

# Solar Photovoltaic Solutions



APPROVED PRODUCTS





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## Location of modules

The location of PV modules is vitally important. They must receive the maximum amount of daylight possible, so it is not advisable to install them in situations where surrounding buildings or trees may cast shadows. The best location for a PV solar collector is on a south-facing roof or side of a building.

### Quick guide to a perfect roof

Orientation: compass bearing (°) measured from north

		<b>West</b>		<b>SW</b>			<b>South</b>			<b>SE</b>		<b>East</b>		
		270°	255°	240°	225°	210°	195°	180°	165°	150°	135°	120°	105°	90°
<b>Angle (°) from horizontal</b>	<b>Horizontal</b> 0°	90	90	90	90	90	90	90	90	90	90	90	90	90
	10°	89	91	92	94	95	95	96	95	95	94	93	91	90
	20°	87	90	93	96	97	98	98	98	97	96	94	91	88
	30°	86	89	93	96	98	99	100	100	98	96	94	90	86
	40°	82	86	90	95	97	99	100	99	98	96	92	88	84
	50°	78	84	88	92	95	96	97	97	96	93	89	85	80
	60°	74	79	84	87	90	91	93	93	92	89	86	81	76
	70°	69	74	78	82	85	86	87	87	86	84	80	76	70
	80°	63	68	72	75	77	79	80	80	79	77	74	69	65
<b>Vertical</b> 90°	56	60	64	67	69	71	71	71	71	69	65	62	58	



## World leading manufacturers

WF has a close alliance with SMA, the world leader in PV Inverter manufacture, and we now carry massive stocks to meet the growing demand.

WF's chosen PV modules are all MCS accredited and also meet our own stringent standards.

## Quality products, all from stock, when & where you need them

Our stock-holding now covers everything needed for a complete PV Installation, including:

- Quality Manufactured Monocrystalline Modules from ZNShine
- Market leading Inverters from SMA
- AC & DC Isolators
- AC & DC Cable
- Racking systems

and everything including the warning labels to complete the installation!

With a network of 69 branches, your local team can offer local collection to negate any hidden carriage charges!

## Innovation to make your job easy

With the increased activity in PV projects expected this year, any time saved on a job is invaluable. We can offer roof fixings and a rail system from Schueco with new one turn quick installation design that can save you valuable man-hours with your installation.

## Training programmes to get you on the road to certification

We can arrange full installation training – the 3-day course covers everything a PV installer needs to become proficient in installing PV Systems and guidance on how to take the next step in gaining the all important MCS approval. The Feed-in Tariff rates are only available if the PV system is installed by an MCS approved contractor.

## Dedicated PV Team at your disposal

We have a dedicated PV team based at our Head Office that supports your local branch with project resources and technical information, so they may guide you through every step of the job, from advice on products and their applications, to cost & energy-saving calculations, and information on current legislation and all the benefits and possible pitfalls to ensure you have the edge over your competitors.

2011 will be the year that PV starts appearing everywhere: on homes and businesses in almost every street in the UK, everyone is recognising that PV is the way forward in energy conservation and cost-saving, so don't miss your opportunity to win business in partnership with WF – with our resources behind you, you will be certain to leave the rest in the shade.

# Solar Photovoltaic Overview

## Introduction

PV utilises free energy from the sun to generate electricity. It relies on daylight (rather than radiation) to generate power through the use of photovoltaic cells within roof mounted collectors (modules). The collectors are simple to install in an on-roof, in-roof and flat roof arrangement, both landscape and portrait. The electricity produced by PV can be used to drive any appliance that is powered by electricity. An inverter (usually situated in the loft) converts the DC current into usable AC current that can be used as power.

## Feed in Tariffs

**New from 1st April 2010 to 31st March 2012**

Government legislation means feed-in tariffs (FITs) became available in Great Britain from 1st April 2010. Under this scheme energy suppliers make regular payments to

householders and communities who generate their own electricity from renewable or low carbon sources including solar electricity (PV panels).

The Feed-in Tariff will then benefit you in 3 ways:

- 1 Generation tariff - a set rate paid by the energy supplier for each unit (or kWh) of electricity you generate (see table below). This rate will change each year for new entrants to the scheme (except for the first 2 years), but once you join you will continue on the same tariff for 25 years.
- 2 Export tariff – you will receive a further 3p/kWh minimum from your energy supplier for each unit you export back to the electricity grid, that is when it isn't used on site.
- 3 Energy bill savings – you will be making savings on your electricity bills, because generating electricity to power your appliances means it is **free** of charge to the customer. The amount you save will vary depending how much of the electricity you use on site.

## UK PV Solar Generation Tariffs current at date of press

Technology	Scale	Tariff level for new installations in period (p/kWh) [NB tariff will be inflated annually]	Tariff lifetime
PV	< 4kW (New Build**)	36.1	25
PV	< 4kW (Retrofit**)	41.3	25
PV	> 4–10kW	36.1	25
PV	> 10–100kW	31.4	25
PV	> 100kW–5MW	29.3	25
PV	Stand alone system**	29.3	25

\*\* "Retrofit" means installed on a building which is already occupied;

"New Build" means where installed on a new building before first occupation;

"Stand alone" means not attached to a building and not wired to provide electricity to an occupied building.

## How 'green' is Solar PV?

Solar power is a renewable energy source that does not require the burning of fossil fuels and does not leave a carbon footprint as it generates no carbon dioxide.

It makes no noise, emits no pollutants, creates no waste and uses no fuel, thus meaning it is the **best** green energy supply.

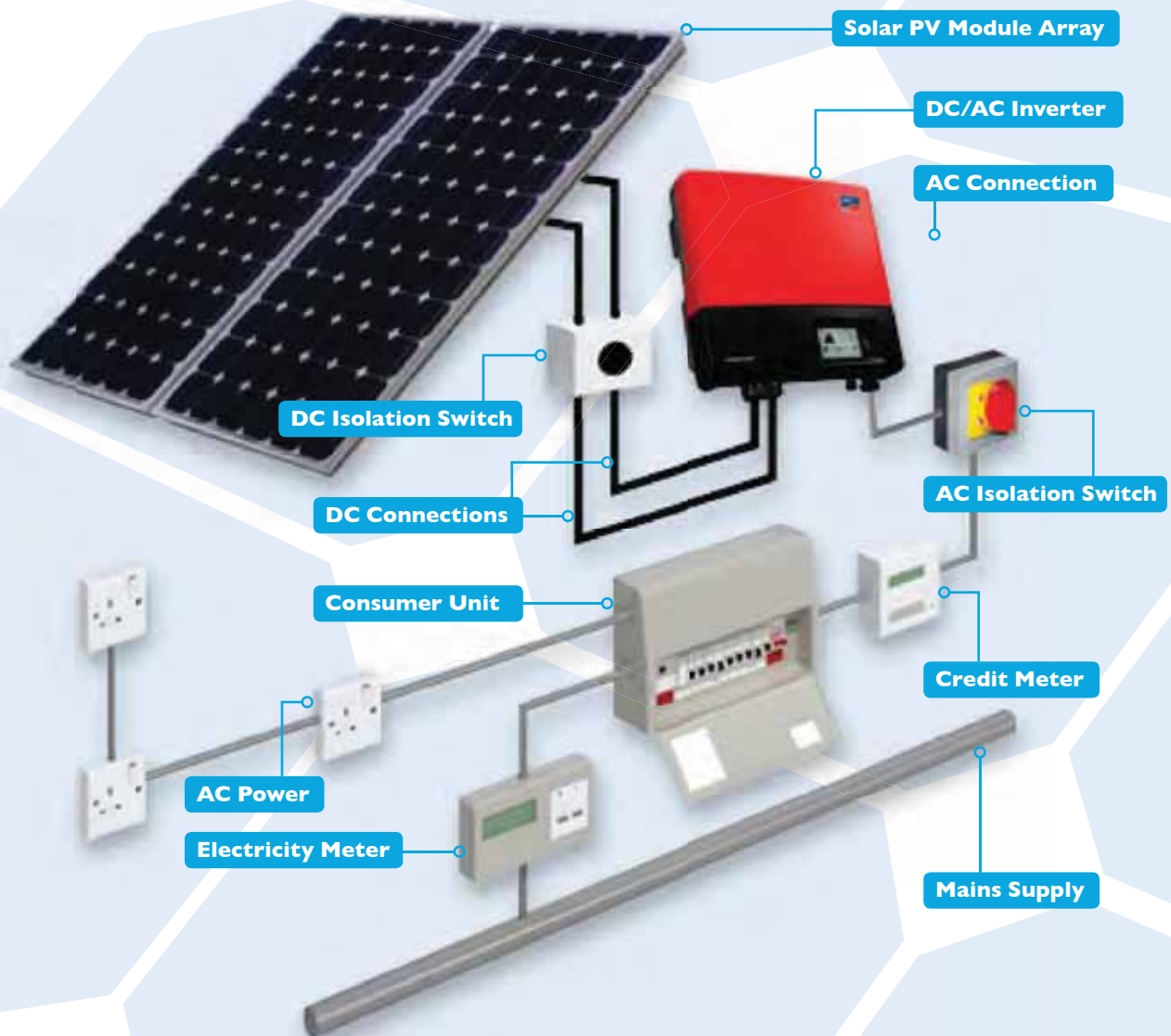
# Solar Photovoltaic System

Electricity requirements vary depending on the size of your house and how energy-efficient the building and appliances are. With a PV system you will be able to reduce electricity bills because the system will supply some or all of your power rather than mains electricity.

If PV is connected through a grid system, it will automatically take electricity from the national grid at times of low generation, for example at night. There is no need to manually switch the system, this will be done instantly.



Solar PV Monocrystalline Module

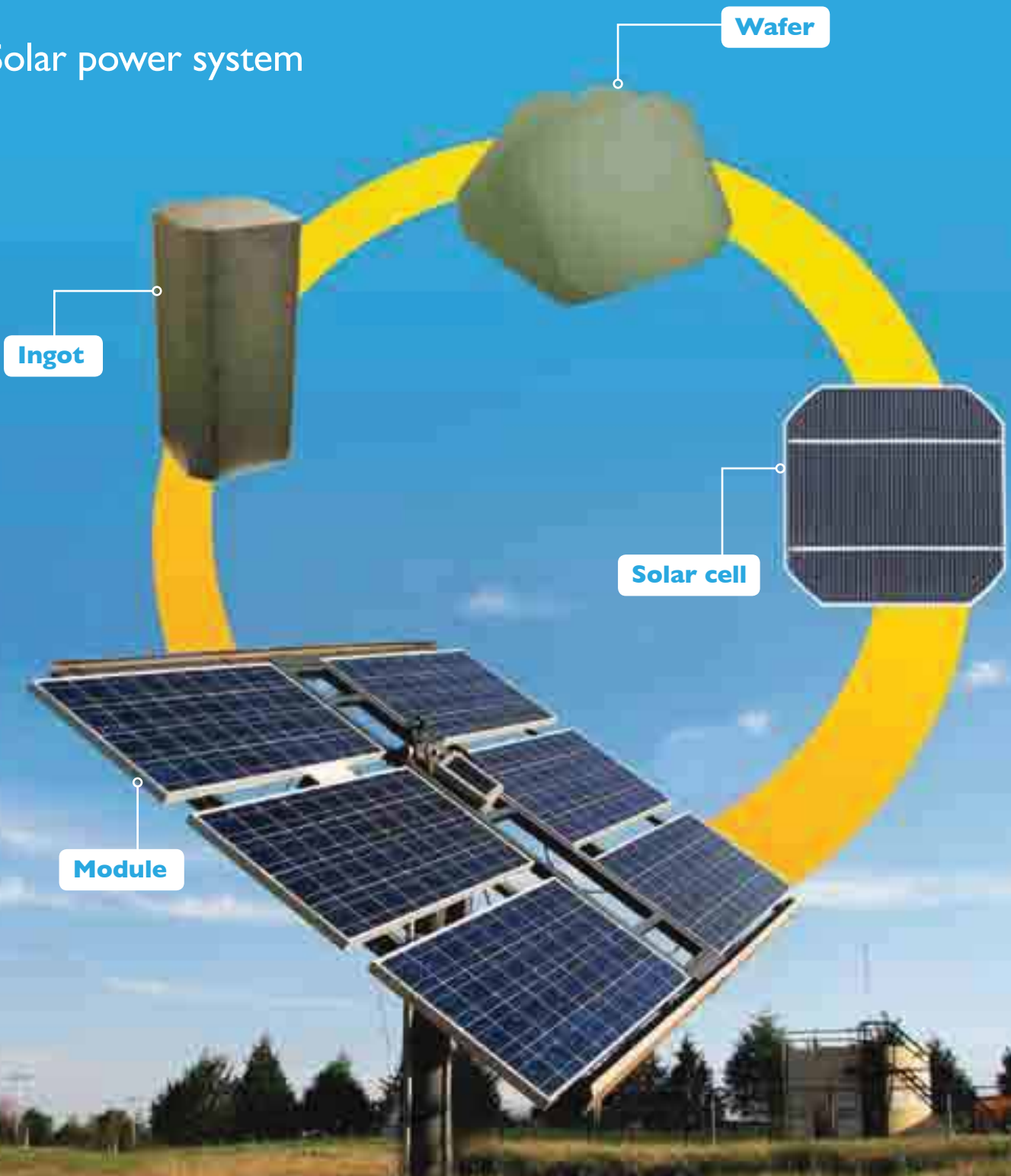




# Vertical Integration

ZNShine group has successfully developed into a leader in the PV industry based on its strong vertically integrated business model, producing its own ingots, wafers, cells and modules in-house. The control and efficiency achieved from this integrated value chain helps to continuously improve the production process as well as ensure high quality and cost-effective products.

## Solar power system



# Why choose ZNShine Solar?

## Solar power system

In order to make their products more competitive, ZNShine has established a strict quality control system. All products are tested using their advanced inspection equipment, ensuring that all the CE, IEC, TUV, UL standards are met.

Also in the past year, a UK-owned and managed Quality Control (QC) team was established and every detail in the manufacturing process is controlled.



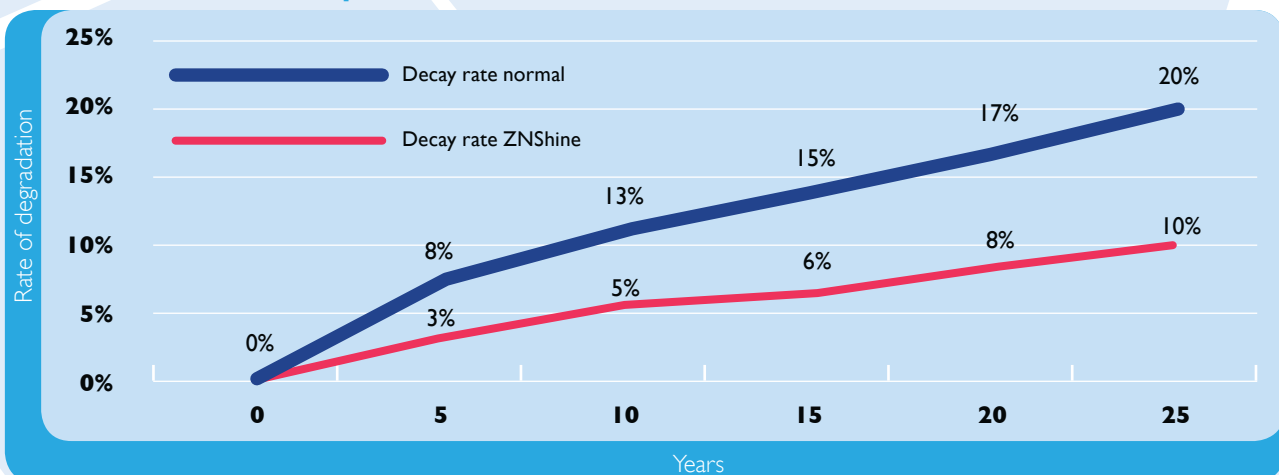
# ZNShine Solar Photovoltaic Modules

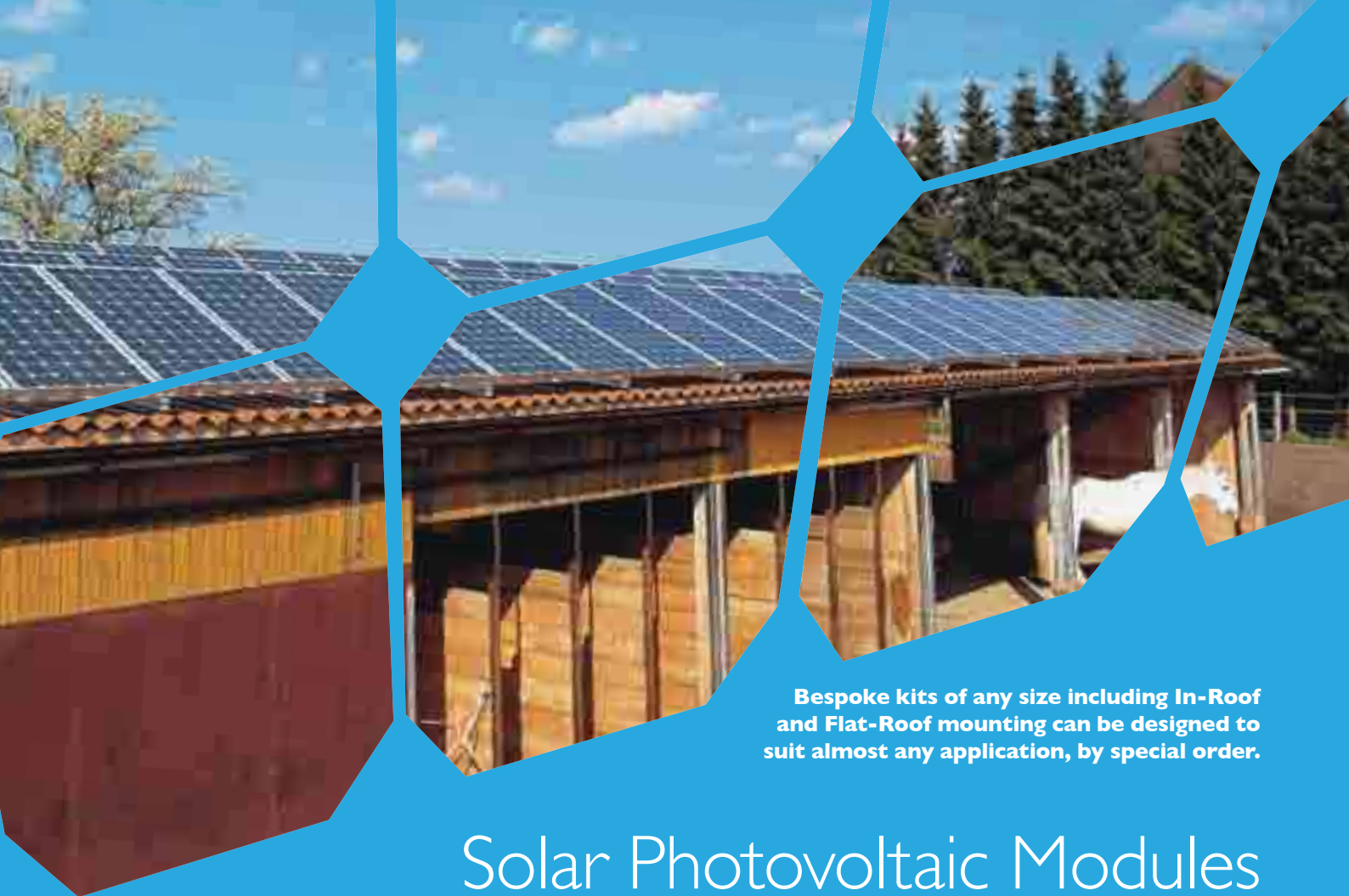


APPROVED PRODUCTS

- Power output is maximised through the highly efficient Gallium 'small angle' solar cells used.
- Low Iron Tempered Glass: The glass applied to the panels is designed to transmit power at a high rate and is coated with an anti-reflecting substance which increases panel efficiency.
- Waterproof Multi-function Junction Box with MC4 connectors.
- Long Lifespan:  $\geq 25$  years with 90% efficiency.
- Power Tolerance:  $\pm 3\%$
- Effective at resisting moisture and corrosion.
- Certificate issued by MCS, BBA, TUV, CE and IEC.

25 Year Performance Graph





Bespoke kits of any size including In-Roof and Flat-Roof mounting can be designed to suit almost any application, by special order.

# Solar Photovoltaic Modules

## Selection Chart

	<b>ZNSHINESOLAR ZX190(37)MS</b>	<b>ZNSHINESOLAR ZX195(37)MS</b>	<b>ZNSHINESOLAR ZX250(48)MS</b>
<b>Technology</b>	Monocrystalline	Monocrystalline	Monocrystalline
<b>Rated Output</b>	190W	195W	250W
<b>Output Tolerance</b>	+3%/-3%	+3%/-3%	+3%/-3%
<b>Module Efficiency</b>	14.90%	15.30%	14.70%
<b>Temperature Coefficient Power</b>	-0.4183%/Deg C	-0.4183%/Deg C	-0.4183%/Deg C
<b>Open Circuit Voltage (Voc)</b>	44.85v	45.21v	60.68
<b>Short Circuit Current (Isc)</b>	5.54A	5.56A	5.56A
<b>Output guarantee to 90%</b>	25 Years	25 Years	25 Years
<b>Output guarantee to 80%</b>	N/A	N/A	N/A
<b>Outer dimensions (L x W x H)</b>	1580 x 808 x 45mm	1580 x 808 x 45mm	1575 x 1082 x 45mm
<b>Weight</b>	16kg each	16kg each	21kg each
<b>WF Part Number</b>	W350515 (pack of 2)	W350516 (pack of 2)	W354199 (pack of 2)

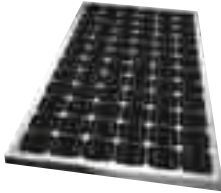


# Solar Photovoltaic Products

Make up your own bespoke kit

WF Part

## PV Panels



ZNShine 190W Monocrystalline ZX190(37)MS Gallium PV Module (Pack of 2)	<b>W350515</b>
ZNShine 195W Monocrystalline ZX195(37)MS Gallium PV Module (Pack of 2)	<b>W350516</b>
ZNShine 250W Monocrystalline ZX190(48)MS Gallium PV Module (Pack of 2)	<b>W354199</b>

## Rail



Schueco 3M Mounting Rail BPI30S 3.00m X 32mm X 50mm	<b>W318208</b>
Schueco 6M Mounting Rail BPI30S 6.00m X 32mm X 50mm	<b>W318209</b>

## Rail Fixing



Schueco One Turn End Retaining Clip 257321 Type 45 (Single)	<b>W350527</b>
Schueco One Turn Mid Retaining Clip 257322 Type 45 (Single)	<b>W350528</b>
Schueco Rail Connection Kit 257106 (Single)	<b>W318219</b>
Schueco Anti-Slip Device for PV Modules 221201 (Single)	<b>W321034</b>
Schueco Hexagonal Anti-Theft Device 259311 (Pack of 100)	<b>W321033</b>
Schueco One Turn Flat Roof Bracket 30.IDEG 256146 (Single)	<b>W321035</b>
Schueco Securing Cruciform 221207 (Single)	<b>W321036</b>
Schueco Cross Connector Kit 249743	<b>W321038</b>
Schueco M8 X 20mm Punching Screw 221585 (Single)	<b>W318220</b>

## Roof Fixing



Schueco A10 Single Roof Anchor Fixing (Slate)	<b>W318207</b>
Schueco 22 One Turn Fixing Bolts 18mm 257887 (Single) (For use with the above fixing)	<b>W318214</b>
Schueco A10 Single Roof Anchor Fixing (Plain)	<b>W318206</b>
Schueco 22 One Turn Fixing Bolts 18mm 257887 (Single) (For use with the above fixing)	<b>W318214</b>
Schueco A10 Single Roof Anchor Fixing (Pantile)	<b>W318205</b>
Schueco One Turn 18 Quick Clamp Connector with Socket Head (Single) (For use with above fixing)	<b>W321037</b>

## Tools



Schueco Solar MCT4 Crimping Tool	<b>W321728</b>
Schueco Solar MCT4 Installation Spanner (Pack of 2)	<b>W321729</b>
Multi Contact MC3 and MC4 Crimping Kit	<b>W318234</b>
Tyco Solar Lock Hand Crimping Tool	<b>W318237</b>
Solar Irradiance Meter	<b>W308693</b>
Schueco Solar T Handle Allen Key	<b>W321730</b>

## Generation Meters



Elster AI100C IPH KWH Meter 65A	<b>W271753</b>
Elster AI100 3PH KWH Meter 100A (Direct Connected)	<b>W293937</b>

## Isolator AC &amp; DC



AC

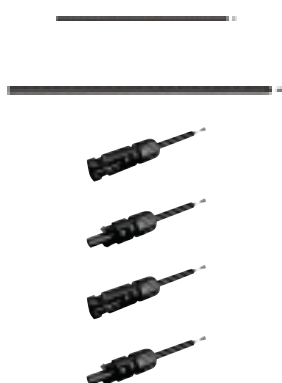
ALTO AL2808 20A 4Pole Insulated Enclosed Isolator Switch IP66	<b>W806105</b>
ALTO AL2809 32A 4Pole Insulated Enclosed Isolator Switch IP66	<b>W806106</b>



DC

Kraus & Naimer KG20BT106/D-P003 KL 11V 16A 650V 2Pole Isolator	<b>W302256</b>
Kraus & Naimer KG32BT106/D-P003 KL 11V 25A 650V 2Pole Isolator	<b>W302257</b>
Kraus & Naimer KG41BT106/D-P003 KL 11V 32A 650V 2Pole Isolator	<b>W302258</b>

## DC Cable &amp; Connectors



Solar Cable 4.0mm	<b>W311029</b>
Solar Cable 6.0mm	<b>W311030</b>
Multi Contact MC4 Solar Cable Male Coupler	<b>W318233</b>
Multi Contact MC4 Solar Cable Female Coupler	<b>W318232</b>
Tyco Solar Lock Male Connector	<b>W318235</b>
Tyco Solar Lock Female Connector	<b>W318236</b>

## Labels



Easyfix 2.1.7 Do Not Disconnect DC PLG/SKT Label 75x25mm (Pack 10)	<b>W308696</b>
Easyfix 2.1.12 PV Array DC Isolator Label 75x25mm (Pack of 10)	<b>W308697</b>
Easyfix 2.3.3 Inverter Isolate AC & DC Label 75x25mm (Pack of 10)	<b>W308698</b>
Easyfix 2.3.2 PV System Main AC SYS Isolator Label 75x25mm (Pack 10)	<b>W308699</b>
Easyfix 4.3 Warning Dual Supply/Isolate Both Mains 105x30mm (Pack 10)	<b>W308700</b>

# Schueco Clip Selection Chart

W # End Clip	W # Mid Clip	Manufacturer	Model
<b>W350527</b>	<b>W350528</b>	ZNShine	ZX All UK Models
		Phono Solar	PS240M-20/U
<b>W350523</b>	<b>W350524</b>	Phono Solar	PS190M-24/F
<b>W318217</b>	<b>W318218</b>	Schueco	I90MS & 215PS
<b>W318215</b>	<b>W318216</b>	Sharp	ND-175-EIF
			ND-210-EIF
			ND-220-EIF
			ND-E230-A2
			NU-180EI
			NU-185EI
			NU-E235-EI
		NU-E245-J5	
		Mitsubishi	PV-TD 185 MF5
			PV-TJ 225 GA6
Romag	SMT648P-175		
	SMT648P-180		
	SMT648P-185		
	SMT654P-200		
	SMT660P-220		
	SMT660P-225		
SMT660P-235			
<b>W342654</b>	<b>W342655</b>	BP Solar	BP323ON
			BP4175T
			BP4180T
		Dimplex	DXPVM230P6-30
		Schott	POLY230
			POLY235
		Yingli Solar	YLI75P23
			YLI75P23
YLI75P23			
Sungrid	SG260M6		
	SG215M6		
<b>W350517</b>	<b>W350522</b>	Sanyo	HIP215
<b>W350525</b>	<b>W350526</b>	Moser Baer	HIT240
			MBPV215
			MBPV220
			MBPV225
			MBPV230
MBPV235			

## Classic Inverters with Transformers

Universally applicable: the Sunny Boy inverters 1200, 1700, 2500 and 3000 are used in the most diverse AC grids thanks to their galvanic isolation. In addition, the devices are suitable for simple grounding of the generator. Their integrated ESS DC switch-disconnector makes installation simpler while also reducing assembly costs. Equipped with the OptiTrac MPP-tracking process, it will always find the best working point, even under dynamic weather conditions. In this way, it reliably converts solar energy into solar yield.

<b>W327159</b>	SMA SB 1200 500041-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W327156</b>	SMA SB 1700 500041-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W327158</b>	SMA SB 2500 500041-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W327160</b>	SMA SB 3000 500041-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W327161</b>	SMA SB 3300 500041-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W327162</b>	SMA SB 3800 500041-ENDE SOLAR INVERTER INC ESS GRID FEED



## New HF Inverters with Transformers

This is the new generation of galvanically isolated inverters – packed full of the latest SMA technology, the Sunny Boy HF series provides the highest yields for transformer inverters of this performance class. Installation is now easier than ever thanks to the DC connector system SUNCLIX, the plug-in generator grounding (optional), and an easily accessible configuration area – including easier mounting due to the reduced weight. The wide input voltage range from 175 to 700 V gives you extraordinary flexibility for your plant design, and the modern graphic display and wireless Bluetooth communication system make the devices highly user-friendly.

<b>W327163</b>	SMA SB 2000HF-30 0000-EN00 SOLAR INVERTER INC ESS GRID FEED
<b>W308744</b>	SMA SB 2500HF-30 0000-EN00 SOLAR INVERTER INC ESS GRID FEED
<b>W308741</b>	SMA SB 3000HF-30 0000-EN00 SOLAR INVERTER INC ESS GRID FEED



## Transformerless Inverters

More communicative, easier to use and more efficient than ever: this Sunny Boy is setting new standards in inverter technology. A modern graphic display, readout of daily values even after sunset, simplified installation concept and wireless communication via Bluetooth: The new Sunny Boys fulfil every wish. With the new OptiTrac Global Peak shade management and an optimal efficiency of 97 %, the inverters ensure optimum solar yield. As transformerless, multi-string devices, the Sunny Boy 4000TL and 5000TL provide maximum flexibility for plant design, and are the first choice for demanding generator designs.

<b>W308763</b>	SMA SB 4000TL-20 0004-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W308762</b>	SMA SB 5000TL-20 0004-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W308761</b>	SMA SMC 6000TL-10 500041-ENDE SOLAR INVERTER INC ESS GRID FEED
<b>W308760</b>	SMA SMC 7000TL-10 500041-ENDE SOLAR INVERTER INC ESS GRID FEED



## New Tripower Inverters 3Phase G59/2

Packed full of pioneering technology: thanks to the new Optiflex technology with two MPP inputs and its very broad input voltage range, the three-phase Sunny Tripower is suited to almost any module configuration. In addition, it is highly flexible in terms of the plant design – right up to the megawatt range. The Sunny Tripower meets all the requirements for reactive power supply, utility interaction management and grid support, thus making a reliable contribution to grid management. The extensive Optiprotect safety concept, with its self-learning string failure detection, electronic string fuse and integrable DC overvoltage protector Type II, ensures maximum availability.

<b>W344477</b>	SMA STPI7000-TL-10-0-08-0-GB-G59/2 TRIPOWER INVERTER 3PH
<b>W344478</b>	SMA STPI5000-TL-10-0-08-0-GB-G59/2 TRIPOWER INVERTER 3PH
<b>W344479</b>	SMA STPI2000-TL-10-0-08-0-GB-G59/2 TRIPOWER INVERTER 3PH
<b>W344480</b>	SMA STPI0000-TL-10-0-08-0-GB-G59/2 TRIPOWER INVERTER 3PH



## Communication Products

With the decision for a PV system, your customers also decide for a long-term source of income. This means that the system must function smoothly at all times. Our products for system monitoring offer you the widest range of possibilities: wireless or internet based, compact or complex, concise or elaborate. Regardless whether you want to monitor the yield of a home roof system or of an open-field solar power station. With us, you will find the perfect solution for every application.

<b>W321724</b>	SMA BLUETOOTH PIGGY BACK UNIT FOR SUNNYBEAM MONITOR/WEBBOX
<b>W327164</b>	SMA SUNNYBEAM BEAM-BT WIRELESS DISPLAY
<b>W327155</b>	SMA SUNNY WEBBOX ETHERNET COMMUNICATION RS485
<b>W345424</b>	SMA WEBBOX BLUETOOTH



## SMA Software

Whether data archiving, system presentation or system configuration - our software offers you many possibilities. It is suitable for all system sizes and is optimally aligned to other SMA components. At the design stage we value the greatest user friendliness. We gladly make our software available to you to download free of charge.

<b>FLASHVIEW IPHONE</b>	SMA FLASHVIEW FOR THE IPAD/IPHONE/IPOD TOUCH
<b>SOLARCHECKER</b>	SMA SOLARCHECKER FOR THE IPAD/IPHONE/IPOD TOUCH
<b>SUNNYDESIGN</b>	SMA SUNNY DESIGN SOFTWARE FOR WINDOWS
<b>SUNNY EXPLORER</b>	SMA SUNNY EXPLORER FOR WINDOWS
<b>FLASHVIEW</b>	SMA FLASHVIEW FOR WINDOWS



# Solar Photovoltaic Training

## Training

3 Day Solar PV Photovoltaic Installation Training Course

**Code: W279688**

### The Logic Certification PV course will cover the following:

- Solar Photovoltaic survey assessment
- SAP calculations
- G83/1 Grid connection requirements
- AC & DC electrical theory
- Basic roofing structures & integrity issues
- Hands-on PV Panel Mounting
- Mechanical installation of roof fixings
- Setting to work/commissioning
- System testing

### Duration

3 Days Course includes Logic certification fees, lunch and refreshments.

Further costs will be involved in gaining the actual MCS approval from your trade association. This course is aimed at either experienced electricians or solar PV installers intending to install Grid Connected Solar PV Systems. It covers the related regulations and standards, AC and DC theory, PV cell types, PV array types, system design and installation, commissioning, testing and fault finding.

This course is not intended to cover roof work or access work in detail. The assessment involves both written and practical tasks leading to a nationally recognised installer qualification.

***Important: It is a prerequisite that candidates are electrically qualified and are able to design, install, inspect and test a single phase electrical circuit in accordance with BS7671:2008 (the IEE Wiring Regulations 17th Edition).***

Course fees include all training and assessment materials for use during the course as well as all the course material and other useful industry documentation supplied on a CD in electronic format.

### Other products available

- Conduit
- Fireboards
- Cable ties
- MCB's
- Twin-Earth

**Request the ALTO catalogue**





# Solar Photovoltaic Design Service

## Introduction

Solar Systems can easily be 'retro-fitted' to existing properties, or you can take the opportunity to install a built-in solution if you are re-roofing, or building a new home.

We are now able to offer a unique custom design service for all Solar Photovoltaic systems, completely free of charge, for any household, or business in the UK.

With the use of the latest dynamic simulation software for the design and calculation of solar systems, we can not only size a system, but give very accurate measurements of the achievable solar gain, CO<sub>2</sub> reduction and fuel savings. Why not let us design a system for your specific requirements and we can even recommend an installer to carry out the job!

**For further information contact the  
WF Renewables Team on: 08457 353433**

## Your Opportunity to get involved in Photovoltaic Installations

With recent government announcements and implementation of the Feed In Tariff (FIT) solar photovoltaic has suddenly become a very sought after technology and is now commonly specified on both new build and retrofit.

The good news is that if you are working as an electrician you already have most of the skills and qualifications needed to install the systems and be registered onto the Microgeneration Certification Scheme (MCS). Customers who use an MCS certified installer will earn up to 41.3p for every kWh (or 'unit') they generate, even if they use it themselves, and even more if they export it to the grid.

Financial returns can vary because the electricity you use while your PV system is generating is free, on top of being paid for just generating it. Therefore each case will vary. A small scale retrofit system (<4kWp) is best rewarded (as per the table on page 4). Also

with the FIT rates guaranteed for 25 years and index linked to make the payments rise in line with inflation, the future returns are extremely attractive.

The Feed-in Tariff or "Clean Cash Back" rates are only available if PV is installed by an MCS approved contractor. The MCS is an independent scheme that certifies micro generation products and installers in accordance with consistent standards.

You can join the scheme through several different certification bodies such as the ECA or NICEIC.

As a first step WF is pleased to be able to help you as a contractor by facilitating a 3 day PV Installers course. The course covers everything a PV installer needs to become proficient in installing Photovoltaic systems and guidance on how to take the next step in gaining the all important MCS approval (this is not the MCS approval itself).

**BASILDON**

Tel: 01268 532558  
Fax: 01268 532559

**BASINGSTOKE**

Tel: 01256810211  
Fax: 012568 810231

**BLACKPOOL**

Tel: 01253 595000  
Fax: 01253 592222

**BRACKNELL**

Tel: 01344 428282  
Fax: 01344 861932

**BRIGHTON**

Tel: 01273 621511  
Fax: 01273 621481

**BURTON-ON-TRENT**

Tel: 01283 541621  
Fax: 01283 510382

**CAMBERLEY**

Tel: 01276 21101  
Fax: 01276 21048

**CAMBRIDGE**

Tel: 01223 413400  
Fax: 01223 246638

**CHELMSFORD**

Tel: 01245 494125  
Fax: 01245 494210

**CHICHESTER**

Tel: 01243 532525  
Fax: 01243 531444

**COLCHESTER**

Tel: 01206 577755  
Fax: 01206 577799

**COVENTRY**

Tel: 024 7643 1000  
Fax: 024 7644 2009

**DARTFORD**

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Fax: 01322 288519

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