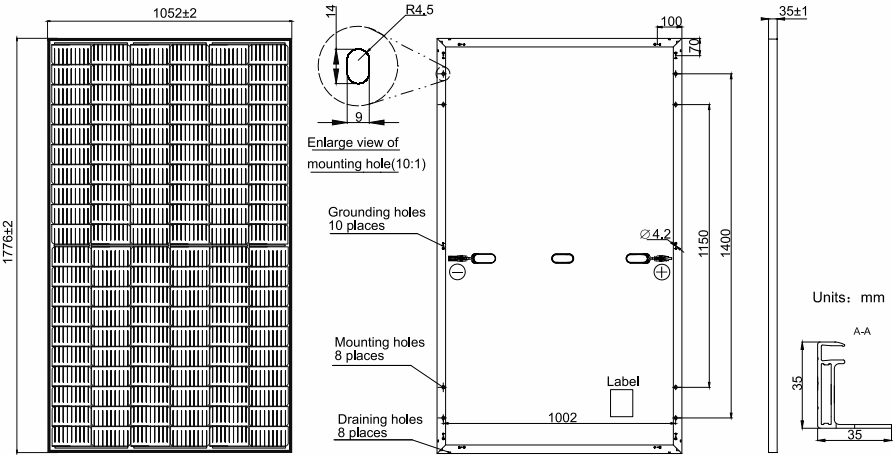
[www.jasolar.com](http://www.jasolar.com)

Specifications subject to technical changes and tests.  
JA Solar reserves the right of final interpretation.



MECHANICAL DIAGRAMS

SPECIFICATIONS



Remark: customized frame color and cable length available upon request

|                                    |                                       |
|------------------------------------|---------------------------------------|
| Cell                               | Mono                                  |
| Weight                             | 20.7kg±3%                             |
| Dimensions                         | 1776±2mm×1052±2mm×35±1mm              |
| Cable Cross Section Size           | 4mm <sup>2</sup> (IEC) ,12 AWG(UL)    |
| No. of cells                       | 120(6×20)                             |
| Junction Box                       | IP68, 3 diodes                        |
| Connector                          | MC4                                   |
| Cable Length (Including Connector) | 1000mm(+)/1000mm(-)                   |
| Packaging Configuration            | 31pcs/Pallet<br>744pcs/40ft Container |

ELECTRICAL PARAMETERS AT STC

| TYPE                                               | JAM60S20<br>-365/MR                                             | JAM60S20<br>-370/MR | JAM60S20<br>-375/MR | JAM60S20<br>-380/MR | JAM60S20<br>-385/MR | JAM60S20<br>-390/MR |
|----------------------------------------------------|-----------------------------------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Rated Maximum Power(Pmax) [W]                      | 365                                                             | 370                 | 375                 | 380                 | 385                 | 390                 |
| Open Circuit Voltage(Voc) [V]                      | 41.13                                                           | 41.30               | 41.45               | 41.62               | 41.78               | 41.94               |
| Maximum Power Voltage(Vmp) [V]                     | 33.96                                                           | 34.23               | 34.50               | 34.77               | 35.04               | 35.33               |
| Short Circuit Current(Isc) [A]                     | 11.30                                                           | 11.35               | 11.41               | 11.47               | 11.53               | 11.58               |
| Maximum Power Current(Imp) [A]                     | 10.75                                                           | 10.81               | 10.87               | 10.93               | 10.99               | 11.04               |
| Module Efficiency [%]                              | 19.5                                                            | 19.8                | 20.1                | 20.3                | 20.6                | 20.9                |
| Power Tolerance                                    | 0~+5W                                                           |                     |                     |                     |                     |                     |
| Temperature Coefficient of Isc(α <sub>Isc</sub> )  | +0.044%/°C                                                      |                     |                     |                     |                     |                     |
| Temperature Coefficient of Voc(β <sub>Voc</sub> )  | -0.272%/°C                                                      |                     |                     |                     |                     |                     |
| Temperature Coefficient of Pmax(γ <sub>Pmp</sub> ) | -0.350%/°C                                                      |                     |                     |                     |                     |                     |
| STC                                                | Irradiance 1000W/m <sup>2</sup> , cell temperature 25°C, AM1.5G |                     |                     |                     |                     |                     |

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer.They only serve for comparison among different module types.

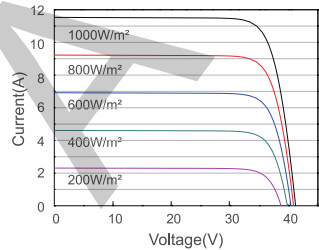
ELECTRICAL PARAMETERS AT NOCT

OPERATING CONDITIONS

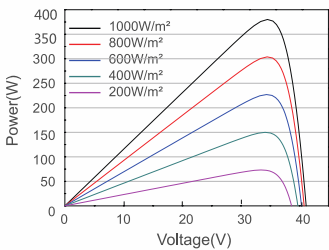
| TYPE                           | JAM60S20<br>-365/MR                                                                   | JAM60S20<br>-370/MR | JAM60S20<br>-375/MR | JAM60S20<br>-380/MR | JAM60S20<br>-385/MR | JAM60S20<br>-390/MR | Maximum System Voltage    | 1000V/1500V DC                    |
|--------------------------------|---------------------------------------------------------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------------|-----------------------------------|
| Rated Max Power(Pmax) [W]      | 276                                                                                   | 280                 | 284                 | 287                 | 291                 | 295                 | Operating Temperature     | -40°C~+85°C                       |
| Open Circuit Voltage(Voc) [V]  | 38.41                                                                                 | 38.65               | 38.89               | 39.14               | 39.38               | 39.63               | Maximum Series Fuse       | 20A                               |
| Max Power Voltage(Vmp) [V]     | 32.05                                                                                 | 32.30               | 32.55               | 32.72               | 32.96               | 33.20               | Maximum Static Load,Front | 5400Pa ( 112 lb/ft <sup>2</sup> ) |
| Short Circuit Current(Isc) [A] | 9.15                                                                                  | 9.20                | 9.25                | 9.30                | 9.35                | 9.40                | Maximum Static Load,Back  | 2400Pa ( 50 lb/ft <sup>2</sup> )  |
| Max Power Current(Imp) [A]     | 8.61                                                                                  | 8.66                | 8.71                | 8.78                | 8.83                | 8.88                | NOCT                      | 45±2°C                            |
| NOCT                           | Irradiance 800W/m <sup>2</sup> , ambient temperature 20°C,<br>wind speed 1m/s, AM1.5G |                     |                     |                     |                     |                     | Safety Class              | Class II                          |
|                                |                                                                                       |                     |                     |                     |                     |                     | Fire Performance          | UL Type 1                         |

CHARACTERISTICS

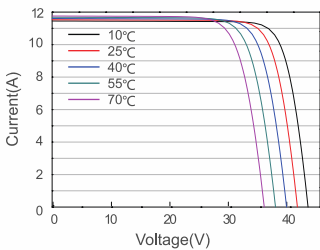
Current-Voltage Curve JAM60S20-380/MR



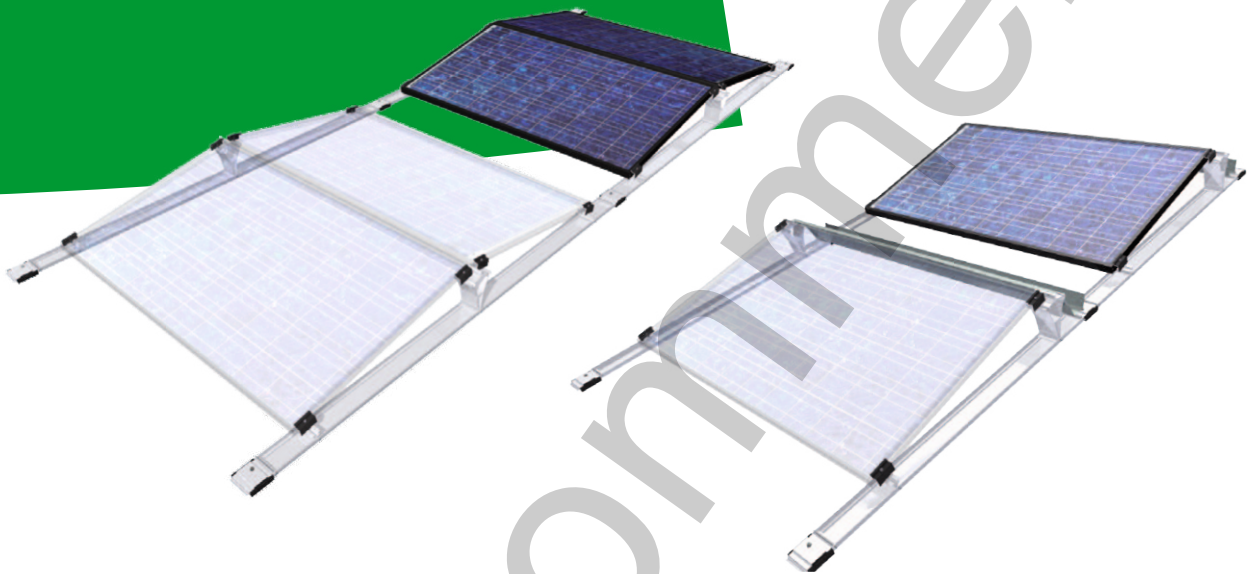
Power-Voltage Curve JAM60S20-380/MR



Current-Voltage Curve JAM60S20-380/MR



# Flat Roof Racking System TRIC F duo



**TRIC F duo** - a highly flexible and compact mounting system for all conventional flat roofs. The sophisticated system combines low material use, easy assembly and short rail lengths facilitating handling. This reduces costs and increases profitability.



## STANDOUTS

- Low system costs
- Very fast installation
- Highly flexible
- Lightweight design

## DETAILS

The material-optimized, intelligent design cuts costs in three ways: the use of materials, during transport and during installation.

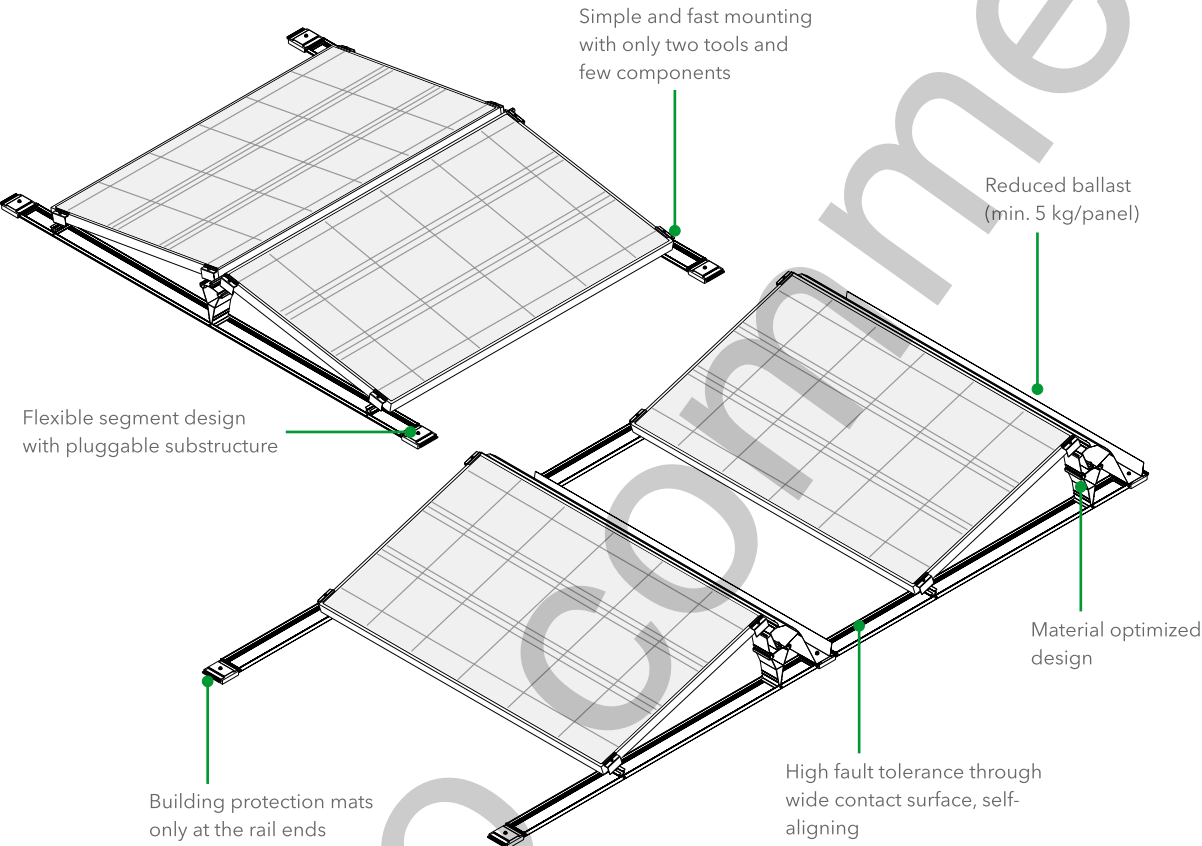
The simple system reduces the installation time considerably.

One system for southern (10°/18°) and east-wester (10°) mounting. The flexible, pluggable and segmental design is self-aligning, adapts to all substrates and surfaces and also forgives uneven roofing.

Thanks to the low ballast the additional roof load is reduced. Building protection mats are only required to cover the rail ends.

Flat Roof Racking System

TRIC F duo



| Technical Data       | TRIC F duo                                                                                       |
|----------------------|--------------------------------------------------------------------------------------------------|
| Application          | Flat roofs with little excess load tolerance or roof penetration impossible/undesirable          |
| Panel orientation    | Pitch south 10° or 18° ; pitch east/west 10°; vertical; for practically all common framed panels |
| Ballast              | Normal roof zone min. 5 kg/panel; corner-/edge zones min. 20 kg/panel                            |
| Structural roof load | Min. 8 kg/m²                                                                                     |
| Material             | Aluminium and stainless steel                                                                    |

Three

20kW  
-  
40kW

Solis Three PV Inverter

- ▶ Three phase output
- ▶ Over 98.8% Max. efficiency
- ▶ 200V-1000V input voltage range
- ▶ 7.0" LCD color screen display
- ▶ Four MPPT design with precise MPPT algorithm
- ▶ Compact and light design, easy installation
- ▶ IP65 rated for outdoor installation
- ▶ RS485, WiFi/GPRS (optional) interface
- ▶ Anti-resonance, single transformer can connect 6M+ in parallel
- ▶ Multiple protection fuctions
- ▶ WiFi and monitoring app available
- ▶ 5 years standard warranty, 20 years optional upgrade



Model:

|           |              |              |
|-----------|--------------|--------------|
| Solis-20K | Solis-25K    | Solis-30K    |
| Solis-33K | Solis-36K-HV | Solis-40K-HV |

Features:

|                               |              |           |                                      |                                                                              |      |
|-------------------------------|--------------|-----------|--------------------------------------|------------------------------------------------------------------------------|------|
| Fanless<br>Cooling<br>Concept | Four<br>MPPT | 7"<br>LCD | WiFi/GPRS<br>Real time<br>monitoring | Available on the iPhone<br>App Store<br>Available on the iPhone<br>App Store | IP65 |
|-------------------------------|--------------|-----------|--------------------------------------|------------------------------------------------------------------------------|------|

Datasheet

| Model                                | Solis-20K                                       | Solis-25K   | Solis-30K   | Solis-33K   | Solis-36K-HV | Solis-40K-HV |
|--------------------------------------|-------------------------------------------------|-------------|-------------|-------------|--------------|--------------|
| Energy Source                        | PV                                              |             |             |             |              |              |
| Input Side(DC)                       |                                                 |             |             |             |              |              |
| Max. DC input power(kW)              | 23                                              | 28          | 34          | 36          | 41           | 48           |
| Max. DC input voltage(V)             | 1000                                            |             |             |             | 1100         |              |
| Start-up voltage(V)                  | 350                                             |             |             |             |              |              |
| MPPT voltage range(V)                | 200-800                                         |             |             |             | 200-1000     |              |
| Max. input current(A)                | 18A+18A+18A+18A                                 |             |             |             |              |              |
| MPPT number/Max input strings number | 4/8                                             |             |             |             |              |              |
| Output Side (AC)                     |                                                 |             |             |             |              |              |
| Rated output power(kW)               | 20                                              | 25          | 30          | 33          | 36           | 40           |
| Max. apparent output power(kVA)      | 22                                              | 27.5        | 33          | 33          | 40           | 44           |
| Max. output power(kW)                | 22                                              | 27.5        | 33          | 33          | 40           | 44           |
| Rated grid voltage(V)                | 400                                             |             |             |             | 480          |              |
| Grid voltage range(V)                | 304-460                                         |             |             |             | 384-576      |              |
| Rated grid frequency(Hz)             | 50/60                                           |             |             |             |              |              |
| Operation phase                      | Three                                           |             |             |             |              |              |
| Rated grid output current(A)         | 28.7                                            | 36.1        | 43.3        | 47.8        | 43.3         | 48.1         |
| Max. output current(A)               | 33.3                                            | 41.7        | 50          | 50          | 47.8         | 53           |
| Power Factor (at rated output power) | 0.8...1...0.8                                   |             |             |             |              |              |
| THDi (at rated output power)         | <3%                                             |             |             |             |              |              |
| DC injection current(mA)             | <50                                             |             |             |             |              |              |
| Grid frequency range(Hz)             | 47-52 or 57-62                                  |             |             |             |              |              |
| Efficiency                           |                                                 |             |             |             |              |              |
| Max. efficiency                      | 98.6%                                           | 98.6%       | 98.6%       | 98.7%       | 98.8%        | 98.8%        |
| EU efficiency                        | 98.3%/98.3%                                     | 98.3%/98.3% | 98.3%/98.3% | 98.3%/98.3% | 98.4%/98.4%  | 98.4%/98.4%  |
| MPPTefficiency                       | 99.9%                                           |             |             |             |              |              |
| Protection                           |                                                 |             |             |             |              |              |
| DC reverse-polarity protection       | Yes                                             |             |             |             |              |              |
| Short circuit protection             | Yes                                             |             |             |             |              |              |
| Output over current protection       | Yes                                             |             |             |             |              |              |
| Output over voltage protection       | Yes                                             |             |             |             |              |              |
| Insulation resistance monitoring     | Yes                                             |             |             |             |              |              |
| Residual current detection           | Yes                                             |             |             |             |              |              |
| Surge protection                     | Yes                                             |             |             |             |              |              |
| Islanding protection                 | Yes                                             |             |             |             |              |              |
| temperature protection               | Yes                                             |             |             |             |              |              |
| Integrated DC switch                 | Optional                                        |             |             |             |              |              |
| General Data                         |                                                 |             |             |             |              |              |
| Dimensins(mm)                        | 530W*700H*356.5D (mm)                           |             |             |             |              |              |
| Weight(kg)                           | 57.2                                            | 58.2        |             |             |              |              |
| Topology                             | Transformerless                                 |             |             |             |              |              |
| Self consumption (night)             | <1W(Night)                                      |             |             |             |              |              |
| Operating ambient temperature range  | -25~60℃                                         |             |             |             |              |              |
| Ingress protection                   | IP65                                            |             |             |             |              |              |
| Noise emission{typical}              | <30 dBA                                         |             |             |             |              |              |
| Cooling concept                      | Natural convection                              |             |             |             |              |              |
| Max.operation altitude               | 4000m                                           |             |             |             |              |              |
| Designed lifetime                    | >20years                                        |             |             |             |              |              |
| Grid connection standard             | EN50438, G59/3, AS4777, VDE0126-1-1, IEC61727   |             |             |             |              |              |
| Relative humidity                    | 0~100%                                          |             |             |             |              |              |
| Safty/EMC standard                   | IEC62109-1/-2, AS3100, EN61000-6-1, EN61000-6-3 |             |             |             |              |              |
| Features                             |                                                 |             |             |             |              |              |
| DC connection                        | MC-4mateable                                    |             |             |             |              |              |
| AC connection                        | Terminal connectors                             |             |             |             |              |              |
| Display                              | 7.0"LCD color screen display                    |             |             |             |              |              |
| Communication connections            | 4 pins RS485 connector , 2 RJ45 connector       |             |             |             |              |              |
| Warranty                             | 5 years standard (extend to 20 years)           |             |             |             |              |              |