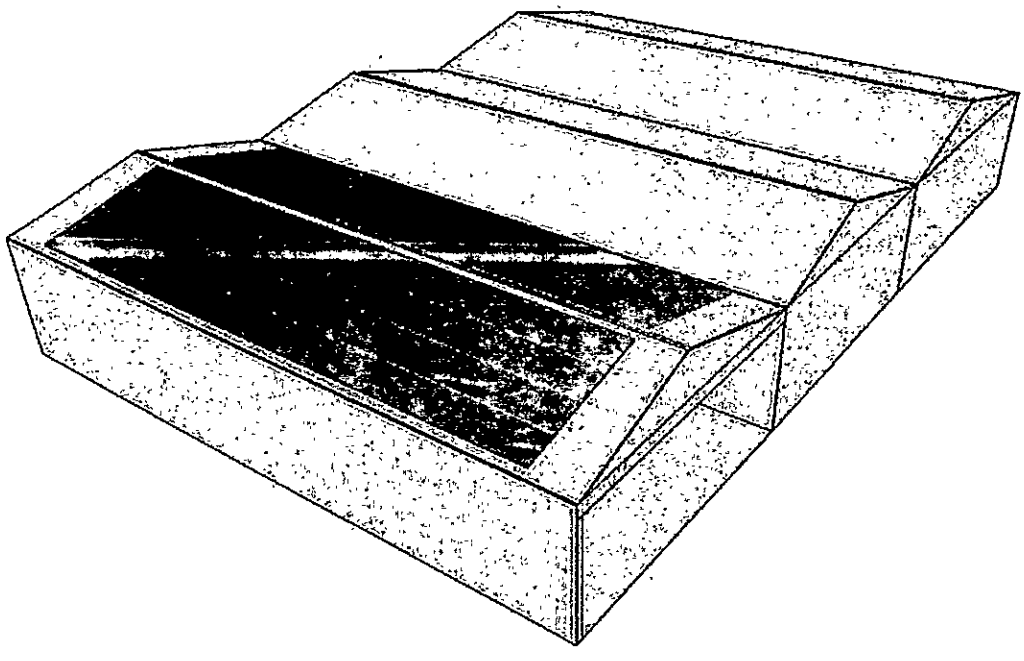
S /113202/F

SOLARSCOUT.CO.UK
putting the sun's power in your hands

PS1: Proposal for a barn mounted 50kW Solar PV array at Lyde Arundel, Lyde



26th October 2011

Contents

Figures

1 Outline of Proposal

It is proposed that a 50kW barn mounted solar PV array will be installed at Lyde Arundel farm, Lyde. The array will consist of 208 x BYD P6-30 240W panels, it will be mounted on K2 aluminium mounting system. The array will be split east and west with 4 lines of 26 portrait panels. The two 17kW inverters and one 10kW inverter will be housed next to the existing three phase grid connection point in their own housing. The array will be silent and all of the components have been installed in vast numbers across the country so can be trusted, BYD panels have met the high standards of the MCS certification.

Although it is difficult to predict with absolute certainty, the array should generate approximately 37,380 kWh of electricity per year using SAP 2005 procedure.

In total the generator should save the emission of 19.8 tonnes of carbon dioxide (CO_2) per year. Over the expected 25yr lifetime of the array it should save the emissions of 494 tonnes of CO_2.

Table 1- Installation details

Installation details	Panels	208x BYD P6-30-240W
	Mounting system	K2 flat rail mounting system.
	Inverter	2x SMA SB17000-TL 1x SB10000TL (see appendix B)
	Potential Annual Energy Yield (SAP 2005)	37,380 kWh (Sunny design prediction 37041.2kWh)
	Location on site	OS GR | SO 4963 4342
	Array max length	26.28m
	Array max height	6.64m
	Panel colour	Dark blue polycrystalline appearance

2 Planning Statement

The information contained within this application provides a comprehensive assessment of the landscape, visual effects and other aspects of the proposed development. It also provides details of the specific environmental, economic and social benefits that arise from this renewable energy project. As such it provides the necessary objective criteria based information for the planning authority to address the key development control issues and to determine the application. However the applicant recognises that notwithstanding the contents of this submission, local politicians and stakeholders may have questions or may require further information. The applicant (and representatives) is willing to meet with politicians and stakeholders to provide any further information and in order to address any subjective concerns as part of the planning application determining process.

This application does not fall within the scope of the 1999 Environmental Impact Assessment Regulations. As such it does not require an Environmental Impact Assessment (EIA). This supporting information has been prepared to include details of the effects of construction and operation. It also identifies beneficial and adverse effects, together with relevant mitigation measures where necessary.

3 Installation details

Lyde Arundel farm is situated north of Hereford, illustrated by the red star.

Figure 1- OS Extract showing the area surrounding the application site (shown as red star)

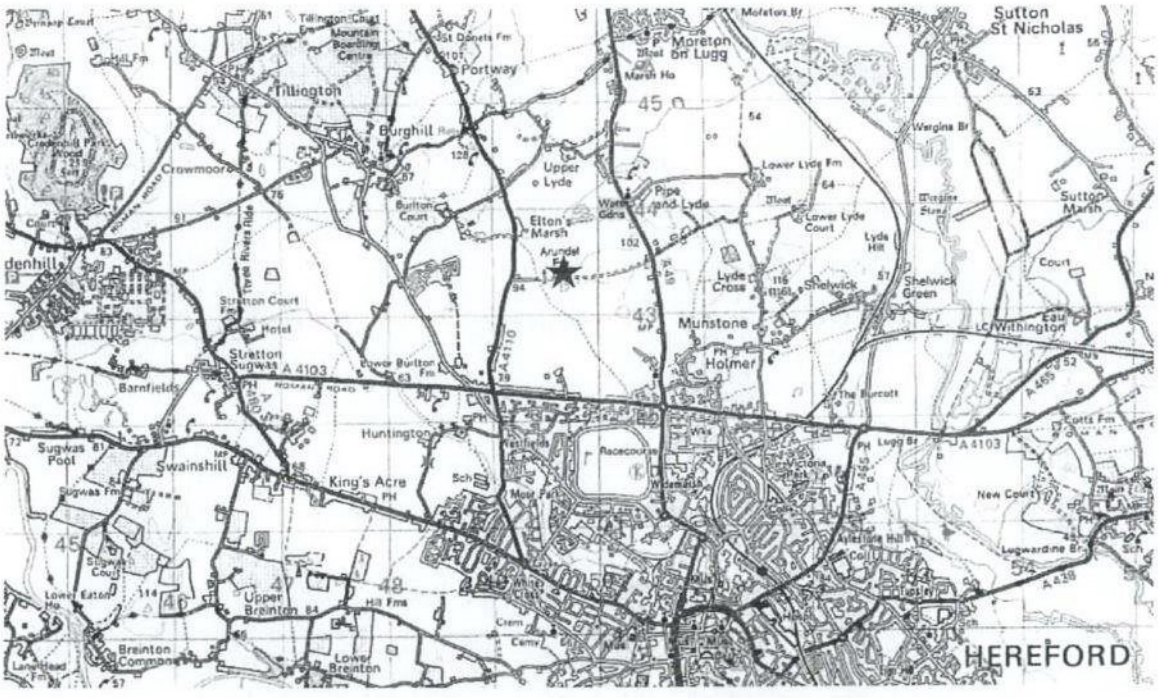
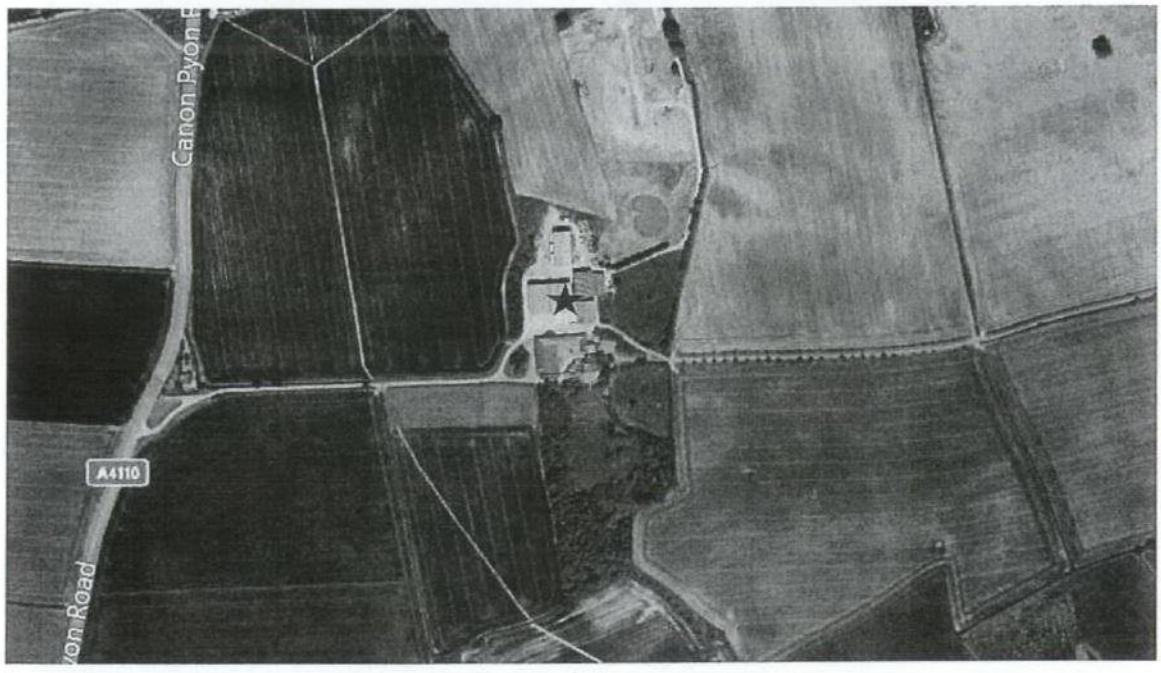


Figure 2- Aerial photograph of surrounding area (Microsoft Bing 2010)



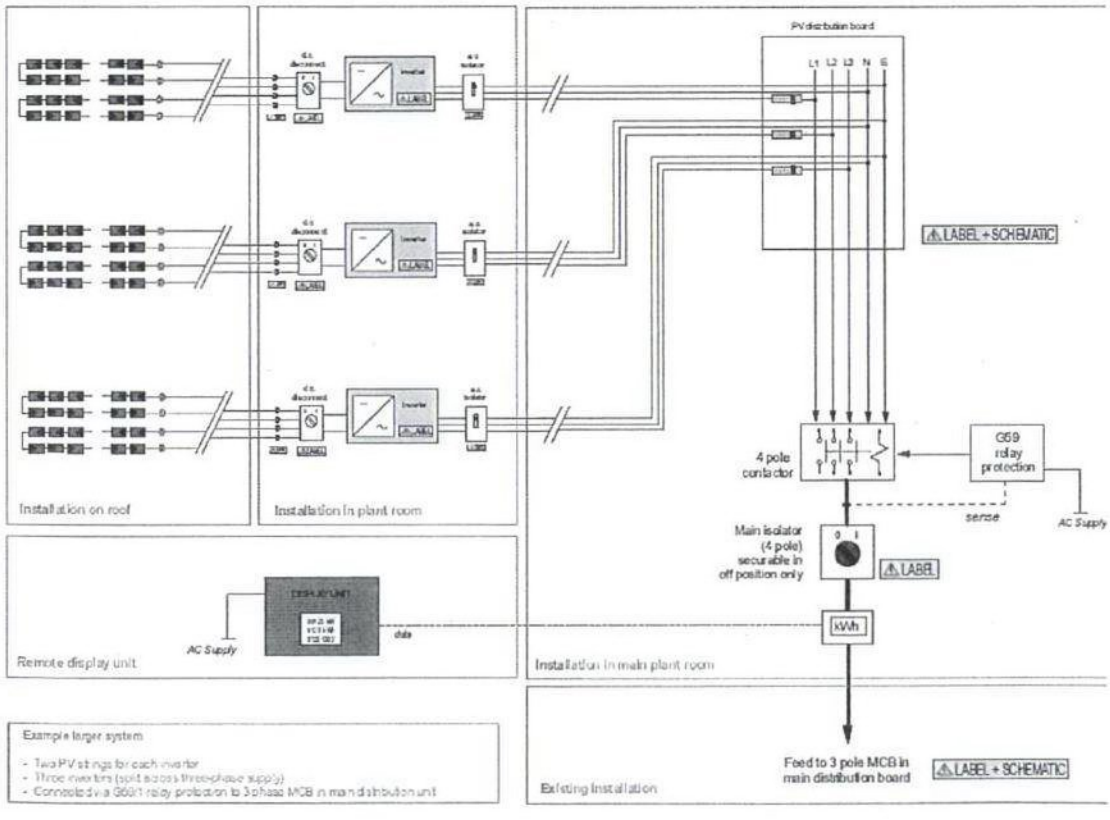
3.1 Design

The design of the system consists of 6 main parts:

1. K2 flat rail mounting system bolts the solar PV panels securely to the sheet roofing.
2. BYD P6-30-240W solar PV panels connected in strings which return to one of three inverters.
3. A DC cable will be installed to transmit power to the inverters.
4. Inverters will be housed in a shed next to existing three phase grid connection to convert the DC electricity into grid quality AC.
5. The inverter is finally connected to the dedicated consumer unit within the house, protection equipment including isolators completes the system.

Figure 3 shows an example electrical schematic of a commercial PV system (DTI Guide to installation of PV systems 2nd edition) Lyde Arundel farm will have a similar arrangement.

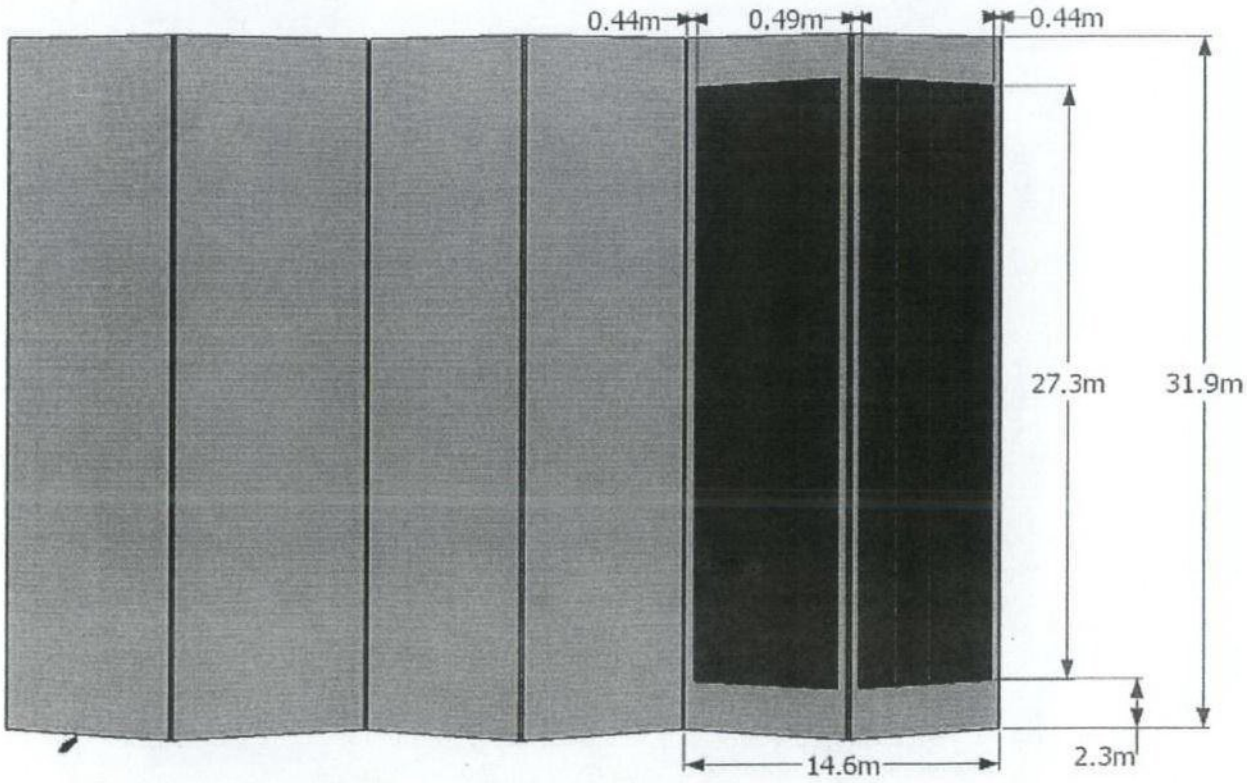
Figure 3- Electrical Schematic showing commercial installation



3.2 Solar PV array layout

Figure 4 shows the layout of the PV panels on the west and east face of the barn. Other options for siting the solar PV array were explored but this choice will minimise the visual impact and maintain the farms older buildings character. This array design is the most suitable for ensuring suitable gap around the array is achieved. The east west split is the most effective way to maximise energy yield when the barns do not have south facing roofs. This can also be seen in Appendix A

Figure 4- PV array barn layout



3.3 Access

The site will be accessed on Lyde Arundel's private road and there is ample parking for all vehicles required during the installation, at no point will the road be blocked or require any additional signage.

4 Points for consideration

Figure 5- BYD P6-30 240W

4.1 Landscape visual Impact

The BYD P6-30 240W panels and K2 mounting system is an attractive and modern design. BYD PV panels are polycrystalline type and have dark blue appearance shown in Figure 5.

The only viewpoints that you can see a small proportion of barn are illustrated below in Figure 6. Each view point is shown respectively in Figure 7 & Figure 8 also.

Figure 6- View point map (Bing Aerial 2011)

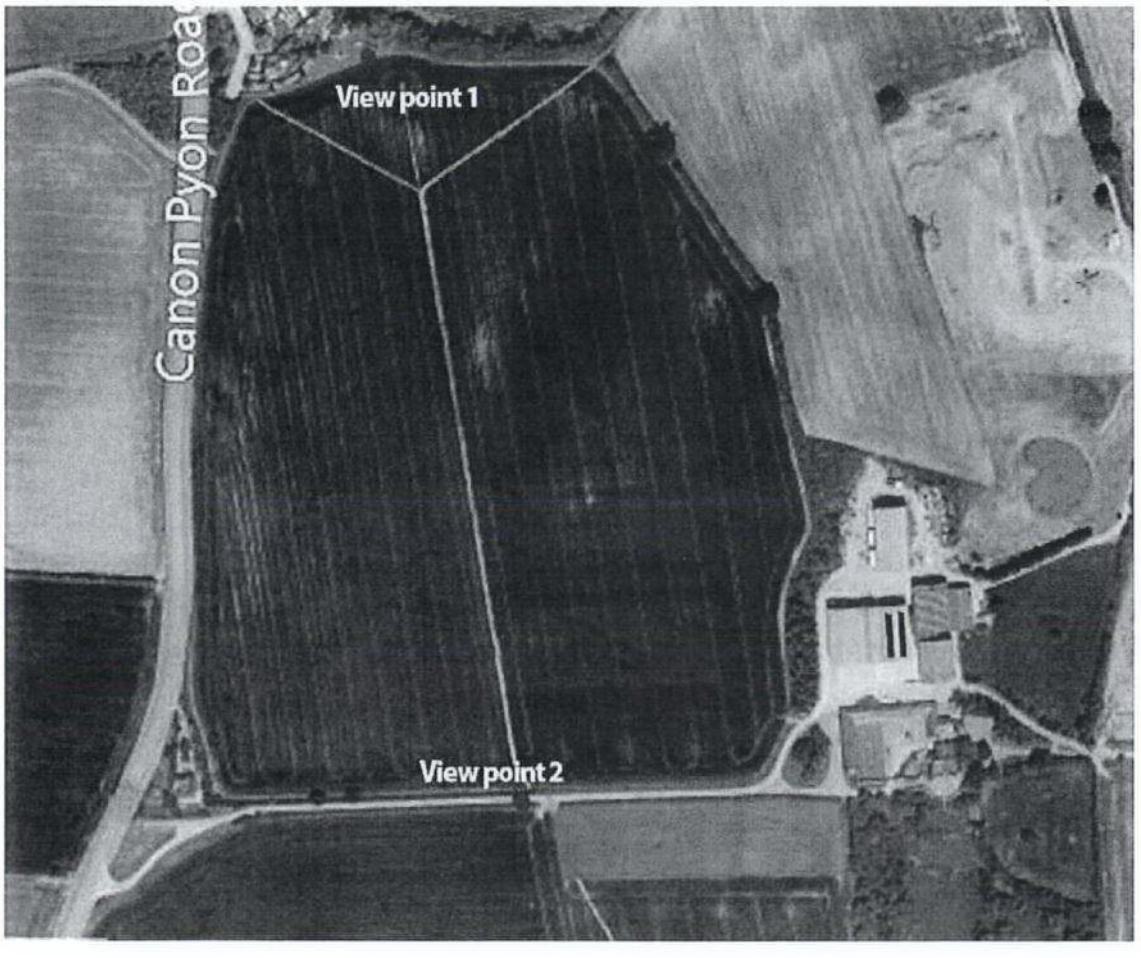


Figure 7- Viewpoint 1 looking SE

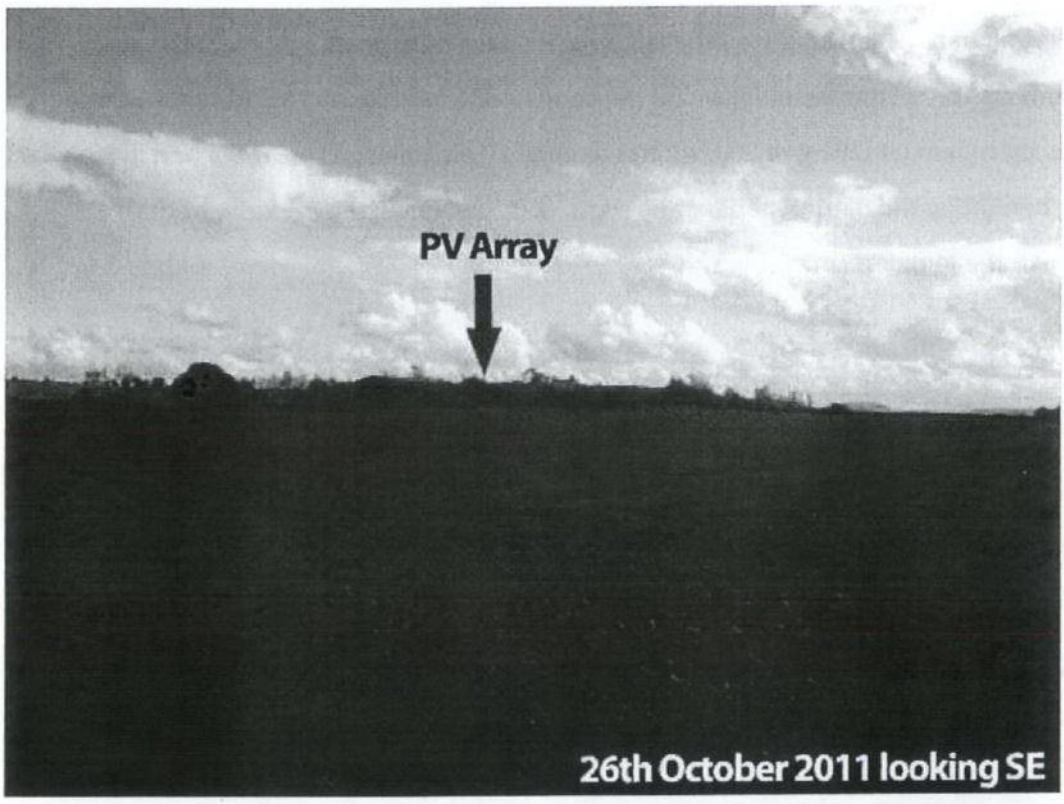
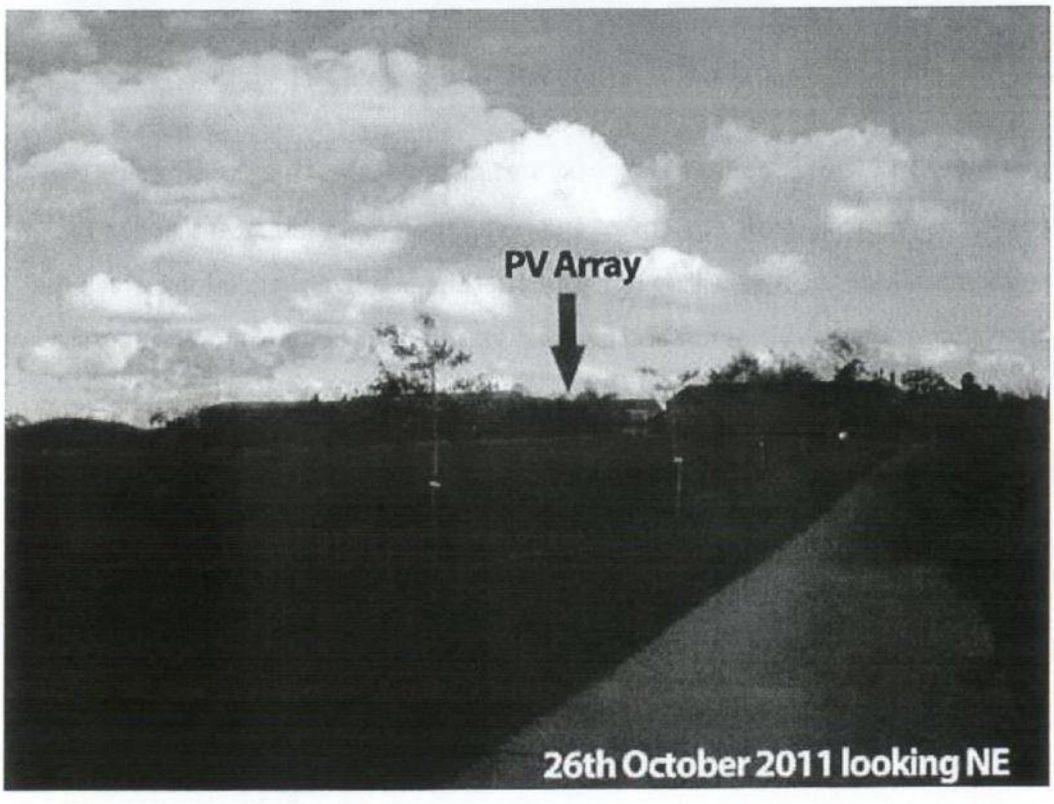


Figure 8- Viewpoint 2 looking NE



Due to the positioning and scale of the proposed barn mounted solar PV array it would have only a very minimal visual impact on the landscape. This would be mitigated by the great positive effects the system would have on the countryside, such as a reduction in CO_2 emissions by an annual saving of 19.8 tonnes annually. This will lead to a reduction in global warming benefiting the natural habitat and support in sustaining the integrity of the landscape in the longer term.

4.2 Glint & Glare

The barn mounted installation at Lyde Arundel will not produce any glint and glare issues, as the site is well protected by other barns and trees.

4.3 Health & Safety

The BYD P6-30 240W panel have been fully MCS certified proving it has been thoroughly tested for all aspects of performance and most importantly safety (MCS certificate Number BABT- 8533-02). The SMA SB17000TL inverter is a trusted product used widely in the solar PV market, spec attached in Appendix B. The MCS certification document can be seen in Appendix B. It therefore can be concluded that the proposed system will NOT pose a risk to anybody.

4.4 Decommissioning

The design of the solar PV array and the choice of location have been consciously made to facilitate ease of dismantling of the equipment and restoration of the site at the end of its useful life – 25 years. Maintenance will be required after the first five years during which the system will be checked for performance and health. Measures will be taken to ensure this is carried out in accordance with health and safety requirements.

4.5 Construction and Operational Disturbance

The system will take a couple of weeks to erect and does not require the use of any construction machinery that is likely to cause any significant disturbance.

4.6 Cumulative impact

The cumulative impact of the array is nil. The proposal is for a 50kW barn mounted solar array which will appear insignificant in the wider landscape. There are also no other similar installations within the immediate locality.

4.7 Economic, Social and Environmental benefits of the proposed development

In accordance with PPS22's companion guide to the Economic, Social and Environmental benefits this proposal should be seen as material considerations in determining the application. This proposed solar PV array will harness a renewable natural resource that is non-polluting, clean and sustainable. More specifically, it is Government policy to achieve 20% of the nation's electrical requirements from renewable sources by 2020. In a small way this proposal will help to contribute towards these targets.

Using SAP 2005 methods the site has the potential to generate 37,380 kWh annually. The current annual energy consumption on site is large because of the sizable farming infrastructure, the array will generate 31% of the total electricity used on the site annually. In order to be socially responsible, generation not used in peak periods versus lower demand, is fed back into the grid. This will provide a wider community benefit, working directly towards the Governments regional and national targets for the supply of energy from sustainable sources.

5 Policy Context

5.1 Government Policy

The UK has committed itself to working towards a 60% reduction in CO2 emissions by 2050, and the development of renewable energy technologies such as solar PV is a core part of achieving this aim. As a carbon free source of energy, solar PV contributes positively to the UK's effort to reduce our carbon emissions to tackle the threat of climate change. The impact of climate change on the landscape will be radical, and therefore the visual impact of a barn mounted solar PV array should be considered in this context.

5.1.1 Planning Policy Statement 22: Renewable Energy

In 2004, the ODPM published Planning Policy Statement 22: Renewable Energy (PPS22), which covers, plays a key role in supporting the Government's wider economic, social and environmental objectives and for sustainable communities.

PPS22 sets out the policy context for action, and the Companion Guide offers practical advice as to how these policies can be implemented on the ground. The Technical Annex includes specific advice on the range of renewable energy technologies that are covered by PPS22.

Relevant to this application are point 18 from PPS22, copied below;

18. Local planning authorities and developers should consider the opportunity for incorporating renewable energy projects in all new developments. Small scale renewable energy schemes utilising technologies such as solar panels, biomass heating, small scale wind turbines, photovoltaic cells and combined heat and power schemes can be incorporated both into new developments and some existing buildings. Local planning authorities should specifically encourage such schemes through positively expressed policies in local development documents.

Finally, the Companion Guide to PPS 22 states, "Each planning application should be considered on its own merits and the argument that granting permission might lead to another application is not sufficient grounds for refusal".

5.2 Herefordshire County Council

5.2.1 Climate Change Policy

HEREFORDSHIRE COUNCIL

Hereford Council has signed the West Midlands Declaration on Climate Change, and has stated its commitment to renewable energy both in its Environmental Policy and in the UDP (Unitary Development Plan).

Hereford Country Council's Environmental policy [1] states:

"To meet this commitment Herefordshire Council will:

[1] http://www.herefordshire.gov.uk/docs/ENVIRONMENT_POLICY_July_2005.pdf (accessed 20.3.07)

- Lead by example and use its influence to actively encourage responsible environmental practice and raise awareness and understanding of the environmental issues among its staff, suppliers, contractors, partners and the public.
- Make efficient use of natural resources including water, heat and electricity and promote the use and development of appropriate sources of renewable energy".

Herefordshire Council's UDP[2] states :

"Sustainable development will be promoted by:

3. Conserving and minimising use of natural resources – particularly non renewables- and encouraging resource enhancement and alternatives to the use of non-renewable resources;
5. Increasing energy conservation, energy- efficiency, and energy generation from renewable sources".

6 Conclusion

The proposed site for the barn mounted solar PV array has been carefully chosen to ensure that it can be absorbed by the local landscape and be largely unnoticed, it is also closest to the distribution point reducing the necessary cable travel. For the farm this is an essential development to maintain a sustainable economic future in farming, diversifying is an important part of Messrs RKF Watkins business plan. This taken together with fact that the whole reason for the project is to generate significant amount of renewable energy, adds up to a proposal that would seem eminently appropriate for such an unobtrusive location.

[2] http://www.herefordshire.gov.uk/udp/Documents/UDP/Revised/HTML/Chapter03.htm#S1 (accessed 20.3.07)

7 Appendix A

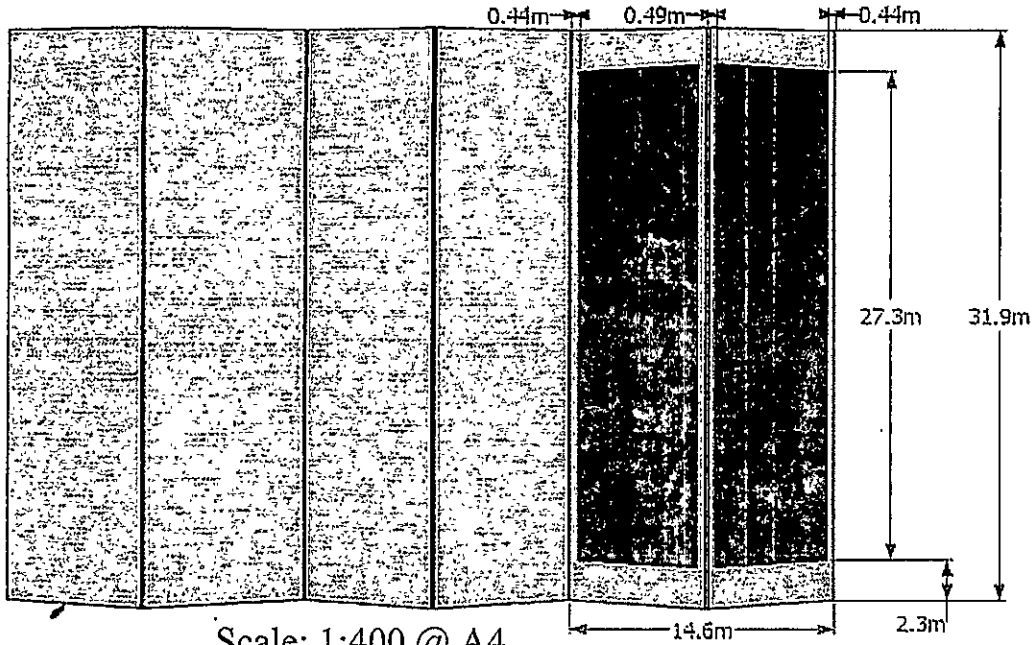
010- PV LAY = Scale drawing showing the layout of PV panels

8 Appendix B

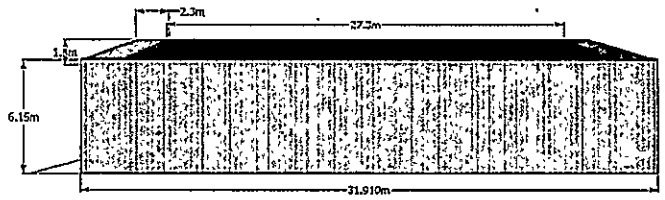
MCS certification for BYD P6-30-240W

Data sheet SMA SB17000TL & SB10000TL

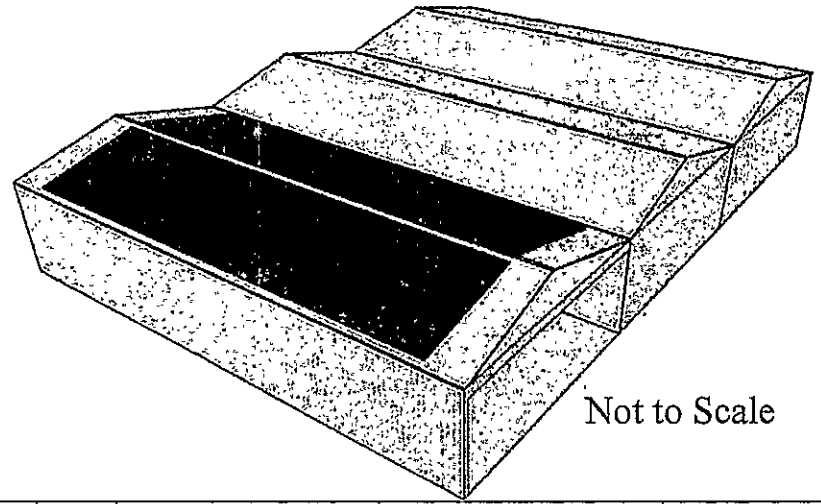
Appendix A



Scale: 1:400 @ A4



Scale: 1:400 @ A4



Not to Scale

REV	DESCRIPTION OF REVISIONS	DATE	DRAWN BY	APPROVED

SOLARSCOUT.CO.UK
putting the sun's power at your hands

DRAWN BY: Alex Ferraro
CHECKED BY: Lloyd Scott

DWG NO.: Q1010-01
FILENAME: Q1010-01 PV Layout Model rev A
REV: A
SCALE: 1:400@A4
DATE: 25/10/2011
SHEET: 1 of 1

Q2010 Robert Watkins
PV Layout Model

Appendix B

ZERTIFIKAT ◇ CERTIFICATE ◇ 證書 證書 ◇ СЕРТИФИКАТ ◇ CERTIFICADO ◇ CERTIFICAT

0172

Certificate of Factory Production Control

This certificate has been issued to

BYD Company Ltd.

of

No. 1, Baoping Road, Baolong Industrial Town,
Longgang, Shenzhen, Guangdong, 518116,
People's Republic of China.

whose production management system has been assessed and found to comply with the Factory Production Control Requirements of the MCS Product Certification Scheme in respect of:

Production of Photovoltaic Solar Panels

at the above address

and includes the following products:

BYD*P6-36 (* = 240 - 290 Watts);**
BYD*P6-30 (* = 200 - 240 Watts);**
BYD*P6-18 (* = 120 - 145 Watts);**

Ranges of Photovoltaic Solar Modules as detailed on the attached annex to this certificate

Signed:

on behalf of BABT

APPROVED PRODUCT MCS BABT

Certificate Number: BABT 8533 R0

Valid from: 4th March 2011 This Certificate expires on: 3rd March 2014

The holder of this certificate is authorised to use the MCS Approved Product Mark. This certificate has been issued by BABT in accordance with the Certification Regulations of BABT. Conditions of validity of this certificate, if any, are listed in the Annex. This certificate is not transferable and remains the property of BABT at all times. This certificate constitutes page 1 of the combined Certificate and Annex.

(For scope of certification prior to the validity date on this certificate please refer to BABT)

British Approvals Board for Telecommunications • TÜV SÜD Group
Forsyth House • Churchfield Road • Walton-on-Thames • Surrey • KT12 2TD • United Kingdom

S /113202/F

Annex to Certificate Number BABT 8533 R0

Manufacturing Location:

Shanghai BYD Company Limited,
No.999 Xiangjing Road, Songjiang,
Shanghai, 201611, People's Republic of China.

Standards used to establish conformity

MCS005 Issue 2.3 and MCS010 Issue 1.5 on the basis of a BABT Assessment Report BABT 8533 dated 25th February 2011 and subsequent information and test data supplied and accepted by BABT.

Product Categories within the Scope of this Certification

Product Category	Conditions
Photovoltaic Panels	See below

Products within the Scope of this Certification

Product Category	Conditions
BABT 8533-01: BYD***P6-36 Where *** = 240 - 290 Watts in 5W steps; **BABT 8533-02:** BYD***P6-30 Where *** = 200 - 240 Watts in 5W steps; **BABT 8533-03:** BYD***P6-18 Where *** = 120 - 145 Watts in 5W steps;	This certificate covers a family of Photovoltaic Solar Panels which use Polycrystalline cells. This is designated by a product suffix "P". The products use 72, 60 or 36 cells respectively and are manufactured using the same processes and materials.

Conditions:

This certificate authorizes the manufacturer or their authorized representative to apply the MCS Approved Product Mark to the range of products listed above in accordance with the MCS sub-licence agreement dated **3rd March 2011.**

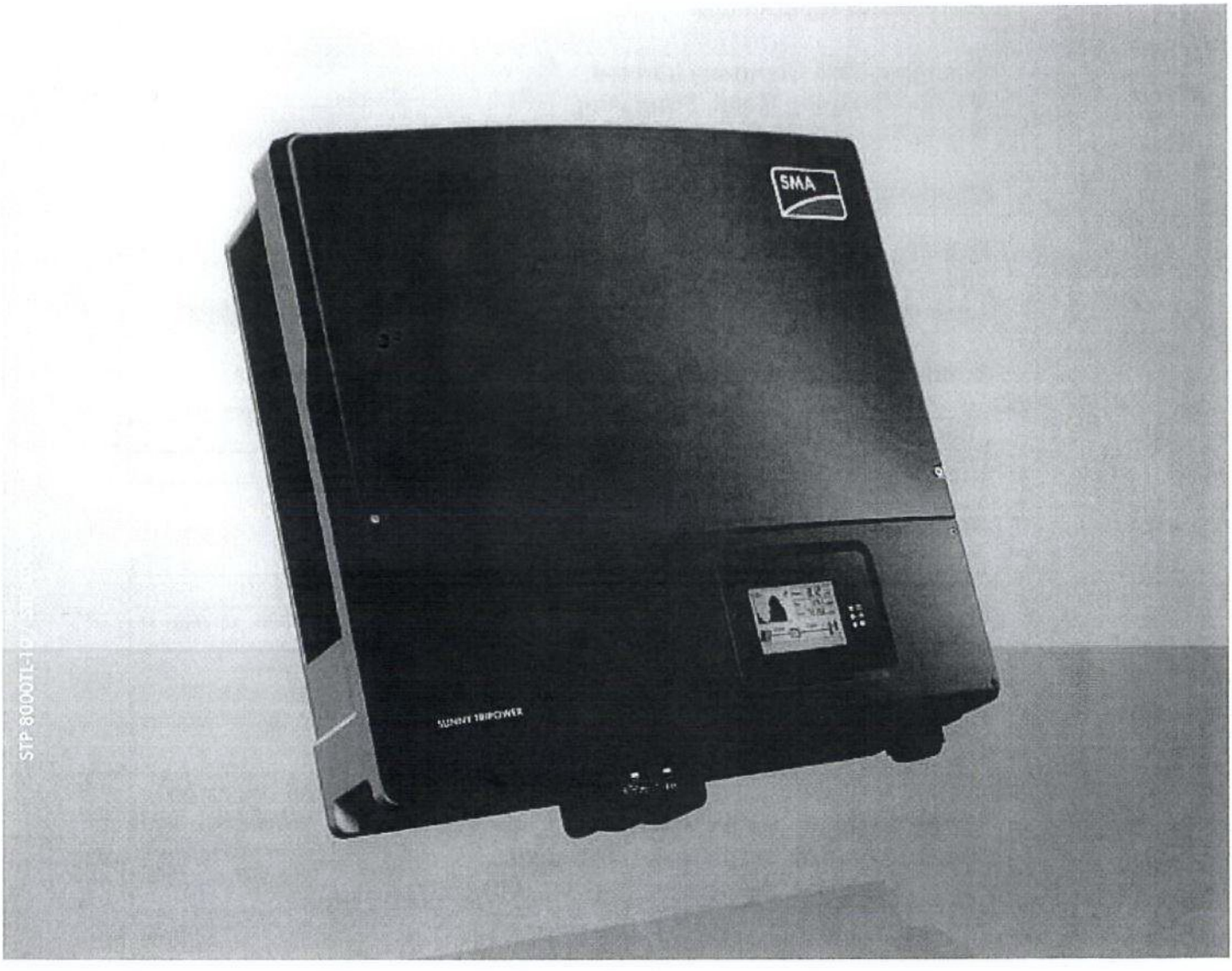
This certificate loses its validity if the manufacturer makes any changes or modifications to the product or the approved quality system, which have not been notified to, and agreed with BABT.

The manufacturer must immediately cease affixing the MCS Approved Product Mark on any product subject to expiry, withdrawal or revocation of this certificate.

Signed:..... Valid From: 4th March 2011

on behalf of BABT

SUNNY TRIPOWER
8000TL / 10000TL / 12000TL / 15000TL / 17000TL



STP 8000TL-10 / STP 10000TL-10 / STP 12000TL-10 / STP 15000TL-10 / STP 17000TL-10

Efficient

- Maximum efficiency of 98.2 %
- Best tracking efficiency with OptiTrac MPP tracking by SMA
- *Bluetooth* communication

Safe

- Triple protection with Optiprotect:
- Electronic string fuse
- Self-learning string failure detection
- DC surge arrester (Type II) can be integrated

Flexible

- DC input voltage up to 1000 V
- Integrated grid management functions
- Custom plant design with Optiflex

Simple

- Three-phase feed-in
- Cable connection without tools
- SUNCLIX DC plug-in system
- Easily accessible connection area

SUNNY TRIPOWER
8000TL / 10000TL / 12000TL / 15000TL / 17000TL

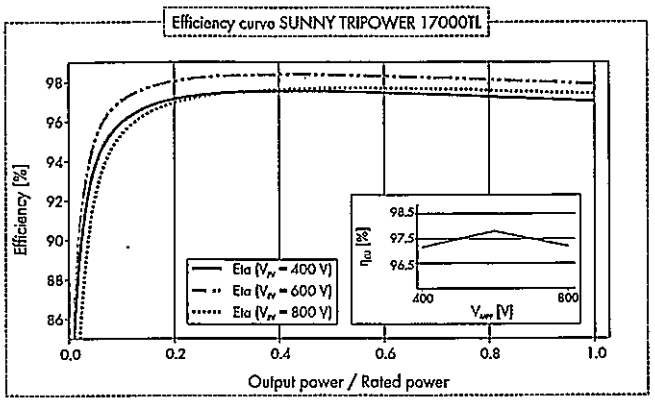
The three-phase inverter for easy plant design

Full of pioneering technology: highly flexible plant design with the three-phase Sunny Tripower inverter. Thanks to Optiflex technology, two MPP inputs and a broad input voltage range, it is suited to almost any module configuration. It meets any requirement such as reactive power supply, grid support thus reliably participating in grid management. The safety concept Optiprotect with self-learning string-failure detection, electronic string fuse and integrable DC surge arrester, type II ensures maximum availability.

S /113202/F

SUNNY TRIPOWER
8000TL / 10000TL / 12000TL / 15000TL / 17000TL

Technical Data	Sunny Tripower 8000TL	Sunny Tripower 10000TL
Input (DC)		
Max. DC power (@ cos φ=1)	8200 W	10200 W
Max. input voltage	1000 V	1000 V
MPP voltage range / rated input voltage	320 V – 800 V / 600 V	320 V – 800 V / 600 V
Min. input voltage / initial input voltage	150 V / 188 V	150 V / 188 V
Max. input current input A / input B	22 A / 11 A	22 A / 11 A
Max. input current per string input A** / input B**	33 A / 12.5 A	33 A / 12.5 A
Number of independent MPP inputs / strings per MPP input	2 / A:4; B:1	2 / A:4; B:1
Output (AC)		
Rated power (@ 230 V, 50 Hz)	8000 W	10000 W
Max. apparent AC power	8000 VA	10000 VA
Nominal AC voltage	3 / N / PE; 220 / 380 V 3 / N / PE; 230 / 400 V 3 / N / PE; 240 / 415 V	3 / N / PE; 220 / 380 V 3 / N / PE; 230 / 400 V 3 / N / PE; 240 / 415 V
Nominal AC voltage range	160 V – 280 V	160 V – 280 V
AC power frequency / range	50 Hz, 60Hz / -6 Hz ... +5 Hz	50 Hz, 60Hz / -6 Hz ... +5 Hz
Rated grid frequency / rated grid voltage	50 Hz / 230 V	50 Hz / 230 V
Max. output current	16 A	16 A
Power factor at rated power	1	1
Adjustable displacement factor	0.8 overexited... 0.8 underexited	0.8 overexited... 0.8 underexited
Phase conductors / connection phases	3 / 3	3 / 3
Efficiency		
Max. efficiency / European efficiency	98.1 % / 97.5 %	98.1 % / 97.7 %
Protection		
Input-side disconnection device	●	●
Ground-fault monitoring / grid monitoring	● / ●	● / ●
DC surge arrester Type II, can be integrated	○	○
DC reverse-polarity protection / AC short-circuit current capability / galvanically isolated	● / ● / –	● / ● / –
All-pole sensitive residual current monitoring unit	●	●
Protection class (according to IEC 62103) / overvoltage category (according to IEC 60664-1)	I / III	I / III
General Data		
Dimensions (W / H / D)	665 / 690 / 265 mm (26.2 / 27.2 / 10.4 in)	665 / 690 / 265 mm (26.2 / 27.2 / 10.4 in)
Weight	64 kg / 141.1 lb	64 kg / 141.1 lb
Operating temperature range	-25 °C ... +60 °C / -13 °F ... +140 °F	-25 °C ... +60 °C / -13 °F ... +140 °F
Noise emission (typical)	51 dB(A)	51 dB(A)
Self-consumption at night	1 W	1 W
Topology / cooling concept	Transformerless / OptiCool	Transformerless / OptiCool
Degree of protection / degree of protection of connection area (according to IEC 60529)	IP65 / IP54	IP65 / IP54
Climatic category (according to IEC 60721-3-4)	4K4H	4K4H
Maximum permissible value for relative humidity (non-condensing)	100 %	100 %
Features		
DC terminal	SUNCLIX	SUNCLIX
AC terminal	Spring-type terminal	Spring-type terminal
Display	Graphic	Graphic
Interface: RS485 / *Bluetooth*	○ / ●	○ / ●
Warranty: 5 / 10 / 15 / 20 / 25 years	● / ○ / ○ / ○ / ○	● / ○ / ○ / ○ / ○
Multi-function relay	●	●
Certificates and approvals (more available on request)	CE, VDE0126-1-1, G83/1-1, RD 1663/2000, RD 661/2007, G59/2, PPC, AS4777, EN 50438*, C10/11, PPDS, IEC 61727, ENEL-Guida, UTE C15-712-1	
Type designation	STP 8000TL-10	STP 10000TL-10



Accessories


RS485 interface
DM-485CB-10


DC surge arrester
(Type II), input A
DCSPD KIT1-10


DC surge arrester
(Type II), inputs A and B
DCSPD KIT2-10

* Does not apply to all national deviations of EN 50438
** To be observed in case of a short circuit in the electronic string fuse
● Standard features ○ Optional features – Not available
Data at nominal conditions

Sunny Tripower 12000TL	Sunny Tripower 15000TL	Sunny Tripower 17000TL
12250 W	15340 W	17410 W
1000 V	1000 V	1000 V
380 V – 800 V / 600 V	360 V – 800 V / 600 V	400 V – 800 V / 600 V
150 V / 188 V	150 V / 188 V	150 V / 188 V
22 A / 11 A	33 A / 11 A	33 A / 11 A
33 A / 12.5 A	33 A / 12.5 A	33 A / 12.5 A
2 / A:4; B:1	2 / A:5; B:1	2 / A:5; B:1
12000 W	15000 W	17000 W
12000 VA	15000 VA	17000 VA
3 / N / PE; 220 / 380 V	3 / N / PE; 220 / 380 V	3 / N / PE; 220 / 380 V
3 / N / PE; 230 / 400 V	3 / N / PE; 230 / 400 V	3 / N / PE; 230 / 400 V
3 / N / PE; 240 / 415 V	3 / N / PE; 240 / 415 V	3 / N / PE; 240 / 415 V
160 V – 280 V	160 V – 280 V	160 V – 280 V
50 Hz, 60Hz / -6 Hz ... +5 Hz	50 Hz, 60Hz / -6 Hz ... +5 Hz	50 Hz, 60Hz / -6 Hz ... +5 Hz
50 Hz / 230 V	50 Hz / 230 V	50 Hz / 230 V
19.2 A	24 A	24.6 A
1	1	1
0.8 overexited... 0.8 underexited	0.8 overexited... 0.8 underexited	0.8 overexited... 0.8 underexited
3 / 3	3 / 3	3 / 3
98.1 % / 97.7 %	98.2 % / 97.8 %	98.2 % / 97.8 %
●	●	●
● / ●	● / ●	● / ●
○	○	○
● / ● / –	● / ● / –	● / ● / –
●	●	●
I / III	I / III	I / III
665 / 690 / 265 mm	665 / 690 / 265 mm	665 / 690 / 265 mm
(26.2 / 27.2 / 10.4 in)	(26.2 / 27.2 / 10.4 in)	(26.2 / 27.2 / 10.4 in)
64 kg / 141.1 lb	64 kg / 141.1 lb	64 kg / 141.1 lb
-25 °C ... +60 °C / -13 °F ... +140 °F	-25 °C ... +60 °C / -13 °F ... +140 °F	-25 °C ... +60 °C / -13 °F ... +140 °F
51 dB(A)	51 dB(A)	51 dB(A)
1 W	1 W	1 W
Transformerless / OptiCool	Transformerless / OptiCool	Transformerless / OptiCool
IP65 / IP54	IP65 / IP54	IP65 / IP54
4K4H	4K4H	4K4H
100 %	100 %	100 %
SUNCLIX	SUNCLIX	SUNCLIX
Spring-type terminal	Spring-type terminal	Spring-type terminal
Graphic	Graphic	Graphic
○ / ●	○ / ●	○ / ●
● / ○ / ○ / ○ / ○	● / ○ / ○ / ○ / ○	● / ○ / ○ / ○ / ○
●	●	●
CE, VDE0126-1-1, G83/1-1, RD 1663/2000, RD 661/2007, G59/2, PPC, AS4777, EN 50438*, C10/11, PPDS, IEC 61727, ENEL-Guida, UTE C15-712-1		
STP 12000TL-10	STP 15000TL-10	STP 17000TL-10

S /113202/F

www.SunnyPortal.com

Professional management, monitoring and presentation of PV plants