BP SOLAR

SOLAR MODULES

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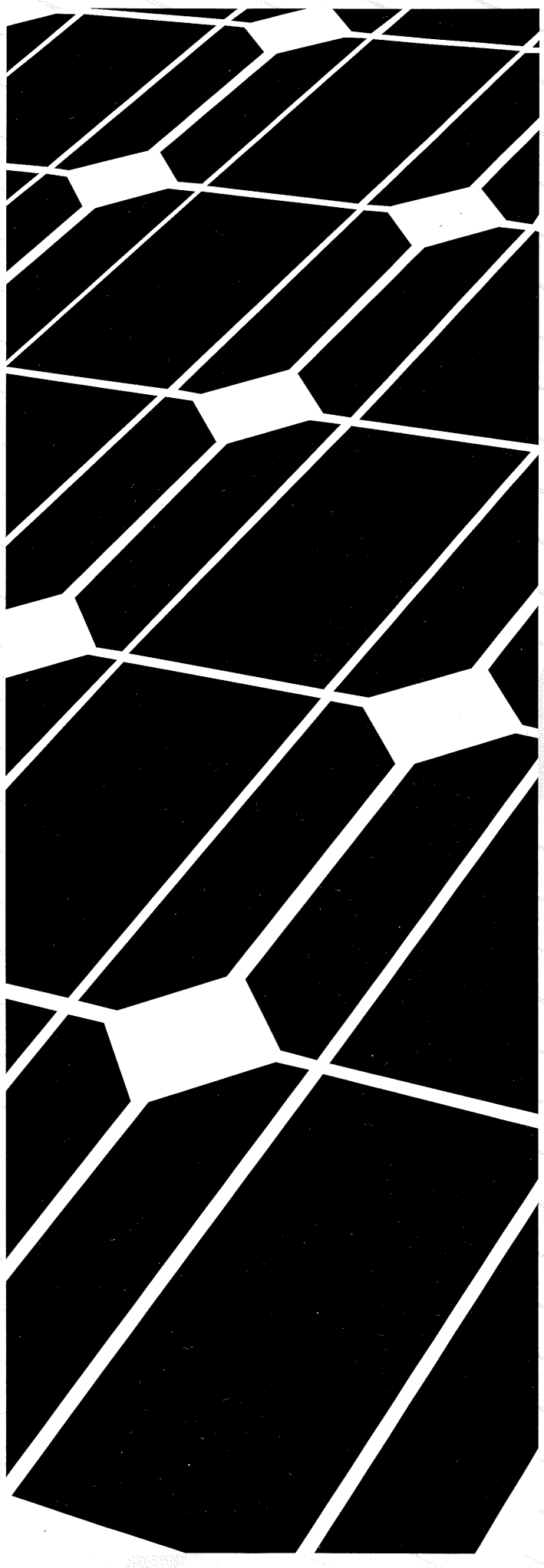
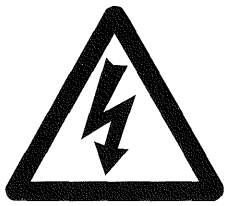


BP SOLAR MODULES: *HEALTH & SAFETY INFORMATION*

Before handling, wiring or using any BP Solar photovoltaic (PV) product please read the information and safety precautions.
If in doubt consult a competent, qualified electrician prior to attempting installation.

MODULE HANDLING AND USE:

A) ELECTRIC SHOCKS:



PV modules generate DC electrical energy when exposed to sunlight. Although single modules produce only a low voltage and current, shocks and burns are still a potential hazard. The shock hazard increases as modules are connected in series producing higher voltage and the burn hazard increases as modules are connected in parallel producing higher current.
PV modules can be made safe to work on by fully covering the front surface with a dense opaque material such as the carton or placing the module face down on a flat surface. A voltmeter can be used to verify that the output voltage is safe.
B) OTHER CONSIDERATIONS:

- Handle the modules with care. Damage can result from impacts to either front or rear surface.
- Do not bend PV modules.
- Do not disassemble PV modules. There are no user serviceable parts.
- This type of PV module is not designed to be used with light concentrators. The high temperatures associated with this type of equipment will damage the PV module.

ELECTRICAL CONNECTIONS:

Although there are regional variations electrical installations should in general comply with BS7671:1992 (IEC364) or other relevant national standard.

- Remove metallic jewellery from hands, wrists and neck.
- Use insulated tools
- Cables must be installed in specific order.

INTERCONNECTION TO FORM AN ARRAY:

- Construction of PV arrays must not be attempted in high winds. Care must be taken when lifting PV modules and structural members and in working at high levels. A useful reference is BS5531 (1988) Safety in Erecting Structural Frames, or equivalent.
- PV modules must be shaded during installation to prevent shock and burn hazards.
- Maximum system voltage with standard terminal block 600V. For further details contact BP Solar.

CONNECTION TO BATTERIES:
The most common application for PV modules is to recharge secondary cells (lead-acid or nickel-cadmium types). BP Solar recommend the use of a charge controller to prevent over charging of the battery cells and thus limit electrolyte loss, minimise the build up of explosive gases and extend battery life. Overcharging of sealed batteries can in some circumstances lead to explosion and thermal runaway.

- Follow the battery manufacturer's recommended safety precautions.
- Seek advice from your PV module supplier.
- The use of a blocking diode is recommended to prevent discharge of the battery through PV modules at night. This is usually only necessary if two or more modules are connected in parallel. Blocking diodes are frequently supplied with the system charge regulator.

CONNECTION TO A CHARGE CONTROLLER:
The following connection sequence should be observed. However, specific manufacturer's instructions should be followed:

- Connect the battery positive and negative cables to the charge controller first. Connect the battery positive and negative cables to the battery – check that the charge controller is operational in accordance with manufacturer's instructions. The charge controller may also require the connection of battery sense and temperature sense cables.
- Connect the PV array positive and negative cables to the PV array first, then connect the PV array positive and negative cables to the charge controller.

EARTHING AND LIGHTNING:
To make a PV system as safe as possible, all exposed metal (e.g. Charge Controller enclosure etc.) should be earthed. Earthing the equipment ensures that the system voltage cannot drift away from ground potential and thus reduces the risk of electric shocks. Adequate earthing provides a path for lightning induced fault currents.

PREVENTIVE MAINTENANCE:

- As a minimum requirement PV installations should be inspected annually. In particular check that all fixings and electrical connections are tight and corrosion free.
- Accumulated dust and dirt can be removed from the front surface of the PV module by washing gently with water and a detergent solution. Do not use solvents or abrasive cleaners on any part of the PV module.

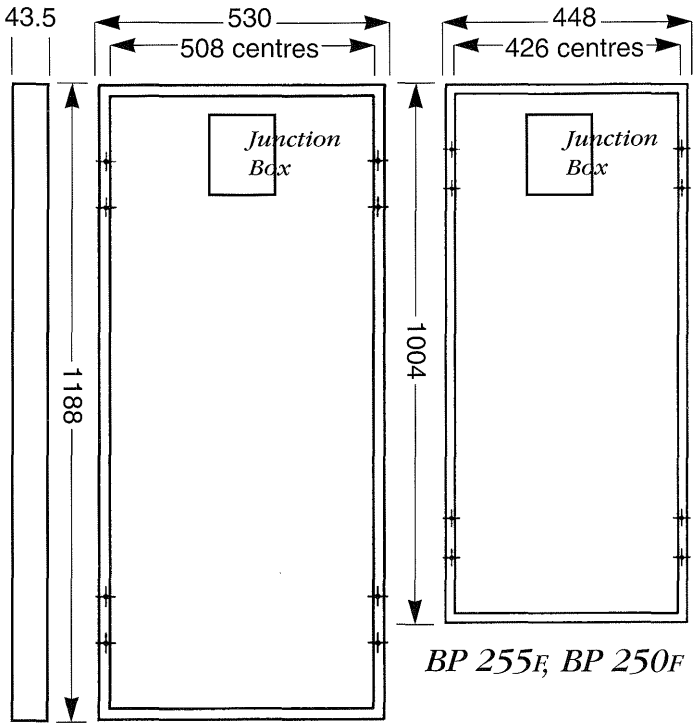
CERTIFICATION:

BP Solar PV Modules have been certified by the Commission of the European Communities Joint Research Centre at Ispra in Italy to comply with CEC503 specification. Approved by TÜV Rheinland Group for use as a Class II equipment, Schutzklasse II.

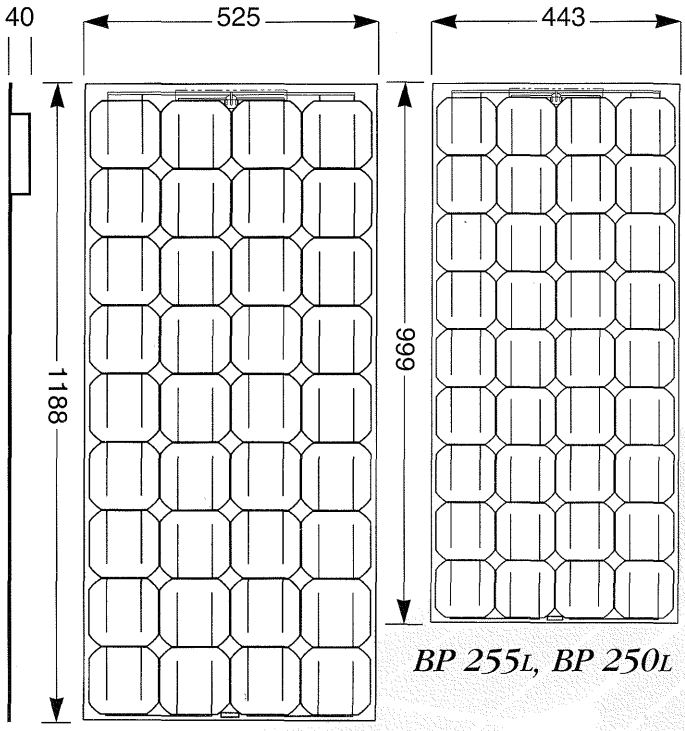
BP SOLAR MODULES: *TECHNICAL SPECIFICATIONS*

Framed Modules (F) DIMENSIONS Laminate Modules (L)

All dimensions in mm.



BP 255F, BP 250F



BP 255L, BP 250L

BP 590F, BP 585F, BP 580F, BP 275F, BP 270F

BP 590L, BP 585L, BP 580L, BP 275L, BP 270L

COMPONENTS

Glass: Toughened high transmission (92%) glass, 3mm thick.

Encapsulant: Ethylene Vinyl Acetate (EVA).

Frame: Anodised Aluminium (F Modules only).

Frame Seal: High Strength Bonding Tape.

Junction Box: glass filled polycarbonate, by-pass diode block fitted and 4 cable entry points (one open), standard in the following modules, BP 590F, BP 585F, BP580F, BP 275F, BP 270F, BP 255F, BP 250F, BP 590L, BP 585L, BP580L, BP 275L, BP 270L, BP 255L, BP 250L.

All BP Solar modules are measured under the Standard Industry Test Conditions, described in the Electrical Characteristics Section, each module is supplied against an agreed specification within a power tolerance band, normally minus 5 watts from the maximum peak power value. For further details on system sizing and module performance under field conditions anywhere in the world, contact BP Solar or their authorised Distribution Network.

ELECTRICAL SPECIFICATIONS

* = CE 503 approved F = framed module L = laminate module

Catalogue Number	Peak Power (W)	Self Regulating	Nominal Voltage (V)	Cell Number	Peak Voltage (V)	Peak Current (A)	Open Circuit Voltage (V)	Short Circuit Current (A)	Weight (kg)
BP 590F*	90	NO	12	36	18.5	4.86	22.30	5.20	7.5
BP 585F*	85	NO	12	36	18.0	4.72	22.03	5.00	7.5
BP 580F*	80	NO	12	36	18.0	4.44	22.03	4.70	7.5
BP 275F*	75	NO	12	36	17.0	4.45	21.40	4.75	7.5
BP 270F*	70	NO	12	36	17.0	4.16	21.40	4.48	7.5
BP 255F*	55	NO	12	36	17.0	3.23	21.20	3.54	5.6
BP 250F*	50	NO	12	36	17.0	2.94	21.20	3.22	5.6
BP 590L	90	NO	12	36	18.5	4.86	22.30	5.20	5.5
BP 585L	85	NO	12	36	18.0	4.72	22.03	5.00	5.5
BP 580L	80	NO	12	36	18.0	4.44	22.03	4.70	5.5
BP 275L	75	NO	12	36	17.0	4.45	21.40	4.75	5.5
BP 270L	70	NO	12	36	17.0	4.16	21.40	4.48	5.5
BP 255L	55	NO	12	36	17.0	3.23	21.20	3.54	4.0
BP 250L	50	NO	12	36	17.0	2.94	21.20	3.22	4.0

BP SOLAR MODULES: *ELECTRICAL CHARACTERISTICS*

POWER SPECIFICATIONS

All performance specifications given are as measured at the standard test conditions.

Standard Test Conditions

Description	Parameter	Value
Intensity of illumination	Insolation (W/m^2)	1000
Spectral Density	Air Mass (AM)	1.5
Operating Temperature	Cell Temperature (°C)	25

Description of performance parameters

P max	Maximum power of a module. The point on the curve curve where the IV product is a maximum (W)
V_{mp}	Voltage at the maximum power point (V)
I_{mp}	Current at the maximum power point (A)
I_{sc}	The short circuit current of a PV module (A)
V_{oc}	The open circuit voltage of a PV module (V)
P_{min}	Minimum guaranteed power of a module (W)

Tolerance – Minimum power, the peak power of all high power modules is normally supplied within minus 5W actual of the nominal value, for further details contact BP Solar.

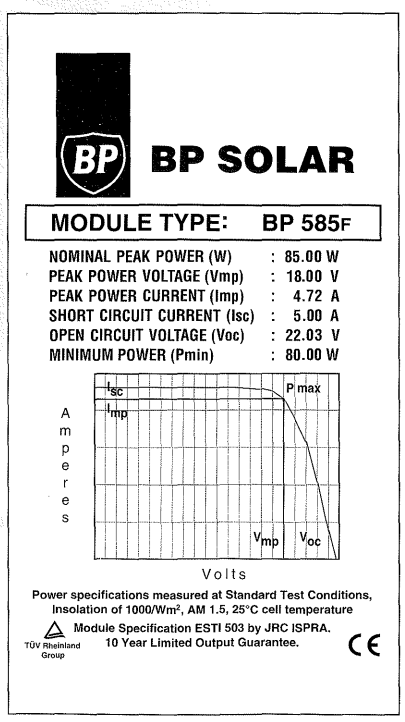
CEC APPROVAL SPECIFICATION NO. 503

BP Solar modules have been tested and qualified to the Commission of European Communities specification number 503 at the CEC Joint Research Centre in Ispra, Italy. The qualification tests are designed to demonstrate the module's suitability for use in field conditions. Modules are designed to last at least 20 years, and guaranteed for 10 years.

- 200 thermal cycles from -40°C to 85°C.
- 10 humidity/freeze cycles from 85°C at 85% relative humidity to -40°C.
- Ice ball impact test.
- Ultra violet exposure.
- Outdoor exposure.
- Damp heat.
- Hot spot endurance (to simulate partial shading).
- Mechanical endurance, to simulate wind loads of up to 225km/h.

Power specifications are measured at Industry Standard Test Conditions. For further information on module performance contact BP Solar.

Rear Module Label



36 CELL MODULES

To boost charge a nominally 12 volt standard flooded lead acid battery the terminal voltage must be taken to a high voltage typically 15 volts at 20°C. At this voltage the battery will be gassed sufficiently to remove stratification and to ensure cell equalisation. In some applications it is necessary to ensure that the boost voltage is reached as quickly as possible even at high temperatures. To ensure that this happens most modules are manufactured with 36 silicon solar cells connected in series which will yield approximately 17-19 volts at the maximum power point. The additional 2.0 volts are required to overcome cabling and blocking diode losses. However, systems, using 36 cell modules must be equipped with a charge controller to ensure that the batteries are not over charged during periods of surplus energy.

TYPICAL PROFESSIONAL AND DOMESTIC APPLICATIONS

GRID CONNECT

Rain-screen Façades
Sun-shade & Balcony products
Roof and Atria Products
Domestic/Residential Roof Products
Multi-Kilowatt and Megawatt Power Stations
Generator-type Power for centralised locations.

TELECOMS

Microwave Repeaters and Terminals
VHF/UHF Radio Systems and Repeaters
Mobile Radio Systems
HF/SSB Radio Transceivers
TV Transmitters
Radio Telephones & Telemetry.
Radio Navigational Aids
Fibre Optic Repeaters
Miscellaneous Packages DC Loads

RURAL INFRASTRUCTURE

Community/Village Water Pumping
Community/Village Water Purification
Community/Village Refrigeration, Medical and Domestic
Community/Village Lighting
Community/Village Television & Video
Individual House Power
Community/Village Power

SPECIALIST

Cathodic Protection
Aircraft Obstruction Lighting
Lighthouse Lighting Systems
Racon Systems
Beacon Buoy LIghting Systems
Fog Warning Systems

BP SOLAR MODULES: *MECHANICAL INSTALLATION*

1. For maximum module performance, where possible face the module towards the equator (i.e. due south in the northern hemisphere or due north in the southern hemisphere) witihin 10 degrees of the equator the module can face either pole without any reduction of performance.
2. Ensure an unshaded location throughout the year and select a tilt angle from the table. Detailed system design reports with performance simulations at optimum tilt angles are generally available from BP Solar or their Distribution network.

LATITUDE	TILT ANGLE	LATITUDE	TILT ANGLE
0 - 10°	0 - 10°	41 - 45°	56 - 60°
11 - 15°	26 - 30°	46 - 50°	61 - 65°
16 - 20°	31 - 35°	51 - 55°	66 - 70°
21 - 25°	36 - 40°	56 - 60°	71 - 75°
26 - 30°	41 - 45°	61 - 65°	76 - 80°
31 - 35°	46 - 50°	66 - 70°	81 - 85°
36 - 40°	51 - 55°	71 - 75°	86 - 90°

MECHANICAL LOADING

The module is capable of withstanding uniformly-distributed loads of up to 2400 Pa applied to the front or back surfaces. This corresponds to a maximum simulated windspeed gust of 225 km/h (62.5 m/sec) with a safety factor of 3.

Any design of support structure for the modules should utilise an appropriate code of practice in order to calculate wind loadings since these codes take edge effects into account.

MOUNTING ARRANGEMENTS

Holes are provided in the frame of the module for mounting purposes. M5 fasteners (stainless steel) should be used since the frame incorporates a channel which holds an M5 hex nut captive.

The module should be mounted so that no corner is displaced from the plane of the other 3 corners by more than 5mm. For details on mounting module laminates contact BP Solar.

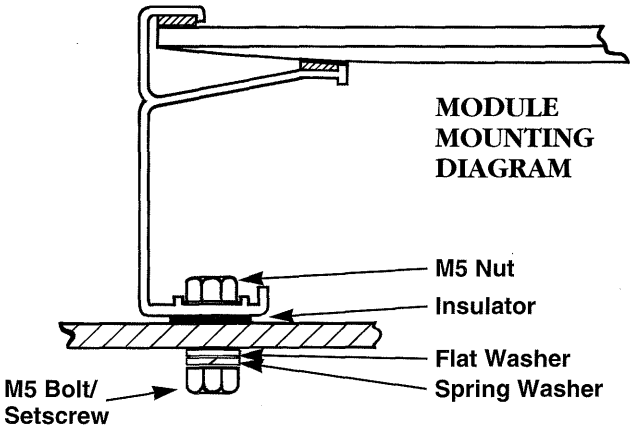
USING M5 FASTENERS

Secure the module as shown, using at least four of the 6mm mounting holes on each module. A PVC spacer or stainless steel washer is recommended when modules are to be mounted on metal (non aluminium) frames to prevent corrosion from dissimilar metals.

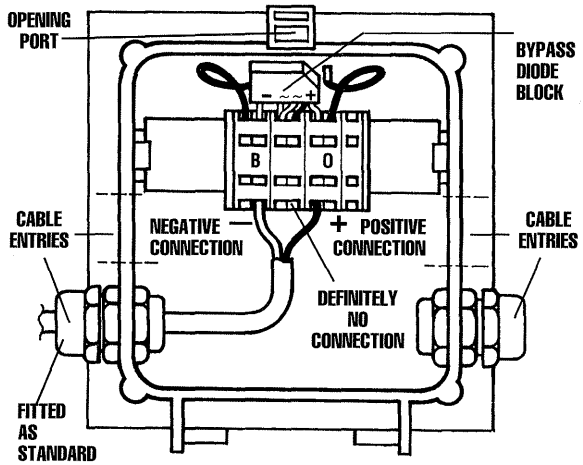
ELECTRICAL INSTALLATION

1. Completely cover the cells of the module with an opaque material (such as the carton).
2. Cut and strip the cables as required.
3. Open the lid with a screwdriver to reveal the terminal connector.
4. If a second cable entry is required punch out the second entry in the box by placing a screwdriver in the groove and then knock out the plastic circle. Fit the second gland and tighten the nut.
5. Push the cable(s) through the gland(s) and using a suitable screwdriver make the connection as required. Two M20 cable glands supplied as standard.
6. Tighten the cable gland(s) to secure the cable(s) and close the junction box (screw kit optional).

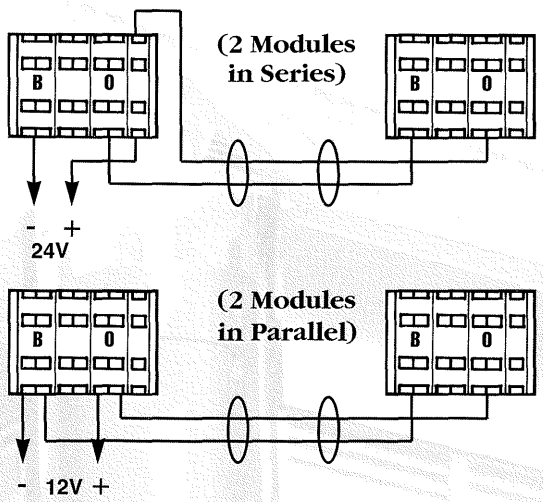
This type of junction box is now standard equipment on the following modules: BP 590F, BP 585F, BP 580F, BP 275F, BP 270F, BP 255F, BP 250F, BP 590L, BP 585L, BP 580L, BP 275L, BP 270L, BP 255L, BP 250L.

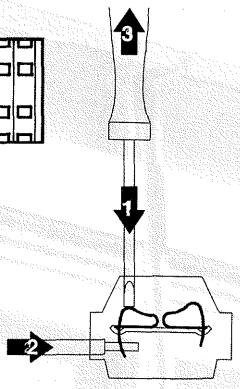


MODULE JUNCTION BOX



TERMINAL COLOURS: B = BLUE (NEGATIVE) O = ORANGE (POSITIVE)
FOR BLOCKING DIODE CONNECTION CONTACT BP SOLAR





1. Insert electrical screwdriver as illustrated to open the required connection.
2. Insert cable into opened connection.
3. Release screwdriver to close and secure connection.

BP SOLAR MODULES: *INTERNATIONAL WARRANTY TERMS*

GENERAL WARRANTY TERMS

Equipment supplied by BP Solar will be warranted for a period of one (1) year from the date of sale to the original consumer purchaser against defects resulting from faulty workmanship and/or materials, when such equipment is installed and used under normal conditions.

BP Solar's solar modules are warranted for a period of ten (10) years from the date of sale to the original consumer purchaser against degradation in excess of ten (10) per cent of the minimum power output measured at an optimum voltage under the standard conditions of 100W/cm² at a cell temperature of 25°C. BP Solar warrant to replace this lost power provided such degradation is determined to be due to faulty workmanship or materilas.

Faulty material is to be returned, freight prepaid and accompanied by a copy of the original invoice, to the point of sale or a nominated company location for either repair or replacement as warranted.

CONDICIONES PARA LA GARANTIA EN GENERAL

Todo el equipo suministrado por BP Solar está garantizado por un periodo de un (1) año desde la fecha de venta al comprador consumidor original contra defectos que ocurran debido a manó de obra y/o materiales defectuosos, siempre y cuando dicho equipo esté instalado y utilizado bajo condiciones normales.

Los Módulos solares de BP Solar se garantizan por un periodo de diez (10) años desde la fecha de venta al comprador o consumidor original contra una degradación mayor del diez (10) por ciento de la minima potencia de salida medida a un voltaje óptimo bajo las condiciones estándar de 100mW/cm² a una temperatura de célula de 25°C. BP Solar garantiza el reemplazo de la energia perdida siempre y cuando se determine que tal degradación ha occurido debido a una mano de obra o materilaes defectuosos.

Todo material defectuoso se debe devolver, con transporte prepagado y debe ser enviado, con una copia de la factura original, al punto de venta o a un lugar denominado por la compañia ya sea para reparalarlo o para reempazarlo tal como se garantiza.

TERMES GENERAUX DE LA GARANTIE

L'équipement fourni par BP Solar sera garanti pendant une période de un (1) an à partir de la date de vente à l'achetur consommateur, contre tout défaut résultant d'une faute de fabrication et/ou de matériau utilisé, quand un tel équipement est installé et utilisé dans des conditions normales.

Les modules BP Solar sont garantis pendant une période de dix (10) ans á partir de la date de vente à l'acheteur consommateur, contre une dégradation dépassant dix (10) pour cent de la production d'énergie minimum mesurée sous tension optimale et dans les conditions standard d'une batterie de 100mW/cm² avec une température d'élément de 25°C. BP Solar garantit le remplacement de cette énergie perdue à condition qu'il soit prouvé qu'une telle dégradation soit due à un defaut de fabrication ou de matériaux.

Le matériel défectueux doit être renvoyé, livraison prépayé et accompagnée d'une copie de la facture d'origine, au point de vente ou à une adresse de compagnie désignée, soit en vue d'une réparation, soit en vue d'un remplacement, selon la garantie.

ALLGEMEINE GARANTIEBEDINGUNGEN

Für von BP Solar gelieferte Anlagen wird eine Garantie von einem (1) Jahr ab dem Zeitpunkt des Verkaufs an den ursprünglichen Verbraucher und Käufer für Mängel aufgrund von Fertigungs und/oder materialfehlern übernommen, wenn diese Anlagen unter normalen Bedingungen installiert und eingesetz werden.

Für die Solarmodule von BP Solar wird eine Garantie von zehn (10) Jahren ab dem Zeitpunkt des Verkaufs an den ursprünglichen Verbraucher und Käufer hinsichtlich einer Verschlechterung der Mindestleist-ungsabgabe von über zehn (10) Prozent, gemessen bei einer optimalen Spannung unter den Standardbedingungen von 100mW/cm²C, bei einer Zellentemperatur von 25°C, übernommen, BP Solar garantiert, daß eine derartige Verslechterung auf Fertigungs oder Materialfehler zurückzuführen ist.

Fehlerhaftes Material ist Fracht vorausbezahlt und mit eine Kopie der Originalrechnung an die Verkaufsstelle oder an ein Vertragsunternehmen zur Reparatur oder zum Ersatz entsprechend der Garantie zurückzuschicken.

TERMINI GENERALI DI GARANZIA

Gli apparecchi forniti dall BP Solar saranno garantiti per un periodo di un (1) anno dalla data di vendita all'acquirente consumatore originale, contro i difette risultanti da esecuzione e/o da materiali difettosi, purché tali apparecchi siano installati ed usati in delle condizioni normali.

I moduli solari della BP Solar sono garantiti per un periodo de dieci (10) anni dalla data di vendita, all'acquirente consumatore originale, contro la degradazione di oltre diecci (10) per cento dell'erogazione minima di poteza, misurata ad una tensionè otiimale in conformità alle condizioni standard di 100mW/mq., ad una temeratura di cellula di 25°C. La BP Solar garantisce la sostituzione della potenza persa, purché sia determinato che tale degaradazione sia stato causato da esecuzione o materiali difettosi.

Il materiale difettoso dev'essere restituito, nolo non assegnato, ed accompagnato da una copia della fattura originale, al punto vendita o in un luogo nominato della società, o per riparazione o per sostituzione secondo la garanzia.

ALLMANNA GARANTIBESTAMMELSER

Utrustning leverad av BP Solar har en garantitid på ett (1) år från försäljningsdatum till ursprunglig köpare, mot felaktgheter härrörande från bristfälligt utförande och/eller materiel, då sådan utrustning installerats och använts under normala förhållanden.

BP Solars solmoduler har en garantitid på tio (10) år från försäljningsdatum till ursprunglig köpare, mot en nedsättning överstigande tio (10) procent av minsta möjliga energiutveckling, uppmätt yid optimal spänning enligt följande normalförhållanden på 100mW/cm² samt en celltemperatur pA 25°C. BP Solar garanterar att ersätta sådan förlorade energi, förutsatt att nedsättningen bedöms bero på bristfälligt utförande eller materiel.

Bristfälligt materiel skall efter förskottsbetalning av faktura, återsändas till försäljningsställe eller till annan utsedd plats för berättigad reparation eller ersättning.

SYARAT-SYARAT JAMINAN AM

Peralatan yang dibekalkan oleh BP Solar dijamin selama satu (1) tahun dari tarikh jualan kepada pengguna asal dari kecacatan pembuatan dan/atau bahan dengan syarat peralatan tersebut dipasang dan diguna dalam keadaan biasa.

Modul suria (Solar Modules) dari BP Solar adalah dijamin selama sepuluh (10) tahun dari tarikh jualan kepada pengguna asal dari kemerosotan tahap minima pengeluaran kuasa elektrik yang melebihi sepuluh (10) peratus apabila diukur pada kadar voltan optima dalam keadaan tetap 100mW/cm² pada suhu sel 25°C. BP Solar memberi jaminan akan mengganti kuasa yang hilang dengan syarat kemerosotan tersebut terbukti disebabkan oleh kecacatan pembuatan atau bahan.

Barangan cacat mestilah dipulangkan, dengan kos penghantaran dibiayai oleh pengguna, berserta sesalinan inbois asal, ke pusat jualannya atau tempat syarikat yang terpilih untuk kerja membaik-pulih atau diganti seperti yang dijamin.

The above warranty terms apply to the following standard catalogue products: BP 590F ,BP 585F, BP 580F, BP 275F, BP 270F, BP 255F, BP 250F, BP 590L, BP 585L, BP 580L, BP 275L, BP 270L, BP 255L, BP 250L. For further details of the International Warranty Procedure contact the original point of sale or a nominal BP Solar location.

WARRANTY LIMITATION

BP Solar shall not be liable to replace or repair the modules in accordance with this warranty if the serial or identification number has been altered, defaced or removed, or if the goods are not properly installed and maintained in accordance with BP Solar's recommendations or if the goods have been subject to misuse, replacement, modification or repair other than in accordance with BP Solar's written instructions. This warranty shall only apply to the original consumer purchaser of the module.

Indirect Loss – BP Solar shall not be liable in any way whatsoever for any indirect, incidental or consequential loss or loss of profit arising out of or in relation to this product warranty. This does not affect the consumers statuatory rights.

As part of our policy of continuous improvement BP Solar reserves the right to change products specifications at any time without prior notice.

The above warranty applies to modules in terrestrial land based applications.

BP SOLAR

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